WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

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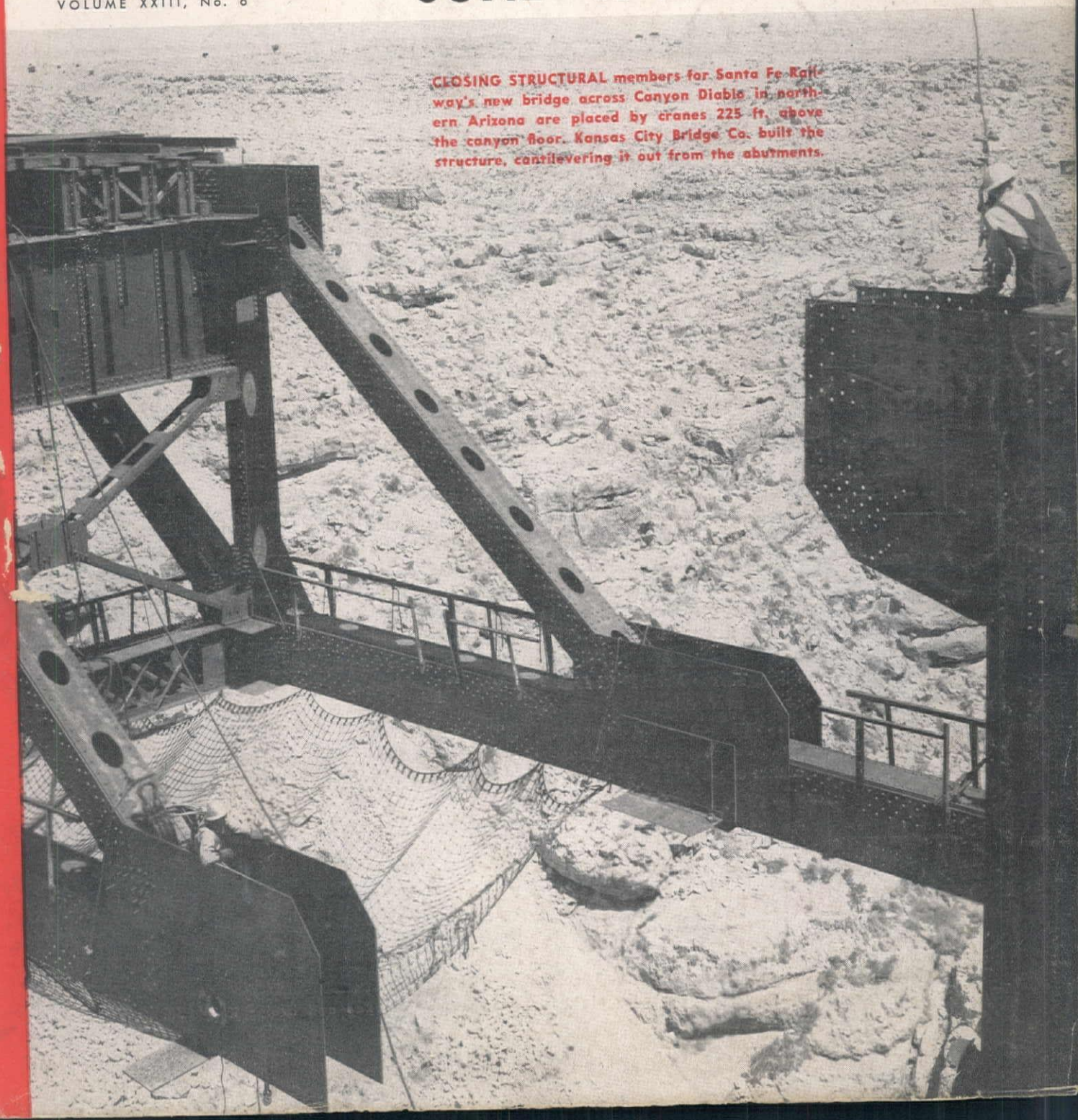

CLOSING STRUCTURAL members for Santa Fe Railway's new bridge across Canyon Diablo in northern Arizona are placed by cranes 225 ft. above the canyon floor. Kansas City Bridge Co. built the structure, cantilevering it out from the abutments.

PROTECT YOUR DRILLS AGAINST RUST AND WEAR

Texaco Rock Drill Lubricants EP help you drill more footage at lower cost

TEXACO *Rock Drill Lubricants EP* are "extreme pressure" lubricants, made to protect moving parts under the most severe conditions . . . and to prevent the formation of rust whether your drills are running or idle.

For added protection, *Texaco Rock Drill Lubricants EP* are made to stay fluid at low temperatures . . . to resist washoff . . . to keep parts free of gum and carbon formations. Drill doctors everywhere say they're the best assurance of trouble-free operation, longer drill life, lower maintenance costs.

Texaco Rock Drill Lubricants EP meet the specifications of leading rock drill manufacturers. Use the viscosities recommended for your particular drills and operating conditions.

To assure efficient compressor operation . . . to keep valves clean, rings free and air lines clear . . . use the recommended *Texaco Cetus, Alcaid or Algol Oil.*

A Texaco Lubrication Engineer will gladly advise you. Just call the nearest of the more than 2500 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

NEW! "Lubrication of Air Drills and Compressors" — a profusely illustrated, 32-page book describing in great detail the lubrication requirements of air compressors and air drills. Send for your free copy today.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Tune in . . . Texaco Star Theatre every Wednesday night featuring Gordon MacRae and Evelyn Knight . . . ABC Network

THE KEY TO PROFIT

You can't afford anything but the best for the heart of the job!

A power shovel is a major tool — a *Key Machine!* It is the equipment that *earns the money* on your earth-moving or rock jobs. If your shovel is "down" your job is "down". It can be a colossal headache to you — or the key to profit!

There is a lot more to consider than the price you pay when you buy a major tool of this kind. Northwest has combined design and materials that have demonstrated their higher quality in superior performance, higher output and reduced "down time". Northwest construction and advantages are recognized as the best in equipment.

This statement can be checked! One out of every three Northwests sold is a repeat order with a responsible customer. Ask Northwest owners — Northwest repeat buyers!

You can't afford anything but the best for those *Key Machine* spots at the heart of the job. Plan now to have Northwest equipment. "Follow the Northwest Crowd."

NORTHWEST ENGINEERING CO.
135 South LaSalle Street
Chicago 3, Illinois

local NORTHWEST sales agents

DENVER, COLORADO The Mine & Smelter Supply Co.	BUTTE, MONTANA Hall-Perry Machinery Co.		SALT LAKE CITY, UTAH Arnold Machinery Co., Inc.
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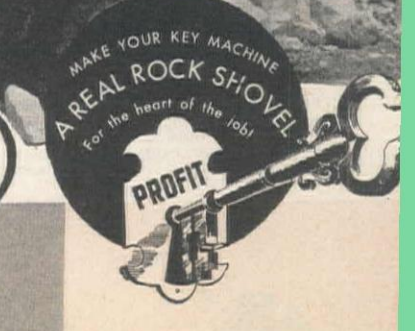
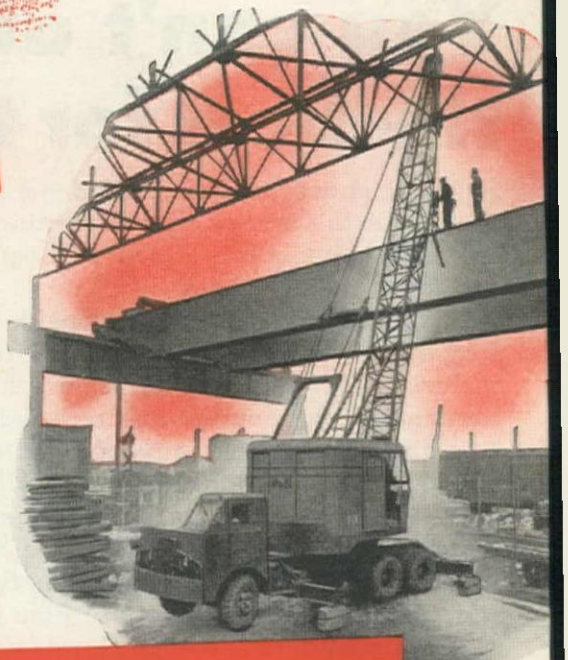
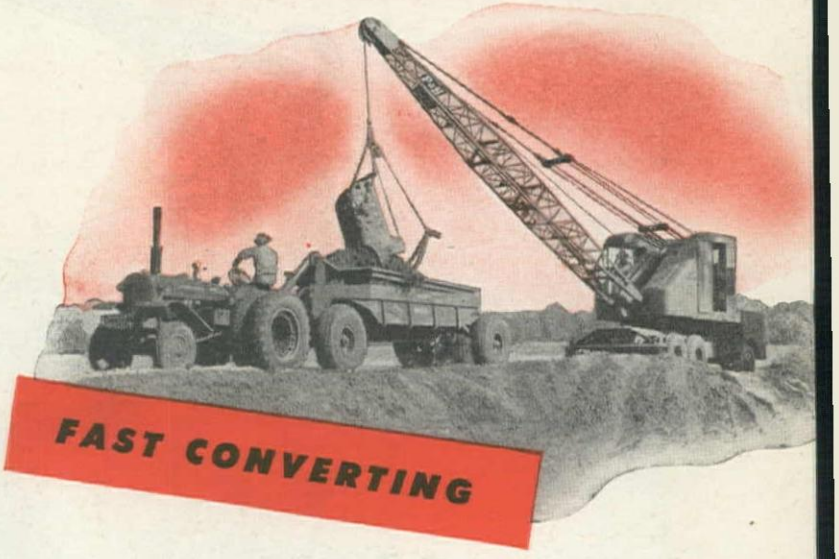


FAST TRAVELING . . .



FAST WORKING . . .

ALL THIS IN ONE MACHINE!



FAST CONVERTING

If you are looking for a *real* profit machine — here's your answer! For in the new P&H Truck Crane is a greater measure of everything that counts — mobility, work-ability, *convertibility!*

HERE'S WHY! P&H Truck Cranes are *dual powered.* For travel, there's an engine *built* for travel alone. You drive from job to job in fast time at regular highway speeds. For work, you have another engine — power that's *right* for doing this job faster, cutting costs.

A P&H Truck Crane also gives you the service of *six* machines—crane, shovel, clamshell, dragline, trench hoe and pile driver. Conversion is simple and fast — can be done in the field. Send for the facts now!

P&H Added Values Mean Added Profits!

- Hydraulic control — a new peak in operating ease and safety
- Greater stability—with exclusive torsion bar-mounted front axle and lower center of gravity
- Independent planetary boom hoist — raises or lowers crane boom smoothly and safely, with or without load
- Planetary load lowering — permits "inching" of loads accurately
- All-welded construction — greater strength

Size for Size, No P&H Truck Crane Has Even Been Outlifted

REMOTE CONTROL AVAILABLE

With this unit you can control all carrier functions (even the horn!) by electric push-buttons — from the operator's position inside the crane cab.

P&H

TRUCK CRANES
4490 W. National Ave.,
Milwaukee 14, Wis.

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EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

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WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

Volume 23 | JUNE • 1948 | Number 6

TABLE OF CONTENTS

Covering the Western Half of the National Construction Field

NOW YOU CAN MOVE

Sensational Price Reduction of LaPlant-Choate Motor Scrapers Cuts Earthmoving Costs Again!!

Here's your opportunity to really make money on earthmoving jobs. At this new low price, LaPlant-Choate Motor Scrapers can compete successfully with track-type tractor-scraper units on hauls of 400 feet and up, and are way ahead of other rubber-tired scraper hauling units at any distance. Look at all the features—in addition to new low first cost—that mean you can bid lower and still make a good profit. More yards per trip—more trips per hour—because of:

MORE POWER—225 h.p. Buda Diesel engine provides over 16 h.p. per struck yard of capacity—plenty of "zip" up and down grades in any material.

BIG TIRES—21:00 x 29 20-ply rating, tapered bead, traction-type tires interchangeable front and rear provide ample flotation and traction.

HYDRAULIC STEERING—Positive, double-acting, effortless steering. No jackknifing—no "nosing" or "hunting". No road shock thru steering wheel.

4-WHEEL AIR BRAKES—350 sq. in. of braking surface on each wheel. Safer, surer stopping.

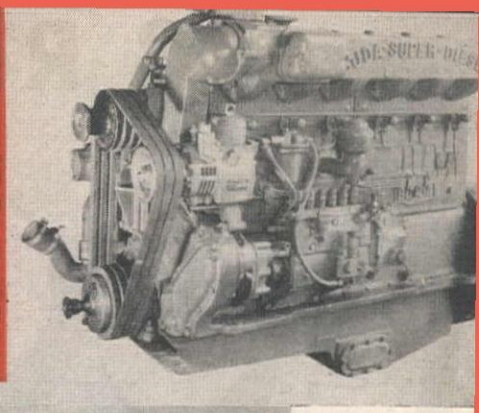
MODERN POSTWAR SCRAPER—14 yd. struck capacity—17.5 yd. heaped capacity LPC scraper embodies all the latest improvements for faster, easier loading, hauling and spreading and definite lower yardage costs.

LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Avenue, Oakland, California.

LAPLANT-CHOATE

HIGH SPEED EARTHMOVING EQUIPMENT

DIRT *at still lower cost!!!*



16 h.p. per str yd. for highe speeds

Hydraulic steering for positive control

Big 4-wheel brakes for extra safety

Big tires for more flotation and traction

Your nearest LPC distributor will give you the latest information on deliveries. Contact him today!

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INDUSTRIAL EQUIPMENT COMPANY OF ARIZONA
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PHOENIX, ARIZONA

'48 Road Show • Soldier

EUCLID will be there in

Don't miss the biggest Road Show in history—you'll see the largest display of construction equipment ever assembled.

A pioneer in the development of off-the-highway hauling equipment, Euclid continues to lead the field and will be one of the largest exhibitors. Many new and improved models will be shown for the first time. In all, there'll be 24 Euclid units with payload capacities up to 40 tons—several cutaway units will be of special interest. Hauling equipment specialists will be on hand to provide technical information and discuss your construction problems.

There'll be plenty of comfortable shaded seats, so make the Euclid exhibit your headquarters and meet your friends there.

MANY NEW MODELS on display for the first time

22 RAILROAD CARS OF EQUIPMENT

The largest display of off-the-highway hauling equipment

BOTTOM-DUMPS • REAR-DUMPS • SIDE-DUMPS • LOADERS

EUCLID THE PIONEER

EUCLIDS

Field·Chicago • July 16-24

a BIG WAY!

SEE THE MOST COMPLETE LINE OF MODERN OFF-THE-HIGHWAY HAULING EQUIPMENT.

24 Models
Payload Capacities
up to 40 tons

THE EUCLID ROAD MACHINERY CO., Cleveland 17, Ohio

Move the Earth

TOURNADOZERS

"TRACTORS WITH LUGS PROHIBITED", is a road sign you can ***forget*** when you own a rubber-tired Tournadozer. This rig rolls easily over any surface . . . concrete pavement, macadam, black-top, gravel, sidewalks, plant floors . . . ***anywhere***, without surface damage. Tournadozer can cross rails, curbs or driveways without planking . . . drive swiftly to ***any*** job without the expense and delay of securing a flat bed hauling unit.

½ Mile is only 2 minutes away

The Tournadozer's ability to make self-powered moves at 15 m.p.h. saves you time and money. You can drive a mile in 4 minutes . . . a half-mile in 2 minutes! You get there faster . . . complete the job more quickly . . . return in less time.

Dozes 30% Faster

Tournadozer is faster on the job, too. With four speeds forward and reverse up to 15 m.p.h., you can doze a full load 30% faster . . . back up for next pass three times ***faster*** . . . complete your dozing cycle in 1/3 the time it takes a slow-moving crawler. With constant-mesh, constant-power transmission and instantaneous speed selection, Tournadozer can travel 200 feet in the 10 seconds a track-type dozer wastes shifting gears.

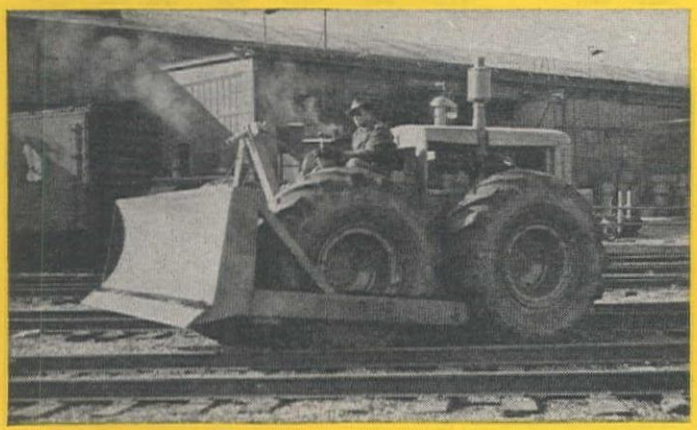
Extra maneuverability and power

In addition, its 180 h.p. Diesel and 21:00 x 25 ground-gripping tires give you all the traction, dozing and pushing power you need for your all-around dozer work . . . plus twice the speed and maneuverability of a cumbersome, limited-travel crawler.

LETOURNEAU LET EQUIPMENT

See your Le Tourneau Distributor NOW for complete information

can go anywhere!



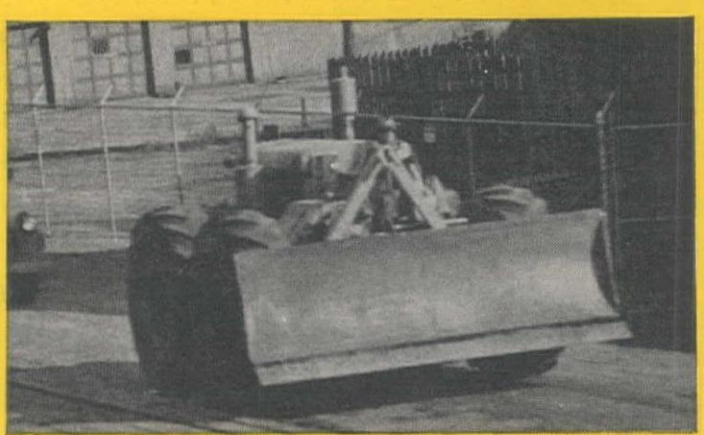
Across rails — Tournadozer is ideal for use along railroad right-of-way . . . it can cross and recross tracks at will, swiftly . . . without damage to rails or ties.

City streets — Tournadozer rolls smoothly along highways or streets . . . accurate controls give easy steering . . . multiple disc air brakes give quick, safe stops.

Over curbs — Tournadozer climbs curbs easily . . . without time and effort wasted laying planks. Big, low-pressure, rubber tires will not crack or chip curbing.

Over asphalt — Tournadozer has no cleats to chew up sun-softened asphalt or macadam . . . rubber tires safe on asphalt or any road surface, hot or cold.

Inside plants — Tournadozer's pushing power and maneuverability can be used profitably in buildings or on any floor surface designed to sustain heavy equipment.



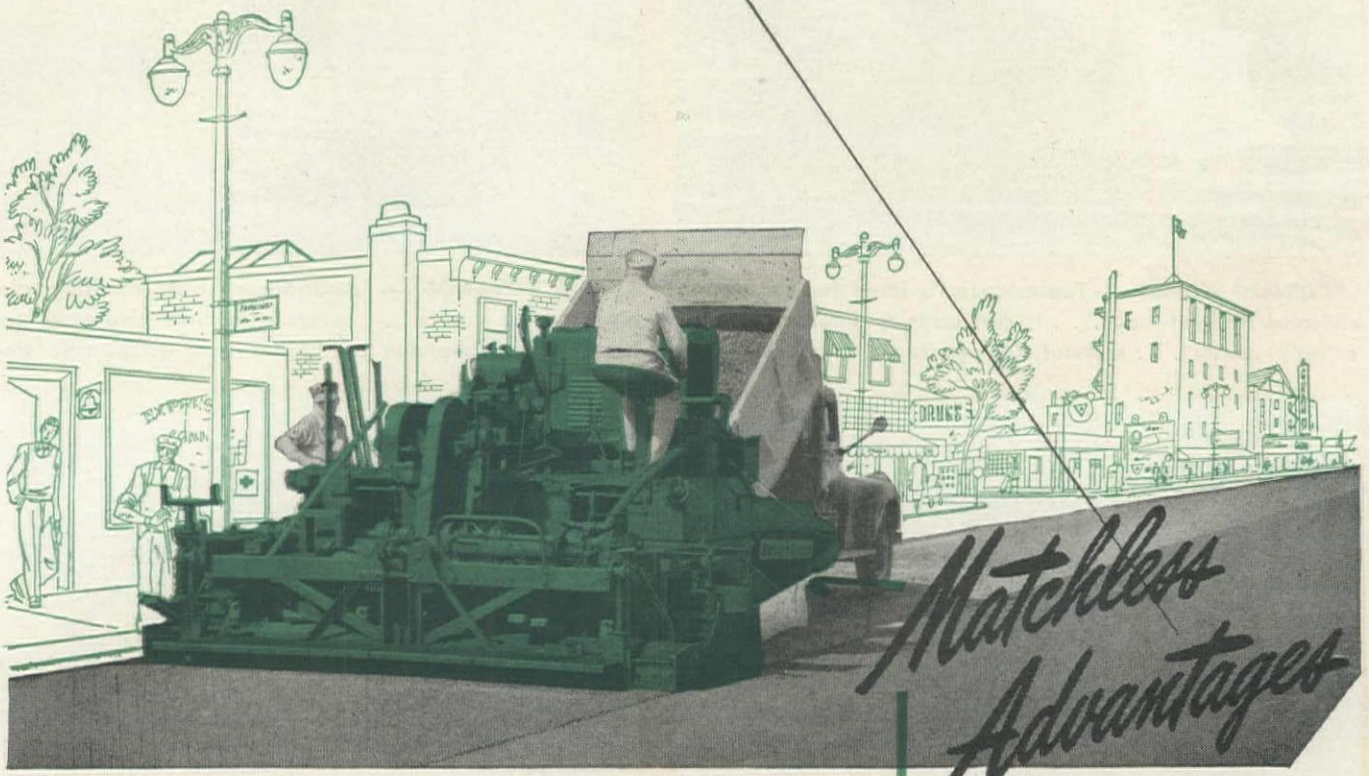
In yard areas — Tournadozer works safely on any type yard-area surfacing. Power, mobility and speed cut costs on a variety of industrial plant applications.

Tournadozer—Trademark C86

LETOURNEAU PEORIA, ILLINOIS — HIGH-SPEED RUBBER-TIRED **TOURNADOZERS**

Barber-Greene

• the finisher that offers



Built into the B-G Tamping-Leveling Finisher are advantages that combine to assure superior performance on the widest variety of bituminous paving jobs. For instance . . .

The B-G Finisher *tamps, levels* and *"strikes off"* simultaneously — automatically measures the correct amount of compacted material for the depressions — leaves a level surface that is maintained under rolling and traffic. The B-G Finisher *automatically* adjusts to differences in the sub-grade and lays to the established grade.

There are other important advantages. For the whole story of B-G Finisher performance, see your Barber-Greene distributor.

Positive Traction

Crawlers have the traction to push loaded trucks up grades while unloading . . . plus adequate control of steering necessary on any job.

Large Hopper

Five-ton hopper saves delays, allows Finisher to operate between truck loads.

Dual Controls

The B-G Finisher may be operated from either side — for easier control while matching previous mat.

Wide-Range Utility

For all bituminous jobs — from sheet asphalt to stabilized mixes — the B-G Finisher is economical, efficient and adds to the quality of the road.

BARBER · GREENE COMPANY · AURORA, ILLINOIS

FOR SALE BY:

BROWN-BEVIS EQUIPMENT CO., Los Angeles 11, California; COLUMBIA EQUIPMENT CO., Spokane, Washington, Seattle, Washington, Boise, Idaho, Portland 14, Oregon; WILSON EQUIPMENT & SUPPLY CO., Cheyenne, Wyoming, Casper, Wyoming; CONTRACTORS EQUIPMENT & SUPPLY CO., Albuquerque, New Mexico; RAY CORSON MACHINERY CO., Denver 9, Colorado; JENISON MACHINERY CO., San Francisco 7, California; WESTERN CONSTRUCTION EQUIPMENT CO., Billings, Montana, Missoula, Montana; KIMBALL EQUIPMENT COMPANY, Salt Lake City 10, Utah; STATE TRACTOR & EQUIPMENT CO., Phoenix, Arizona.

Sure-Grip for Graders!

A right tire for each job

EARTH MOVER ALL-WEATHER
for drawn vehicles and general traction

HARD ROCK LUG
for super-stamina in all rock work

SURE-GRIP
—in grader or earth mover sizes — for maximum traction on drive wheels.

ON the drive wheels of work units—from road graders to giant earth movers—this is the tire that packs pulling power without equal. It's Goodyear's Sure-Grip—"right" on traction jobs because it's designed to bite in and bull through. That *o-p-e-n c-e-n-t-e-r* self-cleaning tread does it—makes each lug bar a *separate* traction cleat that takes firm grip with minimum slip, pulls sure and steady in toughest going.

That's why the Sure-Grip is *first choice* where pulling power comes first—just as every other job-proved Goodyear work tire is first choice for its special type of service. And consistent low-cost, long-life performance *keeps* them first choice—with the result that year after year, *more yards are moved on Goodyear off-the-road tires than on any other kind!*

BUY and SPECIFY GOODYEAR —*it pays!*

Sure-Grip, All-Weather—T.M.'s The Goodyear Tire & Rubber Company

GOODYEAR

BETTER ROADS FOR A BETTER WORLD · 45th Annual Convention and Road Show · SOLDIER FIELD CHICAGO · JULY 16-24, 1948

MORE YARDS ARE MOVED ON GOODYEAR OFF-THE-ROAD TIRES THAN ON ANY OTHER KIND

LEADING THE POWER PARADE

AT this greatest of all *road shows* you'll see International leading the power parade in the earthmoving and roadbuilding industry!

Everything in the International Industrial Power line will be shown... everything from giant TD-24 crawlers with matched equipment down to the Industrial CUB with side-mounted mower. You don't have to go outside the International Industrial Power exhibit to see all the modern roadbuilding and earthmoving equipment you need!

International Harvester's part of the Road Show at Soldier Field in Chicago will be a show in itself! It will occupy 80,000 square feet of space and spill over into an additional 90,000 square feet occupied by International's allied equipment manufacturers. Here International will show you the power and equipment that will do your jobs most economically and fast.

And your International Industrial Power Distributor is ready to supply your needs in power, equipment, accessories and service.

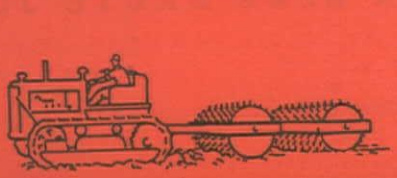
CRAWLER TRACTORS
POWER UNITS
DIESEL ENGINES
WHEEL TRACTORS

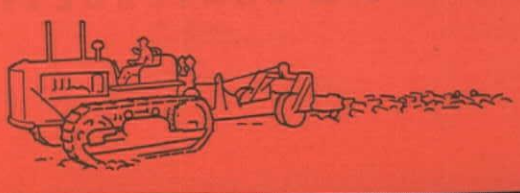
INTERNATIONAL

AT THE A.R.B.A. ROAD SHOW

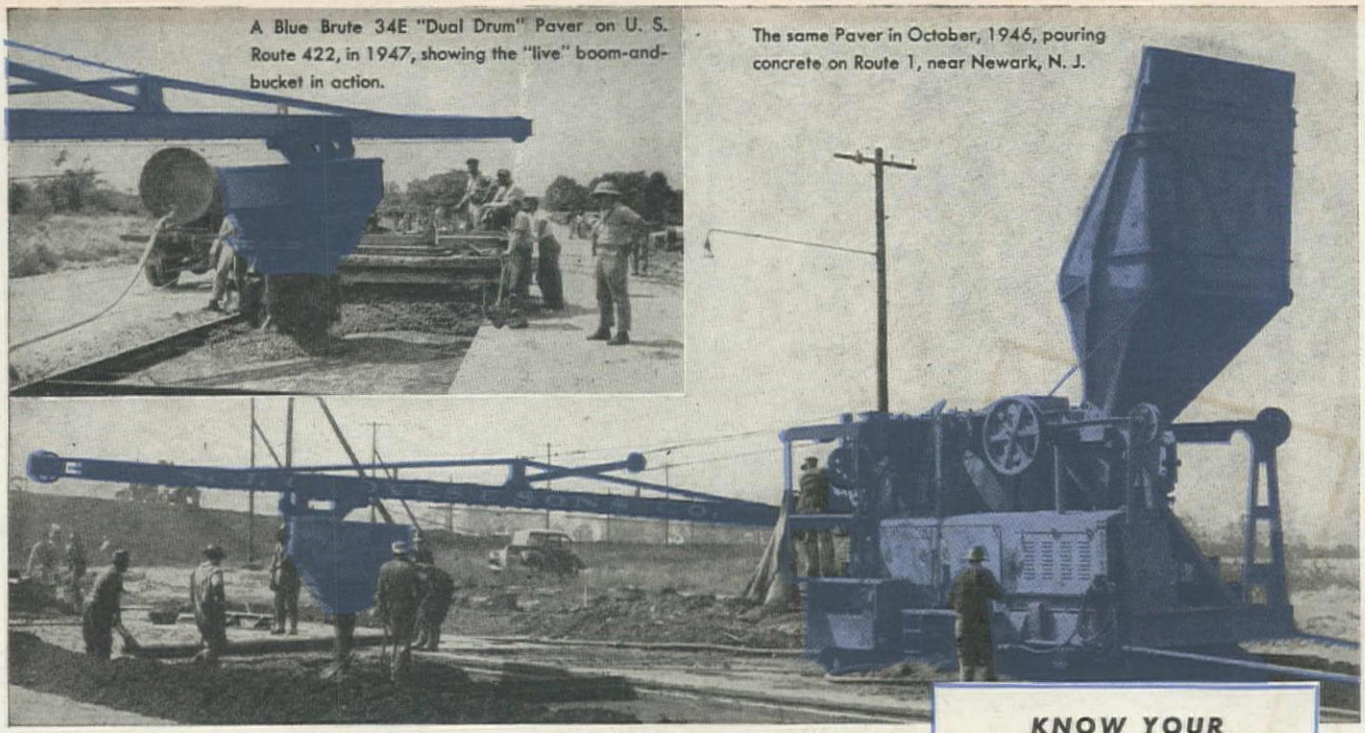
Industrial Power

INTERNATIONAL HARVESTER





WHEN A BLUE BRUTE PAVER SET THE PACE...



A Blue Brute 34E "Dual Drum" Paver on U. S. Route 422, in 1947, showing the "live" boom-and-bucket in action.

The same Paver in October, 1946, pouring concrete on Route 1, near Newark, N. J.

No paving job moves faster than the pace set by its paver. That's why S. J. Groves & Sons Co. selected Ransome Blue Brute 34E Dual Drum Pavers for jobs where fast performance was a "must".

Speed counted on the new 3-lane U.S. 422 between New Castle, Pa., and Youngstown, Ohio, delayed by abnormally heavy rains and lack of skilled manpower. Here a Ransome Blue Brute 34E Dual Drum Paver set the remarkable pace of ½ mile per day. This was the very same Blue Brute, incidentally, that performed a rush job the year before on U. S. 1 near the Newark, N. J. Airport. Here, fast-growing traffic demanded a tremendous widening project in a hurry.

That's where the 34E's many advanced features proved themselves. For example: *the fool-proof, self-cleaning, fast-charging skip . . . mechanically operated batchmeter for all-weather accuracy . . . precision water-measuring . . . and the exclusive, hydraulically operated "live" boom-and-bucket combination that spreads as it swings, cutting down costly hand shovelling.*

Geared to the output of the Blue Brute Paver, these large-scale paving operations were carried out smoothly . . . economically . . . on time! And that's why a Ransome 34E, Single or Dual Drum, on your own construction jobs will lay more yardage . . . more accurately and with less manpower ...than any other paver. For full details, see your nearby Worthington-Ransome Distributor, or write for Bulletin 208.

R6-5

KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your jobs on a profitable basis.

RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, and Accessories.

WORTHINGTON EQUIPMENT

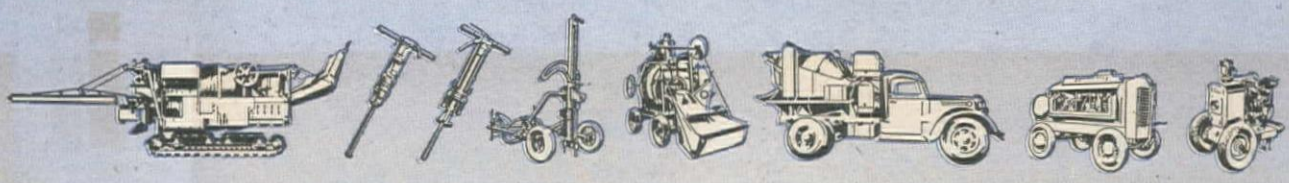
Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON

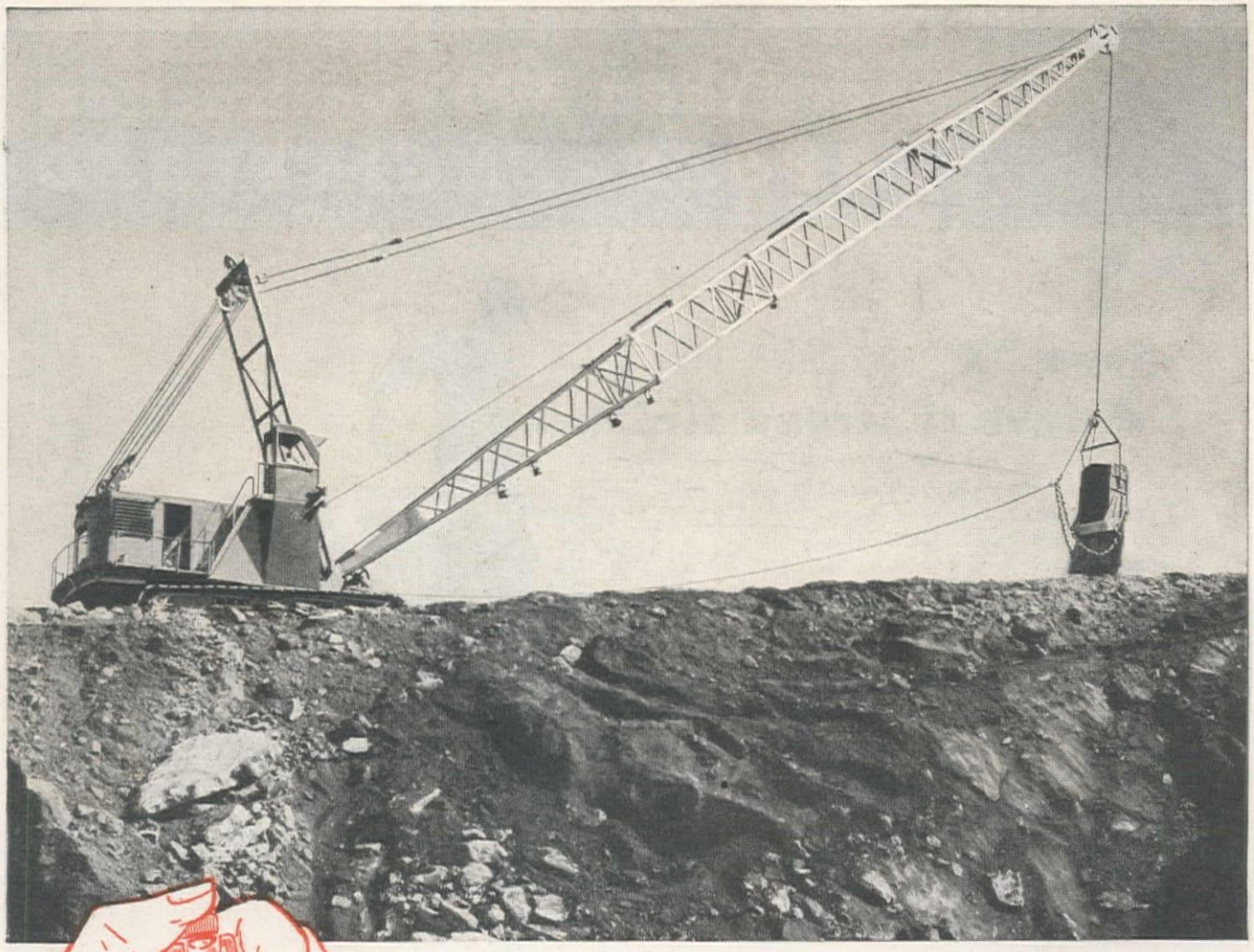
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

Distributors in all principal cities

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB



Manitowoc crane and dragline owned by the Coal Rain Coal Co., Junedale, Penna., and powered with a General Motors Series 71 "Twin" Diesel engine.

A pass every 50 seconds

WHEN you drag a four-yard bucket from the end of a 140-foot boom and make a pass every 50 seconds, you're really moving material.

This is what the Coal Rain Coal Co. is doing with a Manitowoc crane powered with a General Motors Twin 6 Diesel engine.

It's another good example of what GM 2-cycle Diesel power can do. With power at every down-stroke, pick-up is fast, response is rapid, and there's unusual power for a Diesel so compact, so reasonable in size and weight.

GM "71" Diesels are setting performance records in all kinds of equipment. They step up production, cut down maintenance and lower fuel costs.

Isn't this the kind of power you want? It's certainly well worth looking into. So write today and let us give you full particulars.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES.. *Up to 200 H.P.* **DETROIT 28, MICHIGAN** MULTIPLE UNITS.. *Up to 800 H.P.*

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

Evans Engine & Equipment Co.
SEATTLE 9, WASH.

Cate Equipment Co.
SALT LAKE CITY, UTAH

Fred M. Viles & Company
SPOKANE 8, WASH.

Mountain Tractor Co.
MISSOULA, MONT.

Gunderson Bros. Equipment Corp.
PORTLAND 9, ORE.

Olson Manufacturing Co.
BOISE, IDAHO

Capitol Tractor & Equipment Co.
SACRAMENTO, CALIF.

Anderson-O'Brien Co.
LOS ANGELES 21, CALIF.

more than 300 construction JAEGER-ENGINEERED

type "X" diagonal screed finisher

—the revolutionary labor-saving tool to work with today's mass production pavers. Can finish flush to higher form; saves carry-back; insures precision-smooth surface.

see them all at the Road Show next month or see your Jaeger distributor today

Air Compressors
Bituminous Pavers
Bituminous Spreader-Finishers
Concrete Screw Spreaders
Diagonal Screed Finishers
Widening Finishers

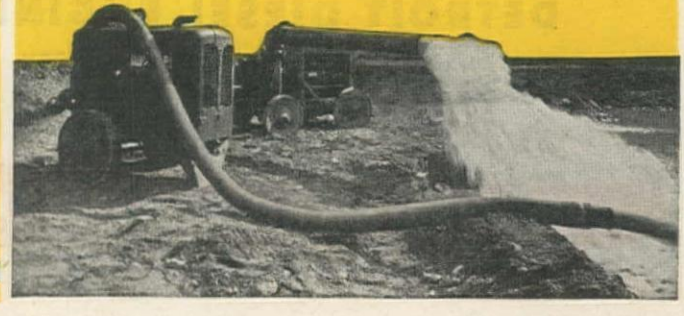
"air plus" compressors

Portable and stationary; sizes up to 600 ft. Designed for full-pressure operation of modern air tools. See them before you buy any compressor.

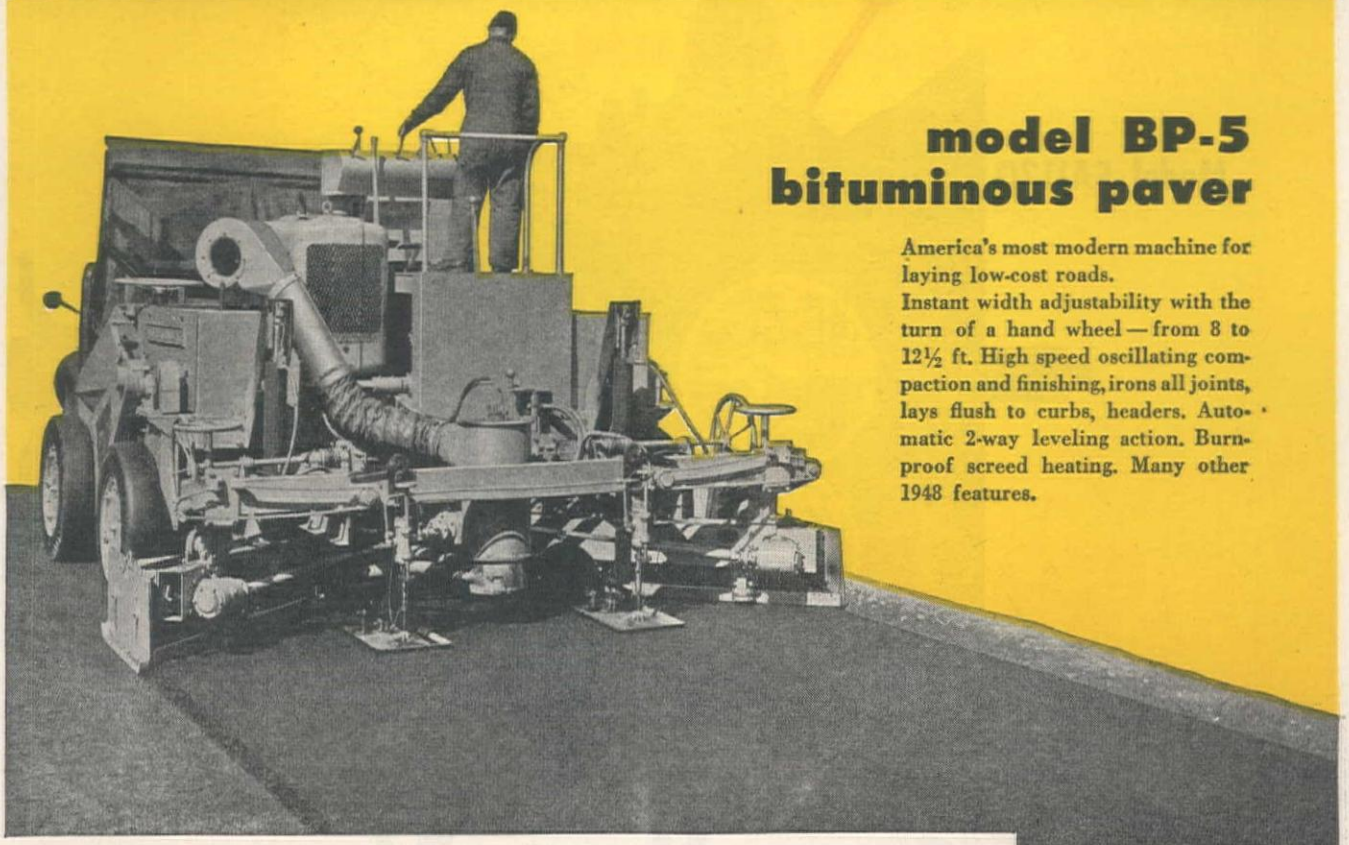
more air is THERE

"sure prime" pumps

Drainage pumps for all requirements up to 10" size, plus latest line of pressure pumps for higher head service such as tank trucks, roadside seeding and weed control spraying, water supply, etc.



and paving machines for labor-saving mass production



model BP-5 bituminous paver

America's most modern machine for laying low-cost roads.
Instant width adjustability with the turn of a hand wheel — from 8 to 12½ ft. High speed oscillating compaction and finishing, irons all joints, lays flush to curbs, headers. Automatic 2-way leveling action. Burnproof screed heating. Many other 1948 features.

Stone & Material Spreaders
Side Discharge Truck Mixers for Paving
Form Tampers
Drainage Pumps
Pressure Pumps
2-Speed Hoists

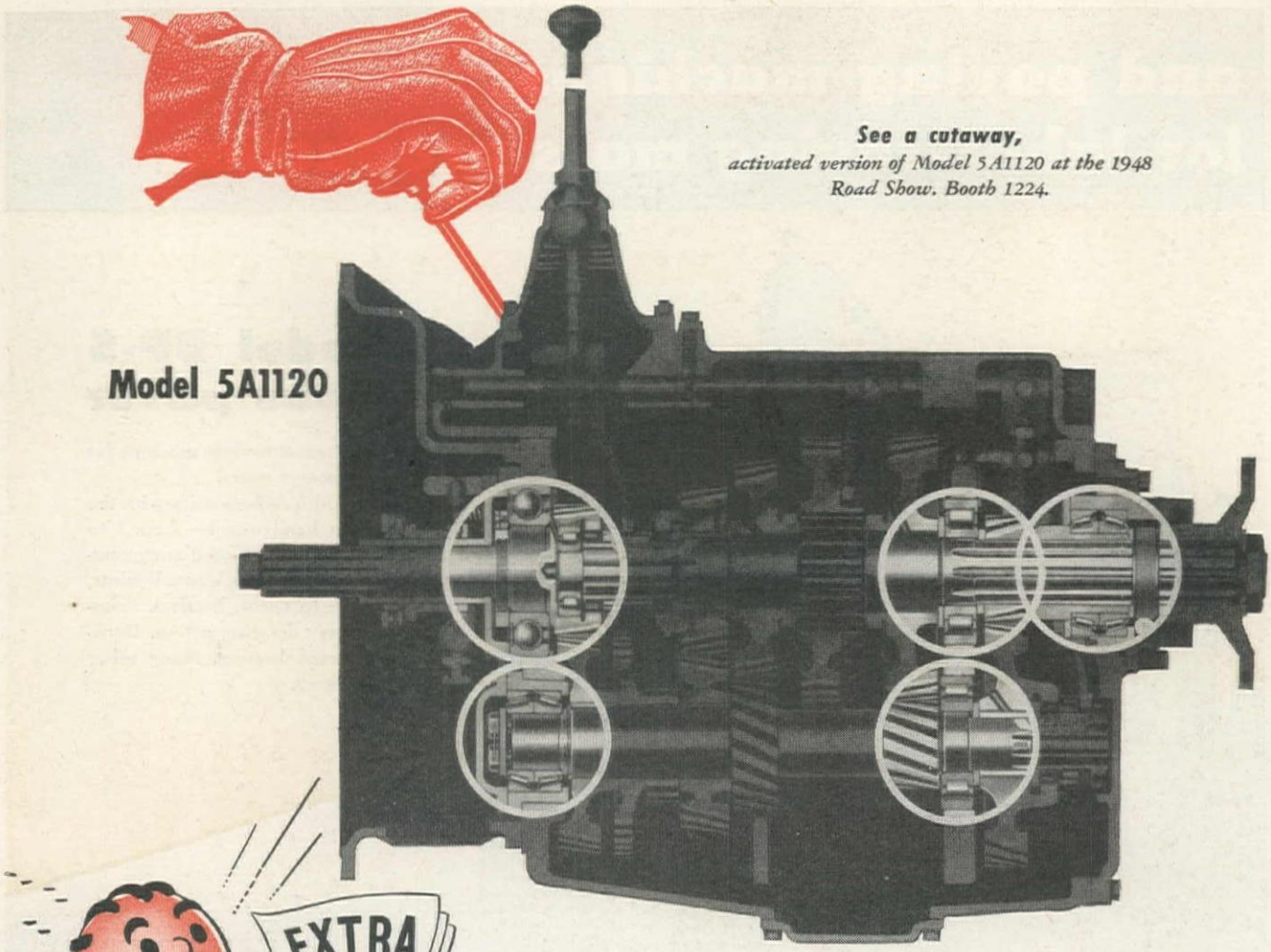
Self-Raising Towers
Concrete Mixers
Cold-Patch Mixers
Plaster-Mortar Mixers
Truck Mixers
Portable Hoppers

"speedline" mixers

Recognized world's leading line of portable mixers for high daily yardages of concrete, bituminous cold patch, plaster, mortar. Sizes 3½S to 16S.

Sold, Rented, Serviced by:

EDWARD R. BACON CO. ..... San Francisco 10, Calif.
SMITH BOOTH USHER CO. .. Los Angeles 54, Calif. and Phoenix, Ariz.
A. H. COX & CO. ..... Seattle 4, Wash.
NELSON EQUIPMENT CO. ..... Portland 14, Ore., Twin Falls and Nampa, Idaho
ANDREWS EQUIPMENT SERVICE ..... Spokane 9, Wash.
WESTERN MACHINERY COMPANY ..... Salt Lake City 13, Utah and Denver 2, Colo.
CENTRAL MACHINERY CO. ..... Great Falls, Mont.
TRACTOR & EQUIPMENT CO. ..... Sidney and Miles City, Mont.
WORTHAM MACHINERY COMPANY .. Cheyenne, Wyo., Billings, Mont.
HARDIN & COGGINS ..... Albuquerque, N. M.



See a cutaway,
activated version of Model 5A1120 at the 1948 Road Show. Booth 1224.

Model 5A1120

Extra-Heavy Bearings

for extra-heavy service

Model 5A1120—Fuller Manufacturing Company's newest transmission—is built for engines up to 1120 cu. in.

Extra-heavy bearings enable it to meet the most rugged requirements of heavy-duty service . . . make it a veritable glutton for punishment.

Maximum-capacity bearings on both the mainshaft and countershaft give Fuller Model 5A1120 the extra stamina that means extra service from your truck.

FULLER MANUFACTURING COMPANY, TRANSMISSION DIVISION
KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wisconsin

Western District Office (Both Divisions): 1060 East 11th Street, Oakland 6, California

Fuller TRANSMISSIONS

Confidence—WITH ITS SLEEVES ROLLED UP!

ATOP THE WORLD'S TALLEST BUILDING . . . yet not high enough! Television's need for unobstructed, long-range broadcasts may be met by planes in the stratosphere, relaying signals from the earth. Engineers working on this problem are confident of ultimate success.

With like confidence, Roebling blazes new trails in developing and making products vital to communication and all other industries. And the widespread confidence reposed in Roebling is our most guarded asset. Leadership is maintained only by constant progress . . . our ideal is to make Roebling products and engineering service the best obtainable anywhere, *any* time.

WHEN TO SPECIFY ROEBLING *Preformed* WIRE ROPE

WHEN IT WILL SAVE YOU MONEY is the time to specify Roebling Preformed Wire Rope. Wherever wire rope is subjected to severe bending, Roebling Preformed is an outstanding money-saver. On thousands of installations it lasts far longer than Non-Preformed ropes . . . pulls down performance costs to an all-time low.

Great resistance to fatigue from bending helps give Roebling Preformed a long life, but you can chalk up other big advantages. Preformed is not inclined to twist and kink . . . is easy to handle and install. It can be cut without seizing. Broken wires lie flat . . . don't injure hands or chew up drums and sheaves.

Get your Roebling Field Man's advice about Preformed and the possibility of its saving you money. You can act on his suggestions with full confidence for he *knows* wire rope, how to choose the *right* one, how to maintain it for top service. Write or call him at your nearest Roebling branch office.

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA

San Francisco Los Angeles Seattle Portland

A CENTURY OF CONFIDENCE ROEBLING

JR ROEBLING

★ WIRE ROPE AND STRAND ★ FITTINGS ★ SLINGS ★ SUSPENSION BRIDGES AND CABLES ★ AIRCORD, AIRCORD TERMINALS AND AIR CONTROLS ★ AERIAL WIRE ROPE SYSTEMS ★ ELECTRICAL WIRE AND CABLE ★ SKI LIFTS ★ HARD, ANNEALED OR TEMPERED HIGH AND LOW CARBON FINE AND SPECIALTY WIRE, FLAT WIRE, COLD ROLLED STRIP AND COLD ROLLED SPRING STEEL ★ SCREEN, HARDWARE AND INDUSTRIAL WIRE CLOTH ★ LAWN MOWERS

NORTH • EAST • SOUTH • WEST • IT'S SCHRAMM!

so versatile, so easy to operate, so economical . . .

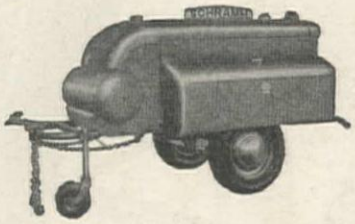
IT PAYS TO USE SCHRAMM!

VERSATILE . . . because Schramm can furnish air for any compressed air job in your work; and versatile because there is a size and model Schramm to fit your individual needs!

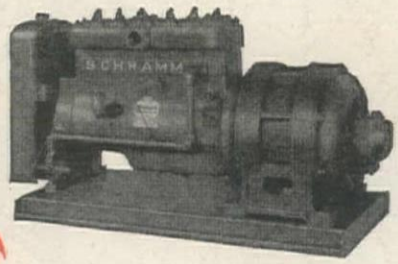
EASY TO OPERATE . . . merely by pushing a button to start, and compact and lightweight enabling you to move the portable units wherever you like! Meanwhile, the stationary units take up very little room, are vibrationless and no trouble!

ECONOMICAL . . . because Schramm can do *all* your compressed air jobs quickly and efficiently. Features that assure economy include 100% water cooled, forced feed lubrication, and mechanical intake valve.

Your field has found that Schramm Air Compressors well fit its needs. And has specified Schramm everywhere . . . North, East, South and West. Write today for full data.



PORTABLE



STATIONARY

SCHRAMM INC.

THE COMPRESSOR PEOPLE

WEST CHESTER

PENNSYLVANIA

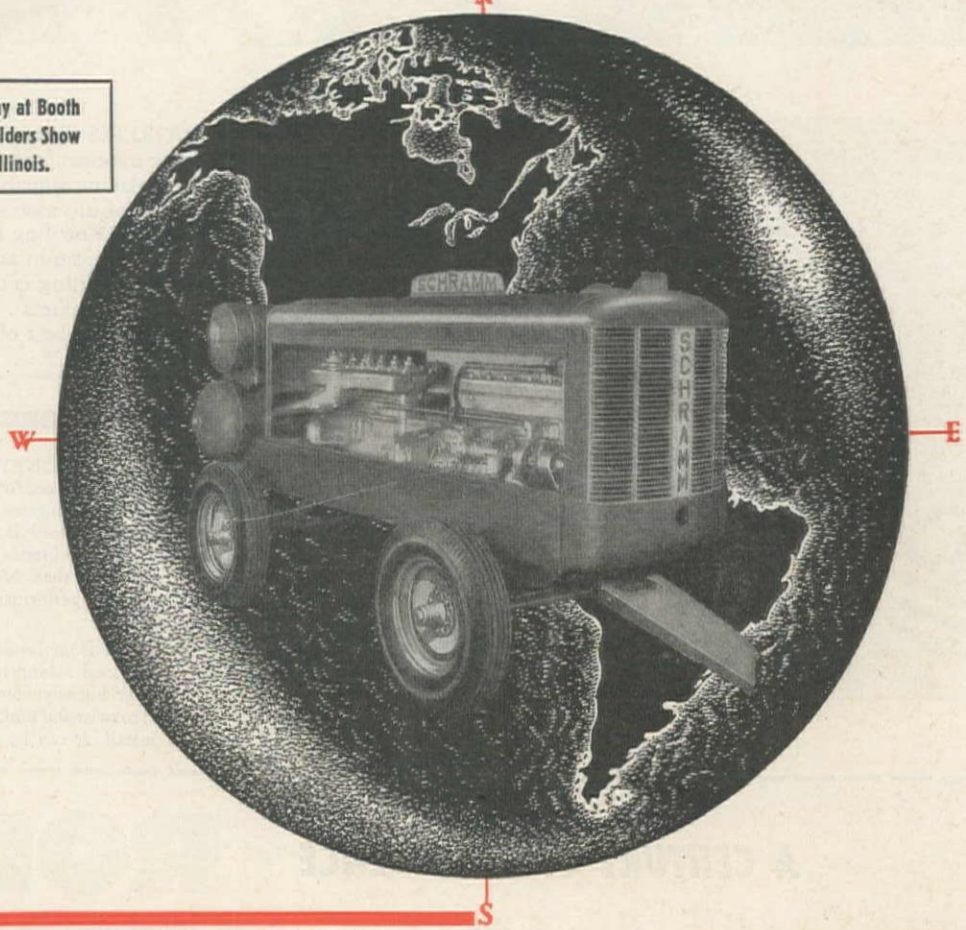
Be sure to visit the Schramm Display at Booth 3201-3212 the American Road Builders Show July 16th to 24th, Chicago, Illinois.

TOOLS *for the* JOB

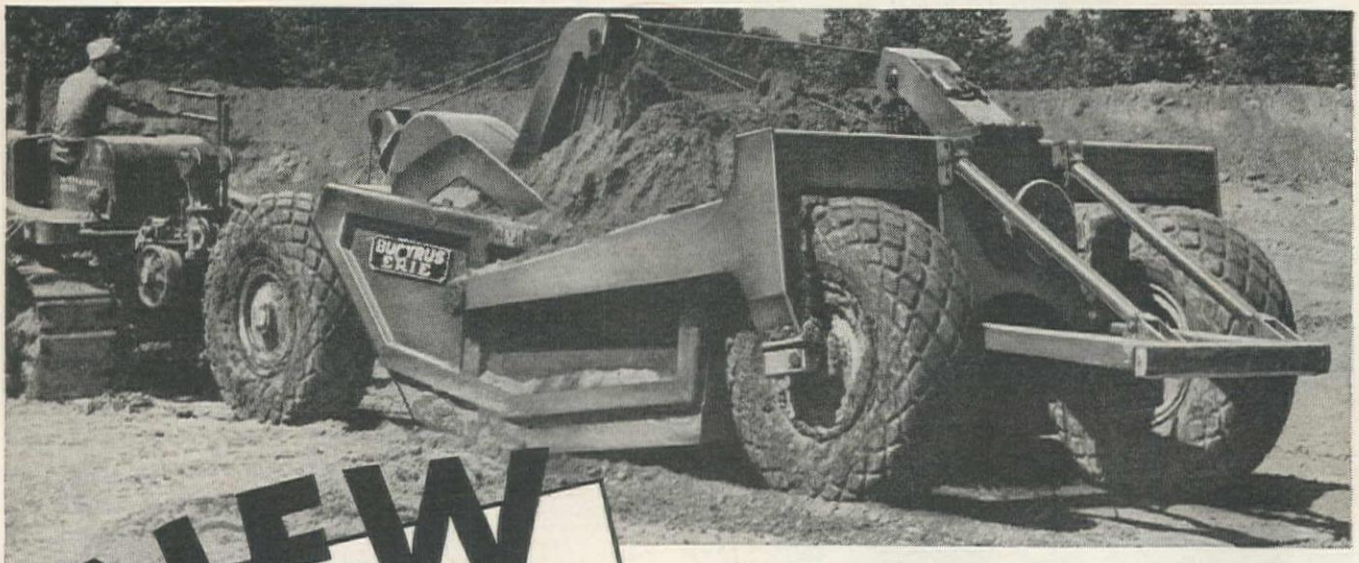
Schramm Inc. also has a complete line of Pneumatic Tools to offer and recommend for operation by their Compressors.

These include Rock Drills, Paving Breakers, Trench Diggers, Clay Spades, Backfill Tampers, Tie Tampers, Sheeting Drivers, Demolition Tools, Chain and Circular Saws.

Write for bulletins and prices.



A COMPLETE NEW LINE OF S-TYPE SCRAPERS



NEW from DRAWBAR PIN to PUSH BUMPER!

BUCYRUS ERIE

THE new Bucyrus-Erie S-type four wheel scrapers combine a host of new improvements with design features that made Bucyrus-Erie scrapers tops in prewar days. You get the best of the old plus proven new developments — the combination you need for most effective scraper performance, lowest operating and maintenance costs. These new scrapers have been thoroughly tested in the field under actual job conditions. They are built in sizes to correspond to sizes of International Crawler Tractors . . . and they're ready to cut your dirt moving costs to the bone!

Look over the many important features listed on this page — and check with your International Industrial Tractor Distributor. Bucyrus-Erie Co., South Milwaukee, Wisconsin.

See Them at the Road Show!

These Features Help You Move Greater Yardage At Lower Cost

DROP CENTER FRONT AXLE — Tongue attaches to low part of axle, providing level pull, eliminating the downward thrust that tends to bog down front wheels.

LARGE LOW PRESSURE TIRES, front and rear, provide maximum flotation and conform with specifications recommended by the Tire and Rim Association. Dual rear tires are available as extra equipment.

DOUBLE DISC DRUM TYPE WHEELS mounted on large tapered roller bearings. Strong sturdy construction built to withstand heavy loads and to prevent clogging by mud or dirt.

TWO-PART APRON provides large opening for dumping sticky material, yet can be operated as conventional single piece apron when necessary.

STREAMLINED GOOSE NECK permits short turning radius with ample clearance for front wheels on uneven ground.

DOUBLE CURVE CUTTING EDGE, an exclusive Bucyrus-Erie feature, boils dirt into apron and bowl, uniformly and compactly, requires less horsepower for loading.

POSITIVE ROLLING EJECTION assures full clean dump, requires minimum horsepower.

POSITIVE BOWL RETURN guarantees bowl return to loading position on any slope. Return is actuated by simple lateral torque rod.

SLIDING TYPE BOWL LOCK for use when transporting scraper long distances.

LOW MAIN FRAME provides low center of gravity, low overall height, great stability.

ALLOY STEEL SIDE CUTTERS are castings bolted to main frame, protecting main frame from wear. Castings are reversible to give additional service.

STRAIGHT LINE CABLE REEVING — No side bends in cable lines, only one reverse bend in each cable. Prolongs cable life.

IMPROVED CABLE ANCHORS are cast open-type wedge sockets; easy to lock, will not kink or crush cable.

ADJUSTABLE BAR TYPE PUSH BUMPER is available as extra equipment. Has vertical adjustment to fit push tractor. Long contact bar eliminates jackknifing, assures straight push.

S-46 4 cu. yd. (struck)
S-68 6 cu. yd. (struck)
S-91 8 cu. yd. (struck)
S-113 10 cu. yd. (struck)

Also ask for information on these larger Bucyrus-Erie 4-wheel scrapers.
B-170 15 cu. yd. (struck)
B-250 22 cu. yd. (struck)

98T48

See Your INTERNATIONAL Industrial Tractor Distributor

10,000,000 Gallons-a-day BONUS!

18% more water than designed capacity delivered by Lock Joint Concrete Pressure Pipe in San Diego Aqueduct!

Route extends over hills and valleys. Pipe diameters range from 48" to 96", operating under heads up to 550'.

Typical example of steep grades encountered along route of the aqueduct.

Example of installation in deep cuts, which were encountered frequently.

With approximately 65 miles of its 71-mile length constructed of Lock Joint Concrete Pressure Pipe, the recently completed San Diego Aqueduct is delivering at least 10,000,000 gallons per day more than its designed daily capacity of 55,000,000 gallons. Based on an investment of some $15,000,000.00, this line is therefore delivering water at substantially less than the expected cost per unit of flow. Extending from San Jacinto to the San Vicente Reservoir, this long gravity line is laid through some of the most rugged country in Southern California. Much of its course is cross-drainage, which necessitated traversing high summits, river bottoms, and deep earth cuts. The problems of terrain alone required the best in pipeline construction in order that the designed carrying capacity would be assured.

Although its flow characteristics were designed on a conservative basis, recent tests indicate the actual flow measures up to the maximum performance obtainable with the smoothest grade of concrete pressure pipe operating under ideal hydraulic conditions. Many years of experience with Lock Joint Concrete Pressure Pipe have proved that this capacity will be sustained indefinitely. In addition to economies in first cost and installation, high capacity and low maintenance expenses will continue to pay dividends to future generations of tax payers and water users in the San Diego area.

American manufactured over 27 miles of 48 inch, 72 inch and 96 inch pipe used in this line. The wide experience of this company in water supply line engineering and construction is available to water works officials and engineers. Information upon request.

American PIPE AND CONSTRUCTION CO.

Concrete Pipe for Main Water Supply Lines, Storm and Sanitary Sewers, Subaqueous Pipe Lines

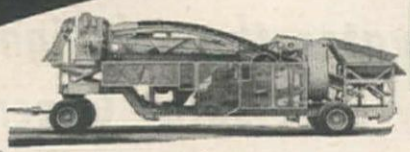
P. O. Box 3428, Terminal Annex, Los Angeles 54, California

Quality pipe line products manufactured and installed by American include . . . Lock Joint Concrete Cylinder Pipe, American Concrete Cylinder Pipe, Prestressed Lock Joint Concrete Cylinder Pipe, Centrifugal Concrete Pressure Pipe.

Main Offices and Plant — 4635 Firestone Blvd., South Gate, Calif.
District Offices and Plants — Oakland — San Diego — Portland, Ore.

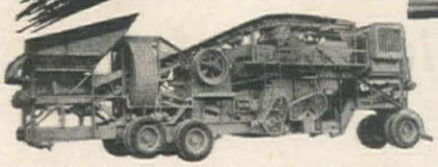
All roads lead to the

12 AGGREGATE PRODUCING EQUIPMENT . . .



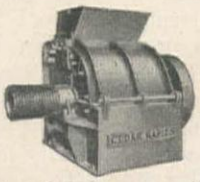
The Pitmaster is our smallest portable gravel crushing and screening plant. 10" x 16" jaw crusher, 16" x 16" roll crusher and 30" x 9'6" double-deck horizontal vibrating screen assure a capacity of fifty tons of minus 1" material per hour.

Unitized plants provide flexibility of set-up for a variety of aggregate production jobs. Each unit is complete in itself and can be used alone or in any one of a dozen different combinations, depending upon the pit or quarry and the finished product desired. Each unit is offered in a number of sizes so that you can have a capacity anywhere from 25 to 250 tons per hour and more and any type of aggregate from riprap to agstone.

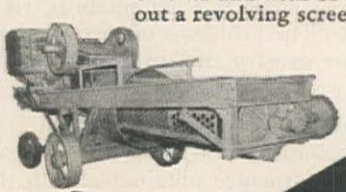


The Junior Tandem is a gravel crushing and screening plant with a capacity of 70 to 100 tons per hour. It can be quickly converted to a rock plant by the addition of a Cedarapids portable primary.

VE-VJ Portable Crushing Plants are low-priced units designed primarily for the export market. They will produce up to four sizes of finished aggregate. Available with jaw or roll crusher and with or without a revolving screen.



In the 4024 roll crusher secondary, the roll crusher can be removed and replaced by a 4033 hammermill where road stone and agstone are desired.

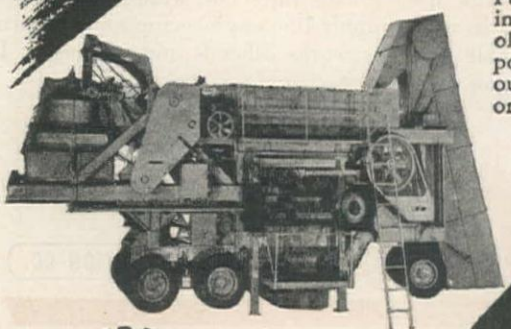


20 BITUMINOUS MIXING EQUIPMENT . . .

Patchmasters are portable, continuous-mix bituminous mixing plants for producing 20 to 30 tons per hour. They are ideal for small jobs such as road maintenance work and out-of-the-way jobs, where portabilility and quick set-up are important.

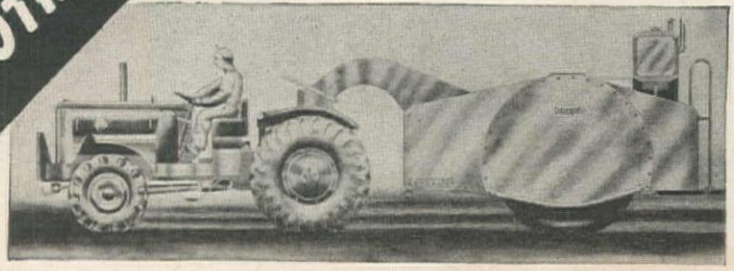
6

Model "FA"s are our most portable batch-type bituminous mixing plants with capacities of 25 cu. ft. Every feature is built for easy portability, accuracy of mix and low cost. Air controls assure fast, easy operation and finger tip control. Ground level charging hopper for quick, easy loading. Pug mill discharges directly into trucks. Choice of gasoline, diesel or electric power, with or without a drier for hot or cold mixes.



OTHER SPECIAL EQUIPMENT . . .

The Cedarapids Compactor is an entirely new compaction machine for compacting highway sub-grades and bases, airport runways, dam fills and for stabilizing soil, graded aggregate or soil cement. It has been on test for three years and results show a very noticeable increase in density of soils at depths of three feet and more. Available in two sizes to fit variety of jobs.



BETTER ROADS FOR A BETTER WORLD · 45th Annual Convention and Road Show · SOLDIER FIELD CHICAGO · JULY 16-24, 1948

THE NEW GALION No. 116 MOTOR GRADER

for

EXTRA HEAVY DUTY

IT'S HEAVIER

23,285 lbs. to 30,000 lbs. - depending on the extra attachments.

IT'S MORE POWERFUL

Rugged 100 H.P. Diesel engine and all-gear tandem drive.

Designed and constructed to handle the heaviest and toughest kind of work. Write for Specification Leaflet No. 310.

GALION DISTRIBUTORS

ARIZONA:
Phoenix — STATE TRACTOR & EQUIP. CO.
Tucson — F. RONSTADT HARDWARE CO.

CALIFORNIA:
Los Angeles 1 — BROWN-BEVIS EQUIPMENT CO.
San Francisco 7 — WESTERN TRACTION COMPANY

COLORADO:
Denver 1 — H. W. MOORE EQUIPMENT CO.

IDAHO:
Boise — IDAHO MACHINERY COMPANY
Salt Lake City 1 — ARNOLD MACHINERY COMPANY
Spokane, Wash. — MODERN MACHINERY CO., INC.

MONTANA:
Butte — HALL-PERRY MACHINERY CO.

NEVADA:
Reno — GENERAL EQUIPMENT COMPANY

NEW MEXICO:
Las Vegas — HILTON'S INCORPORATED

OREGON:
Portland 14 — LOGGERS & CONTR. MACHY. CO.
Boise, Idaho — IDAHO MACHINERY CO.

UTAH:
Salt Lake City 1 — ARNOLD MACHINERY COMPANY

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Seattle — PACIFIC HOIST & DERRICK CO.
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BETTER ROADS FOR A BETTER WORLD — 45th Annual Convention and Road Show — SOLDIER FIELD CHICAGO — JULY 16-24, 1948

Spaces 2206, 2405, 2408 and 2607 NORTH CONCOURSE

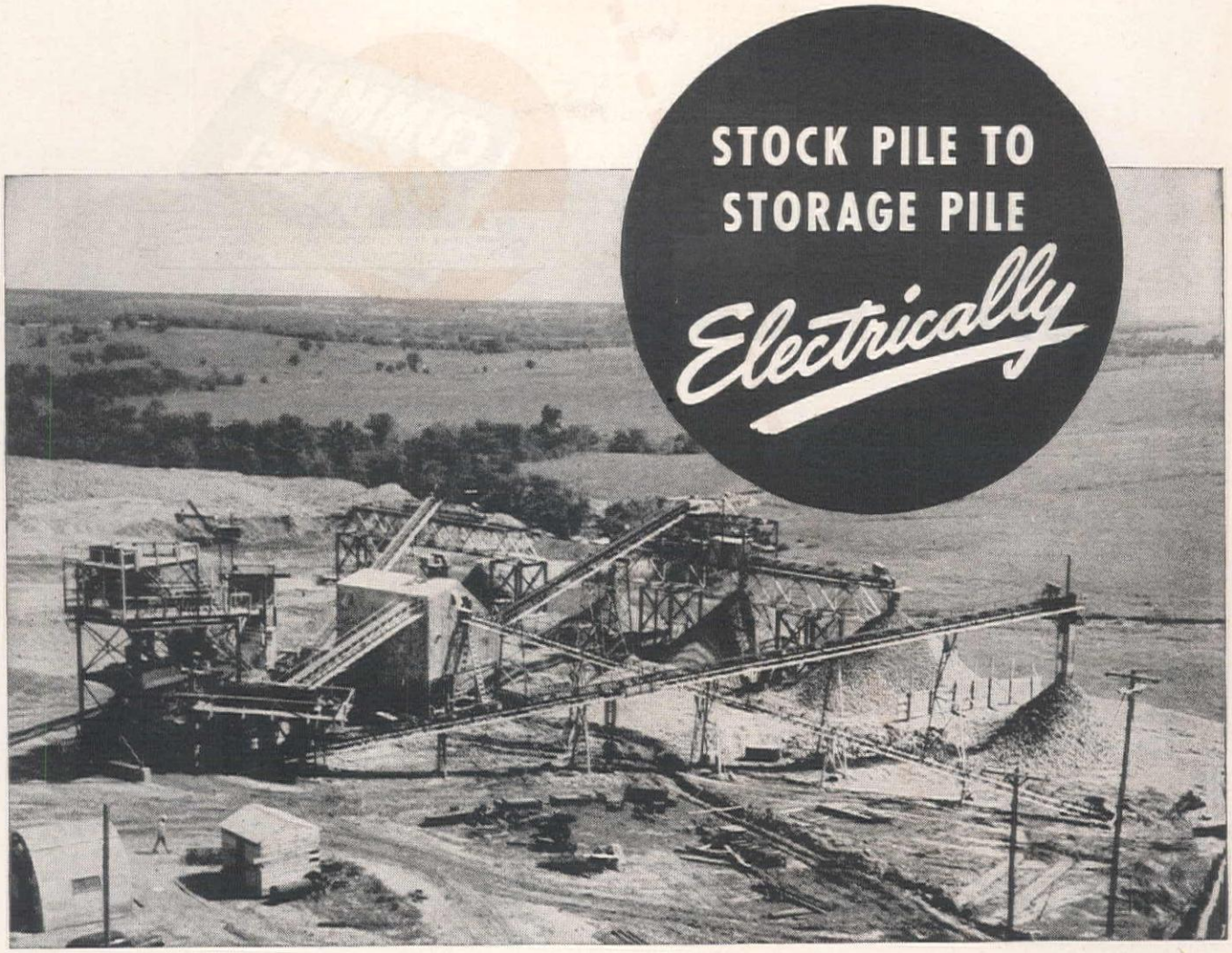
GALION

Estab. 1907

THE GALION IRON WORKS & MFG. CO.

General and Export Offices
Galion, Ohio, U. S. A.

GRADERS • ROLLERS



Electric Component Drives Make this Modern Aggregate Plant Efficient, Easy to Dismantle

ELECTRIFIED CONSTRUCTION
BETTER PRODUCT
LOWER COST

Look how one wise contractor utilizes electric drives to produce aggregate for large construction jobs. In this modern plant there is a total of 765 electric-motor horsepower driving jaw crusher, rotary scalping screen, log washer, rotary crusher, sand roll, sand classifier, sizing screen, elevator and conveyors. That's real versatility . . . and it's indicative of the trend toward more and varied use of electric power in construction.

Electric drive, which offers the maximum in reliability with minimum maintenance, helps contractors build more for less . . . faster. Whether you buy or build contractors' equipment, ask your General Electric representative to show you the inherent advantages of electric drive. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC
655-66

Proved by Performance

CUMMINS *Dependable* DIESEL

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

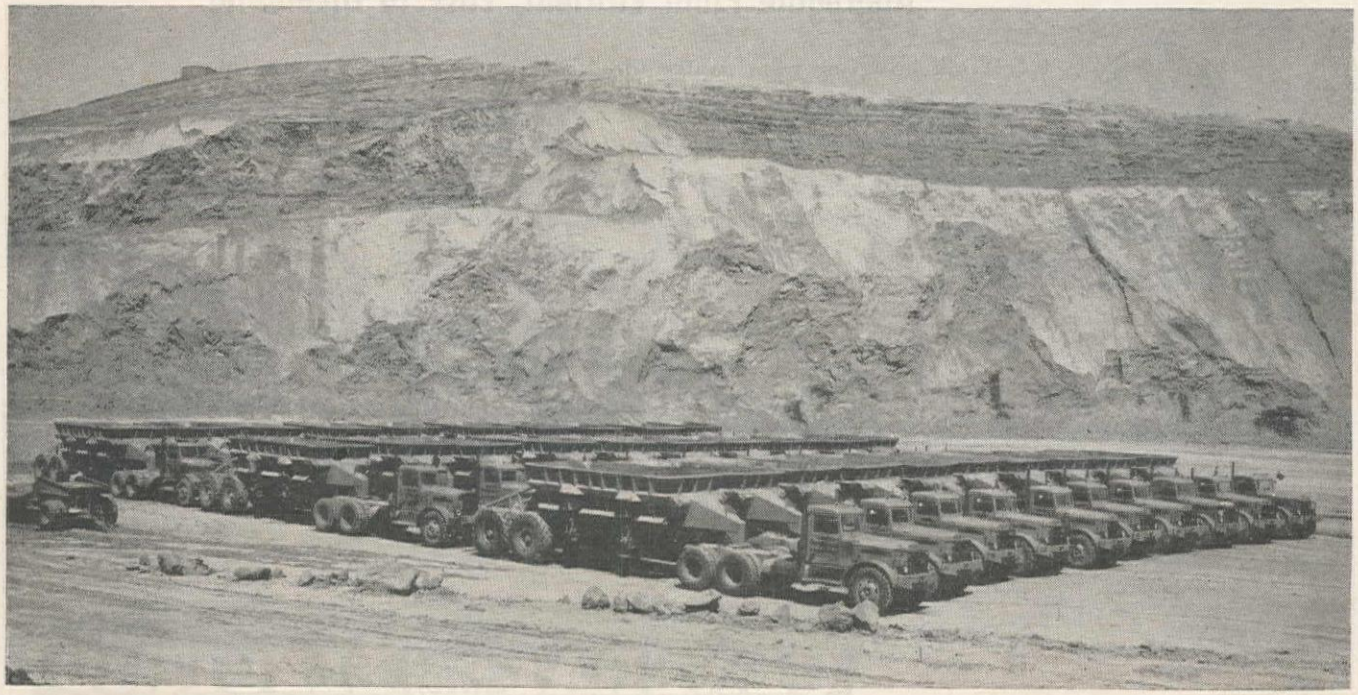
The lowest cost cubic yard hauling unit ever used by the construction industry on an earth-moving job—that is the claim of operators of this fleet of 30 Peterbilt tractor trucks, powered by Model NHB-600 Cummins *Dependable* Diesels and used by Macco Corporation and Morrison-Knudsen Company, Inc., on the San Francisco Airport job.

Increasing the size of the airport by 400 acres made this one of the biggest earth-moving projects ever undertaken in the West. On this job, these huge Cummins-powered trucks operated on a three-shift day and night schedule, carried heaping loads of 30 cubic yards of earth per trip, and made the six-mile round trip over the haul road every 20 minutes.

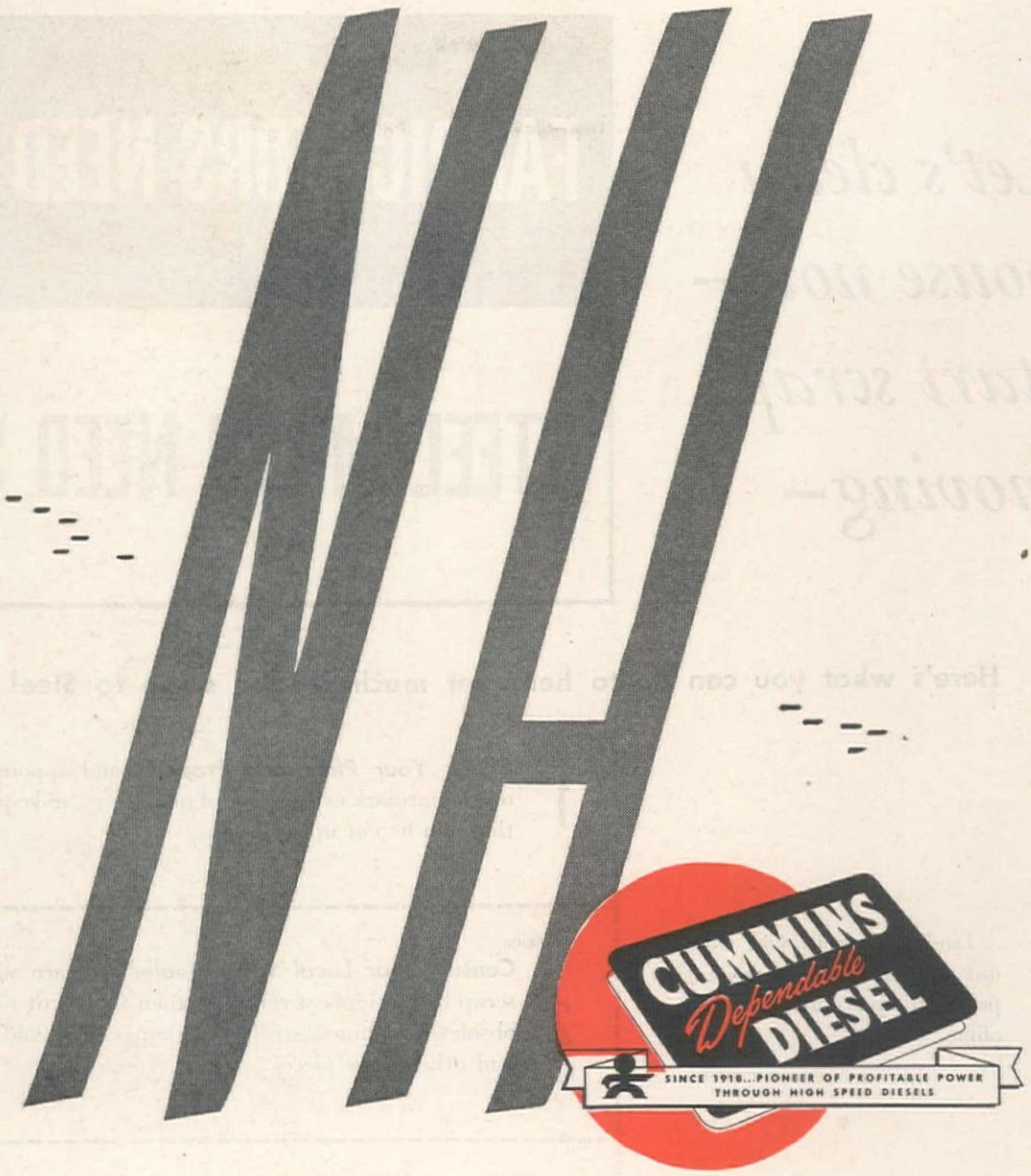
Cummins Power can do the same kind of a job for you. Ask your Cummins Dealer to show you how Cummins Diesels have proved themselves on jobs in *your* vicinity.

Visit the Cummins exhibit at the 1948 Road Show —Booth 1011.

Model NHB-600 Cummins Diesel Engines power these 30 Peterbilt tractor trucks used by Macco Corporation and Morrison-Knudsen Company, Inc., on the San Francisco Airport improvement project.



CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA



Maximum Power . . . Minimum Weight

Maximum power . . . 275 horsepower in 743 cubic inches of displacement in a compact engine. Minimum weight . . . only 10.36 pounds per horsepower.

Faster round trips and bigger payloads result from this increased horsepower, low weight and compact design. The Exclusive Cummins Fuel System and other tested features of the Cummins line combine to make Series NH engines a high point in the modern diesel trend.

The supercharged Cummins Model NHBS-600 is rated at 275 hp maximum at 2100 rpm . . . Model NHB-600 is rated at 200 hp maximum at 2100 rpm. These engines are working on jobs like yours, near you. Ask your Cummins Dealer for actual operating records.

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA

Let's clean house now— start scrap moving—

FABRICATORS NEED STEEL

STEEL MILLS NEED SCRAP

Here's what you can do to help get much-needed scrap to Steel Mills.

1 ***Check Your Plant and Property*** and appoint someone to earmark every piece of machinery and equipment that can be cut up for scrap.

2 ***Consult Your Local Scrap Dealer*** to learn what size scrap brings highest returns—then flame-cut to size all obsolete machines, structural shapes, pipe, old boilers, and other large pieces.

3 ***Classify and Segregate*** alloy steels and other special materials to be sure they are used to best advantage and to obtain higher prices.

4 ***Move Scrap Fast*** when it is ready. Sell it, ship it—keep it moving.

Linde can help you work out a practicable scrapping program—just call our nearest office.

•

To help you identify the common metals for proper scrap classification, we will be glad to send you, without charge, as many copies as you need of the wall charts "Identifying Metals by Spark Testing" (ask for form 4666) or "Simple Tests for Identifying Metals" (ask for form 2299).

THE LINDE AIR PRODUCTS COMPANY

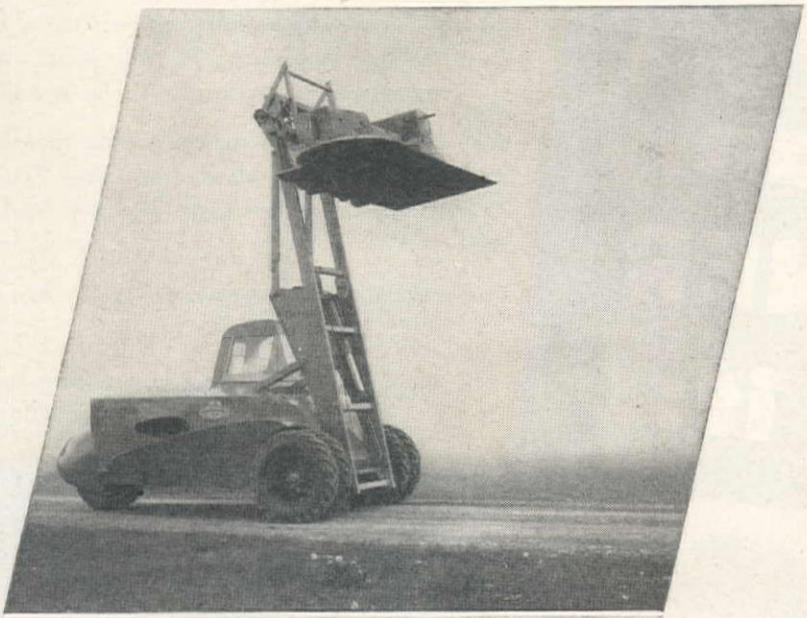
Unit of Union Carbide and Carbon Corporation

30 E. 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

WAGNERMOBILE®
MIXERMOBILE MANUFACTURERS
DUO-WAY LIFT

A NEW IDEA in Heavy Materials Handling



The problem of visibility and operator convenience has been solved by Mixermobile in the new WAGNERMOBILE DUO-WAY LIFT by placing the driver crossways. The usual poor visibility forward and behind now becomes GOOD VISIBILITY right or left.

LIFTING CAPACITY . . . . 16,000 lbs.

TOTAL WEIGHT . . . . . 14,500 lbs.

TRACKS . . . . . 16-ft. or 18-ft. Track folds down hydraulically with full operation at any point between vertical and horizontal . . . any height between 9½ ft. and 18 ft.

CONTROLS . . . . . Hydraulic

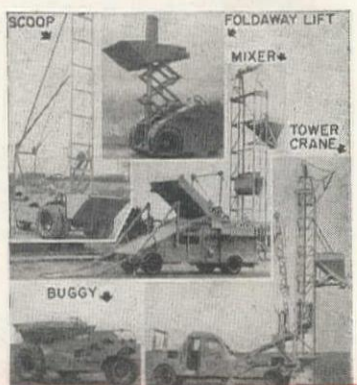
TRACK TILT . . 7° forward—15° back

OPERATING SPEED . Up to 30 M.P.H. 4 speeds both directions.

A New Member of the Famous

WAGNERMOBILE®
MIXERMOBILE MANUFACTURERS

FAMILY OF PRODUCTS



★ **See** this equipment at the ROAD BUILDERS SHOW, July 16-24, Chicago, Ill. Concession 3809 South Concourse.

MIXERMOBILE DISTRIBUTORS, Inc.

6828 N. E. HALSEY, PORTLAND, OREGON

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- **Rhodes and Jamieson, Ltd. 333-23rd Avenue Oakland 4, Calif.**
- **Constructor's Equipment Co. 3707 Downing St. Denver, Colorado**
- **Heiner Equipment and Supply Co. 501 West 7th So. St. Salt Lake City, Utah**
- **Lively Equipment Co. 2601 N. Fourth St. Albuquerque, N. M. and El Paso, Texas**
- **Neil B. McGinnis Co. P. O. Box 3615 Phoenix, Arizona**

let an OWNER tell it:

C. V. Crites, of S. M. Crites Co., Roseburg, Oregon, makes this statement—and you'll find real meat in it:

"I am continually amazed at the performance of our D4 equipped with Traxcavator. That digger has done tough work for us, time after time, in hard shale rock.

"The forward push of the tractor is mighty effective in getting a full load. Also, the Traxcavator will handle large boulders.

"In loading practically any material from plain earth to hard rock, the Traxcavator will put more yardage into the trucks."

Signed — C. V. CRITES

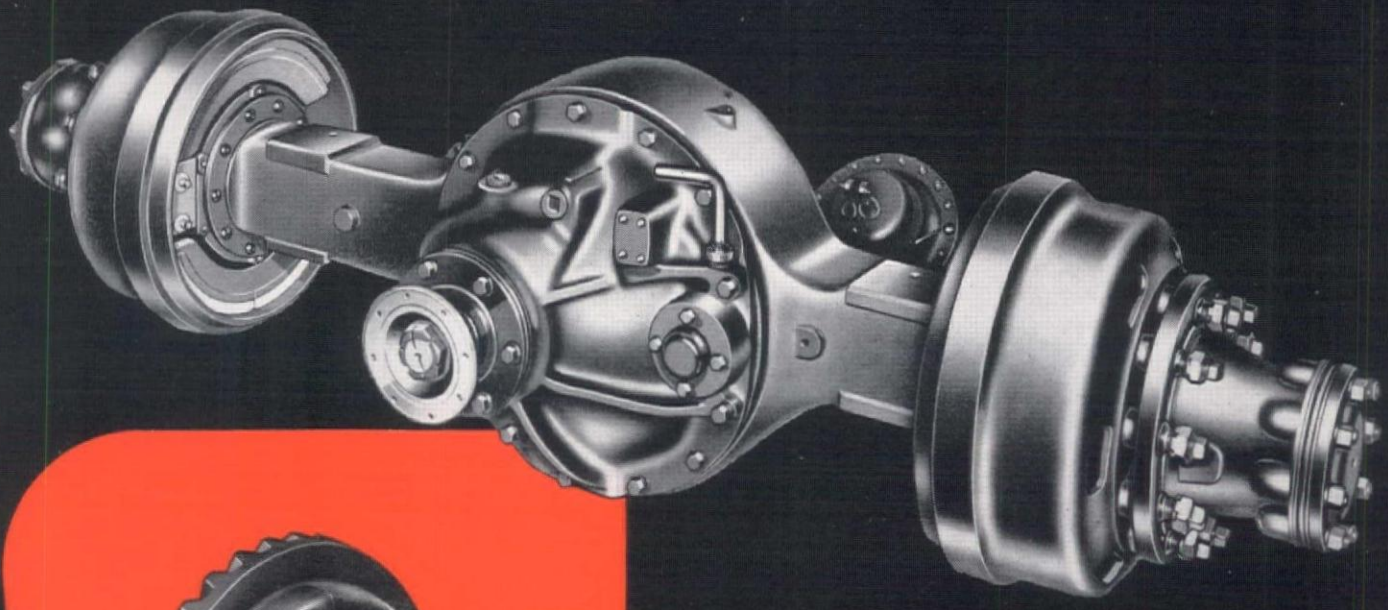
CATERPILLAR TRACTOR CO., San Leandro, Calif.; Peoria, Ill.

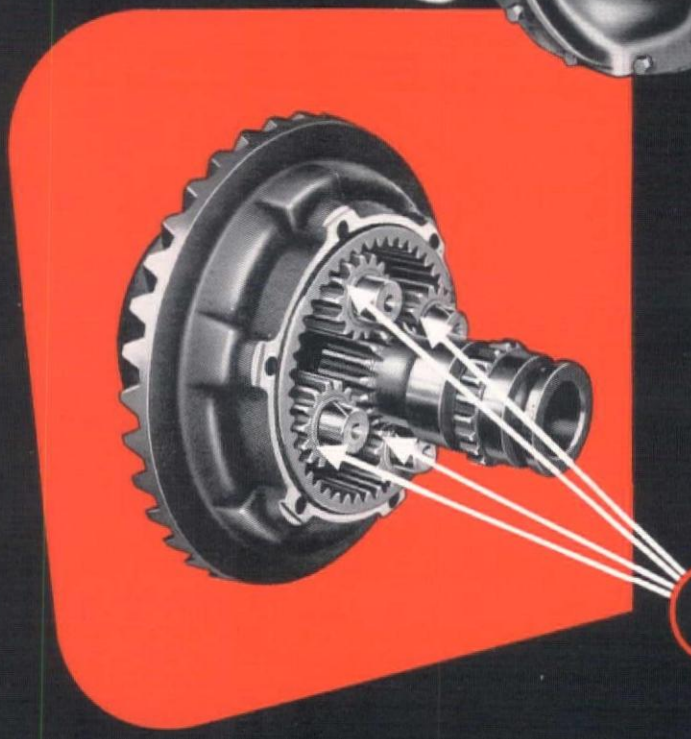
Note how forward push of "Caterpillar" Diesel D4 Tractor enables Traxcavator shovel to take a deep bite.

The D4 Traxcavator unit moves fast, loads fast to pile up yardage.

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL
ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

EATON *2-Speed Truck* AXLES





Stand up Longer because Tooth Load is Distributed over 4 Planetary Gears

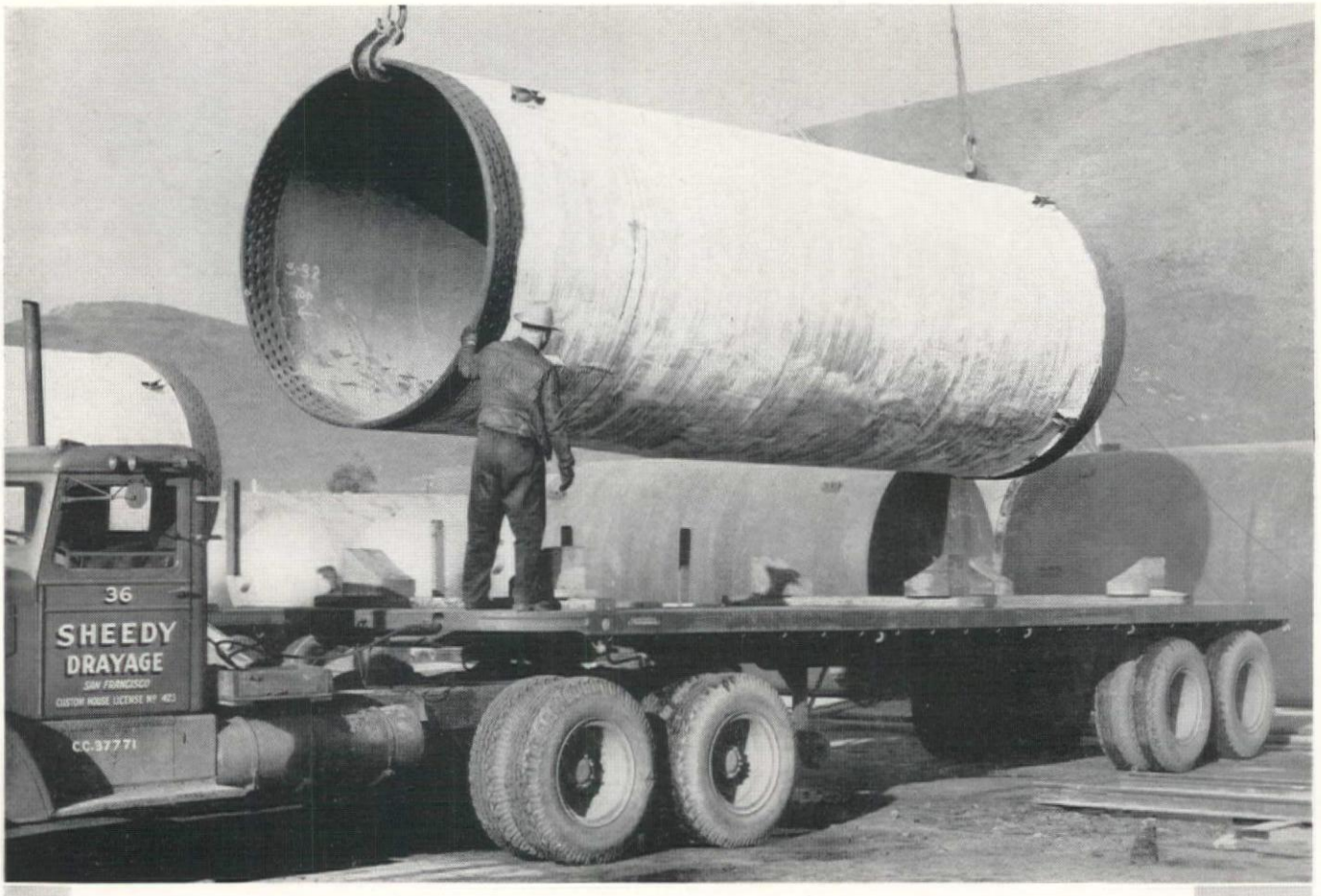
With 4 gears to transfer power, the rugged planetary system in the Eaton 2-Speed Truck Axle provides far greater gear tooth contact. Tooth-loads are distributed, and the load on the teeth is held to a minimum. Direct advantages of this design are reduced wear, longer axle life, and minimum upkeep. Outstanding performance records are proof of Eaton quality and design. See your truck dealer for complete information about Eaton 2-Speed Truck Axles.

NEARLY A MILLION EATON 2-SPEED AXLES IN TRUCKS TODAY

EATON MANUFACTURING COMPANY

Axle Division

CLEVELAND, OHIO



Jos. D. Sheedy Buys FIVE Trailmobiles

The Jos. D. Sheedy Drayage Company of San Francisco specializes in the transportation of all types of heavy construction materials such as contractors' machinery, concrete and steel pipe, fabricated sections for buildings, bridges and dams; poles and piling—in fact, anything that must be hauled from docks or rail's end or factory to a construction project.

In his fleet of heavy hauling equipment Sheedy has five TRAILMOBILES, which he says really stand the gaff in the kind of service he renders. He especially likes the sturdy construction of his 35' TRAILMOBILES, and the way the bed remains level when loading or unloading heavy materials. "When they say that TRAILMOBILES are the 'easy pulling trailers'—they are not fooling," says Joe Sheedy in appraising the performance of his TRAILMOBILES.

PIPE HAUL

The picture above shows a section of steel pipe, 102" in diameter and weighing 28 tons, being loaded onto a TRAILMOBILE which will carry it from South San Francisco to Jackson, California.

THE TRAILMOBILE COMPANY
BERKELEY, CALIFORNIA

TRAILMOBILE

LOS ANGELES • SANTA BARBARA • BERKELEY • SACRAMENTO • SANTA ROSA • FRESNO • SAN JOSE • BAKERSFIELD • STOCKTON
EUREKA • SAN DIEGO • SEATTLE • SPOKANE • PORTLAND • HONOLULU

Just the Job
FOR A HEAVY DUTY GMC

and *here's what we mean by* Heavy Duty

Over-the-road or off-the-highway hauls of big loads of stone, sand, gravel and other construction materials are jobs for heavy, rugged trucks. They are jobs that GMC heavy duty trucks perform with outstanding efficiency, economy and trouble-free service.

For GMC heavy duties are built to stand the gaff of day-after-day heavy hauling work . . . with heavyweight big-truck axles, frames, transmissions, clutches, brakes, and gasoline and Diesel engines especially designed for hauling gross weights up to 90,000 pounds.

You'll save money on your heavy hauling by putting your money into a heavy duty GMC. Many models are now available for quick delivery. See your GMC dealer.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

THE TRUCK OF VALUE

GMC TRUCKS

GASOLINE • DIESEL


See what's NEW
in EXCAVATING . . .
HAULING . . . CONCRETE
AND MATERIALS-
HANDLING EQUIPMENT
KOEHRING • PARSONS
Milwaukee 10, Wisconsin
Newton, Iowa
Koehring Subsidiary

Don't miss this big EQUIPMENT "FAIR"

YOU are due for a big surprise at the 1948 Koehring equipment fair. In one big round-up of excavating, hauling, concrete and materials-handling equipment, you are going to see accumulated postwar changes and cost-cutting improvements in more than 25 modern machines from the complete line of Koehring and subsidiary products. In the exhibit you are going to preview many completely new machines . . . revolutionary developments that will start you figuring for new lower costs and bigger profits.

It's an event you can't afford to miss!

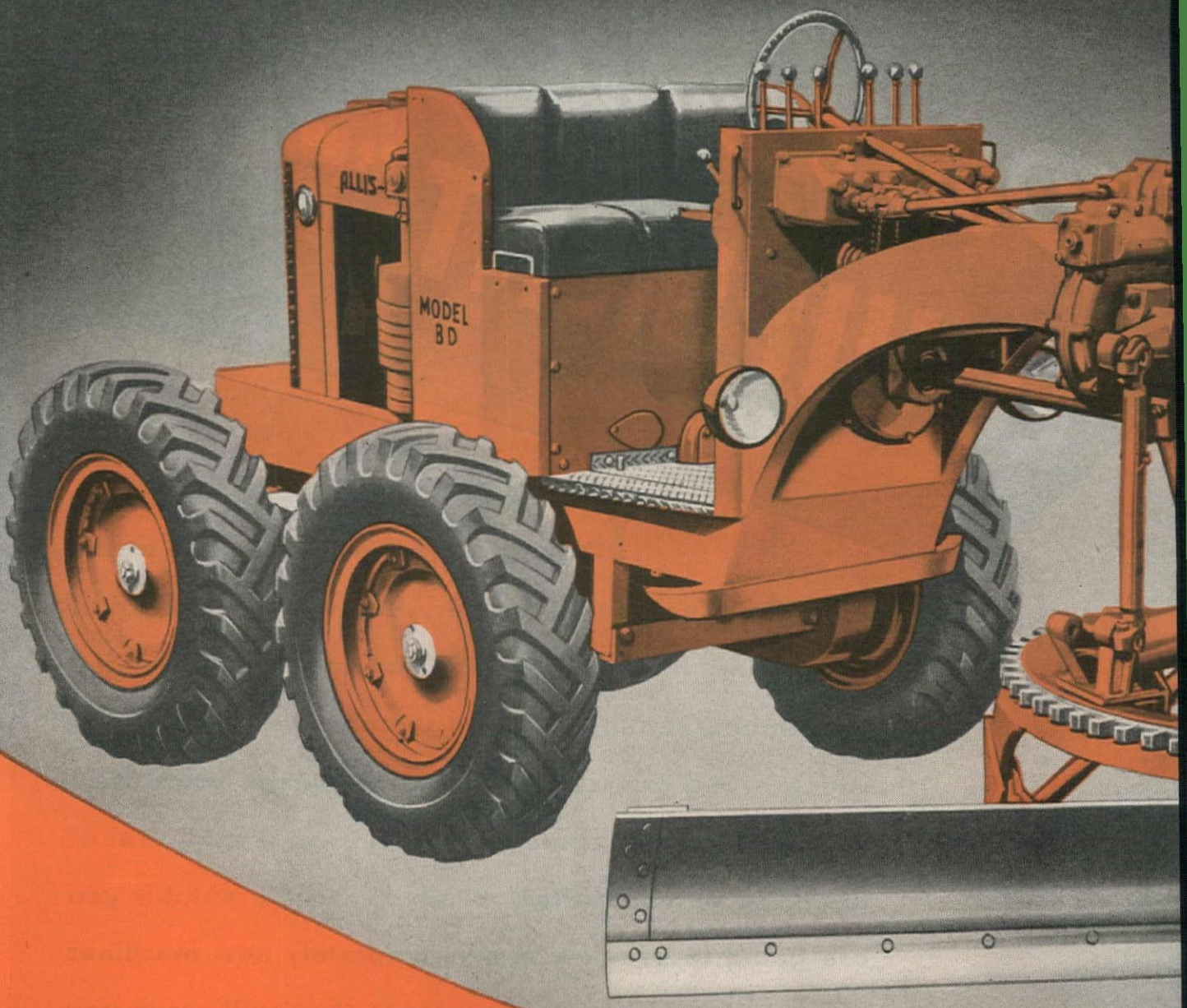
Time: July 16-24 *Place:* Soldier Field, Chicago Exhibit Booth 3010 *Event:* 1948 Road Show

•JOHNSON • KWIK-MIX

Champaign, Illinois
Koehring Subsidiary

Port Washington, Wisconsin
Koehring Subsidiary

Medium Size Motor Grader



BRINGS YOU . . .

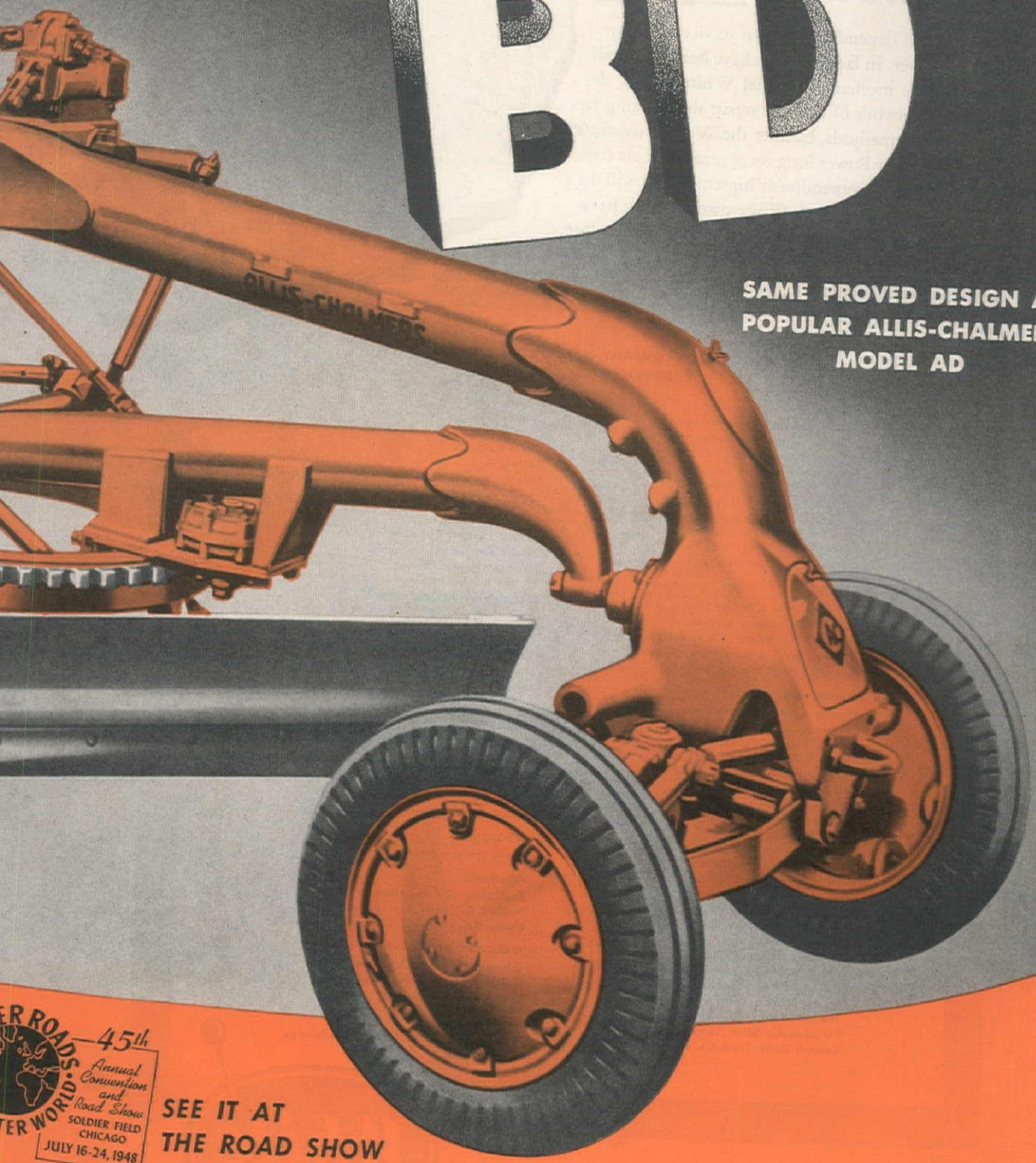
HEAVY-DUTY PERFORMANCE WITH NEW ECONOMY

- HORSEPOWER: 50.5 brake. General Motors 2-Cycle Diesel Power.
- WEIGHT: 17,300 lbs.— balanced for maximum traction and control.
- SPEEDS: Six forward—1.30 to 14.69 m.p.h. Three reverse—1.55 to 5.41 m.p.h.
- Exclusive Tubular Frame.
- 28-inch working throat clearance — 22-inch axle clearance.
- 12-foot "Roll-Away" Moldboard — 360° turning radius.
- Full Blade Visibility; Simplified Maintenance; Comfortable Platform; Rigid Steering Control.

LOW OPERATING COST • SUPERIOR PERFORMANCE • DEPENDABLE SERVICE

The New ALL-PURPOSE

BD



SAME PROVED DESIGN AS POPULAR ALLIS-CHALMERS MODEL AD

45th Annual Convention and Road Show
SOLDIER FIELD
CHICAGO
JULY 16-24, 1948

SEE IT AT THE ROAD SHOW

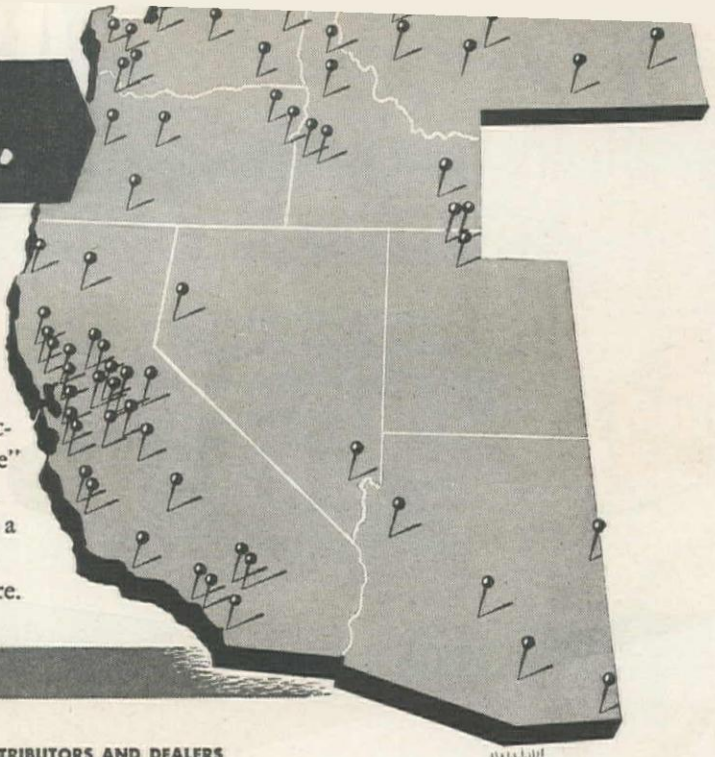
ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

EXPANSION...

highlighted by service

Complete and dependable White service is today better than ever. In fact, facilities have been doubled! Skilled White mechanics, special White testing devices and a network of modern repair shops, using factory approved methods, blanket the West. "Insurance" that White Super Power long recognized for low cost performance over tremendously high mileages will do a superior job year after year. White owners today have greater opportunity for better service than ever before.



WHITE MOTOR COMPANY DISTRIBUTORS AND DEALERS
PACIFIC COAST REGION

WASHINGTON
M. L. Wakefield Motors, Aberdeen
Industrial Supply Co., Bellingham
Osborne Motors, Centralia
Murphy White Trucks, Inc., Seattle
Anderson Sales Co., Walla Walla
Jones-White Truck Co., Spokane
McCoy Auto Company, Vancouver
Tyrrell Motors, Wenatchee
Tacoma White Trucks, Inc., Tacoma
Gale Brothers, Yakima

OREGON
Walker's Truck & Trailer Service, Albany
Gunderson Brothers, Eugene
West-Hitchcock Corp., Klamath Falls
Owyhee Mach. & Supply Co., Ontario
Factory Branch, Flint & Hancock Sts., Portland

CALIFORNIA
Southern Garage, Bakersfield
James S. Cloney & Sons, Eureka
Fresno Trailer Co., Fresno
Harry R. Scott, King City
Sawyer Motor Company, Long Beach
Kaljian Motor Co., Los Banos
Zentner Motor Company, Merced
William J. Silva Co., Modesto
P. E. Van Pelt, Oakdale
Routzan White Truck Sales, Oakland
Cochran & Nichols, Ontario
Coast Truck Sales & Service Co., Oxnard
John L. Boitano, Petaluma
Wm. A. Bystle, Redding
Briggs & Elliott, Riverside
The Ball Motor Co., Sacramento
Hanson Auto Co., Salinas
J. R. Townsend Company, Inc., San Diego
C & L Motor Co., San Jose
Master Brake Service, San Luis Obispo
The Miller Motor Co., Santa Rosa
Riedel Motor Sales, Sonora
Connell Motor Truck Co. Inc., Stockton
J. Levand, Tracy
Chase's Garage, Ukiah
Chris C. Hansen, Watsonville
Abele Motor Co., Woodland
Factory Branch, 400 E. Washington, Los Angeles
Factory Branch, 8th & Harrison St., San Francisco

IDAHO
Idaho Mach. Co., Boise
Farmer's Supply Co., Caldwell
Perl H. Dye Co., Grangeville
Robinson Motors, Kellog
Truck & Bus Equip. Co., Pocatello
Jackson Auto Service, Roberts

UTAH
Russell's Inc., Logan
Lindner & Wood White Motor Sales, Salt Lake City
Lilenquist Bros., Tremonton
Jones-Crawford Motor Co., Cedar City

NEVADA
Dennison Tractor & Supply Co., Reno

ARIZONA
Williston & Ireland, Kingman
Truck Equip. Co., Phoenix
Whiting Brothers, St. Johns
Hub Motor Co., Tucson

WYOMING
Routh Brothers Motor, Rock Springs

MONTANA
Beck Motor Co. Inc., Helena
Nybo & Company, Inc., Missoula
Kalispell Service Co., Kalispell

TERRITORY OF HAWAII
Schuman Carriage Co., Honolulu
Maui Motors, Wailuku, Maui
Island Motors, Ltd., Hilo

ALASKA
Airport Mach. & Storage Co., Anchorage

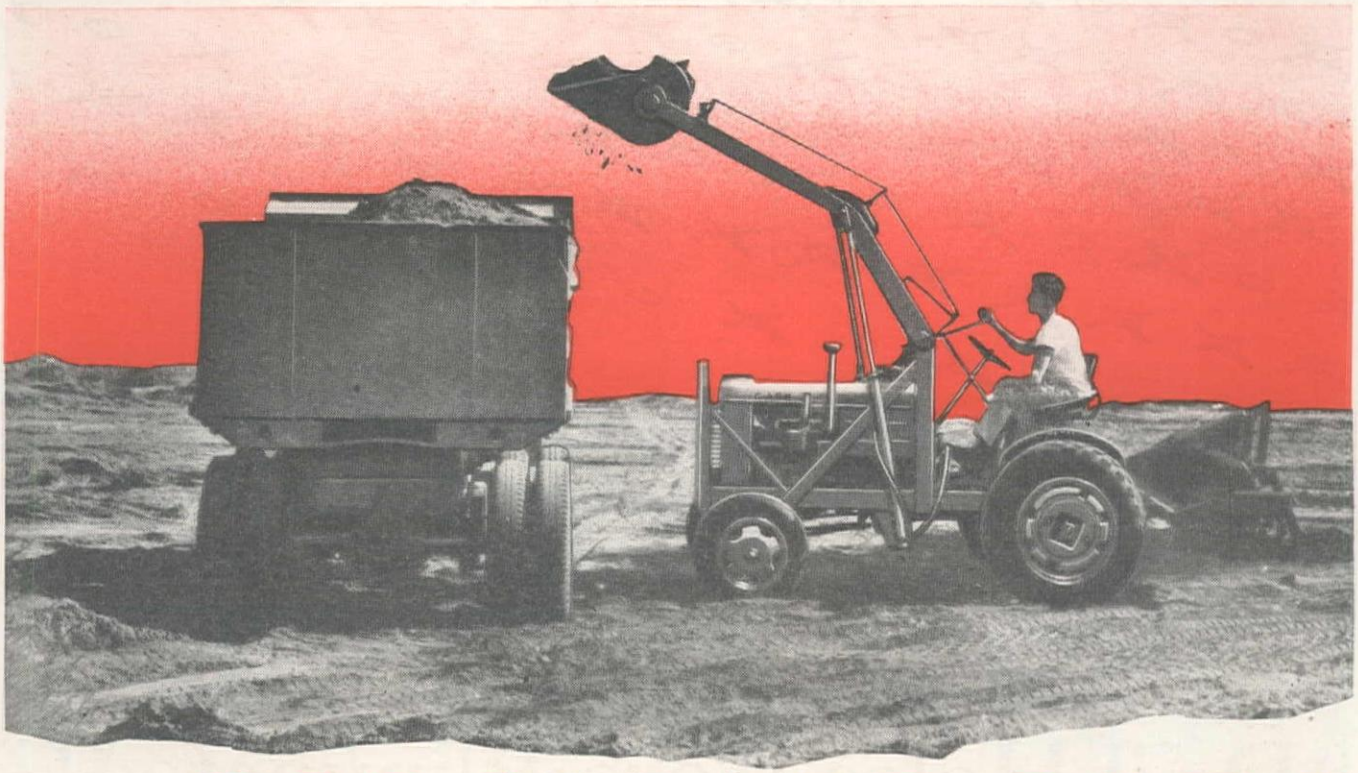
White

THE WHITE MOTOR COMPANY • CLEVELAND

Pacific Coast Branches and Dealers in all the important cities

FOR MORE THAN 45 YEARS THE GREATEST NAME IN TRUCKS

STRIKES PAY DIRT



···ON SMALL JOBS

Do you want the mobility and man-saving ability of tractor-mounted loaders, earth augers, scarifiers, dig-and-carry scrapers? Do you want them all in a "junior size" to work on small jobs, in close quarters, and with a modest investment? Well, here they are!

Not only the units shown, but other types and makes of modern mounted equipment are especially engineered for the Case Model "VAI." Smallest of the Case industrial tractors, this not-too-little model has Case strength to stand up under job-proved equipment, responsive power to surge ahead swiftly or do delicate jobs deftly.

It's the same "VAI" that powers the famous Case Highway Mower. It has proved its ENDURANCE pushing snowplows, pulling all kinds of loads. Call your Case industrial dealer for full information. J. I. Case Co., Racine, Wis.

CASE

Your Case industrial dealer

STATE TRACTOR & EQUIPMENT CO.
Phoenix, Arizona
BROWN-BEVIS EQUIPMENT CO.
Los Angeles, Calif.
COAST EQUIPMENT CO.
San Francisco, Calif.
LIBERTY TRUCK & PARTS CO.
Denver, Colorado
WESTERN EQUIPMENT CO.
Boise, Idaho and Spokane, Wash.
HILTON'S INC.
Las Vegas, New Mexico
NELSON EQUIPMENT CO.
Portland, Ore. — Seattle, Wash.
ROBISON MACHINERY CO.
Salt Lake City, Utah
WORTHAM MACHINERY CO.
Cheyenne, Sheridan and Greybull, Wyoming

More than Half of These Drill-Holes Were Eliminated!

This story will sound almost unbelievable to many quarry, construction and mining men accustomed to ordinary methods of blasting.

A reduction of over 50% in drilling costs and dynamite costs! That's the experience of a well-known Tennessee limestone quarry—due to using the original Rockmaster Blasting System developed by Atlas.

This quarry had made a practice of spacing drill holes on 4-foot centers. Hundreds of holes had been drilled in advance for seven-row shots. When the Rockmaster system was introduced, our representative recommended loading only every other hole and every second row. His suggestion was adopted, as shown in the diagram. Over 70% of the holes already drilled were left unloaded!

Results were astounding. Breakage was *exceptionally good*, better than had ever been obtained before! Future plans call for drilling holes on 8-foot centers (or even greater.)

Of course, results vary according to the problems of the job. But this is no isolated case of economy. Hundreds of engineers are praising the Rockmaster system for greatly increased fragmentation of burden, for increasing production and cutting costs. At the same time, Rockmaster cuts down on objectionable noise and vibration in many instances.

The Rockmaster system is based on millisecond delays between holes, accurately controlled by Rockmaster electric detonators. Explosives and methods of loading are a part of the system, so that each shot is tailor-made to suit requirements.

Call in the Atlas representative and ask him what Rockmaster can do for *you*.

ROCKMASTER GIVES YOU THE GREATER SAFETY OF MANASITE DETONATORS

Less Bark... More Bite

"ROCKMASTER"—Trade Mark
Manasite: Reg. U. S. Pat. Off.

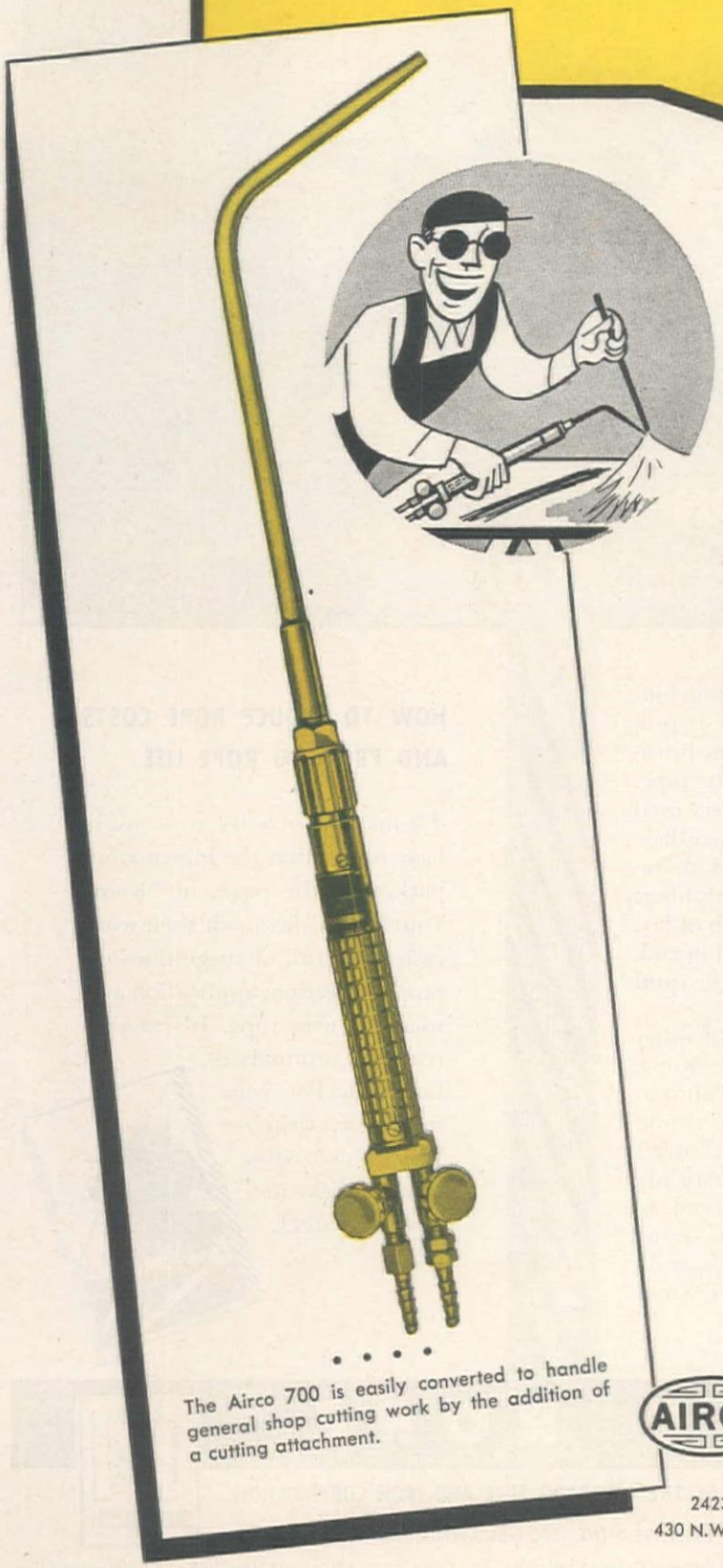
Offices in Principal Cities

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

SAN FRANCISCO 4, CAL. ATLAS POWDER COMPANY SEATTLE 1, WASH.

Announcing the New Airco 700 Welding Torch



The Airco 700 is easily converted to handle general shop cutting work by the addition of a cutting attachment.

. . . DESIGNED TO HANDLE 90% OF YOUR WELDING AND BRAZING JOBS

Before designing the new Airco 700 Torch, we asked shop operators and welders what features they wanted in a welding torch. The new "700" incorporates their recommendations and those produced by Airco research engineers. Salient features are:

Wide Operating Range . . . The Airco 700 Torch is available with a wide selection of tips for use on almost any welding job from thin sheet metal up to two inch plate. Equipped with a multi-flame tip, it is unbeatable for silver and aluminum brazing.

Better Flame Control . . . The Airco 700 Torch is available with tip assemblies which range from Nos. 00 thru 10. Each welding tip is assembled with a mixer drilled for that particular size of tip. This means finer flame control . . . there is no sputtering —better welds result.

Low Maintenance Costs . . . The Airco 700 Torch has a head of durable, long-wearing monel metal. This means fewer replacements and also lower maintenance costs because rarely is reseating required.

Perfect Balance . . . The Airco 700 Torch (with a No. 5 tip) weighs only 19½ ounces and is 16½ inches in length. Equipped with 3/16" I.D. hose, the "700" eliminates heavy hose drag, and reduces operator fatigue.

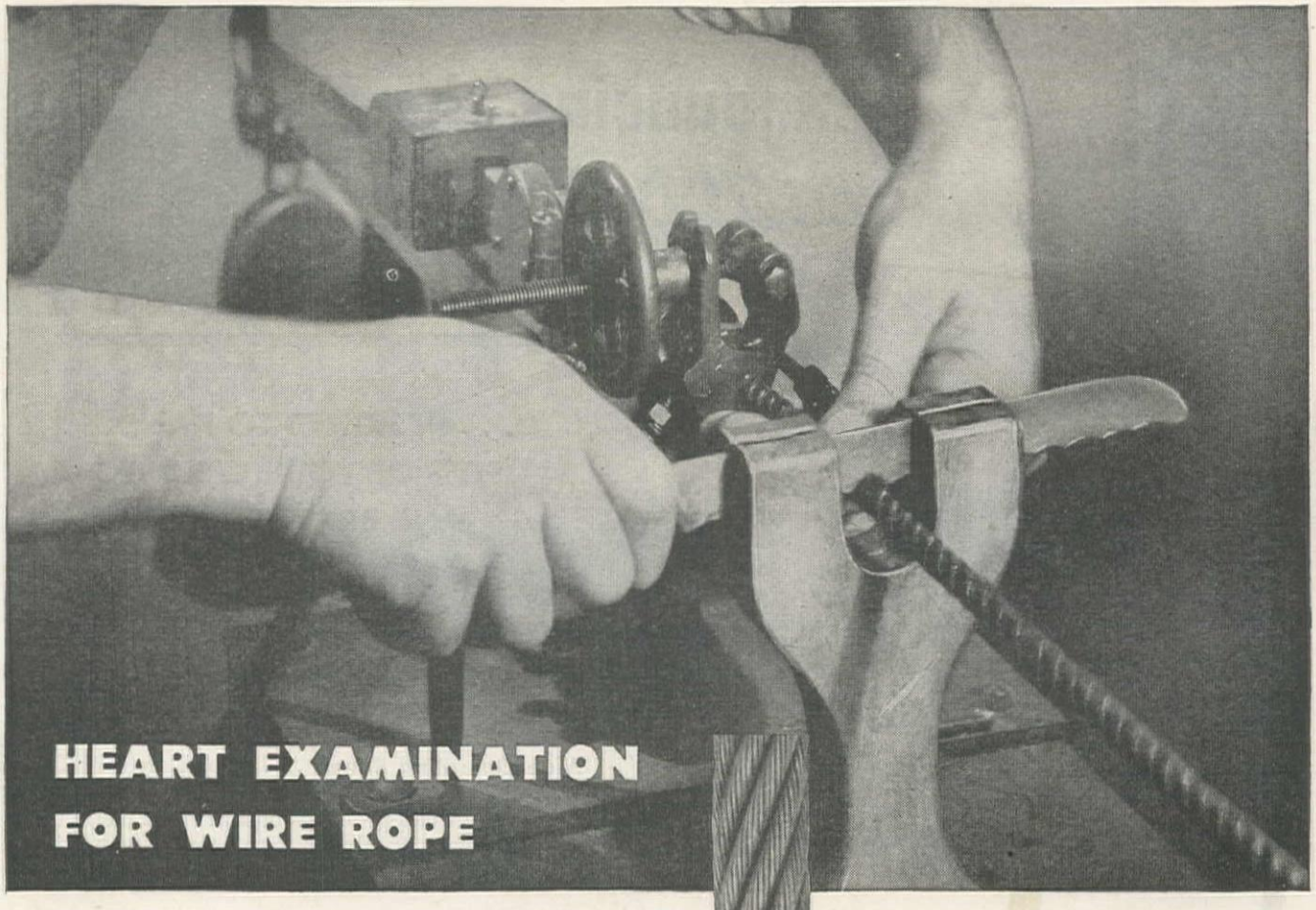
For heavier jobs, Airco also has available a Series 800 Torch which is comparable to the "700" in both appearance and operating characteristics.

If you would like to have either the "700" or "800" demonstrated in your shop . . . or if you desire more information about these torches, write your nearest Airco Pacific Office.

AIRCO **AIR REDUCTION PACIFIC COMPANY**

2423 E. 58th St., Los Angeles and 1485 Park Ave., Emeryville, Calif.
430 N.W. 10th Ave., Portland, Ore. 3623 East Marginal Way, Seattle, Wash.

Western Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories



HEART EXAMINATION FOR WIRE ROPE

The fiber core in the heart of wire rope serves a fourfold purpose. It acts as a support for the wire strands. It provides flexibility. It cushions impact loads. It stores lubricant and feeds it to the strands during the life of the rope.

Because of these important functions, the centers used in Wickwire Rope must pass exhaustive tests at the cordage manufacturer's plant and in Wickwire's Testing Laboratory. Centers must be made of the highest quality fiber; absolutely uniform in diameter, density and length of lay. The rope must be lubricated to the point of saturation and, where called for, an identifying marker tape must be spun into the rope.

Tough specifications? Sure! But so are scores of other tests made during the manufacture of Wickwire Rope. That's why more and more rope users are finding out that you can't beat Wickwire Rope for performance, safety and long rope life. And as for service—Wickwire Distributors and Wire Rope Engineers in key cities everywhere are ready to help solve your wire rope problems and to provide prompt delivery of Wickwire Rope from strategically located warehouse stocks. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed.

HOW TO REDUCE ROPE COSTS AND PROLONG ROPE LIFE

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write — Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Mass.

WICKWIRE ROPE

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

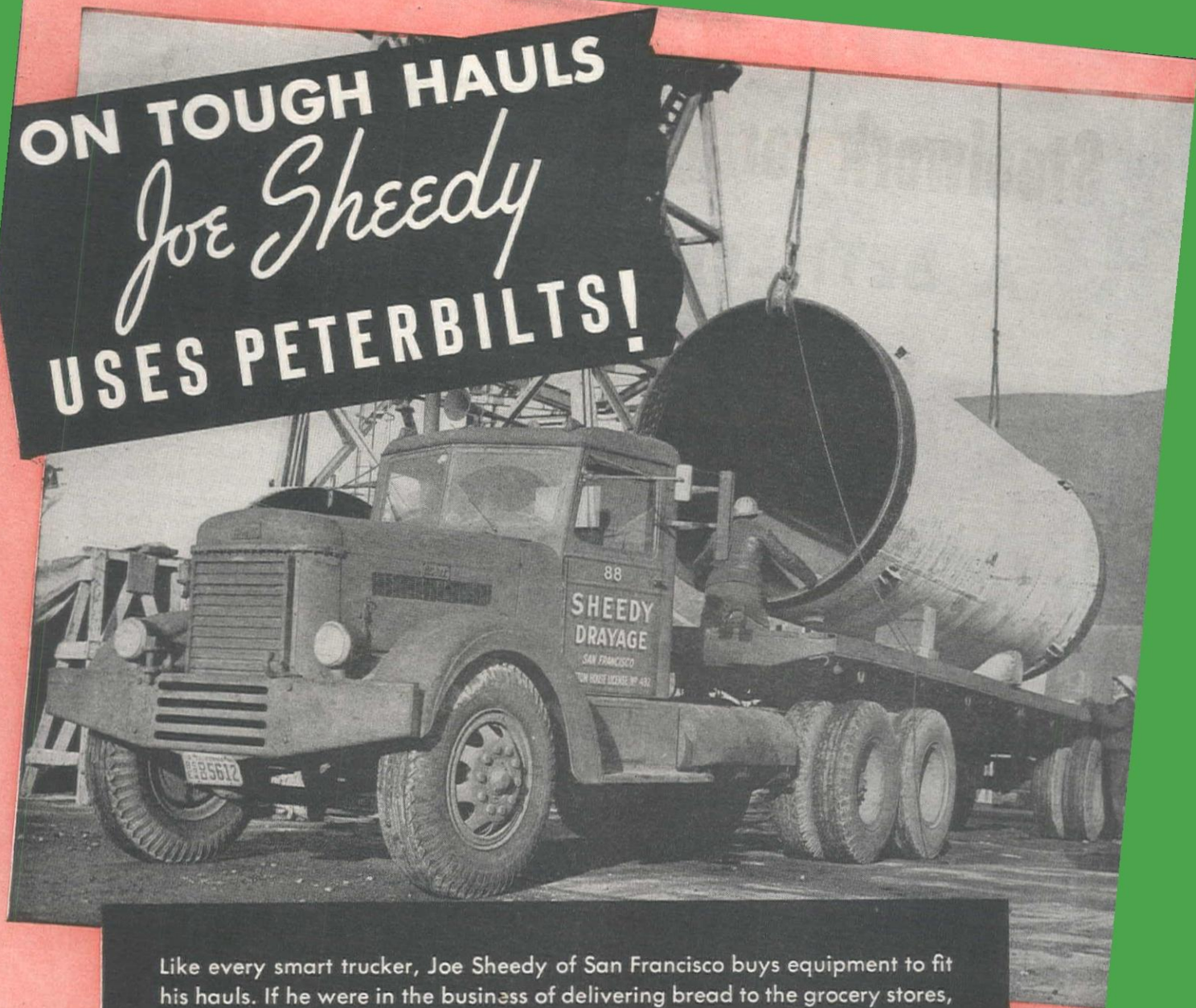
CF&I & SUBSIDIARIES

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Fort Worth • Houston • New York • Philadelphia • Tulsa

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corp., Oakland 6, Cal.

ON TOUGH HAULS *Joe Sheedy* USES PETERBILTS!



Like every smart trucker, Joe Sheedy of San Francisco buys equipment to fit his hauls. If he were in the business of delivering bread to the grocery stores, he would have a fleet of light panel trucks to give quick service on such light weight merchandise. But hauling light weight materials is not Sheedy's dish —he goes in for the heavy stuff. He specializes in hauling construction equipment throughout northern California, and he must have trucks that will pull heavy, concentrated loads over the flat beds of the interior valleys, and up the steep adverse grades of California mountain ranges.

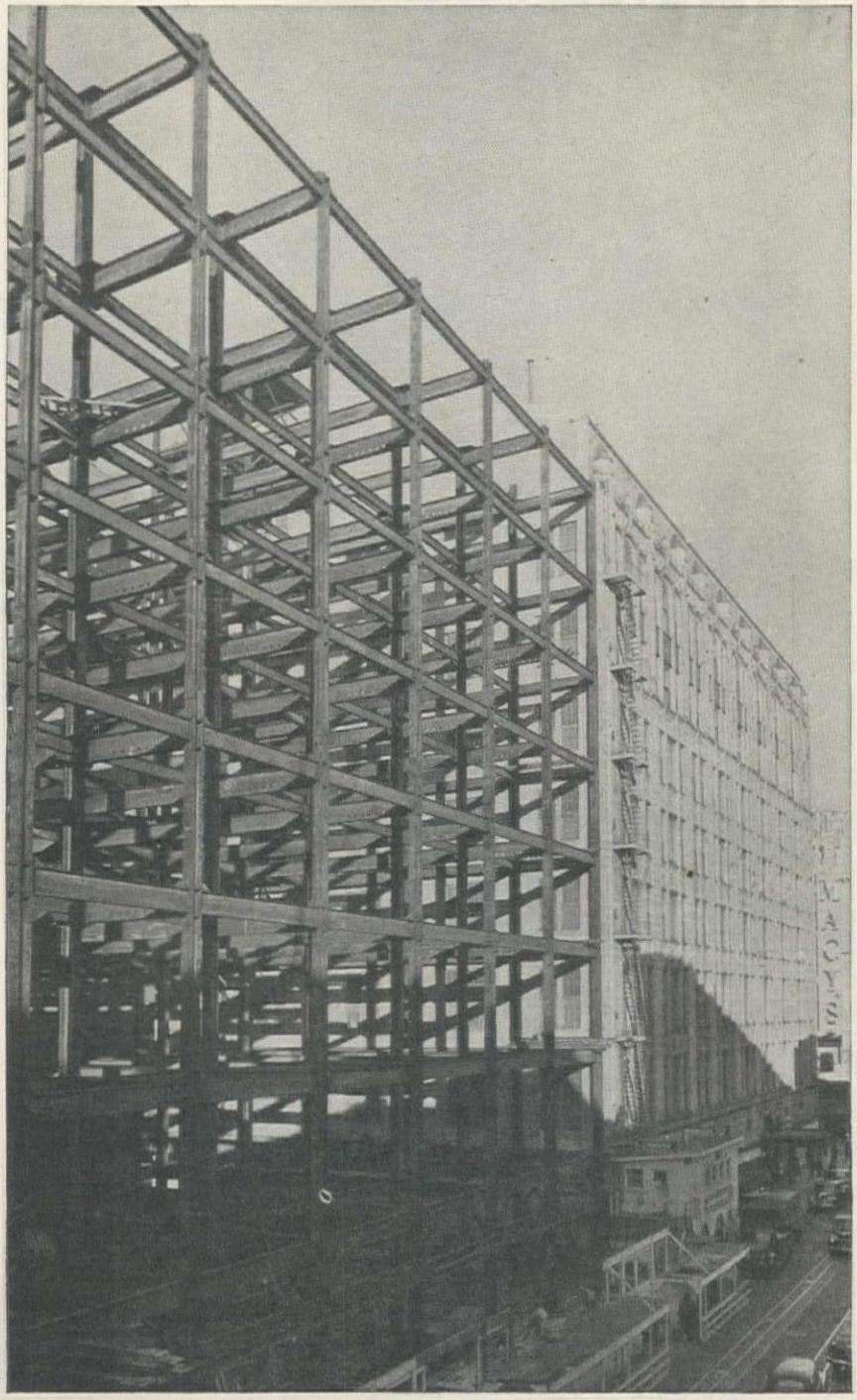
Joe Sheedy has six big PETERBILTS which he uses on his tough hauls. He has been using PETERBILTS since 1940 and knows that he can depend on the PETERBILTS to pull their heavy loads to destination in a minimum elapsed time. The picture above shows one of Sheedy's PETERBILTS being loaded with a section of steel pipe, measuring 102" in diameter and weighing 28 tons, which is being hauled from San Francisco to a new power project near Jackson, California.

Peterbilt Motors Company

107th AVENUE AND MacARTHUR BOULEVARD • OAKLAND, CALIFORNIA

Steelwork for MACY'S of San Francisco

A BETHLEHEM PACIFIC JOB



The 8-story building annex shown under construction will be occupied by Macy's of San Francisco, one of the world's great department stores.

Located on O'Farrell Street next to their present building, this addition will approximately double Macy's former floor area.

Among the important engineering features of this structure is the elimination of many interior columns on the lower levels. The use of unusually large steel girders between the first and second story provides broad unobstructed areas. This will allow more merchandising space on the first floor and clear dock space for delivery trucks in the basement.

The general contract for the building was handled by the Dinwiddie Construction Co. The 1921-ton steel framework was fabricated and erected by Bethlehem Pacific.

Bethlehem Pacific, with fabricating plants at South San Francisco, Alameda, and Los Angeles, is well equipped to handle steelwork on any scale in any western locality.

◀ New building for Macy's of San Francisco. First floor will be free of interior columns. Basement will be provided with ramps and turntables for delivery trucks.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Honolulu

BETHLEHEM PACIFIC

★ BETHLEHEM STEEL ★

DON'T MISS IT!

PLAN to Come to THE GREATEST SHOW ON EARTH! for the CONSTRUCTION INDUSTRY

ALL ROADS LEAD TO THE UNIT EXHIBIT

UNIT will show the most complete line of Excavating and Material Handling Equipment ever before assembled.

Continuous demonstrations of every UNIT machine . . . with every possible attachment . . . Shovel, Clamshell, Trenchoe, Dragline, Crane, Magnet, Elevator, etc.

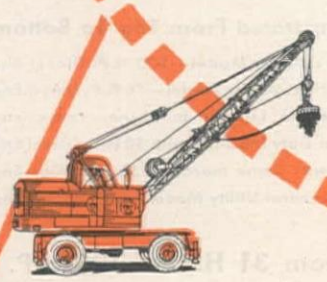
A display of the latest and most modern Truck Mounted . . . Crawler . . . Self-Propelled Mobile equipment in the industry.

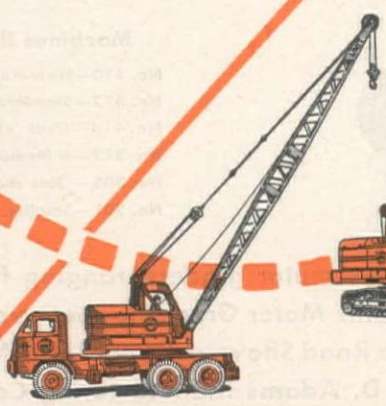
SEE THE
UNIT Exhibit
at the
ROAD SHOW
Soldiers' Field . . . Chicago
July 16-24, 1948

ARBA

UNIT

VISIT UNIT
South Concourse
Space 3815-3206A





9 DAY SHOW

The chance of a lifetime for you to get better acquainted with UNIT quality and versatility.

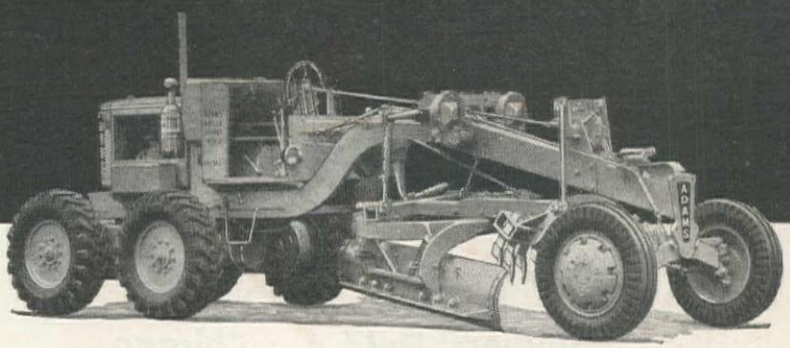
You are cordially invited to visit the UNIT exhibit ANY day . . . or EVERY day, during the show.

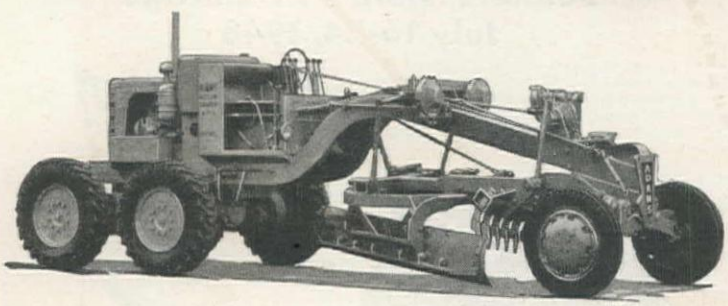
UNIT CRANE AND SHOVEL CORP., Milwaukee 14, Wisconsin, U. S. A.

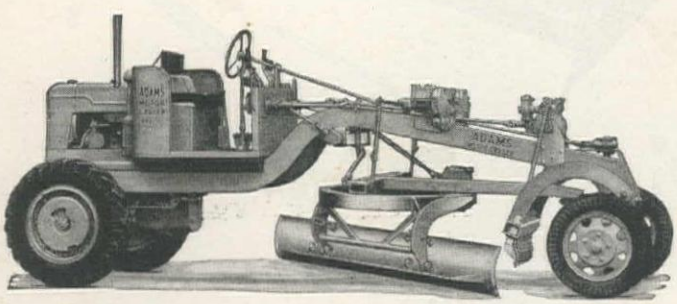
A 5426-1P-C

See Them At The Road Show!

Chicago, Soldier Field, July 16 to 24







ADAMS

The World's Most Complete Line of Motor Graders

Machines Illustrated From Top To Bottom

No. 610—New Heavy-Duty Model—100 H.P. Diesel Engine.
No. 512—Standard Heavy-Duty Model—76 H.P. Diesel Engine.
No. 414—(Not shown) Lighter machine, same engine.
No. 312—A Medium-Duty Machine with 50 H.P. Diesel Engine.
No. 305—(Not shown) Same machine, 50 H.P. Gas Engine.
No. 201—Smaller, General-Utility Model—31 H.P. Gas Engine.

Adams

Adams offers six motor graders, ranging from 31 H.P. to 100 H.P. There's an Adams Motor Grader to meet your needs exactly. If you can't attend the Road Show, ask your local Adams dealer for full particulars . . . J. D. Adams Manufacturing Co., Indianapolis, Indiana.

MOTOR GRADERS · LEANING WHEEL GRADERS · ELEVATING GRADERS

HOW INTERNATIONAL *Specializes* Your Trucks to Loads and Roads

This first step is an analysis of your hauling problem by your International Dealer or Branch.

This analysis includes type of load; method of loading; terrain and grades; and length of hauls.

The amount of payload practicable for your trucks then is determined by the exclusive International Truck Point Rating System.

Your Internationals then are *specialized*—engine power, transmissions, axle ratios and other units and attachments—to fit your trucks to your jobs.

What does this *specialization* add up to?

1. Ability to do *your* hauling jobs right. 2. Dependability. 3. Economical operation. 4. Low maintenance. 5. Long truck life.

The International Truck Line is the most complete line built. It includes 22 basic models that *specialize* into more than 1,000 different types of trucks. Gross weight ratings are from 4,400 to 90,000 pounds.

For details of International Truck *specialization*, and analysis of your jobs by the International Point Rating System, consult your International Dealer or Branch.

Motor Truck Division

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue Chicago 1, Illinois

International Truck Branches located at San Diego, Los Angeles, Long Beach, West Los Angeles, Glendale, Fresno, Sacramento, Oakland, San Francisco, Portland, Tacoma, Seattle, Spokane, Salt Lake City, Denver, Billings and Great Falls.

Tune in James Melton on "Harvest of Stars." CBS Wednesday Night.

INTERNATIONAL

INTERNATIONAL *Trucks*

The most exciting date in Chicago

• Contractors, Excavators, Construction Engineers, Maintenance Men will find their date at the big American Road Builders' Association Show the most exciting date in Chicago this year! It will be a *big* show—better than ever—don't miss it!

SOLDIER FIELD
Chicago

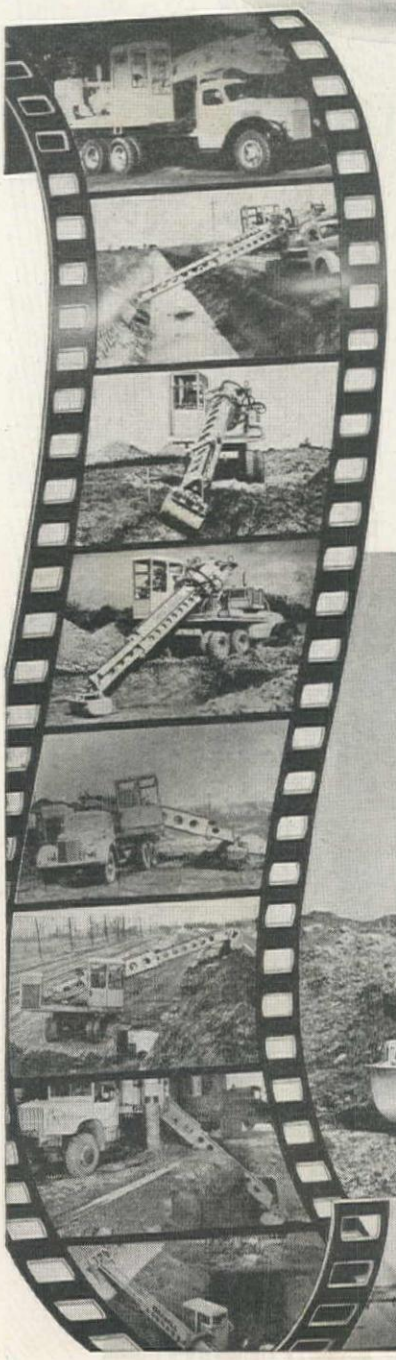
JULY 16-24, 1948

BOOTH 3821

Featuring a great new star in a spectacular personal appearance

THE
WARNER & SWASEY

GRADALL



Here you can *watch the Gradall in action,* see it perform in person, in its special arena where it has a chance to show its speed and maneuverability. Inspect the many interchangeable tools at close range—see how quickly and easily they are attached and detached . . . learn how simple and easy the Gradall is to operate.

Not only will the Gradall perform *in person* but a side show tent will show close-ups of unusual situations in motion pictures taken on actual jobs. Get the facts on how the Gradall can be applied to your job. Don't miss this Show, July 16-24, Soldier Field, Chicago!

The Gradall *in action* . . . star of the American Road Builders' Show

See the Gradall movies packed full of lively action and constructive ideas.

GRADALL
DIVISION
WARNER & SWASEY
Cleveland

Gradall Reg. U. S. Pat. Off.

THE NEW Thor 70-POUND BREAKER

Here's a new Thor breaker so good it will "sell in pairs!"

It's the Thor "24"—a completely new 70-*pound* breaker that answers a big demand for a demolition tool just under the heavy duty class.

More than this, *two* of the new Thor "24's" will operate at full efficiency off one 105 cubic foot compressor . . . *another popular demand!*

The Thor 84-pound "25" leads the heavy duty field . . . the Thor 59-pound "23" outpowers the light duty class. NOW Thor places a great new leader in the 70-pound class.

Watch for full details soon from your Thor distributor.

INDEPENDENT PNEUMATIC TOOL CO.

600 W. Jackson Boulevard, Chicago 6, Illinois
Export Division 330 W. 42nd St., New York 18, N. Y.

Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit Houston Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis St. Paul Salt Lake City Seattle San Francisco Toronto, Canada Sao Paulo, Brazil London, England

Thor PORTABLE POWER TOOLS

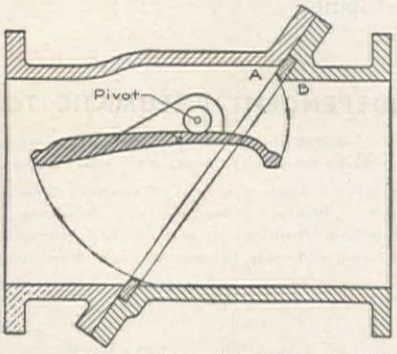
SEE THE NEW THOR "24" AT THE ROAD SHOW

YOU GET A

SMOOTH, EASY CLOSING

WITH

CHAPMAN TILTING DISC CHECK VALVES



Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

The smooth, cushioned closing of Chapman Tilting Disc Check Valves is based on the design of the balanced hinge-pinned disc. When the valve is open, the disc rides evenly in the flow. On closing, the disc seat drops into contact with the body seat *easily* and *quietly*—cushioned by the effect of the stream against the short flap. Vibrations and destructive stresses in pipe lines are thereby reduced.

With this unique check valve, maintenance costs are cut, and head losses are reduced as much as 65% to 80% over those experienced with conventional type check valves.

Available in either iron or steel.

Send *today* for bulletin containing complete information.

THE CHAPMAN VALVE MANUFACTURING COMPANY

INDIAN ORCHARD, MASSACHUSETTS

MORE HEAPING LOADS
PER HOUR—PER SHIFT
MEAN GREATER PROFITS
PER JOB

FASTER LOADING of larger heaping loads, trip after trip with less down-time; faster hauling, spreading and dumping, plus faster return trips with Wooldridge Terra-Cobras; add up to higher total yardages moved, at lower cost and greater profit. That's why more and more contractors are turning to Wooldridge Terra-Cobras and Wooldridge earthmoving equipment. Wooldridge Terra-Cobra is built to move more dirt, even on the toughest jobs. The many proved features of the Terra-Cobra such as two wheel steering, Universal oscillating pivot, independent three line cable control have revolutionized self propelled high speed earthmoving operations. Get full details today and bid your jobs on Terra-Cobra's productive performance.

See the 200 H. P.

WOOLDRIDGE

TERRA COBRA

AT THE ROAD SHOW

JULY 16-24

WOOLDRIDGE MFG. CO.

SUNNYVALE CALIFORNIA, U.S.A.

ALSO FEATURED AT THE ROAD SHOW

The Complete line of Wooldridge Equipment

GET THE MOST OUT OF YOUR JOBS WITH WOOLDRIDGE EQUIPMENT

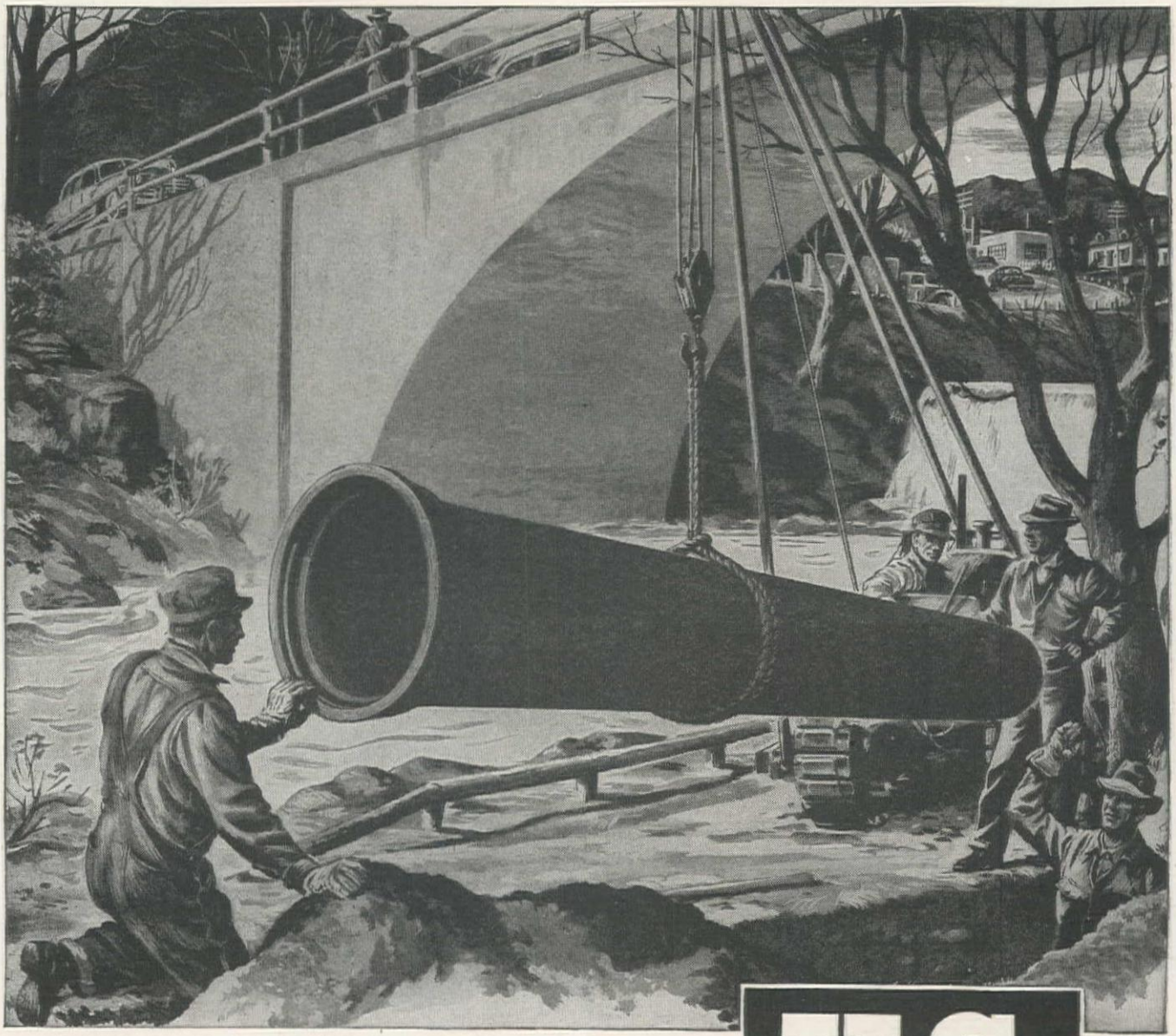

SCRAPERS


BULLDOZERS


RIPPERS


POWER CONTROL UNITS


TRAILBUILDERS



Painted for U. S. Pipe & Foundry Co. by Paul Laune

U.S. cast iron PIPE

FOR WATER, GAS, SEWERAGE AND INDUSTRIAL SERVICE

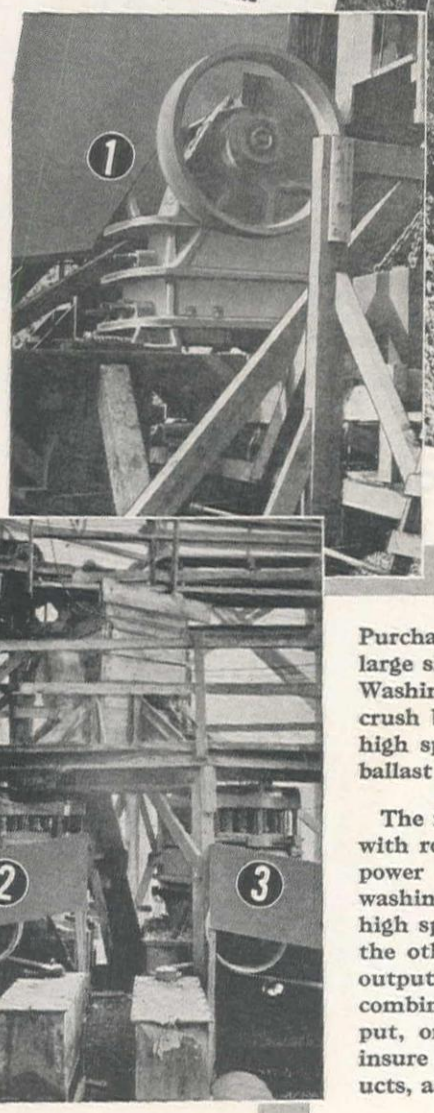
HERE is a brief summary of the products of our several plants. We manufacture Super-deLavaud centrifugally cast pipe in diameters from 3-inch to 24-inch in 12-foot and 18-foot lengths. We also produce pit cast pipe in diameters up to 84-inch in 12-foot lengths. Your choice of these joints—bell-and-spigot, ball-and-socket, flanged, and standardized mechanical joints. Standard fittings or special fittings made to individual specifications. Special castings for industrial requirements. Perhaps our experience gained through nearly a half-century of designing and manufacturing would be helpful in solving your pipe, fittings or special castings problems. **United States Pipe and Foundry Co., General Offices: Burlington, New Jersey, Plants and Sales Offices Throughout U. S. A.**

Ballast...125 cubic yards HOURLY... WITH TELSMITH

1 TELSMITH *Roller Bearing* JAW CRUSHER

2 TELSMITH *Coarse Crushing* GYRASPHERE

3 TELSMITH *Fine Crushing* GYRASPHERE



Purchasing a quarry where former operators had been making large size rock products since 1896, Howard Smith of Vancouver, Washington, has about a million yards of reject smaller rock to crush before working main quarry. His plant, with its modern high speed Telsmith Crushers, is now turning these rejects into ballast for the Spokane, Portland & Seattle Ry.

The material is first fed into a 25″ x 36″ Telsmith Jaw Crusher with roller bearings for higher speed, greater capacity and lower power costs. Aggregate is conveyed to secondary crushing and washing plant alongside Columbia River. Here are two rugged high speed Telsmith Gyrasphere Crushers—one for intermediate, the other for fine crushing. As operated at present, the plant's output is 125 cu. yds. hourly of 2½″ to ¾″ ballast. However, this combination of Telsmith Crushers is capable of a far greater output, or much finer sizing when needed. Telsmith Gyraspheres insure finer crushing, wider range of sizes, uniform cubical products, as well as bigger tonnage and lower upkeep.

Modernizing? Expanding? Building a new plant? Consult Telsmith engineers. Get Bulletin Q-30.

SMITH ENGINEERING WORKS, 4010 N. HOLTON STREET, MILWAUKEE 12, WISCONSIN

Q-17

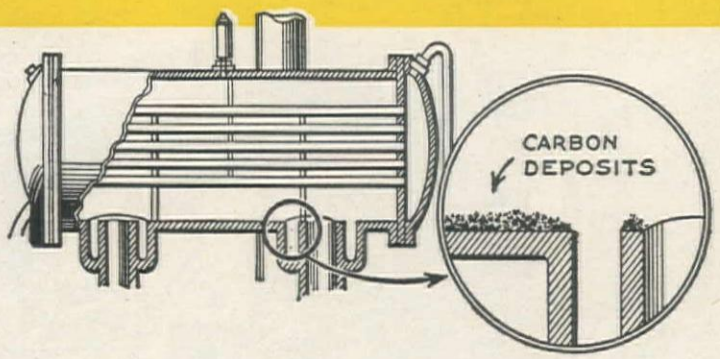
Mines Eng. & Eqpt. Co., 369 Pine St., San Francisco 4, Calif.
Lee Redman Equipment Co. Phoenix, Arizona
Clyde Equipment Co. Portland 9, Ore.
Seattle 4, Wash.
Garlinghouse Bros., 2416 E. 16th St., Los Angeles 21, Calif.
General Machinery Co. Spokane 1, Wash.
The Sawtooth Co. Boise, Idaho
Gordon Russell, Ltd. Vancouver, B.C.

Shell scientists believe it will pay you to know about

SHELL CLAVUS OILS

(formerly "Shell Compressa Oils")

specially developed to step-up compressor efficiency



Carbon can shut down your whole operation

When inferior oils are used in a compressor, excessive carbon deposits clog discharge lines and "insulate" cooler pipes — preventing proper dissipation of heat. As carbon accumulates, it becomes hot enough to ignite oil vapors. The result, if the oil is sufficiently volatile—fire or explosion. And a costly breakdown.

To fight carbon

Shell developed *Shell Clavus Oils* expressly for compressor lubrication. These are refined by a special solvent extraction process . . . are highly oxidation stable. Carbon and "gum" forming materials are negligible . . . Shell Clavus Oils have high and narrow boiling ranges to resist vaporization . . . and good demulsibility to resist washing by moisture.

Figure what Shell Clavus Oils can save you

Shell Clavus Oils can make a compressor more efficient . . . *can cut its cost of operation.* Shell Clavus Oils come in several grades to meet needs varying from low temperature ice machines to multi-stage compressors operating under wet or dry conditions. It will pay you to get complete details — from your Shell Lubrication Engineer.

SHELL

ARE YOU ABSOLUTELY SURE YOU ARE GETTING ALL THAT'S NEW IN LUBRICATION?

Your Shell Lubrication Engineer can make a complete study and analysis of your plant and machines . . . give you engineering counsel, advice on new lubricants and their application . . . help you set up schedules and controls for each and every machine. For that kind of service — call in your Shell Lubrication Engineer.

There is Always ONE BETTER Than the Rest

The blue ribbon on a prize winner practically shouts a story of achievement . . . of careful, accurate breeding. So, too, in the manufacture of dragline buckets. Hendrix buckets and their record in the field prove the accurate, careful planning which goes into each and every Hendrix Lightweight Dragline Bucket. This engineering skill, careful design, and expert experience which goes into each Hendrix is synonymous with the careful breeding and raising of a prize-winner.
Each dragline operator knows he has a "prize-winner" when he's hooked up a Hendrix Lightweight Dragline Bucket!

HENDRIX *Lightweight* DRAGLINE BUCKETS

3/8 TO 40 CUBIC YARDS
WITH OR WITHOUT
PERFORATIONS

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ Manganese Steel chains, fittings, and reversible tooth points.
- ★ Full Pay Load every trip, even in wet digging.
- ★ Perfect Balance; handles easier, fills faster, dumps cleaner.
- ★ Three types; light, medium, and heavy duty. With or without perforations

Write for descriptive literature or ask your dealer.

HENDRIX MANUFACTURING COMPANY
MANSFIELD INCORPORATED LOUISIANA

WINTERIZED NOBLE BATCHER *helps speed* Cherry Creek Dam

Al Johnson Construction Co., insulates plant to whip Ol' Man Winter and keep job rolling

To lick the problem of freezing temperatures so they could keep up wintertime production at Cherry Creek Dam near Denver, Al Johnson Construction Co. housed in and insulated their Noble CA 154 Full-Automatic Batching Plant. They fitted steam coils to the Noble aggregate bins and to the water tank which supplies water to the Noble water weigh batcher. A boiler within the plant supplies steam to the coils and pour, keeps batch temperatures near normal at all times.

Writes Johnson: "*. . . the plant has been giving us excellent service and we are well pleased with the general design and engineering of the plant.*"

HERE'S WHY JOHNSON AND OTHER LEADING CONTRACTORS CHOOSE NOBLE PLANTS

EASY TO ERECT, TAKE DOWN AND MOVE—All-welded center sections, including weigh batching units, factory-fabricated with scales and controls in place and connected. Aggregate bins built as complete units. All units sized for rail or truck shipment.

ONE MAN OPERATION—Centralized, easy-operating batching controls reduce operator fatigue and permit constant view of weigh indicator. Flow of materials and sequence of operations enable operator to batch accurately at top speed all day.

HAIRLINE ACCURACY—Automatically controlled cement and aggregate weigh is accurate to within 0.2%. Automatic bin gates assure fast flow, yet accurate control of materials. Noble back-balance scales give unsurpassed accuracy, ease of operation, and long, trouble-free service.

WIDE CHOICE OF SET-UP—Variety of sizes and types of bins, silos, and weigh batchers enable you to get custom-built plants at stock-model prices to fit your exact requirements.

To get these profit-making advantages of Noble plants on your job, call, write, or wire us for help with your batching problems.

DESIGNERS AND BUILDERS OF

CEMENT AND AGGREGATE BATCHING PLANTS · BULK CEMENT PLANTS · CONVEYORS · ELEVATORS · HEAD FRAMES · SWIVEL DISTIBUTORS AND CHUTES · GATHERING HOPPERS · CALIBRATED WATER TANKS · WATER SCALES · SLIDE GATES · CLAMSHELL GATES · AGGREGATE BINS AND CEMENT SILOS

NOBLE CO.

1860 - 7th STREET · OAKLAND 7, CALIFORNIA
TEMPLEBAR 2-5785
4017 MEDFORD STREET · LOS ANGELES 33, CALIF. · ANGELES 2-6455

YOUR CHOICE OF MANUAL, SEMI-AUTOMATIC OR FULLY AUTOMATIC PROPORTIONING

BOW LAKE EQUIPMENT CO., Seattle; ENGINEERED SALES, San Antonio; HALL-PERRY MACHINERY COMPANY, Butte; RAY L. HARRISON CO., Albuquerque; HELD & McCOY MACHINERY CO., Denver; LOGGERS & CONTRACTORS MACHINERY CO., Portland; TATTAN-DOUGLASS EQUIPMENT CO., Oklahoma City; TRI-STATE EQUIPMENT CO., El Paso; TRI-STATE EQUIPMENT CO., Spokane; J. K. WHEELER MACHINERY COMPANY, Salt Lake City.

Hercules WD-12 Dump Body, equipped with Hercules 7X "Center-Lift" Hoist. Note integrated underbody construction, with crossmembers and longitudinals welded into a single, exceptionally sturdy unit.

X = { SMOOTH, POWERFUL HOIST ACTION

The HERCULES Type X "Center-Lift" Hydraulic Hoists

Smooth, powerful lifting action—that's the advantage of the "Center-Lift" principle, pioneered by Hercules and developed to its most efficient stage in the precision-built Hercules Type X Hydraulic Hoist.

Hercules "Center-Lift" provides maximum lifting capacity with minimum use of power, prevents cramping and eliminates strain on body and hinge bolts —features that make your most difficult hauling and dumping jobs easy—and profitable.

Whatever your hauling and dumping problem, you'll find an economical solution in Hercules Hydraulic Hoists and Dump Bodies—engineered for dependable, low-cost performance on any job. Write, outlining your requirements, for complete information.

The Hercules Aircreter, revolutionary new unit for hauling and placing premium-quality, air-entrained concrete, is equipped with a Hercules 8X "Center-Lift" Hydraulic Hoist for fast, clean dumping of concrete.

YOUR HERCULES DISTRIBUTOR IS READY TO SERVE YOU—

General Truck Equipment Co., 746 South Central, Los Angeles 21, California; A. Pasteris Company, 2200 Wood Street, Oakland 7, California; The Colorado Builders' Supply Co., 324 S. Broadway, Denver 9, Colorado; Twin Falls Equipment Co., 304 Fourth Ave., West, Twin Falls, Idaho; Western Construction Equipment Co., 505 North 24th Street, Billings, Montana; Western Construction Equipment Co., 218 West Pine Street, Missoula, Montana; The Harry Cornelius Company, 1510 N. Second Street, Albuquerque, New Mexico; Newell Truck Equipment Co., 316 N. Russell St., Portland, Oregon; Wagstaff Company, 1755 Beck St., Salt Lake City 3, Utah; Allied Trailer & Equipment Co., 2434 First Ave. S., Seattle 4, Washington; South Tacoma Welding Equipment Co., 7047 S. Tacoma Way, Tacoma 9, Washington.

See these and other Hercules Hydraulic Hoists and Dump Bodies at the Road Show

BETTER ROADS FOR A BETTER WORLD · 45th Annual Convention and Road Show · SOLDIER FIELD CHICAGO · JULY 16-24, 1948

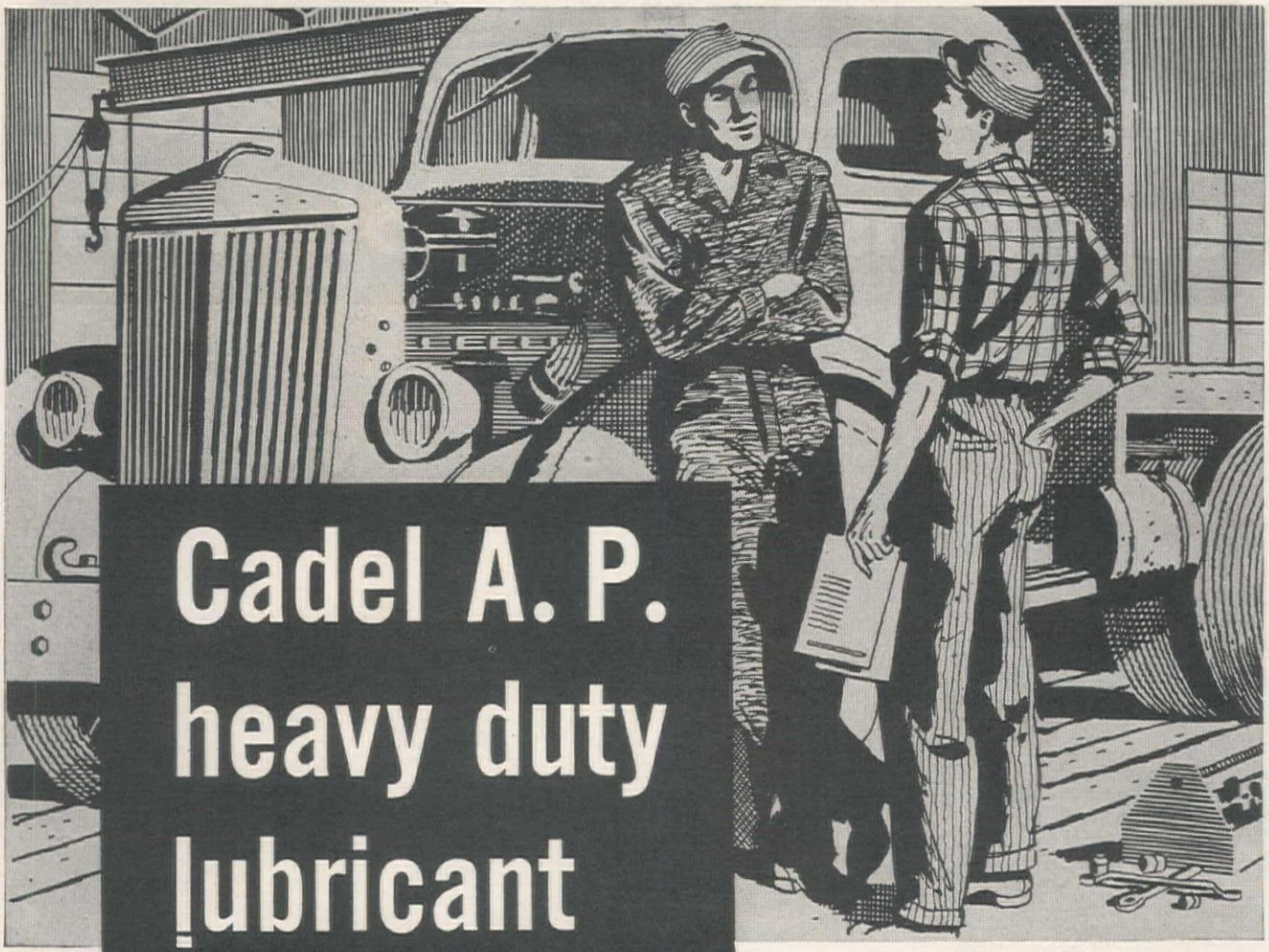
BOOTH 3013

LIFT WITH EASE— USE Hercules

STEEL PRODUCTS CORPORATION • GALION, OHIO

HYDRAULIC HOIST · CONTRACTOR BODIES · LOW-MOUNT BODIES · GARBAGE BODIES · COAL BODIES · TRAILER BODIES · CONCRETE BODIES · LIME SPREADERS · POWER CHUTES AND LOADERS


Preformed . . .
Preformed wire rope extends its influence far across the whole industrial world.
Because each of its components is preformed to its ultimate form, preformed wire rope is comparatively stress-free. It can work with all its strength — longer. Ask your own wire rope manufacturer or distributor for Preformed.
Write to the Preformed Wire Rope Information Bureau, 520 N. Michigan Avenue, Chicago 11, for an illustrated booklet telling the complete story of Preformed Wire Rope.



Cadel A. P. heavy duty lubricant

is winning more friends every day

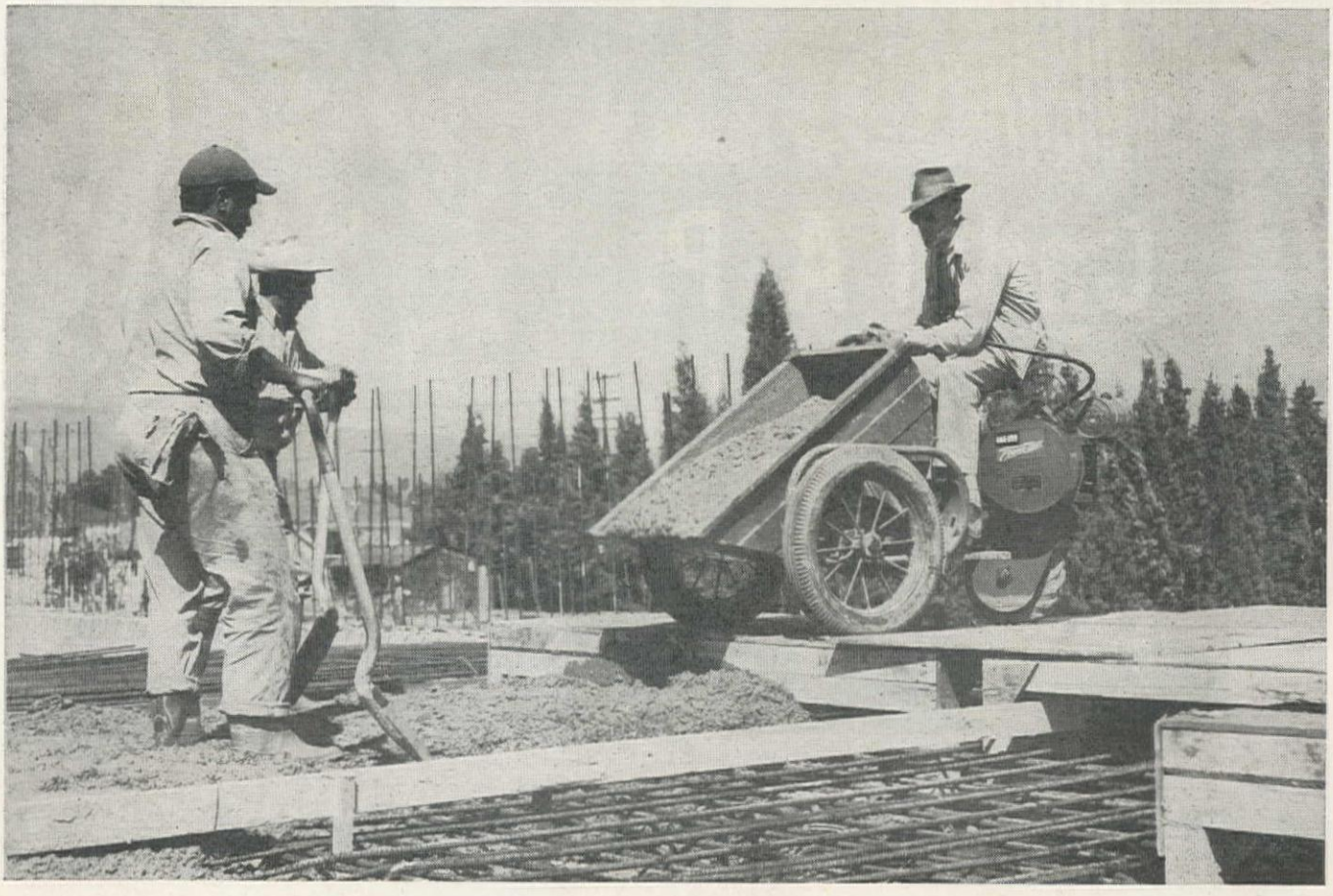
More and more operators of heavy duty equipment all over the West are switching to Cadel A. P. exclusively in all their engines, both diesel and gasoline. For this genuinely *all purpose* oil not only simplifies purchase and storage problems, but also does an outstanding job of protective lubrication. Cadel is available in SAE grades 10 to 50.

Cadel's specially treated, extra quality base oil is fortified with triple-action chemical agents that prevent oxidation, metal corrosion, sludge and engine deposits. Cadel therefore keeps pistons and cylinder walls glass-smooth, oil lines clear, valves and rings clean and free. One look at the interior of a Cadel-lubricated engine after a long period of hard service will add you to the growing list of regular users of this great oil. Give Cadel A. P. a trial.

Call your Associated Representative for expert help on any lubrication problem

TIDE WATER ASSOCIATED OIL COMPANY

GAR·BRO'S *Power-cart* cuts construction job costs



This new Gar-Bro product helps cut construction job costs and builds up real profits. Designed to carry as much concrete as three ordinary wheelbarrows or two carts, it relieves "concrete men" for less back-breaking jobs. It's simple to operate as the steering and transmission are controlled by one lever—a tiller. Forward and reverse speed is foot-throttle controlled. Power unit is detachable from cart. Tractor-type seat reduces operator fatigue.

Designed in accordance with proven engineering principles, the Power-Cart is built to LAST. GAR-BRO Mfg. Co., 2416 E. 16th St., Los Angeles 21, Calif.

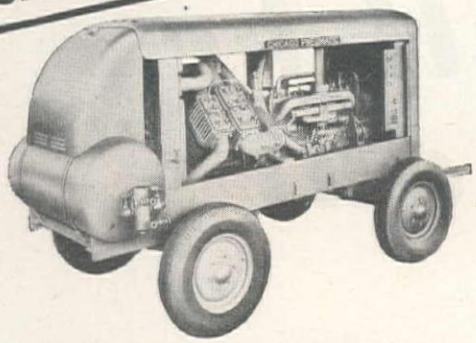
Specifications: 81½" long; 39½" wide. Maximum load: 1500 lbs., 9 cubic feet of concrete... Bulletin #77 tells the full story...shows the Power-Cart in use. Write for it, or contact Gar-Bro distributors.

GAR-BRO
MANUFACTURING CO.
2416 E. 16th St. • Los Angeles 21, California

GAR·BRO

AT THE
A. R. B. A.
SHOW...

Four CP Money-Makers for Road Builders



Economical Operation at any Speed

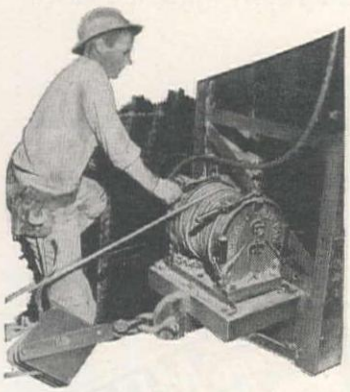
Road builders always can count on economical operation of CP Portable Air Compressors, because the CP gradual speed regulator adapts engine speed to air demands, holding fuel consumption to a minimum. This and other CP features effect fuel savings of 15% to 35%.

CP Portable Compressors are available in gasoline-driven models of 60, 105, 160, 210 and 315 c.f.m., actual capacity, and in Diesel-driven models of 105, 160, 210, 315 and 500 c.f.m.

World's largest line of Demolition Tools

There is a CP tool exactly suited to each type of demolition work: CP-111 (25 lb. class) where light weight is essential — CP-113 (35 lb. class) for light demolition — CP-115 (60 lb. class) a general utility tool — CP-116 (80 lb. class) delivers fast, powerful blows; for heavy asphalt, etc. — CP-117 (80 lb. class) for dense concrete; strikes slower but heavier blow than CP-116.

COMING — *the new CP-118 (80 lb. class). See it at The Road Show.*



CP Utility Winch

Powered with a gasoline, electric or air motor, CP Utility Winches have a wide range of applications — single or multiple line hoisting, spotting cars, handling timber and structural steel, etc. Precision control is provided through clutch and brake levers.

CP Sinker Drills for every type of job

Notable for high drilling speed, strong rotation and effective hole-cleaning qualities, and for low air consumption per inch drilled, CP Sinker Drills range from the 28 lb. CP-22 to the 119 lb. heavy-duty CP-60N.

Also on exhibit
Booths 2601-2462
North Concourse (near Gate 28)
A. R. B. A. Road Show
Soldier Field, Chicago
July 16-24

Portable Air Compressors, 60 to 500 c.f.m.; Wagon Drill; Sinker Drills; Demolition Tools; Sump and Sludge Pumps; Pneumatic and Electric Hand Tools

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Distributors

WESTERN MACHINERY CO., 760 Folsom St., San Francisco, Calif., Phone: EXbrook 4167; WESTERN MACHINERY CO., 500 North 16th St., Sacramento, Calif., Phone: 2-1211; WESTERN MACHINERY CO., 5722 So. Santa Fe Ave., Los Angeles, Calif., Phone: LOgan 3371; BALZER MACHINERY COMPANY, 2136 S.E. Eighth Ave., Portland, Oregon; WESTERN MACHINERY CO., N. 808 Division St., Spokane, Washington; HALL-PERRY MACHINERY CO., 812 E. Iron St., Butte, Montana; Lomen Equipment Co., Inc., Seattle-Alaska.

"and it shall be the duty..."

. . . of the members of the Truck Mixer Manufacturers Bureau, in the interests of our customers, to accurately conform to the standards established by the Bureau guaranteeing the size and capacity of truck mixers.

This is the guiding principle on which the Truck Mixer Manufacturers Bureau is founded. It is based on your best interests and ours! To you, it means that you can judge a truck mixer on its mechanical merits . . . you need have no worries about size and capacity . . . you can accurately establish those portions of your operating costs which are based on the capacity of the machine.

To us, it represents an essential protection against the loss of customer good will that might be caused by the confusion of a multiplicity of sizes . . . by constant changes in capacity with resultant early obsolescence of existing machines.

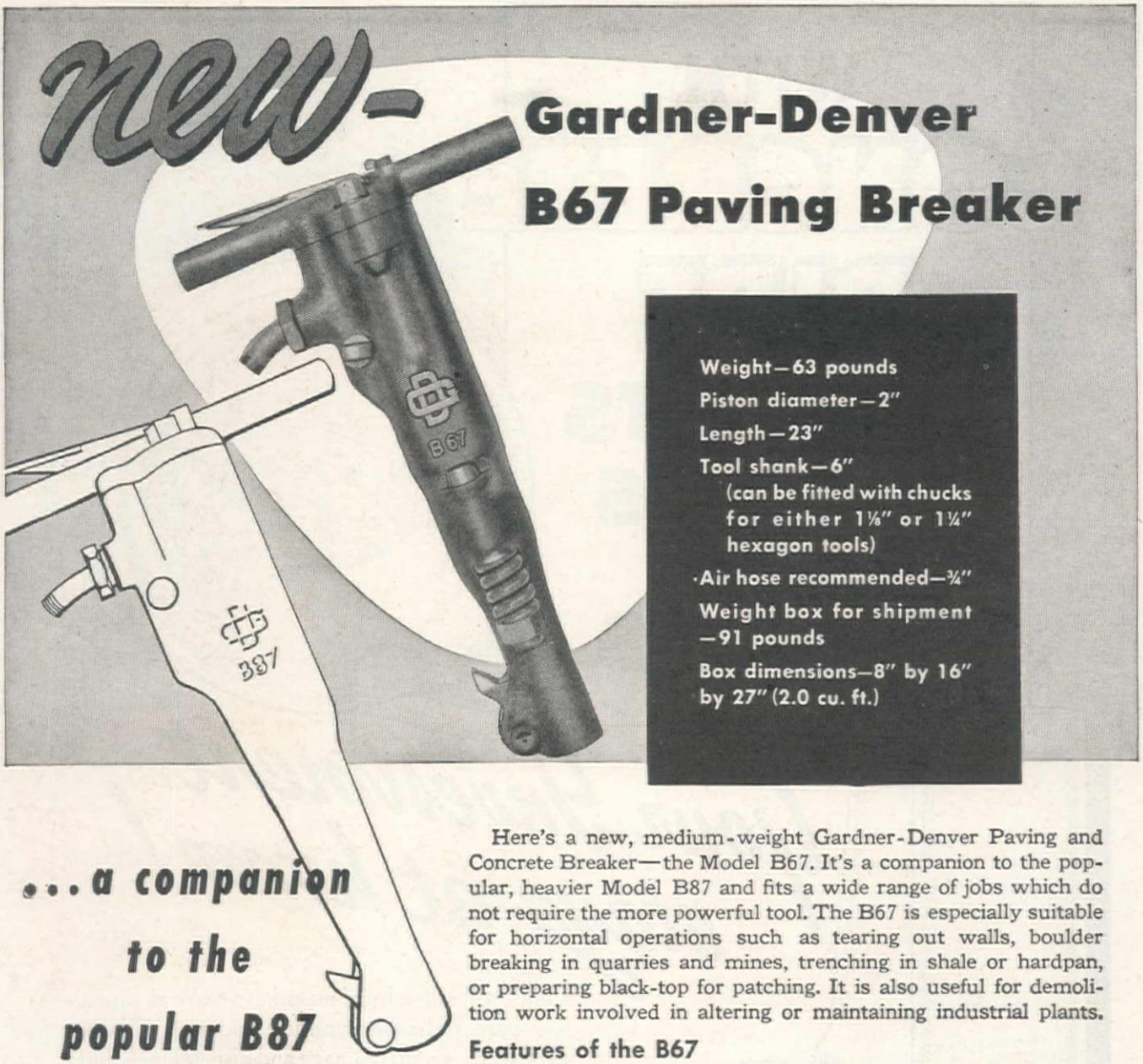
The rating plate of the Truck Mixer Manufacturers Bureau is your assurance of our constant conformance to these standards . . . your guarantee of capacity.

Truck Mixer Manufacturers Bureau

Affiliated with The National Ready Mixed Concrete Association

BLAW-KNOX DIVISION Pittsburgh, Pa.	CONCRETE TRANSPORT MIXER CO. St. Louis, Mo.	RANSOME MACHINERY COMPANY Dunellen, N. J.
CHAIN BELT COMPANY Milwaukee, Wis.	THE JAEGER MACHINE COMPANY Columbus, Ohio	THE T. L. SMITH COMPANY Milwaukee, Wis.

new- Gardner-Denver B67 Paving Breaker



Weight—63 pounds
Piston diameter—2"
Length—23"
Tool shank—6"
(can be fitted with chucks for either 1⅛" or 1¼" hexagon tools)
Air hose recommended—¾"
Weight box for shipment —91 pounds
Box dimensions—8" by 16" by 27" (2.0 cu. ft.)

...a companion to the popular B87

Here's a new, medium-weight Gardner-Denver Paving and Concrete Breaker—the Model B67. It's a companion to the popular, heavier Model B87 and fits a wide range of jobs which do not require the more powerful tool. The B67 is especially suitable for horizontal operations such as tearing out walls, boulder breaking in quarries and mines, trenching in shale or hardpan, or preparing black-top for patching. It is also useful for demolition work involved in altering or maintaining industrial plants.

Features of the B67

Famous Gardner-Denver Safety Latch. Like the B87, the B67 incorporates a safety latch on the throttle valve handle to prevent accidental operation of the hammer when moving the breaker about on a job with live air on the line.

Built-in Lubricator. Holds enough oil for several hours of operation with only one filling.

Easy to Operate. Cool handles are assured by having air inlet at side of cylinder and not through backhead. The steel rides steadily.

Renewable Chuck Liner. When chuck wears to a loose fit, it is unnecessary to replace entire chuck head.

All-weather Performance. The B67 won't "freeze" on cold, damp days.

For complete information, write to Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER SINCE 1859

WESTERN BRANCH OFFICES:

Butte, Montana; Denver, Colorado; Los Angeles, California; Salt Lake City, Utah; San Francisco, California; Seattle, Washington; Wallace, Idaho; El Paso, Texas.

NOW 7 NEW STOODY HARD-FACING WIRES

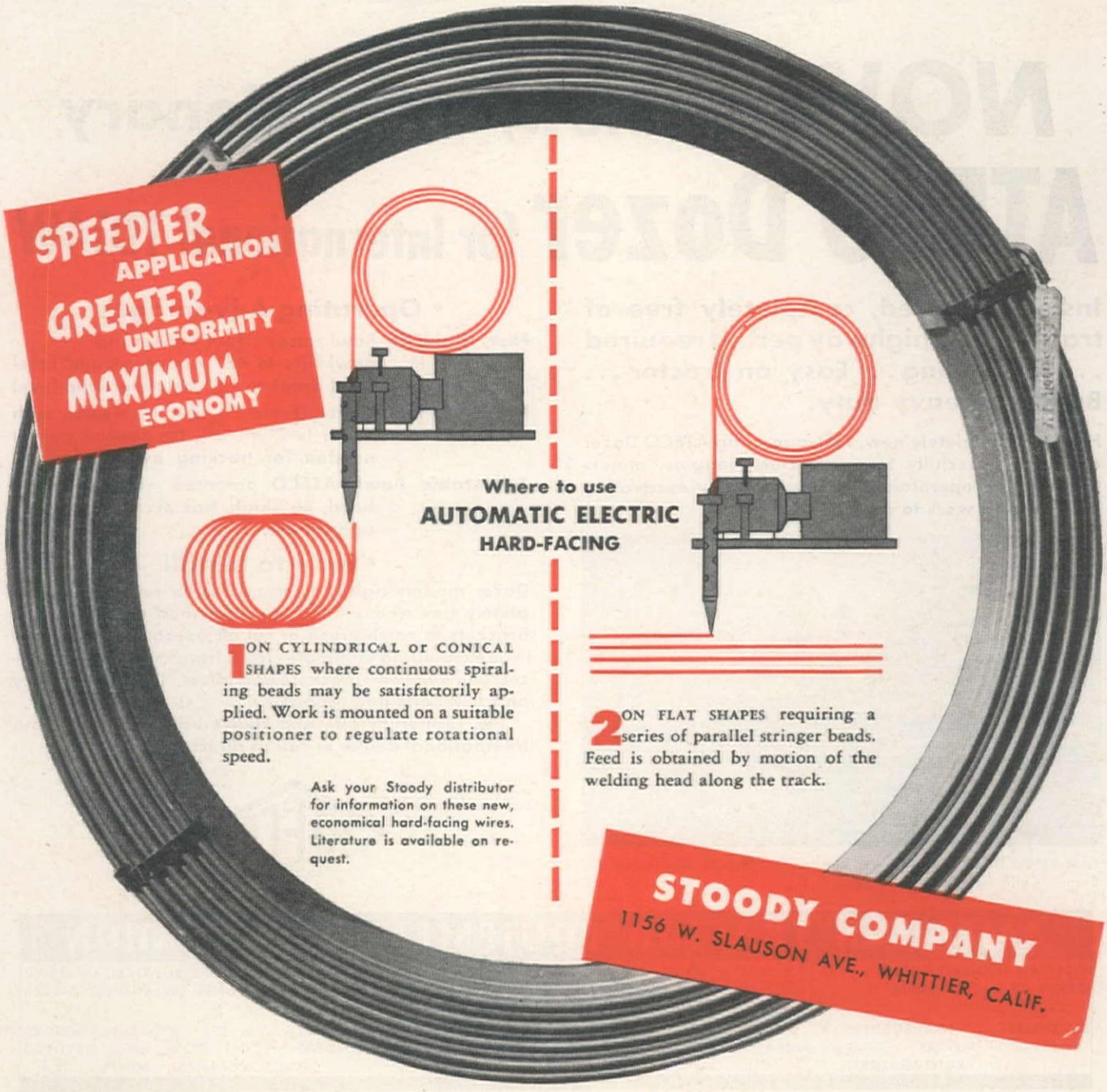
For application with the

AUTOMATIC ELECTRIC WELDING HEAD

THESE 7 new Stoody Hard-Facing wires provide the same high wear-resistant features as their corresponding manual rods, but are made in coils for application by automatic electric welding heads. The analysis of each is varied, producing weld deposits resistant to extreme wear, heavy impact or a combination of both. This wide selection of analyses enables correct choice of alloy for any given application. Advantages over manual welding electrodes are as follows:

3 times greater application speed. Smooth, uniform deposits. No wasted stub ends. Elimination of human element. Elimination of grinding on many applications.

Application by open arc or submerged arc depends upon characteristics of the alloy used and type of bead desired.



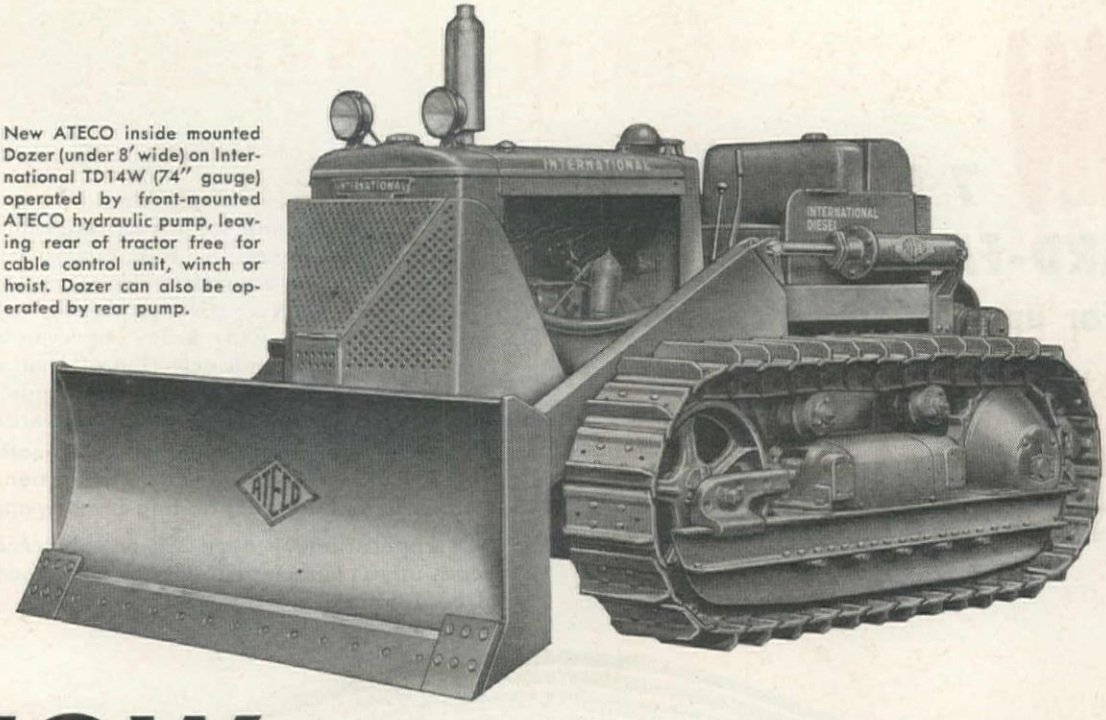
1 ON CYLINDRICAL or CONICAL SHAPES where continuous spiraling beads may be satisfactorily applied. Work is mounted on a suitable positioner to regulate rotational speed.

2 ON FLAT SHAPES requiring a series of parallel stringer beads. Feed is obtained by motion of the welding head along the track.

Ask your Stoody distributor for information on these new, economical hard-facing wires. Literature is available on request.

STOODY COMPANY
1156 W. SLAUSON AVE., WHITTIER, CALIF.

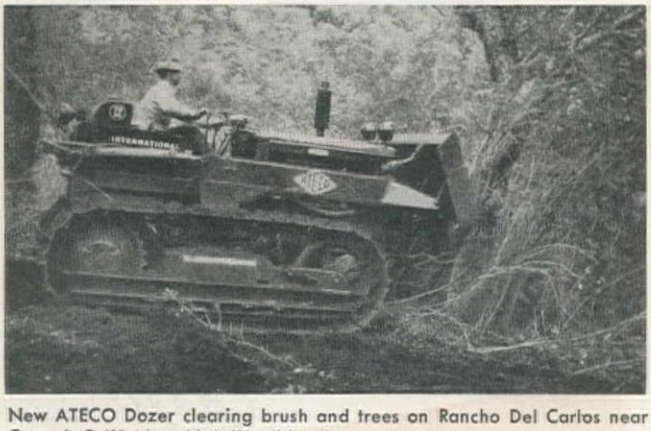
New ATECO inside mounted Dozer (under 8′ wide) on International TD14W (74″ gauge) operated by front-mounted ATECO hydraulic pump, leaving rear of tractor free for cable control unit, winch or hoist. Dozer can also be operated by rear pump.



NOW... new, revolutionary ATECO Dozer for International TD14W

Inside mounted, completely free of tracks... No highway permit required ... Fast acting... Easy on tractor... Built for heavy duty.

Here is a completely new, fast-operating ATECO Dozer designed especially for contractors, loggers, miners and oil field operators with rough, heavy excavating and clearing work to do.



New ATECO Dozer clearing brush and trees on Rancho Del Carlos near Carmel, Calif. Note high lift of bowl.

• Operating Advantages

Fast, High Lift. Bowl raises 1 foot per second
Bowl lifts to 48″ above ground level
Bowl drops to 12″ below ground level

Highway Transport. Overall width of tractor with Dozer is 7′ 11¾″. No special permit needed for trucking over highways.

Adjustable Bowl. ATECO patented, shock-resisting bowl, 36″ high, has accurate leveling adjustment.

• Easy to Install

Dozer mounts rigidly to transmission case. It is completely free of overhead structures and over-the-track brackets to catch brush or cut off operator's view. The inside mounting eliminates track frame twisting and excessive wear on sprockets and idlers. You save money on track parts and repairs.

For further details and delivered prices, see your International dealer or call us direct.

ATECO
AMERICAN TRACTOR EQUIPMENT CORP. BAKERSFIELD, CALIFORNIA, U.S.A. TRACTOR EQUIPMENT

AMERICAN TRACTOR EQUIPMENT CORPORATION

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TRACTOR CRANES • PUMPS

THE SAGA OF 50 MILLION FEET OF CAST IRON PIPE

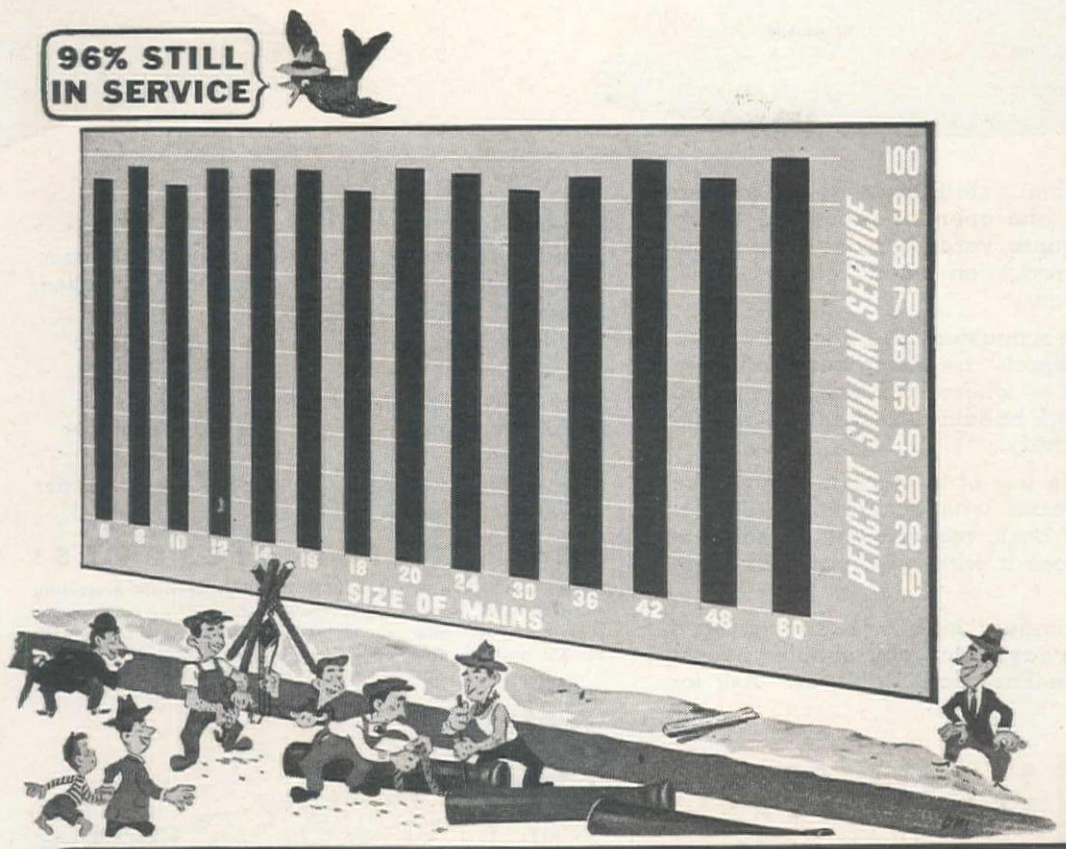
In the 125 years since 1817, 25 cities had laid 50 million feet of cast iron water mains in sizes 6-inch and up. What had happened to those mains and to other facilities? A committee representing three water works organizations determined to find out. For these 25 cities, large and small, stretching from Canada to Florida, provided a representative cross-section of water service conditions generally. Facts developed could therefore be accepted as valid by all water works men. The survey was recently completed and the findings published by the American Water Works Association.

What happened to the 50 million feet of cast iron pipe? The saga is told by the chart. It shows that, of all the cast iron water mains ever laid in the 25 cities since 1817, in sizes 6-inch and up, *96% are still in service.* This statement is based on facts secured *by* pipe users, *from* users, *for* users! Cast Iron Pipe Research Association, Thomas F. Wolfe, Engineer, 122 South Michigan Ave., Chicago 3, Ill.

96% of all cast iron water mains* laid in these 25 cities over a period of 125 years is still in service.

Alexandria, Virginia
Babylon, New York
Clinton, Iowa
Clyde, New York
Denver, Colorado
Des Moines, Iowa
Detroit, Michigan
Huntington, West Virginia
Jamaica, New York
Merrick, New York
Norwich, New York
Ottawa, Ontario
Philadelphia, Pennsylvania
Portland, Maine
Rochester (Suburban), N. Y.
St. Mary's, Pennsylvania
St. Paul, Minnesota
Sag Harbor, New York
Scranton, Pennsylvania
Springfield, Massachusetts
Summit, New Jersey
Syracuse (Suburban), N. Y.
Utica, New York
West Palm Beach, Florida
Winnipeg, Manitoba

*Sizes from 6 to 60 inches.



CAST IRON PIPE SERVES FOR CENTURIES

P&H SINGLE PASS SOIL STABILIZERS

● On this soil-bituminous state highway in Texas, a P&H Stabilizer with one operator processed on an average of 8,000 square yards per day in a single pass. Maximum production often reached 1,200 square yards per hour!

There's little that's unusual in the speed of this Texas job. Such reports are being received from all over the country — where P&H Single Pass Soil Stabilizers are at work building excellent, all-weather surfaces more quickly.

Making maximum use of in-place materials, the P&H Stabilizer performs with accurately predetermined results, *all 8* basic requirements of soil stabilization — and does it with any type admixture and at a rapid pace.

If you build secondary highways, streets, base courses, airport runways, etc., you should investigate the P&H Single Pass Soil Stabilizer. Ask for information.

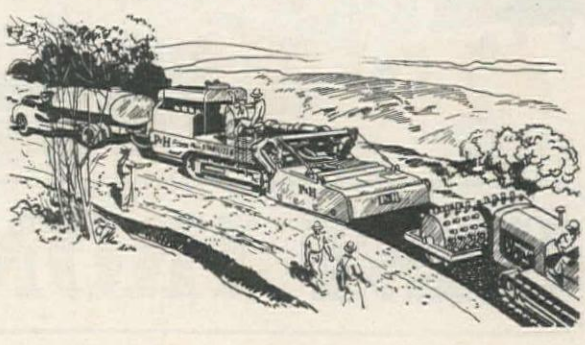
P&H SINGLE PASS STABILIZERS
4490 West National Avenue
Milwaukee 14, Wis.
HARNISCHFEGER CORPORATION
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · HOISTS · WELDING ELECTRODES · MOTORS

FACTS ABOUT THE JOB! . .

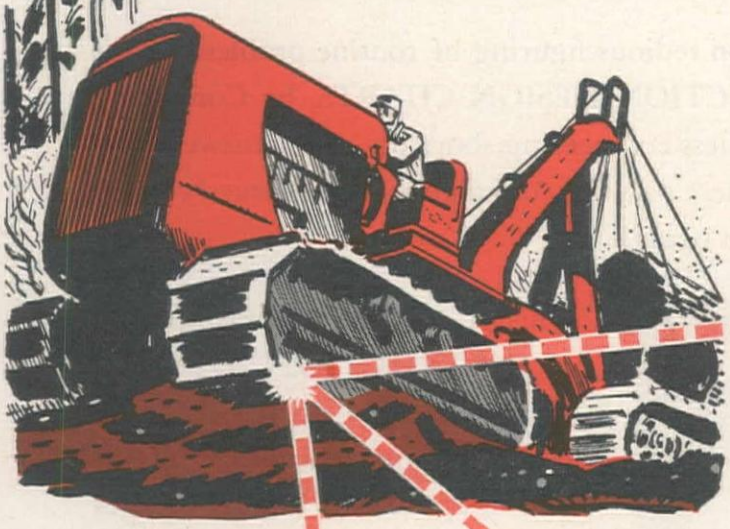
Location of Project — State highway 274, Henderson County—from Tool to Kaufman County line.
Length of Project — 7.68 miles.
Width of Roadway — 20 feet (2 lanes of 10 feet each).
Type of Soil — Loamy sand.
Stabilizing Agent — 4 gal. cracked fuel oil per sq. yd.
Rate of Production — Average 8,000 sq. yds. per working day.

NEW MOTION PICTURES!

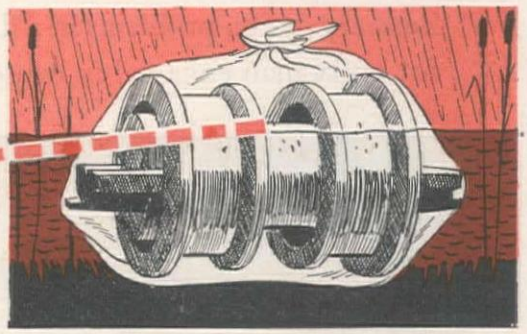
If you would like to see a P&H Stabilizer at work processing soil-stabilized roads — learn how it does it — write us for showing of full color, sound motion pictures. One covers soil-cement and the other soil-bituminous work.



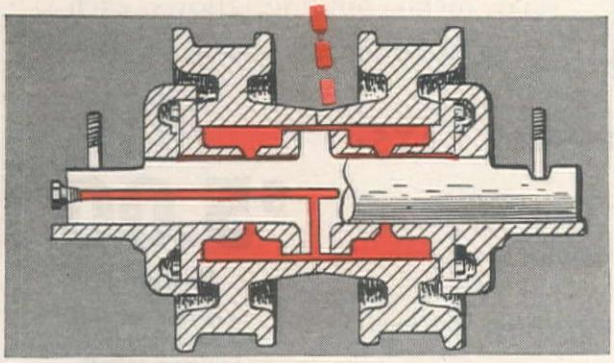
THIS GREASE PUTS A TIGHT SEAL AROUND TRACK ROLLERS!



1. It takes a tough, tenacious grease that will adhere tightly to metal to prevent excessive wear of rollers and bearings when your tractor is wallowing through mud or tearing through brush and dirt.



2. In the face of this problem Union Oil Company research scientists have developed RED LINE Tractor Lubricant. This tacky grease puts a tight seal around bearings that keeps out dirt, gravel, mud and water!



3. RED LINE Tractor Lubricant won't wash away or emulsify. Even in extremely hot weather the dead weight of the tractor can't force this adhesive grease from bearing surfaces. RED LINE is easy to handle in cold weather, for it remains pumpable at below-freezing temperatures.

4. Cases are on record where tractors have operated 8,000 hours on the original set of rollers and bearings using RED LINE Tractor Lubricant. Get this kind of long-term protection for your equipment.

RED LINE
Tractor Lubricant

ANOTHER **UNION OIL** SUCCESS-TESTED PRODUCT

For full information on RED LINE Tractor Lubricant phone your local Union Oil Representative or write Sales Department, Union Oil Company, Los Angeles 14, California.

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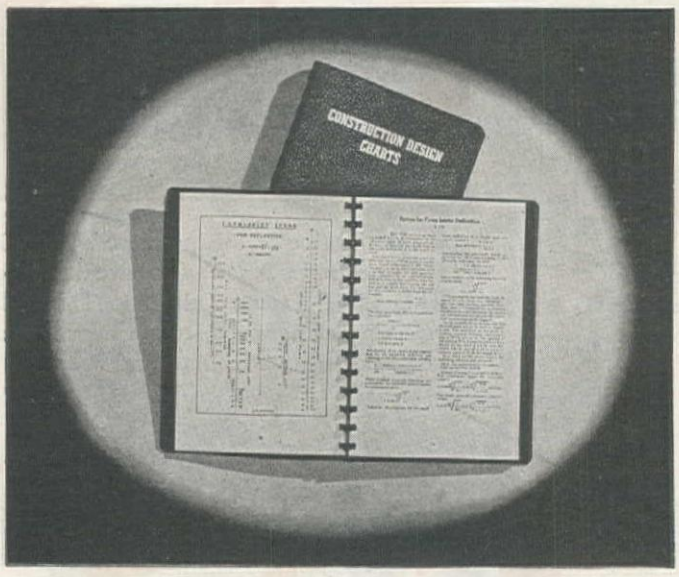
SOLVE ENGINEERING PROBLEMS . . . . . at a Glance!

There is no time to waste these days on tedious figuring of routine problems! This new, enlarged edition of CONSTRUCTION DESIGN CHARTS, by Consulting Engineer James R. Griffith gives countless engineering shortcuts—and answers preliminary design problems in a flash! There's a whale of value in this enlarged edition for every man engaged in construction today!



This is the fourth reprinting of CONSTRUCTION DESIGN CHARTS, and greatly enlarged over all previous editions. Contains 100 design charts and 215 pages filled to the brim with valuable information that is a sure-fire hit with construction men. Handsomely bound in sturdy black Fabrikoid with gold stamped letters. A special metal binding allows each page to lie flat for easy reference.

HERE'S WHAT A SATISFIED CUSTOMER SAYS:

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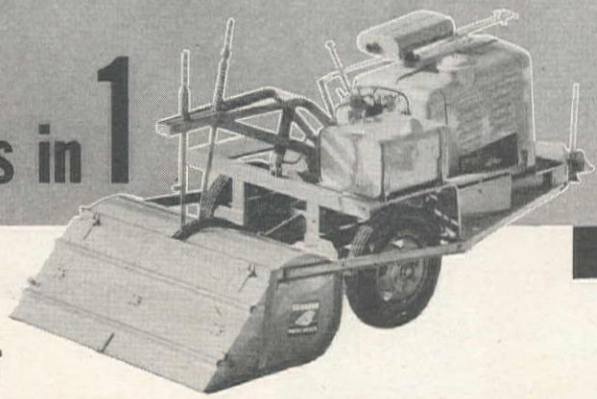
The New SEAMAN MIXER

7 Machines in 1 Here they are:



SEE IT AT THE ROAD SHOW . . .

When you buy equipment to mix for highway stabilization, get a machine that not only does that job to profitable perfection, but gives you PLUS uses the year around . . . That machine, and **only** that machine, is the SEAMAN MIXER.

With the SEAMAN you get not only "plant mix quality at road mix cost" — but 7 other major uses. Here they are:

Pulverization and Mixing of Soils with all types of binders.
Aeration of aggregates and certain bituminous mixes.
Soil pulverization prior to earth compaction.
Brush, weed and root removal in land clearing.
Tillage for perfect seed-beds in parks and landscape work.
Mulching after grass seeding on shoulders and back slopes.
Fragmentation of ice on pavements to facilitate removal.

And in addition there are 4 more applications — any one of which may be a major use for the contractor or the highway authority: Great economy in maintenance and repair of bituminous pavements,— stock pile mixing at as much as 40% savings,— restoration and leveling of rough turf airfields,— and next-to-slab shoulder stabilization.

See the **New** Seaman at the Road Show,— Space 3816. The New Seaman is equipped with auxiliary spray bar and pump, scarifier attachment, and variable speed transmission to fit the Mixer perfectly to every job.

Here's that useful practical handbook, "Soil Stabilization Methods". Your copy awaits your request. Ask for Bulletin N-25 or call for it at Space 3816,— the 1948 Road Show.

SEAMAN MOTORS, INC.
MILWAUKEE 3, WISCONSIN

Pulverization and Mixing of Soils with all types of binders.

1

Aeration of aggregates and certain bituminous mixes.

2

Soil pulverization prior to earth compaction.

3

Brush, weed and root removal in land clearing.

4

Tillage for perfect seed-beds in parks and landscape work.

5

Mulching after grass seeding on shoulders and back slopes.

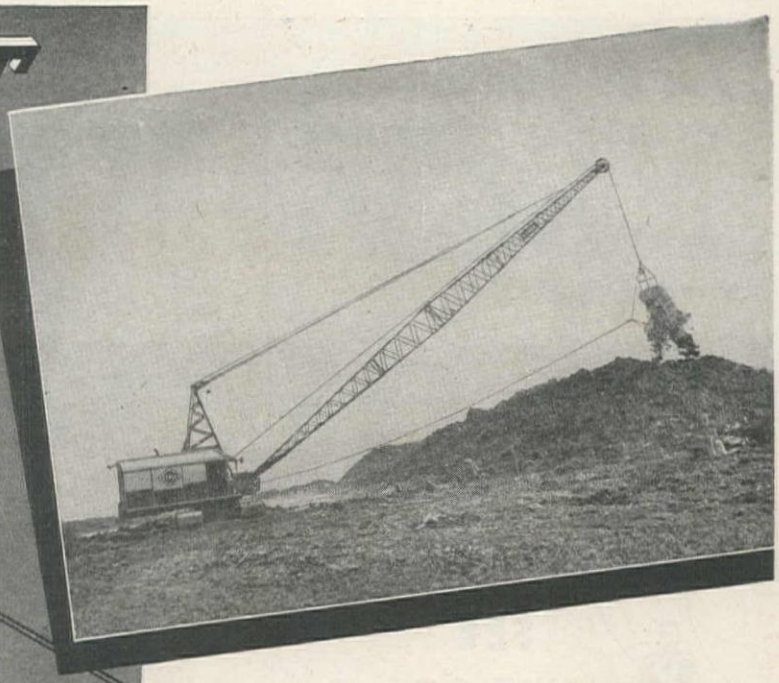
6

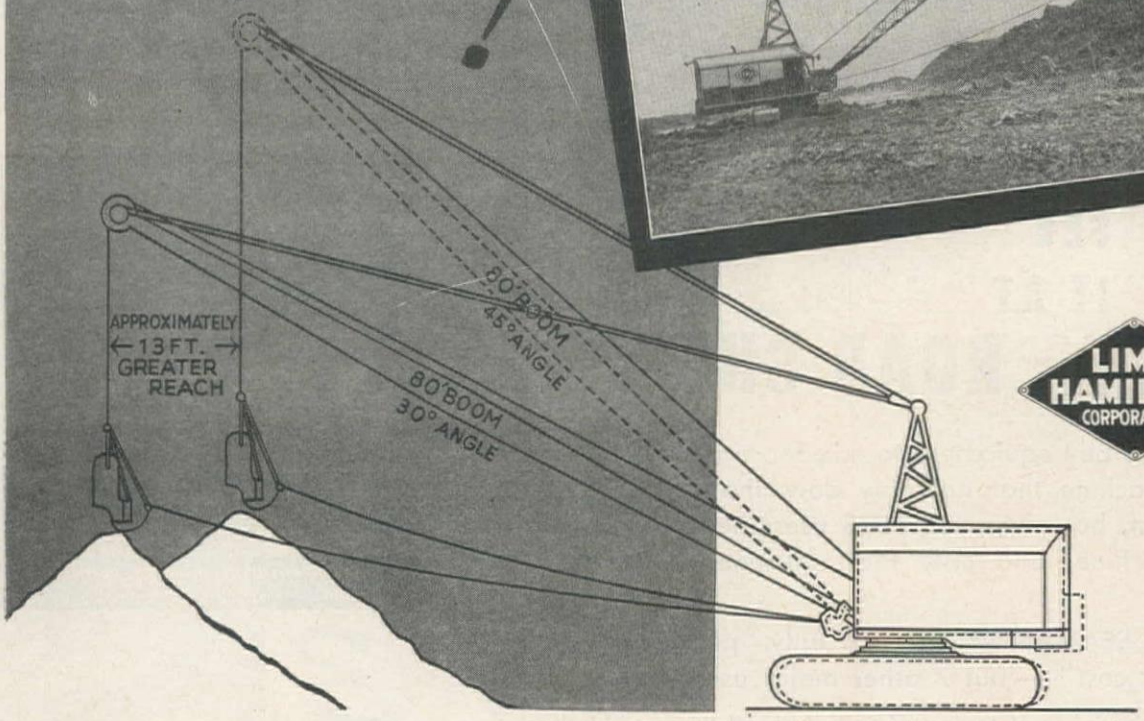
Fragmentation of ice on pavements to facilitate removal.

7

Peerless Equipment Co., Los Angeles, Calif.; Buran Equipment Co., Oakland, Calif.; Contractors' Equipment Corp., Portland, Ore.; Service Equipment Co., Seattle, Wash.; Fred M. Viles & Co., Spokane, Wash.; Intermountain Equipment Co., Boise, Idaho; Sanford Tractor & Equipment Co., Reno, Nev.; Diesel Motor & Equipment Co., Phoenix, Ariz.; Sacramento Valley Tractor Co., Sacramento, Calif.; Valley Truck & Tractor Co., Marysville, Calif.

It's the ANGLE OF THE BOOM THAT Counts!





LIMA HAMILTON CORPORATION

Most dragline work requires the spoil be cast as far back from the cut as possible. Long Booms for such a purpose mean only extra weight if the dragline isn't capable of handling a long boom and load at a low angle. Working range does not depend so much on the length of the boom as it does on the angle at which the boom can be worked without tipping the machine. The accompanying sketch illustrates a comparison in working radii of a well balanced LIMA dragline equipped with an 80 foot boom and a 3 cubic yard bucket, working at 30 degree angle and a light weight machine equipped with the same length boom and bucket capacity, but which must be worked at 45 degree angle to avoid tipping. LIMA draglines are designed and built for dragline work. Low center of gravity, proper balance, long wide crawlers and big drums, all important advantages for successful dragline operation. Get the facts when you buy your next dragline.

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The Outstanding 3/4 Yard Shovel

*Now Better Than Ever**

Available for Delivery NOW!

* CHECK THESE NEW FEATURES

- 2-piece swing clutch band-velvet smooth operation; easier replacement.
- Heavier revolving frame; more massive conical roller assembly; hardened steel roller path.
- Positive locking device on crawler adjusting bolt.
- Relay valve in dipper trip vacuum chamber speeds dumping.
- 3-cyl. GM 3-71 diesel engine with hydraulic coupling furnishes greater, smoother, more economical power (optional) and others.

and others

Always a "best buy" because it offers *all* of the construction and operating features that most shovel users want—*plus* Mevac (metered vacuum) power control, the Buckeye Clipper is now better than ever. Buckeye engineers and field men constantly sounding out the hundreds of owners have incorporated feature after feature to make it truly "the users shovel".

Operators like Mevac control—light touch on small levers actuates vacuum boosters which operate shovel—easy on the operator, easy on the shovel. Faster action, greater yardage. Cuts maintenance costs too. Nothing to freeze, heat-up or leak. Only Buckeye Clippers have Mevac control.

Send for a copy of the new Buckeye Clipper book—pictures Buckeye on all types of excavating, loading and handling jobs—takes the shovel apart before your eyes—explains Mevac control.

See You At the Road Show

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Findlay Division
FINDLAY, OHIO

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Thank you, Mister

Master Mechanic

over 2,000 times!

In March our first issue of the publication devoted especially to your interests and problems was mailed out to you.

And did you eat it up!

Since the March issue of MASTER MECHANIC appeared only a few short weeks ago, we have received over 170 letters expressing approval of the new publication, giving us suggestions on new subjects to be covered editorially.

And are you Master Mechanics hungry for information on new equipment and materials!

What a landslide of inquiry cards has come in to us! To date we have received over 650 inquiries about equipment reviewed and described in our March issue. These have been sent to the manufacturers so that they can mail the literature on to you.

And what about new subscribers?

We have been receiving air mail letters from as far away as Guam—from men who want to keep posted on new equipment and materials; new mechanical design; how to service and repair equipment on the job.

What is the reason for this amazing response?

The answer is obvious—until now, there has been no publication in America devoted exclusively to the problems and interests of Master Mechanics and men charged with the responsibility of selecting, specifying, maintaining and repairing construction equipment, whether they be employed by a contractor or a public works department.

If a Master Mechanic is to EARN BIG MONEY, he must be worth it to his employer. And to earn big money, a Master Mechanic must know much more about his job, tools and equipment than the others around him. Many Master Mechanics today are making well over $10,000 per year, because they can save their employers vastly more than this by avoiding costly break-downs.

WE HAVE SPECIAL PLANS FOR OUR NEXT ISSUE IN JUNE—It will tie in with the Giant ROAD SHOW in Chicago to be held in mid-July.

This June issue of MASTER MECHANIC will carry a great deal of information on the new equipment, accessories and materials that will be displayed in Chicago. Ambitious, intelligent Master Mechanics will want to keep posted on these developments. You'll find a lot of helpful information in our June issue. If you'd like to subscribe, please mail in the coupon below:

---------- **TEAR ME OUT AND MAIL ME!** ---

Yes sir!

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I'd like to get the next four issues. (MASTER MECHANIC is published four times a year.) Enclosed is $1.00 to cover my subscription.

☐ Please send me a sample copy.

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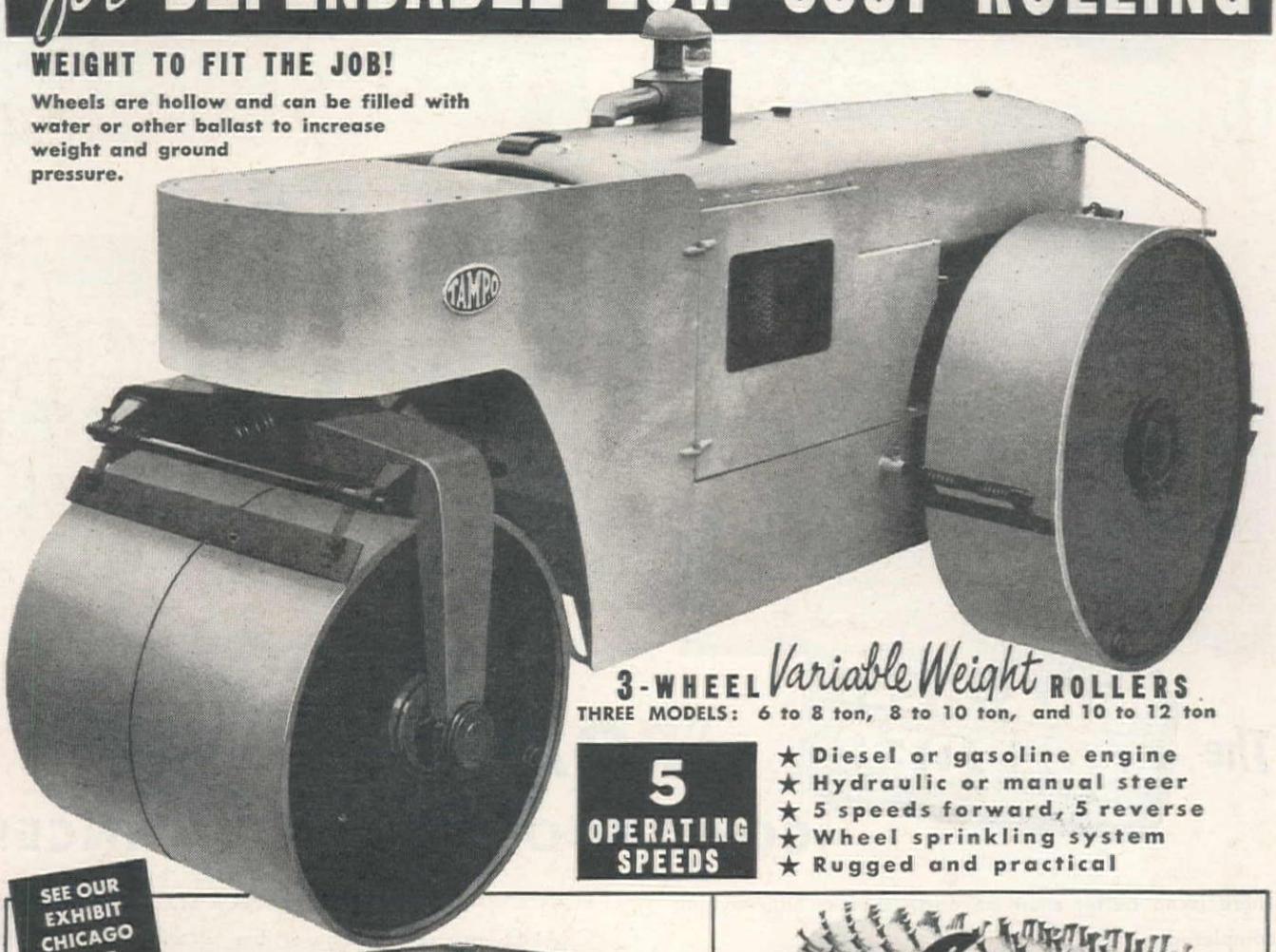
for DEPENDABLE LOW COST ROLLING

WEIGHT TO FIT THE JOB!

Wheels are hollow and can be filled with water or other ballast to increase weight and ground pressure.



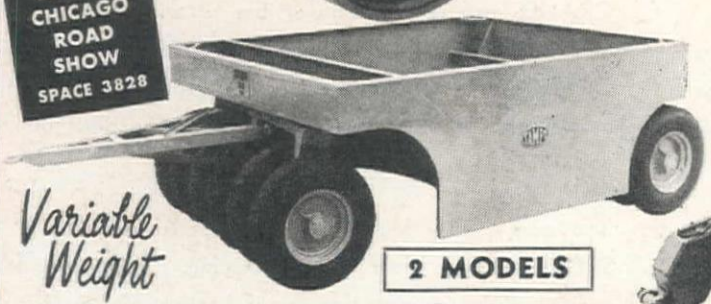
3-WHEEL *Variable Weight* ROLLERS

THREE MODELS: 6 to 8 ton, 8 to 10 ton, and 10 to 12 ton

5 OPERATING SPEEDS

- ★ Diesel or gasoline engine
- ★ Hydraulic or manual steer
- ★ 5 speeds forward, 5 reverse
- ★ Wheel sprinkling system
- ★ Rugged and practical

SEE OUR EXHIBIT CHICAGO ROAD SHOW SPACE 3828



Variable Weight

2 MODELS

PNEUMATIC TIRED ROLLERS

- ★ 13 - WHEEL ROLLERS with 84" FULL COVERAGE rolling width
- ★ 9 - WHEEL ROLLERS with 60" FULL COVERAGE rolling width
- ★ OSCILLATING AXLES assures uniform compaction & longer tire life
- ★ GROUND PRESSURE VARIABLE - DEPENDS ON WEIGHT OF BALLAST
- ★ ROLLER BEARINGS - TWO IN EACH WHEEL

Variable Weight

SHEEPSFOOT TAMPING ROLLERS

- ★ 6 MODELS: 40" and 60" diameters. Single and double drum
- ★ PEAR SHAPED FEET assure least disturbance to areas already compacted
- ★ OSCILLATING DRUMS. Axle passes clear through drum
- ★ ROLLER BEARINGS. Two in each Drum
- ★ RUGGED AND PRACTICAL

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LINK-BELT SPEEDERS are seasoned with an enviable record of trouble free operation. Crawler or wheel-mounted —3/8 yard to 3 yard capacity—there's a LINK-BELT SPEEDER to fill the needs of roadbuilding everywhere.

PLAYS MANY PARTS—LINK-BELT SPEEDER SHOVEL-CRANES are readily convertible to all standard front end attachments—a LINK-BELT SPEEDER SHOVEL-CRANE is busy equipment for roadbuilders—playing many profitable parts—they will do a grand job for you too.

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11,120

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SAY "HUFF"

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BULLDOZER Blade attachments, easily attached, increase Payloader usefulness.

Payloaders are so versatile and so fast *to* the job and *on* the job that there is always work for them to do, winter or summer. They dig, grade, stockpile, load trucks, move dirt and materials, lift, carry, pull, remove snow . . . pack more digging power, mobility, operator visibility, versatility and work-ability than heretofore available in a tractor shovel.

Payloaders are completely Hough designed and built from the tires up, the product of 27 years experience in tractor shovel manufacture. Three sizes are now available — 10½ cu. ft., ¾ yard and 1¼ yard. All have the efficient Hough hydraulic bucket control that dumps and closes the bucket by power so that speed of bucket-dump and instantaneous bucket-closing are fingertip controlled by the operator. Bulldozer Blade and Crane Hook attachments are available. Your nearby Hough distributor will be glad to give you complete Payloader performance data. See him today or write us for full information.

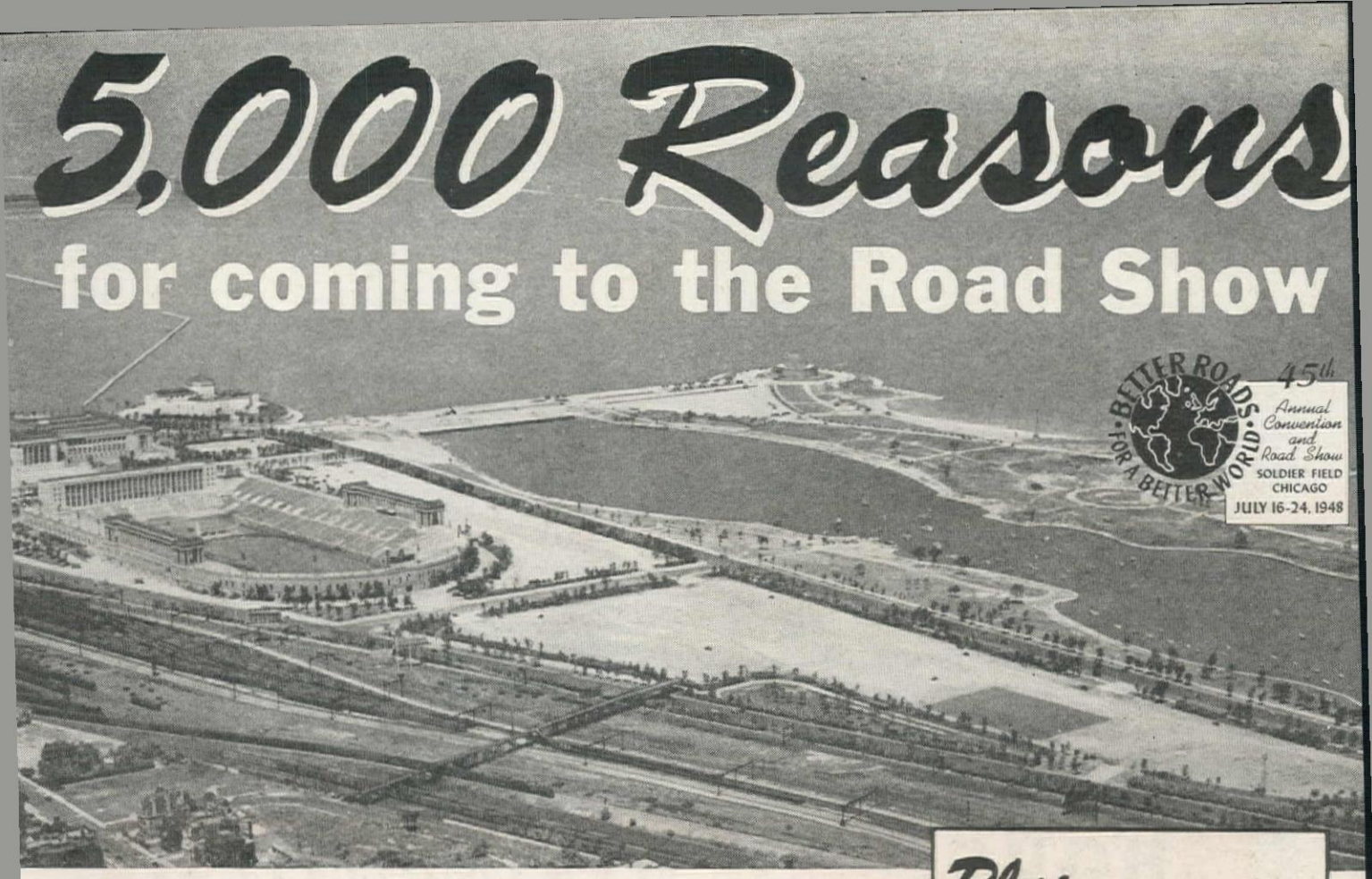
THE FRANK G. HOUGH CO.

707 Sunnyside Ave. Libertyville, Illinois

TRACTOR SHOVELS SINCE 1920

dig . . . load . . . carry . . . dump . . .

5,000 Reasons
for coming to the Road Show



HERE at the Chicago Road Show you will see the biggest, most dramatic equipment demonstration in history . . . 30 acres of construction machinery . . . over 5000 machines of all types . . . many being shown for the first time . . . all of them greatly improved over pre-war models. These are the machines you will be using (or competing against) this year and next . . . this is your one big opportunity to pick the ones you need to increase your efficiency, reduce costs. Better come and look them over.

9 BIG DAYS OF VALUABLE CONTACTS

Friday, July 16	Distributors Day
Saturday, July 17	International Day
Sunday, July 18	Educators and ARBA Student Chapters Day
Monday, July 19	Associated General Contractors Day
Tuesday, July 20	ARBA Contractors Day
Wednesday, July 21 . . .	County Day
Thursday, July 22	Municipal and Airport Day
Friday, July 23	All States Day
Saturday, July 24	Chicago Day

Plus INSTRUCTIVE TECHNICAL SESSIONS ON:

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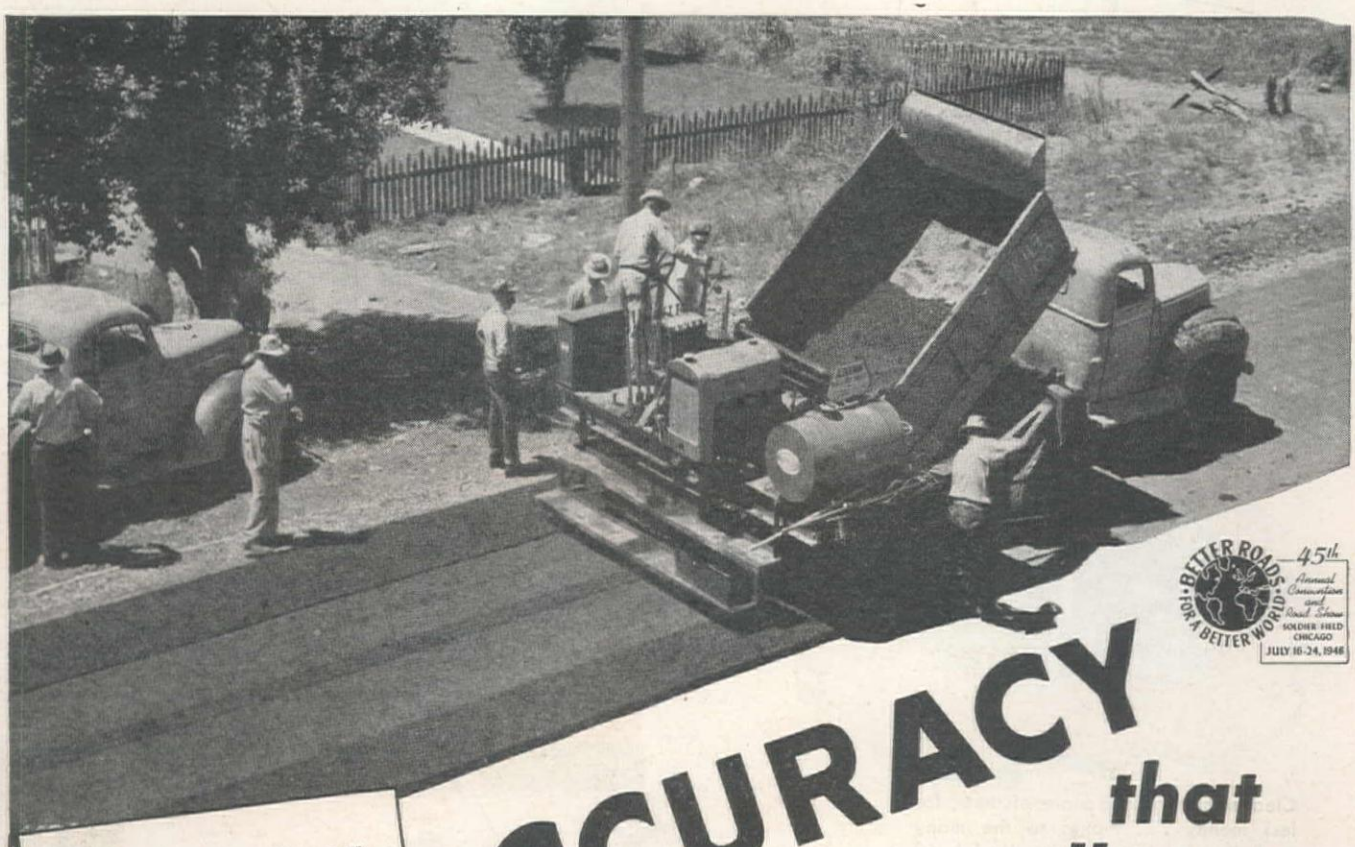
- Grade separations
- Airport construction
- Express highways and terminals
- Soil compaction
- Contract system vs. day labor
- Tar soil stabilization
- Cement soil stabilization
- Highway safety
- Snow and ice control
- Weights and sizes of vehicles
- Financing and legal problems—and many other vital topics.

ARBA-4

45th ANNUAL CONVENTION and INTERNATIONAL ROAD SHOW
SOLDIER FIELD, CHICAGO, JULY 16-24, 1948

AMERICAN ROAD BUILDERS ASSOCIATION
International Building, Washington 4, D. C., U.S.A.



BETTER ROADS FOR A BETTER WORLD · 45th Annual Convention and Road Show · SOLDIER FIELD CHICAGO · JULY 18-24, 1948

ACCURACY *that rolls out smooth as glass!*

- **Hydraulic Controls** — for easy handling
- **Continuous Course Correction** — corrects irregularities with successive courses
- **Powerful Six Cylinder Engine** — power to handle the heaviest truck
- **Four Wheel Drive**
- **Cutter Bar** — overlaps and compacts joint — "crowds" and compacts materials
- **Power Cut-Off** — permits carrying load over intersections and eliminates tag-end run-outs
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- **Screed Heater** — assures better handling of material
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- **Either Rear Roller** — can be disengaged for quick turning
- **Hopper** — big . . . adjustable . . . for narrow pavements
- **Sturdy, Heavy Construction** — that stands the strain of work without constant rebuilding
- **Adnun Carryall** — easily attached . . . makes moving up on jobs easy

● Look at that course behind the Adnun. That black top will roll out as smooth as a billiard table. Continuous Course Correction, the remarkable feature of the Adnun that corrects irregularities with each successive course, means smoother pavements. It means less preparation of subgrade and old pavements when recapping. It means true automatic leveling.

Add to this the important fact that the Adnun is built for the punishment that comes with handling heavy trucks. Contractors say Adnuns don't have to be rebuilt as often. Check the other features that Adnun brings you and plan to have one on your next black top contract.

THE FOOTE COMPANY, INC.
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BLACK TOP PAVER

● For your concrete jobs — ask about the MultiFoote Duo-Mix (Double Drum) 34-E Paver and the MultiFoote Single Drum 34-E Paver. They bring you advantages found in no other concrete paver.

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BETTER ROADS FOR A BETTER WORLD

45th Annual Convention and Road Show
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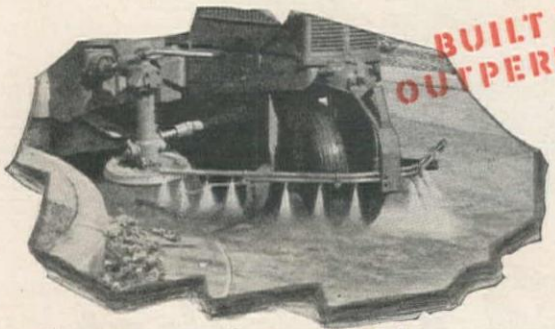
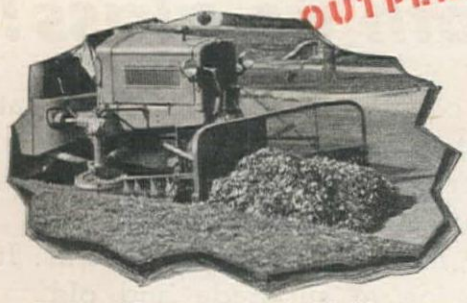
Performance



BUILT TO OUTPERFORM

Cleaner streets, and more of them, for less money . . . thanks to the many exclusive features of the Model 40 Sweeper.

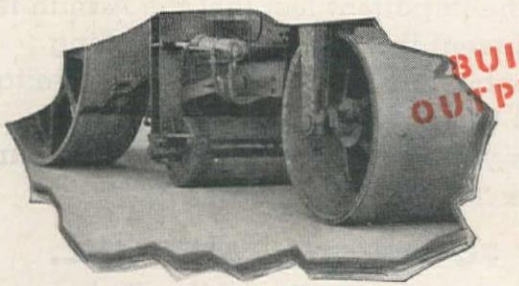


BUILT TO OUTPERFORM

The Leaf Broom on the Model 40 collects the leaves in handy piles for loading into trucks.

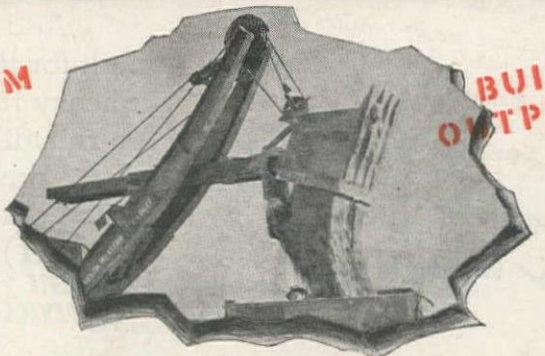
3 NEW Power Graders

See them at the Road Show!



BUILT TO OUTPERFORM

Smoother riding, longer lasting pavement . . . thanks to the automatic, straight-edge action of the 3-axle Roll-A-Plane.



BUILT TO OUTPERFORM

Badger ¾-swing design means more swings per minute, more yardage per hour, more profit for the owner.

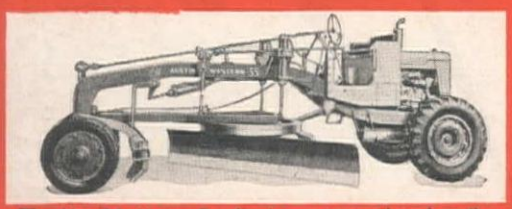
AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

ARIZONA—SMITH BOOTH USHER COMPANY.....Phoenix
CALIFORNIA—EDWARD R. BACON COMPANY.....San Francisco 10
CALIFORNIA—SMITH BOOTH USHER COMPANY.....Los Angeles 54
COLORADO—LIBERTY TRUCKS & PARTS COMPANY.....Denver 1
IDAHO—COLUMBIA EQUIPMENT COMPANY.....Boise
MONTANA—WESTERN CONSTRUCTION EQUIPMENT CO.....Billings
MONTANA—WESTERN CONSTRUCTION EQUIPMENT CO.....Missoula
NEVADA—C. D. ROEDER EQUIPMENT COMPANY.....Reno
NEW MEXICO—N. C. RIBBLE COMPANY.....Albuquerque
OREGON—COLUMBIA EQUIPMENT COMPANY.....Portland 14
UTAH—WESTERN MACHINERY COMPANY.....Salt Lake City 13
WASHINGTON—COLUMBIA EQUIPMENT COMPANY.....Seattle
WYOMING—WILSON EQUIPMENT & SUPPLY COMPANY.....Cheyenne

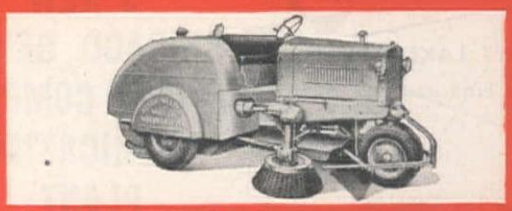
Preview

Performance **— not machinery — is what you buy, and performance is what we sell. Exclusive "Built to Outperform" features are found in every Austin-Western machine . . . Plus Values accumulated by engineering experience that has lived close to road building and earth moving problems and practices since the first crude Austin-Western tools of 1859.**

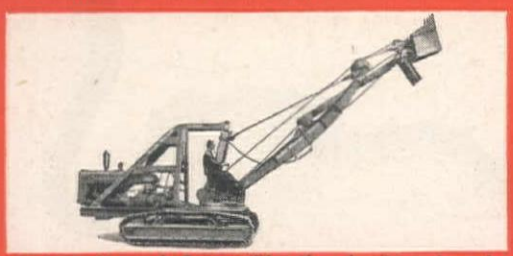
Let's talk performance!



The No. 55 Motor Grader is engineered to handle a wide variety of maintenance and light grading jobs quickly, easily and economically.

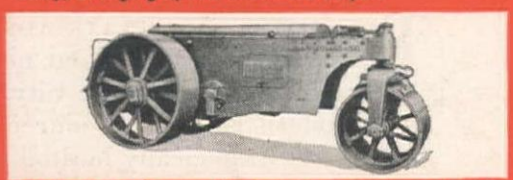


The Model 40 Motor Sweeper is available with right-hand or left-hand gutter broom or both. Famous for its "no conveyor" feature.

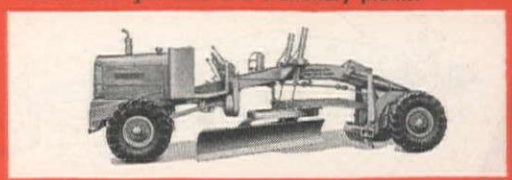


Badger ½-yard Convertible Shovel. ¾-swing design eliminates tail swing; increases stability, visibility, swinging speed and work output.

"101" Portable Crushing and Screening Plant with jaw and roll crushers. One of many standard and custom-built portable and stationary plants.



3-Wheeled Rollers and Roll-A-Planes are made in five sizes. Variable Weight Tandem Rollers are made in two sizes.

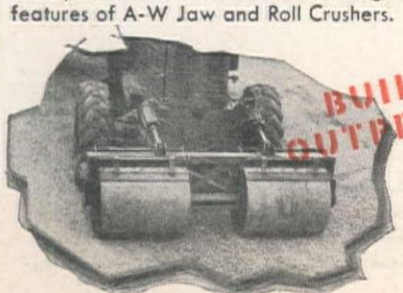


"99-H"—The Power Grader That Has Everything, including All-Wheel Drive, All-Wheel Steer, High-Lift Blade and 30% more Power-at-the-Blade.

Austin-Western Crushing Plants are tops in output, thanks to the exclusive design features of A-W Jaw and Roll Crushers.

Controlled Traction moves more material farther and faster; all wheels miss the windrow.

The 13-foot blade reaches several feet higher . . . thanks to the climbing power of All-Wheel Drive.



Roller Attachment on Power Grader has many uses . . . saves investment in costly, single-purpose equipment.

Rear steer makes it possible to finish slopes and shoulders in 10-foot swaths, leaving no tire marks.

Loader Attachment on Power Grader trims shoulders, balances quantities and does much other shallow excavation.

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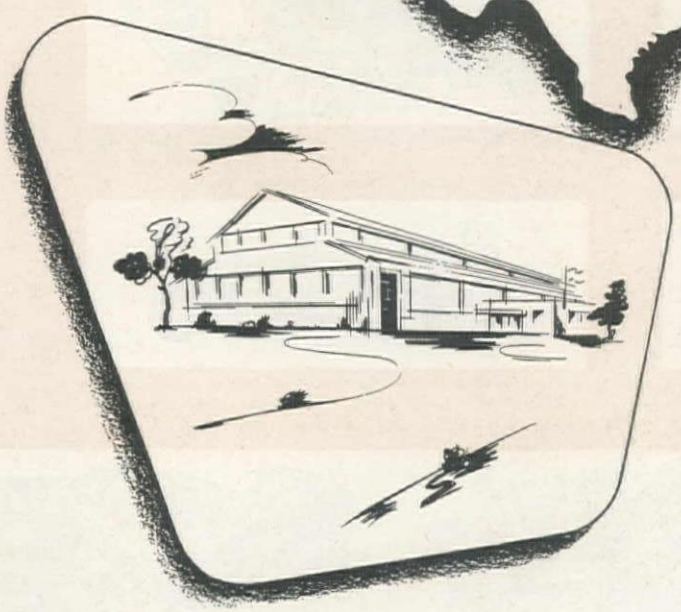

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WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

June, 1948 Vol. 23, No. 6

J. M. SERVER, JR. . . . . Editor
D. F. STEVENS . . . . . Associate Editor

Indians and Fish

WE READ THAT recently the Federal District Court at Yakima, Wash., turned down an appeal of the Yakima and Nez Perce Indian tribes for an injunction to halt construction of McNary Dam on the Columbia River because it might interfere with their fishing rights on the river. It was denied because Fish and Wildlife Service investigators testified that neither the preliminary cofferdam or the completed structure would cause more than "negligible damage" to salmon runs.

Also recently, Indians of North Dakota have appealed to Congress to stop construction of Garrison Dam on the Missouri River, because it would flood the reservations on which they live, even though exchange lands were being given to them.

Also frequently operating to hamper construction or increase the cost of important projects, are the federal and state fish and game departments, operating usually as the spokesmen for small, but wealthy and very noisy minorities of sportsmen, who consider the killing of fish a primary requisite of modern life. The much talked-about Matilija Dam, in Ventura County, Calif., had that grief added to its already heavily-burdened cost sheet.

The State Fish and Game Commission insisted on a $100,000 fish ladder, to operate in the event some miscreant steelhead might someday find enough water in the creek to tempt him to swim up its boulder-strewn course. While under normal conditions, probably a first-grader could have counted on the fingers of one hand the annual run of steelhead up Matilija Creek, yet the county was obliged to spend $100,000, under threat of refusal to permit construction.

The days of Daniel Boone are past, as are the days of Sitting Bull. The Indians are seeking full citizenship rights, which probably they should have. But the Indians, as citizens, must be willing to accept the burdens of citizenship as well as receive its benefits.

One of the burdens that Indians and fishermen alike must come to understand is that our government and its projects operate to secure the "greatest good for the greatest number." Flood control benefiting millions of citizens, irrigation and electric power for thousands of farms and cities, navigational controls on the rivers, and other benefits to whole great sections of our nation may not be held up by the selfish desire of a few Indians and fish-killers.

Wave the Boys Goodbye, Mike!

ON MAY 14, Congressman Forest A. Harness, of Indiana, recommended to the Appropriations Committee of the House that no funds from the 1948 Appropriation Bill be used to pay any Commissioner of Reclamation or Regional Director of the Bureau of Reclamation who was not a qualified engineer. The recommendation was obviously directed against Mike Straus, Commissioner, and Richard Boke, Director of Region II, which supervises California's Central Valley Project. (What a pity that no Western congressman had the guts to present this desirable legislation!)

Neither of these men are qualified in even a small way for the posts they hold, having had no knowledge of engineering, of reclamation, of construction, or of the West, prior to their elevation to these important posts. They were appointed by Harold Ickes, not for reasons of their ability or fitness, but because of their left-ward political leanings. Straus, then Assistant Secretary of Interior, recommended Boke's appointment in these words: "Boke is distinctly not one of our regulation, non-crusading Reclamation engineers and his original arrival in the Bureau of Reclamation was accomplished with considerable difficulty in one of the better jobs (present salary $6,750)." Thus, it is obvious that Mike considered Boke's "crusading" ability as a propagandist to be of infinitely more importance than that he be a "reliable . . . Reclamation engineer." Mike speaks correctly in saying Boke got into the Bureau with great difficulty, for the personnel officer of the Bureau had found him "clearly unqualified for appointment as regional head of operation and maintenance on the CVP." Former Commissioner Bashore also flatly rejected Boke for the same post on the ground that he had no qualification.

When Mike became commissioner, naturally no such minor point carried any weight, and Boke almost at once became Regional Director, over the head of a qualified, "reliable . . . Reclamation engineer" with years of experience on the Central Valley Project, both in field and administrative work.

And Boke has responded as nobly as might be desired of one who was thoroughly indoctrinated with the ideals of his superiors. He has delayed construction of important projects by fomenting unpleasantries between the Bureau and the Army Engineers, by ordering appropriations spent in defiance of Congress' desires, by attempting to take over for construction by the Bureau projects already assigned to the Army, by insisting that farmers have no rights to their water, but must purchase it as from a public utility company, and by using publicly-generated power as a political weapon.

Well, the Harness recommendation was dropped after Mike announced he'd refuse to quit, even if Congress did stop his pay, for, said he, "I still have a few jobs left to do here." Probably he wouldn't leave, either, for men like him and his friend, Secretary Krug, who was, you will remember, also a buddy and beneficiary of Gen. Benny Myers, feel that God has given them a mission to perform in patterning the life of the ignorant, stupid, lazy American common man.

We're sorry the Harness idea was dropped, but when the reports of Congressional and other investigators of the unholy mess in the Bureau are made public, Mike and some of his buddies will indeed be "waving the boys goodbye." We can't imagine who'll weep when that happens.

Still Slowing Traffic

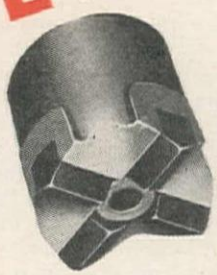
THE VALUE of speeding up the movement of automobile traffic is becoming more and more evident as the great freeway system in California, gradually comes into being. The people get where they wish to go quickly and safely. Fretting, time, gasoline wastage, accidents, are minimized.

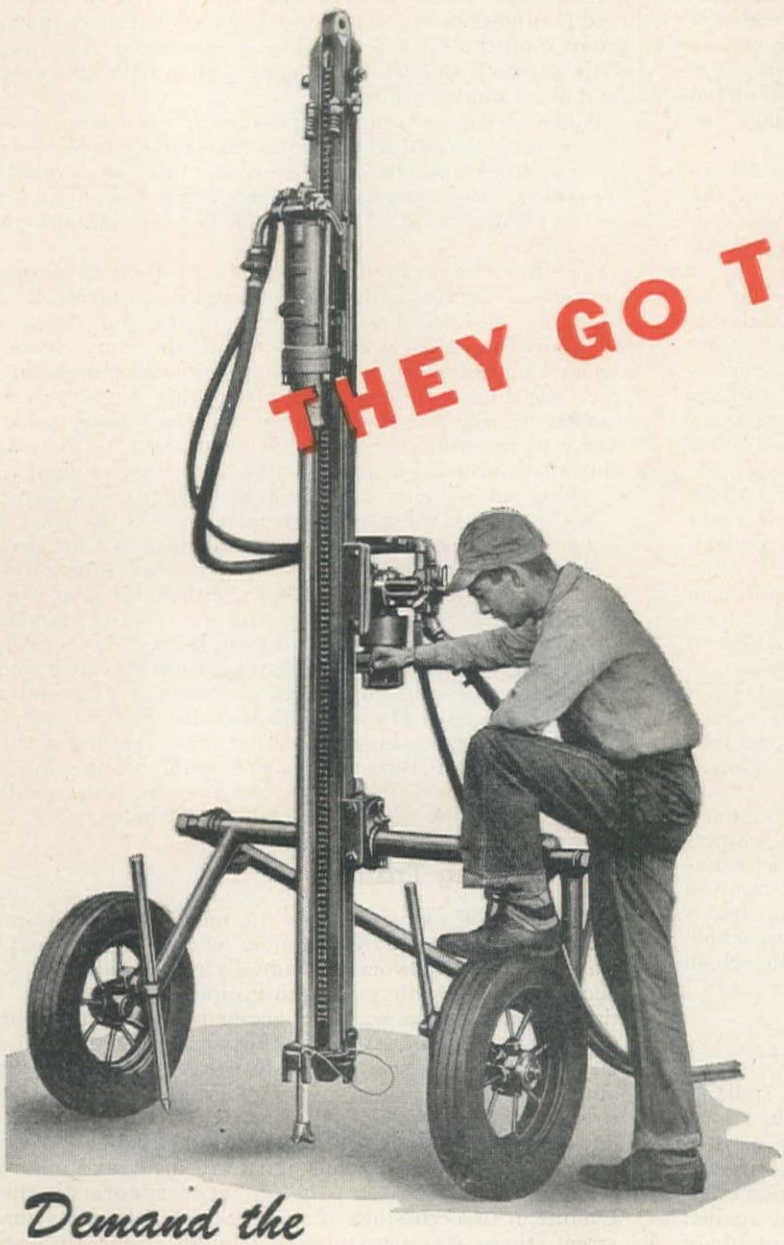
We cannot help contrasting this with the attitude of many city officials, who still persist in believing that to stop the autos, and to make them bunch up in busy streets, is the way to solve traffic problems. We are amused and aggravated at our home city of Berkeley, Calif., which has apparently fallen for the solicitation of some signal salesman, and now seems bent on putting on a "stop-and-go" at every corner in the city. On one or two crossings of Shattuck Ave., the main business street, there was occasionally enough traffic to justify a signal, but they have been installed on six or eight intersections in a row, intersections which prior to the lights never had any traffic problem, but which are now jammed with stalled cars, and have become active accident hazards.

We are reminded of the story of one of our uncles, who lived in a very small town on a busy through Pennsylvania highway. Visiting him some years ago, we were amazed to see a traffic signal stopping all the through cars at an intersection with a cross street that extended but one block each way and carried only an occasional car. "Why?" we asked him. "Well," he explained, "all the big towns have 'em!"

WAGONJACKS and CARSET JACKBITS

THEY GO TOGETHER





WAGONJACKS and CARSET BITS make a perfect drilling combination for the contractor. They go together. Maximum benefits are obtained only when one is used with the other.

WAGONJACKS were designed to give the contractor a lightweight wagon mounting featuring long steel changes . . . positive feeding pressures . . . maneuverability and a powered frame elevator . . . all of which reduce operator fatigue.

The Ingersoll-Rand CARSET BIT is recognized as a revolutionary development in the rock-drilling field. It is extremely long wearing and fast drilling. One Carset Bit will often drill several hundred feet of hole in hard rock. Elapsed drilling time is frequently cut in half. In addition, time is saved that is normally required to remove a dull bit and replace it with a sharp one. Reconditioning of bits is practically eliminated. The I-R Wagonjack and I-R Carset Bit combination make new drilling records. *They go together.*

Wagonjacks and Carset Bits are available for immediate delivery. Call the nearest Ingersoll-Rand branch office for full details.

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CONTRACTORS' COMBINATION . . . Top quality machines that work as a team. Machines designed, built, sold, and serviced by men who know rock excavation . . . application "know how"

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WESTERN CONSTRUCTION NEWS
JUNE • 1948

Davis Dam—
Colorado to Be Diverted This Month

Earthfill re-regulation and power structure below Hoover Dam soon to be started—Two years work has resulted in completion of diversion-power intake channel, grouting of foundations and adjacent rock and commencement of outlet structures and powerhouse foundation—Delivery of Mexico Treaty water is further function.

AFTER TWO YEARS of work, contractors on Davis Dam, second largest structure on the Colorado River, are about ready to divert the flow of the stream and begin construction of the dam proper. A full two years of work have resulted in excavation of a diversion canal, grouting of rock, and erection of the first stage of the outlet works and powerplant.

Davis Dam is located on the Colorado, about 67 mi. downstream from Hoover Dam, near the prominent hill known as Bullhead Rock, about 30 mi. west of Kingman, Ariz. It is primarily a power dam, but will serve the additional purposes of re-regulating the outflow from Hoover Dam, and storing the water to be delivered to Mexico under the terms of the treaty negotiated by the U. S. State Department with that country, under terms of which an abnormal amount of Colorado River water goes to Mexico to balance the demands of the state of Texas for water from the Rio Grande.

General design

It is to be an earth and rockfill structure approximately 138 ft. above the bed of the river and approximately 1,600 ft. long on the crest, which is 50 ft. wide. The central or impervious portion of the dam will consist of a moistened and rolled embankment of clay, sand, and gravel, varying from 10 ft. in thickness at the crest to 120 ft. at the base and with a blanket of the same material extending over the entire upstream portion of the foundation of the dam. It is to be rolled in layers not over 6 in. in compacted thickness.

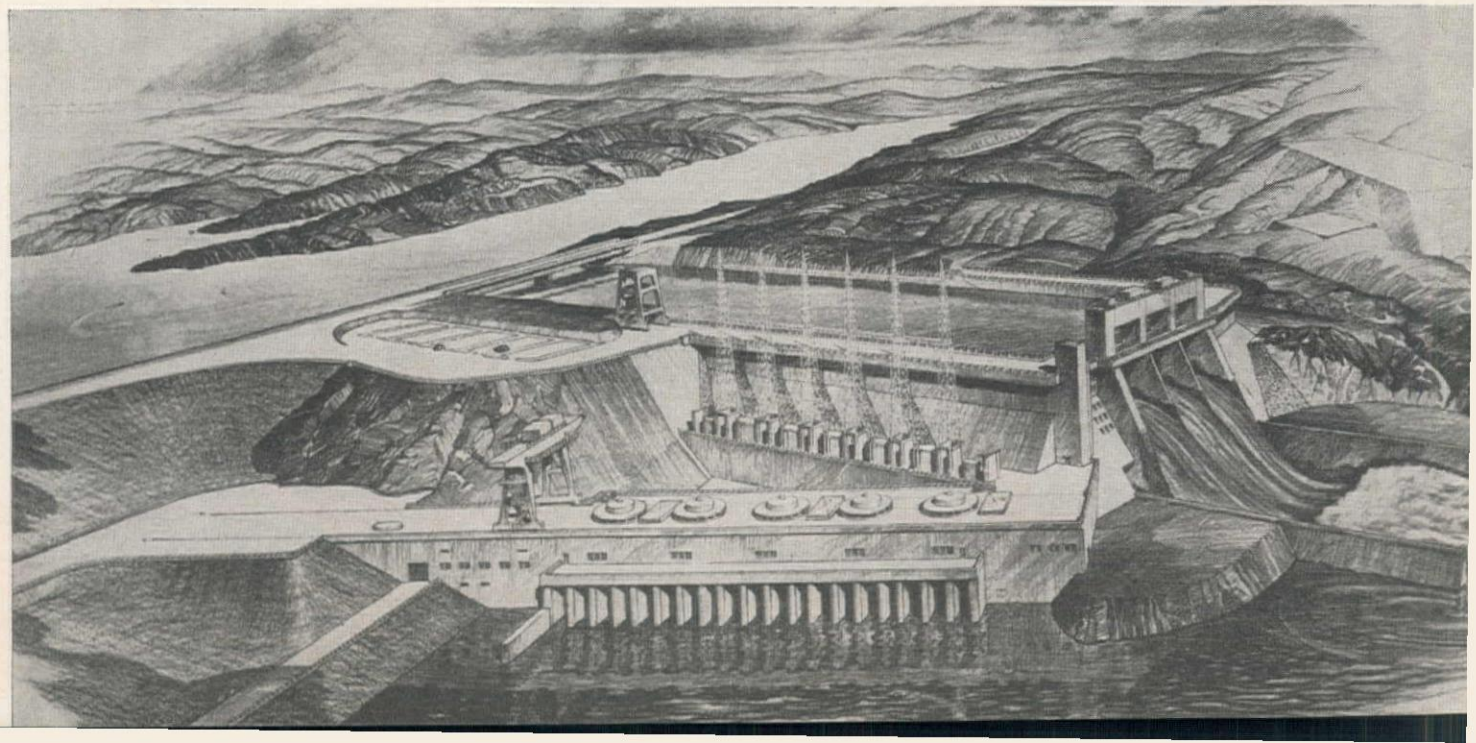
Immediately both upstream and downstream from the impervious section will be a semi-pervious fill composed of moistened and rolled rock screenings, with a blanket of this material extending over the entire downstream portion of the foundation. Both the upstream and downstream faces of the embankment will consist of rock fill.

From the crest at elev. 655 to elev. 575 the upstream face will have a slope of 3:1 and the downstream face of 2½:1. At that elevation the upstream face will have a flat berm 40 ft. wide, after which the slope will continue on a grade of 8:1 until it intersects the upstream cofferdam. On the downstream face the slope between elev. 575 and 550 will be 12:1 and from the latter elevation to the streambed the slope will be 3:1. These extremely flat slopes will make the thickness of the maximum section about 1,300 ft., this unusual breadth being required to increase the path percolation through the pervious streambed gravel of the foundation.

A cut-off trench with a bottom width of 120 ft. will be excavated to elev. 455 across the river bed and cut-off trenches have been excavated to firm rock on both abutments. In the abutment trenches concrete cut-off walls with a minimum of 3-ft. thickness in the rock and tapering to 9 in. thick at a maximum height of 15 ft. will be constructed. A trench across the river bed, however, will be filled with impervious material similar to the central zone of the dam.

Diversion channel

A diversion channel approximately 4,500 ft. long has been excavated through the left abutment. It has a maximum depth of 220 ft. and a bottom width of 200 ft., narrowing to 75 ft. at its downstream end. As originally designed, the rock cut was to have side slopes of ½:1,



ARTIST'S CONCEPTION of the completed Davis Dam plant. The earthfill dam itself extends off to the left, and the normal channel of the Colorado River is in the foreground. In the center is the diversion channel terminating in the spillway and outlet structure with powerhouse in front.

but when partially completed, it became evident that the rock was less stable than originally anticipated and the channel was redesigned for side slopes of 1:1. In addition, a very extensive grouting program was undertaken in the rock walls under and around the cut and the powerhouse, forebay, spillway, and outlet foundations. To April 1, a total of 202,000 sacks of cement had been used for grouting purposes. Grout holes were drilled on 10-ft. centers each way, and in some cases were as much as 310 ft. deep. One hole, 230 ft. deep, accepted 628 sacks of cement.

The downstream end of the diversion channel will, when the dam is completed and in operation, be the forebay for the powerhouse. At right angles to the centerline of the diversion channel and located approximately on the original bank line of the river will be the spillway and outlet structure, and the intake structure for the powerplant will be along the right hand side of the channel. From the intake five 22-ft. diameter welded plate steel penstocks will lead to the powerhouse.

The outlet structure at the end of the forebay channel will have two outlets, one on each side of the spillway, each controlled by a 22 x 19-ft. high-head radial gate with its sill at elev. 542. Each of these gates will be operated by a hydraulic hoist. Three 50 x 50-ft. fixed wheel gates with sills at elev. 597 will be installed at the crest of the spillway ogee. These gates will be operated by hoists installed in a hoist house above the spillway. Concrete block counterweights will also be housed in the same building.

The powerplant, location of which was slightly changed when the rock of the abutment was found to be less strong than anticipated, will be an outdoor type plant of reinforced concrete, accommodating five main generating units. Each of these units will consist of a 62,200-hp. turbine driving a 45,000-kva. vertical shaft generator with direct connected exciter. Power from the plant will be conveyed by transmission lines, already under construction, to Yuma, Phoenix and other Arizona cities, as well as to southern California and southern Nevada.

Construction program

The contract for construction of Davis Dam was awarded to Utah Construction Co. and others in the summer of 1942, but they had scarcely more than gotten their camp set up and equipment on the site when the wartime construction curtailment order caused a shutdown of the work. In Jan., 1946, the contract was re-awarded to the same firm at a figure of $21,462,505 and work was actually started on April 19 of that year when the first blast was fired on the top of the

CONSTRUCTION WORK on the spillway and outlet works. Beginning of the spillway ogee shown beneath the construction trestle, top, with excavation trenches for drainage pipe in the apron, in the foreground; structural members of the construction trestle are embedded in the rising concrete, center; cooling pipes in place before a pour of concrete in a spillway block.

hill which subsequently became the diversion channel. Excavation of this channel was the first order of business. It was carried out with one 3½-cu. yd. and four 2½-cu. yd. shovels, loading into a fleet of 24 end-dump Euclids, with 10-cu. yd. bodies and 16 bottom-dump trucks, with 13-cu. yd. bodies. Most of the excavated material was hauled across the river and stockpiled on the right or Nevada side, for subsequent use as fill material in the dam. It was first graded as to size, but later was stockpiled ungraded.

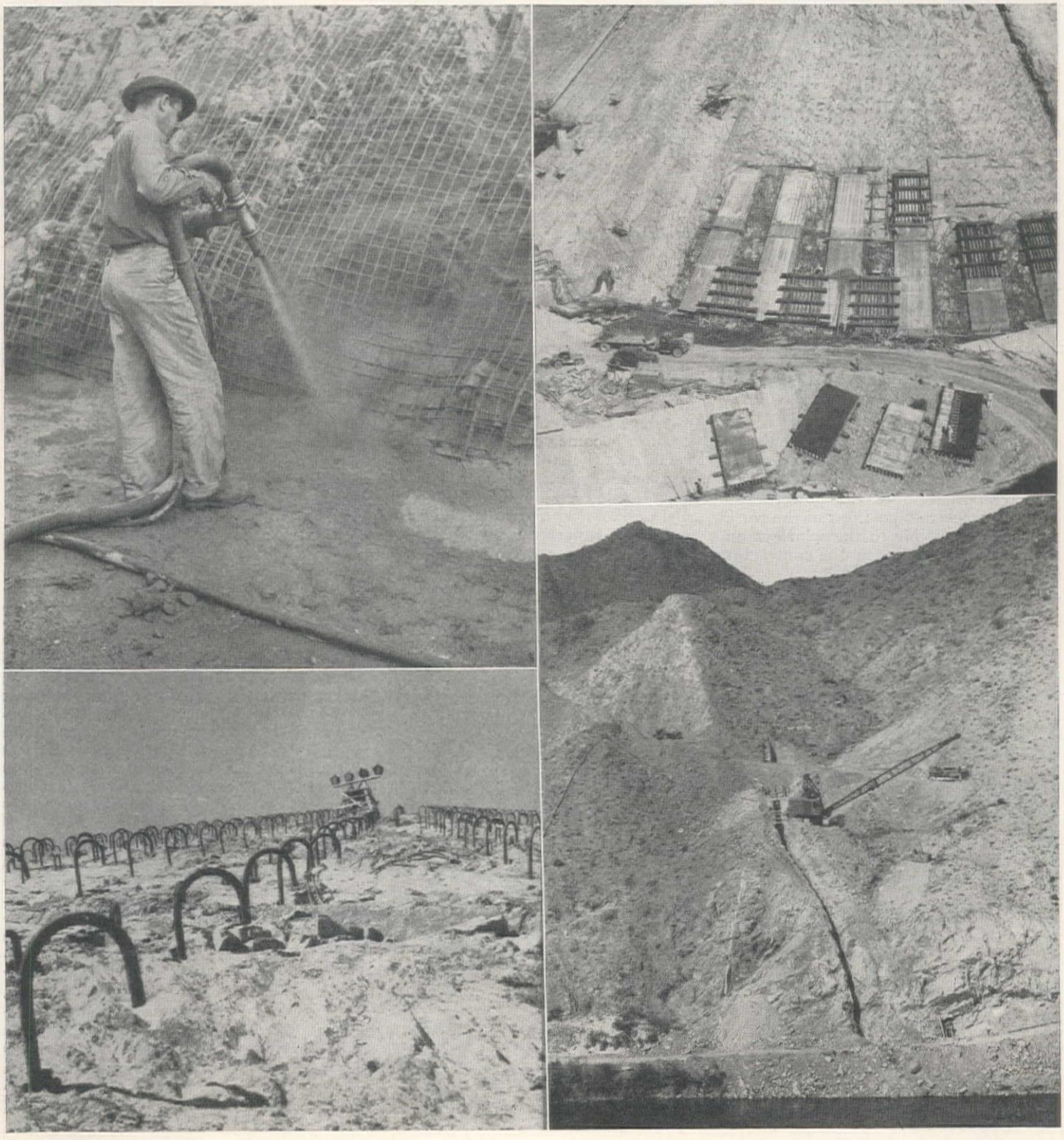
River diversion

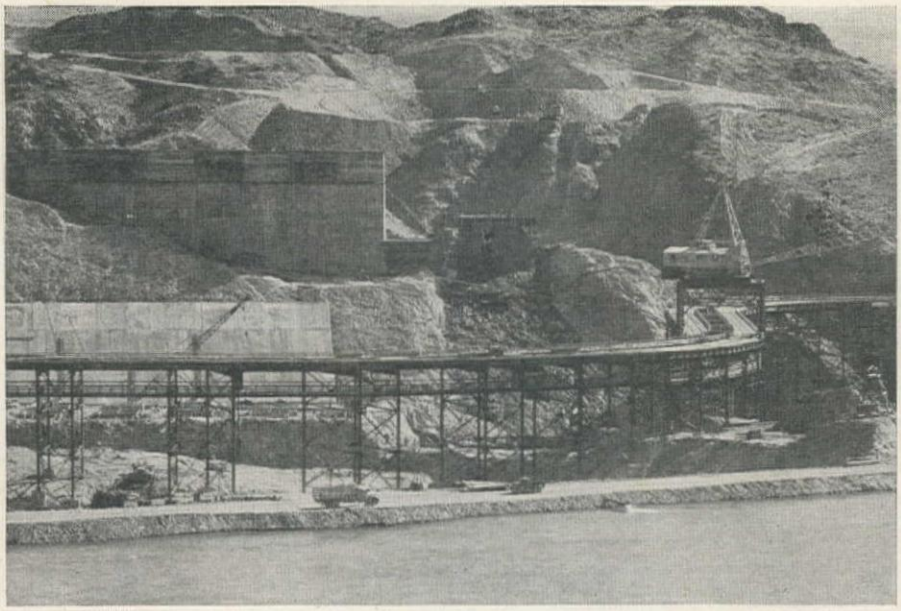
A plug of unexcavated material was left at the upstream end of the diversion channel to keep it dry during excavation and construction of the outlet and penstock works. When the first stage of these is completed, the plug will be removed, a cofferdam built across the river, and construction of the main embankment commenced. This will probably occur about June 15.

An open-floored pile trestle has been erected across the river, through which a fleet of bottom-dump trucks will cast heavy stone to form the backbone of the cofferdam, raising it gradually and evenly from the bottom across the whole width. After the rock reaches water level, finer material will be dumped to seal the voids and make the cofferdam watertight.

The diversion channel is unlined, except for a gunite covering on its lower surfaces on the narrower portion, and a poured slab covering on the surfaces near the penstock and outlet works, where currents may be fairly strong. To secure these slabs, 1¼-in. steel rods were

TWO METHODS of lining the walls of the diversion channel are shown here. At upper left gunite is being applied to wire mesh laid against the rock near the bottom of the straight section of the channel. On the curved sections and near the outlet, the lining is poured in slabs from 18 to 36 in. thick, upper right, held secure by hooked rods embedded in the hillside, lower left. Concrete cutoff walls are to be constructed at each end of the main embankment in rock trenches, lower right.





A UNIQUE construction trestle 1,084 ft. long has been constructed on an S-alignment to afford access to the concrete structures. In the background is the partly completed gravity wall section extending the diversion channel to the spillway.

grouted 4 ft. into the hillside, with the outer ends hooked.

Steel and form placing, and concrete pouring in the outlet structures are handled by two whirley cranes with 140-ft. booms, traveling on an S-shaped construction trestle 90 ft. high and 1,084 ft. long. Concrete is mixed in a central batching and mixing plant, using a Johnson batcher and bin, and two 4-cu. yd. T. L. Smith mixers, transported in buckets on railroad cars to the trestle, where it is picked up and placed by the whirleys. Two railroad tracks pass along the trestle, and the cars may pass under the legs of the whirleys.

As construction of the powerhouse progresses, certain portions of the work will be inaccessible to the whirleys on their present trestle, and the contractor expects to build a branch trestle, so that all points may be reached. Steel legs and diagonals of the trestle are imbedded in the concrete as pouring advances, and will become structural parts of the concrete.

Concrete aggregates

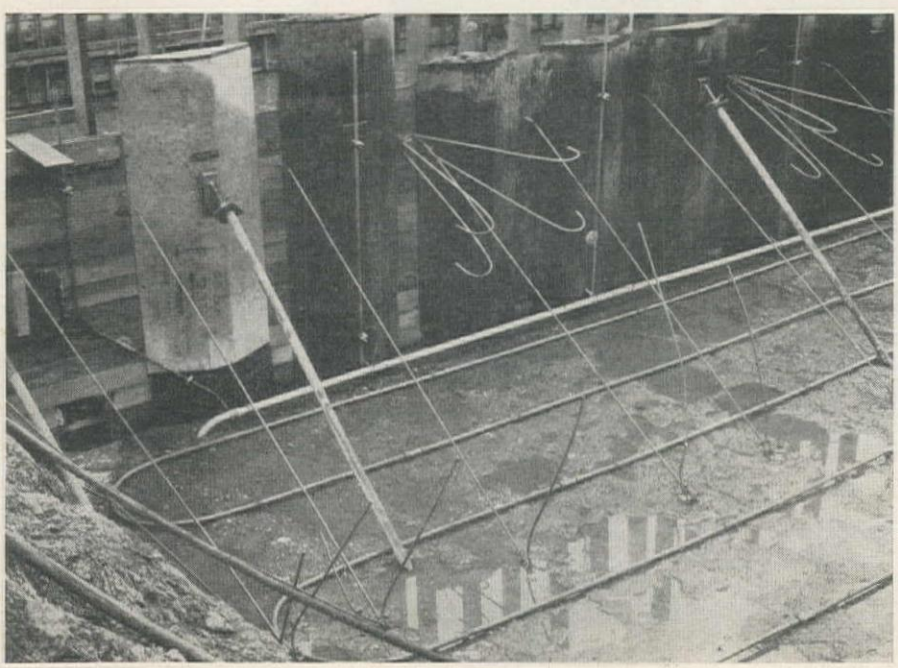
Aggregate for concrete comes from a pit about 3 mi. down the river on the Nevada side. It is stored near the batching-plant under a roof of planks, in order to reduce the heat, which at the desert site, may become very intense. It is conveyed from the stockpile to the batcher on a belt. Type 2, modified low-alkali cement is delivered in bulk from Victorville, Calif. An admixture of Pozzolith is used in the concrete.

Form panels for the spillway piers and other parts of the outlet works are held in place with Williams form ties fastened to loops of reinforcing steel left protruding above the concrete of the preceding lift, and she-bolts, which permit accurate positioning. Square-to-round transition forms for the penstock intake were fabricated in the yard and placed whole by the whirleys.

Other sections of the job now under construction include a gravity wall along the left side of the diversion channel, between the down-slope of the hill through which the channel was dug, and the spillway structure. This will be backed with compacted fill and will act to continue the left-hand bank of the channel in a straight line.

The overflow apron below the spillway and outlet works is also under construction. It is a heavy layer of concrete, on a foundation excavated to solid rock and criss-crossed with 8-in. concrete pipe drain lines.

CONCRETE in the outlet structure is poured in 5-ft. lifts with keyed surfaces between blocks. Form ties and she-bolts are used to hold the key forms in position.



River diversion schedule

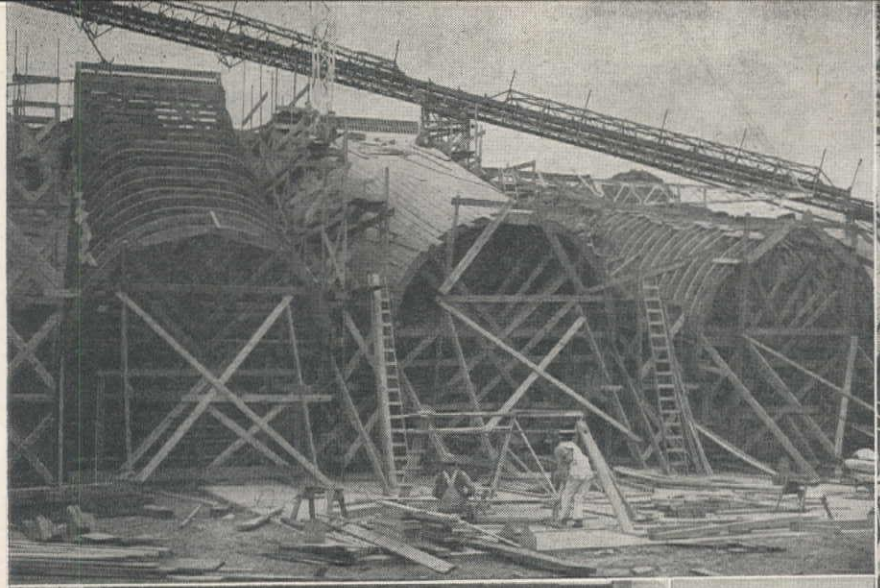
The diversion of the river and completion of the spillway and outlet structure is to be performed in several steps.

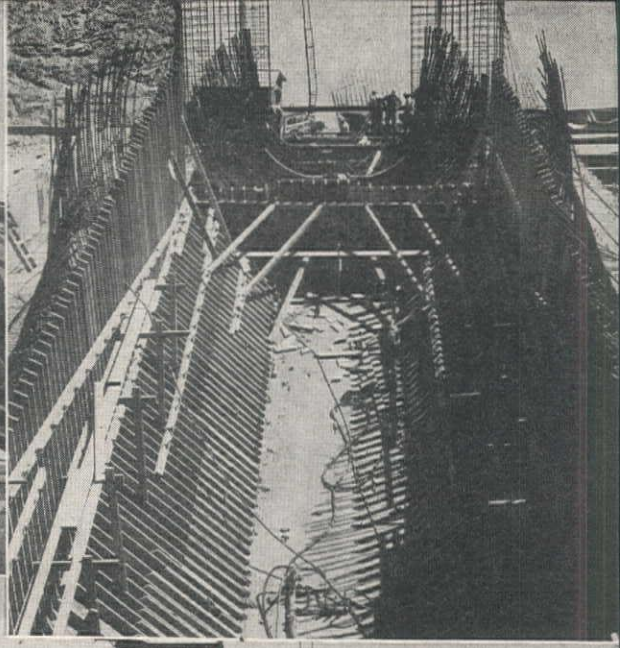
PHOTOS on the opposite page show construction and placing of transition forms for the powerhouse penstocks. At upper left, three of the rectangular-to-round inside forms are being prepared by carpenters. The rectangular intake measures 17.5 ft. by 35 ft. and the circular section has an inside diameter of 22 ft. In the background may be seen the conveyor belt carrying aggregate to the batch plant. At lower left and upper right are the nests of reinforcing steel and timber bracing for the forms. The last three pictures show the form being carried by truck to the whirley crane, which lifts and places the form accurately in its bed.

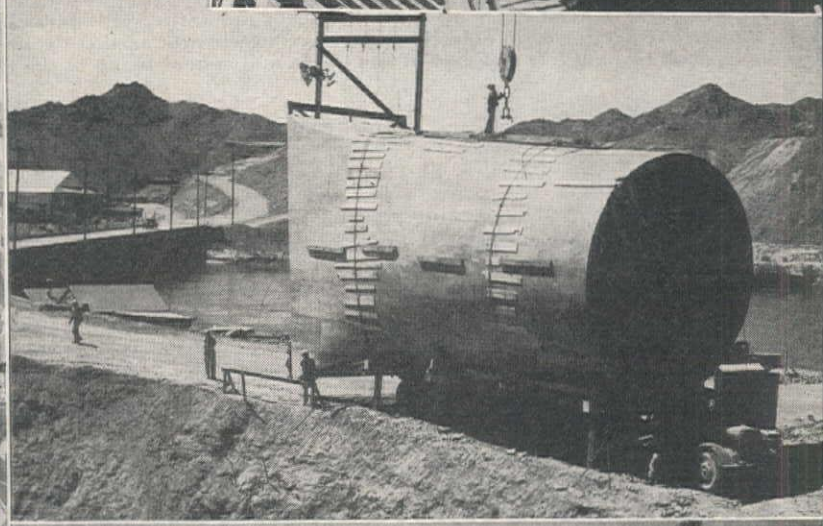
The initial diversion will be made through nine temporary diversion openings in the spillway (each 50-ft. spillway opening will have 3 ports, each 13 ft. 4 in. wide). Stop logs will be placed in the trashrack opening in the powerhouse intake structure to elev. 550, to permit continuation of work on that feature, and also at the upstream ends of the regular outlet gates. Temporary wooden floors will be placed between the piers of the six left temporary openings in the spillway. A flow of not to exceed 25,000 cu. ft. per sec. will be maintained in the river for a period of not more than two weeks, while this initial diversion is accomplished.

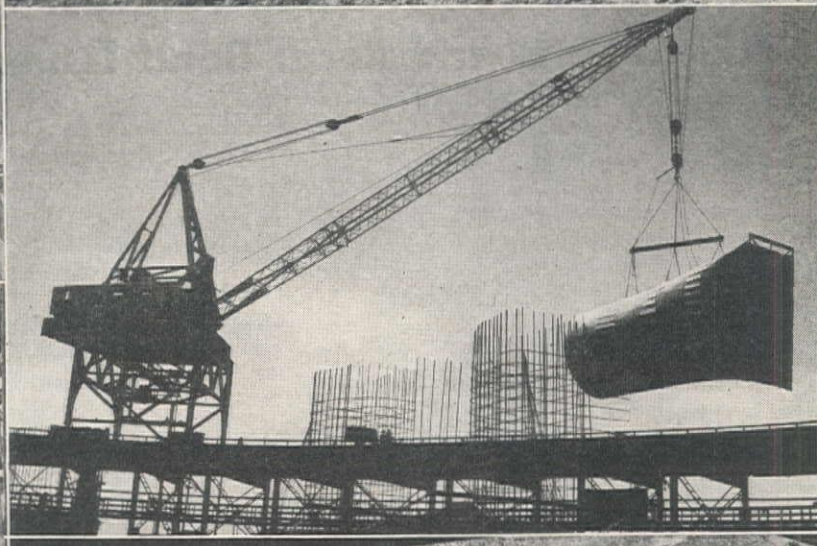
After the initial diversion, stop logs will also be placed across the three right temporary openings, and all the diversion will be through the six openings with the wooden floor, until the construction of the dam embankment is completed to such elevation as will provide for a discharge of 60,000 cu. ft. per sec. over the completed spillway crest. It is expected that after the initial diversion, the flow will fluctuate frequently in the range between 25,000 and 60,000 cu. ft. per sec.

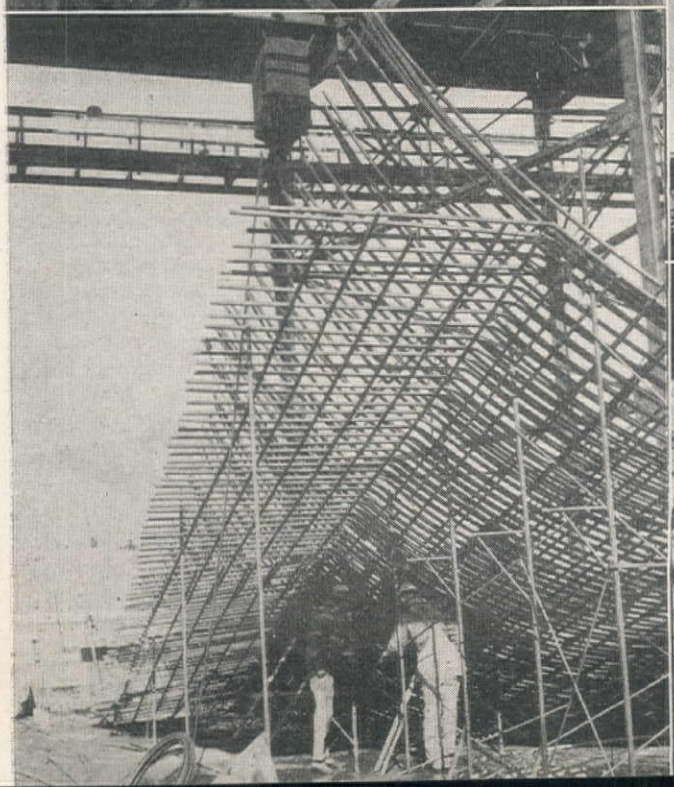
After the dam has been completed to that point, the stoplogs will be removed from the two 22 x 19-ft. outlet openings

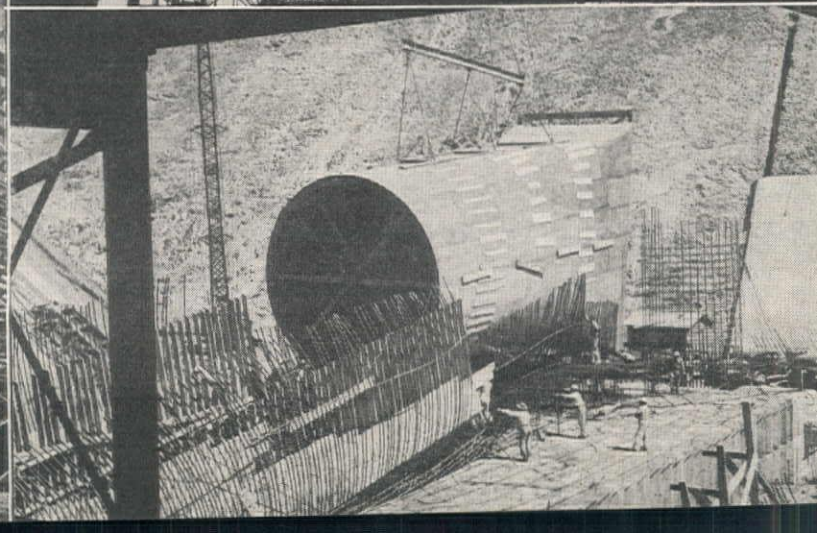


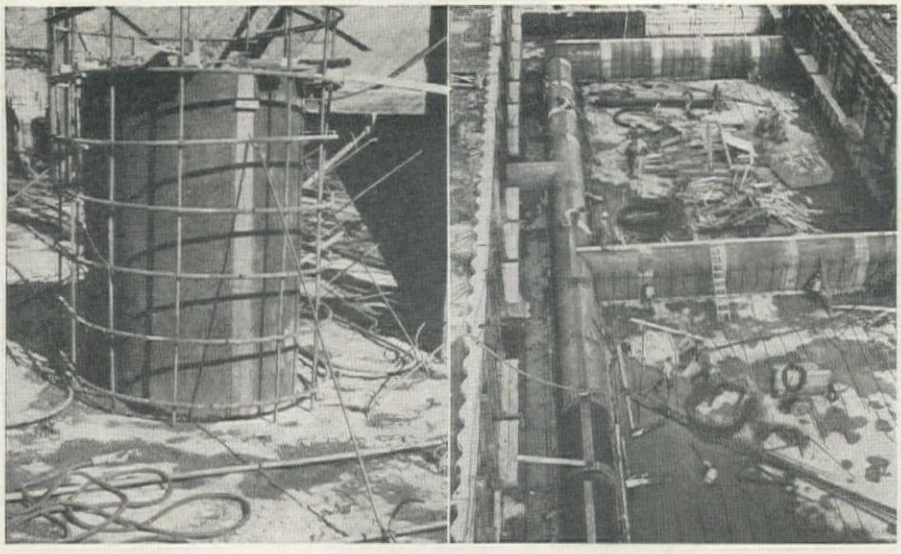












INSPECTION GALLERIES are installed throughout the spillway-outlet structure. Shown here are forms in place for pouring concrete around these galleries; a manhole shaft form at left and part of the horizontal system forms at the right.

at the sides of the spillway, and at the same time stoplogs will be placed upstream of the spillway openings to elev. 580. This will permit full diversion through the two small openings. River flow will be held to 25,000 cu. ft. per sec. for three months, during which period the spillway crest will be completed.

Organization

The dam is being built for the Bureau of Reclamation under the direction of E. A. Moritz, Director of Region III, located at Boulder City, Nev. Construction Engineer for the Bureau is H. F. Bahmeier, and assisting him are H. R. Orr, office engineer and Jean Walton, field engineer. B. C. Wilkas is in charge of the field laboratory, John Stringer is safety engineer, and J. H. Fordham, chief clerk.

For Utah Construction Co., contractors, H. E. Williams is project manager, T. L. Terry is general superintendent and P. R. Newell is project engineer. H. K. Thiesen is mechanical superintendent and T. G. Richards is office manager.

Extensive Construction Forecast by REA Loans and Local Bond Issues

THE RURAL Electrification Administration has approved numerous loans to Western agencies in recent weeks to be used to finance construction of distribution lines, generating facilities and other REA projects. Repayment will be made from revenues of the various projects. Western loans were as follows:

Arizona

To Sulphur Springs Valley Electric Coop., Wilcox, $700,000 for 70 mi. of transmission line, 117 mi. of distribution line, and a 1,000-kw. generating unit.

Colorado

To Union Rural Electric Assn., Brighton, $575,000 for 75 mi. of distribution line and system improvements; to Poudre Valley Rural Electric Assn., Fort Collins, $215,00 for 40 mi. of distribution line and system improvements.

Montana

To Goldenwest Electric Coop., Wibaux, $475,000 for 312 mi. of line, system improvements and headquarters facilities; to Missoula Electric Coop., Missoula, $450,000 for 57 mi. of distribution line and 39 mi. of transmission line.

Nebraska

To Loup Valleys Rural Electric Membership Assn., Ord, $565,000 for 290 mi. of line, system improvements, and 10 mi. of tie line; to Franklin County Electric Membership Corp., Franklin, $261,000 for 156 mi. of distribution line and 4 mi. of transmission line.

New Mexico

To Central Valley Electric Coop., Artesia, $300,000 for 50 mi. of distribution line, 20 mi. of tie line and system improvements.

Oregon

To West Oregon Electric Coop., Vernonia, $430,000 for 81 mi. of distribution line, system improvements, and for construction completed with previous REA approval.

South Dakota

To Lake Region Electric Assn., Webster, $710,000 for 319 mi. of distribution line and system improvements.

Texas

To South Plains Electric Coop., Lubbock, $210,000 for 160 mi. of distribution line; to Pedernales Electric Coop., Johnson City, $465,000 for 301 mi. of line and system improvements; to Southwest Texas Electric Coop., Giddings, $65,000 for 50 mi. of distribution line; to Bowie-Cass Refrigeration Coop., Douglassville, $3,000 for completion of earlier construction; to Hill County Electric Coop., Itasca, $310,000 for 219 mi. of distribution line and system improvements.

Utah

To Dixie Rural Electric Assn., St. George, $5,000 for system improvements.

Washington

To Columbia County Rural Electric Assn., Dayton, $230,000 for system improvements and 7 mi. of tie line; to Pend Oreille Electric Coop., Newport, $500,000 for 80 mi. of distribution line and system improvements; to PUD No. 1 of Clallam County, Port Angeles, $68,000 for system improvements; to Mason County PUD No. 1, Shelton, $65,000 for system improvements.

Other construction work is forecast by the passage of recent bond issues in California, including an issue of $40,000,000 by the Los Angeles Department of Water & Power for construction of the Owens River Gorge hydroelectric power project; $5,250,000 by the city of Stockton for school buildings; $1,600,000 by the city of Culver City for high schools; $105,000 by the city of Firebaugh for school additions; $74,000 by the city of Marysville for school additions; $70,000 by the city of Lathrop for the same purpose; and $40,000 by the city of San Miguel for similar purposes.

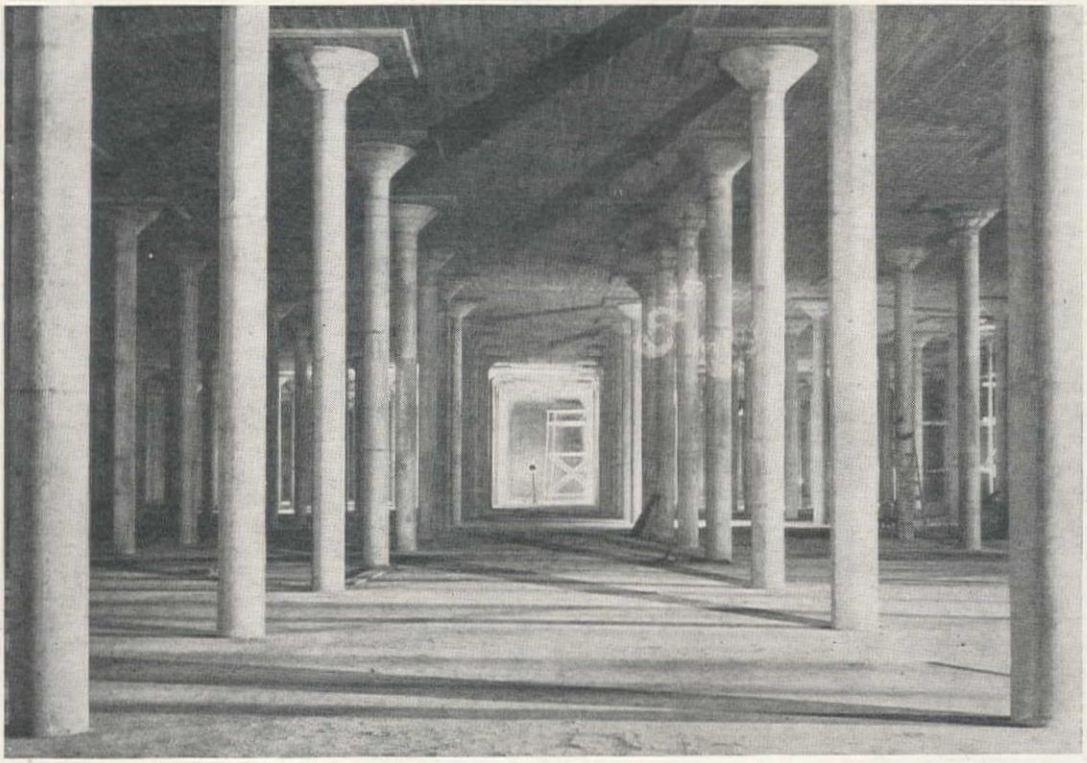
New Group Formed to Improve Specifications

A NEW ORGANIZATION, The Construction Specifications Institute, Inc., dedicated to the improvement of specification writing and practices in the construction and allied industries, has been launched at Washington, D. C. The group is composed primarily of specification writers, architects, and engineers, both in private and public practice. James E. Moore, Chief of Specification Review Unit, Division of Hospital Facilities, U. S. Public Health Service, was elected president at the organization's first meeting.

Priority goals set by the new organization are better specification writing, simpler specifications, standardization of building codes, standardized specifications for public works by the government at all levels, and study of new materials and other processes developed during the last war in order to fit them into the construction picture as substitutes or improvements on costlier and scarcer materials today retarding all construction.

Those eligible for membership include equipment and material researchers as well as those engaged in their production, individuals who are or have been employed in closely related industries, technical organizations concerned with the use of specifications pertaining to construction or to allied fields, and students enrolled in regular courses of architecture and engineering. The Institute's principal office will be at 1825 K St., N.W., Washington 6, D. C.

Flat Slab Concrete Reservoir



INTERIOR VIEW of the new Capitol Hill Reservoir, Basin No. 1, showing the 18-in. columns spaced 20 ft. center to center. The new reservoir is of "Flat Slab Design," without beams or girders to transfer the loads to supporting columns.

Denver builds a new 24-m.g. reinforced concrete box-type reservoir to supplement present storage capacity—The monolithic reservoir will furnish a supply for booster pumps serving the higher districts—Construction continued through winter

By D. D. GROSS
Chief Engineer
Board of Water Commissioners
Denver, Colorado

THE 24-M.G. reinforced concrete box type reservoir, being built by Denver's Board of Water Commissioners to hold potable water, is nearing completion. Construction has been under way since 4:00 a.m. one day last August, when the neighbors rushed out in their night attire to learn what all the noise was about and were astonished to see two 15-cu. yd. carryall scrapers tearing up the soil on that vacant block, and the excavation contractor soon learned that city folks wish to sleep in the morning.

The reservoir is located 1¾ mi. from the Colorado State Capitol building, and 2½ mi. from the center of Denver's congested value district and 175 ft. higher, and is thus a good location for a reserve supply of water. The new reservoir is adjacent to a 28-m.g. reservoir and the Capitol Hill Pumping Station. That is, there will be available 52,000,000 gal. of storage supplementing 131-m.g.d. conduit capacity delivering water to this station, but a considerable portion of the conduit supply is bled off before reaching the Capitol Hill station. These two reservoirs will float on the distribution system supplying the main gravity district, and will furnish a supply of water for booster pumps in the station serving the high area district.

Operation

Denver has four filter plants and several potable water distribution reservoirs other than the two mentioned above. Only one filter plant is located at an elevation which permits supplying higher portions of Denver by gravity. Water from the other three plants must pass through booster pumping stations to serve the higher areas. Clear water reservoirs used in connection with these three filter plants are located in or near the city limits. More storage of this nature is needed for two reasons: first, the present storage capacity does not provide for the full and continuous operation of the filter plants through the night; and second, it has been found that by making changes in operation methods and alterations to the filter plants, their capacity can be greatly increased. With adequate reservoir storage within the city, the supply conduits can also be used to capacity during the nighttime.

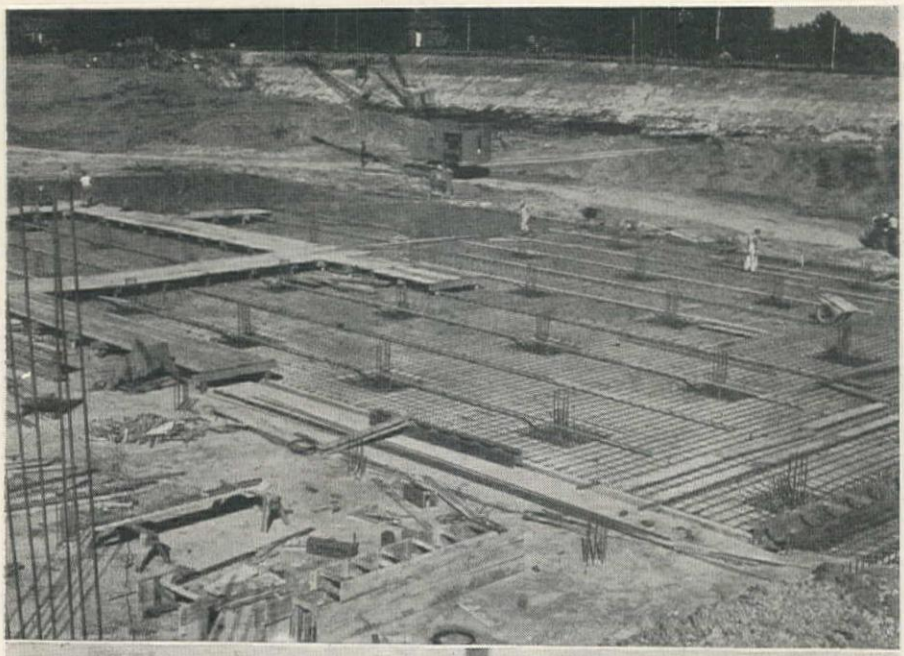
Design

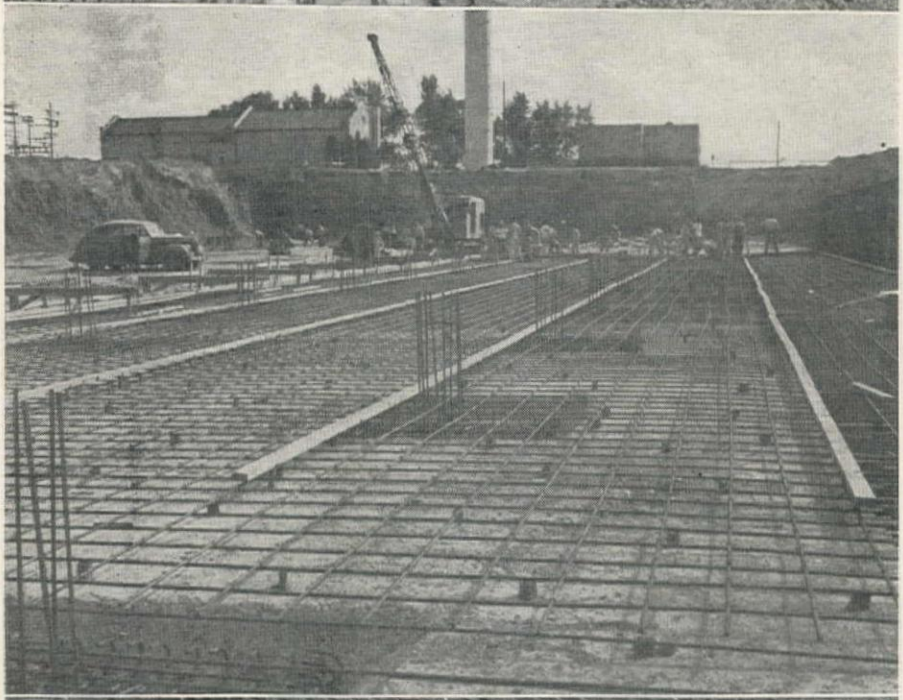
It has been found necessary, in Denver, to use covered reservoirs for storage of filtered water. The Denver water, though not hard, contains up to 128 p.p.m. hardness at some times of the year from some sources of supply. The city has many sunny days and if the reservoirs are not covered it is impractical to keep down algae growth, which imparts a bad taste to the water.

The first reservoirs for potable water storage were built with sloping earth embankments, paved with concrete or stone, and covered with wooden roofs. The roofs did not need to be tight to keep down the algae growth, but even if built tight they soon cracked and opened. Wind blew dust into the water, wood from the deteriorating roofs dropped into it, and it was difficult to keep birds out of and away from the structures. For economy of space and efficiency in operation, the box type of reinforced concrete reservoir has been adopted.

The new reservoir is of the "Flat Slab Floor" design, without beams or girders to transfer the loads to supporting columns. This design is frequently used in warehouse buildings and is adaptable to reservoir construction. The reinforced concrete design and building code, adopted by the American Concrete Institute, has been followed.

The reservoir is 298 ft. wide, 458 ft. long, and 24 ft. high. As near as it is





structurally convenient, the reservoir is a monolith. It is believed to be much more economical and convenient to use this design, repairing any cracks that may appear, than to provide expansion joints. The specifications provide for leakage tests, and that the contractor must make the structure water tight (within reasonable limits, no appreciable fall in water level in 24 hr. and no wet spots appearing on the outside of the reservoir).

It has been the experience of the Denver Water Department that after a reservoir of this type was tested, and placed in service, there was no further trouble from leakage. Construction joints are provided between the floor and walls, vertical construction joints are placed in the walls, and horizontal construction joints are placed in the floor and roof, where needed to meet the contractor's convenience between each day's pouring of concrete. The floor at the base of the walls is level around the entire structure, but the floor area is divided into panels, sloping to three longitudinal drains, which connect with a head drain discharging into a waste pipe to facilitate washing the basin. There is an overflow weir with a 20-ft. crest. The water flowing over the weir falls into a well and flows out through a waste pipe.

The inflow of water from the conduits is at the south end of the reservoir and the outflow to the distribution system is at the north end. The suction pipes, to supply the pumps, are brought into wells extending below the floor of the reservoir and hence give a greater cover of water over the open end of the pipe, thus reducing the danger of drawing air into the pumps through vortexes when the water is low in the reservoir. It is proposed that at some time in the future two more similar reservoirs will be built at this station, one on each side of the new basin—the side walls of this basin serving as one wall for each of the proposed basins. Provisions have been made for joining the structures. Furthermore, provisions have been made for openings in the walls so that the basins may be operated separately or as one big unit. This feature is to facilitate shut-outs for cleaning or repairs.

The structure was designed on the basis of compressive strength of concrete of 3,000 lb. per sq. in., and tensile strength of reinforcing steel of 18,000 lb. per sq. in. The floor slab is 6 in. thick and the roof 9 in. thick. The walls are 21 in. thick at the floor, tapering to 15 in. at the top. The columns are 18 in. in diameter and are spaced 20 ft., center-to-center. It is proposed to place backfill around the outside of the walls and 15 in. of earth on the roof; the slopes and adjacent portions of roof to be land-

PLANK RUNWAYS, top, supported by sawhorses were placed over the floor reinforcing for Basin No. 1 and were removed as pouring progressed. Center, a close-up view of the floor reinforcing and, bottom, steel for the roof construction showing both upper and lower reinforcement in the slab and at one of the columns. The roof is 9 in. thick.

scaped. The center area of the roof is to be available for playgrounds, either grassed or paved. The roof is designed for 200 lb. dead load, and 150 lb. per sq. ft. live load, including paving over playground, if any.

The reservoir can be entered through a small head house from which a concrete stairway descends into the basin. Electric lights are provided in the ceiling for use when the basin is washed. The lights are spaced 40 ft. on centers each way. Suitable vapor-tight lighting fixtures and convenience outlets are used.

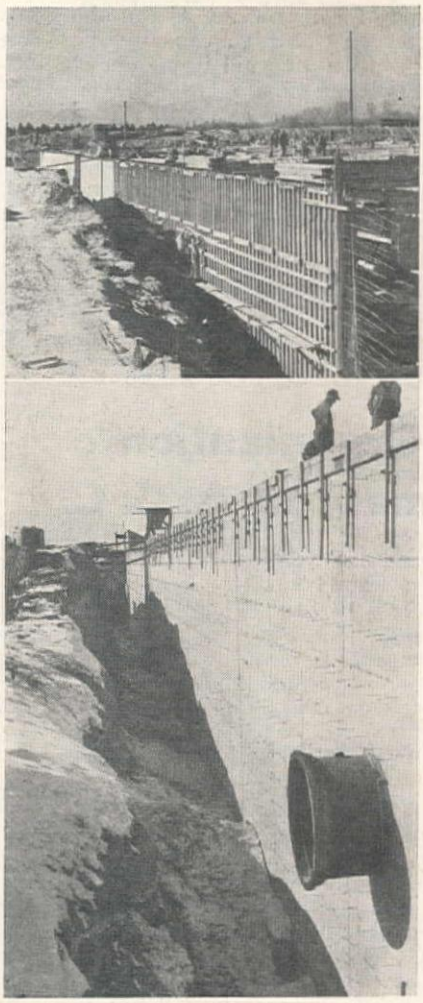
Construction

The reservoir is a cut-and-cover proposition, but excavation and backfill do not balance. It was necessary to haul away 78 per cent of the excavated material. The top of the reservoir is 3 ft. above the original surface of the ground at one end and 22 ft. at the other. There was storage space, for needed backfill material, available at the building site. The top soil was kept separate from the rest of the backfill. Excavated material, stockpiled for backfill, was taken out by two 15-cu. yd. carrier scrapers. The remaining material was loaded onto 1½ and 3-cu. yd. trucks by two dragline cranes.

Considerable water was encountered but was handled by placing an 8-in. tile and French drain on three sides of the reservoir site, with a longitudinal lateral near the center line. A ¾-in. lean coat of pea gravel concrete was placed over the surface of the excavation. In locations where the excavation was inadvertently carried below grade, the contractor was required to backfill with this concrete. This method gave a clean and satisfactory surface on which to place the steel and proceed with construction.

Construction was hampered by the presence of an old type reservoir, taking up about one-half of the site. It was necessary to keep this reservoir in use until past the time of high summer consumption of water, and then to complete the new basin before start of high consumption in 1948. Hence, considerable concrete was placed before the completion of excavation, and some of the roof was poured before all the floor was completed.

The general contractor secured the concrete from two commercial concrete companies. The material was delivered in truck mixers; a single day's pouring ranging from 116 to 350 cu. yd. The truck mixers delivered the concrete into a bucket, which was handled by a crawler crane. The bucket deposited the concrete into a storage bin or dispenser, which in turn discharged into buggies. Plank runways, supported by sawhorses, were placed over the reinforcing steel on the area to be poured and removed as the pouring progressed. This method was used on floor and roof. In the case of the walls, the bucket could be lifted by the crane to a point directly over the section of wall to be poured, and the concrete was discharged from the bucket into a string of tremies; the tremies also being handled by the crane. By reason of the reduction in the cross



WALL AND ROOF construction, top, looking along the south side of Basin No. 1. The entire 24-ft. height of the walls was poured in one lift using a string of tremies and a bucket and crane. Bottom, completed south wall with forms removed. Inflow of water is from the south end.

section of the tremies, from top to bottom of the string, there was no separation of the concrete aggregate, and it was possible to pour the entire 24-ft. height of a section of wall in one lift. On the larger pours of concrete, two sets of equipment were used.

Great care was used in cleaning and preparing the surface of the floor at the joints with the walls. A rich mixture of grout was placed before starting to pour the concrete. There was sufficient room for men to work between the line of reinforcing steel on either side of the wall form when concrete pouring was in progress, and thus insure a good job of placing. Electric vibrators were used in tamping all concrete.

Although the winter was unusually cold, with more snow than normally, the placing of concrete proceeded all winter. Snow would be cleaned from the forms the day after a storm, and concrete poured on the following day. Warm water was used to mix the concrete, and the concrete was warm when it reached the job. Tarpaulins and hay were placed over the concrete and the material was kept warm by oil fired salamanders. Most of the roof was poured during cold weather. The space under sections of the roof to be poured was housed in and kept warm with salamanders.

The specifications provided for the use of 6½ sacks of cement per cubic yard of concrete. However, soon after the job was started, the Denver area was hit by a cement shortage. For this reason cement was rationed and the amount assigned to this job threatened to delay the work. As an alternative, it was suggested that an admixture be used, and the amount of cement reduced from 6½ to 5½ sacks per cu. yd. It was found that the new mixture was as easy, or easier, to place in the forms, and that the strength of concrete met the requirements. It was understood that the use of the admixture would eliminate, or greatly reduce the number of cracks that would appear in the structure, but this did not materialize, and when the cement shortage eased, the mixture was returned to the 6½ sacks mix.

Costs

The construction of this reservoir was contemplated before the war but it was impossible to proceed with its construction during the war period. When plans for its construction were again seriously considered, there was a shortage of reinforcing steel, and many prospective contractors would not be able to obtain the required amount without considerable delay, hence an order for the steel was placed by the Board of Water Commissioners, and monthly allotments received by the Board were conserved until the required 1,800,000 lb. were accumulated, at a total price of $94,858.

When it appeared that a sufficient supply of steel would be available, bids were called for. The low bidder, J. T. McDowell and Sons, of Denver, submitted the following prices:

77,000 cu. yd. excavation	$ 1.10
108,000 yd. mi. of overhaul	.30
17,000 cu. yd. backfill	.50
10,000 cu. yd. "Class A" concrete	38.75
326 cu. yd. "Class B" concrete	25.50
Placing 1,800,000 lb. of reinforcing steel	.0185
Installing 1,800 lin. ft. of 6-in. drain	6.80

The total estimated cost, on the basis of the above bid price, was $764,790, including valves and incidental materials furnished by the Board, together with engineering.

It is the Board's policy to postpone construction, so far as possible, beyond the existing period of shortage of materials and labor, but the phenomenal growth of Denver since the war made imperative demand for water and the quickest and cheapest way to provide it is to make improvements to the filter plants, which are now under way, and in the construction of reservoirs such as this one, making it possible to more efficiently operate the filter plants. The Board has under way a program of improvements, estimated at $30,000,000.

It is interesting to note that present prices are from 80 to 100 per cent higher than those in effect immediately before the war, and in some cases bids have been more than 100 per cent higher. The

anit bid on concrete for a similar but smaller reservoir than that being built at Capitol Hill, constructed in 1939, was $15.00 per cu. yd. as against $38.75 given above. The reservoir built in 1939 had a capacity of 5 m.g.; the cost per million gallons of storage capacity was $17,700, not including the cost of the building site. There was no surplus excavation over backfill. The present 24-m.g. Capitol Hill reservoir will cost, in round figures, $32,000 per million gallons storage capacity.

On March 1, 1948, the Board opened bids for another reservoir, of the same type of construction as the above two reservoirs, having a capacity of 5½ m.g. The unit price bid was somewhat less than on the Capitol Hill reservoir. However, under the terms of the specifications, winter construction is not required. The cost per million gallons storage capacity of this reservoir, not including the cost of the building site, was $37,400.

The lower price per million gallons of storage capacity in the Capitol Hill reservoir reflects the advantage in cost of storage capacity being obtained by construction of the deeper reservoir.

Japanese Contractor Organization Follows Pattern of American A. G. C.

THE ASSOCIATED General Contractors of America has been utilized as the pattern for reorganizing the Japanese contractors association along democratic lines, the American association has been informed.

The Japanese organization, now named the Associated General Contractors of Japan, was established with the assistance of the U. S. Army.

Managing Director H. E. Foreman, of the A.G.C. of America, made public a letter received from the A.G.C. of Japan in which the Japanese organization asked the American group to "teach, assist and lead us" in their association work.

Last November the A.G.C. of America received a request from Major General Hugh J. Casey, Chief Engineer, General Headquarters, Far East Command, for information which could be used in reorganizing the Japanese association. The A.G.C. of America sent copies of its Governing Provisions, Code of Ethical Conduct, outline of its organization and work, and other material.

The full text of the letter sent to the A.G.C. of America from the A.G.C. of Japan is as follows:

"Dear Sirs:

"We take the pleasure in addressing to you and to inform you the character of our Association, because this organization was established with the assistance of GHQ Engineering Section; and your by-laws were copied extensively.

"Our organization, The Associated General Contractors of Japan was established last month, with 40 local associations as its members which were formed in almost every prefecture of Japan with about 5,000 general contractors as their members.

"The purpose of our Association is to contribute in advancement of welfare of the public and the general contractors by promoting the technical, economical and social standing of the industry.

Our activities, briefly speaking, include investigation, research of the construction technics, management of the business, elevation of the ethical standard, distribution of statistics and reports, securing proper legal and social treatment for the industry, cooperation with other related organizations, etc.

"We are now making efforts in every respect to accomplish your purpose and we desire your kind help. May we ask you if you can kindly contribute some printed matters useful in study of any of the items, technical phase of the general construction, administration of the enterprise, method of estimate, question of efficiency, labor question and any other problems concerning architecture and civil engineering?

"We wish to add that Japan is becoming more and more peaceful democratic nation after the war. We firmly believe and hope the deeper friendship will ever be established between your country and ours, and further hope that your Association will kindly teach, assist and lead us in the general construction work.

"Your kind reply will be very much appreciated.

"Very truly yours,
"K. Komoda, Secretary General
"S. Ando, President."

Western Conferees See Latest Safety Devices

WESTERN building and construction leaders and safety authorities attended the Tenth Annual Western Safety Conference held at the Hollywood Roosevelt Hotel in Los Angeles on June 16-17-18, presided over by Gerry H. Lockner, president of the conference. Special panel and discussion groups dealt particularly with safety in the construction fields. More than 10,000 persons interested in the safety phases of the industrial, marine, home, public, traffic and aviation fields were in attendance.

Carl E. Johnson, of the State of California, Department of Industrial Relations, Division of Industrial Safety, as general chairman of the Industrial Division of the conference, arranged a program of outstanding speakers for the discussions on construction safety.

"Safety's Place in Construction" was the subject of H. W. Richardson, McGraw-Hill Publishing Company, New York City. Walter J. Escherich, of the National Apprentice Committee, Associated General Contractors of America, spoke on "Elements of Safety as Taught in our Apprentice Program." In addition to the talks and panel discussions there was a film entitled "Safety in Construction."

Labor and management gave their views on safety in industry. Carleton B. Tibbetts, president of the Los Angeles Steel Casting Co., spoke on "The Objectives of an Accident Prevention Program as Viewed by Management," and C. J. Haggerty, of the California State Federation of Labor (AFL), spoke on the same matter as viewed by labor.

A highlight of the conference was an exhibit of the latest developments in safety devices and equipment. This exhibit, which will be open to the general public, emphasized the ease with which safety can be attained when it is planned into any job or project.

The Western Safety Conference area covers California, Oregon, Washington, Idaho, Utah, Nevada, Montana, Wyoming, Colorado, Arizona, and New Mexico; also British Columbia, Alaska, Hawaii and Lower California.

Optical Radar Equipment Utilized for Surveying

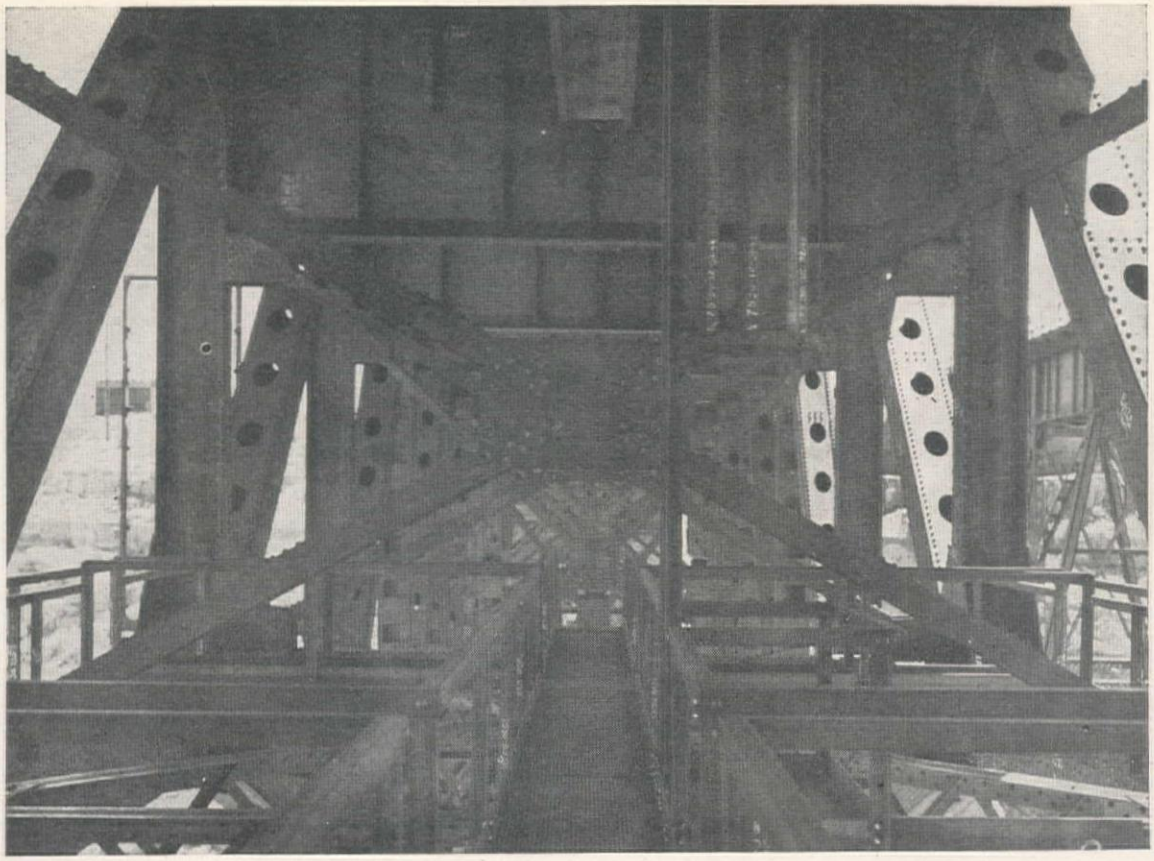
PORTABLE equipment which utilizes optical radar for surveying the earth's surfaces has been developed, according to W. W. Hansen at the Illinois Institute of Technology in Chicago. The equipment sends out pulses of light which are reflected back from the point whose position is to be determined, and this distance is measured by the time the light takes to return to its source. The returning light falls on a photomultiplier whose output is amplified to produce a pip, or an illuminated spot, on a cathode-ray tube.

Determination of the transit time of the pulse of light is accomplished by auxiliary circuits which include a local crystal-controlled oscillator. The circuits produce timing markers on the tube, which can be made to match the pip produced by the returning light.

The system for measuring angles corresponds to that for the conventional surveyor's transit. The optical system makes use of a single parabolic searchlight mirror, the outer portion of which is used for the transmitted beam, while the inner portion is used for the returned beam. The equipment operates alternatively from storage batteries or from 110-volt alternating current.

A Contractor Goes Broke

MAYBE he actually was a contractor who went broke in the meantime. Anyhow, Timothy O'Brien, posing as a heavy contractor, hoodwinked railroad officials in Cheyenne, Wyo., and Colorado Springs, Colo., into assembling a fleet of flat cars to move his non-existent heavy machinery. He failed to appear to accept charges on any of them and was later found by police washing dishes in a Colorado Springs cafe for $19 a week. O'Brien had ordered 41 flat cars and several gondolas assembled in the two cities. The "king for a day" pleaded guilty to a charge of disturbance, but gave no explanation for his conduct in posing as a big-time operator.



Santa Fe Erects Third Bridge Over Canyon Diablo in Northern Arizona

New Pratt-style, deck-truss structure 540 ft. long designed for 100-m.p.h. operation on each of two tracks replaces lighter structure with restricted speed over gauntlet track—Fissured canyon wall grouted with Prepakt concrete before construction of abutments and footings

ANOTHER BOTTLENECK has been removed from the transcontinental railway service of the Santa Fe Railway through the replacement of a gauntlet-track, 10-m.p.h. slow-order bridge over Canyon Diablo, near Winslow, Ariz., by a modern steel structure, designed for double-track, 100-m.p.h. traffic by the heaviest equipment on the line. The new bridge has been in service since last fall, and the abandoned one has now been completely dismantled.

Canyon Diablo is a gorge cut 225 ft. deep into the northern Arizona desert, through a hard, but fissured limestone. The new structure is the third bridge the railway has built across the same canyon, the first, a single-track steel viaduct 526 ft. long, having been erected in 1881 by the Atlantic & Pacific Railroad, one of the predecessor lines of the Santa Fe, and the second, also a single-track, but heavier structure erected in 1900, and altered to accommodate the gauntlet track service in 1913.

The new deck-truss bridge is 540 ft. long, consisting of two 120-ft. approach spans, and a 300-ft., two-hinged center arch. The arch span is 25 ft. deep at the center and 80 ft. 2 in. deep at the haunches. The structural design is of the Pratt truss style with 30-ft. panels, and the trusses are at 28 ft. center-to-center. Basin load design is double-track E-72 loading.

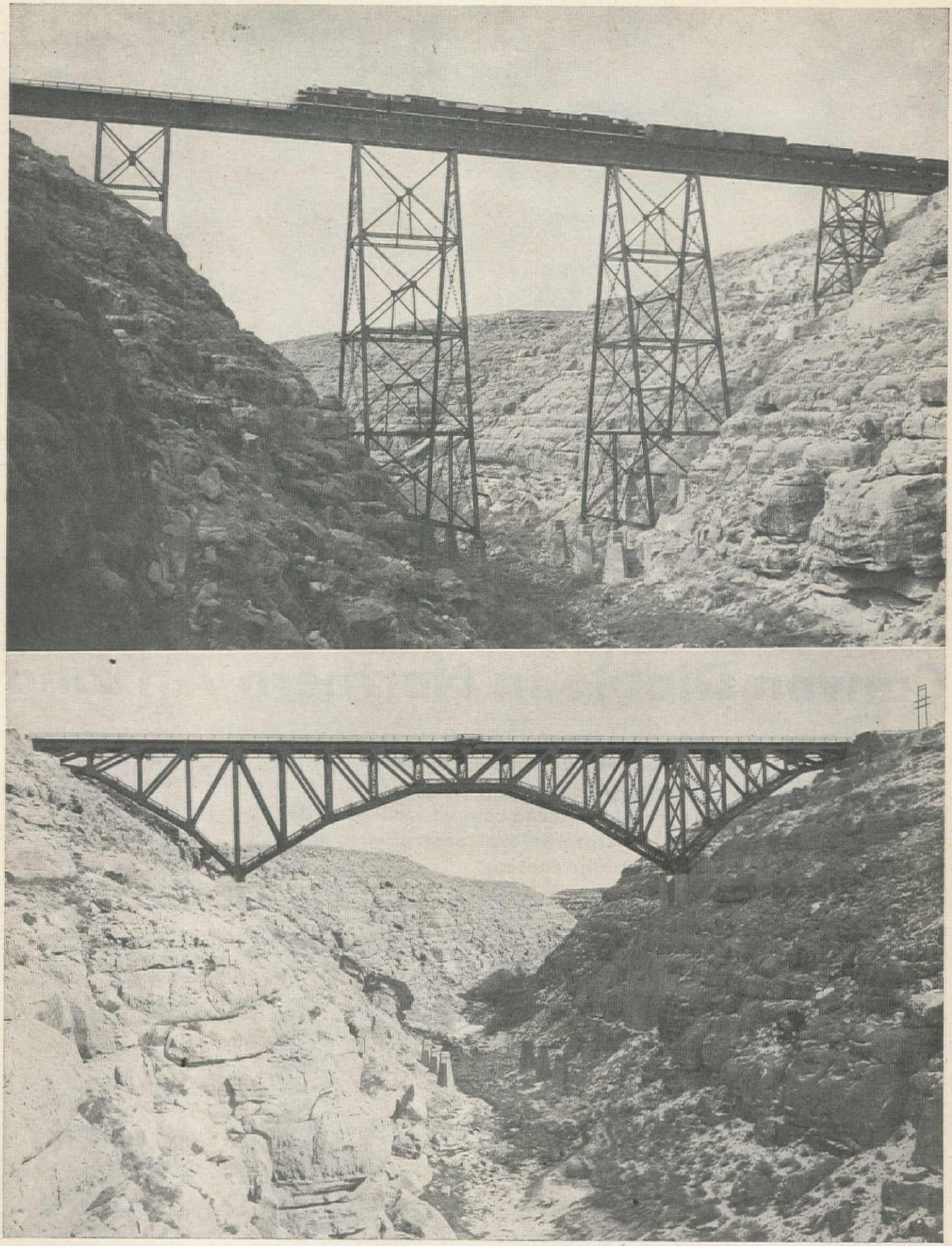
The steel for the bridge was fabricated by the Kansas City Structural Steel Co. and erection in the field was by the Kansas City Bridge Co. Excavation and construction of the piers and abutments was carried out by Morrison-Knudsen Co., Inc., and grading of alignment changes made necessary by relocation of the bridge, was done by Winston Bros. Co. These consisted of a half-mile long approach from the east and a quarter-mile section on the west.

LONGITUDINAL VIEW of the new bridge, above, showing inspection catwalk and oval openings in truss members. All portions of the truss are readily accessible for inspection and maintenance, with an elaborate system of walks. The oval openings replace latticed style of truss members, and readily permit painting and inspection.

Canyon wall grouted

Of unusual interest was the preparation of the canyon walls before construction of the footings. Both vertical and horizontal cracks, some quite large, were observed in the limestone forming the canyon walls. In order to give adequate support in the area surrounding the footings, all loose rock was scaled off, the cracks were thoroughly cleaned both with water and air streams, and they were then completely closed by the Prepakt method. In this method, dry aggregate is packed securely into the cracks, after which a sand-cement grout is forced through the aggregate. The dry material having already been firmly compacted, it is found that no shrinkage cracks appear in the finished seal.

Regular grout holes were also drilled into the foundation rock to a maximum depth of 40 ft., to seal deeper lying cracks. Altogether 5 carloads of sand, 2,830 sacks of cement, 1,400 sacks of filler, and 4,250 lb. of intrusion agent were used in this grouting program. A large crack in front of the west piers was backfilled with broken rock, grouted with cement, and 25 cu. yd. of concrete poured over the top to produce a sloping apron with a minimum thickness of 1 ft., so that water would drain rapidly off.



OLD AND NEW! Bridging Canyon Diablo, near Winslow, Arizona, the bridge shown in the upper photo carried Santa Fe Railway trains across the 225 ft. deep stream bed since 1900. It was built for single track service, and in 1913 was made available for double track operation by alteration to accommodate gauntlet tracks. However, a 10 m.p.h. slow order prevailed over it. Recently completed is the modern 100-m.p.h. double track structure shown in the lower picture. In the bottom of the canyon may be seen the footings remaining after the 1900 structure was demolished, also those of an earlier bridge built in 1881.

Arch piers

The bridge foundations consist of concrete abutments at each end and concrete piers under each of the arch haunches. Each pier has a horizontal surface to carry vertical loads from the arch, and a sloping face, approximately normal to the lower chord member of the arch, to carry the diagonal thrust.

Specially designed arch shoes, 6 ft. wide and 7 ft. 6 in. long, receive stresses through 16-in. pins passing through the lower chord members of both the 120-ft. span and the arch, and the end vertical member of the arch. The top chords of the approach spans were connected to the upper end of the adjacent vertical posts of the arch by 10-in. pins.

Rocker shoes were installed at the abutment end of each of the 120-ft. approach spans to care for expansion. Also, to provide for freedom of movement in the lower chords of those spans, slip joints were provided at the first panel point above the arch shoe.

The tracks on the deck of the bridge are each supported by four wide-flange longitudinal beams, 36 in. deep, which in turn rest upon rib bearings at each transverse floor beam. At every fourth one of these floor beams, a special truss consisting of 14-in. wide flange beam sections placed directly under the floor stringers, acts as a traction truss to transmit traction and braking forces into the top lateral system of the bridge.

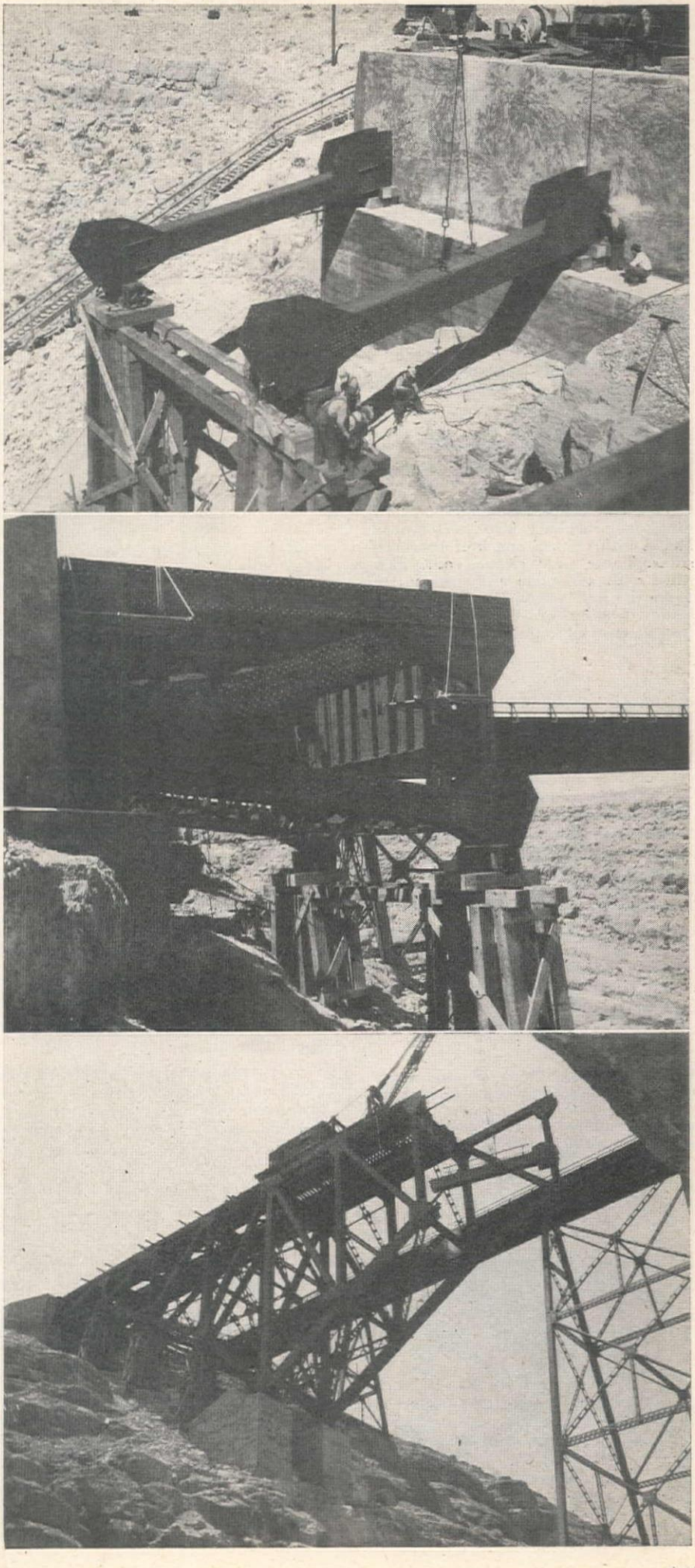
The timber deck of the bridge is composed of 6-in. treated timbers, 16 ft. long, covered with an 8-in. layer of crushed rock ballast, upon which the ties are laid. A 2-ft. walkway, with wearing surface of asphalt plank, and protected by a steel handrail, is provided along each side of the deck.

A system of catwalks, protected with handrails is built inside the truss structure, to provide complete facilities for maintenance and inspection. The system of walks includes one for the full length of the structure on the center line at the level of the bottom chord, another immediately under the deck, and at each panel point, a cross-walk to each truss. Handrails were also placed along the bottom chord members themselves, so that every part of the bridge is readily available for inspection.

Each of the main truss members was built up as a box, with the four corner angles turned inward, and with the angles joined by perforated plates rather than lacing bar. These plate perforations are elliptical in shape, being 12 in. high and 20 in. long, and are spaced on 4-ft. centers. These openings are for the purpose of affording ready access for painting and inspection of the truss members.

Erection procedure

The first erection job, after comple-



STEEL ERECTION progress: first lower chord members are set on abutment and a timber falsework bent, top. The abutment end was tied down, but set on jacks to permit adjustment for final closure. Completed first panel, center. Arch span being erected as a cantilever by crane on tracks advanced as erection proceeded. The old bridge is visible in the background.

CANYON WALL was composed of hard limestone, broken into rectangular blocks with vertical and horizontal fissures. These were cleaned out, then filled with aggregate and grouted, to make the wall a monolithic mass. Old bridge, footings of 1881 structure and first pour of new abutment visible.

tion of excavation and sidewall grouting, was the pouring of the concrete pier footings. Concrete forms were anchored to the rock walls of the excavation, and heavy reinforcing steel was placed on 2-ft. centers both ways inside the forms. Concrete, designed for a strength of 3,000 lb. per sq. in. after 28 days, was chuted into the piers from mixers set on the previously-poured abutments. An admixture of Pozzolith was used in the concrete. Forms were left on the block for seven days, and in some cases, when the weather was extremely cold, the piers were inclosed in tarpaulins, with salamanders kept lighted for five days. Safety handrails were placed around the tops of the piers.

A recess 12 in. deep and a little larger than the under surface of the arch shoe was left open, in each case, at the time that the arch footings were poured. After the concrete in the piers had set, the steel arch shoes were very accurately placed, using careful readings by surveyor's instruments, after which the recesses were filled with concrete up to the shoe.

The structural steel was placed working outward from the ends. Timber falsework bents on concrete foundations were placed at each panel point, to facilitate erection of the steel for the 120-ft. approach spans, as far as the arch piers. As each panel was erected, track was laid on the deck to permit cranes to advance to the farthest point to raise and place the members of the next panel.

After erection of this approach span was completed, the several panels of the arch were erected as a cantilever, with the arch chords secured to the approach spans. In order to prevent movement of the connected span around the pier footing as a center when the cantilever construction progressed farther out, the abutment end of the short span was anchored firmly to the concrete. This was accomplished by placing two 40-ft. channels in the concrete of the abutments at right angles to the centerline and 5 ft. below the surface of the concrete, and connecting to these channels vertical tie rods, which were in turn fastened to heavy steel plates over the top of the top chords.

Steel erection was commenced at the east abutment, and proceeded until the entire east approach span and the arch as far as the central closing span, were completed. The west simple span and west end of the arch were then erected in a similar manner.

During erection, hydraulic jacks were placed under the end floorbeams of the approach spans, so that at the time of closure of the center section of the arch, the outer ends of the arch sections could be moved up or down as required to secure proper horizontal alignment. With this assistance, riveting in the center section was simple.

ROCKER SHOES were placed under the lower chord members at each abutment, to provide for expansion. In addition, slip joints in each approach span give added protection from expansion.

Special techniques

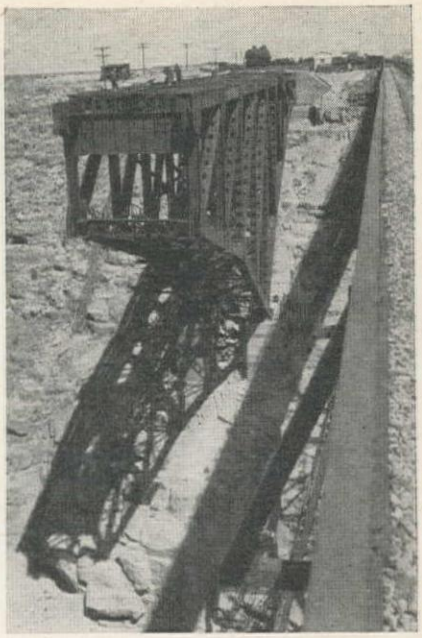
An unusual steel procedure was worked out for passing hot rivets, using pneumatic tubes directly from the heater to the riveter. This expedited the work by speeding delivery, increasing safety, reducing the number dropped and lost, and delivering directly to the man who would use them.

During the steel erection, rope nets were used throughout as a safety measure, and no serious accident occurred to personnel during the entire construction period.

After completion of the new bridge and re-routing of traffic, the old structure was completely dismantled. About 700 tons of steel were reclaimed from the old bridge. Steel in the new structure amounted to 2,056 tons.

Construction of the new bridge was under the supervision of G. W. Harris, chief engineer of the Santa Fe Railway, M. C. Blanchard, chief engineer of the Coast Lines of the railway, and R. A. Van Ness, system bridge engineer, with C. H. Sandberg, assistant bridge engineer of the system, acting as resident engineer.

For the Kansas City Bridge Co., contractors on steel erection, Harry Pyle was superintendent. Painting was performed by Omar White Co., with Omar White in direct charge of the work.



ERECTION COMPLETED on each approach span and each half of arch, left projecting as a cantilever, while work was under way from the west abutment. When ends were united, the structure no longer acted as cantilever, but as arch.

Peace River Suspension Bridge Tower Salvaged

CIVILIAN and Canadian Army engineers have now won a battle which has been raging throughout the winter to save the Peace River Bridge on the Alaska Highway near Dawson City.

This $4,000,000 suspension bridge, which is 2,100 ft. in length, is the major span on the Alaska Highway. One of the 250-ft. bridge towers was found to be leaning 14 in. out of line. Engineers feared that unless this could be protected before the spring thaw, that the huge ice blocks on the Peace River might knock the pier from its foundations and thus cause the bridge to crash, blocking the highway.

When the discovery was made, the Peace River was covered with ice 7 ft. thick. Divers cut through the ice and went down to build a steel cofferdam to provide watertight protection for the bridge piers. For a time it was touch and go, but the final work has now been completed and engineers state that after the thaw, the cofferdam will permit the placing of 1,000 cu. yd. of concrete as reinforcement for the leaning tower.

Strangely enough the divers state that it was warmer below the water than on the surface. They worked in unheated diving suits and although it was 50 deg. below zero on the ground, it was only 30 deg. below on the bottom of the river beneath the heavy ice coating.

Santa Barbara's Water Plans

Condition of continuous drought, brought about by limited watershed and silted reservoir, aggravated by meager rainfall, causes serious situation in California garden city—To alleviate shortage, City will raise existing Gibraltar Dam, and Bureau of Reclamation plans dam and tunnel system

A CONTINUOUS drought, only somewhat amplified by the rain shortage in the early part of the present season, has made Santa Barbara, Calif., very conscious of water, and brought into being two plans for correction of the ever-existent potential threat to the welfare of the community. The two plans are (1) a program to enlarge the existing facilities of the City in the bed of the Santa Ynez River, and (2) a project outlined by the Bureau of Reclamation to build a new dam further down the same river and drive a tunnel through the Coast Range mountains to gather the considerable supplies of ground water locked in their strata.

The city is situated in the center of a narrow coastal shelf about 60 mi. long and running virtually due east and west, between Ventura and Gaviota. The shelf varies from a mile in width to perhaps 10 or 12 mi., being bordered northerly by the Coast Range and southerly by the Pacific Ocean. Although the Indians and the early Spanish settlers were able to collect sufficient water from watersheds on the south slopes of the mountains by means of extensive collection systems, some remnants of which are still preserved in the vicinity of Santa Barbara Mission, the expansion of the settlement into a city early brought indications that this supply was inadequate.

Water from adjacent watershed

Accordingly in 1920, Gibraltar Dam, a concrete arch structure having a maximum height of 160 ft. above foundation was constructed across the Santa Ynez River, approximately 8 mi. due north of the city, the river running in a westerly direction parallel to the ocean's shore, in the first canyon over the mountain wall to the north of the city. The watershed above the dam was about 110 sq. mi., and the capacity of the reservoirs 15,374 ac. ft.

RELIEF MAP, top of page, shows geographic situation in Santa Barbara area, with existing Gibraltar Dam, and proposed new Cachuma Dam, 6-mi. tunnel, and 30-mi. conduit advocated by the U. S. B. R.

Water from the reservoir was conveyed to distribution reservoirs on the south slope of the mountains through Mission tunnel, a 5-mi. bore through the Santa Ynez Mountains. A very important source of water was that produced from the strata through which the tunnel was driven. This flow amounted to about 3,500 ac. ft. per year when the tunnel was first opened, and has continued to flow ever since, however on a steadily decreasing scale. In 1941, the yield had been reduced to 1,100 ac. ft. per year, and it is estimated at about 660 ac. ft. annually at the present time.

In the nearly thirty years of its life, the effective storage capacity of Gibraltar Reservoir has been decreased to approximately 7,000 ac. ft., by the accumulation of silt. This is about the annual demand of the city, and in years of drought, when the reservoir is not filled to even this limited capacity, the demand cannot be nearly met from this source.

Present curtailment

Such a year is 1948. Rainfall in the watershed has been about 50% of normal, which at best is in the neighborhood of 16 in. per year. This has made available for storage only a small quantity of water in the reservoir and the city has

been obliged to clean out old wells and drill new ones in the hope of providing enough water to maintain minimum living standards through the coming dry season.

The city of Santa Barbara is well known for the beautiful gardens, lawns and trees growing on numerous large estates. In order to adequately water and maintain these properties and to supply the normal requirements of a city of 40,000 people, the water requirement is approximately 8 mgd. or 9,000 ac. ft. per year. Restrictive ordinances now in effect have cut water use to about 3 mgd., or 3,500 ac. ft. per year. At the present time it is unlawful to use municipal water for irrigation of any lawns or flowers, the washing of walks, driveways or other hard surfaces, the washing of autos, either commercial or private, the operation of ornamental fountains or pools, or any other use not strictly necessary for living purposes.

Water available at Gibraltar in 1947 was well over the limited storage capacity, and had it been possible to hold that supply the city would not now be in such a drastic situation, but because of the capacity reduction due to silting, it was lost over the spillway.

Additions to Gibraltar Dam

Accordingly, the city employed the engineering firm of Leeds, Hill and Jewett, of Los Angeles, to investigate the condition and make plans for its correction. Under the direction of Raymond A. Hill, a plan for addition of 15 ft. to the height of Gibraltar Dam was worked out. This would restore to the reservoir the original capacity of 15,374 ac. ft.

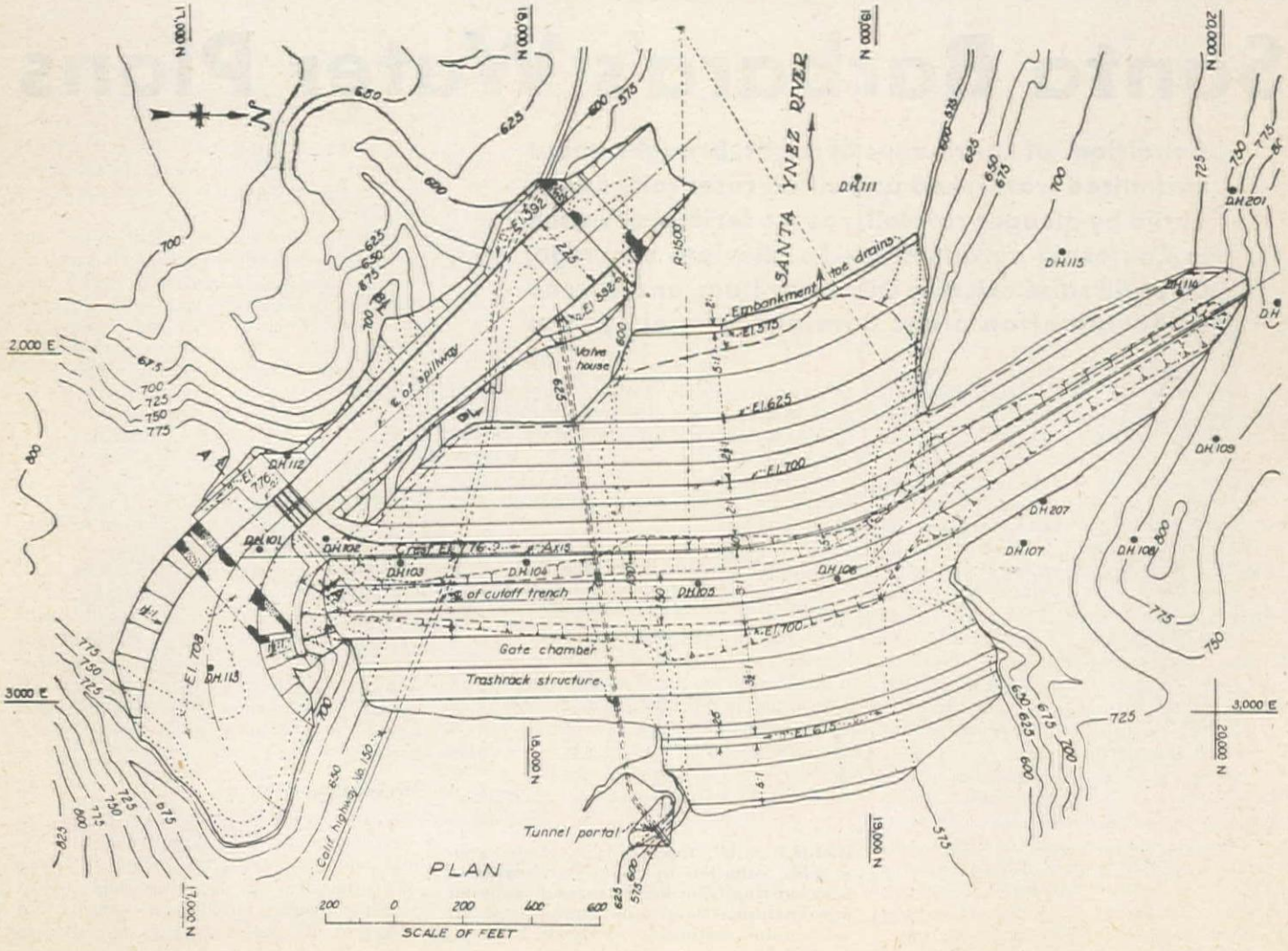
The proposed raise of 15 ft. will be accomplished by removing an existing parapet wall on the upstream face of the dam and the removal of an average of 3.5 in. of the present surface concrete on the 8 ft. wide crest of the dam in such a way as to leave keyways on the surface. New concrete will then be poured above the existing crest. The present vertical downstream face of the dam will be extended, as will the 0.075-to-1 slope of the upstream face. The new crest will therefore be 6 ft. 10½ in. thick. A new parapet wall 3.5 ft. high will be added above the crest on the upstream side. In addition to raising the arch, a heavy concrete thrust block will be constructed at the left abutment of the arch and a radial gate controlled spillway will be constructed to the left of the left abutment by pouring concrete in an ogee shaped block over the existing gravity section. There will be three of the gated spillways controlled by eccentrically hung radial gates automatically operated by an elaborate system of floats and balances. At the extreme left end of the gravity section there will be an overpour spillway at an elevation 3.74 ft. lower than the crest of the main dam.

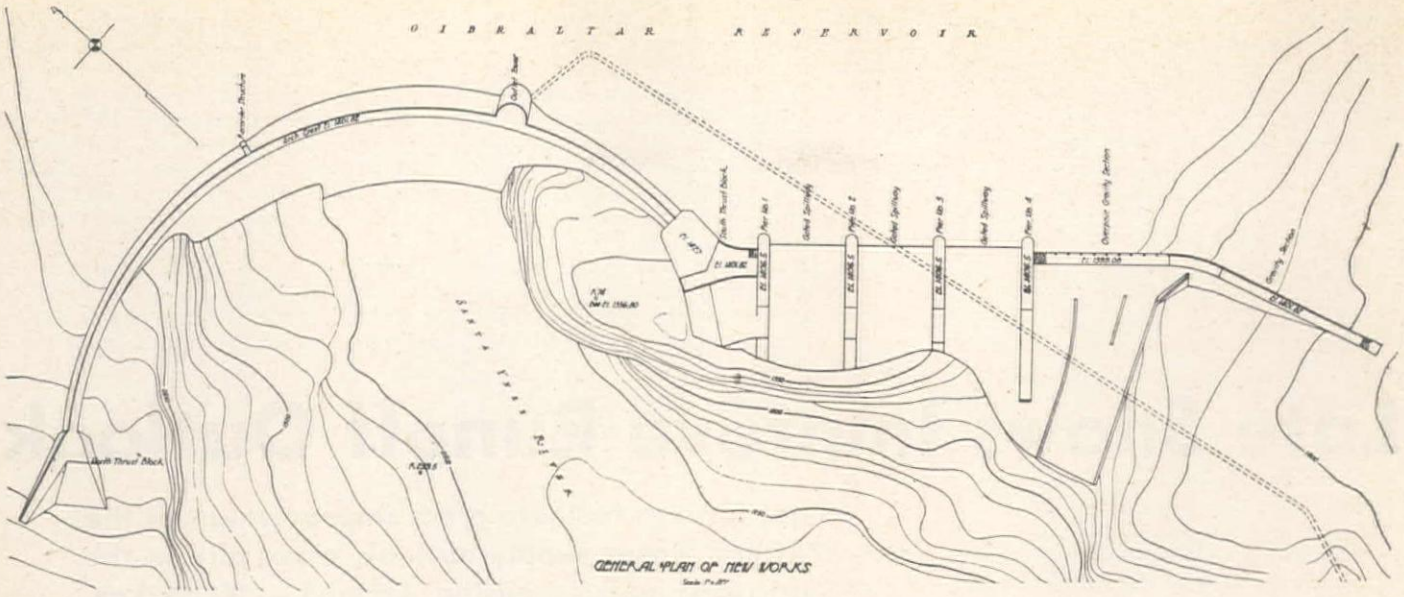
A bond issue was approved by the voters of the city of Santa Barbara early last year in the amount of $600,000 to finance the additional construction at Gibraltar Dam. When bids were called, however, the lowest proposal amounted to $848,000, with the result that all bids were rejected. A recent special session of the California Legislature advanced emergency funds to the city in the amount of $310,000 and new bids were received on May 6, the lowest being submitted by V. D. Case Co. of Long Beach, in the amount of $797,587, and the contract was awarded. It is believed that the bond and emergency money will be sufficient to take care of the contract cost, supervision and engineering, but if additional funds are required they will be withdrawn from surpluses of the municipal water department. Construction time is estimated at six months, so that the enlarged reservoir will be available for use by the 1948-9 winter rainy season.

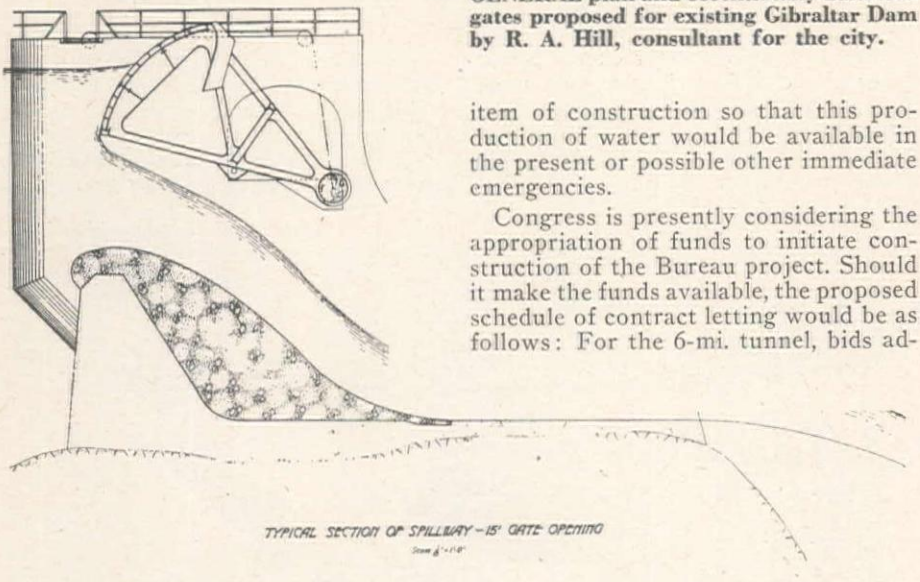
PLAN of Cachuma Dam, an earthfill structure which the Bureau of Reclamation proposes to build on the Santa Ynez River, about 20 mi. downstream from Gibraltar Dam, and with about twice the watershed catchment area. Estimated at $14,000,000.

Bureau of Reclamation plan

At the same time, the Bureau of Reclamation under the direction of Jerome H. Fertig has had under study a comprehensive water plan for all of Santa Barbara County and has recommended a project which will supply municipal water for the city of Santa Barbara as







GENERAL plan and eccentrically balanced gates proposed for existing Gibraltar Dam by R. A. Hill, consultant for the city.

well as irrigation water for the rich farmland east and west of the city on the coastal shelf. The project embraces construction of Cachuma Dam on the Santa Ynez River approximately 20 mi. downstream from Gibraltar Dam. It is proposed to be an earthfill structure 216 ft. high, with a reservoir capacity of 210,000 ac. ft. The calculated safe yield for the watershed is approximately 33,000 ac. ft. per year, ample for the present and predicted future needs of the city and irrigation districts for the next fifty to one hundred years.

Water from Cachuma Reservoir would reach the coastal plain through Tecolote tunnel, a 6-mi. bore through the Santa Ynez Mountains about 12 mi. west of the city. From the outlet portal of the tunnel, a 30-mi. conduit along the base of the mountains would convey the water to the vicinity of Carpinteria at the easterly boundary of the county.

Bureau engineers estimate that a water yield of 5,000 ac. ft. per year would be developed in Tecolote tunnel itself in the same manner as the flow which was originally obtained from Mission tunnel. Under the Bureau plan, therefore, the driving of this tunnel would be the first item of construction so that this production of water would be available in the present or possible other immediate emergencies.

Congress is presently considering the appropriation of funds to initiate construction of the Bureau project. Should it make the funds available, the proposed schedule of contract letting would be as follows: For the 6-mi. tunnel, bids advertised by Sept. 1, 1948; for the 30-mi. conduit, bids advertised by Feb. 1, 1949; for Cachuma Dam, bids advertised by Oct. 1, 1950. These three sections of the project are estimated to cost $28,500,000 at 1948 prices. About 40% of the yield of Cachuma Reservoir would be available for municipal purposes by the city of Santa Barbara, the balance to be distributed to Goleta, Carpinteria and other irrigation districts.

An anticlinal geological structure roughly follows the seacoast and another paralleling it results in the Santa Ynez Mountains to the north, thus leaving the coastal shelf already described as a synclinal natural water storage basin. Farm irrigation at the present time is almost entirely from wells drilled into this basin. The city drilled four wells in the same basin about thirty years ago in an earlier period of extreme drought. They were pumped for but a few weeks at that time, after which they were capped. They have now been reopened and are producing about 1,500,000 mgd. Another well has been drilled in the San Roque district and is yielding approximately 1 mgd. and two other wells are in the process of being drilled.

Due to the limited recharge and considering overdrawing in normal times, water in this basin is low in quality, carrying considerable sulphur and salt, and it has been estimated by geologists that there is only a supply for approximately two years on the above mentioned withdrawal basis. Wells, therefore, are definitely not the solution to potential continuous drought for the area.

India Developing Irrigation Plans With the Aid of American Engineers

THE NEW National Government of India is working on a dozen or more hydroelectric schemes which will provide approximately 4,000,000 kw. of electric energy to numerous industrial plants in India which are being set up or will be set up in future, to operate pumping machinery for irrigation and drainage, and for domestic use.

In addition to power generation, high-level irrigation and navigation are other objectives. American experience and technical skill are helping in the execution of these projects.

The most spectacular project is the dam across the Kosi river near Barahkshetra in Nepal territory. The dam will rise 750 to 850 ft. above bedrock and be the highest dam in the world. The power station at the dam will have installed capacity of 1.8 million kw.

In addition, it will make possible irrigation of one million acres of land in Nepal and two million acres in Bihar, thus providing an annual addition of one million tons to the food production of the area. Another benefit is that the river channel, which has changed its course nine times and has devastated approximately 4,000 sq. mi. of land in

Nepal and Bihar, will be stabilized and made fit for navigation throughout the year. The construction of the dam is expected to take ten years and cost about $300,000,000. Dr. J. L. Savage, famous American expert on dam construction, visited the site recently and gave useful advice to Indian engineers engaged on the task.

Another important dam will be built across the Godavari river, near Polavaram, about 20 miles above Rajamundry in Madras province. It is estimated to cost $250,000,000, and take eight years to complete. The design has been completed by Indian Engineers of the Madras Government in consultation with Dr. Savage, and the International Engineering Co. of Denver. American contractors have already been invited to get in touch with the Madras Public Works Department to undertake the construction. It is also anticipated that the major portion of the construction machinery as well as power plants will be obtained from the United States. The dam will be a massive concrete structure, 420 ft. high and 6,000 ft. long. Excavation for the foundation of the dam will be approximately 22,250,000 cu. yd., and it will mean placing 8,020,000 cu. yd. of concrete. The project will irrigate 2,000,000 ac. of land and generate electricity equal to 100,000 kw. with provision for doubling it.

Construction has begun on the $150-million Hirakud dam on the Mahanadi river near Sambalpur in Orissa. The dam will be 150 ft. high and 3 mi. long. Six irrigation channels will be taken out from the dam to irrigate over 1,000,000 ac. of land. Hydro-electric power will be generated to the extent of 350,000 kw.

Late Snows Improve Runoff Outlook

Final surveys indicate great improvement of the Western water supply outlook, especially in the Southwest and excepting Arizona — Flood hazards in the Columbia River Basin predicted here

BELATED but liberal precipitation during April resulted in marked improvement of the Western water-supply outlook, especially in the Southwestern States that previously were threatened with severe summer shortages. May snow surveys by Federal, State and private agencies in the United States and the Government of British Columbia, as analyzed by the Soil Conservation Service, now indicate a generally satisfactory outlook except for Arizona, which remains the only large area of continuing serious deficiency. Retarded snow melt and more than normal April precipitation have, in fact, so increased the amount and rate of run-off in the northern and western parts of Columbia River basin as to create a flood hazard. Rocky Mountain States confirm previously reported favorable prospects.

Arizona

Outlook unchanged. Previously reported statewide shortages are still unrelieved.

California

The outlook was improved greatly during April by intermittent storms which brought moderate rains to the valleys, heavier rains to the foothills and a considerably increased snow pack in the higher mountains. Before the snow pack has melted, all Sacramento Valley reservoirs will be full. Shasta reservoir now holds capacity supplies for the first time.

San Joaquin Valley supply will be considerably better than last year. Indications point to the filling of all reservoirs except the one formed by Friant Dam. With water used conservatively, it is expected that most of the areas usually irrigated in San Joaquin Valley will have enough water.

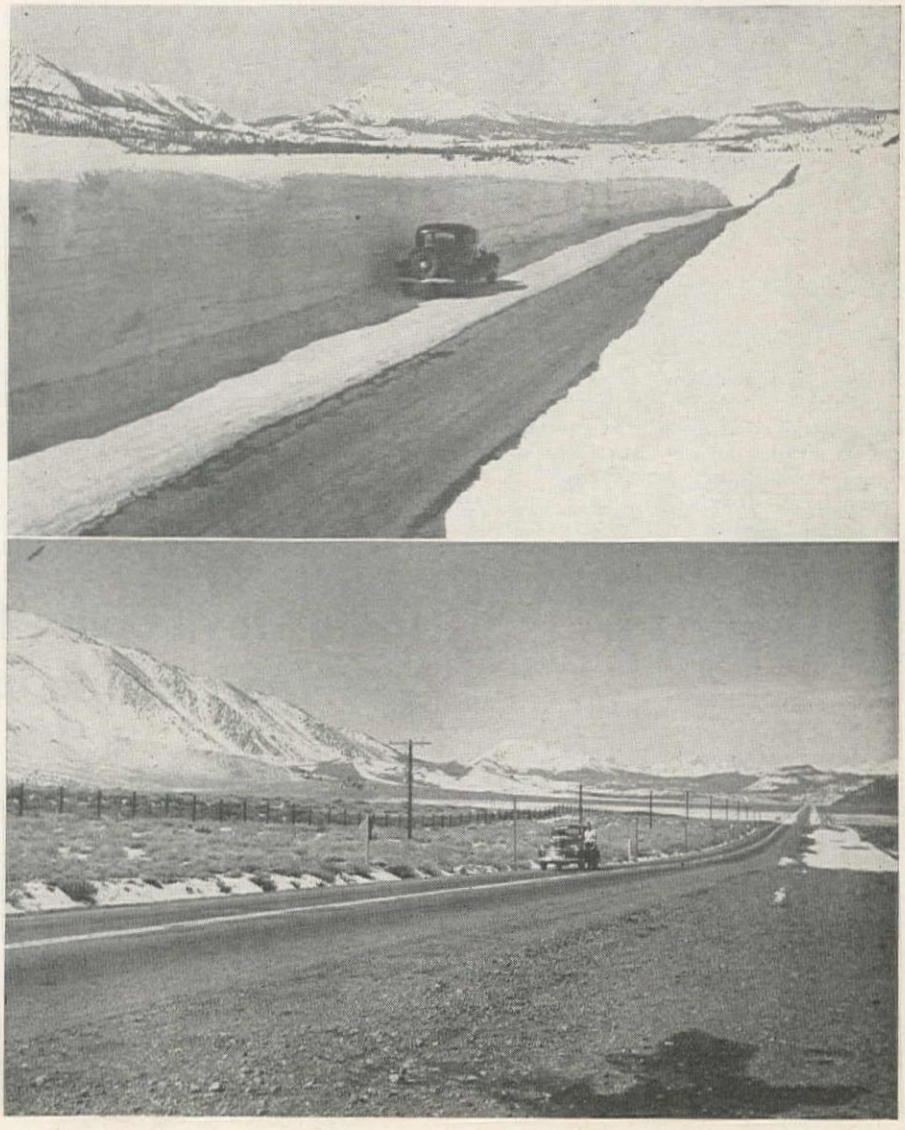
Colorado

Prospects are still highly favorable although a ten per cent decline from April snow-survey readings is now apparent in Poudre, Thompson and St. Vrain basins.

Idaho

Snow pack as of May 1 on all tributaries of Columbia River except Snake River above Weiser is generally more than during past years and in some instances equals or exceeds the pack of April 1, when it is usually greatest. This is due to retarded melting and further accumulation of snow at high altitudes. Accumulated precipitation in these areas has also been greater than normal during April. On the Snake River and its tributaries in Idaho the valley precipitation during April was only a little

Photos by George Lewis, courtesy Intake.



WIDE VARIATIONS in the High Sierra snowfall are indicated in these pictures, taken from the same spot in Owens Valley watershed in 1938, top, and 1948, below.

above normal and the snow pack is more nearly the usual amount.

Flood hazard exists on the streams in northern Idaho. For the third consecutive year high water in Kootenai Valley at and below Bonners Ferry is expected. According to preliminary calculations of the Geological Survey approximately 950,000 ac. ft. passed Leonia during April, with a now estimated 8,000,000 ac. ft. still to come, which is roughly the same amount as flowed down the river during May to September, 1946 and 1947. During each of these years the large areas of reclaimed farm land along the river in the United States and Canada were endangered by the high river water level, but damage was largely averted through timely forecasts based on snow surveys and by the prompt action taken by the U. S. Engineers to hold the river dike. It is possible that higher river stages than those of the past two years will occur again.

Montana

Previously reported favorable outlook is generally confirmed, with Madison River supply now estimated at 150 per cent of normal and run-off of flood proportions west of the Continental Divide; five to 10 per cent increase above April 1 prospects is now expected.

Nevada

April precipitation in the higher Sierra ranged from twice to three times normal. May 1 surveys show the snow pack slightly better than average for this date at the higher elevations. Revised estimates for eastern Sierra streams indicate a general increase of about 50 per cent over the April forecast. Usable storage in Lake Mead on May 1 was 19,177,000 ac. ft., or about 2,000,000 ac. ft. more than last year.

New Mexico

Previously reported favorable prospects are unchanged.

Oregon

Prospects have been improved somewhat by accumulating snow in the mountains during April. All irrigated lands of the state can expect good to fair supplies with the best assurance provided by reservoirs. Greatly deficient supplies are not expected in any section and few, if any, late season shortages will occur.

Total storage in all important reservoirs is nine per cent less than at this date last year, 18 per cent less than in 1946, 11 per cent less than in 1945, and 15 per cent less than the 10-year average. Seventy-four per cent of the reservoirs are half full or better.

South Dakota

No essential change in previously reported fairly satisfactory outlook.

Utah

Bear River and tributaries will probably show seasonal run-off about 10 per cent greater than April estimates. The same expectation applies to Weber River, where heavy precipitation has built up snow storage. Although April precipitation in Salt Lake Valley was slightly below average, the previously expected yield will not be changed materially. In Uinta Basin, water supplies for Duchesne River and Ashley Creek may be decreased slightly because of deficient precipitation. Expected streamflow for Sevier River, Beaver River, Coal Creek, and Virgin River, will be about the same as forecast on April 1.

Washington

Near maximum run-off and flood hazard are now expected, five to 10 per cent increase of April forecasts being in prospect. High stages in Columbia basin streams are likely in late May and early June.

Wyoming

Previous favorable statewide prospects are generally confirmed.

British Columbia

Previously reported outlook is generally confirmed and an improvement for Okanogan Basin is now in prospect. The flood potential reported in April has been increased by the lateness of the spring and delayed thawing at high elevations. This flood potential exists on most streams in the Province but is especially acute with respect to the Kootenai, Columbia, Thompson and Fraser Rivers and their tributaries, as well as coastal streams. Protracted warm weather or warm rains could produce a flood hazard very quickly.

Revenue and Future Bay Bridge Traffic Studied

AN ESTIMATE of future traffic and revenue that may be realized from the San Francisco-Oakland Bay Bridge, and any additional Bay crossings built by the State of California, will result from a study now being made by Coverdale & Colpitts, New York firm of consulting engineers who specialize in industrial and transportation revenue problems.

Retaining of these consulting engineers by the Division of San Francisco Bay Toll Crossings, State Department of Public Works, was announced by Chief Engineer Ralph A. Tudor.

Under the direction of George W. Burpee, partner in the firm, and G. Harold Warfield, Coverdale & Colpitts will study the data of the traffic survey of all traffic in the entire San Francisco Bay Area recently made by the State Division of Highways and the Public Roads Administration.

Their analysis and estimate will become a part of the report and recommendation of the San Francisco Bay Toll Crossings Division to the State Department of Public Works, on the feasibility of construction and ability to finance the two proposed crossings approved for construction by the State Toll Bridge Authority.

The firm of Coverdale & Colpitts has made traffic studies and engineering audits on numerous highway, rail, air and water projects in past years. They prepared the prior studies in 1936 and 1938 on the present Bay bridge; Lake Washington and Tacoma Narrows bridges for the Washington Toll Bridge Authority; La Guardia, New York International and Newark Airports, and the vehicular tunnels and bridges operated by the Port of New York Authority.

Two Bridges Completed Over San Joaquin River

TWO BRIDGES over the San Joaquin River and Overflow at Firebaugh, Calif. are being completed this month by Charles MacClosky Co. of San Francisco.

All of the 15 piers are supported by Raymond cast-in-place concrete piles approximately forty feet long.

Excavating of the piers was accomplished by the use of a wellpoint system, which was moved along to keep ahead of the pile driving rig. In order to excavate for the piers in the river itself, and still utilize the wellpoint system, the river was "detoured" through two of the piers which had already been finished; fill was then pushed around the site of the proposed river piers, the wellpoints inserted, and the water table lowered about eight feet to permit driving of piles and placing of concrete.

Under the supervision of Walter F. Maxwell, a member of the contractor's firm, these bridges were completed three months ahead of the contract schedule.

The counties adjacent to the bridges are now placing the necessary road embankments, and when completed, this project will form an important traffic link between Highway 99 and Highway 33. Trucks traversing this route have formerly been restricted to a total load of six tons due to an old bridge structure at Firebaugh which the new bridges will replace.

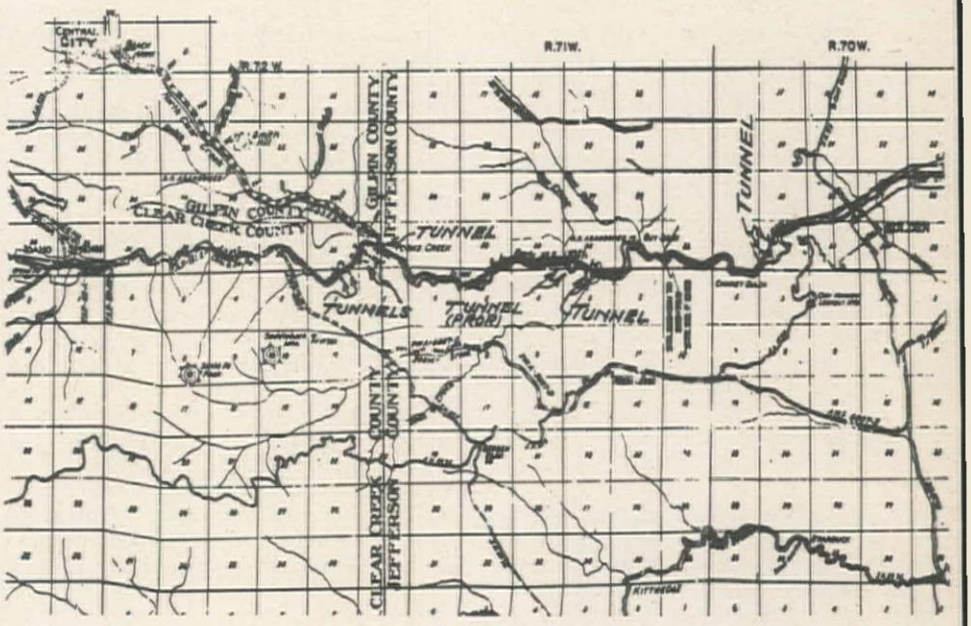
R. M. Sherick, for the California Division of Highways, served as resident engineer for this project under the general direction of F. W. Panhorst, Deputy State Engineer. Bethlehem Pacific Coast Steel Corp. of Alameda, Calif. furnished and erected the steel for the superstructure.

Last Grand Coulee Generator In Place Ahead of Schedule

NINTH AND LAST of the 108,000-kw. generators to be installed in the left (west) power house at Grand Coulee dam was placed in operation on April 25, several weeks ahead of schedule. The total rated capacity of power installations at Grand Coulee is now 992,000 kw., and the peaking capacity about 1,150,000 kw. Although work is underway preparing the right power house for the installation of the first of six generating units which are now on order, it is expected to be more than a year before the first of these is ready for operation. Three of the units are scheduled to be in operation by the end of 1949 and the other three by the end of 1950.

Highway Tunnels in Colorado Canyon

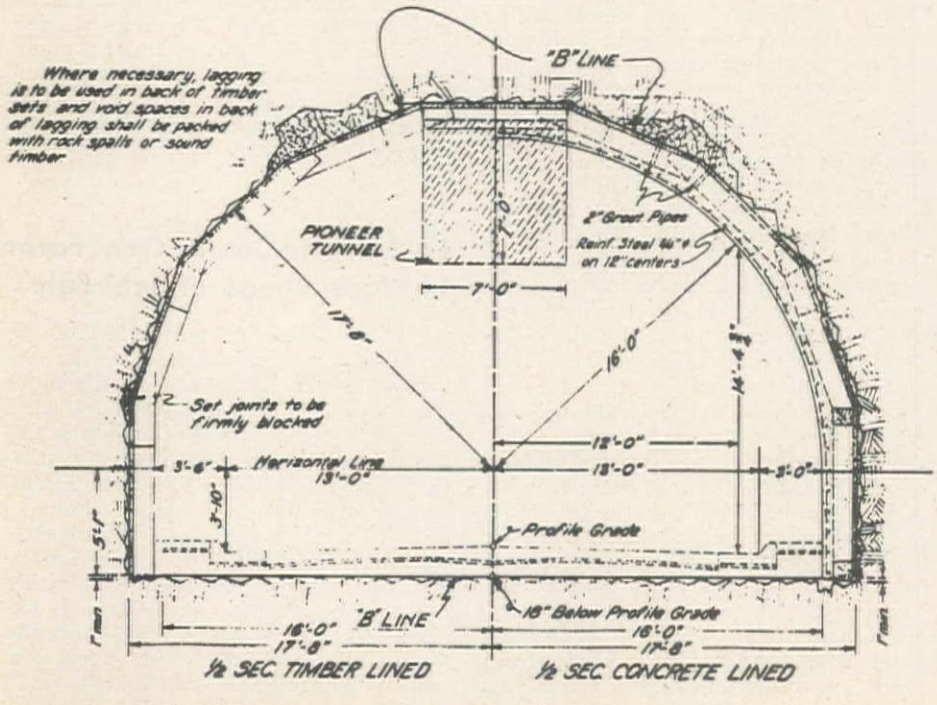
Only desirable location of U. S. 40 through Clear Creek Canyon requires numerous tunnels through granite and schist—Tunnels are either lined with concrete or a 2-in. gunite lining to protect against air slacking of the rock—Portal construction is of masonry and concrete



By R. E. LIVINGSTON
Special Assistant Engineer
Colorado State Highway Department
Denver, Colorado

HIGHWAY LOCATION in the Rocky Mountains of Colorado has often brought exclamations of awe from tourists visiting the state. The average motorist is only aware of the spectacular scenery that comes into his line of vision. It doesn't occur to him that a highway has been placed in the location in which he finds it for any reason other than to afford him pleasure from a scenic view-point. While it is true that the highway location engineer does, where possible, attempt to provide pleasure for the casual traveler by opening vistas of grandeur, his principal concern is to so locate a highway that safe and speedy transit from one point to another will result. This concern for safe and speedy movement of the traffic using a highway brings into being some problems of engineering and construction which add to the difficulties of the contractors and engineers of the region. Certainly not the least of the many problems involved, is the location and construction of a highway through the many "box" canyons of the state.

For the benefit of the uninitiated, a "box" canyon is one which has practically vertical walls which may tower as much as hundreds of feet above the floor of the water course which they confine. These canyons are the result of water erosion of the rocky terrain through the aeons of geologic history. Probably the best example of such a canyon is the well known Grand Canyon of the Colorado River in Arizona. This canyon, while much deeper than the average canyon in the State of Colorado, does provide advantages which are missing in the precipitous gorges encountered by Colorado construction forces. It is relatively wide and given to sweeping bends in the river in most places. Colorado canyons, on the other hand, are usually quite narrow and are very tortuous. Because of their sinuous characteristic, it is often practically impossible to obtain a highway location with curves suited to present day traffic needs.



TYPICAL TUNNEL SECTIONS

Minimum curves won't fit

It is most discouraging to the location engineer to have imposed on him a limitation which dictates a minimum curve radius of say six hundred feet, and then find that each time he attempts to fit his location line to a curve in the floor of the canyon with the minimum radius, the line so located bumps headon into a vertical cliff. This particular circumstance often brings into being some of the spectacular construction and scenic effects so greatly appreciated by the tourist. The only way in which curvature suited to the needs of traffic can be maintained is to connect successive bends in the canyon with tunnels which burrow through a mountain from vertical cliff face to vertical cliff face.

A classic example of the type described in this article exists on transcontinental U. S. 40, west of Denver. Between the towns of Golden, home of the Colorado School of Mines, and Idaho Springs in the heart of a famous metal mining district, lies the precipitous walled canyon of Clear Creek. This canyon offers the only possible location for a road on a water course grade be-

tween the two terminal points. Just prior to World War II, the State Highway Department in conjunction with the Public Roads Administration decided to undertake the development of a road along this route. Subsequent to this decision, the war intervened and because of the necessity of utilizing all available construction effort on items of urgency for the war needs, construction work on the route was deferred. After the termination of hostilities, the Clear Creek route has again become the scene of activity.

The location of the route under construction is shown on the accompanying map. Also indicated on the map are the locations of tunnels already drilled and those which will ultimately be built in the construction of the route. Each of these tunnels is required in order to obtain a highway with a minimum design speed of 35 m.p.h.

Design and construction

The typical section to which the tunnels are constructed is also shown. The curb-to-curb width of 26 ft. is considered to be the minimum necessary for the volume and character of traffic which will use the route upon completion. A clear height of not less than 14 ft. is provided at the curb lines. This clearance is in conformity with the minimum specified on the Interstate Highway network.

Little bad ground has been encountered in the construction of the tunnels built so far. The major part of the excavation operations have encountered granite and schist, all of which has responded to drilling and shooting without too much difficulty. Water which has been encountered has, in all cases, been of such minor volume that it can readily be handled by a normal 6 or 8-inch subdrain pipe.

All sections of the tunnels constructed thus far have been lined either with a Class "A" concrete lining placed after the timbering operation, or in the better sections, a gunite lining not less than 2 in. thick has been placed to protect against air slacking of the rock. The portal construction is of concrete and masonry and adds a nice architectural treatment for a final finish.

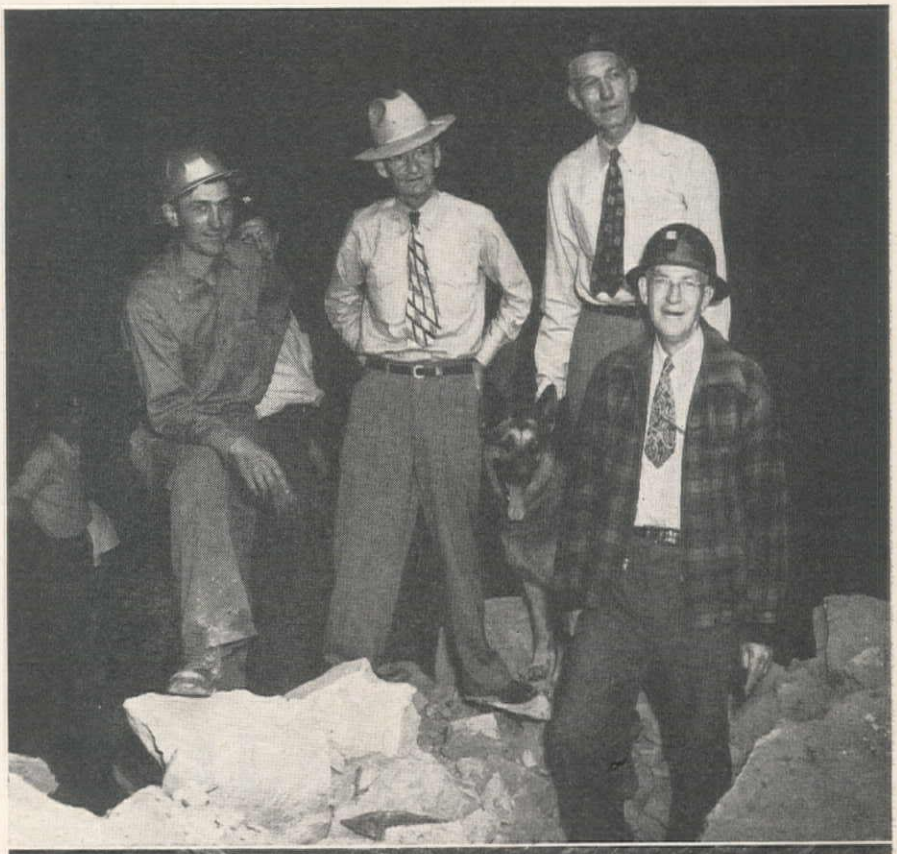
The longest tunnel required is approximately 1,100 ft., and is ventilated by the natural air currents in the canyon with such efficiency that no artificial ventilation is required. Studies conducted by the Highway Department in conjunction with the U. S. Bureau of Mines have proven that, with the maximum intensity of traffic using the road, there is never present a toxic amount of carbon monoxide gas.

Organization

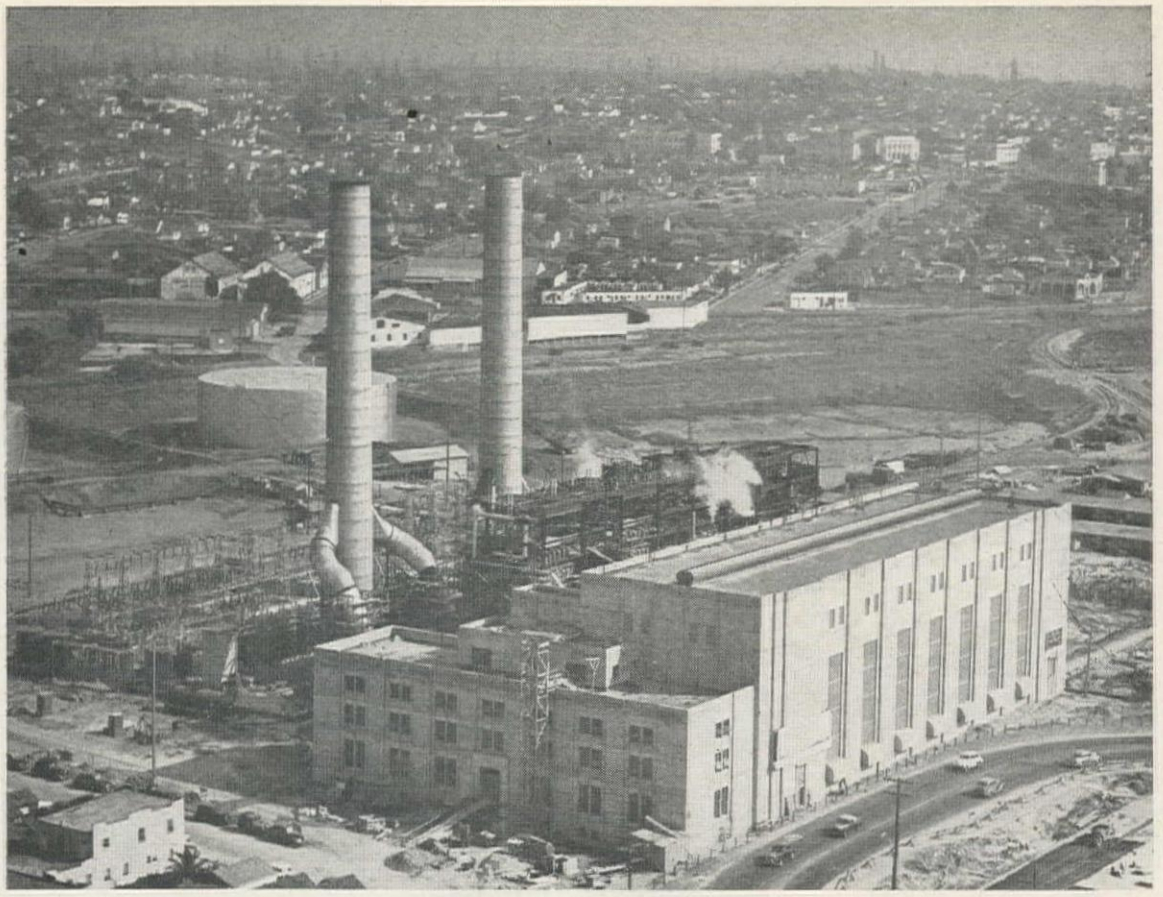
Contracting organizations which have held construction contracts involving tunneling operations include Lowdermilk Brothers, the E. H. Honnen Company, the Pioneer Construction Company, and the Larson Construction Company. The Larson company had the latest contract for work in the canyon which included tunneling operations. This contract was finished during the 1947 construction season. "Long John" Austin supervised the tunneling operation for the Larson company.

Engineering supervisory personnel, directly in charge of operations for the Colorado State Highway Department, have included Fred W. Miller, W. A. Gray and E. H. Dauchy, all of the Denver Division. Mark U. Watrous is State Highway Engineer.

Colo. State Hwy. Dept. Photos.



INSPECTING the latest tunneling operations, completed by Larson Construction Co., are, l. to r., FRANK PETERS, foreman, MARK U. WATROUS, State highway engineer, JOHN R. AUSTIN, tunnel subcontractor, and E. H. DAUCHY, resident engineer. Completed tunnel, right, is finished with a concrete and masonry portal.



THE NEW $37,000,000 Redondo Steam Station, now in service with the first two of four 66,000-k.w. generating units. Construction is continuing, and the station's ultimate capacity of 264,000 k.w. is expected to be available by 1950.

Steam Plant Units in Service

New station is one of the most modern and efficient of its type in the world — Unique features include reversal system for the flow of ocean condenser cooling water and provisions for use of three kinds of fuel

SOUTHERN CALIFORNIA Edison Company's monumental plant expansion program embraces system-wide construction to increase capacities in all phases of operation. The present three-year development, 1947-1949 inclusive, represents a $132,300,000 investment.

Principal elements of new generating, transmission and distribution facilities scheduled for this period include 321,500 kw. of new steam and hydroelectric generating capacity, three major transmission substations, 111 distribution substations and over 2,000 mi. of lines.

The $37,000,000 Redondo steam station, with an ultimate capacity of 264,000 kw., is now in operation with the first two of four 66,000-kw. generating units. Built by the Stone and Webster Engineering Corp. in close collaboration with Edison engineers, it is one of the most modern and efficient plants of this type in the world. Some of the unique features employed include a reversal system for the flow of ocean condenser cooling water, direct pumping of fuel oil from storage tanks to burners, and provisions for the use of three types of fuel—oil, gas or coal.

Located strategically with respect to transmission, distribution and electrical load centers, the proximity of the Redondo steam station to the ocean also assures a ready supply of sea water necessary for cooling purposes in plant operation.

Plant design

The plant, located at Hermosa and 11th Aves. in Redondo Beach is being constructed for an ultimate capacity of 264,000 kw. Four 60,000/66,000-kw. AIEE-ASME preferred standard steam turbine generators are to be installed and steam for these will be furnished by seven 400,000-lb./hr. boilers.

One of the principal design features is the ability to quickly pick up full load from minimum load standby conditions. Another is the extensive use of outdoor equipment wherever practicable. Because of the need for early completion of the plant, standardized equipment has been adapted to the plant design.

Cooling water is drawn from the Pacific Ocean through two underground precast concrete pipes extending offshore about 2,000 ft. These are arranged in such a way that each may alternately be an intake or discharge conduit to provide means of controlling fouling growths by temperature elevation. Also, arrangements have been provided for chlorinating the sea water to control the growth of marine organisms within the conduits and in the main condensers.

Fuel oil is stored in two 100,000-bbl. tanks and is heated and pumped to the burners through a direct system using no intermediate tanks. Although initial operation has been on fuel oil, facilities are being provided for burning natural gas. Also, space has been provided in the plant layout for burning pulverized coal, should future conditions justify this change.

Station auxiliary power is furnished by transformer banks connected to the main 69-kv. station bus. To provide auxiliary power during emergencies affecting the normal supply, two 6,000-kw. steam turbine generators are to be installed. These can be started from standstill manually or automatically by low frequency or low voltage and assume the station auxiliary load within 15 sec.

The output from the station is to be transmitted at 69-kv. over six transmission lines to La Fresa Substation located about 4 mi. inland from Redondo. Four circuits are now constructed.

The building is of steel and reinforced concrete, designed with a seismic factor of .2g. The foundation is a concrete mat over Raymond concrete piling. An attached Administration building houses offices, shops, storeroom, laboratory, etc.

Main turbine generators

Two Westinghouse and two General Electric AIEE-ASME preferred standard 3,600 rpm., 850-lb. 900°F, 60,000/66,000-kw. turbine units will be installed. They are provided with four point extraction for feed water heating. They will drive hydrogen cooled generators rated at 70,588 kva, .85 p.f., 13,800 volts, with exciters using Rototrol or Amplidyne control. In addition to the usual controls the turbines also have:

(a) A low steam pressure regulator to adjust load to available steam supply under quick pick-up conditions.

(b) A low load limit control, a high load limit control and a low frequency release.

(c) A low vacuum throttle trip.

(d) A complete set of supervisory instruments, including speed recorder, valve position recorder, cylinder expansion recorder, shaft eccentricity recorder, spindle position recorder, turbine vibration recorders.

Circulating water system

Two 10-ft. ID precast reinforced concrete pipes laid in trench on the ocean floor, with 4-ft. minimum cover and extending about 2,000 ft. offshore will supply cooling water. Terminal structures will admit or discharge water at a depth of about 20 ft. below mean lower low water. Operation of the cooling system will be by four 7 x 10-ft. welded steel gates with frames, stems, motor operated hoists and controls, with automatic controls for raising and lowering both pairs of gates at intervals for reversing flow in the offshore conduits. S. Morgan Smith trash rack rake equipment including hoisting structure, hoist, drive and control is arranged to remove large trash and seaweed and transfer it to a car for removal.

Four Chain Belt traveling screens, including steel framework, driving mechanism, spray system, guideways, trash trough, automatic starting and stopping controls will protect the circulating system. Extensive use is made of stainless steel and other corrosion-resistant materials for reduction of maintenance costs. To maintain pressure, there will be two vertical circulating water pumps for each main turbine generator unit, each rated at 25,400 gpm at 25.0-ft. total dynamic head, motor driven, 300/50 hp, 880/440 rpm. Half normal speed is provided for extended operating periods on standby or light load conditions.

Six Wallace & Tiernan automatic chlorinators are installed, each with a maximum capacity of 6,000 lb. of chlorine per 24 hr. Facilities are provided for chlorinating the discharge water in the submarine pipe lines for control of marine organisms. Also, condenser inlet water is chlorinated for slime control. Four Ingersoll-Rand surface condensers, with 42,500 sq. ft. of surface are used. Butterfly valves are used in large circulating water lines.

Each condenser requires 45,000 gal. of ocean water per minute. The water is returned to the ocean about 20° warmer.

Condensate system

Hotwell level control is arranged to automatically make up and draw off condensate in accordance with load requirements. A divided hotwell minimizes loss of condensate due to tube leaks.

Two vertical condensate pumps with a capacity of 1,000 gpm at 100-ft. head are provided with each main unit to circulate condensate through the low head heating system. Recirculation of condensate and condensate cooler are provided to facilitate operation at light loads.

Two horizontal condensate booster pumps with a capacity of 1,000 gpm at 360-ft. head circulate condensate through the 4th point heater, 3rd point heater, and evaporator condenser, and discharge into the 2nd point deaerating heater. Dissolved oxygen and other gases are removed from the condensate in the deaerator.

Each unit is provided with three Byron-Jackson motor-driven boiler feed pumps, each rated at 785 gpm at 1,098 psi head. Induction motor drivers are rated 700 hp, 3,600 rpm. A steam driven boiler feed pump is provided for emergency use on either of two main turbine generator units. This pump is started automatically by a predetermined drop in boiler feed water pressure and takes water directly from the distilled water tanks.

Combustion control system

At centrally located control boards in the firing aisle, automatic combustion control is installed to provide:

(1) Automatic control and equal loading of all boilers from one master board.

(2) Manual or remote manual loading of selected boiler or boilers and complete automatic control and equal loading of the remaining boilers.

(3) Manual or remote manual control of all boilers.

Each boiler is provided with automatic equipment which

(a) Controls the flow of fuel to the burners;

(b) Controls the induced draft fan inlet louvres and outlet damper, and

(c) Controls the forced draft fan inlet vanes and outlet damper.

The combustion control system has been designed specifically for quick pick-up of load from minimum load standby conditions, and to provide high speed, wide range control the following features have been incorporated into the design:

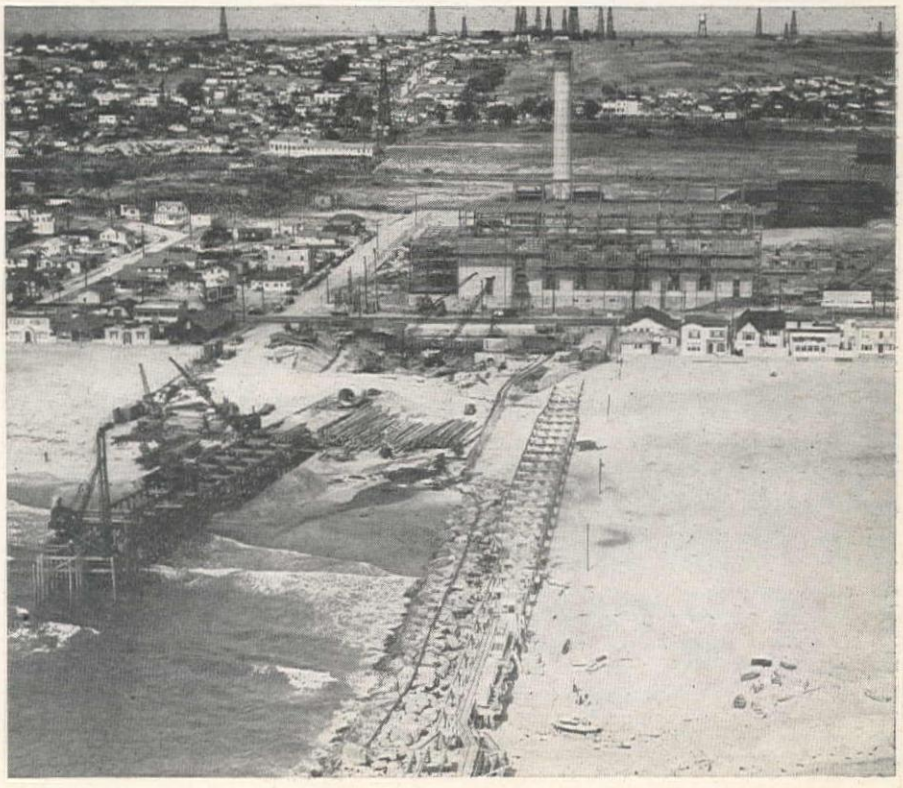
(1) Steam flow rather than steam pressure provides the impulse to increase the supply of fuel and air.

(2) Air loading pressure is transmitted direct and simultaneously to the controls for fuel, air volume and draft.

(3) Control drives are of the "high speed" type with extra large pilot valves for rapid admission of operating air resulting in faster piston travel and the air supply lines are larger than customary.

(4) Combustion air is measured by a

CONSTRUCTION progress on the plant during fall of 1947. Temporary trestle, left, which provided means of laying submarine intake and discharge tunnels for supplying plant with ocean condenser cooling water, was extended 1,900 ft. into the sea. Excavation for pump house, center, had begun and one stack was completed.



DEMOLITION of the So. Calif. Edison Company's old steam plant at Redondo Beach in August, 1946, was the first step in preparing the site for the new construction. The old plant which was razed had been out of service since 1933.

Venturi section in the air duct rather than being measured subsequent to combustion, thereby decreasing the lag in adjusting air flow to correspond to steam flow.

Fuel system

Fuel oil is taken from the main storage tanks and led through heaters before entering strainers and the suction of screw type fuel oil pumps. These pumps increase the oil pressure to about 725 psig, and it is then transported to the main oil heaters adjacent to the boilers by means of two 8-in. lines. The oil temperature is further increased here to about 200°F, and after again passing through strainers, it enters the suction of the "constant differential" pumps adjacent to the boiler fronts. The oil is sent to the burners at 900 psig and 200°F and is consumed in Peabody burners having a 20-to-1 range. Automatic controls are provided in this system to start additional pumps in accordance with load demands, control recirculation of oil to storage tanks and control flow of steam used for heating the oil. Furnace and burner protection is obtained through controls which shut off fuel to the burners if:

(a) Oil supply pressure is low.
(b) Fan motors fail.
(c) Furnace has not been purged prior to "lighting off."

Draft system

A system of ducts and flues has been installed to connect each pair of boilers to a common reinforced concrete stack. Combustion air from the forced draft fan is carried through a regenerative air heater and secondary air ducts to the burner wind box. Flue gases leaving the last section of the superheater pass through the economizer and air heater to the induced draft fan and to the stack.

Fans are driven by constant speed induction motors and volume is automatically controlled by means of vanes and louvre dampers. Provision has been made for later installation of low speed motors on the shaft of the present motors, should extensive operation at light loads make such an installation desirable. Corrosive attack by sulfur-bearing flue gases is minimized by automatically controlled steam heaters which maintain a minimum temperature well above the dew point of the flue gas at points subject to corrosive attack.

Water treatment and makeup plant

Service water is supplied by the California Water Service Co. and is stored in a 5,000-bbl. service water tank. This tank supplies water for station makeup and building service requirements as well as being the source of supply for the fire pumps.

Evaporator feed water is treated in Permutit zeolite softeners to remove calcium and magnesium hardness. These softeners are completely automatic in operation.

Each main unit is provided with twin evaporators, arranged for single or double effect operation. Steam supply to the evaporators is automatically controlled to avoid production of vapor at excessive rates and to prevent unsatisfactory operation of the deaerator at light loads.

Electric system

Output from the main generators is fed through 70,000-kva, 13.8/69-kv transformer banks to the 69-kv outdoor substation buses. Transmission lines connect these buses to La Fresa Substation approximately four miles distant. Oil circuit breakers, each rated for 1,200 amp. and with an interrupting capacity of 2,500,000 kva are installed.

The main control room is located centrally within the main building and contains a control board which operates the 4 main generating units, 2 emergency station service generators, 2 station service transformer banks, and 6 transmission lines.

Station service is normally obtained from two 10,000-kva, 2.4/69-kv transformer banks and in addition, two 7,500-kva emergency station service generators have been provided. Metal-clad switchgear is provided for all 2,400-volt and 440-volt station service circuits.

State Highway Programs Shown in Steady Gain

HIGHWAY PROGRAMS of the 48 state highway departments and the District of Columbia call for the building of 46,821 mi. of state and federal highways during 1948 at an estimated cost of $1,072,283,810, a recent survey by the American Road Builders' Association shows.

The survey, covering state and federal highway construction and maintenance for 1947 and 1948, shows that 3,414 mi. of concrete roads, 25,631 mi. of bituminous mixes and treated types, and 17,776 mi. of other types make up the total.

It is estimated that state highway departments will let contracts for some 27,859 mi. of highways during 1948, with the states reporting a total of 18,962 mi. of work carried over from 1947 contracts. Work carried over includes 1,290 mi. of concrete pavement, 10,920 mi. of bituminous mixes and treated types, and 6,752 mi. of other types.

The postwar highway program is steadily gaining momentum. Construction expenditures for Federal, state, and local highways are expected to reach $1,500,000,000 this year. Highway expenditures will represent some 40 per cent of all public construction.

Total expenditures for 1947 state maintenance in 48 states and the District of Columbia were $371,003,027, the survey shows, with expenditures for 1948 estimated at $377,693,133.

Airstrip Will Provide Access To Remote Oregon Project

AIR TRANSPORTATION to the remote Toketee Falls power project being constructed by the California-Oregon Power Co. on the North Umpqua River 80 mi. northeast of Roseburg, Ore., will be available upon completion of an airstrip near the project. Construction of the airstrip is being done cooperatively by the power company, the U. S. Forest Service, and the Briggs Logging Co. It will be 3,000 ft. long and 200 ft. wide.

Use of air transportation to the hydroelectric construction project is expected to simplify the problem of transporting both men and supplies during winter months when travel over the unimproved highways in the area is extremely difficult. Upon completion of the project the landing strip will be made available for public use.

Portrait—An Engineering Professor

A. Diefendorf, head of the civil engineering department of the University of Utah, keeps in touch with realities of his profession by spending summers in the field — A specialist in highway construction, arranging conferences is his hobby

By O. N. MALMQUIST
Salt Lake City, Utah

MOST ENGINEERS who personally know, or who have heard of A. Diefendorf, head of the civil engineering department of the University of Utah, associate his name with highway construction. And that incidental fact about him is a testimonial to his success in a job he undertook nine years ago.

When Mr. Diefendorf came to the University of Utah in 1939 as professor of civil engineering the department was in the last stages of decay. It had only a half dozen students, its prestige was at the vanishing point and it faced the loss of accreditation. To the new professor it was obvious a revival called not only for marked improvement in the quality of courses but some prestige-building treatment to attract more students and institutional support. As a first step toward proving to the university and public that the department was not quite dead he industriously began promoting a highway engineering conference. He reasoned that this field offered an opportunity for the school to perform an important public service and at the same time focus some favorable attention upon itself.

Highway conferences

The first conference was strictly a local affair. But the Utah State Highway Department and contractors were cooperative and it was successful enough to encourage another try. The U. S. Public Roads Administration came to the support of the project and it gradually expanded, despite handicaps imposed by the war years, into a conference of regional, and in some aspects, national scope.

For the 1948 conference, 17 states were represented on the program and 27 states sent some 400 delegates. The department has about 300 undergraduate and 30 graduate students and prestige enough to attract future highway specialists from India, Pakistan, China, Burma, Siam, the Middle East, Cuba, Costa Rica and Mexico. And Mr. Diefendorf, who doesn't want to appear boastful, thinks he is justified in concluding that the annual conference has contributed substantially both to better highway construction and to the reputation of the civil engineering department of the University of Utah.

Using Western products

Although an Easterner by birth, Mr. Diefendorf now sounds like a 100 per cent Westerner. One of his pet theories, which he expounds in and out of school, is that the Intermountain West should make much greater use of its own materials in all types of construction. Specifically, he believes that the possibilities of concrete, rock asphalt, asphaltic sands and Gilsonite as building materials have barely been scratched. He has been trying to scratch a little deeper by carrying on research with the objective of lightening concrete without loss of strength. The department has done considerable work on perlite, an aggregate of fused volcanic ash which pops like corn when heated. The researchers have succeeded in making a concrete light enough to float on water. But it is below par on strength and Mr. Diefendorf is about ready to write this project off as a failure, but an instructive one. He has now turned his attention to pumicite, a lightweight volcanic aggregate which is found in large quantities near Fillmore, Utah.

Mr. Diefendorf concedes that the use of rock asphalt as a highway surfacing material is limited by transportation costs (inasmuch as aggregate must be shipped along with the bitumen). But he points out that this factor might be minimized by the extraction of the bitumen. As for Gilsonite and asphaltic sands, he is convinced that they have an immense future. He dismisses the difficulties that have been experienced in some instances with natural asphalts as simply a matter of careless blending, or insufficient knowledge of blending.

His policy in the research field is to aim all projects at one target: promotion of the use of local materials in local construction.

Foreign assignments

While Mr. Diefendorf has devoted most of his professional life to the academic field, he makes it a practice to spend his summers in the field to keep in touch with practical realities. Two assignments which were particularly interesting to him were surveys of public works programs in Mexico and Cuba. The Mexican job was carried out in the summer of 1940 and the Cuban job last summer.

A. DIEFENDORF, left, with a Cuban division engineer in Pinar del Rio Province. The photo was taken last summer while he was surveying the Cuban public works program.

In both instances he was retained by the governments to make an over-all survey of public works and submit recommendations on general policies, planning and economic aspects as well as on construction methods. One incidental result of his experience in those two countries was to improve his opinion of public agencies engaged in construction activities.

"There is too much politics in highway planning and building in this country," he commented. "But in comparison to Mexico and Cuba we are getting along very well. Our state highway departments are doing an excellent job despite political pressures."

He found both Mexico and Cuba still using the Telford base for highways, a type of construction which he describes as excellent for make-work purposes but outmoded so far as a good, practical road system is concerned. Far too little use was being made of machinery, partly because it was difficult, or impossible, to obtain and partly because the political leaders didn't know what to do "with all these people" if they displaced handwork with machine work. And once a highway was completed it received no more attention in the way of maintenance.

But he concluded that the countries in the south excel in one respect — the preparation of elaborate reports on the administration's public works plans, with imposing pictures of all the officials involved.

A teacher since 1921, Mr. Diefendorf has never been particularly interested in the accumulation of degrees. He doesn't look down his nose at these badges of scholastic attainment, but merely reveals the strong utilitarian streak in his own make-up by going after those things he wants to learn without regard to how the work might add up for degree purposes.

Mr. Diefendorf was born in Newark, N. J., May 19, 1891, his ancestry being Pennsylvania Dutch. He was christened Adelbert but shortened that to the initial A. for convenience. His surname was originally spelled "Devendorff" but an English school teacher convinced his grandfather that he didn't know how to spell his own name, and it became "Diefendorf." His father was in the steel business, being vice-president of a company when he died at the age of 32.

Professional background

A. Diefendorf entered the engineering profession because he was interested in construction work, not by family guidance or advice. He received his civil

engineering degree from Ohio Northern University and the same year went to work for the American Bridge Co. at Gary, Ind. He subsequently worked as engineer of structures for the Guggenheim Co. of New York; chief engineer for Krajewski-Pesant Corp. of Havana, Cuba, a firm which specialized in the construction of sugar mills; plant maintenance engineer for Semet Solvay Co. of Syracuse, N. Y. (coke ovens and by-product plants); and chief engineer of the Lackawanna Bridge Co. of Buffalo, N. Y.

He started his teaching career at the University of Illinois in 1921, moved to the South Dakota State School of Mines as assistant professor of civil engineering in 1924 and to the University of New Mexico in 1927 as head of the civil engineering department. From 1930 to 1939 he was a professor of civil engineering at the University of Pittsburgh.

A willing worker in organizational activities, he is usually busy arranging conferences and conventions. And if he has anything that could be called a hobby this is it. He has been president of the education division of the American Road Builders Assn. since 1941, was chairman of the engineering registration board of the state last year and will be in charge of a meeting of the National Council of State Boards of Engineering Examiners which will be held in Salt Lake City this summer.

Power Tool Drives Foundation Studs

New powder-power tool shoots foundation bolts into concrete walls and slabs, is particularly valuable for hard to reach places and can be used under water — California contractor uses the tool to drive studs at 50 per hour rate

By A. E. NIEDERHOFF
Civil Engineer
International Engineering Co., Inc.
San Francisco, Calif.

HADDOCK-ENGINEERS, Limited, of Oceanside, California, has adopted a new tool for use on their $76,000 contract with the Navy for an addition to the commissary at the Naval Ordnance Test Station, Inyokern, Calif. The new tool is a powder-power tool for shooting foundation bolts into concrete walls and slabs and is manufactured by the Powder-Power Tool Corporation of Portland, Ore. Bill Koerwitz, foreman for Haddock-Engineers, has proven that bolts ¼ in. in diameter and 3½ in. long can be shot through 1-in. wood furring into a concrete wall at a rate of 50 per hour.

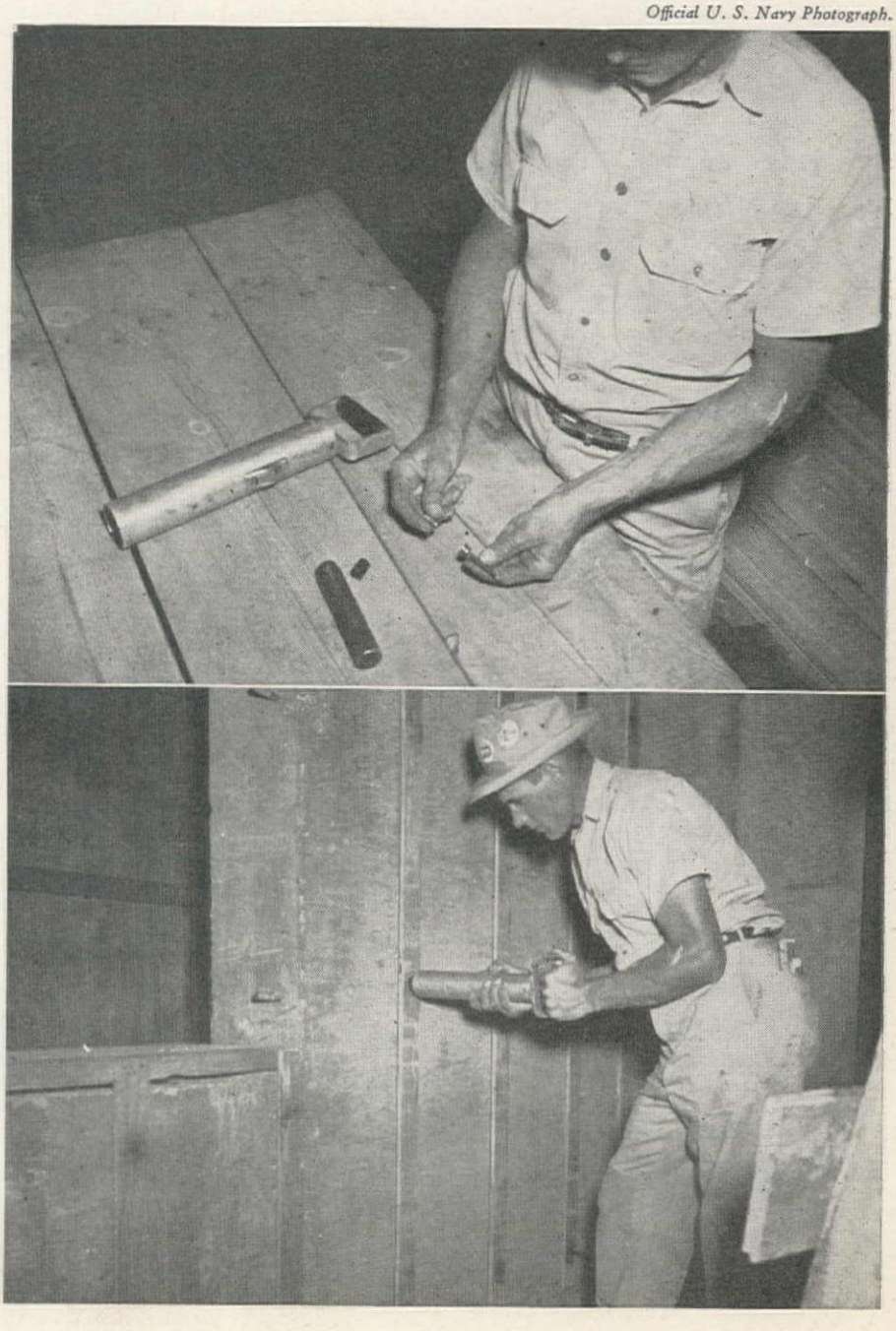
The tool obtains its driving power from an explosive charge contained in a .38-calibre cartridge. The stud that is driven into the concrete has a thin flange at the top of the head providing a means for holding the stud in the tool and for confining the explosion in the breech plug until the pressure is sufficient to shear the flange from the head of the stud. The tool is rugged, portable (weight only 7 lb.), and is particularly valuable for hard to reach places. It can be used under water without loss of efficiency.

Powder-power tools offer a quick, satisfactory method of driving studs into concrete for holding wood sill plates, placing foundation bolts for machinery, hanging electrical conduit, attaching junction boxes to concrete walls, hanging air conditioning ductwork, fastening steel angles, pipe brackets or eye bolts onto concrete walls. They have also been used at other jobs for riveting together steel plates, angles, channels and forgings. Holes ½ in. in diameter can be punched in mild steel plate 5/16 in. thick without the use of electrical power or compressed air. A threaded stud (male or female) or a plain stud can be driven through a steel plate into an underlying concrete wall.

Operation of tool

Loading the tool and using it is a simple matter which can be performed safely by unskilled labor. The compon-

Official U. S. Navy Photograph.



COMPONENT parts of the tool are barrel, breech plug, stud (operator's left hand), cartridge (in right hand) and housing. Bottom, the 7-lb tool in action driving 3½-in. studs through wood furring into a concrete wall.

ent parts are large and rugged enough to allow gloves to be worn without affecting the operation.

The first step in loading is to unscrew the barrel and remove the breech plug. Next, the proper stud (various sizes and types are available) or punch is inserted into the barrel. A thirty-eight calibre cartridge of either light, medium, or heavy charge, depending upon the material and depth of penetration desired, is then placed in the breech plug. The barrel is screwed into the housing and the operator is ready to shoot the first stud into a concrete wall.

The handle of the tool is usually grasped in the right hand and the left hand supports the housing with the thumb close to the trigger. A piece of cardboard or other reaction plate is placed over the point where the stud is to be driven holding the tool against the cardboard. The cardboard acts as a safety device to prevent chips from flying back and injuring the operator. Shatterproof goggles are recommended to protect the eyes from scale or cement dust.

The workman next presses the trigger or "safety" button which does not fire the cartridge but allows the barrel to be depressed. The tool is then pushed firmly against the work until it fires the cartridge. Resulting explosion shears the flange on the stud head, driving it forward into the work.

Contrary to opinions sometimes expressed, the tool is not a lethal weapon. To fire a stud it is necessary first to depress the safety button and then to bounce the tool against an unyielding surface.

Before reloading it is necessary to unscrew the barrel and remove the sheared ring.

A further word of precaution is added based upon experience on other jobs. When shooting long studs into concrete slabs where reinforcing bars are within 1½ in. from the surface it is possible to have the fired stud deflected by the steel bar and ricochet back toward the operator. The length of stud used should be less than the depth of concrete cover over reinforcing steel. Studs should always be fired into the work in a vertical or normal position.

The tools are nominal in price and the purchase price includes 100 studs and 50 cartridges each of light, medium, and heavy charges. Underwater work requires a special trigger and a few extra accessories which are nominal in cost. Because of the wide application of this tool for cofferdams, buildings, railroads, and other heavy construction and manufacturing work, its performance on this Haddock-Engineers job is of interest and importance.

Ozone Discussed at NW Sewage Meet

FINAL REPORT of the committee on ozone treatment of sewage, approval of a resolution directed toward improvement of public works financing in Idaho and Washington, and a record attendance were the principal features of the annual meeting of the Pacific Northwest Sewage Works Association held in Boise on May 12-13. At the close of the annual dinner Kenneth H. Spies, associate state sanitary engineer of Oregon was elected president to succeed H. C. Clare, director of the health engineering division, Idaho department of public health.

Other officers of the association include Emil C. Jensen, chief of the division of public health engineering for Washington, who was elected first vice president, and William P. McNamara, sewer maintenance engineer for Seattle, was elected second vice president. William P. Hughes, city engineer of Lewiston, Idaho, was re-elected secretary-treasurer, and Cotton M. Howard, engineer for the Concrete Pipe & Products Association of Washington, was re-elected member of the federation board of control.

In making the final report of the committee on sewage treatment by the use of ozone, Ray E. Koons, consulting engineer of Portland, chairman of the committee, recommended that the committee be discharged since the duties for which it was established three years prior have been largely completed. The conclusions reached by the members of the committee were: "For all practical purposes the West Kelso (Wash.) plant has not been successful and there appears to be no reasonable evidence that it ever will be acceptable on the basis of contract obligations." Amozone of Oregon operated the plant almost continually on an experimental basis from the middle of 1947 until nearly the end of the year. At that time the city of Kelso refused to finance further experimental operation and the plant ceased operations. In December, 1947, Amozone of Oregon informed the city that the plant was ready for operation and requested payment which the city refused.

During a discussion panel on method of finance for municipal sewage works construction, Gerald D. Hall, consulting engineer of Yakima, Wash., pointed out a serious deficiency in the Washington sewer revenue act in that charges cannot be made against unimproved property. This frequently leads to excessive assessments against improved property in some instances and has discouraged local improvement district construction.

There is no satisfactory method of financing complete sewage works construction in smaller communities of Idaho, according to R. E. Smylie, attorney general for the state, who spoke on the same panel. Except for water supply construction, communities are limited to expenditures not exceeding 15 per cent of the assessed property valuation. The speaker recommended a constitutional amendment which would permit the use of general obligation bonds in combination with revenue financing as the only satisfactory method of permitting the smaller communities to undertake adequate sanitary works construction.

At the dinner meeting the membership in attendance approved a motion which would authorize the association president to appoint a committee to cooperate with representatives of other organizations in preparing and supporting legislation to correct deficiencies in Washington and Idaho laws relating to the financing of public works.

A brief review of developments in the sulphite waste disposal problem of the pulp and paper industry was presented by Dr. R. S. Hatch, director of research for the pulp division of the Weyerhaeuser Timber Co. With an investment of about $3,000,000 Weyerhaeuser is constructing the first magnesium oxide process plant at Longview, Wash., and expects to have the plant in operation this summer. The use of magnesium in place of the customary calcium will provide a closed cycle in which chemicals will be recovered with power being generated in the process. The power generation and chemical recovery are expected to repay the cost of the additional investment required.

Asphalt Institute Meet Held in So. California

THE FIRST Southern California Asphalt Forum was held by The Asphalt Institute in Riverside on April 30.

Attendance included engineers and superintendents of city, county, state and federal departments in the counties of San Bernardino, Riverside, Imperial and Orange. There was an attendance of approximately 90.

The Asphalt Institute is a national organization to which petroleum producers offer facilities for the engineering and development of uses of asphalt through research and field engineering contacts.

The activities of the Pacific Coast Division of The Asphalt Institute are sponsored by the following companies: General Petroleum Corporation, The Petrol Corporation, Shell Oil Co., Inc., Standard Oil Co. of California and Union Oil Co. of California.

Among the subjects discussed at the meeting were Plantmix Resurfacing, by C. B. Kane, Asst. District Engineer, California Division of Highways, and M. H. Irvine, City Engineer of Riverside; Water Conservation and Flood Control Problems, by Howard L. Way, County Engineer, San Bernardino Co.; Use of Asphalt for Canal Linings, by C. V. Kiefer, Shell Oil Co., and W. A. Bugge, Managing Engineer, The Asphalt Institute, San Francisco; and Mixed-in-Place Construction, by J. W. Powers, engineer for Matich Bros., and R. L. McKenzie, Asst. County Road Commissioner, Riverside County.

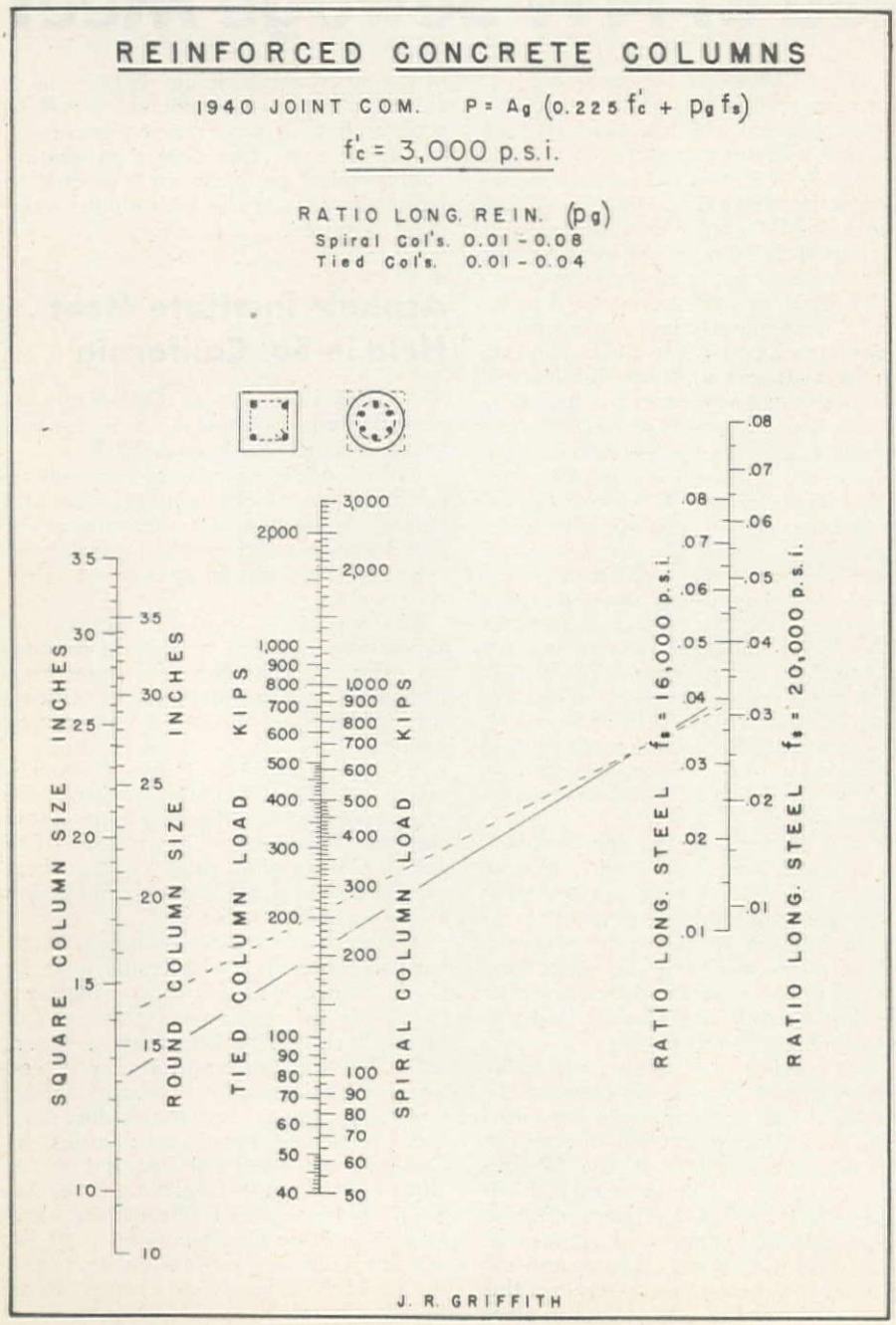
CONSTRUCTION DESIGN CHART

XCVI... Reinforced Concrete Columns

By JAMES R. GRIFFITH
Dean of Engineering
University of Portland
Portland, Oregon

THE ACCOMPANYING chart is similar to one presented in Dec., 1946 except for the ultimate strength of concrete used. The first chart was based on $f'_c =$ 2,000 p.s.i., wherein this one is for $f'_c =$ 3,000 p.s.i. One serious objection to the use of reinforced concrete in multi-floor building construction, is the amount of floor area utilized by the columns. The use of higher strength concrete in the columns would therefore appear to be logical. A reinforced concrete building frame is usually formed in lifts of one floor at a time. It is customary to pour the slabs, beams and columns monolithically. In cases where the concrete for the columns is to be a higher strength mix than that for the beams and slabs, the columns must all be poured first, before changing the mix. Rigid inspection and control is therefore necessary that the proper mix is used. While it is entirely possible to so vary the mixes, it is highly undesirable from the construction standpoint and should be avoided where possible.

In order to illustrate the use of the chart based on $f'_c = 2{,}000$ p.s.i., conditions were assumed for a total column load of $P = 205$ kips. It was found that for a 14 × 14-in. column with $f_s = 16{,}000$ p.s.i., it was necessary to use spiral reinforcing since the ratio of p_g for a tied column was higher than allowed. It was likewise found that the necessary ratio of longitudinal reinforcement was $p_g = 0.055$ for a 14 × 14-in. spiral reinforced column. On the accompanying chart I have drawn solution lines for the same conditions in order to compare results, the dashed line being for a tied column, and the solid line for a spiral reinforced column, wherein $f_s = 16{,}000$ p.s.i. It will be noted, from the dashed line, that the required ratio of longitudinal reinforcement is now slightly less than the maximum $p_g = 0.04$ permitted by code. The ratio of longitudinal reinforcement for a 14 × 14-in. spiral reinforced column will be seen, from the solid solution line, to be $p_g = 0.041$ for $f_s = 16{,}000$ p.s.i., which is appreciably less than that found necessary for an ultimate strength of $f'_c = 2{,}000$ p.s.i. A smaller column would actually be in order.



In order to demonstrate comparative accuracy and provide a check on the above value found for a spiral reinforced column, we would have

$$P = A_g (0.225 f'_c + p_g f_s)$$
$$= 153.9 \ (0.225 \times 3{,}000 + 0.041 \times 16{,}000)$$
$$= 205 \text{ kips.}$$

I explained in Dec., 1946, my own practice of using the chart for the selection of probable column size and then solving for the required area of longitudinal reinforcement by slide-rule. Therefore this will not be repeated. It is difficult to always be sure of the size of column until the actual bar combination is selected. Rules governing the spacing of longitudinal bars, where they are to be lapped, frequently require the use of a larger column than the maximum allowable ratio of p_g would indicate.

Commerce Department Lists Concrete Reports

A SPECIAL bibliography listing 154 technical reports and documents on cement and concrete manufacture is available from the Office of Technical Services, Department of Commerce, Washington 25, D. C. Included in the listing are all of the documents on cement and concrete technology accumulated by O. T. S. from domestic and foreign services as of January, 1948.

Reports of German technology comprise the bulk of the materials listed. For example, one of the reports listed describes a German-developed "high early strength cement" composed of a mixture of calcium, aluminum, ferrous and silicon oxides. This cement costs three times as much as Portland cement, the report states, but is used economically in certain applications calling for a cement with special chemical properties and high initial strength.

Among the documents listed from American sources are declassified reports of the Army Air Forces, Engineer Corps, U. S. Navy and other research agencies. The bibiography gives the author, title, and price of each of the items.

Wellpoints Dewater Below Sea Level

Use of wellpoint installations for Terminal Island excavation project makes easy work of what had been considered a difficult pumping job — Predraining permitted dry excavation to 28 ft. below ground water level with dragline walking without mats for even the final cut

By A. J. SALLEY
Moretrench Corporation
Houston, Texas

TERMINAL ISLAND, near Long Beach, California, with its oil wells and many other activities is an active piece of land within itself. The island is settling at a slow constant rate and surface construction requiring soil stabilization is not unusual here. The near surface soil problems, however, are not necessarily related to the island's settlement, which is believed to be the result of displacement occurring at a much greater depth.

In connection with their steam plant located on the eastern end of Terminal Island, the Southern California Edison Co. provided another interesting experience in soil stabilization when they decided to change their method of discharging 600 sec. ft. of cooling water from an open flume to a 20 x 30-ft. concrete conduit.

The site chosen for the construction of this conduit was through 1200 ft. of hydraulic fill bounded on two sides by open water. The close proximity of open water together with the required depth of excavation (28 ft. below ground water), and fine inert material made this a major soil stabilization problem.

It is recognized that silt deposits found in fills of this type are among the most treacherous soils when treated as a structural material. They lack internal friction and cohesion, the forces necessary in soil to resist the force of gravity. Their low liquid limit is an indication of their unstable behavior with the presence of small amounts of free water. Therefore, complete dewatering was the first important step in this construction. Macco Corporation of Clearwater, Calif., was awarded the contract for this project and they, in turn, chose Moretrench Corporation, of Houston, Tex., to engineer and perform the predraining of the excavation. Moretrench wellpoint equipment was used for this purpose.

PILE DRIVING operations, top of page, required very little subsurface drainage. Water standing in bottom of the excavation is the result of high pressure jetting which discharged water at a greater rate than percolation to the wellpoints. Long Beach Harbor is seen in the background. Site is bounded on both sides by water.

Two-stage dewatering

The dewatering and excavation were carried out in two stages. Access roads were first thrown up around the proposed top of slope and as the roads were built, the first temporary stage of 8-in. header pipe was laid at elevation plus 6, two feet above normal ground water. Connected to this header were 24-ft. wellpoints on 5-ft. centers. Pumping from this level the ground water was lowered to elevation minus 12. Macco then made the first cut to elevation minus 10 using a Northwest 85 with a 3-cu. yd. drag bucket.

The lower permanent wellpoint installation followed the first cut at elevation minus 10, and as this permanent system was put in operation, the first temporary stage of wellpoints above was removed. The final cut was then made to elevation minus 22 with the dragline walking at minus 10 without mats. This was

EVIDENCE of the dry sub-grade maintained using the wellpoints at 28 ft. below ground water level. Final cuts were made with the dragline walking at elevation minus 10. Stacks on So. Calif. Edison Steam Plant are in the background. Bottom, Macco Corporation's general superintendent, J. M. SAWYER, left, and assistant, SAM PENNA, discuss details of the construction prior to pile-driving operations.

thought to be impossible at the beginning.

Pumping on this first 650-ft. section of the excavation was handled with three 8-in. double vacuum pumps—each with 500 ft. of 8-in. header pipe and 125 wellpoints. A 25-in. vacuum was maintained and the volume of water discharged was approximately 500 g.p.m. per pump. The ground water drawdown was from elevation plus 4 to minus 24, or a total of 28 ft. No sheeting was used in this section. Slopes were cut on 1:1 and remained in good condition with the exception of a few minor cave-ins which did not cause delay. Flatter slopes are recommended in this type of soil where space permits. Dry excavation and good progress prevailed throughout this part of the work.

Twenty-four hundred foundation piling will go into this structure and, at this writing, they are approximately 50 per cent complete. An anticipated artesian flow around the piling has been negligible and very little additional subsurface drainage was required for this purpose. Aside from water accumulated during the pile jetting operation which was not objectionable, there was no evidence throughout of ground water seepage. Wellpoints made easy work of what has long been considered a difficult pumping job.

Courses for Water Works Operators Approved at NW Association Meeting

A RECORD MEMBERSHIP attendance at the 21st annual meeting of the Pacific Northwest Section of the American Water Works Association in Boise, May 13-15 approved re-establishment of short courses for water works operators, but failed to agree on the subject of operators' licensing after a lengthy discussion and left the matter on the table for consideration at the next annual meeting.

James E. Morrison, manager of utilities for Renton, Wash., was elected chairman of the section to succeed Sidney J. Benedict, assistant water engineer for Portland. Other officers elected to serve the section during the year include B. C. Gosney, superintendent of the Auburn (Wash.) water department, vice chairman; and W. G. Wilmot, water superintendent for McMinnville (Ore.), member of the board of trustees. Fred Merryfield, professor of civil engineering at Oregon State College, was re-elected secretary-treasurer.

Reporting for the committee on licensing and short courses, Curtiss M. Everts, state sanitary engineer of Oregon and chairman of the committee, submitted recommendations that short courses for water works operators be held annually in each of the Northwest states; that regional schools be held within each state where necessary to assure attendance by operators from the more outlying communities; and that licensing of operators be undertaken on a voluntary basis to initiate the program. He also recommended that the Pacific Northwest Sewage Works Association be asked to establish a school committee which would cooperate with the water works school committee.

At the following business session a motion to endorse state and regional short courses was unanimously approved. A second motion to endorse a program which would provide registration for water works operators and authorize the committee on licensing to cooperate with appropriate authorities in each state toward establishing registration was the subject of considerable debate. Although the motion was declared passed by the chairman, a motion to reconsider was finally approved and the matter laid on the table until the next annual meeting of the section.

The use of fluorine in public water supplies, a subject on which there are widely varying opinions among water works men, was discussed by Dr. Walter Pelton, dental consultant with the U. S. Public Health Service at Denver, Colo. A fluorine content of 1.0 to 1.5 ppm in a domestic water supply appears to definitely reduce tooth decay by 60 to 70 per cent, reported Dr. Pelton. Fluorination of water supplies would appear to be definitely an economic necessity since it is fairly well established that such treatment can reduce dental care in a community from an average of $12 per capita per year to about $4 per capita per year.

Presenting the case for increased water rates, Louis R. Howson, consulting engineer of Chicago, predicted that construction costs will not drop more than 20 per cent in the future from present levels and possibly not that much.

In order to maintain prewar water supply facilities, Howson said, an increase of about 30 per cent in revenue will be required. Capital expenditures on water works facilities during 1947, although larger in dollar value, was actually less in value received than the 20-yr. average. He recommended that depreciation revenues be based on replacement at present costs rather than on original costs.

Soil Samples Tested in Roving Labs

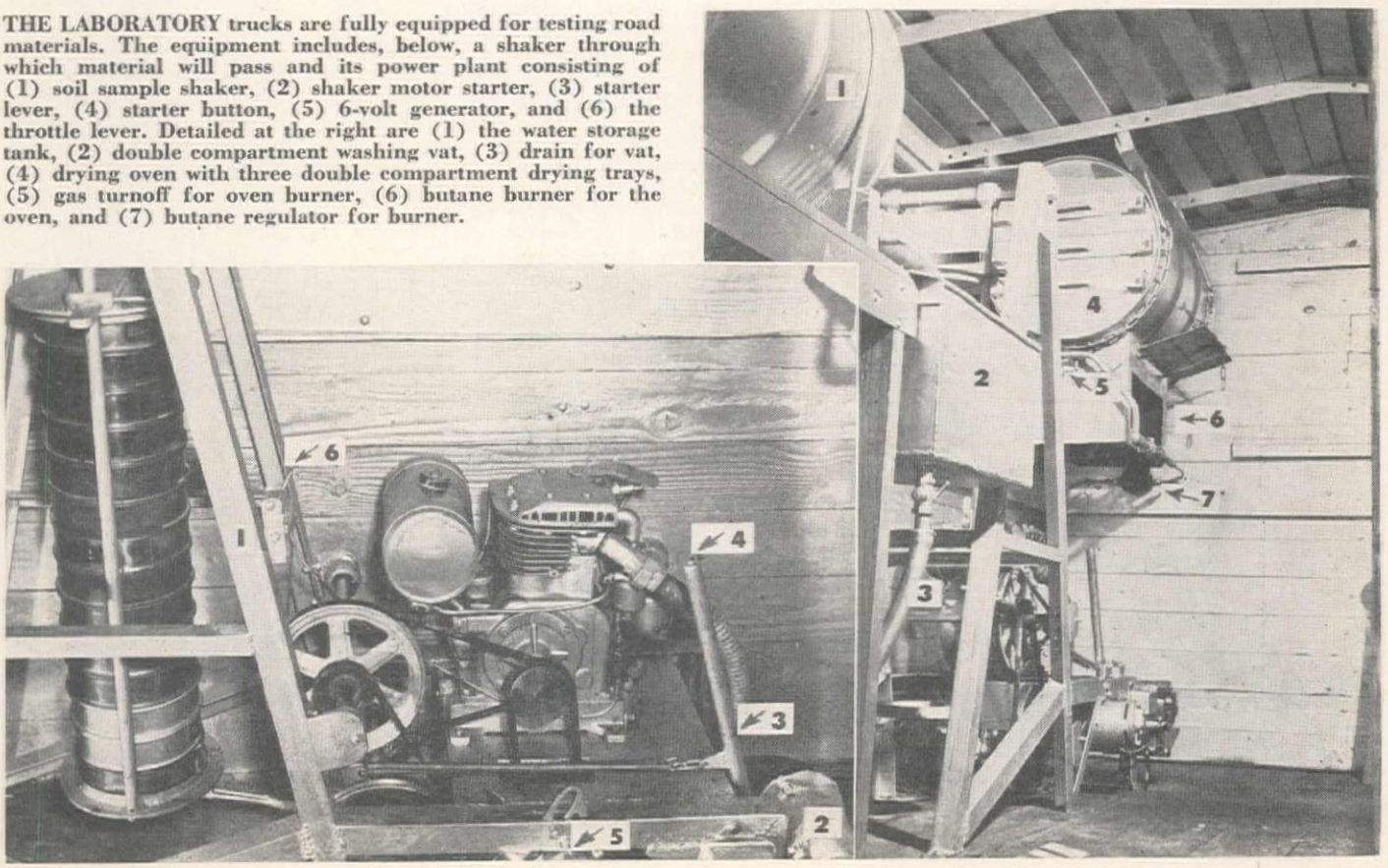
A FLEET of eight laboratory trucks has been equipped by the Oklahoma State Highway Department to give on-the-spot tests of road building materials. The trucks will be used as a means of hastening the state's 1948 road building program, according to State Highway Director H. E. Bailey.

The roving labs will be fully equipped to determine whether gravel, sand, rock and soils meet state standards and will relieve the over-loaded central testing plant at Oklahoma City. It has frequently been necessary to bring in soil samples from all parts of the state where construction was in progress into the central testing plant.

State Maintenance Engineer Dick Winfrey says that, with the help of the laboratory trucks, the department will concentrate more than ever on the selection of soils in order to obtain only that type that mixes best and lays satisfactorily. The labs will operate in every county of the state out of division headquarters at Muskogee, Ada, Antlers, Perry, Clinton, Buffalo, Duncan and Tulsa.

The photographs show some of the equipment which is installed in each truck, including a shaker through which samples will pass, its power plant, and a double compartment drying vat, water storage tank and drain and drying oven with three double compartment drying trays heated by butane.

THE LABORATORY trucks are fully equipped for testing road materials. The equipment includes, below, a shaker through which material will pass and its power plant consisting of (1) soil sample shaker, (2) shaker motor starter, (3) starter lever, (4) starter button, (5) 6-volt generator, and (6) the throttle lever. Detailed at the right are (1) the water storage tank, (2) double compartment washing vat, (3) drain for vat, (4) drying oven with three double compartment drying trays, (5) gas turnoff for oven burner, (6) butane burner for the oven, and (7) butane regulator for burner.



NEWS OF WESTERN CONSTRUCTION

JUNE, 1948

Three States Compromise on Knotty Rio Grande Problems

A COMPROMISE on the controversial Rio Grande reclamation and flood control problem, arrived at by engineers from Texas, New Mexico and Colorado in closed conference at Washington, D. C., will probably have the effect of hastening authorization of the project by Congress. The three states, as well as the Corps of Engineers and Bureau of Reclamation, are in accord now to delay for further study the proposed Chiflo reservoir of 800,000 ac. ft. on the Rio Grande and to temporarily reduce the size of a 945,000 ac. ft. reservoir to be built at Chamita on the Chama River in New Mexico.

The compromise provides that the Chamita reservoir will be built to back up 680,000 ac. ft. until water savings have been effected below Albuquerque by improving the channel to San Marcial. Then, with the addition of flood gates, the dam will back up the full amount. Elimination of the Chiflo reservoir will bring the cost of the entire project down $30 million to a total of $65 million. Construction of the Jemez reservoir on the Jemez River in New Mexico has been retained in the proposal because of its value for controlling sediment in the Rio Grande. Capacity of this reservoir will be about 120,000 ac. ft. The proposed project also contemplates canalization of the Rio Grande and rehabilitation of the present levee and irrigation features.

Objections to the project by Colorado and Texas had centered in possible adverse effects on Colorado's San Luis project and New Mexico's Elephant Butte Dam. The compromise pledges Texas and Colorado to work for authorization of the reduced project. Hopes of the project backers are that authorization measures can be tacked onto the omnibus flood control bill in the U. S. Senate. This bill has already passed the House without the Middle Rio Grande Project included.

NAVY DEDICATES SCIENCE RESEARCH LABORATORY AT INYOKERN, CALIF.

MICHELSON LABORATORY, the most complete science research facility of its type in the world, was dedicated May 8. Built at a cost of $8,000,000, it contains 7½ ac. of floor space, all air-conditioned. Main section of the building is constructed as four segregated sections with 6-in. space between each for earthquake movement and expansion and contraction. It is completely equipped for development work on rockets and guided missiles and applied research in fields of physical and chemical sciences.

Official U. S. Navy Photograph.

First Water Delivered In the Columbia Basin

THE FIRST WATER was delivered to farms on the Columbia Basin project in Washington on May 15. The lands near Pasco, Wash., which received the water pumped from the Columbia River with power from Grand Coulee, represent but a small fraction of the over one million acres which ultimately will be opened on this project. The first unit comprises 5,360 ac. divided into 84 farms.

Construction schedules are pointed to bringing the first big block of land, an additional 210,000 ac., under irrigation with water from behind Grand Coulee Dam in 1952.

The Pasco unit lands are at the southern tip of the Columbia Basin project area. The unit is served by 18 mi. of canals and 5 mi. of concrete pipe, constructed since August, 1946, to serve the farms which are for the most part privately owned, but which, because of rainfall of less than 7 in. a year, have not been suitable heretofore for intensive cultivation.

At present, the Bureau of Reclamation is building three dams, miles of river-size canals, a record-size pumping plant, and other works on the northern part of the project to lift the water 280 feet from the lake back of Coulee, into a 27-mi. equalizing reservoir and then distribute it among the project lands. In time, the Pasco Unit farms will be served from one of the main distribution canals.

The Pasco farms will be required to pay an average of $85 per acre in construction charges, on an interest-free basis over a 40-year period following a 10-year development period. Water users will also pay costs of operation and maintenance, including electrical energy for pumping. Power revenues from sale of the energy generated at Grand Coulee Dam will pay more than three-fourths of the cost of building the irrigation system.

Bid Calls Summarized For Reclamation Jobs

THE BUREAU of Reclamation announces that invitations to bid were issued on June 15 for the construction of concrete pipe lines and structures for Unit No. 5 of the Coachella Valley distribution system near Mecca, Calif. About 51 mi. of 10 to 72-in. diameter concrete pipe will be required in addition to other items.

On June 22 bids will be invited for the construction of concrete pipe line and structures on the Provo River project near Provo, Utah. Over 24,500 ft. of 69-in. concrete pipe will be involved.

Invitations to bid will be issued on June 25 for three important projects. The first will be for construction of the Soap Lake siphon, a concrete and steel structure 12,900 ft. long on the Columbia Basin project near Soap Lake, Wash. The second will be for construction of Spring Creek dam, an earthfill structure approximately 130 ft. high and 1,300 ft. long, part of the Paonia project, on East Muddy Creek, about 20 mi. from Paonia, Colo., and the third will be for the construction of 16,000 ft. of 8-in. water pipe line on the Payette division of the Boise project, near Cascade, Idaho.

Also to be issued for bid about June 25 will be specifications on 76 mi. of 115-kv. transmission line between Tucson and Cochise, Ariz., grading and surfacing of a switchyard area and construction of a railroad spur near Elverta, Calif., and construction of ¼ mi. of access road to the Shoshone power plant near Cody, Wyo.

It is also expected that the following bid calls will be issued during the next two months: Canyon Ferry dam and power plant, 15 mi. northeast of Helena, Mont.; Cedar Bluff dam, earthfill, on the Smokey Hill River near Ellis, Kans.; Superior-Courtland diversion dam on the Republican River near Guide Rock, Neb.; earthwork, lining and structures for 10 mi. of the Horsetooth feeder canal, including a diversion dam, one mi. of tunnel, one steel and 12 concrete siphons near Loveland, Colo.; and earthwork, lining and structures on four important canal projects, 27 mi. of the Friant-Kern canal near Porterville, Calif., 15 mi. of the Delta-Mendota canal near Patterson, Calif., 15.3 mi. of the West canal near Ephrata, Wash., and 8.3 mi. of the Potholes East canal near Norden, Wash.

Other bid calls anticipated within two months are: 170 mi. of 115-kv. transmission line from Casper, Wyo. to Gering, Neb., and a transmission line from Anderson Ranch dam to Mountain Home, Idaho; one mile of 69-in. pipe line for the Big Cottonwood section of the Salt Lake City, Utah, aqueduct; a pumping plant on the Yellowstone River near Savage, Mont.; 3 mi. of access road at Bixby dam, S. Dak.; and government camps at Keyhole, 18 mi. northeast of Moorcroft, Wyo., Shadehill, 20 mi. south of Lemmon, S. Dak., Bixby, 40 mi. northwest of Faith, S. Dak., Moorhead, 5 mi. southwest of the existing town of Moorhead, Mont., and Mirage Flats, 12 mi. south of Hay Springs, Neb.

LATE NORTHWEST WIRE

THE HIGHEST water in more than fifty years in the Columbia River and its tributaries has caused damage, roughly estimated as this magazine goes to press, at more than $40 million and claimed an unknown number of lives throughout the basin. The first emergency occurred at Bonners Ferry, Idaho, where the Kootenai River broke its dikes despite the strongest efforts of the Corps of Engineers. As the flood crest rolled down the main stem, highways, railroads and bridges were damaged and large areas inundated.

The Okanogan, Methow, Yakima, Clearwater and Snake Rivers, as well as others emptying into the Columbia, were at flood stage nearly simultaneously as a result of a cold spring, followed by unseasonably heavy rains and high temperatures late in May. More than a million second feet were flowing over the spillway at Bonneville Dam and power production at both Bonneville and Grand Coulee power houses was materially reduced by the high water.

Most serious damage was occurring on the lower Columbia River, where dikes were broken, flooding the war housing center of Vanport (see *Western Construction News*, Aug. 1943, for description of location and type of building in Vanport) in Columbia River lowlands north of Portland. At press time the entire city is still under water, with buildings almost completely destroyed and no count of deaths available.

Union Pacific Railroad's main line tracks were under water almost the entire distance from The Dalles to Portland. Northern Pacific tracks were flooded near Kelso, Wash. One pier of the Interstate Bridge between Portland and Vancouver shows signs of being undermined and is being supported by a stern-wheel tug pulling against the current. The Willamette River, also high, and backed up by the Columbia is flowing over the seawalls into downtown Portland, flooding railroad yards and cutting off bridge approaches. Woodland, Kalama, South Kelso, Clatskanie, and Conconully, Wash., were flooded, but little if any loss of life occurred. Colonel O. E. Walsh, Corps of Engineers District Engineer at Portland, ordered all shipping off the river from Portland to the ocean because at many points water was so near the crest of dikes that it was feared even the weight of ships might cause overtopping and break-throughs.

First Unit in Southern California Power Development Now in Operation

RACING AGAINST TIME, Southern California Edison Co. on April 28 put its new 35,000 kw. generating unit at Big Creek Powerhouse No. 3 in operation. Additional use can now be made of water which would otherwise spill during the annual runoff, usually occurring about this time of the year. Edison's Big Creek power development utilizes water from a 1,050-sq. mi. drainage area in the High Sierra watershed.

Part of a $168,000,000 three-year construction program through 1949 to increase Edison's capacities in all phases of operation, the new unit was installed at a cost of $1,600,000.

Water for the new unit is supplied through the same tunnel, built in 1923, which services the other three units of the powerhouse. The penstock for piping water to the new turbine was built by Western Pipe and Steel Co. and was installed by Clyde W. Wood Co. of Los Angeles. Westinghouse Electric Corp. built and installed the generator, which is driven by a Pelton hydraulic turbine.

Work inside Powerhouse No. 3 necessary for generator and turbine installation was done by Johnson-Western Co. of Los Angeles, and all phases of installing the new generating capacity were accomplished in close collaboration with Edison engineers.

A new building to house shop facilities, which previously occupied space now taken up by the new generating unit, was constructed adjacent to Powerhouse No. 3. With the completion of a new transformer bank, total improvement and additions to this one plant will amount to $2,600,000.

Southern California Edison Company's Big Creek hydro-electric development in the High Sierra consists of sixteen generating units installed in five plants. The system is a composite of three major artificial lakes created by the construction of six dams and eight tunnels. The series of five powerhouses use the water in turn as it is released to the San Joaquin Valley throughout the year.

Los Angeles Airport Due to Have First Commercial FIDO

THE FIRST commercially installed fog dispersal system in the world will be in operation within six to eight months at the Los Angeles Airport. The Los Angeles Airport Commission has accepted an $820,000 bid by Bechtel International Corp., Los Angeles. Airlines using this dispersal system will repay the city over a 5-yr. period for the installation cost and will also pay for its maintenance and operation. The system will eliminate fog from runways through intense heat generated from oil-fed burners on the sides of the area.

FIDO (Fog, Intensive Dispersal Of) is a creation born during the labors of war. It has been extensively studied by a joint Army-Naval-Civil Agency since

1945 at the Naval Auxiliary Air Station at Arcata, Calif. The stated goal of the research program has been the development of a low cost installation for commercial use. Full details of the FIDO investigations were presented in *Western Construction News*, May, 1946.

Texans Demand Compact On Pecos River Water

TEXANS are insisting that a Texas-New Mexico compact on Pecos River water should be signed before any further work is done on the Carlsbad, N. M., reclamation project. They have asked the Senate Irrigation Subcommittee not to approve legislation introduced by Senators Hatch and Chavez of New Mexico which would provide for rehabilitation of the project, principally by building a channel to by-pass 11,000 ac. of salt cedars which are drinking up the flow of the Pecos.

A. H. Woolverton, Chief Engineer of the Texas State Board of Water Engineers said the by-pass channel might save upwards of 30,000 ac. ft. of water, but that this extra supply would be consumed in New Mexico by bringing 5,000 ac. more land under cultivation in the Carlsbad project. Senator Hatch contends that New Mexico has no plans for claiming any of the extra water beyond that sufficient to irrigate the full 25,000 ac. authorized in the project. Wesley R. Nelson, Assistant Reclamation Commissioner, said the improvement of the Carlsbad project, estimated to cost $4,597,000, will increase the flow of the Pecos available to the Red Bluff project in Texas and at no expense to Texas water users.

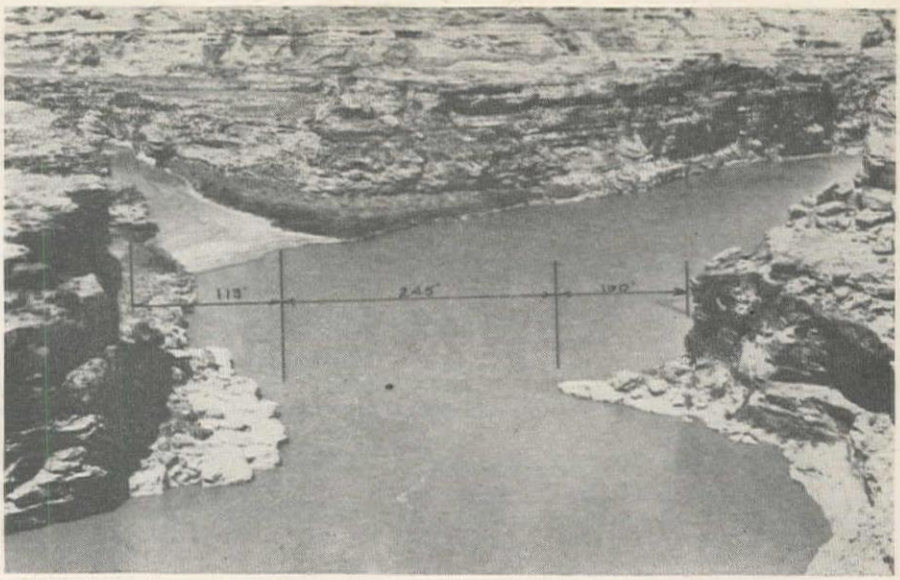
Hunt Foods Initiates Huge Building Program

CONSTRUCTION of a 274,000-sq. ft. warehouse at Hayward, Calif., one of the largest in the food industry and believed to be the largest building in all Alameda County, has been initiated by Hunt Foods, Inc., as a part of a $2,750,000 expansion program scheduled for the first half of 1948. Completion is planned for July.

The new building will have a capacity of 2,250,000 cases. Along with outside service features, it will occupy 9½ ac. at B and Winton Streets, adjoining on the north and east the present 626,000-sq. ft. Hunt canning plant.

Also planned for the immediate future adjoining the Hayward warehouse is a modern refrigeration depot, to occupy 30,000 sq. ft.

Builders of the warehouse are Swinerton & Walberg, general contractors, with Close Building Supply Co. and Hayward Building Material Co. included among the sub-contractors. The building is of steel frame, with brick walls and concrete floors. Concrete loading aprons stretch the full length of the building on the north and east, served by four Southern Pacific spur tracks. Loading capacity is 80 cars a day.



Site Near Hite Explored for Bridge Across Colorado into Southeast Utah

DESIRING TO furnish highway access to the southeast corner of the state of Utah, with its scenic natural bridges and cliff dwellings, the Department of Publicity and Industrial Development of the state has been exploring the Colorado River in search of a suitable highway bridge crossing site. It is apparent from their investigations that the only suitable crossing in 300 miles is at Hite, Utah, immediately south of the confluence of the Colorado and the Dirty Devil or Fremont Rivers. At this point, almost vertical cliffs stand about 200 ft. above the river and at their base on both sides is an outcropping of good rock only a few feet above the level of the river and narrowing its channel to 230 ft.

Preliminary investigations and designs were made by Professor Junius J. Hayes of the Civil Engineering Department of the University of Utah and Robert G. Harding, consulting engineer of Salt Lake City.

In his preliminary report, Harding indicates that the clear distance between opposite cliffs is approximately 465 ft. He indicates that the site appears to be suitable both as to bridge and foundation requirements and for the accommodation of approach roads. He feels that the minimum bridge to be desired would be a single roadway approximately 12 ft. wide, with walkways and designed for a minimum H-15 loading, equivalent to a 15-ton truck under standard conditions.

Harding suggests that either of two types of bridge might be suitable at the site. The first is a deck type steel arch rib bridge, and the second a suspension type structure. In the event the arch rib type were selected, he recommends that the entire distance between canyon walls be bridged with a single span, having a level deck approximately 150 ft. above the riverbed and with the spring line of the arch or the abutments firmly anchored into the canyon walls 80 to 100 ft. above high water. The exact height of the deck would be selected to accommodate the approaches on both sides of the river, using wherever possible, small canyons leading into the main channel of the river as access ways for the roads.

If the suspension type bridge were selected, Harding suggests that it would be wise to utilize the rock outcroppings in the bed of the river as foundations for suspension towers. Being a resistant strata of Permian formation, little or no expensive under-water excavation would be required. In such a structure, the center span would be about 300 ft. between towers, with approach spans approximately 100 ft. long on each side. Good anchorages would be available on each side of the canyon for the suspension cables. The deck of this bridge would likewise be from 100 to 150 ft. above high water.

Subject to considerable variation based on a fuller knowledge of foundations, span length, transportation difficulties, access roads, erection problems and labor market, Harding estimates the cost of the arch rib bridge at about $160,000. He feels that the suspension type bridge would be approximately the same cost.

Hayes suggests a 3-span bridge at the site, with piers constructed at the outward end of the projecting rock at river level. As shown in the accompanying photograph, the center span would be about 245 ft. in length with approach spans of 100 and 113 ft. respectively. He believes that such a structure would be less expensive than a single arch.

A preliminary meeting has been held by the Department of Publicity and Industrial Development and the Utah State Road Commission and it was agreed that survey parties of the Road Commission would make a detailed survey of the proposed bridge site. The parties are now in the field and will make their report in the near future.

Should the studies indicate the advisability of building a bridge at the site and a road is constructed to the Natural Bridges National Monument, tourists

traveling along the southern rim of the Dirty Devil River would have a view of magnificent desert scenery. From the divide at the head of the Dirty Devil River, the finest view of the classic Henry Mountain laccoliths is obtained. Robbers Roost to the north and Cataract Canyon to the northeast, as well as prehistoric caves and cliff dwellings in the area, will be of outstanding interest to users of the road.

Army Engineers Favor Levees on Snake River

A FLOOD CONTROL project, consisting of a system of levees, is favored by the Army Corps of Engineers for the Snake River and its tributaries in Wyoming according to a report issued from the Office of the Division Engineer in Portland, Ore. The report was prepared following a public hearing held in Jackson, Wyo., late last year.

The report recommends that a levee be built on the right bank of Snake River extending 2.5 mi. below Moose to the Jackson-Wilson bridge, a total distance of about 10.5 mi.; a levee approximately one mile long on the left bank of the river immediately upstream from the bridge and a levee 2.5 mi. in length on the right bank downstream from the bridge. All the levees would be riprapped at points subject to erosion and attack by flood waters.

Based on 1947 price levels, the estimated cost of the project would be $1,010,000. The report also contended that the protection of areas on Buffalo Fork and on the west bank of the Snake River upstream from Moose, although desireable, would provide insufficient benefits to justify the work.

Final Dates Announced for Bay Crossing Engineer Exams

STATE CIVIL service examinations for Principal Engineer and Assistant to the Chief Engineer, San Francisco Bay Toll Crossings, are scheduled for July. Duties of the Principal Engineer will be to direct and plan the design or construction work on one or more of the major bridges or tunnels and to direct the making of specialized layouts and designs on major structures. Final date for filing of applications is July 1 and the examination date is July 22. The monthly salary range starts at $676 for a 40-hr. week.

The position as Assistant to the Chief Engineer requires a person possessing a wide general knowledge of engineering practices together with public relations experience, and involves the making of special studies and the interpreting of technical material for the layman. June 24 is the final date for filing application and July 15 is the examination date for this position. Monthly salary range is from $505 for a 40-hr. week. Applications are obtainable from the State Personnel Board in Sacramento, San Francisco, Los Angeles or the local Department of Employment offices.

B. C. Railroad Bridges Replaced in Diversion

CULMINATING a four-year program of bridge replacement, the large diversion and fill now under way on the Canadian Pacific R.R. right-of-way west of Princeton, B. C. comprises the largest single task of the entire project.

When completed, this line-change will have cost approximately $630,000 Two Kamloops, B. C. firms are concerned in various phases of the work, Kenyon & Co. on concrete bridge abutments and piers, and the Interior Contracting Co. on earth and rock-moving.

Four Howe-truss wooden bridges, originally built by the Great Northern railway, will be replaced by the change. In their place will be two steel spans, a tunnel, and a deep cut into solid rock.

Those who know the history of this stretch of line will recall that "Jim Hill's road," the Great Northern, originally planned to have its line from Oroville through Keremeos, Hedley and Princeton, extended through to the coast, or at least to link with the C.P.R. main line.

A considerable portion of this line was built, the sector concerned in this change forming a portion of it. These bridges were only taken over by the C.P.R. in January 1945.

Work will not be completed, it is anticipated, until some time in 1949. Steel for the bridges is not expected until next year.

The job consists of the replacement of the bridges at Miles 71.7 and 77.8 with steel structures, and the elimination of two other bridges, at 75.5 and 75.7 by a line change.

This diversion is one of the largest earth and rock-moving projects undertaken by the railway in this region in many years. It will be 4,000 ft. long, and will include a 500-ft. concrete-lined tunnel at one end, and will pass through a cut 70 ft. deep in rock, at the other.

The abutments and piers, upon which Kenyon & Co are working, will contain some 1,800 cu. yd. of concrete.

Dry Ice Hung in Trees "Milks" Clouds of Snow

SCIENTISTS have revealed a new method used during the past winter to "milk" moisture laden clouds of snow. The experiments, which consisted of hanging huge blocks of dry ice in trees on mountain tops, were aimed at storing water on the Hood River Valley Irrigation District watershed in Oregon and proved successful after each of nine tests staged between November and January. All of the assaults on the clouds were made at elevations of 4,000 ft. or more on Green Point Mountain in the eastward path of clouds moving off the ocean.

Dr. Phil E. Church and William Schallert, of the University of Washington Department of Meteorology and Climatology, reported the work was sponsored by the university and the Oregon Valley Apple Growers. Vincent Schaefer, General Electric Co. scientist, assisted in the tests.

Dr. Church explained that blocks of dry ice, weighing from 25 to 75 lb., were placed on stumps or hung in trees at exposed locations and that a definite amount of snow fell in areas 20 to 30 miles downwind from the points. The scientists did not have equipment on hand to measure amount of the snowfall.

NORTHERN CALIFORNIA A. G. C. SIGNS TO SPONSOR THIRD RESERVE UNIT

SIGNING AFFILIATION papers for the third construction reserve unit to be sponsored by the Northern California Chapter, A. G. C., are, seated left to right: LT. COL. ANDREW D. CHAFFIN, Executive Officer, San Francisco District, Corps of Engineers, and H. C. MAGINN, chairman of the chapter's affiliation committee. Standing left to right are W. H. ARATA, chapter manager, AL BIASOTTI, chapter president, and BRIG. GEN FREDERIC C. BUTLER and BRIG. GEN. GARRISON H. DAVIDSON of the Sixth Army Staff.

PERSONALLY SPEAKING

R. E. Setterstrom, industrial engineer with the Montana Power Co. at Butte, has been elected president of the Montana Society of Engineers. Other officers of the society, elected at the April meeting, include: **E. A. Champ,** Butte, first vice president; **E. A. Barnard,** Anaconda, second vice president; and **R. D. Piper,** Butte, secretary-treasurer. **F. C. Homann,** Bozeman, and **E. C. Shevalier,** Great Falls, were elected as trustees.

Herbert R. Pirkner, design specialist on vehicular tunnels and recently Chief Design Engineer on highway tunnels in Texas and Alabama where the open trench type of construction was used, has been appointed to the staff of engineers studying the proposed San Francisco Bay Crossings, according to **Ralph A. Tudor,** Chief Engineer. The open trench method is being studied for the tubes under San Francisco Bay for the Southern Crossing and also for the tube under the Oakland Estuary, included in the Southern Crossing project.

L. Sterling Hedgpeth, senior highway engineer with the Public Roads Administration in Washington, D. C., and an engineer in the Phoenix, Ariz., office for seven years until 1941, is now in Turkey where he will act as consultant on the construction of a modern highway network. **Eugene V. Aldrich,** also formerly in the Phoenix office, is also in Turkey.

B. F. Jakobsen, Menlo Park, Calif., civil engineer, is in Sweden representing the United States at the International Congress on High Dams. He is one of three engineers designated to represent the Army Corps of Engineers at the Stockholm conference. Jakobsen was twice awarded medals by the American Society of Civil Engineers for his studies on dams.

F. F. Palmer, city engineer of Forsyth, Mont., has been elected chairman of the Montana Section of the Federation of Sewage Works Association. At the fourth annual convention of the section in Livingston on April 4, **C. W. Eyer,** Laurel, was elected vice chairman; **Kurt Weil,** Miles City, and **Rodney Preater,** Helena, were elected trustees; and **H. B. Foote,** Helena, was re-elected secretary-treasurer.

W. M. Cobleigh, Bozeman, Mont., was awarded the Kenneth Allen award for outstanding service to the Federation of Sewage Works Associations at the annual meeting of the Montana Section. The presentation was made by **W. H. Wisely,** executive secretary of the Federation.

Col. William E. Potter, formerly district engineer at Kansas City, Mo., for the Corps of Engineers, has been transferred to Anchorage, Alaska, as district engineer for Alaska. He succeeds **Lt. Col. James D. Lang** who has been associated with the Seattle and Alaska district offices since 1941.

Roscoe F. Cole, resident engineer at Coos Bay, Ore., for the Corps of Engineers, retired on May 31 after 29 yr. of service at Coos Bay and 41 yr. with the Corps of Engineers as a civilian engineer. Cole has been succeeded by **Allen Terry** who has been associated with the Corps of Engineers for the past 11 yr. The Coos Bay district includes the coast line area from Alsea Bay to the California state line.

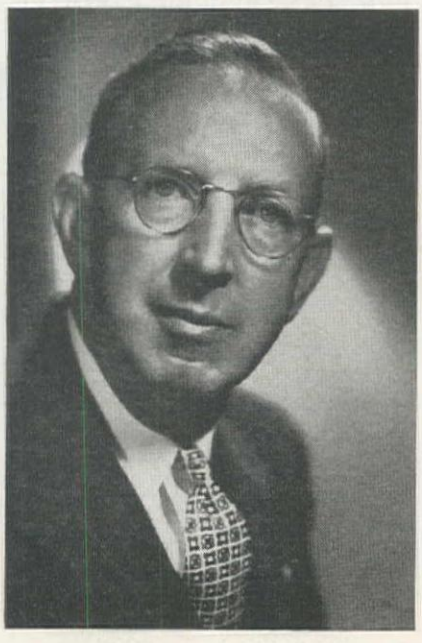
Richard G. Tyler, professor of sanitary engineering at the University of Washington, has been retained by the city council of Tacoma, Wash., to make a survey preliminary to preparation of a smoke abatement ordinance. The appointment climaxes a campaign by the Tacoma Engineers Club to institute a smoke abatement program in the city.

David E. Morris, formerly traffic engineer for the Washington state highway department, has been appointed city engineer for Tacoma. Morris is a graduate of Oregon State College, and has served with the Washington highway department and the Public Roads Administration. He was district office engineer at Wenatchee, Wash., from 1935 to 1942, and since then has been in charge of traffic engineering at Olympia.

W. J. Scofield, office engineer for the Portland division office of the Public Roads Administration, has retired after 30 yr. in federal service. He began his career as a levelman in Missoula, Mont., in 1918, becoming office engineer for the Bureau of Public Roads in Portland in 1922. In addition to his federal service Scofield has served as assistant city engineer of Aberdeen, Wash., and as resident engineer for the Oregon and Montana state highway departments.

James R. Griffith, assistant chief engineer with Birch-Johnson-Lytle and author of "Construction Design Charts," appearing monthly in *Western Construction News* and in book form, has been appointed dean of the University of Portland's new school of engineering. From 1929 to 1940 Griffith served as professor of structural engineering at Oregon State College. From 1940 to 1945 he served as assistant public works officer of the 13th naval district and as public works officer, U. S. naval drydocks, Terminal Island, Calif., holding the rank of commander in the Civil Engineer Corps, U. S. Navy. Since 1946 he has been assistant chief engineer and departmental engineer with Birch-Johnson-Lytle, contractors for Alaskan military construction with headquarters in Seattle. As dean of the school of engineering at the University of Portland, Griffith will administer a general engineering course which will emphasize the teaching of engineering fundamentals rather than specialties.

JAMES R. GRIFFITH



Robert H. Lochow and **R. Ruskin Fisher** have joined in a partnership to establish a practice in civil engineering and land surveying in Seattle. Lochow served with the Corps of Engineers, Seattle District during the construction of Mud Mountain dam, with the Austin Co. during the construction of the Sand Point Naval Air Station, and as chief stress analyst for Webster-Brinkley Co. Fisher has served as land surveyor for Pope & Talbot and the Pacific Telephone & Telegraph Co., and for the past 5 yr. has been associated with the Seattle district of the Washington state highway department.

Lieutenant General R. A. Wheeler, Army Chief of Engineers, has announced his retirement from active duty to become effective June 30, 1948. General Wheeler is rounding out 41 years of Army service, which carried him from a Second Lieutenant of Engineers to three-star rank and, by appointment of the President, to command of the entire Corps of Engineers. Recalled to take over this assignment in 1945 after 46 months overseas, General Wheeler was confronted with the task of directing the resumption of peacetime work of the Corps, suspended during the war years. More than 250 construction projects have been reviewed or initiated since he took office. General Wheeler's successor has not yet been chosen.

George Stevens, assistant bridge engineer for the Washington state highway department, has been promoted to the position of bridge engineer. He succeeds **Ralph W. Finke,** who resigned to accept the position of city engineer of Seattle.

Noted as an authority of titles and surveys, **Edward T. Williams,** office engineer for the Port of Oakland, Calif., has retired. He had been in charge of surveying and locating the boundaries of waterfront properties, and had been with the Port of Oakland since 1927.

F. L. Guy has retired as engineer in charge of maintenance of ways and structures for Southern Pacific Co., and **R. W. Putnam** has been appointed to succeed him. Guy began his railroad career in 1900, and came to the company's general offices in 1938 to fill the position he held until his retirement. Putnam has been located in San Francisco as assistant engineer for maintenance of way and structures since 1943.

Harold E. Aldrich has been appointed acting district manager of the Upper Missouri district for the Bureau of Reclama-

tion. He succeeds **William P. Price, Jr.,** who has held the position since last September in addition to his duties as construction engineer of the Canyon Ferry dam project. Price continues in the latter position. Aldrich has been with the Bureau of Reclamation since 1944 and was transferred to the Upper Missouri district office at Helena, Mont., from the regional office at Billings, Mont.

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William S. Peterson, assistant chief electrical engineer for the Los Angeles Department of Water and Power, has accepted a position as consultant to the National Security Resources Board of the Federal Government whereby he will advise the Board in matters relating to power load and capacity problems. The position is on a short time basis and offers no compensation.

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Ten outstanding high school senior men have been awarded George Westinghouse Scholarships valued at $2,200 each, presented by the Westinghouse Electric Corp., Pittsburgh, Pa., to be applied toward an engineering education at the Carnegie Institute of Technology in Pittsburgh. Among the winners are **Albert Ivan Moon, Jr.,** Oxnard, Calif., and **Robert Buel Power,** Plentywood, Mont. The successful candidates, picked from 581 participants in a nation-wide contest, were chosen for outstanding mental ability, aptitude for engineering and qualities of leadership.

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Lieut. Donald A. Gray, U.S.N.R., formerly resident engineer in charge of construction on the San Diego Aqueduct Project in California, is now resident engineer in charge of construction of the U. S. Naval Reserve Training Center at Las Vegas, Nev.

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Charles S. Content has been designated regional geologist for the Bureau of Reclamation's Region 6 with headquarters at Billings, Mont. He was formerly engaged as assistant regional geologist at Sacramento, Calif.

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Dean E. W. Schilling, Montana State College, was elected chairman of the Northwest section of the American Society for Engineering Education at the annual meeting of the section in Corvallis, Ore., on April 24. **M. R. Good** and **Dale Sheckles,** both of Montana State College, were elected vice chairman and secretary, respectively. **O. E. Osborn,** Washington State College, was selected as representative to the national council.

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Edward Morelock, district maintenance engineer in the Madras office of the Oregon state highway commission for the past 3 yr., has been transferred to Corvallis, Ore. He has been succeeded by **S. Paul Jones,** formerly maintenance engineer at Klamath Falls.

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Earl Colwell, water superintendent for Ritzville, Wash., will retire on June 30, after 21 yr. in that position. He will be succeeded by **Ralph Allert.**

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C. O. Manus, engineer with DeWitt C. Griffin & Associates, has been appointed city engineer of Kelso, Wash., by the Kelso city council. The Seattle consulting engineering firm will supply engineering services for the city and maintain a junior resident in Kelso.

BURWELL BANTZ

Burwell Bantz, city engineer of Tacoma for the past 3 yr., has resigned and plans to retire from active service. Prior to his appointment as city engineer of Tacoma, Bantz served for 3 yr. as Washington state highway director. He has also been county engineer for Lewis and Island Counties, and construction engineer for the Centralia, Wash., hydroelectric project.

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Frank R. Creedon, construction manager at the Hanford Works, Richland, Wash., and former federal housing administrator, has been appointed manager of the design and construction divisions. During the war Creeden was resident engineer in charge of construction at the Oak Ridge, Tenn., atomic energy project for Stone & Webster.

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Donald G. Drake has been appointed technical engineer in charge of cost accounting for the Donald M. Drake Co., general contractors of Portland.

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William H. Wisniski, transferred from the irrigation division of the Columbia Basin project at Ephrata, Wash., has been appointed materials engineer for the Canyon Ferry dam project on the Missouri River near Townsend, Mont.

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Lawrence E. Hough, formerly city engineer of Ontario, Ore., has taken over the position of city engineer for Aberdeen, Wash.

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John H. Sellen, building contractor of Seattle has been appointed as a national director of the Associated General Contractors for District No. 1 in the building classification. Sellen succeeds the late J. B. Warrack.

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Rodney Ryker, supervisor of hydraulics for the Washington department of conservation and development, has been appointed district engineer in Oregon and Washington for the Asphalt Institute. He succeeds **W. A. Bugge,** who was made managing engineer with headquarters in San Francisco several months ago. Ryker served as county engineer for Kittitas County, Washington from 1936 to 1939 and as Okanogan County, Washington, engineer from 1939 until his appointment as supervisor of hydraulics in 1944. In his new position he will make his headquarters in Seattle.

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E. R. "Ed" Davis, vice-president of the Southern California Edison Co., has retired after 52 years of service to the electrical industry in Southern California. He first became distinguished in the industry for his prominent part in the famous Big Creek hydro-electric development in the High Sierra, which was begun in 1911. He consecutively held positions with the Edison Co. as division superintendent, manager of construction, manager of engineering, assistant general manager and vice-president. He will continue to make his home in Los Angeles.

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J. G. Bastow, Assistant Port Manager and Assistant Chief Engineer for the Port of Oakland, Calif., has been appointed a member of the engineering and architectural committee of the American Institute of Airport Executives.

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H. C. Higgins, assistant office engineer with the Washington state highway department at Olympia, has been promoted to traffic engineer. He succeeds **David E. Morris,** who resigned to become city engineer for Tacoma.

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Joseph Rector, Roger Rector, and **Clark Dietrich** have established a general contracting firm to be known as the Columbia Valley Construction Co. in Kennewick, Wash. The organization will design and construct commercial and residential buildings.

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Patrick J. Whalen was appointed city engineer of Missoula, Mont., on May 1, succeeding **William D. Vealey** who resigned after three months in the position.

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Archie K. Hill, with the Bureau of Reclamation at Sacramento, Calif., is going to Greece on a year's job as an irrigation consultant.

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Jackson Faustman, transportation engineer with the California Public Utilities Commission at Sacramento, Calif., has been appointed Traffic Engineer for that city.

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J. E. Hanlon of Vancouver has been appointed city engineer at Port Alberni, B. C. He succeeds **J. R. King,** who is leaving for England.

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John L. Miller and **James W. Pearce,** general contractors of Pasco, Wash., have merged their interests to form a new general contracting firm which will be known as Miller-Pearce, Inc.

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Earl G. Forbes, city engineer of Auburn, Wash., has resigned from that position, effective May 31.

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Alden W. Miller, Phoenix, Ariz., has been recognized by the American Water Works Association by being awarded the George Warren Fuller distinguished service citation for oustanding work in the water supply field. The citation was voted to Miller as testimonial to his organizing a state unit of the association last year.

Joseph H. Latimore, formerly sanitary engineer with the Idaho state department of health, has been appointed city engineer of Coeur d'Alene, Idaho. The position has been vacant for the past six years.

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William D. Shannon, consulting engineer of Seattle, has accepted in a temporary capacity the post of county engineer for King County, Washington. He will serve the county for the months of May, June and July. **C. Glenn Smith,** who recently resigned the position, has returned to his previous association with the General Engineering Co., consulting engineering organization of Seattle.

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A. G. Hanson, county engineer for Klickitat County, Washington for the past 14 yr., resigned from that position on May 1.

SUPERVISING THE JOBS

C. W. Wood has been named project manager for construction of the $43,431,000 Hungry Horse Dam on the south fork of Flathead River near Kalispell, Mont., the contract being held by the combine, General Construction Co., the Shea Co., and Morrison-Knudsen Co., Inc., with offices in Seattle, Wash. **R. W. Jones** has been named chief engineer on the project, and **D. H. Henderson** is the office manager.

* * *

Tom Martinsen has been appointed resident engineer for Bethlehem Pacific Coast Steel Corp. to take charge of construction of the second Tacoma Narrows bridge. **Earl Starbard,** building construction, and **Gerald Keely,** equipment and heavy construction, are serving as superintendents for Woodworth & Co., subcontractor to Bethlehem for concrete anchorages, piers, and approaches. **Eugene Peterson** is general foreman for Woodworth & Co.

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A. J. Hyde is job superintendent and **A. O. Strandberg** is project manager on the $2,789,284 project for the construction of transformer and tie circuits, switchyard and other improvements at Grand Coulee Dam. The contract is held by Morrison-Knudsen Co., Inc., and Peter Kiewit Sons' Co. **Guy B. Whitehead** is the job engineer and **C. A. Pitman** is office manager.

* * *

Vern Davis is the job superintendent for H. M. Keller Co., Burbank, Calif., on construction of a 5-million gallon water forebay in connection with the municipal water system of Burbank in Los Angeles County. **George Leverenz** is engineer on the job. The contractor received the contract award for $163,900.

* * *

Vernon Bradley is the job superintendent on construction of the Columbia Blvd. unit of the intercepting sewer for the Portland Sewage Disposal Project, Portland, Ore., for Guy F. Atkinson Co., who maintain headquarters in Portland. The $671,600 project is under the general supervision of **William E. Hoy,** Portland district manager.

* * *

Bert Miller, a key man on construction of the Golden Gate Bridge, is general superintendent for Burkett Construction Co., Inc., who have the job of demolishing the Consolidated Steel Company's shipyard at Wilmington, Calif., under a $500,000 contract. The company formerly had demolition contracts for the army, removing camouflage and bomb shelters in the Southern California area. **Charles Alcott** is president of the company and is acting as project manager on the job, **Lee H. Barron** is vice-president, and **Al J. Gursey** is secretary-treasurer. **R. E. Nash** is general foreman on the job and **C. B. Muncy** is in charge of piling work.

* * *

W. M. Elkins is job superintendent for the Gaasland Construction Co., Bellingham, Wash., on construction of a sewage treatment plant in Bellingham. **John R. Wallace** is the job engineer and **L. M. Brown** is in charge of materials. The contract award price was $325,374.

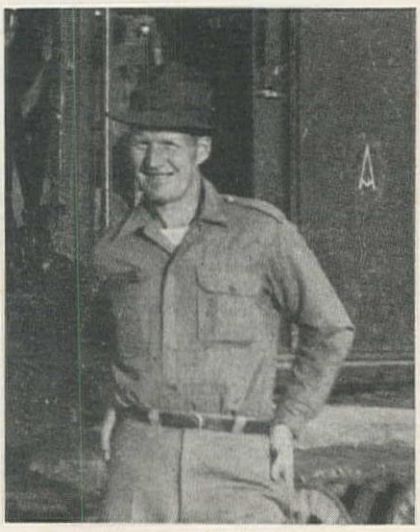
* * *

John L. Armitage has been appointed superintendent for construction of Cresta and Rock Creek dams near Belden, Calif. **L. L. Wheeler** is office engineer. Contract for the work is held by Morrison-Knudsen Co., Inc. **John Reed** is project manager, and **William A. Lee,** office manager.

* * *

Carl Edwards is supervising construction of the huge Millirons Dept. Store in the Westchester District of Los Angeles, Calif., for the McNeil Construction Co., Los Angeles. **Austin Hawthorne** is carpenter foreman on the job, **Asa Taylor** is steel foreman, and **Pete Renteria** is labor foreman. **H. P. Mecca** is representing Gruen & Krummeck, architects.

WALTER F. MAXWELL, partner in the Charles MacCloskey Co., San Francisco, is in charge of the construction of two reinforced concrete undercrossings on Hollywood Parkway in Los Angeles under a $332,786 contract.



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W. A. Rohrer has been appointed project manager by Peter Kiewit Sons' Co. for construction of a Veterans Administration hospital at Omaha, Nebr. Contract for the work is held by a joint venture including Morrison-Knudsen Co., Inc., Al Johnson Construction Co., Chas. H. Tompkins Co., Olson Construction Co., and Kiewit as sponsor. Other supervisory personnel assigned to the project includes **R. E. Smathers,** office manager, and **F. I. Sather,** project engineer.

* * *

Ray Brittan is supervising construction of an underpass under tracks of the Atchison, Topeka & Santa Fe Railway Co. east of Madera in California. Trewhitt-Shields & Fisher, Fresno, Calif., contractors, have the $129,160 contract award for the work, which includes a half mile of grading and paving. **G. A. Graham** is the job manager, and **J. S. Fisher** is timekeeper.

* * *

Dan Morrison is superintendent for Guy F. Atkinson Co., So. San Francisco, Calif., on the job of widening about 2 mi. of existing pavement in Fresno, Calif. The $237,484 contract calls for grading and paving with plant mix surfacing along Belmont Circle and Clinton Ave.

* * *

Robert A. Giles is the job superintendent for Moore & Moore Construction Co., Stockton, Calif., on construction of the Flotill Cannery, the largest building to date in California with complete Gunite wall construction. **Charles D. Moore** is acting as general superintendent on the job, and **Delmer G. Moore** is the purchasing agent. The building is being constructed under a $280,000 contract.

* * *

Clem Smith is general superintendent and **W. C. Miller** is project manager for the J. C. Boespflug Construction Co., Seattle, Wash., on construction of the large and modern reinforced concrete and brick Medico-Dental buildings at the University of Washington in Seattle. **E. Peterson** is assistant superintendent on the job, which will be completed by April, 1949. **Vic Showland** is the general carpenter foreman, and carpenter foremen are **Melvin Buck, Ole Johnson, Bob Good** and **Ernie Good. George Bain** is in charge of the saw yard and **Clarence Omstead** is foreman for the cement finishing work. **Tom Steiner** is foreman for the steel work, **Lloyd Julyan** is labor foreman and **Larry Pettifer** is in charge of the brick work.

* * *

James Sleeth is the job superintendent for Moore & Moore Construction Co., Stockton, Calif., on construction of dormitories for the San Joaquin General Hospital at French Camp, Calif. **Charles D. Moore** is the general superintendent and **Delmer G. Moore** is the purchasing agent. The job is being carried out under a $257,500 contract.

* * *

Walter Durbin is job superintendent for the work of grading and surfacing on the Warner Secondary Highway in Lake County, Ore. Inter-City Sand & Gravel Co., Eugene, Ore., have the contract for the job at a $298,255 figure. **Sam Lackstrom** is portable crusher foreman on the job.

JOHN CARREL

John Carrel is supervising the grading and surfacing work on about 3.6 mi. of the highway between the Santa Ynez River and Jonata Park in Santa Barbara County for contractors Dimmitt & Taylor, Los Angeles, and T. M. Page, Monrovia, Calif. **Tom Condon** is timekeeper for the $497,287 project, **Frank Ogden** is master mechanic, **Glen R. Everett** and **Wade W. Johnston** are grade foremen, and **Alfred Oberhoff** is labor foreman.

* * *

Sam E. Johnson is the superintendent for Canyon Construction Co., Caldwell, Idaho, for the work of grading and bituminous surfacing on 6.8 mi. of the La Belle Road in Jefferson County, Ida. **Walter Packard** is crusher foreman on the job, which is being carried out under a $72,859 contract.

* * *

Martin L. Sheeran is supervising construction of the reinforced concrete reservoir which will have a 57,000,000 gal. capacity at Glendale in Los Angeles County, Calif., for contractor E. C. Nickel of Arcadia, Calif. The contract was awarded at a figure of $1,352,600.

* * *

W. W. Clyde & Co., Springville, Utah, received the $507,255 contract for surfacing of 13.9 mi. of U. S. Hwy. 40 in Tooele County, Utah, which includes construction of two concrete and steel bridges. **W. Cornell Clyde** is acting as the job superintendent.

* * *

Oscar Mannon is supervising construction of approx. 2 mi. of new highway and a reinforced concrete bridge on State Highway No. 11F in the Crab Creek vicinity, Wash. Goodfellow Brothers, Wenatchee, Wash., have the $168,548 contract for the job. **Frank Smaniotto** is powderman on the job.

* * *

Dean McPherson is superintendent for the Kaiser Co. in charge of jetty repairs at the mouth of the Columbia River. The work, which got underway late in April, consists of repairing a break in jetty A near Cape Disappointment on the Washington shore.

* * *

Dick Alexander is supervising the job of grading and surfacing along 5.2 mi. of highway north of Forsythe Creek in Mendocino County, Calif., for Guy F. Atkinson Co., So. San Francisco. **Tom Foran** is the office manager. The amount of award is $876,059 and the work includes construction of a steel beam bridge.

* * *

Walter Rigulhuth has been appointed by Fred J. Early, Jr., San Francisco contractor, to supervise construction of the sewage pumping and treatment works at Redwood City, Calif. **Benjamin E. Nelson** is general superintendent for the contractor. Unit 1 of the works is being constructed under a $449,863 contract.

* * *

A. L. Carpenter is superintendent for the Utilities Construction Co., Nashville, Tenn., who have the $663,252 contract for construction of transmission lines from Gering to Alliance and from Cheyenne to Pine Bluffs in Scottsbluff and Morrill counties, Neb.

* * *

J. F. Ratchye is the superintendent for S. J. Groves & Sons, Minneapolis, Minn., contractors for surfacing work along 26 mi. on Lavina Road in Yellowstone County, Mont. **D. A. McKinnon** is assistant superintendent on the job and **C. A. Thompson** is the job accountant. Amount of the contract award is $304,833.

* * *

G. H. Lohrer is superintending construction of an addition to the Jefferson School building in Port Angeles, Wash., for contractors, the S. S. Mullen Co., Seattle, Wash. **R. C. Howard** is foreman on the job. **William Mallis,** Seattle architect, is resident engineer.

* * *

Carl Jarboe is supervising construction of the Science Building at Grossmont High School in San Diego County for contractor, I. C. Curry, San Diego. **William B. McCoy** is carpenter foreman on the job.

* * *

Ralph D. Van Cleave is supervising sewage disposal works improvements at Pomona, Calif., for the Hermann Co., Los Angeles, Calif. **R. C. Hinton** is project manager. The job was awarded for $412,660.

* * *

Jess W. Hoopes has left the Utah Construction Co. after 8 years in their employ to return to the George Pollock Co., Sacramento, Calif., for whom he worked prior to 1940. He will be in charge of the Pollock company's contract for the Hawaiian Belt Highway job, with headquarters at Hilo.

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H. L. Gourlie has been appointed acting project manager by Morrison-Knudsen Co., Inc., at John Martin dam near Caddoa, Colo.

* * *

R. Hafner is foreman in charge of the grading crew of Stanley Arkwright & Co. working on state highway No. 19 east of Harlowtown, Mont. The contract calls for 16.9 mi. of grading.

* * *

Elton L. Cox, superintendent for W. Smith, Inc., is in charge of constructing a $1,500,000 dormitory building at the University of Oregon, Eugene. Work was officially started on the project on April 28.

* * *

Maurice H. Brown who went to Afghanistan in March as assistant project manager for Morrison-Knudsen Afghanistan, Inc., has been promoted to project manager. He succeeds **James F. Horan.**

William R. "Bill" Bushelle is the project manager for Guy F. Atkinson Co., Long Beach, Calif., for construction of the filter, drier and fertilizer storage system of the Hyperion Activated Sludge Plant at El Segundo, Calif., under a $6,295,518 contract. **Al Nimitz** is the building superintendent and **Joe McNabb** is the project engineer. **Alva A. Taylor** is coordinating engineer for the project and other key engineers are **Robert S. Corr** and **H. E. DeShurley. Harold H. Brown** is general carpenter foreman, **Rayburn L. Travis** is labor foreman, and **Gene Graven** is excavation foreman. **Harold Walker** is office manager for the contractor.

* * *

H. B. Isbell is supervising grading and surfacing work in Reno, Nev., under a $146,845 contract held by Isbell Construction Co., Reno.

NEW BOOKS...

FUNDAMENTALS OF SOIL MECHANICS—by Donald W. Taylor, Associate Professor of Soil Mechanics, Massachusetts Institute of Technology. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York City 16. 700 pages, size 5½ x 8½. Price $6.00.

This treatise is principally devoted to fundamentals but it does not neglect the laboratory phases of the practical aspects of the subject. In addition to covering theoretical material, the author describes soil tests for engineering purposes, and discusses the interpretation of test data and their application to field problems. As a textbook, the book contains the comprehensive treatment necessary for the graduate level but it may be used by students to whom soil mechanics is entirely new. It also lends itself to use as a reference book for scientifically inclined men in the field of foundation engineering and allied work.

* * *

MASONRY SIMPLIFIED — by J. Ralph Dalzell, Managing Editor, American Technical Society, and Gilbert Townsend, Member of the Royal Architectural Institute of Canada. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill. Volume I, Tools, Materials and Practice, 360 pp. Price $4.50. Volume II, Practical Construction, 400 pp. Price $5.00. Size of both volumes, 6 x 8½.

Volume I presents a complete discussion of the tools, materials and practices of masonry and provides the "know-how" of the trade which otherwise would take years to acquire. Every step in unit masonry is explained in the text and by means of pictorial illustrations showing construction processes in great detail. A complete section is devoted to the presentation of blueprint reading from the practical viewpoint of the mason. Volume II, a comprehensive study of masonry construction, applies principles to construction problems which frequently confront the mason on the job. The authors explain and demonstrate the elements of construction and their application to the various types of buildings now being erected.

Included are discussion of methods of handling new products such as glass bricks. The architect, builder and contractor should appreciate the usefulness of the volumes as a quick reference to modern practices.

* * *

RESULTS OF PUBLICLY-OWNED ELECTRIC SYSTEMS—Authors and publishers, Burns & McDonnell Engineering Co., Consulting Engineers, P. O. Box 7088, Kansas City, Missouri. Stiff paper cover, loose-leaf binding. 384 pp., Price $10.00.

What the publicly-owned and operated electric systems in the United States are doing is set forth in this ninth edition, which gives the rates, earnings, expenses, and other operating records based on the rates in effect for 1947-1948. The book shows the results of all the large cities and many small ones down to 2,500 in population. The 600 cities recorded out of a total of 3,460 communities having publicly-owned electric systems give a fair cross-section of results. The statistical results cover comparison of steam, Diesel, hydro and purchased power. Information is also included in the volume regarding Federally-owned power systems.

Greatest Gains Shown In Public Construction

NEW CONSTRUCTION put in place during April in the Continental United States is estimated at $1,269 million, an increase of 9 per cent over the revised March figure of $1,166 million, according to figures released by the Construction Division, Department of Commerce.

This increase was somewhat smaller than the normal seasonal advance to be expected between these two months. However, construction in April was 37 per cent higher than in April 1947.

Private nonfarm residential construction put in place in April reached $500 million, accounting for almost forty per cent of all new construction and continuing for the second month the increase from the seasonal low reached in February. The April figure is 5 per cent over March and 61 per cent above April of last year.

Total new private construction activity in April increased at the same rate as residential construction and amounted to $990 million, 5 per cent higher than in March. Within this total, farm and public utility construction increased along with residential construction, while a small decline occurred in nonresidential building. Industrial construction, which currently represents over two-fifths of all nonresidential building, continued its steady decline of the past sixteen months.

All important types of public construction activity increased in April, with the total rising to $279 million, an increase of 24 per cent above March. Public nonresidential building and highway and sewer and water construction showed the principal increases, in each case making a more-than-seasonal gain.

PRA Decides to Veto Colorado Plans For Loveland Pass Tunnel Project

THE PUBLIC ROADS Administration has vetoed Colorado Highway Department plans for the Loveland Pass tunnel through the Continental Divide as feasible from an engineering standpoint but not economically feasible. The administration does not believe the Loveland Pass route is important enough to warrant the expenditure of enough money to build a tunnel of any kind at present day prices, according to a statement by A. V. Williamson, regional PRA director. He said that PRA studies indicate that the route would not be any more important in the future than several other mountain pass routes in Colorado. This decision to veto any kind of Loveland Pass tunnel marks a change from the attitude the federal agency has maintained since 1940 when federal funds were combined with state funds to drill a $300,000 pioneer bore for the tunnel.

PRA, according to Williamson, believes that the $2,100,000 estimate by the Colorado highway department for a road to be built over the top of the pass represents the best plan of the four submitted for consideration. The department estimated a one-way tunnel, using the pioneer bore, would cost just under $4 million, two one-way tunnels would cost more than $8 million and a two-way tunnel would cost $7,200,000. State Highway Engineer Mark Watrous announced plans for an aerial survey of an over-the-top road and extensive improvements to the existing highway.

Meanwhile, a flurry of challenges came from Western Slope backers of a tunnel project for the route, who pledged action in investigating the cost figures on which the PRA rejection was based. A group of mining engineers recently estimated the cost of a one-way tunnel, using the present pioneer bore, at $2,700,000 and expressed belief that two one-way tunnels would cost less than a single two-way tunnel. Williamson said the PRA was glad to have the benefit of this estimate, which placed the cost for a one-way tunnel without approaches, ventilation or lighting only $200,000 less than the highway department's estimate.

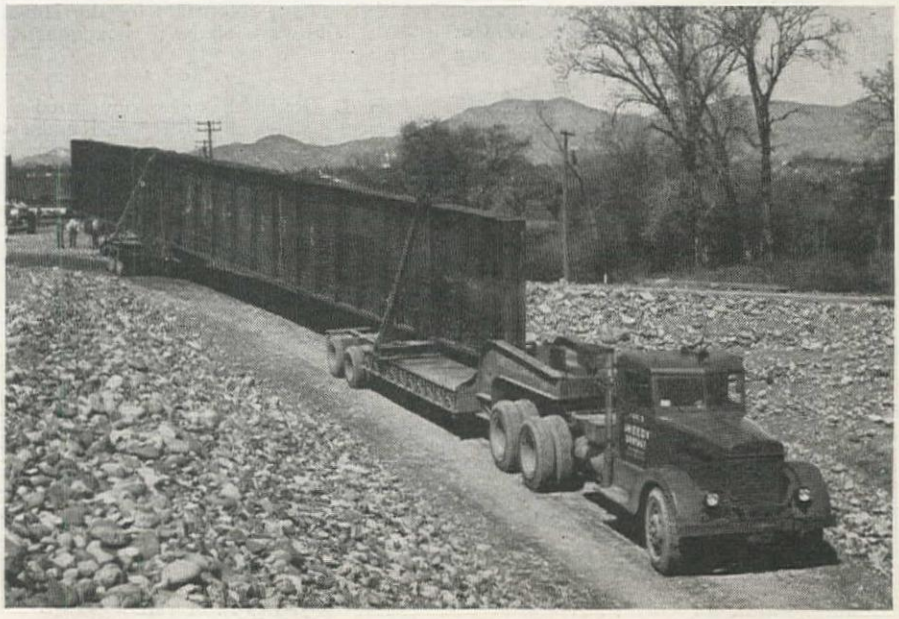
John R. Austin, Colorado tunnel contractor, also challenged the federal estimates. He said that his surveys of the pioneer bore showed that two one-way tunnels could be built for $5 million.

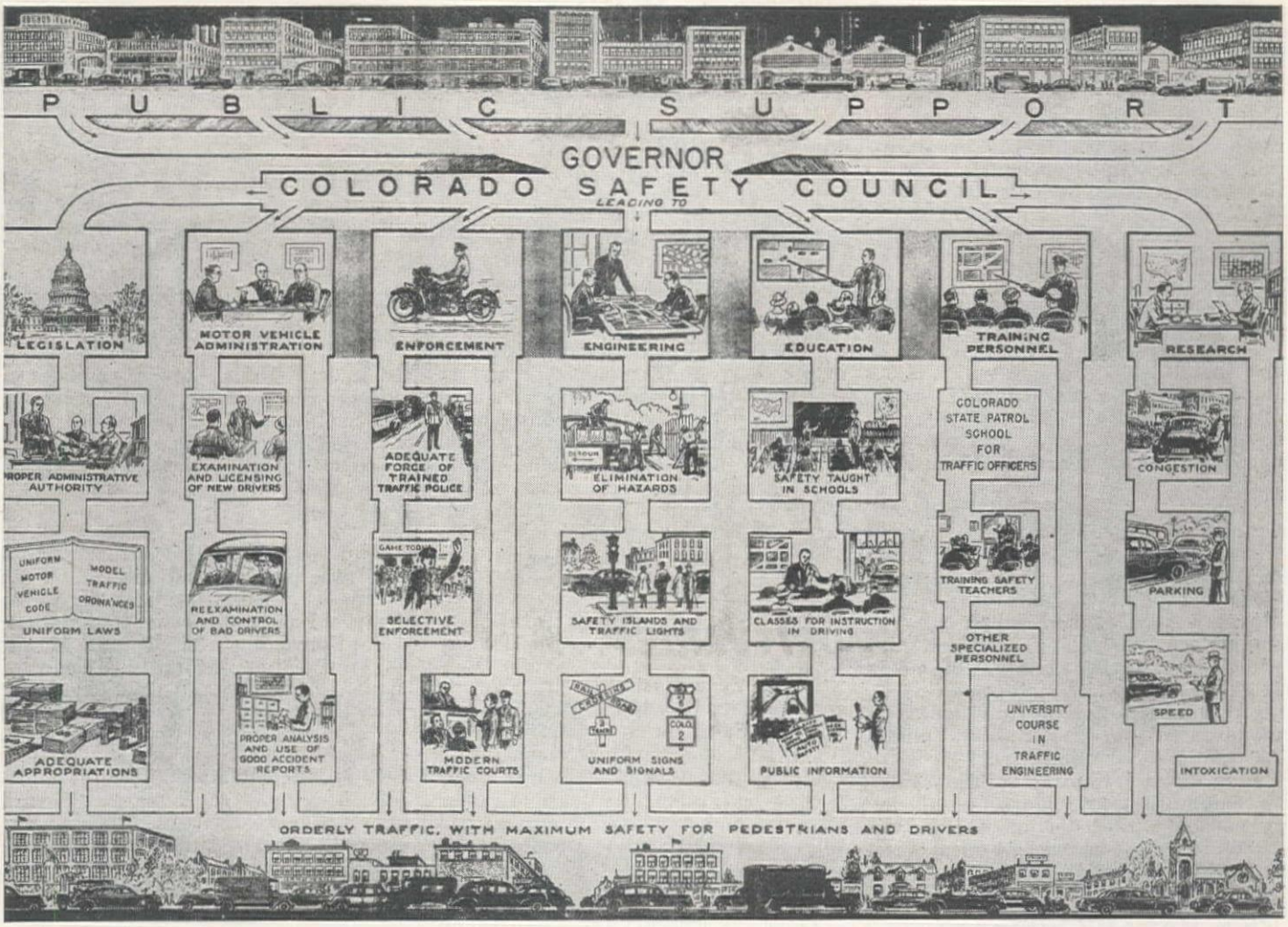
Lump Sum Bidding Practices Recommended in AGC Guide

A SUGGESTED GUIDE to Bidding Procedure, outlining recommended practice for use in private work when competitive lump sum bids are requested, has been published by the Associated General Contractors of America, Inc., Washington, D. C. The guide, containing sections on preliminary investigation, drawings, specifications, bidding, separate contracts and sub-contractors, is designed to outline procedure for bidding on building and related construction and is also applicable in public work so far as requirements of public authorities permit. Procedures recommended are aimed at eliminating waste and establishing a friendly spirit of cooperation between the contracting parties and the architect.

54-TON STEEL GIRDER DELIVERED BY TRUCK AND TRAILER

ONE OF THE SIXTEEN 125-ft. steel girders for the new highway bridge across the Sacramento River near Redding, Calif., is shown below arriving at the site by truck and trailer. The girders, which are 8 ft. deep and weigh 54 tons apiece, were assembled at Bethlehem Pacific Coast Steel Corp.'s Alameda, Calif., fabricating works.





COLORADO SAFETY COUNCIL SWINGS INTO ACTION TO HALT "MURDER BY MOTOR"

FUNCTIONS of the Colorado Safety Council, shown graphically in the chart above, are being coordinated in the greatest and most comprehensive traffic accident program in the state's history. Traffic killings in Colorado since 1941 have been 41 per cent higher than the national average, and the state's traffic fatalities are increasing this year. The active current program of the Council is based on three E's—education, engineering and enforcement. Every facility of the state government, as indicated by the chart, has been placed behind the program. The Safety Council was established by a statute last year.

New Construction at Socony-Vacuum's Wyoming Refinery Is Now in Progress

THE SOCONY-VACUUM Oil Company, Inc., announces that practically all phases of a general expansion, improvement and rehabilitation program are now under way at its refinery in Casper, Wyo., and that completion of the program is scheduled for next December.

This refinery handles two types of crude oil from producing fields in Wyoming. Its products include gasoline, kerosene, distillate, tractor and Diesel fuels, and asphalt, which are marketed in Wyoming, Colorado, Nebraska and other states.

The program will double the refinery's current 3,000-bbl. per day capacity.

The Catalytic Construction Co. of Philadelphia, Pa., is the general contractor for the project, handling mechanical design and field construction under the supervision of Emory M. Skinner, chief refinery engineer of Socony-Vacuum's White Eagle Division.

Included in the refinery's new equipment under construction is a thermofor catalytic cracking unit to produce high-quality gasoline from virgin gas oil. Also included is a new light oil transfer pump-house to handle an increased flow of refined products, coupled with new facilities to improve the qualities of gasoline and intermediate distillates by the copper chloride slurry method. Another unit will remove hydrogen sulfide from four million cubic feet daily of refinery gas.

A new steam boiler under construction at the refinery will have a capacity of 30,000 lb. per hr. to augment the refinery's existing steam-boiler facilities, while excess butanes and propanes will be recovered and polymerized in a new catalytic polymerization unit.

Other new construction in progress includes complete pump-house facilities to handle an increased volume of industrial asphalts and road oils, truck-loading facilities with increased efficiency and safety; office building of modern brick design; locker and change house with medical facilities for the entire refinery staff and added machine shop space and equipment.

Special facilities are being installed for lime treatment of river or well water to supply the cooling towers and a water-treater for the boilers, supplemented by a new tower to supply cooling water under forced draft for all of the refinery's facilities. Divided into two sections, the cooling tower will be able to supply 4,500 gpm. at 75 deg. F. and 2,500 gpm. at 80 deg. F.

Western Road Builder's Association Organized

ARTICLES of incorporation for the Western Road Builders, a non-profit association, have been filed with the Secretary of State in Sacramento, according to Floyd O. Booe, former secretary-manager of Northern California A. G. C.

According to Booe, the membership of this association will be representative of the entire highway and airport industry in the eleven western states. Its activities will be educational and scientific, as well as directed in support of highway

and airport development throughout this area. Representing a complete cross section of the industry, it will be expanded to function in every western state as rapidly as possible, and each state will be assured adequate local representation. Eventually the organization will apply to become affiliated with the American Road Builders Association of Washington, D. C. and to act as its western division, although retaining its autonomous character.

Listed in the articles as original incorporators are the following residents of Northern California:

Rex A. Daddisman, President, Western Engineers, San Francisco; Floyd O. Booe, President, Auburn Lime Distributors, Sacramento; L. H. Taylor, Maintenance Engineer, City of Oakland, Retired; Gerald L. Worthley, Secretary, Board of Directors, Municipal Airport, Hayward; H. B. "Bert" Scott, President, Granite Construction Co., Watsonville; Elmer J. Larson, President, Hild Elec. & Mfg. Co., Stockton; Earl W. Hepple, General Contractor, San Jose; B. H. Maynard, Road Commissioner, Amador County, Jackson; Leo C. Hammett, Supervisor, Stanislaus County, Chairman, Highway Committee, California Supervisors Association, Modesto; Clyde Edmondson, Manager, Redwood Empire Association, San Francisco; H. Earl Parker, General Contractor, Marysville.

Temporarily the main office of the organization will be maintained at 2325 H St. in Sacramento, with a branch office at 177 Post St. in San Francisco.

PRA Report Outlines 1947 Highway Progress

DURING the fiscal year 1947, the Public Roads Administration completed most of the work of designating routes to comprise the National System of Interstate Highways as 37,681 miles of the Nation's principal highways and 350,809 miles of secondary highways were selected in cooperation between States and the Federal Government, according to the Eighth Annual Report published by the Federal Works Agency. This left only a small portion of the recommended system yet to be designated.

Concerning future developments of the system, the report states, "It may require a number of years to improve all routes in the system to standards recommended, but the goal has been set and eventually it will be reached. Progress may be varied from State to State according to traffic requirements, the ability of the State to match Federal funds available for major improvements, and the willingness of State highway departments to initiate long-range programs to meet future traffic needs. It is encouraging to note, however, that many States already have drafted tentative plans for highway programs which will be developed over a period of ten years or longer."

In numerous instances, acting upon the assumption that certain heavily traveled routes would be included in the national system as finally approved, several State highway departments awarded contracts during the fiscal year for extensive improvements for which plans had been prepared in previous years. Included in this category are the postwar improvements of U. S. 66 in Arizona, the program of widening U. S. 90 from Los Angeles to Sacramento in California, construction of the Hollywood and Santa Ana Freeways in the vicinity of Los Angeles and the Bayshore and Eastshore Freeways in San Francisco and Oakland, and improvement of Harbor Drive, a main thoroughfare in Portland, Ore.

Concerning public building works under the Public Buildings Administration of the F. W. A., the report points out that much public construction has been voluntarily deferred since construction costs remained high during the fiscal year and critical materials remained in short supply. For these reasons, emphasis was placed on the complete planning and blueprinting for construction of public works as soon as conditions permit.

OBITUARIES . . .

Henry Zenas Osborne, Jr., 72, civil engineer died of a heart ailment in Los Angeles, Calif., on April 27. At various times, he had been Chief Deputy City Engineer of Los Angeles, Chief Engineer of the Los Angeles Board of Public Utilities, and executive chairman and chief engineer of the Los Angeles Traffic Commission.

* * *

Three Bureau of Reclamation employees were killed May 1 by a cavein which occurred as they were inspecting a previous cavein in the irrigation tunnel which runs under the city of Tucumcari in New Mexico. The dead are: **William Q. Reeves,** 31, construction engineer on the Tucumcari irrigation project and an employee of the Bureau of Reclamation since 1934; **George Fulton,** 46, field engineer on the project and **Carl Berg,** 46, a dragline operator.

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Sybren R. Tymstra, 64, professor of general engineering at the University of Washington, died at Seattle March 23. Born in the Netherlands and educated in Germany, Prof. Tymstra was employed by engineering firms in New York and Detroit from 1906 until 1929 when he joined the faculty of the University of Washington as an instructor in general engineering.

* * *

Rolland C. Ingram, 59, superintendent of public roads in Alaska, died in Seward, Alaska on April 19. He was a native of the state of Washington and a graduate of Oregon State College. He had been U. S. superintendent of roads in the territory since 1923.

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Lionel G. McCray, 38, Bureau of Reclamation Engineer in field charge of the location and reconstruction of the railroad and highway around Culbertson Reservoir in southwestern Nebraska, died May 26 of a heart attack. McCray had been with the Bureau of Reclamation for 12 years and was employed in various engineering capacities at Parker, Hoover, Shasta, Friant and Keswick Dams.

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Frank B. Lessman, 53, highway engineer in the Western headquarters office of the Public Roads Administration in San Francisco, died suddenly in Ogden, Utah, on April 6. He was employed in the Public Roads Administration for 29 years.

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Claude F. Price, 52, civil engineer in the California State Department of Public Works and city manager of San Mateo, Calif., in 1923 and 1924, died May 13 after a long illness. He had retired a few years ago because of poor health.

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Two men were killed instantly and a third was injured fatally May 17 in the cavein of the Horsetooth Feeder Canal Tunnel 10 mi. southwest of Fort Collins, Colo. The victims were: **Tommy Muniz,** 24, Fort Collins; **George A. Teeter,** 34, Masonville, Colo., and **Don Regan,** 22, Loveland, Colo.

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E. A. "Pete" Rose, 50, engineer and New Mexico director for the Federal Works Agency, died May 19 of a heart attack at Socorro, N. M. He was a New Mexico resident for many years and a member of the American Society of Civil Engineers.

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Warren E. Chambers, 49, construction materials inspector of Tacoma, Wash., died April 22 in Seattle. For the past 10 yr. he had divided his time between Alaska and Seattle projects.

* * *

Leon H. Spaulding, 55, secretary-treasurer and chief engineer of the Continental Pipe Manufacturing Co., Seattle, died April 16. During World War I he served in France with the Corps of Engineers. He was a past president of the Seattle Engineers Club.

* * *

Charles M. Brown, 70, retired building contractor at Albuquerque, N. M., died May 13 after a long illness.

* * *

William H. Wheeler, 86, contractor in Oakland, Calif., for many years and operator of a screen factory in San Jose, died April 27. He was a native of California.

* * *

Albert Clarke Eddy, 70, who retired a few years ago as Chief Engineer of Way and Structures for the British Columbia Electric Co., died at his home in Vancouver, B. C., recently.

* * *

John S. Blakemore, 59, construction engineer and a resident of the San Francisco Bay area for 27 years, died May 14 at Hayward, Calif.

For Pasting in Your Hat

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AFFILIATED WITH COMMERCIAL INVESTMENT TRUST INCORPORATED

YOUR THEW-LORAIN DISTRIBUTOR SAYS

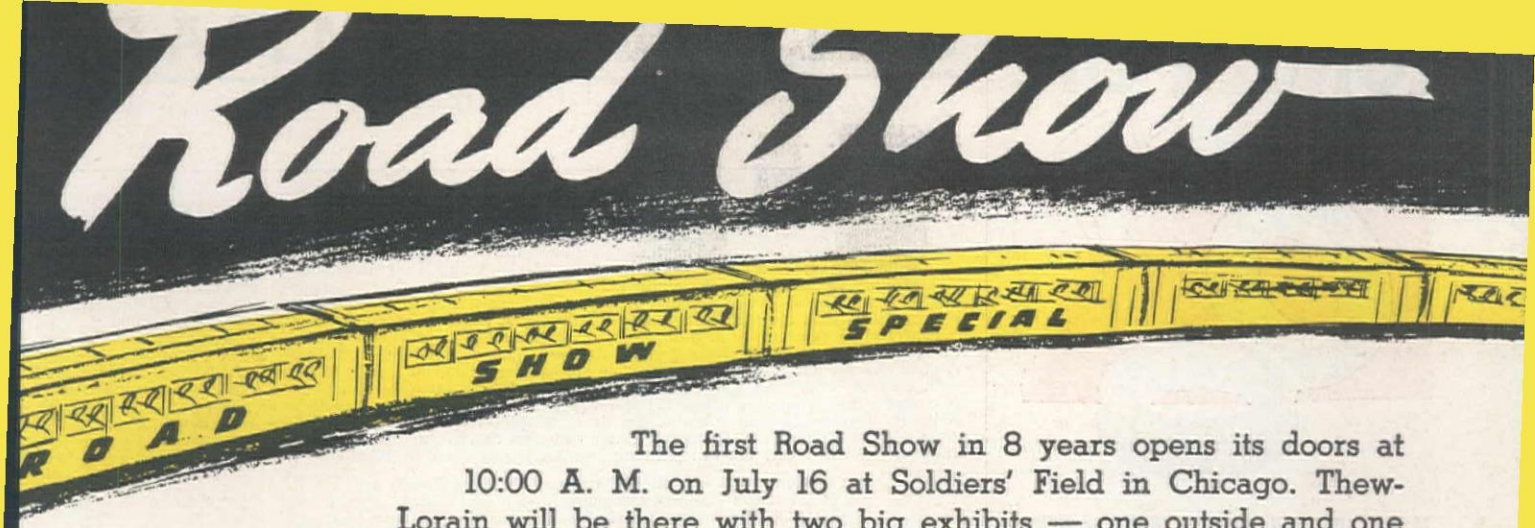
See you at the

FOR YOUR CONVENIENCE

A Year 'Round Road Show

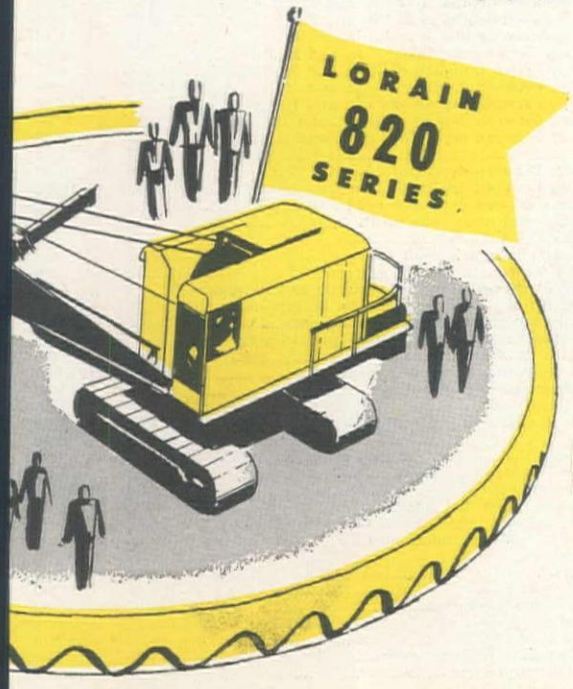
AT YOUR THEW-LORAIN DISTRIBUTOR

Road Show



The first Road Show in 8 years opens its doors at 10:00 A. M. on July 16 at Soldiers' Field in Chicago. Thew-Lorain will be there with two big exhibits — one outside and one inside. Make these exhibits your headquarters. Your Thew-Lorain distributor will be there too, and will be glad to see you. See the newest in power cranes and shovels. See the new TL-20 — a real post-war unit — find out why over 1000 of them are already in use. See why Thew-Lorain is "tops" in design and performance. — *The Thew Shovel Co., Lorain, Ohio.*

P. S. *If you can't make it to the Show we're sorry, we'll miss you, but your Thew-Lorain Distributor has a year 'round road show where you can inspect and try out Thew-Lorain equipment at any time. Call on your distributor. He'll be glad to serve you.*



ANDREWS EQUIPMENT SERVICE OF WASHINGTON, INC......*Spokane, Wash.*
BUNTING TRACTOR CO., Inc. *Boise, Twin Falls, Gooding, Fairfield, Burley, Carey, Idaho LaGrande Oregon*
CATE EQUIPMENT CO., *Salt Lake City 4, Utah*
CENTRAL MACHINERY CO....*Great Falls and Havre, Mont.*
COAST EQUIPMENT CO......*San Francisco 3, California*
A. H. COX & COMPANY.....*Seattle 4, Wash.*
P. L. CROOKS & CO., INC., *Portland 10, Ore.*
LE ROI-RIX MACHINERY CO., *Los Angeles 11*
LIBERTY TRUCKS & PARTS CO...*Denver 1*
MOUNTAIN TRACTOR CO......*Missoula and Kalispell, Mont.*
LEE REDMAN EQUIPMENT CO.....*Phoenix, Arizona*
SOUTHERN IDAHO EQUIPMENT CO. *Idaho Falls, Idaho*
TRACTOR & EQUIPMENT CO., *Sidney, Mont. Branch: Miles City Equip.Co., Miles City, Mont.*
WORTHAM MACHINERY CO......*Cheyenne, Wyo. and Billings, Mont. Branches: Sheridan, Greybull, Casper and Rock Springs, Wyo.*

MEET YOUR **THEW-LORAIN** DISTRIBUTOR AT BOOTH NOS. 1020, 1221 & 3029

UNIT BID SUMMARY

Dam . . .

Montana—Flathead County—Bur. of Recl.—Concrete

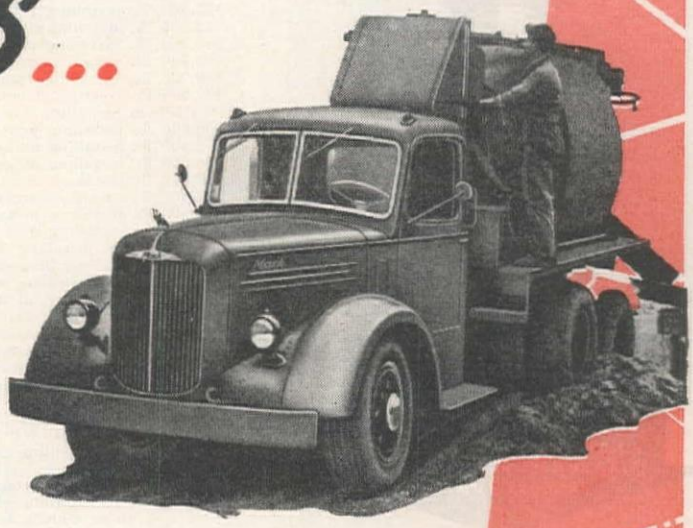
General Construction Co., The Shea Co., and Morrison-Knudsen Co., Inc., Seattle, Washington, were awarded a $43,431,000 contract by the Bureau of Reclamation, Boise, Idaho, for the construction of the 520-ft. high Hungry Horse Dam on the South Fork of the Flathead River, near Kalispell. This contract is the second largest in the Bureau of Reclamation history and exceeded only in money value by the Hoover Dam. Hungry Horse will be both the fifth highest and fourth largest concrete dam in the world, and its 2,900,000 cu. yds. of concrete will be exceeded in volume only by Reclamation's largest dams, Grand Coulee, Shasta, and Hoover. The powerhouse to be constructed at the dam will have a generating capacity of 300,000 kilowatts of hydro-electric energy. The reservoir will provide storage for 3,500,000 acre-ft. of water. Hungry Horse Dam will be a concrete arch dam 2,100 ft. long; and it is believed that 2,500,000 barrels of cement will be used. A concrete-lined ring-gate controlled spillway of the "glory-hole" type will be on the right abutment. The contract provides for completion of the dam and powerhouse within 2,000 days after notice to proceed is given, and it is hoped that storage of water will start in 1952, and the first generator is expected to be operating shortly thereafter. The full generating capacity is expected by 1954. Unit bids were submitted as follows:

(1) General Construction Company, The Shea Company, Morrison-Knudsen Company, Inc. $43,431,000
(2) Allied Dam Contractors, Inc. 51,729,073

		(1)	(2)
Lump sum,	diversion and care of river during constr. and unwatering foundations	$855,559	$775,702
65,000	cu. yd. excav., common, for dam, powerplant, and appurtenant works	5.50	6.50
890,000	cu. yd. excav., rock, for dam, powerplant, and appurtenant works	5.50	6.50
31,000	cu. yd. excav., all classes, in spillway tunnel and shaft	35.00	50.00
1,500	cu. yd. excav., all classes, in foundation tunnels	50.00	60.00
1,000	cu. yd. excav., all classes, in shafts in foundation faults and seams	125.00	100.00
750	cu. yd. excav., all classes, for water pipe trench	14.00	25.00
5,000	lin. ft. drilling line holes for rock excav.	1.00	2.00
50,000	cu. yd. backfill for dam, powerplant, and appurtenant works	2.00	1.00
20,000	cu. yd. compacting backfill for dam, powerplant, and appurtenant works	3.60	5.00
3,100	cu. yd. rock fill behind spillway walls	2.00	5.00
110	lin. ft. furn. and embedding 12-in. diam. 16-gauge corrugated-metal pipe	3.30	5.00
70	lin. ft. furn. and embedding 30-in. diam. 14-gauge corrugated-metal pipe	7.00	10.00
1,100	lin. ft. furn. 6-in. diam. sewer pipe and constr. drains with uncemented joints	3.00	4.00
800	lin. ft. furn. 12-in. diam. sewer pipe and constr. drains with uncemented joints	4.75	5.00
900	lin. ft. furn. 18-in. diam. sewer pipe and constr. drains with uncemented joints	7.00	7.50
550	lin. ft. furn. and laying 6-in. diam. sewer pipe with cemented joints	3.00	4.00
170	lin. ft. furn. and laying 12-in. diam. sewer pipe with cemented joints	4.60	5.00
50,000	lin. ft. drilling grout holes in stage between depths of 0 ft. and 35 ft.	2.84	3.25
19,000	lin. ft. drilling grout holes in stage between depths of 35 ft. and 60 ft.	2.84	3.25
25,000	lin. ft. drilling grout holes in stage between depths of 60 ft. and 110 ft.	2.84	3.50
16,000	lin. ft. drilling grout holes in stage between depths of 110 ft. and 160 ft.	2.95	4.00
7,000	lin. ft. drilling grout holes in stage between depths of 160 ft. and 210 ft.	2.95	4.50
3,000	lin. ft. drilling grout holes in stage between depths of 210 ft. and 260 ft.	3.05	5.00
1,000	lin. ft. drilling grout holes in stage between depths of 260 ft. and 310 ft.	3.05	5.50
5,000	lin. ft. drilling drainage holes in stage between depths of 0 ft. and 25 ft.	3.30	8.50
5,000	lin. ft. drilling drainage holes in stage between depths of 25 ft. and 50 ft.	3.30	8.50
2,000	lin. ft. drilling drainage holes in stage between depths of 50 ft. and 75 ft.	3.30	8.50
2,000	lin. ft. drilling drainage holes in stage between depths of 75 ft. and 100 ft.	3.30	8.50
1,500	lin. ft. drilling drainage holes in stage between depths of 100 ft. and 150 ft.	3.45	9.00
500	lin. ft. drilling drainage holes in stage between depths of 150 ft. and 200 ft.	3.45	10.00
400	lin. ft. drilling weep holes	2.75	4.50
500	lin. ft. core drilling NX holes in stage between depths of 0 ft. and 50 ft.	6.30	10.00
500	lin. ft. core drilling NX holes in stage between depths of 50 ft. and 100 ft.	6.30	10.00
1,000	lin. ft. core drilling NX holes in stage between depths of 100 ft. and 200 ft.	6.80	12.50
800	lin. ft. core drilling 5½ in. diam. holes not more than 30 ft. deep	11.45	25.00
41,000	cu. ft. pressure-grouting foundations and tunnels	2.75	3.00
84,000	cu. ft. pressure-grouting foundations and tunnels with packers	3.15	3.00
40,000	cu. ft. pressure-grouting contraction joints and cooling systems	3.30	3.00
137,000	lb. furn. and placing metal pipe and fittings for foundn. grouting and drainage	.75	.75
93,000	lb. furn. and placing metal pipe and fittings for formed drain connections	.40	.75
250,000	lb. installing metal tubing and fittings for grouting contraction joints	.60	.55
166,000	lb. furn. and placing perm. struct.-steel tunnel support, steel tunnel liner plates, and steel lagging	.25	.25
Lump sum,	reprocessing 100 cu. ft. of cement for contraction joint grouting	$27,500	$25,000
14,000	cu. ft. reprocessing cement for contraction joint grouting	.85	1.00
130,000	ton furn. and handling pozzolan	18.00	15.00
3,600	lin. ft. drilling holes for anchor bars and grouting bars in place	2.45	3.00
2,900,000	cu. yd. concrete in dam	7.00	8.40
16,200	cu. yd. concrete in spillway tunnel and shaft lining	33.00	60.00
800	cu. yd. concrete in foundation tunnel lining	60.00	75.00
1,000	cu. yd. concrete backfill in exploration tunnels	20.00	52.50
1,000	cu. yd. concrete in shafts in foundation faults and seams	10.00	52.50
2,500	cu. yd. first-stage conc. in downstr. spillway tunnel portal and outlet struct.	20.00	30.00
800	cu. yd. second-stage conc. in downstr. spillway tunnel portal and outlet struct.	80.00	100.00
3,200	cu. yd. concrete in spillway crest struct.	75.00	50.00
10,900	cu. yd. concrete in trashrack structs.	65.00	100.00
1,200	cu. yd. concrete in elevator towers	100.00	75.00
1,600	cu. yd. concrete in sidewalks, curbs, and parapets	85.00	30.00
40	cu. yd. concrete in gate service and erection struct.	125.00	75.00
15,500	cu. yd. first-stage conc. in powerplant sub-struct.	18.00	40.00
21,000	cu. yd. first-stage conc. in powerplant intermediate struct.	33.00	60.00
15,500	cu. yd. first-stage conc. in powerplant superstruct.	70.00	100.00
14,000	cu. yd. second-stage conc. in powerplant struct.	25.00	20.00
630	cu. yd. concrete in blockouts	80.00	100.00
1,100	cu. yd. concrete in encasement for river outlets	20.00	40.00
2,600	cu. yd. concrete in anchors for river outlets	15.00	40.00
510	cu. yd. concrete in valve house	100.00	100.00
100	cu. yd. concrete in gutters	75.00	40.00
8,500	cu. yd. concrete in retaining walls	17.00	40.00
2,200	cu. yd. concrete in diversion tunnel intake struct.	50.00	100.00
17,000	cu. yd. concrete in diversion tunnel plug	22.00	30.00
350	sq. yd. special finishing of concrete	20.00	27.00
20	cu. yd. lightweight concrete fill	90.00	40.00
3,600,000	lb. placing metal tubing and fittings for concrete cooling systems	.21	.25
2,930,000	cu. yd. cooling concrete	.27	.10
17,000,000	lb. furnishing and placing reinf. bars and fabric	.14	.15
75,000	lin. ft. furnishing and placing metal sealing strips	1.85	2.50
1,800	lb. furnishing and placing metal water stops	1.25	2.00
24,000	lin. ft. furnishing and placing metal grout groove covers	1.20	2.00
600	lin. ft. constructing control joints	3.50	6.00
58,000	sq. ft. furnishing and placing cork board joint filler	1.00	1.00
200	sq. ft. furnishing and placing bituminous joint filler	1.25	1.00
15,000	lin ft. constructing asphalt seals in dam	9.30	10.00

(Continued on next page)

On the RIGHT ROAD with MACK TRUCKS...



● Experienced road builders know they're on the right road when they use rugged, hard-working Mack trucks.

Maintaining the roads of today . . . or building the highways of tomorrow, Macks win stand-out preference because they bring to the job exclusive quality features found in no other truck — features that assure unrivaled economy and enduring reliability.

High-efficiency engines give extra power, plus all-around savings in fuel and maintenance costs. Husky frames and driving members are engineered and built for utmost durability — to stand up and last longer under the severest punishment of road building work.

Mack's complete line provides performance-proved models ranging from 3-ton up to 30-ton payload capacities. Available in truck or tractor types — with four or six wheels — gasoline, diesel or butane-fueled engines — transmissions, axles and wheelbases for every operating requirement.

MACK at the Road Show

CHICAGO: July 16-24

Mack's exhibit at the annual Road Show of the American Road Builders Assn. will feature models of the type illustrated here — including the mighty Mack Model LV of 22 tons capacity. Be sure to see these great trucks. Ask for your copy of our new booklet, "Mack Builds The Highways Of The Future." It gives the full story of what Macks are doing on road building projects all over the country — what Macks can do for you in lower costs and greater efficiency on the job.

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trucks for every purpose

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6723

1,700	lin. ft. constructing asphalt seals in powerplant	9.50	10.00
11,500	lin. ft. placing rubber water stops	5.75	1.50
2,600	lin. ft. installing rubber facing strips	1.35	1.50
4,000	lin. ft. installing metal facing strips	2.00	1.50
400	ea. finishing lighting recesses	12.00	25.00
500	sq. ft. furn. and placing compressed-cork roof insulation 1 in. thick	.80	.43
28,000	sq. ft. furn. and placing compressed-cork roof insulation 2 in. thick	1.10	.715
33,000	sq. ft. furn. and placing coal-tar-saturated-felt roofing	.55	.45
36,000	sq. ft. furn. and placing membrane water proofing	.55	.85
12,800	sq. yd. furn. and applying dampproofing	1.15	1.00
8,800	sq. yd. bonded concrete floor finish	5.50	5.40
400	lin ft. cement cove wall base	2.00	2.00
1,200	sq. ft. installing glassblock panels	3.00	2.50
9,100	sq. ft. furn. and installing terracotta wall units	4.50	1.75
140	sq. ft. furn. and installing terracotta veneer units	5.00	4.25
2,600	sq. ft. furn. and installing clay-tile units	3.00	4.00
18,000	lb. steel framework for partitions	.55	.35
430	sq. yd. metal lath and two-coat plaster on partitions	4.00	2.35
3,500	sq. yd. metal lath and three-coat plaster on partitions	5.50	2.75
400	sq. yd. two-coat plaster on concrete base	3.00	2.35
7,400	sq. yd. three-coat plaster on concrete base	4.00	2.75
290	sq. yd. three-coat plaster on masonry base	4.00	2.75
680	sq. yd. suspended metal lath and plaster ceilings	7.00	3.25
22,300	sq. ft. suspended metal lath and acoustical ceilings	1.10	.90
21,000	lb. installing pumps	.12	.07
190,000	lb. installing metal pipe, fittings, and valves less than 6 in. in diam.	.25	.35
600,000	lb. installing metal pipe, fittings, and valves 6 in. and larger in diam.	.15	.25
292,000	lb. installing hollow-jet valves	.10	.05
1,000,000	lb. installing frames & guides for bulkhead & fixed-wheel gates & stop logs	.10	.10
760,000	lb. installing fixed-wheel and bulkhead gates	.06	.04
250,000	lb. installing fixed-wheel gate hoists	.06	.045
600,000	lb. installing spillway ring gate	.25	.04
330,000	lb. installing ring-follower gates	.05	.04
13,000	lb. installing control apparatus and piping for ring-follower & fixed-wheel gates	.30	.15
2,000,000	lb. installing cranes	.025	.04
3,000,000	lb. installing trashrack sects., stop logs, and gate-slot closures	.05	.05
480,000	lb. installing track rails	.05	.03
820,000	lb. erecting structural-steel roof framing	.05	.05
1,500	lb. installing fire-hose and service cabinets	.50	1.25
6,000,000	lb. installing penstocks, outlet pipes, and bellmouth castings	.08	.15
2,300	lb. installing unit-electric heaters	.50	1.25
16,000	lb. installing ice-prevention air system	.40	.25
17,500	lb. installing metal inserts	.35	.50
22,000	lb. installing embedded metal frames, supports, and bearing plates	.20	.075
20,000	lb. installing metal floor plates and gratings	.05	.035
150,000	lb. installing draft-tube pier noses	.05	.056
810	sq. ft. installing metal accordion doors	2.00	4.00
280	sq. ft. installing metal swinging doors	2.00	4.00
6,500	sq. ft. installing metal-sash windows	2.00	4.00
47,000	lb. installing oil storage tanks	.10	.10
86,000	lb. installing water storage tank	.25	.10
340,000	lb. installing metal stairways and handrails	.25	.20
40,000	lb. installing miscellaneous metalwork	.35	.50
68,000	lin. ft. installing embedded electrical metal conduit 1¼ in. or less in diam.	1.00	1.50
23,000	lin. ft. installing embedded electrical metal conduit larger than 1¼ in. and not larger than 3 in. in diam.	1.25	1.75
400	lin. ft. installing embedded electrical metal conduit larger than 3 in. and not larger than 6 in. in diam.	2.50	2.25
11,000	lin. ft. installing embedded electrical non-metallic conduit 2 in. and larger in diam.	1.25	1.75
16,700	lb. installing ground wires and ground rods	.50	1.75
20,000	lin. ft. installing electrical cable for resistance thermometers, strain meters, stress meters, and joint meters embedded in concrete	.50	1.50
8,800	tons transporting matls. of all kinds for the Govt. or its agents, other than the contractor, betw. the railhead and the dam site	7.00	15.00
10	acres clearing right-of-way for roadway	250.00	$1,000
205,000	cu. yd. excav., all classes, for roadway	1.75	2.30
1,000	cu. yd. excav., common, for roadway structs	2.00	7.50
3,000	cu. yd. excav., rock, for roadway structs.	4.50	7.50
500,000	sta. cu. yd. overhaul for roadway	.02	.05
1,000	cu. yd. backfill for roadway structures	1.50	1.35
620	cu. yd. compacting backfill for roadway structs.	2.50	5.35
400	cu. yd. riprap for roadway	3.50	5.00
1,000	sq. yd. dry-rock paving for roadway	4.00	18.00
44	lin. ft. laying 24-in. diam. corrugated-metal pipe	2.00	4.50
364	lin. ft. furn. and laying 24-in. diam. 14-gauge corrugated-metal pipe	6.50	9.50
48	lin. ft. furn. and laying 30-in. diam. 14-gauge corrugated-metal pipe	8.00	12.00
196	lin. ft. furn. and laying 36-in. diam. 12-gauge corrugated-metal pipe	12.00	16.00
94	lin. ft. furn. and erecting 102-in. diam. multiple plate corrugated-metal pipe	80.00	100.00
110	lin. ft. furn. and installing half-round 14-gauge corrugated-metal spillways	6.00	7.50
48	cu. yd. concrete in roadway structures	85.00	100.00
10,073	tons furnishing crusher-run base	1.00	2.75
10,500	tons placing crusher-run base	1.00	1.75
933	tons furn. mineral aggregate for road-mix bitum. surfacing	1.00	3.25
1,400	tons placing road-mix bitum. surfacing	1.00	3.50
80	tons liquid asphalt for road-mix bitum. surfacing	40.00	40.00
110	tons applying stone-chip seal coat	1.00	4.50
11	tons liquid asphalt for seal coat	40.00	50.00
60	tons furn. stone-chips for seal coat	6.00	7.50
3,550	tons pit-run gravel surfacing	1.00	3.50
400	lin. ft. constructing timber bumper	1.00	2.75
670	lin. ft. constructing wire cable guardrail	6.00	5.00
5	sta. finishing roadway	20.00	100.00

Bridge and Grade Separation . . .

Arizona—Gila and Pinal Counties—State—Abutments and Piers

Fisher Contracting Co., Phoenix, at $688,536, were awarded the contract, by the State Highway Commission, Phoenix, for the construction of abutments and piers of the Queen Creek Viaduct, located at the new highway crossing of Queen Creek about 1 mi. northeast of Superior. The contract also includes the construction of approach spans, steel arch and deck of the Queen Creek Viaduct and the steel arch and deck of the Pinto Creek Bridge, located at the new highway crossing of Pinto Creek about 12 mi. northeast of Superior. Unit bids were submitted by the following:

(1) Fisher Contracting Company $688,536
(2) Arizona Sand & Rock Company 692,173
(3) H. J. Hagen 699,226
(4) Vinson Construction Company $709,918
(5) Western Constructors, Inc. 742,668

		(1)	(2)	(3)	(4)	(5)
1,800	cu. yd. struct. excav.	9.50	5.00	10.00	15.00	11.00
50	hr. mechanical tamping	3.60	8.00	5.00	6.00	6.00

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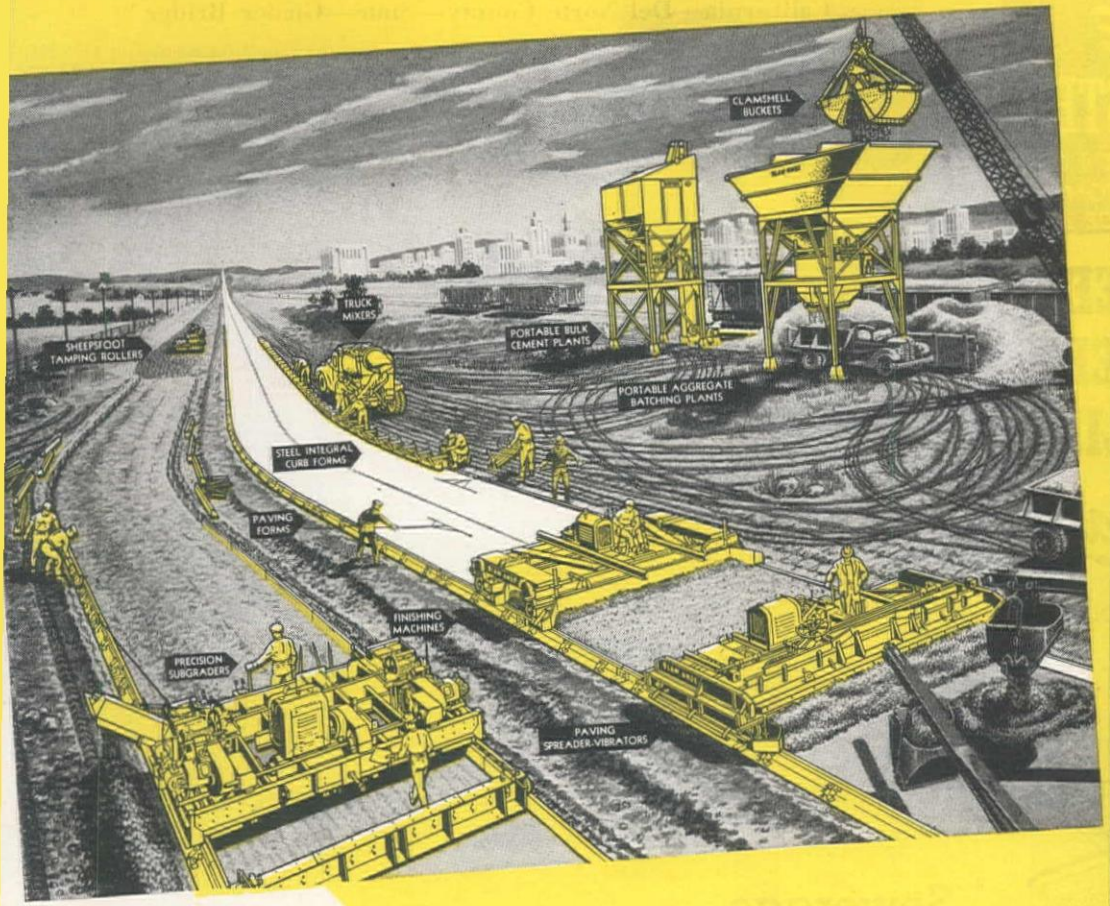
The BLAW-KNOX EXHIBIT MAKES YOUR ROAD SHOW TRIP WORTH-WHILE



- Steel Street Forms
- Steel Paving Forms
- Precision Subgraders
- Concrete Paving Spreaders
- Finishing Machines
- Paving Vibrators
- Aggregate Batching Plants
- Cement Batching Plants
- Ready Mixed Concrete Plants
- Truck Mixers and Agitators
- Concrete Buckets
- Clamshell Buckets
- Steel Forms for Dams, Tunnels, Bridges, etc.
- Prefabricated Steel Buildings
- Steel Grating

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C. H. Grant Company, 435 Bryant St., San Francisco 7, Calif.; Shaw Sales & Service Co., 5100 Anaheim-Telegraph Road, Los Angeles 22, Calif.; Western Machinery Co., 1025 South Central Ave., P. O. Box 1652, Phoenix, Ariz.; Intermountain Equipment Co., Broadway at Myrtle St., Boise, Idaho; E. M. Ornitz, 215 West Fifth St., Los Angeles 13, Calif.; Contractors Equipment Corp., 1215 S.E. Grand Ave., Portland, Ore.; The C. H. Jones Equipment Co., 236 West South Temple St., Salt Lake City 1, Utah; Lively Equipment Co., P. O. Box 784, Albuquerque, N. M.; Colorado Builders Supply Co., 342 South Broadway, Denver, Colorado.

BLAW-KNOX THE ONLY *SINGLE* SOURCE FOR COMPLETELY MECHANIZED CONCRETE PAVING MACHINERY

2,450 cu. yd. Class "A" conc. (including cement)	43.70	65.00	60.00	65.00	72.00
822 cu. yd. Class "D" conc. (incl. cement)	78.70	65.00	80.00	65.00	72.00
404,900 lb. reinf. steel (bars) (CIP)	.105	.11	.11	.11	.115
2,079,500 lb. struct. steel (CIP)	.207	.192	.1865	.1925	.198
2,390 lin. ft. aluminum handrail (CIP)	11.10	11.00	15.00	10.50	12.00

California—Del Norte County—State—Girder Bridge

Baldwin Straub Corporation and Arthur B. Siri, Inc., San Rafael, were awarded the contract of $195,358, by the Division of Highways, Sacramento, for the construction of a steel plate girder bridge and about 0.7 mi. of approaches to be graded and surfaced with base material and seal coat at Turwar Creek about 3 mi. east of Klamath. Unit bids were submitted by the following:

(1) Baldwin Straub Corporation, Arthur B. Siri, Inc. $195,358
(2) Mercer, Fraser Company 214,058
(3) Fred J. Maurer & Son 220,283
(4) Clements & Company and Underground Construction Co. $222,840
(5) G. L. Miner, R. G. Clifford and A. R. McEwen 236,458

	(1)	(2)	(3)	(4)	(5)
Lump sum, remove existing bridge	800.00	$2,000	$2,580	$1,736	$1,500
Lump sum, clearing and grubbing	$3,236	$4,000	$4,500	$4,500	$6,700
13,700 cu. yd. roadway excav.	.67	1.10	.90	1.00	1.77
800 cu. yd. struct. excav. (Type A)	4.00	20.00	10.00	7.50	20.00
850 cu. yd. struct. excav. (Type B)	3.00	2.00	2.50	3.90	4.00
300 cu. yd. ditch and channel excav.	2.00	1.00	2.00	2.00	1.25
38,000 sta. yd. overhaul	.015	.01	.02	.01	.01
57,000 cu. yd. imported borrow	.70	1.05	1.00	1.15	1.03
2,700 cu. yd. base material	3.00	2.30	1.50	3.00	1.25
Lump sum, dev. wat. supply and furn. wat. equip.	$2,000	500.00	500.00	$2,000	$2,000
1,350 M. gal. applying water	2.00	3.00	2.00	1.00	1.00
36 sta. finishing roadway	15.00	20.00	20.00	15.00	10.00
15 tons liq. asphalt, SC-2 (pr. ct. & sur. rdwy. gutters)	40.00	40.00	50.00	60.00	40.00
24 cu. yd. mineral aggregate (sur. rdwy. gutters)	15.00	15.00	7.00	8.00	10.00
320 sq. yd. mix. and compact. sur. rdwy. gutters	.25	.50	3.00	.25	1.00
22 tons liq. asphalt, SC-6 (sl. ct.)	40.00	70.00	50.00	50.00	45.00
210 cu. yd. screenings (sl. ct.)	6.00	4.00	8.00	5.00	5.00
334 lin. ft. timber bridge railing	5.25	4.00	3.00	4.25	3.00
305 cu. yd. Class "A" P.C.C. (footing blocks)	52.00	24.00	30.00	26.50	40.00
400 cu. yd. Class "A" P.C.C. (struct.)	64.00	56.20	77.50	67.40	66.00
1 ea. Redwood cover for drop inlet	10.00	50.00	70.00	26.00	50.00
160,000 lb. structural steel	.15	.147	.15	.16	.135
4,746 lin. ft. furnishing conc. piling	2.87	2.75	3.25	2.50	3.00
104 ea. driving piles	136.00	108.00	100.00	132.00	150.00
324 cu. yd. sacked conc. riprap	26.25	25.00	35.00	30.00	25.00
31 ea. monuments	6.50	5.00	5.00	7.50	6.00
29 ea. culvert markers and guide posts	6.50	4.00	5.00	7.50	5.00
1.2 mi. new property fence	$2,700	$1,000	$2,800	800.00	$3,000
5 ea. timber drive gates	37.50	50.00	75.00	50.00	50.00
120 lin. ft. 18-in. reinforced conc. pipe (stand. str.)	4.50	3.75	3.50	4.00	5.50
60 lin. ft. 24-in. reinforced conc. pipe (std. str.)	7.00	5.00	6.00	8.00	7.00
92 lin. ft. 60-in. reinforced conc. pipe (std. str.)	25.00	27.00	25.00	38.00	25.00
4 ea. spillway assemblies	70.00	50.00	40.00	50.00	50.00
88 lin. ft. 8-in. C.M.P. down drains (16 ga.)	3.00	2.00	2.50	3.00	2.50
26 lin. ft. salv. exist. pipe culverts	1.50	1.00	1.00	3.00	2.00
26 lin. ft. relay. salv'g'd C.M.P. culverts	1.50	1.00	1.50	3.00	1.00
76,100 lb. bar reinforcing steel	.10	.096	.13	.10	.10

Sewerage . . .

Montana—Cascade County—City—Sewer Trunk

Utility Builders, Great Falls, submitted the low bid of $273,973, to the City Engineer, Great Falls, for the construction of a storm sewer trunk in 7th St. from Central Ave. North to the Missouri River and Central Ave. 6th to 7th St., Great Falls. This work is the first of two units of a $1,300,000 sewer project approved by the voters of Great Falls. Unit bids were submitted by the following:

(1) Utility Builders $273,973
(2) Robertson & Cave 289,830
(3) S. Birch & Sons 294,990
(4) Kiely Construction Company $298,361
(5) McLaughlin, Inc. 290,904
(6) Engineer's Estimate 294,957

	(1)	(2)	(3)	(4)	(5)	(6)
6,200 cu. yd. (a) Excavation and backfill uncl.	6.90	5.00	7.00	7.75	7.80	7.50
5,700 cu. yd. (b) Soft rock and backfill	6.90	9.95	9.00	8.75	7.80	9.00
2,600 cu. yd. (c) Hard rock and backfill	9.90	9.95	9.00	8.75	9.80	12.00
FURNISHING LAYING AND JOINTING PIPE						
1,415 lin. ft. (a) 60-in. diam. pipe	30.52	32.65	30.00	31.20	33.72	27.84
1,600 lin. ft. (b) 48-in. diam. pipe	22.54	20.45	24.00	22.70	24.60	18.47
1,210 lin. ft. (c) 42-in. diam. pipe	18.82	16.10	21.00	19.60	17.50	14.35
215 lin. ft. (d) 15-in. diam. pipe	5.26	3.80	7.00	4.90	5.00	3.13
520 lin. ft. (e) 12-in. diam. pipe	4.86	2.75	5.00	4.40	4.50	2.24
375 lin. ft. (f) 10-in. diam. pipe	4.23	2.05	4.00	3.60	4.00	2.00
100 lin. ft. (g) 6-in. diam. pipe	2.62	1.25	2.00	1.90	2.50	1.50
1 ea. (h) 42-in. to 48-in. increaser	264.00	305.90	300.00	240.00	225.00	120.00
1 ea. (i) 48-in. to 60-in. increaser	339.00	382.00	400.00	295.00	300.00	128.00
1 ea. manhole, std., 6-ft. - 8-ft. ht.	262.00	221.00	275.00	190.00	210.00	300.00
1 ea. 42-in. x 48-in. manhole 8-ft. - 10-ft. ht.	374.00	383.00	375.00	310.00	280.00	400.00
1 ea. 42-in. x 48-in. manhole 10-ft. - 12-ft. ht.	461.00	445.00	475.00	360.00	350.00	500.00
1 ea. 42-in. x 48-in. manhole 14-ft. - 16-ft. ht.	585.00	522.50	575.00	450.00	490.00	550.00
1 ea. 48-in. x 48-in. manhole 16-ft. - 18-ft. ht.	645.00	594.00	680.00	580.00	580.00	600.00
1 ea. 48-in. x 48-in. manhole 20-ft. - 22-ft. ht.	705.00	686.00	750.00	650.00	670.00	650.00
1 ea. 48-in. x 48-in. manhole 22-ft. - 24-ft. ht.	782.00	733.00	790.00	710.00	730.00	675.00
1 ea. 48-in. x 48-in. manhole 24-ft. - 26-ft. ht.	859.00	778.00	875.00	790.00	790.00	700.00
2 ea. 60-in. x 48-in. manhole 10-ft. - 12-ft. ht.	597.00	563.50	650.00	540.00	540.00	800.00
1 ea. 60-in. x 48-in. manhole 12-ft. - 14-ft. ht.	677.00	610.00	725.00	590.00	610.00	875.00
1 ea. 60-in. x 48-in. manhole 14-ft. - 16-ft. ht.	754.00	656.00	800.00	690.00	690.00	900.00
1 ea. 60-in. x 48-in. manhole 18-ft. - 20-ft. ht.	903.00	737.60	$1,000	890.00	840.00	950.00
22 ea. inlets (a) corner	180.00	98.60	160.00	175.00	128.00	200.00
25 ea. inlets (b) side	193.00	144.00	180.00	185.00	155.00	200.00
30 ea. inlets (c) removal of exist.	29.00	12.00	20.00	15.00	19.00	25.00
PAVEMENT REPLACEMENT						
200 cu. yd. (a) concrete	26.00	42.00	28.00	26.50	27.00	25.00
175 ton (b) asphaltic paving	14.00	23.20	15.00	17.00	16.00	10.00
10 MFBM shoring, lumber	145.00	175.00	120.00	130.00	150.00	300.00
75 cu. yd. (a) concrete	29.00	28.00	25.00	25.00	18.00	50.00
75 lin. ft. (b) curb removal and replace	2.70	4.00	3.00	3.00	2.00	2.50
375 cu. yd. trench gravel, in place	5.00	7.00	4.00	5.00	6.00	5.00
823 cu. yd. tunneling (a) excavation	10.50	13.65	15.00	18.00	14.00	20.00
703 cu. yd. tunneling (b) soft rock	10.50	17.20	15.00	18.00	14.00	20.00
320 cu. yd. tunneling (c) hard rock	15.00	20.50	15.00	18.00	15.00	20.00

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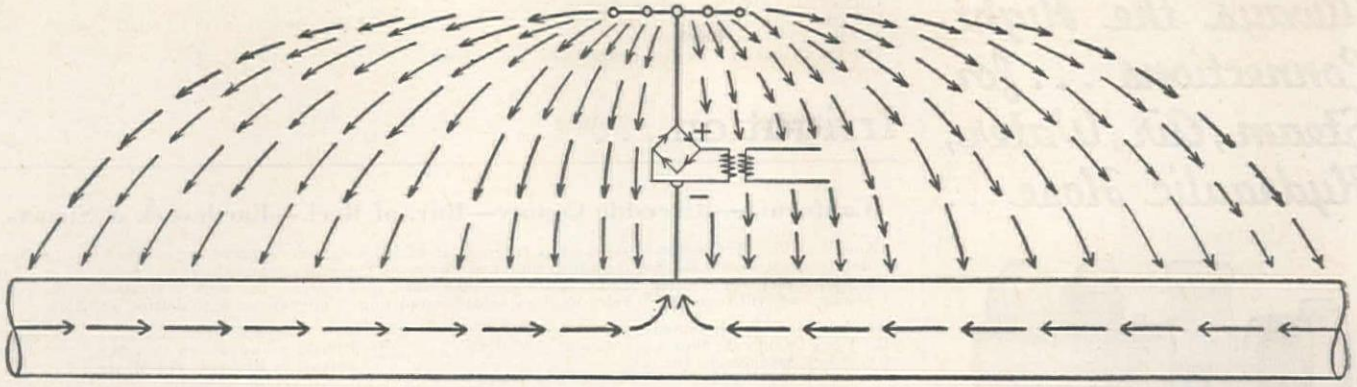

HIGH RESISTANCE COATINGS

INCREASE THE LIFE EXPECTANCY OF YOUR PIPELINES

Barrett* Coal-tar Enamels, because of their low moisture absorption under varying conditions of the soils, provide a constant, uniform and long-lasting resistance to electrical leakage.

Mechanically applied by modern methods, these coal-tar enamels assure the proper continuity of the insulation.

Electrical inspection improves the quality of application and the handling of pipe during construction and, together with a protective pipe coating of stable dielectric strength, makes cathodic protection economical. This combination permits the use of a minimum number of cathodic protection units, spaced the maximum distance, and a minimum investment in the complementary electrical protection. A dependable procedure when designing corrosion-proof pipelines.

FIELD SERVICE: The Barrett Pipeline Service Department and staff of Field Service men are equipped to provide both technical and on-the-job assistance in the use of Barrett* Enamel.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

*Reg. U. S. Pat. Off.

OUTFALL

150 cu. yd. (a) structural excavation	12.00	42.50	10.00	10.00	7.00	10.00
58 cu. yd. (b) concrete	58.00	58.00	65.00	50.00	45.00	50.00
4,400 lb. (c) reinforcing steel	.14	.26	.15	.12	.15	.15
60 lin. ft. (d) untr. timber piling 10-in. to 12-in. dia.	3.00	6.50	4.00	2.75	2.50	4.50

Irrigation . . .

California—Riverside County—Bur. of Recl.—Earthwork & Structs.

American Pipe & Construction Co., Los Angeles, at $1,593,462, were awarded the contract by the Bureau of Reclamation, Coachella, for the construction of earthwork, pipe lines and structures on lat. 97.1, Unit 1, Coachella Valley Distributing System of the All-American Canal System. The work is situated in the vicinity of Mecca, and will require 500 calendar days before completing. Unit bids were submitted as follows:

(A) American Pipe & Construction Co...$1,593,462
(B) United Concrete Pipe Corporation.. 1,619,740
(C) P & J Artukovich, Inc. and Bebek & Brkich 1,699,205
(D) Artukovich Brothers 1,729,264
(E) Macco Corporation 1,777,328
(F) R. A. Wattson Company 1,791,994
(G) R. V. Lloyd & Company.....$1,810,942
(H) Hensler Construction Co., MacDonald & Kruse, Green-Mears Construction Company 1,843,843
(I) G. E. Kerns 1,879,816
(J) Edward Green and R. J. Daum Construction Company 1,919,530

(1) 180,000 cu. yd. excavation for pipe trench
(2) 1,600 cu. yd. excavation for structures
(3) 180,000 cu. yd. backfill in pipe trench
(4) 1,800 cu. yd. backfill about structures
(5) 22,600 cu. yd. excav., load., haul., and place select consolidated matl. from borrow areas
(6) 27,700 cu. yd. consolidating backfill in pipe tr.
(7) 170 cu. yd. compacting backfill about structs.
(8) 95 sq. yd. removing exist. 3½-in. conc. lining
(9) 30 sq. yd. replacing 3½-in. conc. lining
(10) 620 cu. yd. concrete in structs.
(11) 325 cu. yd. concrete for pipe bedding
(12) Deleted by change notice No. 1
(13) 73,200 lb. furn. and plac. reinf. bars in structs.
(14) Lump sum, furn. and laying 30-in. diam., 50-ft. head reinf.-conc. pipe and bends in lateral 97.1-7.1.N
(15) Lump sum. furn. and laying 30-in. diam., 50-ft. head reinf.-conc. pipe and bends in control stand wasteway
(16) Lump sum, furn. and laying 36-in. diam., 50-ft. head reinf.-conc. pipe and bends in lateral 97.1-7.1.E
(17) Lump sum, furn. and laying 42-in. diam., 50-ft. head reinf.-conc. pipe in lateral 97.1-7.1.W
(18) Lump sum, furn. and laying 42-in. diam., 50-ft. head reinf-conc., pipe and bends in lateral 97.1-7.1.NW
(19) Lump sum, furn. and laying 72-in. diam., 50-ft. head reinf.-conc. pipe at control stand outlet
(20) 96 lin. ft. furn. & laying cl. 15-78NC50 conc. pipe
(21) 275 lin. ft. furn & laying cl. 5-78NC90 conc. pipe
(22) 290 lin. ft. furn. & laying cl. 10-78NC90 conc. pipe
(23) 880 lin. ft. furn. & laying cl. 5-78NC100 conc. pipe
(24) 310 lin. ft. furn. & laying cl. 5-78NC110 conc. pipe
(25) 555 lin. ft. furn. & laying cl. 10-78NC110 conc.
(26) 890 lin. ft. furn. & laying cl. 5-78NC120 conc. pipe
(27) 240 lin. ft. furn. & laying cl. 10-78NC120 conc. pipe
(28) 1,229 lin. ft. furn. & laying cl. 5-84NC50 conc. pipe
(29) 225 lin. ft. furn. & laying cl. 10-84NC50 conc. pipe
(30) 780 lin. ft. furn. & laying cl. 5-84NC60 conc. pipe
(31) 840 lin. ft. furn. & laying cl. 5-84NC70 conc. pipe
(32) 340 lin. ft. furn. & laying cl. 5-84NC80 conc. pipe
(33) 535 lin. ft. furn. & laying cl. 10-84NC80 conc. pipe
(34) 75 lin. ft. furn. & laying cl. 5-84NC90 conc. pipe
(35) 300 lin. ft. furn. & laying cl. 10-84NC90 conc. pipe
(36) 1,125 lin. ft. furn. & laying cl. 5-78C130 conc. pipe
(37) 1,150 lin. ft. furn. & laying cl. 5-78C140 conc. pipe
(38) 690 lin. ft. furn & laying cl. 5-78C150 conc. pipe
(39) 695 lin. ft. furn. & laying cl. 10-78C150 conc. pipe
(40) 525 lin. ft. furn. & laying cl. 5-78C160 conc. pipe
(41) 995 lin ft. furn. & laying cl. 10-78C160 conc. pipe
(42) 350 lin. ft. furn. & laying cl. 15-78C160 conc. pipe
(43) 2,910 lin. ft. furn. & laying cl. 5-78C170 conc. pipe
(44) 955 lin. ft. furn. & laying cl. 10-78C170 conc. pipe
(45) 3,474 lin. ft. furn. & laying cl. 5-78C180 conc. pipe
(46) 2,265 lin. ft. furn. & laying cl. 10-78C180 conc. pipe
(47) 3,220 lin. ft. furn. & laying cl. 5-78C190 conc. pipe
(48) 5,202 lin. ft. furn. & laying cl. 10-78C190 conc. pipe
(49) 306 lin. ft. furn. & laying cl. 15-78C190 conc. pipe
(50) 116 lin. ft. furn. & laying cl. 20-78C190 conc. pipe
(51) 3,050 lin. ft. furn. & laying cl. 5-78C200 conc. pipe
(52) 2,402 lin. ft. furn. & laying cl. 10-78C200 conc. pipe
(53) 317 lin. ft. furn. & laying cl. 20-78C200 conc. pipe except under railroad
(54) 48 lin. ft. furn. & installing cl. 20-78C200 conc. pipe under railroad
(55) 44 lin. ft. furn. & installing 42-in. diam. 25-ft. head reinf. conc. pipe vertically at air valves
(56) lump sum, constr. pipe vent at sta. 2 plus 00
(57) lump sum, constr. pipe vent at sta. 3 plus 50
(58) lump sum installing 78-in. diam. line meter tube and head
(59) 105 sq. ft. furn. & placing elastic filler matl. in joints
(60) 130 lin. ft. placing rubber water stop in jts.
(61) 30,800 lb. installing slide gates and gate hoists
(62) 4,000 lb. installing radial gate
(63) 800 lb. installing radial-gate hoist
(64) 7,250 lb. installing metal pipe and valves in blowoffs and air valves
(65) 4 units furn. & installing 4-in. flanged outlets
(66) 1 unit furn. and installing 8-in. flanged outlet and blind flange
(67) 1 unit furn. and installing 10-in. flanged outlet and blind flange
(68) 2 units furn. and installing 12-in. flanged outlets
(69) 1 unit furn. and installing 12-in. flanged outlet and blind flange
(70) 11 units furn. and installing 20-in. flanged outlets and blind flange
(71) 0.5 mbm. furn. and erecting timber in structs.
(72) 6,500 lb. installing miscl. metalwork
(73) 200 lin. ft. installing rigid metallic conduit 1-in. and less in diam.
(74) 50 lb. installing electo conductors and ground wires

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
(1)	.40	.75	.28	.20	.30	.35	.50	.40	.10	.75
(2)	2.25	2.00	1.50	1.00	1.75	1.00	1.00	1.00	2.50	1.50
(3)	.40	.50	.20	.10	.15	.15	.40	.10	.10	.40
(4)	1.50	.50	1.00	.25	.60	1.50	.60	.25	1.00	1.50
(5)	1.50	1.00	1.00	1.10	1.15	1.25	1.20	1.40	2.00	2.60
(6)	1.40	1.20	1.50	.60	1.40	1.40	2.00	1.00	2.50	2.00
(7)	3.00	4.00	3.00	2.00	2.25	3.50	2.00	4.00	3.00	4.00
(8)	1.35	3.00	4.00	1.00	2.25	2.00	25.00	1.35	20.00	5.00
(9)	3.60	6.00	20.00	6.00	4.50	3.00	10.00	3.00	4.00	6.00
(10)	70.00	92.00	75.00	70.00	85.00	76.00	85.00	60.00	120.00	97.50
(11)	18.50	20.00	30.00	20.00	25.00	25.00	35.00	20.00	30.00	30.00
(12)	Deleted by Change Notice No. 1									
(13)	.10	.10	.13	.12	.10	.10	.13	.10	.15	.14
(14)	375.00	600.00	340.00	600.00	640.00	540.00	470.00	390.00	530.00	600.00
(15)	350.00	400.00	335.00	500.00	465.00	469.00	450.00	370.00	370.00	575.00
(16)	500.00	700.00	540.00	600.00	640.00	723.00	710.00	525.00	565.00	840.00
(17)	515.00	600.00	550.00	600.00	670.00	745.00	750.00	550.00	570.00	860.00
(18)	340.00	400.00	425.00	500.00	480.00	482.00	460.00	400.00	395.00	700.00
(19)	590.00	$1,000	675.00	700.00	890.00	912.00	850.00	720.00	645.00	$1,140
(20)	28.80	26.30	32.45	35.50	34.00	34.05	36.20	38.80	35.80	33.00
(21)	27.60	25.30	31.25	34.00	32.50	32.55	35.00	37.50	34.50	32.00

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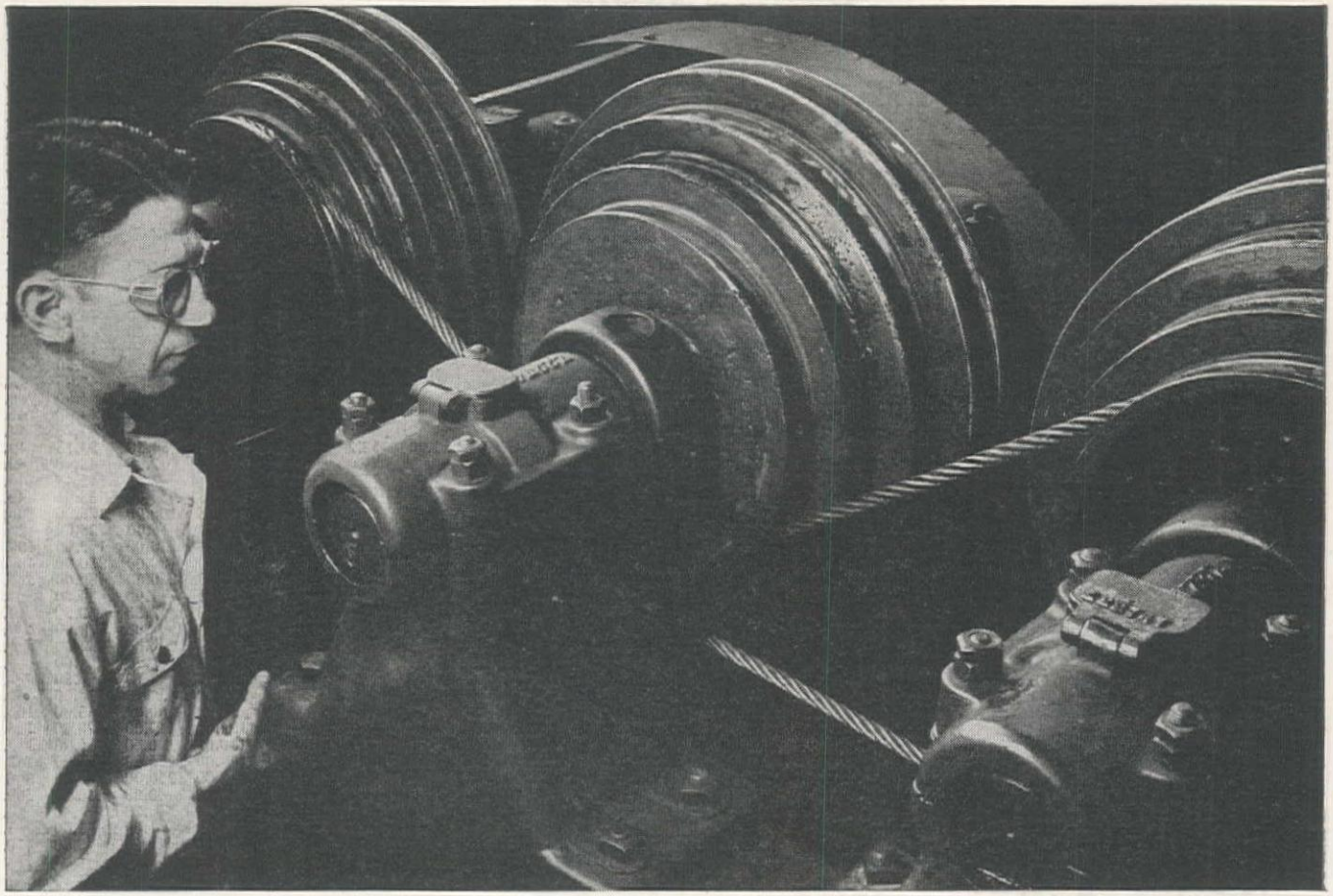

Columbia's "fatigue tests" *put TIGER BRAND through paces far tougher than on-the-job. Sharp bends... small sheaves... continual operation... TIGER BRAND must take them in stride to make sure each type and grade passes its specifications.*

How Columbia's "torture-test" assures long wire rope service

TIGER BRAND must stand up. That's why it's given rugged tests like this all along the line, from ore to finished rope . . . that's why it's held to close tolerances and exacting specifications in the great mills of United States Steel.

When you rig up with preformed TIGER BRAND you'll immediately like its handling ease, its ability to ride smoothly in sheave grooves. You'll notice how it resists kinking . . . how it gets right on the job with reduced break-in time. But the best is yet to come. Wait until TIGER BRAND has been at work for awhile. Then you'll see how you really save . . . for TIGER BRAND likes its work. It keeps equipment going. Those high-tensile U·S·S steel wires and strands just won't quit.

Get in touch with your nearest dealer. Find out for yourself why . . . THE BIG DEMAND IS FOR TIGER BRAND.

A Columbia Service Tip

When unloading, avoid dropping reels onto ground or floor from car or truck. Reels are not designed to stand this abuse and may collapse. It is almost impossible to remove wire rope from a collapsed reel without damage to the rope.

Columbia Steel Company

San Francisco • Los Angeles • Portland • Seattle • Salt Lake City

American Steel & Wire Co.

Cleveland, Chicago and New York

Tennessee Coal, Iron & Railroad Company, Birmingham
Southern Distributors
United States Steel Export Company, New York

UNITED STATES STEEL

(22)	29.20	26.65	32.95	36.00	34.50	34.25	36.65	39.20	36.30	33.50
(23)	28.25	25.75	32.10	35.00	33.30	33.05	35.65	38.20	35.20	32.50
(24)	28.75	26.25	32.45	35.50	34.00	34.05	36.20	38.80	35.80	33.00
(25)	30.60	27.40	34.15	37.00	36.10	36.05	38.05	40.50	37.85	35.00
(26)	29.55	26.95	33.30	36.00	34.90	34.65	37.00	39.50	36.70	34.00
(27)	31.15	28.45	35.10	38.00	36.70	37.05	38.60	41.10	38.45	35.50
(28)	27.70	29.30	31.85	34.00	32.80	32.55	35.10	37.50	34.60	32.00
(29)	30.20	30.90	34.45	35.00	35.60	35.45	37.65	40.20	37.40	34.50
(30)	28.35	29.85	32.50	35.00	33.40	33.55	35.75	38.40	35.30	32.50
(31)	28.95	30.35	33.10	35.50	34.20	33.85	36.35	38.90	36.00	33.50
(32)	29.55	30.90	33.75	36.00	34.90	34.65	37.00	39.50	36.70	34.00
(33)	31.40	32.40	35.75	38.00	37.10	37.05	38.90	41.50	38.75	36.00
(34)	30.10	31.30	34.40	37.00	35.50	36.35	37.55	40.00	37.30	35.50
(35)	32.05	32.95	36.35	38.50	37.80	37.65	39.50	41.00	39.45	36.50
(36)	31.20	30.30	35.00	38.00	36.80	36.65	38.65	41.20	38.50	35.50
(37)	32.00	31.05	35.85	38.50	37.80	37.65	39.50	42.00	39.45	36.50
(38)	32.80	31.70	36.75	39.50	38.70	38.65	40.30	42.80	40.30	37.50
(39)	34.10	32.75	38.00	41.00	40.30	40.55	41.65	44.20	41.80	38.50
(40)	33.55	32.75	37.45	40.00	39.60	39.55	41.10	43.70	41.20	38.50
(41)	34.70	32.35	38.65	41.50	41.00	41.05	42.25	44.80	42.45	39.50
(42)	38.50	33.25	42.50	45.00	45.40	45.55	46.70	48.70	46.70	43.00
(43)	34.40	34.90	38.35	41.00	40.60	40.55	36.10	44.50	42.15	39.00
(44)	35.50	33.65	39.50	42.00	41.90	42.05	43.10	45.50	43.40	40.50
(45)	35.65	33.70	39.70	42.00	42.10	42.05	37.35	42.60	43.50	41.00
(46)	36.10	34.20	40.35	43.00	42.60	43.05	43.70	43.80	44.05	41.00
(47)	36.50	34.45	40.80	43.50	43.10	43.25	38.25	42.60	44.50	41.50
(48)	36.65	34.60	40.90	43.50	43.20	43.55	38.35	42.70	44.60	41.50
(49)	39.40	36.45	43.85	46.00	46.50	47.05	47.05	45.60	47.75	44.50
(50)	44.20	39.95	49.00	51.00	52.20	53.05	56.95	54.50	53.15	49.00
(51)	37.30	35.05	41.65	44.00	44.00	44.05	39.05	47.50	45.40	42.50
(52)	37.35	35.10	41.70	44.00	44.10	44.25	39.10	47.50	45.45	42.50
(53)	44.50	40.15	49.30	52.00	52.50	53.05	57.25	54.80	53.45	49.50
(54)	93.50	40.15	49.50	75.00	168.50	100.00	152.25	100.00	175.00	200.00
(55)	12.00	20.00	11.25	25.00	50.00	15.00	15.00	15.00	25.00	20.00
(56)	125.00	200.00	100.00	125.00	150.00	65.00	200.00	320.00	175.00	400.00
(57)	225.00	400.00	200.00	300.00	520.00	65.00	400.00	450.00	250.00	400.00
(58)	150.00	$1,000	100.00	150.00	100.00	250.00	150.00	250.00	480.00	500.00
(59)	4.00	2.00	1.00	1.00	1.15	.60	3.00	1.00	4.00	4.00
(60)	2.00	1.00	1.00	.50	1.15	2.50	.50	.50	2.50	1.00
(61)	.06	.10	.25	.25	.20	.40	.14	.06	.40	.25
(62)	.08	.10	.35	.25	.20	.40	.14	.06	.40	.25
(63)	.15	.10	.50	.25	.25	.50	.14	.06	.50	.25
(64)	.12	.15	.50	.25	.15	.50	.10	.10	.50	.25
(65)	26.00	100.00	50.00	30.00	30.00	35.00	30.00	30.00	30.00	40.00
(66)	59.00	150.00	90.00	75.00	70.00	70.00	68.00	60.00	65.00	100.00
(67)	105.00	200.00	150.00	125.00	120.00	125.00	122.00	110.00	120.00	125.00
(68)	95.00	250.00	140.00	100.00	110.00	110.00	110.00	100.00	105.00	150.00
(69)	125.00	275.00	170.00	150.00	145.00	150.00	144.00	125.00	140.00	160.00
(70)	275.00	500.00	350.00	300.00	300.00	300.00	282.00	250.00	270.00	300.00
(71)	500.00	200.00	600.00	400.00	400.00	200.00	560.00	400.00	350.00	500.00
(72)	.15	.30	.25	.25	.25	.40	.14	.20	.40	.25
(73)	.75	1.00	.25	.50	.50	.20	1.00	1.00	3.00	1.00
(74)	1.40	2.00	.50	1.00	1.00	.10	3.00	.50	3.00	10.00

Highway and Street . . .

California—Alameda County—State—Grade and Pave

Fredrickson & Watson Construction Co. of Oakland, was awarded a $1,373,333 contract by the Division of Highways at Sacramento, for about 2.9 mi. of grading and paving with Portland cement concrete on crusher run base on the Eastshore Freeway, between 38th Ave. and Oak St. in Oakland. The following unit bids were submitted:

(1) Fredrickson & Watson Construction Co. $1,373,333
(2) Stolte Inc. & The Duncanson Harrelson Co. 1,412,218
(3) Guy F. Atkinson Co. $1,440,264
(4) Chas. L. Harney, Inc. 1,485,484

		(1)	(2)	(3)	(4)
7,750	cu. yd. remov. conc.	1.75	4.65	2.50	4.80
Lump sum,	clearing and grubbing	$13,400	$2,320	$3,000	$10,601
Lump sum,	grading area	$6,301	$4,540	$7,000	$20,366
113,000	cu. yd. rdwy. excav.	.50	.46	.38	.47
300	cu. yd. ditch and channel excav.	1.45	1.15	2.00	1.70
26,000	cu. yd. structure excav.	2.00	1.75	2.60	2.90
65,000	sq. yd. compacting orig. ground	.04	.05	.06	.05
105,000	ton imported borrow	1.20	1.25	1.05	1.22
1,000,000	sta. yd. overhaul	.007	.006	.01	.006
5,400	cu. yd. imported top soil	3.00	2.85	2.90	2.40
16,300	sq. yd. scarifying landscape areas	.05	.06	.10	.08
Lump sum,	dev. water supply and furn. wat. equip.	$2,300	$2,300	$4,500	$18,833
11,000	M. gal. applying water	1.45	1.75	2.00	1.00
134	sta. finish rdwy.	31.00	17.50	35.00	26.00
44,000	ton crusher run base	2.50	2.82	2.68	2.85
50	ton liq. asphalt SC-1 (pr. ct.)	29.00	26.50	30.00	30.00
2	ton liq. asphalt, SC-2 (pen. tr.)	40.00	42.50	60.00	100.00
5	ton asph. emuls. (pt. bdr.)	35.00	31.80	35.00	40.00
8,500	ton P.M.S.	6.50	6.30	6.00	6.60
28,000	cu. yd. P.C.C. pavement	13.65	12.90	13.75	14.00
26,000	ea. pavement tie bolt assemblies	.46	.60	.55	.48
2,650	cu. yd. Class "A" P.C.C.(structures)	41.30	43.50	47.50	45.00
90	cu. yd. Class "C" P.C.C. (pipe encasement)	16.50	12.75	25.00	28.00
172,000	lb. furn. bar reinf. steel	.07	.08	.07	.07
172,000	lb. placing bar reinf. steel	.02	.03	.03	.02
680	lin. ft. steel railing	8.00	8.40	8.00	8.00
4,650	cu. yd. Class "B" P.C.C. (curbs and gutters)	27.00	35.50	35.00	29.00
110	ea. curb dowels	.55	.53	.40	1.00
575	cu. yd. Class "B" P.C.C. (sidewalks)	26.50	25.40	23.00	18.50
44	ea. survey monuments	23.00	10.50	30.00	27.00
20	ea. monument markers	5.00	5.80	6.00	4.50
325	lin. ft. laminated guard railing	2.90	2.90	2.50	2.70
250	lin. ft. metal plate guard railing	3.00	2.90	3.00	3.25
50	ea. culv. markers	5.00	7.00	5.50	4.50
32,000	lin. ft. chain link fence	1.06	.87	1.10	1.10
35	ea. walk gates	49.00	50.00	50.00	50.00
4	ea. drive gates	91.00	90.00	100.00	90.00
2,100	lin. ft. 12-in. R.C.P. (std. str.)	1.92	2.10	1.85	1.70
260	lin. ft. 15-in. R.C.P. (std. str.)	2.37	2.75	2.30	2.10
12,000	lin. ft. 18-in. R.C.P. (std. str.)	2.90	3.15	2.90	2.80
1,800	lin. ft. 21-in. R.C.P. (std. str.)	3.70	4.00	3.80	3.50
800	lin. ft. 24-in. R.C.P. (std. str.)	4.65	5.10	4.80	4.50
20	lin. ft. 12-in. R.C.P. (3000-D)	2.55	2.50	2.50	3.00

(Continued on next page)

Greater Strength and Serviceability Obtained at Lower Cost with Arc Welding

By David R. Graham
Structural Engineer
Tulsa, Oklahoma

MANY new advancements in structural design are now made possible costwise through arc welded construction. Longer column-free spans, increased structural strength, greater building serviceability, are achieved *at lower building costs*. The multi-purpose building constructed for the Wright Recreation Company, Tulsa, Oklahoma, is designed for arc welded construction and serves to illustrate these structural advantages. This building, at present used as a skating rink, is so designed that it can be converted easily to a large warehouse or factory building.

With a length of 180 feet and span of 80 feet, this building has a maximum clearance height of 29 feet from floor to roof members. The rigid frame construction used produces an entirely unobstructed interior highly desirable for sports arenas or for unpredictable future conversion requirements. All roof trusses and interior columns are eliminated. High side walls, normally needed in conventional construction to obtain greater floor to roof clearance, are avoided by this all-welded rigid frame design, thus reducing structural costs.

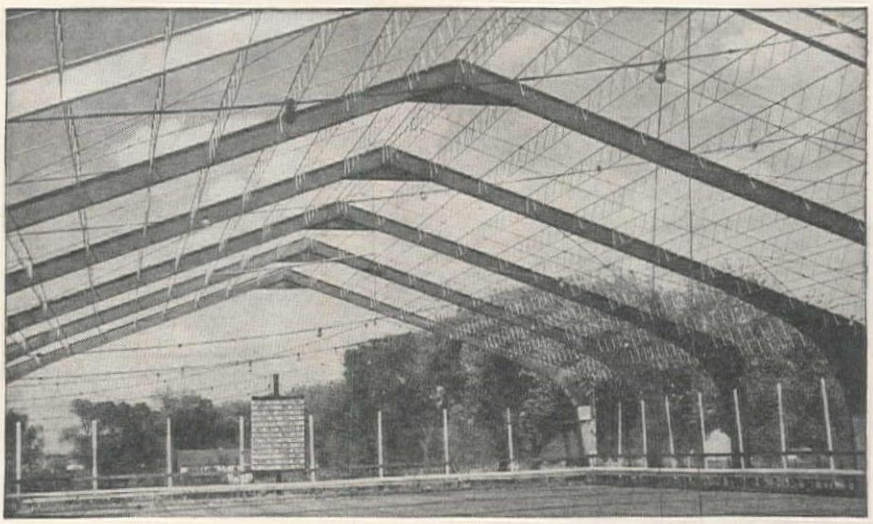

Fig. 2. Building framework for the Wright Recreation Company, Tulsa.

The arch frames (Fig. 1) are designed by the usual rigid frame formulas allowing the entire structure to support an evenly distributed snow load of 25 pounds per square foot. The design analysis also allows for wind velocities up to 70 miles per hour.

The arch frames are built from flame-cut steel plates to which inside and outside plates and ribs are fillet-welded with "Fleetweld 5" electrode. All arch frames are shop-fabricated and hauled to the site for field-weld erection. Gable members are fabricated from 16″ WF beams. Haunches and legs are welded from flame-cut steel plate.

The bar joist purlins are $\frac{5}{8}$″ steel bars, arc welded to the roof members as shown in Fig. 2. Although steel bars are a little more costly per pound than channels, they are considerably lighter, thereby reducing dead weight in the building frame.

A building of similar design, but 80 feet by 100 feet in size, is being built for a gymnasium at Kiefer, Oklahoma.

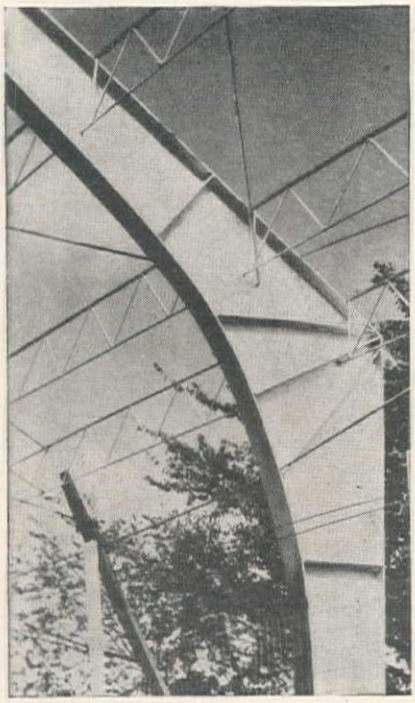

Fig. 1. Arc welded arch frame showing connections of bar steel purlins.

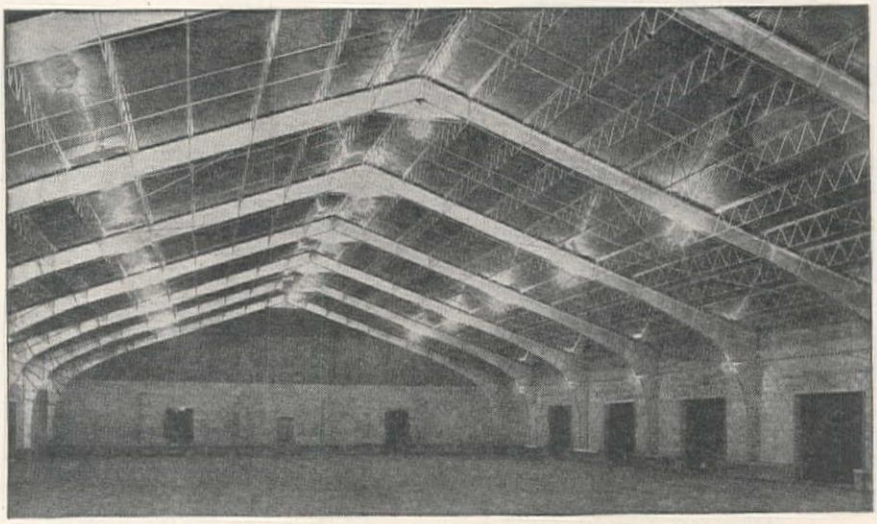

Fig. 3. Inside view of building showing completed brickwork and roofing. Fabrication and erection by the Saxon Steel Co., Tulsa, Oklahoma.

140 lin. ft. 18-in. R.C.P. (2700-D)	4.65	4.60	4.75	4.50
190 lin. ft. 36-in. x 5-in. part circle corr. metal culv. (8-ga.)	4.83	4.85	4.40	6.00
880 lin. ft. 8-in. vitr. clay pipe	1.30	1.07	1.65	1.00
320 lin. ft. 10-in. vitr. clay pipe	1.75	1.50	2.10	1.40
520 lin. ft. 15-in. vitr. clay pipe	3.45	2.90	3.35	2.50
260 lin. ft. 4-in. plain concrete pipe	1.05	.50	.45	.65
36 lin. ft. 6-in. plain concrete pipe	1.30	.75	.60	1.10
726 lin. ft. 8-in. plain concrete pipe	1.10	1.00	.80	1.30
136 lin. ft. 18-in. plain concrete pipe	2.70	2.90	2.60	2.90
144 lin. ft. 21-in. plain concrete pipe	3.50	3.70	3.30	3.70
115 ea. 4-in. x 8-in. concrete tees	10.00	3.85	10.00	5.00
38 ea. 4-in. x 18-in. concrete tees	22.00	13.40	22.00	18.00
15 ea. 4-in. x 21-in. concrete tees	27.50	17.50	28.00	24.00
35 ea. adjusting manholes to grade	40.00	35.00	20.00	27.00
4 ea. adjusting lampholes to grade	40.00	23.00	10.00	13.00
125 lin. ft. new manholes	31.00	22.00	25.00	28.00
3 ea. manhole frames and covers	47.00	46.50	50.00	50.00
13 ea. salvag. manhole frames and covers	12.00	8.00	10.00	17.00
12 ea. placing salvaged manhole frames and covers	12.00	11.60	9.00	10.00
45,000 lb. miscl. iron and steel	.30	.25	.35	.42
300 lin. ft. raised bars	1.15	1.20	1.25	1.50
175 sq. yd. membrane waterproofing	3.30	1.50	2.50	1.80
109 ea. sgl. electroliers, Type A1	570.00	570.00	600.00	580.00
45 ea. sgl. electroliers, Type B1	661.00	665.00	700.00	670.00
7 ea. dbl. electroliers, Type A2	688.00	690.00	700.00	700.00
1 ea. dbl. electrolier, Type B2	825.00	825.00	850.00	840.00
24 lin. ft. 1¼-in. galvanized steel pipe	2.00	.90	1.10	1.10
340 lin. ft. 1½-in. galvanized steel pipe	1.15	1.00	1.25	1.40
2,750 lin. ft. 2-in. galvanized steel pipe	1.26	1.15	1.45	1.60
510 lin. ft. 2½-in. galvanized steel pipe	1.55	1.30	2.00	1.75
120 lin. ft. 4-in. galvanized steel pipe	2.25	2.25	3.20	2.00
Lump sum, electrical equip.	786.00	790.00	800.00	800.00
Lump sum, drainage pumping equip.	350.00	342.00	250.00	325.00

Colorado—Boulder County—Pub. Roads Adm.—Grade and Drain

Platt Rogers, Inc., Pueblo, was awarded a $242,036 contract by the Public Roads Administration, Division No. 9, Denver, for 2.4 mi. grading and draining of Boulder-Idaho Springs Road. Road width is 26 ft. Unit bids were submitted as follows:

(1) Platt Rogers, Inc. $242,036
(2) M. J. Sears 263,129
(3) Colorado Constructors 267,650
(4) C. L. Hubner Company $271,246
(5) Leach Bros. 299,540
(6) Engineers Estimate 259,549

	(1)	(2)	(3)	(4)	(5)	(6)
15 acre clearing and grubbing	250.00	250.00	300.00	300.00	300.00	250.00
114,000 cu. yd. unclassified excavation	1.50	1.70	1.65	1.77	2.00	1.50
1,290 cu. yd. unclassified excavation for structures	5.00	5.00	5.00	5.00	5.00	4.00
12,000 cu. yd. unclassified excavation for borrow, Case 1	1.00	1.00	1.50	.70	1.20	1.25
50,000 sta. yd. overhaul (1000-ft. free haul)	.03	.03	.05	.03	.02	.02
7,000 cu. yd. mi. special overhaul of borrow (1000-ft. free haul)	.30	.25	.35	.30	.30	.30
30 units obliteration of old roadways	10.00	10.00	10.00	10.00	10.00	10.00
2.426 mi. finishing earth graded roads	500.00	375.00	300.00	300.00	500.00	400.00
282 cu. yd. conc. Cl. A (air-entrained low-alkali cem.)	75.00	75.00	80.00	80.00	72.50	65.00
21,700 lb. reinforcing steel	.15	.13	.15	.15	.14	.12
110 cu. yd. cement rubble masonry	50.00	50.00	50.00	60.00	45.00	45.00
1,900 lin. ft. 24-in. C.G.S.M. culvert pipe	5.00	5.00	5.00	5.00	5.00	4.00
52 lin. ft. 48-in. C.G.S.M. culvert pipe	12.00	12.00	14.00	12.00	12.00	10.00
350 lin. ft. 6-in. perf. C.G.S.M. pipe underdrain	4.00	4.50	5.00	3.00	5.00	4.00
12 each concrete maintenance marker posts	12.00	10.00	15.00	10.00	10.00	10.00
130 each timber guide posts with warning reflectors (treated)	5.00	6.00	5.00	6.00	5.00	5.00
Lump sum, removal of old bridge	$1,500	600.00	500.00	$1,000	500.00	500.00

Nevada—Elko County—State—Grade and Surf.

Gibbons & Reed Co., Salt Lake City, at $549,007, have been awarded the contract by the State Highway Department, Carson City, for 5 mi. of grading, surfacing and drainage structures, from Pequop Summit to 1 mi. west of Oasis on Rt. 1. Unit bids were submitted as follows:

(1) Gibbons & Reed Company $549,007
(2) W. W. Clyde & Company 562,089
(3) Olof Nelson Construction Co. 643,083
(4) Westbrook & Pope 696,307
(5) McNutt Brothers $737,107
(6) Isbell Construction Co. 763,846
(7) J. A. Terteling & Son, Inc. 829,636

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Force account, special detours	500.00	500.00	500.00	500.00	500.00	500.00	500.00
1,235 cu. yd. selected detour surfacing	.79	1.00	1.50	3.50	1.50	2.00	1.50
43 ton liq. asph., SC-2 or SC-3 (rd. mix)	31.00	32.00	35.00	36.00	60.00	33.65	50.00
Lump sum, signs	850.00	500.00	$1,000	$10,000	100.00	$2,000	600.00
27 acre clearing	50.00	100.00	50.00	400.00	100.00	100.00	35.00
36 lin. ft. remove culvert pipe	1.60	1.50	3.00	1.00	2.00	1.00	1.25
2 ea. remove headwalls	11.00	15.00	25.00	10.00	25.00	20.00	12.00
110,567 cu. yd. roadway excav. A	.32	.25	.30	.30	.50	.40	.37
396,899 cu. yd. roadway excav. B	.62	.60	.77	.78	.78	.87	1.20
706 cu. yd. drainage excav.	.35	.75	2.00	2.00	1.00	2.00	.50
215 sta. V-type ditches	3.20	10.00	10.00	3.00	6.00	10.00	5.00
1,602,738 yd. sta. overhaul, yd. sta.	.01	.015	.015	.01	.015	.015	.02
74,078 yd. mi. overhaul, yd. mi.	.10	.20	.15	.20	.30	.15	.18
709 cu. yd. structure excav.	1.25	2.00	3.00	2.00	2.50	2.50	2.50
1,748 cu. yd. backfill	1.85	1.50	2.00	2.00	2.00	2.00	1.00
20,540 M. gal. water	2.15	1.25	.50	1.50	1.50	2.00	1.00
Lump sum, furnish water equipment	500.00	$3,000	$1,000	$12,000	$37,425	$20,000	$5,000
398 hr. power roller	5.00	6.00	6.00	6.00	8.00	7.00	5.00
28,145 ft. hr. tamping roller	.63	.50	.30	.60	.60	.60	.55
58,121 ton Type 1 gravel base	.35	.45	.75	.75	.65	.64	.61
25,456 ton Type 2 gravel base, 1 in. size	.68	.85	.90	.95	1.05	1.35	.83
219 ton liquid asph. MC-1 (pr. plant mix)	32.00	34.00	36.00	36.00	45.00	36.00	34.00
106 ton emulsified asph. (seal)	34.00	36.00	35.00	32.00	40.00	40.00	37.50
877 ton screenings	4.50	5.00	3.00	5.00	4.00	5.00	3.00
1,152 ton liquid asph., SC-4 or SC-5 (plntmx)	28.80	31.00	35.00	31.00	35.00	32.50	33.00
19,195 ton Class F-2 plantmix surface	2.00	2.40	3.00	2.80	2.75	3.10	2.60
189 cu. yd. Class A concrete	62.50	60.00	60.00	60.00	48.00	60.00	65.00
24,810 lb. reinforcing steel	.10	.12	.13	.12	.10	.12	.12
164 lin. ft. 18-in. corr. metal pipe (16 ga.)	2.55	2.65	3.00	3.00	3.05	3.00	3.00
1,664 lin. ft. 24-in. corr. metal pipe (14 ga.)	3.70	4.00	4.40	4.50	4.65	4.50	5.00
280 lin. ft. 30-in. corr. metal pipe (12 ga.)	6.20	6.50	7.00	7.00	7.25	7.00	8.00
104 lin. ft. 36-in. corr. metal pipe (12 ga.)	7.20	8.00	8.00	8.00	8.75	8.25	9.50
340 lin. ft. 36-in. corr. metal pipe (8 ga.)	10.45	11.85	12.00	13.00	12.60	12.00	14.00
116 lin. ft. 29" x 18" corr. metal arch pipe	4.45	4.20	5.00	5.00	5.70	5.00	6.00
3,800 lin. ft. beam type metal guard rail	2.30	2.50	3.50	3.00	2.00	2.30	3.00
48 ea. culvert markers	7.50	6.00	5.00	5.00	5.00	6.00	7.00
12 ea. guide posts	8.50	6.00	10.00	5.00	6.00	6.00	7.00
9,496 sq. yd. paved ditches	.23	.90	.25	.50	.50	1.00	.30
Force account, miscellaneous work	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000

CONSTRUCTION SUMMARY

The following pages contain the most complete available tabulation of construction contracts awarded in the eleven western states during the past month. Except for certain instances, contracts amounting to less than $75,000 are not listed. Space is not available to list more than a small proportion of the proposed projects. For your convenience, all items are prepared in an identical manner to provide the following information: County of job location (capital letters); name and address of contractor (bold face); bid price; brief description of work; awarding agency; and approximate date of award. More detailed information may be secured concerning employment conditions, wage rates, etc., by writing directly to the contractor. When available, the names of the supervisory personnel will be published in the "Supervising the Jobs" columns.

CONTRACTS AWARDED

Large Western Projects . . .

M. P. Munter Co., Seattle, Wash., have been awarded a contract of $640,397 (Stage 1) for const. railroad terminal yard at Fairbanks, Alaska; **Morrison-Knudsen Co.,** Boise, Idaho, at $3,080,-170 (award pending—Stage 2) and contract at $4,401,541 (Stage 3) was awarded them by the Alaska Railroad, Anchorage. The work is defined in the following stages:

1. Installation of new railroad terminal yard at Fairbanks.
2. Construction of warehouses and other buildings in the new Fairbanks yards.
3. Track raising and bank widening program along 99 mi. of track.

The above contracts total $8,122,108.

Otto B. Asbach and Sons, St. Paul, Minn., and **Steenberg Construction Co.,** St. Paul, Minn., were awarded a contract of $4,826,544, by the Bureau of Reclamation, Friant, Calif., for the const. of earthwork, canal lining, and structs. on the Friant-Kern Canal, Central Valley Proj., located about 3 mi. S. of Woodlake, Calif., to about 2 mi. E. of Lindsay, Calif. Completion of the work is required in 700 calendar days.

Monson Brothers, San Francisco, Calif., were awarded a $4,500,-000 contract by the Pacific Telephone & Telegraph Co., San Francisco, for const. of a steel frame, 3-story and basement addition to the Telephone Exchange Building in Berkeley, Calif.

Albert B. Schuff, Phoenix, Ariz., has been awarded the contract of $1,500,000 by the Arizona Manor Co., Inc., for const. of Camelback Villa in Phoenix.

Starrett Brothers & Eken, San Francisco, Calif., have been awarded the $2,000,000 contract by the Metropolitan Life Insurance Co. of San Francisco, Calif., for the const. of eleven apartment buildings, housing 9,000 persons, and other adequate facilities in the Lake Merced area, San Francisco.

Fredericksen & Kasler, Sacramento, Calif., were awarded the contract of $1,055,958 by the Division of Highways, Sacramento, for 5.1 mi. grade and surface, const. reinf. conc. girder bridge across San Luis Obispo Creek, betw. Pismo Beach and Miles Station.

Swinerton & Walberg, San Francisco, at $4,700,000 have been awarded the contract by the Standard Oil Co. of San Francisco, for the const. of a reinf. conc. and steel frame 22-story office bldg. in San Francisco, Calif.

Miners Western Ltd., Vancouver, B. C., at $1,236,998, were awarded the contract by the British Columbia Power Commission, Victoria, for const. a 12-ft. diameter tunnel about 2 mi. long and auxiliary works at Whatshan Lake, British Columbia.

Western-Knapp Engineering Co., San Francisco, Calif., at $1,000,000, were awarded a contract by the Bradley Mining Co., San Francisco, for const. a smelter in Stibnite, Idaho.

Guy F. Atkinson Co., Long Beach, Calif., were awarded the contract of $3,613,850 by the Board of Public Works, Los Angeles, Calif., for const. a primary settling system for the Hyperion Activated Sludge Plant at El Segundo, Calif. Work includes const. of tanks, galleries, rooms, buildings, tunnels, channels,

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and furnish and install equipment. Completion of the project will be in 420 calendar days.

Sound Construction & Engineering Co., Seattle, Wash., at $1,592,592 were awarded the contract by the Oregon State Board of Control, Salem, for const. a reinf. conc. 5-story State office bldg. in Salem.

Stolte, Inc., Oakland, Calif., and **Duncanson-Harrelson Co.,** San Francisco, Calif., at $1,318,315, were awarded a contract by the Calif. Division of Highways, Sacramento, for 4.3 mi. grade, surface, and const. bridges betw. 2 mi. N. and 0.7 mi. S. of Santa Rosa.

S. J. Groves & Sons, Minneapolis, Minn., were awarded a $868,730 contract by the North Dakota State Highway Department, Bismarck, for 13.1 mi. grade and surface on U. S. Hwy. 81 N. of Argusville to Fargo, N. Dak.

Macco Corporation, Clearwater, Calif., have been awarded a $848,245 contract by the California Water and Telephone Company, San Francisco, for const. Los Padres Dam on the Carmel River 6 mi. upstream from San Clemente Lake at Barnes Flat in the Cachagua Area, Calif.

Judson-Pacific-Murphy Corporation, Emeryville, Calif., at $750,000 were awarded a contract by the Corps of Engineers, Fairbanks, Alaska, for const. airplane hangar 300-ft. long and wide and 80-ft. in height in Fairbanks, Alaska.

Kloepfer & Gramkow, Boise, Ida., have been awarded a $871,452 contract by the Veterans Administration, Seattle, Wash., for const. hospital additions to the Veterans Administration Hospital in Boise, Ida.

B. D. Palfreyman, Provo, Utah, was awarded the contract of $3,000,000 by the City Council, Orem, Utah, for the const. of a housing subdivision in Orem.

Marigold Corporation, San Bernardino, Calif., at $2,000,000, will const. a private housing project in San Bernardino, Calif.

Macco Corporation, Clearwater, Calif., at $845,900, have been awarded a contract by the Oregon State Highway Commission, Salem, for the const. of a bridge about 2214 ft. in length over the Willamette River at Independence, Ore.

James I. Barnes Construction Co., Santa Monica, Calif., at $793,320 were awarded a contract by the Board of Harbor Commissioners, Los Angeles, for const. of a conc. wharf and approaches at Berths 72, 73A, B, C and E, Los Angeles Harbor.

V. D. Case Co., Los Angeles, Calif., have been awarded a $797,587 contract by the City Clerk, Santa Barbara, for const. an addition of 15 ft. in height of existing Gibraltar Dam, and const. appurtenant structures on the Santa Ynez River, 8 mi. N. of Santa Barbara, Calif.

Lowdermilk Brothers, Espanola, N. Mex., were awarded a $788,655 contract by the U. S. Atomic Energy Commission, Los Alamos, N. Mex., for grading, fencing and improvements on the South Mesa Rd., Los Alamos.

Western Paving Co., Denver, Colo., at $743,556, have been awarded the contract by the Department of Improvements and Parks, Denver, for airport improvements including a new 8500-ft. east-west runway (asphalt) and reconst. of N. part of north-south runway; lighting, drainage, etc., at Stapleton Airfield, Denver, Colo.

Highway and Street . . .

Arizona

APACHE CO.—**Bowen-McLaughlin Co.,** Box 4037, Phoenix—$319,959 for 15½ mi. surf. U. S. Hwy. No. 66, betw. St. Johns and Sanders—by State Highway Department, Phoenix.

COCONINO AND NAVAJO COS.—**W. J. Henson,** 817 Crest Ave., Prescott—$356,532 for 5.1 mi. bitum. surf. of U. S. Hwy. No. 66 betw. Flagstaff and Winslow—by State Highway Department, Phoenix.

YAVAPAI CO.—**Packard Contracting Co., Inc.,** 601 Luhrs Tower, Phoenix—$198,042 for grade, drain and surf. from Yavapai Co. line nr. Courthouse Butte, 5.2 mi. N. to Sedona—by State Highway Department, Phoenix. 5-10

California

CALAVERAS CO.—**A. Teichert & Son,** P. O. Box 1133, Sacramento—$98,577 for surfacing betw. 2.6 mi. E. of Valley Sprgs. and 4.9 mi. E., a distance of 4.2 mi. in length—by Division of Highways, Sacramento. 5-7

HUMBOLDT CO.—**Mercer-Fraser Co.,** 2nd and Commercial Sts., Eureka—$522,115 for about 2.8 mi. grade and surf. betw. N. Scotia Bridge and 16th St., Fortuna—by Division of Highways, Sacramento. 5-1

KERN CO.—**Griffith Co.,** 1080 South Broadway, Los Angeles—$735,584 for 5.1 mi. grade and surf. betw. Hoskins Rd. and Brundage Lane—by Division of Highways, Sacramento. 5-24

LOS ANGELES CO.—**John J. Papac,** 726 N. Hill St., Los Angeles—$137,622 for improvement of Anza Ave. and streets bounded by 116th and 120th Sts., Inglewood Ave. and Aviation Blvd., Hawthorne—by Board of Supervisors, Los Angeles. 5-21

LOS ANGELES CO.—**Bainter Construction Co.,** 1767 Lime Ave., Long Beach—$163,330 for about 2 mi. of improvement on Cherry Ave., betw. South St. and Carson St., in the vicinity of Long Beach—by Board of Supervisors, Los Angeles. 5-7

LOS ANGELES CO.—**G. W. Ellis Construction Co.,** 8240 Lankershim Blvd., North Hollywood—$97,776 for about 8.1 mi. surf. betw. Lancaster and Kern County line—by Division of Highways, Sacramento. 5-7

LOS ANGELES CO.—**J. E. Haddock, Ltd.,** 3538 E. Foothill Blvd., Pasadena—$132,874 for street improvements on Slauson and Garfield Aves., in the vicinity of Montebello—by Board of Supervisors, Los Angeles. 5-7

RIVERSIDE CO.—**Hensler Construction Corp.,** 816 Allen Ave., Glendale—$386,232 for 6.8 mi. grade and surf. betw. 3 mi. SE of Mecca and 2.3 mi. SE of Thermal—by Division of Highways, Sacramento. 5-25

SAN LUIS OBISPO CO.—**Fredericksen & Kasler,** 212 13th St., Sacramento—$1,055,958 for 5 mi. grade and surf., const. reinf. conc. girder bridge across San Luis Obispo Crk., betw. Pismo Bch. and Miles Sta.—by Division of Highways, Sacramento. 5-1

SHASTA CO.—**W. C. Railing,** 27 Lowell St., Redwood City—$185,909 for 5.5 mi. grade and surf. betw. Fall River Mills and Dana—by Division of Highways, Sacramento. 5-7

SHASTA AND SISKIYOU COS.—**W. C. Railing,** 27 Lowell St., Redwood City—$116,377 for about 5.7 mi. surf. in Location 1 (Shasta Co.), and about 3.3 mi. surf. in Location 2 (Siskiyou Co.)—by Division of Highways, Sacramento. 5-17

SONOMA CO.—**Stolte, Inc.,** 8451 San Leandro St., Oakland, and **Duncanson-Harrelson Co.,** 1404 DeYoung Bldg., San Francisco—$1,318,315 for 4.3 mi. grade, surf. and const. bridges betw. 2 mi. N. and 0.7 mi. S. of Santa Rosa—by Division of Highways, Sacramento. 5-24

STANISLAUS CO.—**M. J. Ruddy,** 922 J St., Modesto—$191,470 for about 9.6 mi. graded roadbed and surf. betw. 1.2 mi. E. of Oakdale and 1.8 mi. W. of Tuolumne Co. line—by Division of Highways, Sacramento. 5-1

YOLO CO.—**A. Teichert & Son,** Box 1113, Sacramento—$91,495 for 4.5 mi. place cr. grav. base and surf. on Netherlands Rd. betw. St. Hwy. Rte. 99 and Clarksburg—by Division of Highways, Sacramento. 5-10

Colorado

BACA CO.—**Domenic Leone Construction Co.,** 818 Oak St.,

Trinidad—$113,711 for 7.1 mi. surf. betw. Springfield and Walsh —by State Highway Department, Denver. 5-3

EAGLE CO.—**C. L. Hubner Co.,** 4000 York St., Denver—$398,-909 for 5.2 mi. grav. surf. betw. Dowd and Wolcott—by State Highway Department, Denver. 5-1

FREMONT CO.—**J. H. & N. M. Monaghan and Associated Companies,** Rt. 1, Derby—$559,200 for 6.6 mi. gravel surf. betw. Canon City and Penrose—by State Highway Department, Denver. 5-7

MESA CO.—**J. H. & N. M. Monaghan Construction Co.,** Rt. 1, Derby—$89,068 for 10.9 mi. surf. betw. Grand Jct. and Fruita—by State Highway Department, Denver 5-1

PROWERS CO.—**Colorado Constructors, Inc.,** Denver—$88,-274 for 10.4 mi. oil processing on S. H. No. 59—by State Highway Department, Denver. 5-3

PROWERS CO.—**Blanchard Brothers,** 412 Tramway Bldg., Denver—$313,000 for 16 mi. grade and improvements on S. H. No. 59, located betw. Lamar and Springfield—by State Highway Department, Denver. 5-1

PUEBLO AND HUERFANO COS. — **Brown Construction Co.,** 1322 E. Willamette, Colorado Springs—$196,270 for 9.3 mi. oil process and improvements betw. Pueblo and Walsenburg—by State Highway Department, Denver. 5-7

VARIOUS COS.—**J. H. & N. M. Monaghan and Associated Companies,** Rt. 1, Derby—$235,536 for 23.3 mi. of gravel surf. betw. Sugar City and Haswell—by State Highway Department, Denver. 5-7

Idaho

JEROME CO.—**Hoops Construction Co.,** Box 431, Twin Falls —$76,781 for 8.5 mi. bitum. surf. of the Sawtooth Prk. Hwy., betw. Jerome and Rim Bridge—by Bureau of Highways, Boise. 5-1

Kansas

BARBER CO.—**Clarkson Construction Co.,** Kansas City, Mo. —$218,125 for 12 mi. grade—by State Highway Commission, Topeka. 5-19

CLARK CO.—**Southwest Sand & Gravel Co.,** Dodge City—$138,325 for 11 mi. grade and surf.—by State Highway Commission, Topeka. 5-19

CLARK CO.—**Southwest Sand & Gravel Co.,** Dodge City—$81,499 for 7.2 mi. grade and surf.—by State Highway Commission, Topeka. 5-19

FINNEY CO.—**Reno Construction Co.,** Overland Park—$146,-624 for 8.5 mi. pavement widen. and asph. surf.—by State Highway Commission, Topeka. 5-19

GRANT CO.—**San-Ore Construction Co.,** McPherson—$176,043 for 11.1 mi. grade and surf.—by State Highway Commission, Topeka. 5-19

PRATT CO.—**San-Ore Construction Co.,** McPherson—$132,807 for 10.6 mi. grade and surf.—by State Highway Commission, Topeka. 5-19

STEVENS CO. — **San-Ore Construction Co.,** McPherson — $187,775 for 13.2 mi. grade and surf.—by State Highway Commission, Topeka. 5-19

Montana

CARTER CO.—**Inland Construction Co.,** 3867 Leavenworth St., Omaha 5, Nebr.—$125,641 for 9.6 mi. grade, drain and surf. Wyo. line W. sect. Broadus-Wyo. line rd. —by State Highway Commission, Helena. 5-1

CHOUTEAU CO. — **Thomas Staunton,** Great Falls—$138,048 for 11.4 mi. grade, drain, and surf. Ft. Benton-Geraldine-Stanford Rd.—by State Highway Commission, Helena. 5-1

FLATHEAD CO.—**S. Birch & Sons Construction Co.,** 314 Ford Bldg., Great Falls —$377,417 for 7 mi. grade, drain and surf. the Kalispell-Libby Hwy.—by State Highway Commission, Helena. 5-1

POWDER RIVER CO. — **Lou Richardson,** Miles City—$80,644 for 11.5 mi. grade, drain and surf. Broadus-Biddle Rd. — by State Highway Commission, Helena. 5-1

ROOSEVELT CO. — **Northwest Engineering Co.,** 1311 St. Joe St., Rapid City, S. Dak.—$196,454 for 16.7 mi. grade, drain, surf. and const. two tbr. bridges on North Rd. — by State Highway Commission, Helena. 5-1

TOOLE CO.—**H. G. R. Construction Co., Inc.,** Great Falls—$97,641 for grade, drain and surf. 7.7 mi. Kevin west rd.—by State Highway Commission, Helena. 5-1

Nevada

ESMERALDA CO.—**J. C. Compton Co.,** Box 86, McMinnville, Ore. — $95,330 for const. of about 29.8 mi. of State Highway System, from a point about 6 mi. N. of Nevada-Calif. line to a jct. with U. S. 6 nr. Coaldale — by Department of Highways, Carson City. 5-7

EUREKA CO.—**Olof Nelson Contracting Co.,** Box 413, Logan—$101,973 for 20.2 mi. of hwy. improvements from a jct. with U. S. 50 nr. Eureka in Garden Pass, Rt. 20—by Department of Highways, Carson City. 5-4

LANDER CO.—**Hunt and Frandsen,** Box 1626, Reno—$230,563 (Prop. A.) and **Isbell Construction Co., Inc.,** S. Virginia Rd., Reno—$307,359 (Prop. B.) for const. proj. on Nev. Lands Hwy., a total length of 5.5 mi.—by Public Roads Administration, Carson City. 5-21

WASHOE CO.—**G. E. Schilling Co.,** 1227 D St., Sparks—$104,475 for grade and surface on Const. Job No. 4, Reno—by City Council, Reno. 5-24

WASHOE CO.—**I. Christensen Co.,** 234 Gardiner St., Reno—$182,575 for street improvements in Reno — by City Council, Reno. 5-14

WASHOE CO.—**I. Christensen Co.,** 234 Gardiner St., Reno — $114,149 for const. sidewalks, curbs, gutters, etc. on Contract No. 3 in Reno—by City Council, Reno. 5-25

WASHOE CO.—**Isbell Construction Co.,** Box 2351, Reno—$146,845 for grade and surf. on Contract No. 5, Reno—by City Council, Reno. 5-25

New Mexico

MORA AND COLFAX COS.—**Allison & Haney,** Box 1507, Albuquerque — $108,878 for 97 mi. addl. leveling and reprocessing of oil mat on U. S. Hwy. Rt. No. 58 betw. Springer and Clayton and Rt. 85 betw. Watrous and French—by State Highway Department, Santa Fe. 5-19

SANTA FE CO.—**Lowdermilk Brothers,** Box 276, Espanola—$788,655 for grading, fencing and improvements on the South

Mesa Rd., Los Alamos—by U. S. Atomic Energy Commission, Los Alamos. 5-11

North Dakota

CASS CO.—**S. J. Groves & Sons Co.,** 509 Wesley Temple Bldg., Minneapolis, Minn. —$868,730 for 13.1 mi. grade and surf. on U. S. Hwy. 81 N. of Argusville to Fargo—by State Highway Department, Bismarck. 5-1

McKENZIE CO.—**Albert LaLonde Co.,** Sidney, Mont.—$247,494 for 4.7 mi. grade, remove structs. and surf. on U. S. Hwy. 85 from Missouri Riv. nr. Williston, S.E.—by State Highway Department, Bismarck. 5-1

MORTON CO.—**Northwestern Engineering Co.,** 1311 St. Joe St., Rapid City, S. Dak. —$199,597 for 0.6 mi. grade, surf. and structs. on U. S. Hwy. 10, within city limits of Mandan — by State Highway Department, Bismarck. 5-1

STEELE AND TRAIL COS.—**Herbert Reese,** Greenbush, Minn. — $220,899 for grade and surf. on S. H. No. 7, Finley E. — by State Highway Department, Bismarck. 5-1

Oregon

CLACKAMAS CO.—**Warren Northwest, Inc.,** N.E. 102 and Warren Road, Portland —$657,071 for 5.3 mi. grade, pave, bridge wall and viaduct const. on Oregon City-New Era Sect. of Pacific Hwy.—by State Highway Commission, Salem. 5-17

DOUGLAS CO.—**The Slate Construction Co.,** Albany—$256,972 (recommended) for road const. in Umpqua Natl. Forest—by Public Roads Administration, Portland. 5-19

Utah

MILLARD CO.—**Reynolds Construction Co.,** Springville—$111,148 for 17.9 mi. grav. surf. on U. S. Hwy. 6 betw. Nev. State Line and Delta—by State Road Commission, Salt Lake City. 5-7

Washington

ASOTIN CO.—**Sather & Sons,** Box 197, Spokane—$80,780 for 2.4 mi. clear, grade, drain, surf. and const. conc. girder bridge on the Asotin to Jerry Rd.—by State Highway Department, Olympia. 5-13

BENTON CO.—**C & E Construction Co.,** Box 1531, Yakima—$168,543 for 6.5 mi. grade and surf. from Richland to Kennewick — by State Highway Department, Olympia. 5-22

COWLITZ AND LEWIS COS.—**Pacific Sand & Gravel Co.,** Centralia—$82,880 for resurf. with asphlt. conc. pave. on 5.4 mi. from Chehalis to Barnes Park—by State Highway Department, Olympia. 5-22

KING CO.—**Queen City Construction Co.,** Seattle—$91,028 for improving 46th Ave. S.W. by sewers in the City of Seattle—by Board of Public Works, Seattle. 5-7

KING CO.—**Northwest Construction Co.,** 3950 6th Ave., N.W., Seattle—$278,998 for street improvements on Beacon Ave., Seattle—by Board of Public Works, Seattle. 5-7

KING CO.—**Northwest Construction Co.,** 3950 6th Ave., N.W., Seattle—$104,764 for resurf. E. Marginal Way, Seattle — by Board of Public Works, Seattle. 5-21

KING CO.—**Seattle Contracting Co.,** Seattle — $121,199 for pave 20th Ave. W., Seattle—by Board of Public Works, Seattle. 5-21

KITTITAS AND YAKIMA COS.—**Okanogan Valley Paving Co.,** Omak—$84,462 for grade and surf. 13.4 mi. hwy. from Ellensburg to Umptanum; on 7.6 mi. from Hillside to Yakima; and 6.8 mi. from Yakima to Moxee—by State Highway Department, Olympia. 5-8

OKANOGAN CO.—**C. E. O'Neal,** Box 268, Ellensburg—$300,547 (recommended) for 3.5 mi. of the Washington Forest Hwy. Proj., Loup Loup Hwy., Chelan Natl. Forest—by Public Roads Administration, Portland. 5-22

Wyoming

DOUGLAS CO. — **Knisely-Moore Co.,** Box 77, Douglas—$99,980 for grade and surf. 15.5 mi. Shoshoni-Pavillion Rd.—by State Highway Commission, Cheyenne. 5-16

NIOBRARA-WESTON COS.—**Sharrock and Pursel,** Box 316, Casper—$309,903 for 8.4 mi. surf., const. bridge and seven culverts on the Newcastle-Lusk Rd.—by State Highway Commission, Cheyenne. 5-16

SHERIDAN CO.—**Big Horn Construction Co.,** Box 875, Sheridan—$388,799 for grade and surf. 20 mi. of Sheridan-Ucross Rd. — by State Highway Commission, Cheyenne. 5-16

Bridge & Grade . . .

Arizona

MOHAVE AND MARICOPA COS.—**H. L. Royden,** Box 3707, Phoenix—$345,970 for const. of 9-span steel girder bridge and 1 mi. approaches on the Wickenburg-King-

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. . . Tractair and Le Roi-Cleveland Air Tools save you money

man Hwy. over Big Sandy Riv. about 55 mi. SE of Kingman—by State Highway Department, Phoenix. 5-11

California

DEL NORTE CO. — **Baldwin, Straub Corp.,** 26 Francisco Blvd., San Rafael, and **Arthur B. Siri,** 1357 Cleveland Ave., Santa Rosa—$195,358, for const. steel plate girder bridge and about 0.7 mi. grade and surf. appr. at Turwar Crk. about 3 mi. E. of Klamath—by Division of Highways, Sacramento. 5-7

LOS ANGELES CO.—**George W. Peterson,** 6035 Barton Ave., Los Angeles—$126,346 for const. reinf. conc. box girder overcrossing on the Arroyo Seco Parkway at Alpine St., Los Angeles—by Division of Highways, Sacramento. 5-19

LOS ANGELES CO.—**J. E. Haddock, Ltd.,** 3538 E. Foothill Blvd., Pasadena—$416,812 for const. reinf. conc. overcrossing and undercrossing on Hollywood Parkway at Bonnie Brae St. and at Beaudry Ave., Los Angeles—by Division of Highways, Sacramento. 5-18

LOS ANGELES CO. — **Charles MacClosky Co.,** 112 Market St., San Francisco —$332,786 for const. two reinf. conc. undercrossings at Hollywood Parkway at Vendome St. and at Coronado St., Los Angeles — by Division of Highways, Sacramento. 5-3

SACRAMENTO CO.—**Brighton Sand & Gravel Co.,** Box 2604, Sacramento, and **Lew Jones Construction Co.,** 150 N. 28th St., San Jose—$202,034 for 1.6 mi. grade and surf., and const. three reinf. conc. slab bridges at Sloughouse — by Division of Highways, Sacramento. 5-17

Colorado

ARAPAHOE CO. — **Henry Shore,** Box 271, Littleton—$234,267 for 3 mi. surf. and const. bridge on S. H. No. 83 S. of Denver —by State Highway Department, Denver.

OURAY CO.—**Gardner Construction Co.,** Glenwood Springs — $108,996 for const. bridge and appr. betw. Ridgway and S. H. No. 19 on S. H. No. 62—by State Highway Department, Denver. 5-7

PHILLIPS CO.—**Baab Construction Co.,** 828 19th St., Greeley, and **Carl V. Hill,** 1844 13th Ave., Greeley — $93,745 for const. bridge and oil process appr. 0.3 mi. in length in Holyoke—by State Highway Department, Denver. 5-3

Oregon

MARION AND POLK COS. — **Macco Corporation,** 815 N. Paramount Blvd., Clearwater, Cal.—$845,900 for the const. of a bridge about 2214 ft. in length over the Willamette River at Independence — by State Highway Commission, Salem. 5-7

Washington

COWLITZ CO.—**Lockyear & White,** 4136 40th St., S.W., Seattle—$87,978 for const. reinf. conc. app. and steel truss bridge on 0.1 mi. of Tower Rd. over the Toutle Riv. —by State Highway Department, Olympia. 5-22

COWLITZ CO.—**Hawkins & Armstrong,** 5265 16th N.E., Seattle—$254,279 for clear, grade, drain, surface and const. fixed steel truss span with reinf. conc. appr. on 0.7 mi. Toutle Riv. Bridge and appr. nr. St. Helens —by State Highway Department, Olympia. 5-8

Water Supply . . .

Arizona

MARICOPA CO.—**J. H. Welsh & Son,** 805 S. Central Ave., Phoenix—$72,311 for const. numerous short connections in the water dist. syst. lines from Thomas Rd. to Indian School Rd. on 32nd St., Phoenix—by City Commission, Phoenix. 5-7

California

LOS ANGELES CO.—**A. Teichert and Son, Inc.,** 1846 3rd St., Sacramento—$460,452 for const. reinf. conc. conduit in Arroyo Seco Channel from La Loma Rd., Pasadena, to San Pascual Ave., Los Angeles—by Board of Supervisors, Los Angeles. 5-1

Sewerage . . .

California

ALAMEDA CO.—**P. and J. Artukovich,** 13305 S. San Pedro St., Los Angeles — $169,369 for const. of Sect. 3, South Interceptor Sewer in Oakland—by East Bay Municipal Utility District, Oakland. 5-1

ALAMEDA CO.—**John Pestana,** 16411 E. 14th St., San Leandro—$222,635 for const. access roadways, bridges and main trunk sewers at San Lorenzo—by Oro Loma Sanitary District, San Lorenzo. 5-7

ALAMEDA CO. — **Robert B. McNair,** 3745 Rhoda Ave., Oakland—$115,543 for installation of sewer system and pumping plant at the Coast Guard Base, Govern-

"Plenty of what it takes"

FOR HEAVY HAULING JOBS

WHEN ponderous loads are to be moved, you're almost certain to find a Fruehauf Low-Bed Trailer on the job. A Fruehauf drew the famous Palomar Mountain assignment. Another Fruehauf, owned by Jay F. Oldham, helped in adding to Bonneville's power outlet by transporting a huge transformer. This latter load towered 15′ 7″ and weighed 76,000 lbs. — 38 tons — gross 108,000 lbs., a near-record for highway hauling in Oregon.

The Fruehauf Low-Bed Trailer is a "natural" for many uses in the construction field. Shovels, dozers, cranes, boilers, generators — any type of heavy equipment — can be loaded easily and moved to the job quicker and for less cost than by any other means. Owners say they prefer Fruehaufs, because they are easier to manipulate, roll freely on the highways and can be positioned in the exact spot for unloading no matter how difficult the terrain.

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PLAIN HORSE SENSE
YOU CAN PULL FAR MORE THAN YOU CAN CARRY!

FRUEHAUF TRAILERS

"Engineered Transportation"

ment Island, Alameda — by U. S. Coast Guard, San Francisco. 5-7

CONTRA COSTA CO.—**Martin Brothers,** Box 5, Concord—$146,312 for installing a central trunk sewer of 5 mi. from Lafayette to a point about NW of St. Mary's College, Moraga—by Central Contra Costa Sanitary Dist., Walnut Creek. 5-18

LOS ANGELES CO.—**Guy F. Atkinson Co.,** 22233 So. Santa Fe Ave., Long Beach — $3,613,850 for const. primary settling syst. at the Hyperion Activated Sludge Plant, El Segundo—by Board of Public Works, Los Angeles. 5-1

LOS ANGELES CO. — **Robert Vlacich,** 2901 Worthen Ave., Los Angeles—$118,420 for instl. sewers in Oak Ave., et al, in Los Angeles—by City Council, Pasadena. 5-21

LOS ANGELES CO.—**Artukovich Bros.,** 7320 N. Atlantic Ave., Paramount—$285,280 for 7.3 mi. of sanitary sewers on El Camino Ave., etc., Los Angeles—by Board of Public Works, Los Angeles. 5-7

LOS ANGELES CO.—**M. F. Kemper Construction Co.,** 3701 Overland Ave., Los Angeles—$115,111 for const. of effluent outfall connections and appurt. works for the Hyperion Activated Sludge Plant, El Segundo—by Board of Public Works, Los Angeles. 5-7

SAN FRANCISCO CO.—**Martin Murphy,** Rt. 2, Box 894, Oak Road, Walnut Creek—$70,808 for const. sewer syst. on 20th and 21st Sts., and Florida St., San Francisco—by Department of Public Works, San Francisco. 5-1

SANTA CLARA CO.—**Earl W. Heple,** 494 Delmar Ave., San Jose—$266,502 for const. storm water sewers and appurt. in San Jose—by City Council, San Jose. 5-7

SANTA CRUZ CO. — **Stolte, Inc.,** 8451 San Leandro St., Oakland—$242,997, for const. municipal sewage disposal plant nr. Bay and California Sts., Santa Cruz—by City of Santa Cruz. 5-4

STANISLAUS CO.—**Stockton Construction Co.,** Box 2087, Stockton—$416,136 for const. settling and oxidation ponds, percolation beds, screen structs. and pipe lines in Modesto—by City Council, Modesto. 5-28

Oregon

LANE CO.—**Thorburn & Logozo,** 4107 35th S.W., Seattle, Wash.—$155,769 to install sanitary sewer syst.; **Rushlight Automatic Sprinkler Co.,** 55 N.E. Farragut, Portland—$82,683 for sewage pump sta.; **Salem Sand & Gravel Co.,** 1405 N. Front St., Salem—$47,135 for outfall sewer. All work to be done in Junction City—by City Council, Junction City. 5-24

LANE CO.—**P. S. Lord,** 4507 E. Milwaukie, Portland — $292,314 to install sewer mains in Eugene—by City Council, Eugene. 5-24

Waterway . . .

California

ALAMEDA CO.—**San Francisco Bridge Co.,** 503 Market St., San Francisco—$510,400 for dredg. and fill 2,200,000 cu. yds. matl. for new industrial land in the San Leandro Bay area E. of Hegenberger Rd. and S. of Eastshore Freeway, Oakland—by Board of Port Commissioners, Oakland. 5-14

LOS ANGELES CO. — **Warren-Southwest, Inc.,** 2145 E. 25th St., Los Angeles—$374,447 for furnish. 63,144 lin. ft. of reinf. conc. jacketed bearing piles at Los Angeles Harbor — by Harbor Commission, Los Angeles. 5-7

LOS ANGELES CO.—**James I. Barnes Construction Co.,** 1119 Montana Ave., Santa Monica—$793,320 for const. of conc. wharf and appr. at Berths 72, 73-A, B, C and E, Los Angeles Harbor—by Harbor Commission, Los Angeles. 5-7

YOLO CO.—**H. Earl Parker,** 12th and F Sts., Marysville—$534,560 for const. levees along N. and S. bank of Putah Crk. from W. levee of Yolo By-Pass upstream 9.4 mi. —by Corps of Engineers, Sacramento. 5-18

Irrigation . . .

California

TULARE CO.—**Otto B. Asbach and Sons,** 2975 N. Hamlin Ave., St. Paul, Minn., and **Steenberg Construction Co.,** W. 1672 First Natl. Bank Bldg., St. Paul, Minn.—$4,826,544 for const. earthwork, canal lining, and structs. on the Friant-Kern Canal, Central Valley Project, located about 3 mi. S. of Woodlake to about 2 mi. E. of Lindsay. Completion of the work is required in 700 calendar days—by Bureau of Reclamation, Friant.

Wyoming

FREMONT CO.—**United Engineers,** Ogden, Utah—$59,541 (Sch. 1) and $219,900 (Sch. 2) for earthwork and structs. on Wyo. Canal, Sheep Camp Drain into Five Mile

The One Carryable Pump for all jobs

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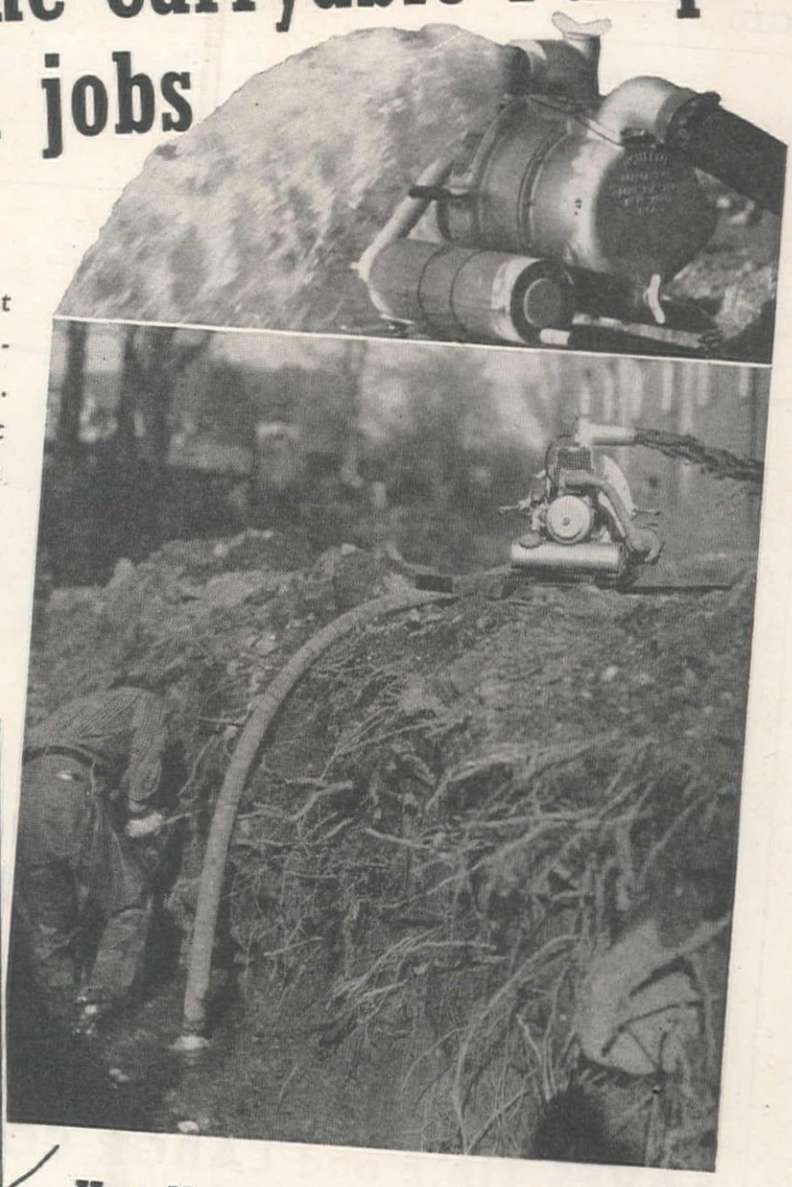

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Factory sales and service branches: Seattle, Portland, San Francisco, Los Angeles, Denver, Phoenix, Salt Lake City.

Crk. and N. Pavillion Lat. Syst., about 25 mi. NW of Riverton—by Bureau of Reclamation, Denver, Colo. 5-24

Dam . . .

California

MARIN CO.—**Piombo Construction Co.**, 1571 Turk St., San Francisco, and **Baldwin, Straub Corp.**, 26 Francisco Blvd., San Rafael—$472,630 for const. 1200 ft. long earthfill Bon Tempe Dam, 4 mi. W. of San Rafael—by Marin Municipal Water District, San Rafael. 5-7

MONTEREY CO. — **Macco Corporation**, 815 North Paramount Blvd., Clearwater—$848,245 for const. Los Padres Dam on the Carmel Riv., 6 mi. upstream from San Clemente Lake at Barnes Flat in the Cachagua area—by California Water and Telephone Company, San Francisco. 5-5

SANTA BARBARA CO.—**V. D. Case Co.**, 850 E. Ocean Blvd., Los Angeles—$797,587 for an addition of 15 ft. to height of exist. Gibraltar Dam, and const. appurt. structs., on the Santa Ynez Riv., 8 mi. N. of Santa Barbara—by City Clerk, Santa Barbara. 5-10

Airport . . .

Colorado

DENVER CO. — **Western Paving Co.**, 5230 Washington, Denver — $743,556 for airport improvements incl. new 8500-ft. east-west runway (asphalt) and reconst. of N. part of north-south runway; lighting, drainage, etc. at Stapleton Airfield, Denver—by Dept. of Improvements and Parks, Denver. 5-11

Power . . .

British Columbia

VANCOUVER—**Miners Western, Ltd.**, 675 West Hastings St., Vancouver—$1,236,998 for const. a 12-ft. diameter tunnel about 2 mi. long and aux. works at Whatshan Lake—by British Columbia Power Commission, Victoria. 5-1

Building . . .

Arizona

GREENLEE CO. — **Womack Construction Co.**, 1712 S. Central Ave., Phoenix—$739,825 for const. 3-story conc. High School bldg., Morenci — by High School District, Morenci. 5-24

MARICOPA CO.—**J. R. Porter**, 3407 N. 7th St., Phoenix—$167,563 for const. new obstetrical wing to Southside Dist. Hospital, Mesa—by Southside District Hospital, Mesa. 5-7

MARICOPA CO. — **Albert B. Schuff**, Phoenix—$1,500,000 for const. of Camelback Villa on the NW cor. of Camelback Rd. and Biltmore Dr., Phoenix—by Arizona Manor, Inc., Phoenix. 5-19

TUCSON CO.—**M. M. Sundt Construction Co.**, 440 S. Park Ave., Tucson—$419,583 for const. college bldg. at the Univ. of Ariz., Tucson — by Board of Regents, University of Arizona, Tucson. 5-7

California

ALAMEDA CO.—**Swinerton & Walberg**, 1723 Webster St., Oakland—$229,628 for const. gymnasium for Elmhurst Junior High School, 98th Ave. and Cherry, Oakland—by High School District, Oakland. 5-27

ALAMEDA CO.—**Monson Brothers**, 475 Sixth St., San Francisco — $204,800 for alterations and additions to the Hearst Memorial Mining Bldg., at the Univ. of Calif., Berkeley — by Board of Regents, Berkeley. 5-1

ALAMEDA CO.—**Monson Brothers**, 475 6th St., San Francisco — $4,500,000 for const. 3-story and basement addn. to the Telephone Exchange Bldg. at 2116 Bancroft Way, Berkeley—by Pacific Telephone & Telegraph Co., San Francisco. 5-28

ALAMEDA CO. — **Leo Epp**, 317 Broderick St., San Francisco — $591,877 for const. reinf. conc. 2-story Lafayette School on West St., Oakland—by Board of Education, Oakland. 5-7

ALAMEDA CO.—**Willis F. Lynn**, 1040 Folger Ave., Berkeley—$511,250 for const. reinf. conc. 2-story elementary school on Richie St. and Ney Ave., Oakland — by Board of Education, Oakland. 5-1

CONTRA COSTA CO.—**Parker, Steffens & Pearce**, 136 South Park, San Francisco—$250,000 for const. all-steel store bldg. at 241-251 E. 4th St., Pittsburg—by J. C. Penney Co., Inc., San Francisco. 5-18

KERN CO.—**O. D. Williams, Jr.**, and **L. H. Huffman**, Box 874, Oildale—$368,900 for const. the Casa Loma School Bldg. on

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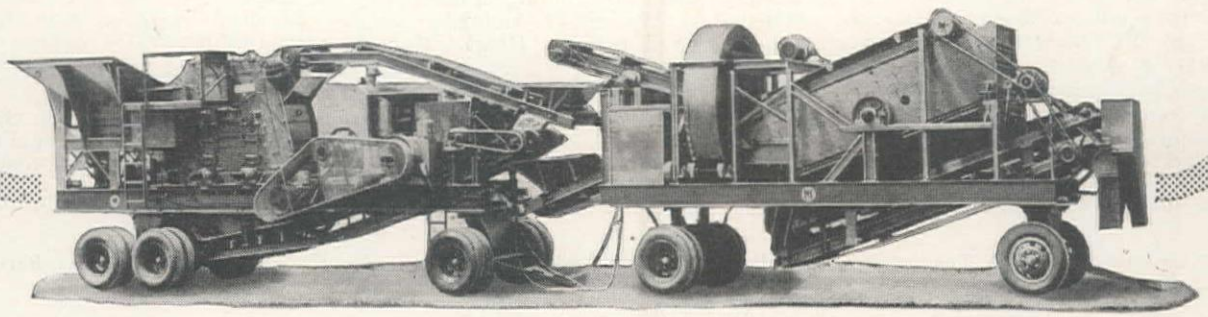

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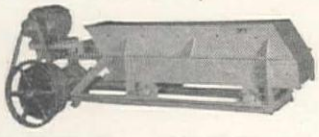

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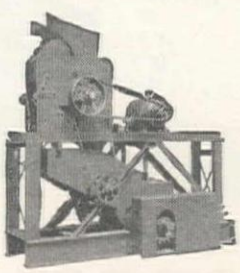
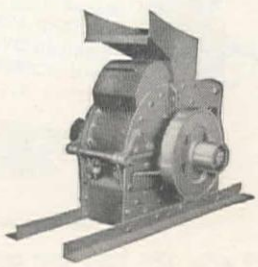
Inclined Bucket Elevators and a complete line of Conveyor Belts



Combination Hammer and Roll Crusher with Vibrating Screen



Hammer Pulverizer

Casa Loma Drive and Madison St., Bakersfield—by City School District, Bakersfield. 5-13

KERN CO.—**Guy E. Hall,** 310 30th St., Bakersfield—$476,817 for const. 2-story and basement cafeteria and home economics bldg. at East Bakersfield High School, Bakersfield—by Union High School District, Bakersfield. 5-7

KERN CO.—**L. H. Hanson & Sons,** 212 Palm Ave., Fresno—$443,388 for const. school bldg. on Wayside and P St., Bakersfield—by City School District, Bakersfield. 5-4

LOS ANGELES CO.—**Contracting Engineers, Ltd.,** 2301½ W. Vernon Ave., Los Angeles, and **Halper Construction Co.,** 739 N. Highland Ave., Los Angeles—$577,752 for const. 1 and part 2-story club house on 10,000 W. Pico Blvd., Los Angeles—by Hillcrest Country Club, Los Angeles. 5-24

LOS ANGELES CO.—**L & P Construction Co.,** 153 S. Beverly Dr., Beverly Hills—$328,800 for const. forty dwellings in Venice Dist., Los Angeles—by self. 5-21

LOS ANGELES CO.—**Starrett Brothers and Eken,** 6120 W. 3rd St., Los Angeles—$442,200 for const. 66-unit, 2-story reinf. brick apartment bldg. on Orange Grove Ave., Genesee and Blackburn Sts., Los Angeles — by Metropolitan Life Insurance Company, Los Angeles. 5-1

LOS ANGELES CO.—**Peter P. Shelby,** 4414 W. Jefferson Blvd., Los Angeles—$669,966 for const. 2-story and basement, reinf. conc. administration and classroom bldg. at Verdugo Hills High School, Tujunga—by Board of Education, Los Angeles. 5-1

LOS ANGELES CO.—**E. A. Teague,** 5126 Wilshire Blvd., Los Angeles—$186,000 for const. two 16-family apartment bldgs. at 215-33 Lucas Ave., Los Angeles — by Crownwood View Corporation, Los Angeles. 5-7

LOS ANGELES CO. — **G. Iannini Co.,** 2503 Sepulveda Blvd., Manhattan Beach—$228,005 for const. eleven frame classroom units at the Sherman Way Junior High School, Canoga Park—by Board of Education, Los Angeles. 5-1

LOS ANGELES CO.—**H. B. Nicholson,** 117 E. Colorado St., Pasadena—$188,490 for const. Naval Reserve Armory in North Hollywood—by 11th Naval District, San Diego. 5-25

LOS ANGELES CO. — **Encino Gardens Co.,** 6307 Wilshire Blvd., Los Angeles—$800,000 for const. one hundred dwellings in Van Nuys—by self. 5-7

LOS ANGELES CO. — **Steed Brothers,** Box 350, Alhambra—$279,400 for const. Arden School at Lower Azusa and Arden Dr., El Monte—by School District, El Monte. 5-1

MONTEREY CO.—**Stolte, Inc.,** P. O. Box 1470, Monterey—$293,400 for const. school bldg. on the E. Monterey Elementary School site, fronting on Hardy Pl., Maple Ave., Waring Pl., and Elm Ave., Monterey—by City School District, Monterey. 5-13

MONTEREY CO. — **Harold C. Geyer,** Box 1190, Monterey—$385,141 for heating plant, laundry and shop bldgs. on a portion of the Monterey County Hospital site, E. of Natividad Rd., and about 2 mi. from Salinas—by County of Monterey, Salinas. 5-4

NAPA CO.—**Clem Anderson,** 2048-A Lincoln Ave., Alameda—$186,696 for const. 1-story school bldg. on Kilburn Ave. betw. Cornwall and Avon Sts., Napa—by School District, Napa. 5-1

ORANGE CO.—**R. Koel,** 2034 W. 96th St., Los Angeles — $168,000 for const. twenty-four 8-room dwellings at 1700 and 1800 block Birch St., Santa Ana—by Santa Ana Development Company, Santa Ana. 5-7

SACRAMENTO CO. — **MacDonald, Young and Nelson,** 351 California St., San Francisco—$196,609 for const. Naval Reserve Armory in Sacramento — by 12th Naval District, San Francisco. 5-25

SACRAMENTO CO.—**H. W. Robertson, Inc.,** 2917 T St., Sacramento—$242,887 for const. conc. 2½-story office bldg. on the SW cor. 21st and J Sts., Sacramento—by Department of Employment, Sacramento. 5-19

SAN BERNARDINO CO. — **Marigold Corp.,** San Bernardino — $2,000,000 for const. private housing proj. on San Bernardino Ave., betw. Richardson St. and Mountain View Ave., San Bernardino—by self. 5-21

SAN FRANCISCO CO.—**Starrett Bros. & Eken,** 3701 - 19th Ave., San Francisco—$2,000,000 for const. 11 apartment bldgs. to house 9,000 in Lake Merced area, San Francisco—by Metropolitan Life Insurance Co., San Francisco. 5-27

SAN FRANCISCO CO. — **Swinerton & Walberg,** 225 Bush St., San Francisco — $4,700,000 for const. reinf. conc. and steel frame 22-story office bldg. at 265 Bush St., San Francisco—by Standard Oil Co., San Francisco. 5-12

SAN FRANCISCO CO.—**Barrett & Hilp,**

918 Harrison St., San Francisco—$289,127 for construction of reinf. conc. additions to St. Vincent De Paul Parochial School, San Francisco—by Roman Catholic Archbishop, San Francisco. 5-24

SANTA CLARA CO.—**Earl W. Heple,** 494 Delmas Ave., San Jose—$156,968 for const. school addn. of College Park School on Coleman and Hedding Aves., San Jose—by Board of Education, San Jose. 5-4

SANTA CLARA CO. — **Earl W. Heple,** 494 Delmas Ave., San Jose—$111,820 for the const. of four fire stations in Santa Clara County—by Board of Fire Commissioners, San Jose. 5-13

SANTA CLARA CO.—**Earl W. Heple,** 494 Delmas Ave., San Jose—$257,507 for const. office and warehouse bldg. in San Jose—by Joseph George Distributors, San Jose. 5-19

SANTA CRUZ CO.—**MacDonald, Young & Nelson,** 315 Montgomery St., San Francisco—$375,000 for const. 3-story telephone exchange bldg. on Van Ness Ave., Watsonville—by Pacific Telephone & Telegraph Co., San Francisco. 5-4

SHASTA CO. — **Pacific Coast Builders,** 2530 18th St., San Francisco—$267,776 for const. Sequoia School, Kutras Tract in Redding—by Elementary School District, Redding. 5-24

TULARE CO.—**Flowers & Shirley,** 1150 E. San Joaquin St., Tulare—$152,000 for const. school bldg. in Woodlake—by Elementary School District, Woodlake. 5-21

YOLO CO. — **J. A. McNeil Co.,** 1106 Broadway, Oakland — $175,000 (approx.) for const. Our Lady of the Rosary Church on W. corner of Main, E. of Cleveland and Pendergast Sts., Woodland — by Roman Catholic Church, Sacramento. 5-12

Idaho

ADA CO.—**Kloepfer & Gramkow,** 416 S. 6th St., Boise—$871,452 for const. hospital addns. to the Veterans Administration Hospital, Boise—by Veterans Administration, Seattle, Wash. 5-17

Montana

LEWIS AND CLARK CO.—**McKinnon-Decker Co.,** 1520 Hauser Blvd., Helena—$160,000 for const. 2-story reinf. conc. office bldg. at 555 Fuller Ave., Helena—by 555 Fuller Ave. Building Corporation, Helena. 5-1

Nevada

CLARK CO.—**Superior Construction Co.,** Box 1551, Las Vegas—$169,700 for const. Naval Reserve armory in Las Vegas—by 11th Naval District, San Diego, Calif. 5-17

WASHOE CO.—**J. A. Bryant,** 1815 Capitol St., Vallejo, Calif.—$141,845 for alterations to exist. bldg. and const. two addl. wings at the Veterans' Administration Center, Reno — by Veterans Administration, San Francisco, California. 5-1

New Mexico

BERNALILLO CO.—**Robert E. McKee,** 1918 Texas St., El Paso, Texas—$453,200 for const. 5 conc. and hollow tile warehouses at Sandia Base, Albuquerque—by U. S. Engineer Corps, Albuquerque. 5-26

Oregon

LANE CO. — **Waale-Camplan Co.,** 2100 S.W. Jefferson St., Portland—$129,779 for const. an addn. to the music hall at the University of Oregon, Eugene—by Board of Regents, University of Oregon, Eugene.

MARION CO. — **Sound Construction & Engineering Co.,** 1403 W. 45th St., Seattle —$1,669,905 for const. reinf. conc. 5-story state office bldg. on North Capitol St., Salem—by Board of Control, Salem. 5-25

MULTNOMAH CO. — **Waale-Camplan Co.,** 2100 S.W. Jefferson, Portland—$222,-216 for const. 2-story conc. office bldg. in Portland—by Teamster Building Association, Inc., Portland. 5-6

WASCO CO. — **H. J. Settergren,** Henry Bldg., Portland—$225,500 for const. brick veneer reinf. conc. 2-story dormitory and residence at the Tuberculosis Hospital, The Dalles — by State Board of Control, Salem. 5-1

Utah

UTAH CO.—**B. D. Palfreyman,** 167 E. 2nd St., Provo—$3,000,000 for const. housing subdivision in Orem—by City Council, Orem. 5-15

Washington

PIERCE CO.—**J. G. Watts Construction Co.,** 2315 Western Ave., Seattle—$272,223 for const. a reinf. conc. stadium with a 3,000 seating capacity in Ft. Lewis — by Corps of Engineers, Seattle. 5-7

SKAGIT CO.—**Paul Odegard,** 2417 Hewitt Ave., Everett—$285,490 for const. addns. to food preparation, storage bldg., and dining room for personnel at the Northern State Hospital, Sedro-Wooley—by Department of Instruction, Olympia. 5-3

THURSTON CO.—**A. G. Homann,** 112 N. Franklin, Olympia—$445,627 for const. 1-story, 12-classroom Roosevelt Elem. School, Olympia—by School District 320, Olympia. 5-24

British Columbia

VANCOUVER—**Associated Construction Co., Ltd.,** 445 Granville St., Vancouver — $350,000 for const. 8-story reinf. conc. bldg. and rack house in Vancouver—by United Distillers, Ltd., Vancouver. 5-14

Miscellaneous . . .

California

SAN FRANCISCO CO.—**Ben C. Gerwick Inc.,** 112 Market St., San Francisco—$112,-200 for drilling test borings on various routes for future Bay crossings in San Francisco — by Department of Public Works, Sacramento. 5-14

SAN FRANCISCO CO.—**Eaton & Smith,** 715 Ocean Ave., San Francisco—$112,479 for removal of tracks and reconst. of pavement on Kearny St. betw. Geary and Broadway Sts., San Francisco—by City and County of San Francisco. 5-7

SAN FRANCISCO CO.—**Charles L. Harney,** 575 Berry St., San Francisco—$187,-898 for reconst. of various streets in San Francisco—by City and County of San Francisco. 5-11

SAN FRANCISCO CO.—**Charles L. Harney,** 575 Berry St., San Francisco—$143,444 for grade, retaining walls and service stations at Elkton Yard, San Jose and Ocean Ave., San Francisco—by City and County of San Francisco. 5-5

Idaho

VALLEY CO. — **Western-Knapp Engineering Co.,** 760 Folsom St., San Francisco, Calif.—$1,000,000 for const. of a smelter in Stibnite — by Bradley Mining Company, San Francisco, Calif. 5-25

Nevada

CLARK CO. — **Southwest Welding & Manufacturing Co.,** 3201 W. Mission Rd., Alhambra, Calif.—$935,000 for furnishing steel penstocks to be embedded in conc. intake struct. at right side of downstream end of forebay channel at Davis Dam — by Bureau of Reclamation, Davis Dam. 5-24

Alaska

FAIRBANKS — **Judson-Pacific-Murphy Corporation,** 4300 Eastshore Hwy., Emeryville, Calif.—$750,000 for const. airplane hangar 300-ft. long and wide and 80 ft. in height in Fairbanks—by Corps of Engineers, Fairbanks. 5-21

FAIRBANKS—**M. P. Munter Co.,** Vance Bldg., Seattle, Wash.—$640,397 (Stage 1) for const. railroad terminal yard at Fairbanks; **Morrison-Knudsen Co.,** Box 450, Boise, Idaho—$7,481,711 (Stages 2 and 3) for terminal facil., track raising, bank widen. and tie removal at Fairbanks — by Alaska Railroad, Anchorage. 5-25

1948 ARBA Road Show

Latest innovations in construction equipment will be unveiled at the road show in Chicago, July 16 to 24—The remainder of this issue is devoted to a preview of the show for those who will attend and information about the exhibits for stay-at-homes

THE FIRST POSTWAR road show to be conducted by the American Road Builders Association will be held at Soldier Field, Chicago, from July 16 to 24. It will, by all gages, be the greatest and most dramatic spectacle in the road building history of the United States. A display area of 1,250,000 sq. ft. —an area equal to 30 football fields— will be utilized by 300 manufacturing concerns exhibiting the latest innovations in road and airport construction equipment and materials.

Featuring some giant machines weighing more than 100 tons, the many "largests" and "firsts" will make this show the greatest in the history of ARBA.

Since 1909, thirty-one road shows have been held by the Association, the foremost advocate in the United States of extensive roadbuilding programs. Ten of the shows have been held in Chicago. The first show, held in Columbus, Ohio, in 1909 was viewed by many as a rather hazardous experiment. Forty manufacturing concerns exhibited road machinery, materials and appliances in two buildings at the State Fair Grounds. About 40,000 sq. ft. of space were used for the displays. About 1,000 delegates, representing 33 states, attended this early convention.

The first exhibition

Horse-drawn dump wagons, stone spreading cars, a portable narrow-gauge track for use in light grading work, a rock crushing plant, hand shovels, traction engines, paving brick, cement, macadam, and dust preventives were among items exhibited before the 1909 delegates. On the outskirts of the fair ground, a "sample" road was constructed during the convention and furnished a practical demonstration of the machinery and materials on exhibit.

From this small beginning the Road Show has grown with the American Road Builders Association. By 1913 the 40 exhibitors had expanded to 100; ten years later more than 200 exhibitors were participating, and by 1937 nearly 300 firms exhibited the latest models. In 1940, some 40,000 people visited the road show held in Chicago. About 235,000 sq. ft. of space were utilized in this greatest prewar show.

Of unavoidable necessity, roadbuilding and the Road Show became casualties of war. But the war years brought miracles of construction through the drive of American ingenuity under compulsion. Many new developments and innovations which have been under pilot plant and field tests since the war ended will be displayed for the first time at the coming exhibition at Soldier Field. These are machines designed for new efficiency and economy — machines which pay their own way through the tremendous construction miracles they perform — machines which stretch the highway dollar. They are the product of engineering genius and resourcefulness, scientific knowledge and technical "know how."

Reservations by 40,000 airport and road builders had been made for this great 1948 Road Show by April 1. These included construction men, engineers, and related operators. It is anticipated that by the time the show closes more than 100,000 out-of-town visitors will have seen the displays of machinery.

Bringing the Show West

Because *Western Construction News* realizes that the distance and the pressure of a great construction program will prevent many Western road builders and engineers from attending the great exhibition, exhibitors have been invited to send information on the products they will display and the personnel from their companies expected to be in attendance at the show, in order that it

may be passed on in these pages to busy Western stay-at-homes. Many manufacturers have responded with data on their Road Show display and it is with great pleasure that the editors pass on the information they have sent.

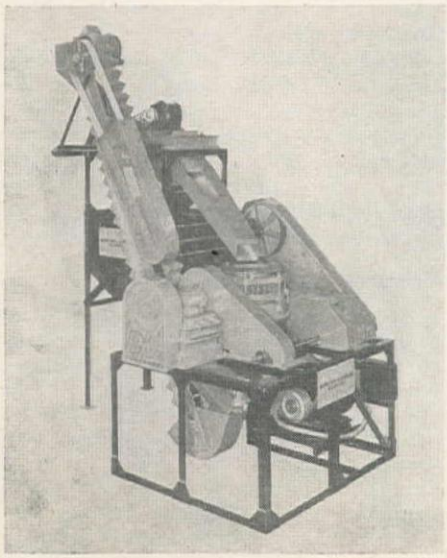
LAPLANT-CHOATE MANUFACTURING CO., INC., Cedar Rapids, Ia.

The company will have the largest exhibit in its history in Booths 3205A-3216 and 3207A-3218. Included in the display will be five tractor drawn scrapers, three of which will be the standard cable-controlled type in 6, 8, and 14-cu. yd. struck capacities. The other two will be

hydraulically controlled models for use with either rubber tired or track type tractors. In addition the company will show four different models of their new self-propelled line. These are a 4-wheel drive, 4-wheel steer dozer shown in the accompanying photo, a 15-cu. yd. bottom dump wagon, a 9-cu. yd. motor scraper and a 14-cu. yd. motor scraper. All of the equipment on display will be operated in the display area.

SMITH ENGINEERING WORKS, Milwaukee, Wisc.

The feature of the Telsmith exhibit will be a 500-ton-per-day rock crushing plant shown in the photograph. This machine includes a roller bearing jaw crusher as a primary breaker, an elevator, a double-deck pulsator over a steel bin arranged so that the over-size is returned to a secondary crusher. The model to be displayed is 1/6 the size of a regular 500-ton plant, but rock will actually be crushed for demonstration purposes.

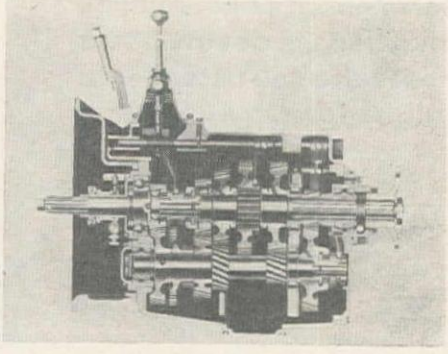


THEW SHOVEL CO., Cleveland, Ohio.

The 20-ton Moto Crane shown in the accompanying photo with the addition of a considerable "new look" will be the feature of the Thew display at the show. The fact that this crane was actually driven over the highway from Lorain, Ohio, to Chicago, is an important selling point for the machine.

FULLER MANUFACTURING CO., Kalamazoo, Mich.

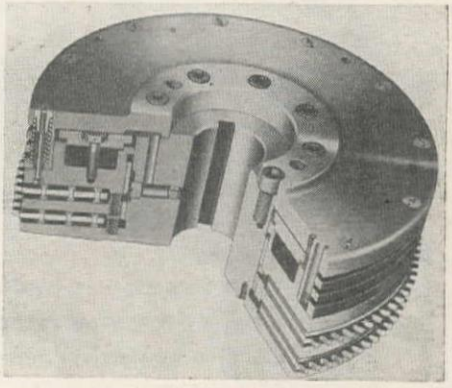
A new extra large 5-speed transmission designed for use with the largest automotive engines and commercial



trucks, will be shown in an activated cutaway version at the Fuller exhibit in Booth 1224. Other Fuller products to be shown include: a 5-speed unit-mounted transmission, a 3-speed auxiliary with a full-torque power takeoff, a remote control unit and special forgings. The new model mentioned above and shown in the cutaway photo is built for engines with a piston displacement up to 1,120 cu. in.

TWIN DISC CLUTCH CO., Racine, Wisc.

Producers of a rugged clutch for use on road building and material handling machinery since the early '20s, Twin Disc will have on display sectionalized versions of modern power transmission units at Booth 1212. Included will be the Model P-214 air-actuated clutch and the Model B power take-off, the complete line of small hydraulic couplings, several models of heavy-duty friction clutches and the hydraulic torque con-



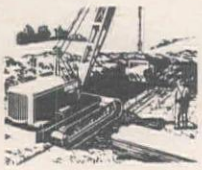
verter. The air-actuated clutches are particularly suited to operation by remote control, without complicated linkage and may also be used as cut-off clutches. Power take-offs are used to transmit power from internal combustion engines to any type of equipment. Friction clutches meet the demand for couplings on line shafts, drives for pulleys, or they may be used with driving spiders carrying gears, sprockets or pulleys. The photograph shows a cutaway view of the Twin Disc air-actuated clutch.

WISCONSIN MOTOR CORP., Milwaukee, Wisc.

The feature of the Wisconsin exhibit will be an animated display unit featuring the new trademark, "Most H.P. Hours." Also on display will be cutaway models of all three types of engines manufactured by the company, namely, the 4-cycle, single-cylinder engine, the 2-cylinder model and the V-type 4-cylinder air-cooled engine. Two new models in the 2-cylinder class will be especially featured. They are the TE and TF models, delivering 11.2 and 13.3-h.p. respectively at 2,600 rpm. Representing Wisconsin will be: **H. A. Todd,** president; **Harry Cronk,** vice-president; **Phil Norton,** sales manager; **Ray J. Fel-**

They had a Problem..

SULPHATE RESISTANT



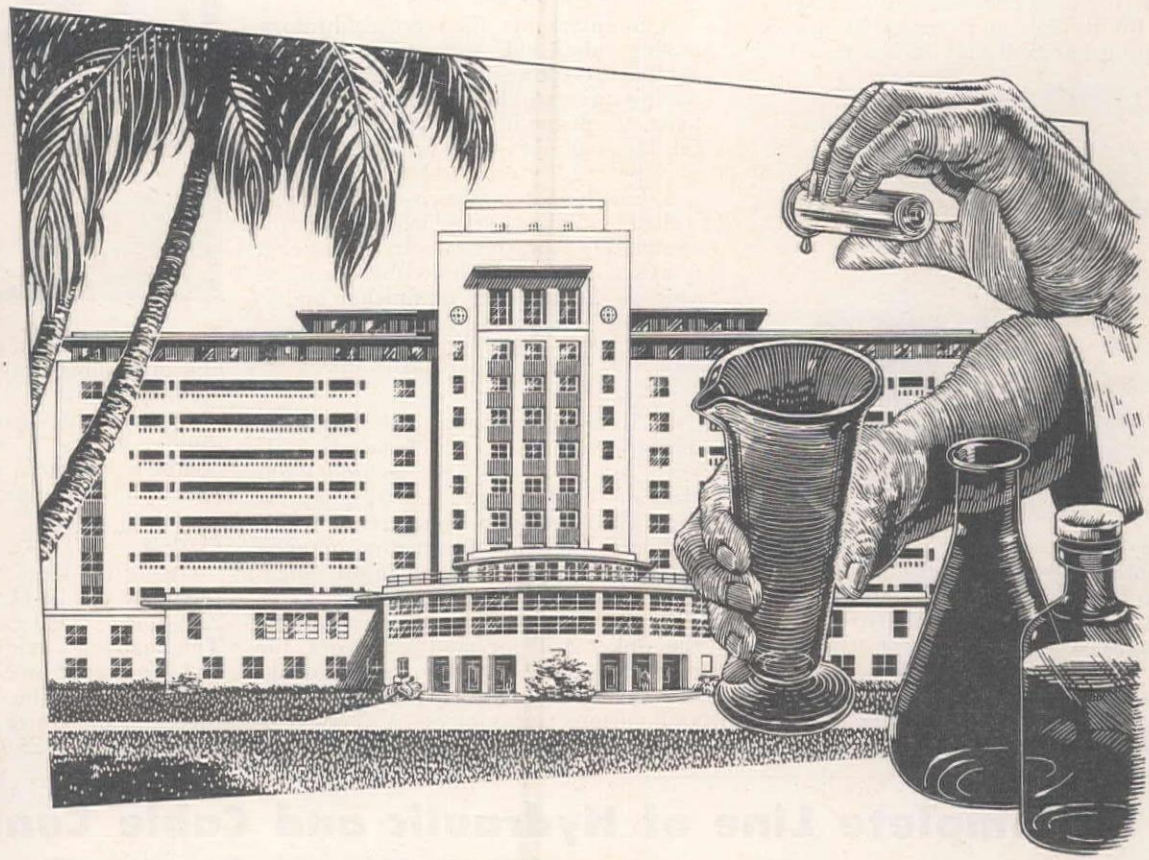
STANDARD PORTLAND

POZZOLAN

PRONTO

PLASTIC

HIGH-EARLY STRENGTH



Permanente BRICK-MIX was the answer

MORRISON-KNUDSEN and PETER KIEWIT CO., General Contractors on the Army's huge 12 unit, 13 story TRIPLER GENERAL HOSPITAL, in Hawaii, had a difficult masonry problem in the installation of concrete block facings for the buildings. Rigid Army specifications called for complete earthquake-proof construction throughout. The buildings were to be of reinforced concrete with facings consisting of more than 1,500,000 pre-cast pieces of HOLL-O-BLOC which required a mortar of exceptional strength to meet the earthquake-proof requirements.

PERMANENTE BRICK-MIX was selected by the contractors because, first: the laboratory control during its manufacture is so exact that every bag will meet the most rigid specifications without any admixture; it needs only water and sand. Second: it produces a watertight joint, and attains ultimate strength equal to or exceeding that of the masonry unit itself. PERMANENTE BRICK-MIX far exceeds all requirements for both Federal and A.S.T.M. specifications for masonry cement.

HONOLULU CONSTRUCTION & DRAYAGE CO., principal suppliers for the project, used more than 30,000 bags of PERMANENTE BRICK-MIX for the job; mixing the mortar in a batch plant set up on the site. H. C. & D. also provided more than 125,000 cubic yards of ready-mix concrete during construction, using 100% Permanente Cement.

PERMANENTE CEMENT COMPANY

On the job - On time

PERMANENTE CEMENT COMPANY

PERMANENTE, SANTA CLARA, YOSEMITE AND KAISER BRANDS OF PORTLAND CEMENT AND PERMANENTE LIME PRODUCTS

OAKLAND · SEATTLE · HONOLULU

lows, assistant sales manager; **Irving LeBeau**, export manager; **A. H. Knief, J. W. Perschbacher, H. W. Eckhardt** and **E. A. Volk**, sales representatives.

BUCYRUS-ERIE CO., South Milwaukee, Wisc.

A full line of tractor equipment for International crawlers will be displayed at Booth 2502 and there will also be a photographic display of Bucyrus-Erie's

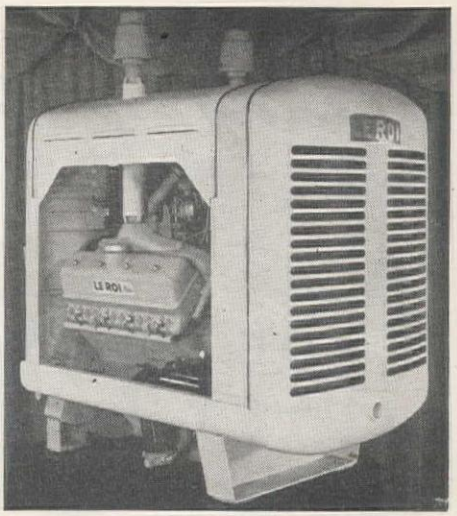
line of ⅜ to 2½-cu. yd. excavators in Booth 1018-1219. Additional units will also be shown in connection with International Harvester's Industrial Power exhibit. Among the tractor attachments are five scrapers, three cable-controlled 4-wheeled units, and two 3½-cu. yd. rear-dump 2-wheel scrapers. Also bulldozers, bullgraders, the dozer shovel and power-controlled winches will be shown. The photo herewith shows both the 5-cu. yd. 2-wheel hydraulic scraper and bullgrader, a complete dirt-moving unit which can be operated together by one man.

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Mich.

A complete line of concrete vibrators, paving tubes, side form vibrators, soil compactors, power plants and municipal paving units will be shown by this company. Of prime interest perhaps will be the Jackson vibratory paving tool which may be readily attached to any standard finisher or for two-course slabs, trailed behind any standard spreader for completely vibrating the first course. It is hydraulically controlled by the operator of the spreader or finisher and is powered by a Jackson power plant.

LE ROI COMPANY, Milwaukee, Wisc.

Le Roi, who introduced the first gasoline power unit at the road show 27 years ago, will this year exhibit eight sizes of the Airmaster line of compressors. The Tractair, a completely integral and completely mobile tractor compressor with a great variety of interchangeable front end equipment will also be shown. Other Le Roi equipment will be the sinker drill for mud jack work, the mechanized weed mower, paving breakers, tampers, wagon drills, rock drills, and various accessories. A V-type 8-cylinder engine will be introduced at the



show. It provides a wide range of speeds and horsepower varying from 50 to 125. Rounding out the exhibit will be a cutaway operating model of a Le Roi engine, a 10-kw. AC generator set and a complete service parts display. The photo shows the new 8-cylinder engine.

MACK TRUCKS, INC., New York.

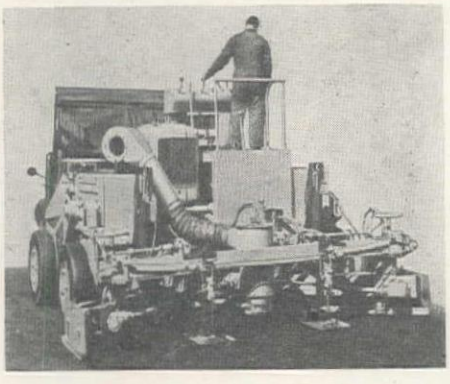
One of the largest trucks exhibited at the show will be Mack's new Model LV 22½-ton payload capacity and dumper. The machine weighs 38,000 lb. empty and is powered by 275-h.p. supercharged Diesel engine. The display will also feature a medium size dump truck, Model EQX, rated at 25,000 lb. gross vehicle

weight, and the stripped chassis of the Model LJSW, a 4-wheel drive 6-wheeler of 50,000 lb. gross vehicle weight rating.

The exhibit will be in Booth 3003 and a pedigreed English bull pup will be given as a prize for an estimating contest on the number of turns made by a tailshaft turning continuously during the show. The big Model LD is shown in the accompanying photo.

JAEGER MACHINE CO., Columbus, Ohio.

To be exhibited by this manufacturer will be a complete line of "New Standard" sizes of portable air compressors in 75, 125, 185, 250, 365 and 600-cfm. capacities and an extensive display of paving machines, including a new diagonal-



screed concrete finisher, a bituminous paver, a re-mixing compacting concrete spreader and side discharge truck pavers. Hoists, de-watering and pressure pumps, building mixers, and truck mixers will also be displayed. The model BP-5 bituminous paver shown in the photo is instantly adjustable between 8 and 12½-ft. widths. Its high frequency, oscillating compaction and finishing action is a noteworthy feature. It can lay material flush to curves and irons all joints. Close control of material spreading is easy and powerful crawlers keep the weight and traction of the machine and its load always on the subgrade, not on the material being laid.

FRANK G. HOUGH COMPANY, Libertyville, Ill.

Two new products will be publicly displayed for the first time at the road show by the Hough Company. One of these is the Model HM payloader, a completely new tractor shovel featuring all-wheel drive on large pneumatic tires and having 1½-cu. yd. bucket capacity. The other is a pickup street sweeper, a heavy duty sweeper with revolutionary new features. Other products in the Hough line will also be displayed, in-

cluding three other payloader models, bulldozer shovels for International tractors, loaders and sweepers for International and Case tractors and Hough-Universal road sweepers.

UNIT CRANE & SHOVEL CORP., Milwaukee, Wisc.

Over 9,000 sq. ft. of space (Booths 3815-3206A) will be used for the Unit display. Under cover will be a full-size working model of the Unit 1-piece cast gear case with chromium plated gears and other parts and illuminated to show its simplicity. Automatic traction brakes, hook rollers, clutches, etc. will also be shown, as will a large photographic display. Out of doors the complete line of excavating and material handling equipment will be exhibited, including the ½-cu. yd. crawler, the self-propelled ½-cu. yd. model with trenchoe, crane, and elevator attachments, the ¾-cu. yd. crawler, the truck crane, and the new self-propelled 3-axle mobile crane.

SULLIVAN DIVISION, Joy Manufacturing Co., Pittsburgh, Pa.

The latest developments in equipment for highway, airport, tunnel, building and other construction will be exhibited by Sullivan in Booth 3001. Prominently displayed will be six different sizes of the Sullivan portable air compressors and also the heavy-duty semi-portable compressor will be shown. This model will actually be seen working in slow motion through heavy transparent lucite plates. Other products such as rock bits, drifter drills, tunnel jumbos, hoists and winches, paving breakers, backfill tampers and the popular one-man wagon drill will be among the items on display. Parts and accessories for the various pieces of equipment will be shown.

INTERNATIONAL HARVESTER CO., Chicago, Ill.

The predominant display at the road show will be the International Motor Truck and Industrial Power exhibit. Some 80,000 sq. ft. will be devoted to International and approximately 90,000 additional square feet will be occupied by allied equipment manufacturers featuring International products. Scores

of individual displays, including Diesel, gasoline powered trucks, tractors and power units will be shown. All International tractors will be shown with matched equipment. All of the trucks will be equipped for specific types of work. Five of the giant new TD-24 Diesel crawlers will be in the show and a complete line of trucks, including the powerful off-highway models manufactured in California, will be in evidence. The exhibit will be reminiscent of the company's "100 Years in Chicago" exposition which attracted 500,000 people to these same grounds last year. Shown in

the photographs are four different types of International power units.

HOMELITE CORPORATION, Port Chester, N. Y.

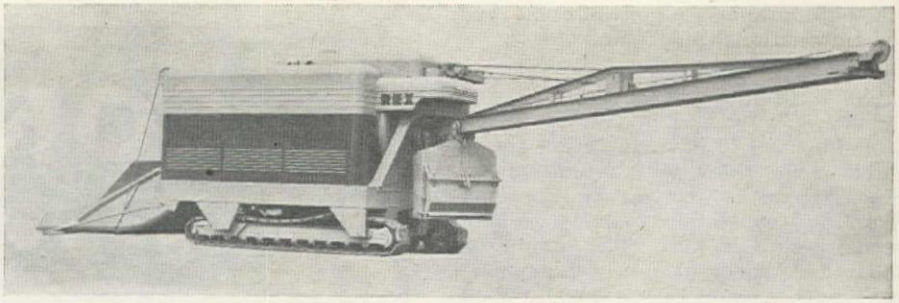
Homelite will have an action act exhibit at the show, with actual working demonstrations of many new products and cutaway sectional models to show construction details. The company's new line of carryable self-priming pumps will be shown in operation at various

suction and discharge heads. Various dual purpose generators, also portable and gasoline engine driven, making possible the operation of high-cycle electric tools, as well as standard 110-volt tools and flood lights will be on display. Another new product is the one-man electric chain saw weighing only 27 lb. complete. Still others are Homelite blowers for ventilating tunnels, manholes, etc., and a new electric paving breaker. All of these products can be carried by one man. The photo shows the paving breaker opening up a street for water main repairs being powered by the dual purpose generator.

PIONEER ENGINEERING WORKS, Minneapolis, Minn.

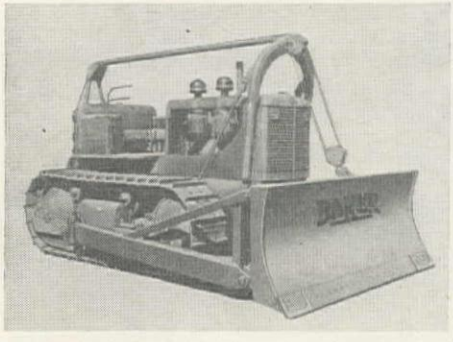
In a transplanted bit of the North Country, visitors to Booth 3301 will find a complete Pioneer asphalt plant and a complete 2-unit crushing and screening plant, as well as a number of smaller units. It will be the first showing of many of the new features recently built into Continuflo hot mix asphalt plant. One pneumatic tired chassis carries a

90-in. aggregate drier, and a second chassis carries the gradation screen, aggregate bin, and mixer unit. These two constitute the main units of the plant. Also on exhibit for the first time will be the new low cost Continuflo gravel plant consisting of a screen attached to a 40- or 50-ft. conveyor with reciprocating plate feeder, all readily portable. The Pioneer triple roll crusher will also be featured. Shown in the photo is the Continuflo gravel plant.



BAKER MANUFACTURING CO., Springfield, Ill.

The feature of the Baker display will be their new hydraulic and cable bulldozers and Gradebuilders to be used with the huge Allis-Chalmers HD19 tractor. The show will also mark the first appearance of a giant ripper to be used with the HD19. In addition, several types of truck, tractor, and motor grader snowplows will be shown, as well as cutaway parts of various equipment.



CHAIN BELT COMPANY, Milwaukee, Wisc.

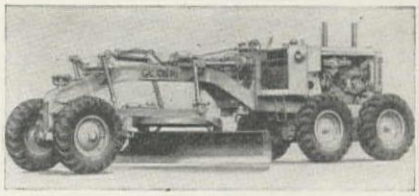
Occupying Booths 2605-2406, Chain Belt will show approximately $100,000 worth of machinery. The new and completely streamlined Rex single and double drum pavers will be the highlight. One of the machines is shown in the photo. The Pumpcrete machine will also be a feature.

CATERPILLAR TRACTOR CO., Peoria, Ill.

Under the direction of C. E. Jones, manager of sales development, Caterpillar's exhibit will be housed in Booth 3208-3805. The parade of Caterpillar Diesel tractors will be headed by the new D8, featuring constant mesh transmission and 130 drawbar horsepower, and will include the D7, D6, and D4 tractors equipped with the full line of earthmoving accessories. The Diesel wheel-type tractor and Caterpillar wagon and the combination of this tractor and No. 10 scraper will also be displayed. All of the company's Diesel engines which are applicable to road construction will also be shown, as well as the allied equipment with which Caterpillar items are associated.

GALION IRON WORKS & MFG. CO., Galion, Ohio.

In Booths 2206, 2405, 2408 and 2607, Galion will display approximately $100,000 worth of equipment including four

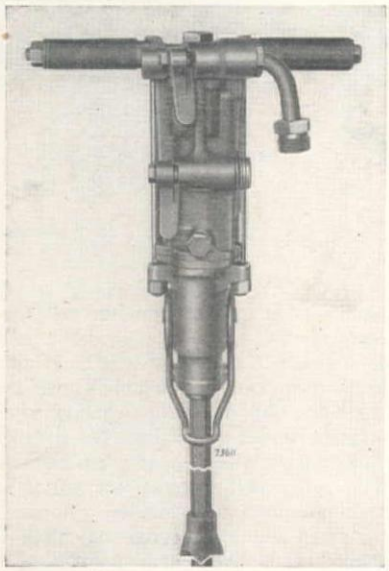


sizes of motor graders and seven sizes of rollers and the sales organization will be on hand for the whole ten day period to answer questions. Additional Galion equipment will also be included in the International Harvester exhibit which

will be adjacent. One of the graders to be shown is the Model 116 extra heavy duty machine illustrated in the accompanying photograph.

INGERSOLL-RAND CO., Phillipsburg, N. J.

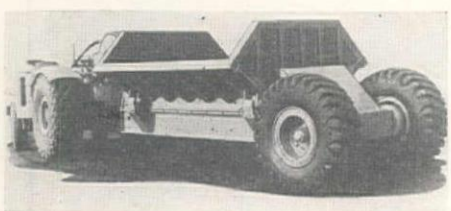
A great variety of Ingersoll-Rand drilling and other equipment is to be shown at the road show. Many of the items will be entirely new, while others are previously introduced members of the Ingersoll-Rand family. One of the new items will be the 30-lb. rock drill



Jackhammer, which is easily convertible to wet, dry, or blower type of machine. Another is the Wagonjack of light weight construction and with centralized controls, capable of mounting either a Jackhammer or drifter. Still another is a self-propelled rock drill known as the Quarrymaster, capable of drilling very rapidly because the air-operated piston type rock drill strikes more than 200 blows per min. It is mounted on a generously sized crawler so that it may easily be moved from place to place. Jackbits, paving breakers, an impact drill-wrench tool, compressors, the Airlite generator and other items are also to be displayed.

ATHEY PRODUCTS CORPORATION, Chicago, Ill.

Athey will introduce three new pieces of construction equipment at the show. They are (1) the PD-10 rubber-tired



quarry trailer equipped with large low pressure tires (shown in the photo herewith), (2) the portable crusher unit designed primarily for towing behind and use with the Athey force-feed loader, and (3) the small capacity 2-ton Forged-Trak wheels for use with portable equipment. Athey's display will be located in Booths 3208-3805.

THE HEIL COMPANY, Milwaukee, Wisc.

The particular feature of Heil's exhibit will be the sensational new Heiliner, a 2-wheel, rubber-tired Diesel powered tractor and 16-ton 2-wheel scraper combination capable of a loaded speed over rough terrain of 20 mi. per hr. The complete range of Heil bulldozers and trailbuilders will be shown and demonstrated and a rugged new line of open-top 4-wheel scrapers will also be displayed. The Heil booth number is 3110. Among those in attendance will be Julius P. Heil, Joseph F. Heil, W. E. Simons, Dan Pierce, Mike Carlson, Ted

Miller, Harlan Stoller, Herman Waggen, John Barclay, Chas. Allis, Len Andersen, Art Keenan, Vernon Jones,

Bob Miller, Alec Milne, Bill Copp, Joe Beles, Marc DeDoming, Fred Zwanzig, Fred Wrede, Herb Erdman, John Zimmerman, Henry French, Arnold Meyer, Armin Wothe and **Fritz Storatz.** The photo shows the Heiliner in operation.

STERLING MOTORS CORPORATION, Milwaukee, Wisc.

Four Sterling units will be displayed, of which one, the model HWS235, is

shown in the photo. It is powered with a Cummins Diesel engine and will be mounted with a Rex 5½-cu. yd. horizontal Moto-mixer. Other models will be equipped with dump bodies and hoists.

C.I.T. CORPORATION, New York, N. Y.

To adequately serve their host of contractor, distributor and manufacturing clients, C.I.T. will use the specially built display booth shown in the photo in Space 1220. Company representatives from all parts of the country will be in

daily attendance to meet clients, answer questions and render financing service to construction men. In 1947 this company financed over $50,000,000 worth of construction equipment and another record breaking year is anticipated in 1948.

UNIVERSAL ENGINEERING CORP., Cedar Rapids, Ia.

The TwinDual Master gravel plant, the most recent addition to the Universal line of portable crusher units, will be shown at the show. The roll crusher makes possible two stages of secondary reduction in one machine. These rolls provide the approximate capacity of two separate crushers, but since the different diameter rolls are mounted on common shafts, bulk and weight are much reduced. Three axles, twelve pneumatic tires, rear wheel equalizers, V-drives and air brakes are features of a special interest. Also to be shown will be the

portable primary crushing unit, a widely used piece of equipment.

GAR WOOD INDUSTRIES, INC., Wayne, Mich.

Gar Wood will display its products in Booths 3206, 3403, 3404 and 3603, and in addition the Findlay Division will have their scrapers, dozecasters, bulldozers and tipdozers on display in the adjacent Allis-Chalmers space. A great variety

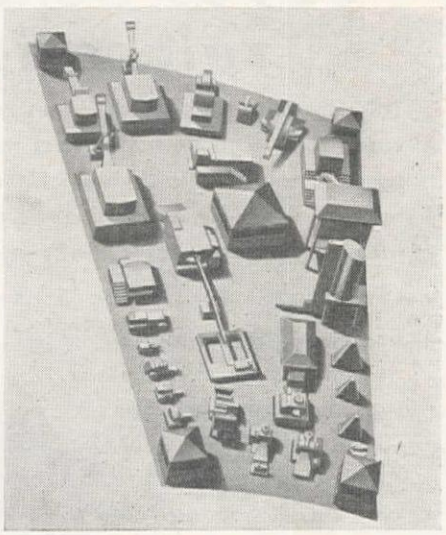
of products will be included in the exhibits of the three Gar Wood divisions. The Wayne Division will have twelve different items, including hoists, dump bodies, tanks and winches. The St. Paul Division will have eight items, including hoists, dump bodies and platforms. The Findlay Division will show nine items of Buckeye equipment, including fine graders, ditchers, shovels and spreaders. In addition, nineteen Gar Wood items of tractor equipment will be shown either in the company's own space or in the Allis-Chalmers display. The photo shows one of the four wheel scrapers made by the Findlay Division.

THE BUDA COMPANY, Harvey, Ill.

Buda will exhibit in Booths 2404 and 2603 a complete line of power units from the smallest 1-cylinder 5-h.p. engine up to the supercharged 410-h.p. engine. In addition the company will show a complete line of generator sets, varying in size from 2½ kw. up to 125 kw. At least 20 different models of gasoline and Diesel engines and generator sets will be shown. Of particular interest will be two new models of hydraulic earth drills, illustrated in the accompanying photo. The display will feature operating models of these drills and one will be mounted on a heavy-duty truck and be powered by a Buda Diesel engine.

KOEHRING COMPANY, Milwaukee, Wisc.

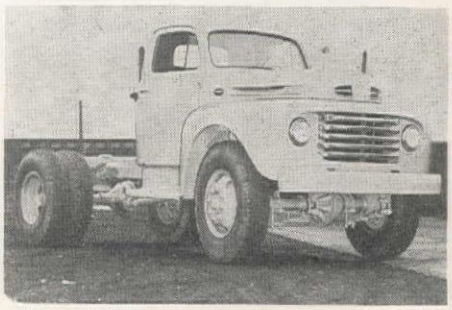
One of the most unusual displays will be the combined exhibit of the Koehring Company and its subsidiaries, the C. S. Johnson Co., Kwik-Mix Co., and Parsons Co. They plan an equipment "fair" of more than 30 modern machines from their widely diversified line of excavating, hauling and concrete tools. Included will be at least a half dozen completely new machines. Among these will be the first entry of Koehring into the 2½-cu. yd. excavator field, a new 12-yd. hauling unit for high speed off-road work, a new small paver, and a new longitudinal finisher with hydraulically operated screed lift. A new Parsons contribution will be



the Model 80 trench liner, a small utility size trench excavator. Two new Kwik-Mix items will be a non-tilting 3½-S cement mixer and a power wheelbarrow. Various Johnson aggregate and cement handling equipment will be exhibited, including the new Lo-Bin trolley batcher. The photo shows the layout of the "fair."

MARMON-HERRINGTON CO., INC., Indianapolis, Ind.

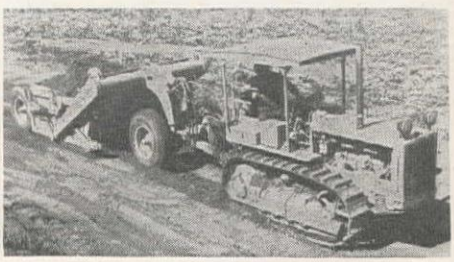
This firm will exhibit its four regular heavy-duty new all-wheel-drive models and the complete line of standard Ford models converted to all-wheel-drive. The



Marmon-Herrington heavy-duty trucks all have a drop-type frame and vary in gross vehicle weight up to 42,000 lb. Representing the firm at the show will be: **A. W. Herrington, D. M. Klausmeyer, C. A. Campbell, E. F. Ray, C. T. Ellis, F. M. Myers, R. L. Kalp, H. B. Blank** and **G. H. Freers.** The photo shows a Model F-7 Ford truck converted to a Marmon-Herrington all-wheel-drive.

BE-GE MANUFACTURING CO., Gilroy, Calif.

The Be-Ge Speedhaul, a new series of hydraulically - operated self - loading scrapers will be shown by this firm. Both 2-wheel and 4-wheel models will be on display. These machines are currently



available in 3, 4.5 and 6-cu. yd. heaped capacity. Although primarily self-loading, the low overall height of the open-top bowl permits loading by shovel or dragline. All operations are instantly controlled by the tractor operator. In field tests with an experienced operator, a 6-cu. yd. model moved 82 cu. yd. of earth per hr. over a loaded haul of 212 ft.

UNITED STATES STEEL CORP., Pittsburgh, Pa.

Ribbed white concrete markers that "sing" a warning when motorists stray from a traffic lane will actually be manufactured in a feature demonstration of the exhibit of U. S. Steel at the Road Show, in Booths 1022, 1223 and 3860A. Subsidiaries having displays of their products include American Bridge Co.,

American Steel & Wire Co., Cyclone Fence Division; Tennessee Coal, Iron & Railroad Co.; United States Steel Supply Co.; Universal Atlas Cement Co.; Columbia Steel Co.; National Tube Co., and Oil Well Supply Co. Wire rope, wire fabric, road markers, steel for bridges and other highway units and reinforcing steel will be among the items on display.

HERCULES STEEL PRODUCTS CORP., Galion, Ohio.

Principal feature of the Hercules exhibit will be the Aircreter, the new dump body designed especially for hauling and

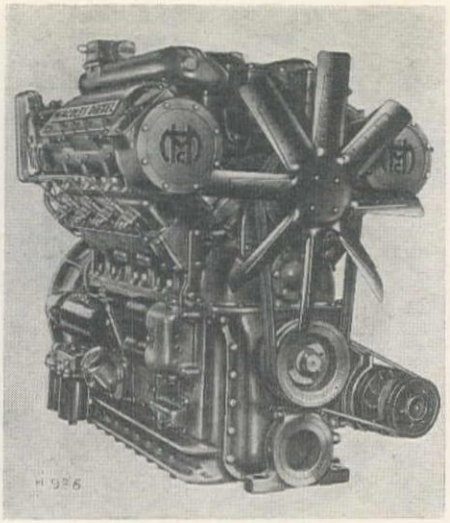
placing of premium quality air entrained concrete, shown in the photograph. It is a compact lightweight unit with an entirely new method of discharge. In addition, several models from its complete line of hydraulic hoists and dump bodies, including a semi-trailer body will be shown.

IOWA MANUFACTURING CO., Cedar Rapids, Iowa.

One of the features of the Iowa exhibit will be the Cedarapids unitized plant which will produce almost any kind and volume of aggregate. The four basic units are: (1) portable primary crusher, (2) scalping unit, (3) secondary crushing unit and (4) wet or dry screening unit. Each section is mounted on a pneumatic tired truck and each is available in a number of sizes. Each unit can be equipped with gasoline, Diesel or electric power and each unit can be purchased individually. A working plant is shown in the accompanying photo. Three styles of bituminous mixing plants will also be exhibited.

HERCULES MOTORS CORPORATION, Canton, Ohio.

Floor space totaling 1,500 sq. ft. in Booths 1014 and 1215 have been taken by Hercules to exhibit the most extensive and diversified array of Hercules engines and power units ever assembled in one space. Of the 31 units to be exhibited, 14 will be Diesels, the balance gasoline engines. On several of the Diesels the company has just completed de-



velopment work during the last year. All of the Hercules engines, including the V8 Model shown in the accompanying photograph, which will develop up to 400 h.p. are the solid injection, compression ignition, 4-stroke cycle type. Through special design of the combustion chamber, the all important function of high turbulence is accelerated at the critical time of injection and combustion. Altogether Hercules can now offer to the trade a combined total of 22 series and 49 models of engines, varying from 3 to 500 h.p.

CONSTRUCTION MACHINERY COMPANIES, Waterloo, Iowa.

Many CMC items of long acceptance will be shown and a number of brand new models will receive their first public

display. There will, for instance, be innovations like the Jetcrete gun for pneumatically applied concrete, the gas-electric radial saw and a readily portable batch and mix plant. Shown in the photo is the new CMC 6S non-tilt mixer. The company delegation will be headed by **L. S. Holden,** president, and **G. A. Loveall,** vice-president.

GORMAN-RUPP CO., Mansfield, Ohio.

The complete new line of Gorman-Rupp centrifugal self-priming contractors' pumps will be on display at the show. With the impeller, the only moving part, the pumps employ positive, unfailing centrifugal force and the power of gravity to achieve startling priming results. For example, the 4-in. model primes at 15 ft. suction in 36 sec. and 25 ft. in 65 sec.; the 6-in. pump primes at 15 ft. in 21 sec. and 25 ft. in 44 sec. The line includes pumps from 2 in. to 8 in. in diameter. The company's display will be in Booth 3021.

BARBER-GREENE CO., Aurora, Ill.

The largest Barber-Greene exhibit in history will be presented in Booth 2203. It will include many new road building, conveying and loading machines and a 3-dimensional color film entitled "Highway U. S. A." Set up and ready to work will be the new Model 845 Utility bitu-

B-G Utility Plant. **845 Mixer-Gradation, 835 Dryer and 852 Dust Collector. Capacity 60 tons per hr. Handles all types of mixes, including highest quality multiple aggregate mixes. Pneumatic-tired portability. Each unit may be used separately.**

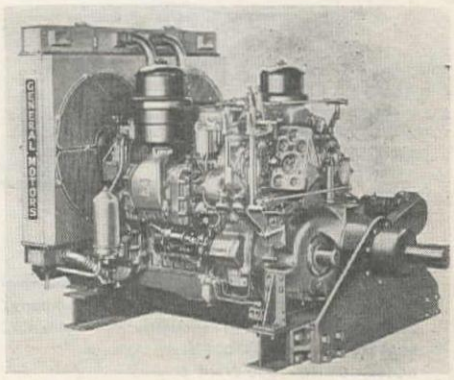
minous plant, the first and only completely portable plant in the 60-ton-per-hr. range. With it will be the B-G maintenance plant, a small unit specifically designed for repair work. Other items will be the tamping-leveling finisher, the hopper car unloader and the portable conveyor - loader - stockpiler. Bucket loaders will also be shown as will several models of ditchers and belt conveyors.

EUCLID ROAD MACHINERY CO., Cleveland, Ohio.

In Booths 3002-3201, covering an acre of ground, Euclid will have the largest display of off-the-highway hauling equipment by any single manufacturer. A total of 24 units will be shown, including rear dump, side dump and bottom dump hauling units, as well as the Euclid loader. A large staff of engineering, service and sales personnel will be on hand to provide technical information.

DETROIT DIESEL ENGINE DIVISION, General Motors Corporation, Detroit, Mich.

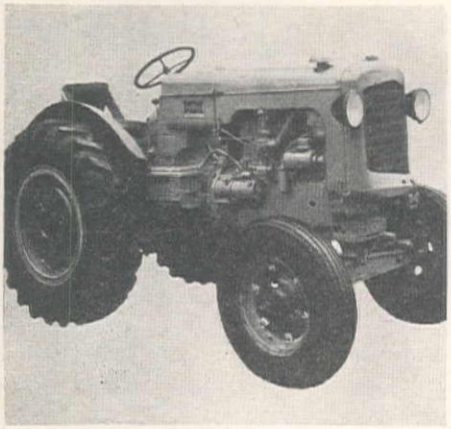
In Booth 1001 visitors will be able to observe an interesting and instructive



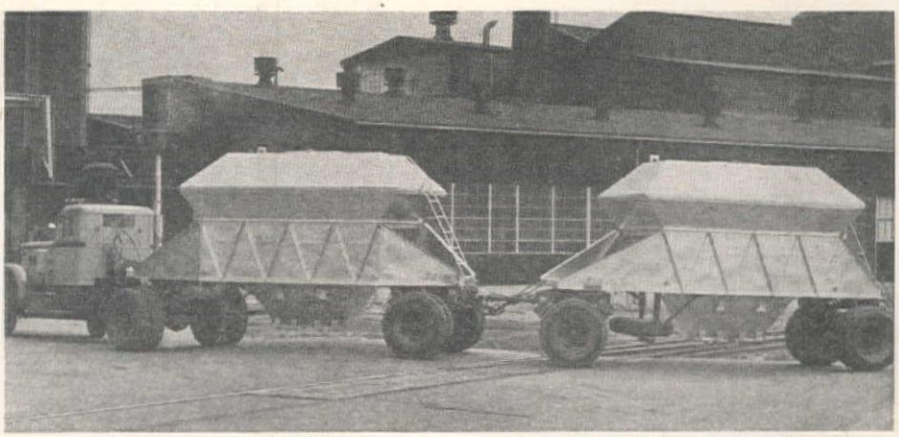
film entitled "Diesel, the Modern Power," as well as a demonstration of the General Motors unit fuel injection system. There will also be a chromium plated rotating cutaway of a 3-cylinder Series 71 Diesel, with all moving parts in full view of the spectators. A number of different types of the Series 71 line will be on display, including the Twin-4, 236-hp. unit, the Twin-6, 349-hp. model, 58 and 93-hp. smaller units for excavators, ditchers, etc. and a 120-hp. 4-cylinder packaged power plant.

MINNEAPOLIS-MOLINE POWER IMPLEMENT CO., Minneapolis, Minn.

This firm will occupy Booth 3210 and personnel in charge will be: **Ben D. Grussing,** advertising manager; **E. A. Henry,** industrial sales manager; and **E. R. Raveling,** in charge of sales to manufacturers. The 27-h.p. Model RTI



and the 49-h.p. Model UTI industrial tractors will be on display. These tractors feature the easiest steering offered in equipment of their size and type and include many advanced improvements which make for efficient and economical operation. Various items of attached equipment will be demonstrated at the show, including mowers, loaders, dozers, scrapers, snowplows and winches. The MM industrial power unit line will also be represented and especially featured will be the new 1210-12A, 230-h.p. 12-cylinder model. Shown in the photo is the Model RTI tractor.

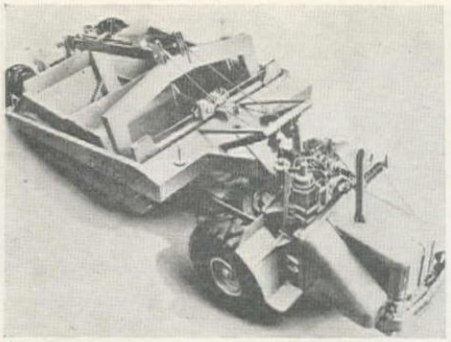


FRUEHAUF TRAILER CO., Los Angeles, Calif.

Of particular interest to California haulers is a new Fruehauf trailer for handling bulk cement, sand, gravel and kindred commodities. It will not be on display at the road show, but is mentioned especially because of its advanced design. It will provide maximum payload capacity, while keeping the gross weight of trailer and load within legal limits for highway hauling. The tare weight of the vehicles is 28,620 lb., the payload 47,380 lb., all distributed over the tractor, semi-trailer and trailer axles in legal proportion. The trailers are known as Hopper Dumps, with all metal bodies designed to expedite discharge. A Fruehauf unit is pictured above.

WOOLDRIDGE MANUFACTURING CO., Sunnyvale, Calif.

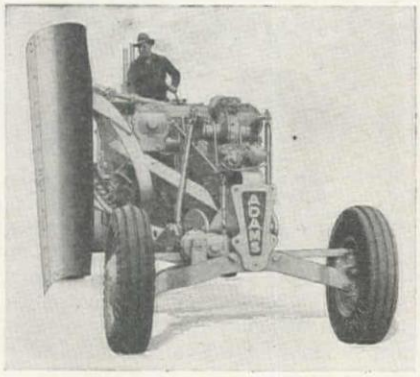
The new 200-h.p. Terra-Cobra will be highlighted in Wooldridge's complete line of earthmoving equipment to be exhibited at the show. The latest Terra Clipper and Boiling Bowl scrapers, power control units, rippers, bulldozers,



and trailbuilders will also be included. The big self-propelled earthmover is powered by a rugged 200-hp. Cummins Diesel engine. It easily traverses soft mud, loose sand and steep grades, and maximum maneuverability is maintained through positive hydraulic 2-wheel steering and other special features. It has a struck capacity of 14 cu. yd. and a heaped capacity of 17.5 cu. yd. The Terra Clipper scraper on display will carry up to a heaped capacity of 27.5 cu. yd. and the smaller Boiling Bowl scrapers will carry as high as 14.5 cu. yd. heaped. All these models are designed to operate with standard tractor units. The 200-h.p. Terra-Cobra is shown in the photo.

J. D. ADAMS MANUFACTURING CO., Indianapolis, Ind.

Visitors to the Adams display will find motor graders ranging from the new extra heavy duty 100-h.p. machine to a light 31-h.p. gasoline grader which still incorporates all the advantages of the larger machine. The headline number will be the recently introduced 610 grader. This machine is powered by a 100-h.p. International Diesel engine and with over 18,000 lb. on the rear wheels, ample traction is provided to make full use of the power. The new Adams rotary snowplow-motor grader combination will be exhibited for the



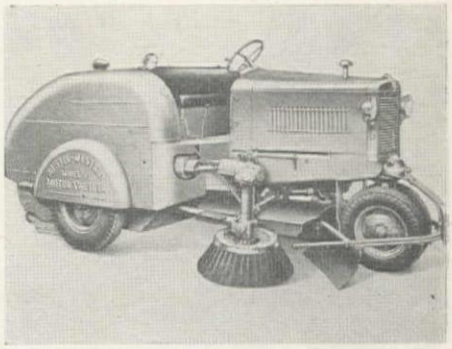
first time at this show. This machine is designed to give Adams owners in the heavy snow belt all-year utility from their machines. Shown herewith is a picture of the heavy 610 grader.

WHITE MANUFACTURING CO., Elkhart, Ind.

This firm will display the following products: portable asphalt plant; front end tractor-loader; concrete vibrators; asphalt and tar heating kettle; asphalt surface heater; lead melter, asphalt tool heater and kerosene torch.

AUSTIN-WESTERN CO., Aurora, Ill.

A considerable variety of high-grade construction equipment will be demonstrated at the show by Austin-Western. Included will be the Model 55 light power grader and the Model 99H heavy grader; the Badger convertible shovel; the Autocrat 10 and 12-ton roller and the variable weight tandem roller; the 101 portable crusher; and the Model 40 motor sweeper. The company has long been known for its road graders and the two models on display include the latest design features worked out by the firm's



engineers. The heavy model combines all-wheel drive, all-wheel steer, precision side shift, high-lift blade, com-

pletely reversible blade and full hydraulic control. Numerous attachments will also be shown. The Autocrat roller includes maximum rigidity, low center of gravity for smooth operation and fingertip hydraulic steering. Either gas or Diesel engines may be used. The 101 portable crusher is the largest unit manufactured by the company and uses a 10 x 36 jaw crusher and a 30 x 18 roll crusher in connection with matched screens and conveyors. The photo shows the Model 40 sweeper.

LIMA SHOVEL & CRANE DIVISION, Lima-Hamilton Corp., Lima, Ohio.

Lima will participate in the show with two machines, a shovel and a dragline, shown in Booth 3811, 3202A. Visitors will have an opportunity to make a thor-

ough inspection of all their features. Lima officials in attendance will be the following: **Henry Barnhart,** vice-president; **Paul R. Ehrgott,** general sales manager; **Roy Wills,** advertising manager; **J. W. Hardesty,** asst. sales manager; **A. J. Townsend,** vice-president, engineering; **Wm. Huston,** mechanical engineer; **J. W. Artz,** parts and service manager; **J. R. Gregson,** foreign operations; **O. J. Greiwe,** asst. secretary; **M. K. Tate,** assistant to the president; **W. D. Haley,** Seattle representative, and **R. A. Otterness,** from Dallas.

OWEN BUCKET CO., Cleveland, Ohio.

Featuring a representative display of Owen clamshell buckets for all purposes, as well as Owen grapples for handling rocks and other heavy objects, the Owen Exhibit will be in Booth 3834. Of particular interest will be an operating model of the grapple. Representatives of the company to be in attendance are: **Edward W. Botten,** secretary-treasurer, and his son **Jack Botten; Wm. H. Russell, W. S. Jenkins** and **L. L. Hanson.**

INDEPENDENT PNEUMATIC TOOL CO., Aurora, Ill.

Three new Thor pneumatic contractors tools, two of them scheduled for their first public showing, will be exhibited at the show. The newest addition to the Thor line will be a wagon drill, but details will not be announced until the show. The second new product will be a 75-lb. paving breaker. The third new item on display will be the backfill tamper introduced late in 1947. Also to be shown are rock drills, clay diggers, nail drivers, cement guns, electric hammers, electric saws, and other tools.

THE WARNER & SWASEY CO., Cleveland, Ohio.

In Booth 3821 the precision maneuvering of the Gradall, multi-purpose earthmover by Warner & Swasey, will be featured. On-the-job motion pictures will also be shown of some of the 115 machines now in service. The Gradall is truck-mounted and maintains a busy work schedule because of its ability to move from job to job at highway speed. Contractors have found the all-hydraulic design to be useful in ditching, contouring, and sloping to precise dimensions. It can also double as a light mobile crane, handling concrete forms, pipe and supplies.

HARNISCHFEGER CORPORATION, Milwaukee, Wisc.

A variety of the newest P & H equipment will be shown at the show. Included will be: the Model 150 ½-cu. yd. shovel equipped with dual controls; the

Model 255A equipped both as a trench hoe and as a truck crane with extra-long boom; the Model 855B, a 2-cu. yd. machine; and the single pass soil stabilizer.

Two portable arc welders are also scheduled for display and a model of the Magnetorque unit used on the Model 1055 shovel will be arranged so that visitors can witness its operation. A P&H planetary transmission will also be demonstrated, and P&H Diesel engines will be seen.

HYSTER COMPANY, Portland, Ore.

Although Hyster will display a number of different items at the show, the one of particular interest will be the

Hystaway, a crane attachment for use on a crawler-tractor. Shown in the accompanying photo is one of the units being utilized as a dragline, but it can also be used as a clamshell, a crane or a utility lifting unit. It is the only unit of its kind in the field and is winning wide acceptance on highway and other construction jobs throughout the world.

D-A LUBRICANT CO., INC., Indianapolis, Ind.

The D-A exhibit in Booth 1035 will be in charge of **Robert J. Binford** of the home office, with representatives from the field also on hand.

WILLIAMS FORM ENGINEERING CORP., Grand Rapids, Mich.

Various types of form ties and clamps will be displayed by Williams in Booth 1822 and catalogues and tables dealing with form pressures and design will be available for distribution.

ELECTRIC STEEL FOUNDRY CO., Portland, Ore.

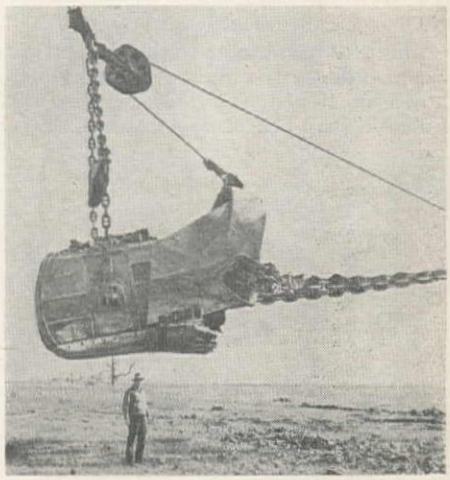
In Booth 3844 ESCO will feature dragline buckets, power shovel dippers and related equipment. Special emphasis will be placed on equipment for the coal stripping industry, for which the company has designed a special line of buckets. Company representatives will be: **J. J. Davis, J. L. Oliver, E. N. Novis, T. P. Kirby** and **L. F. Maxwell.**

BUTLER BIN CO., Waukesha, Wisc.

A cement batching plant of radically new design will be displayed for the first time at the show by the Butler company. The assembly, called the Butler Auto-Batch Twinbin is comprised of two bins, one above the other and provides adequate live storage in the second story, while a more than comfortable reserve capacity is held on the ground floor. Over 533 bbls. of cement are available in a plant only 30 ft. high. The plant is easily demountable and a crew can erect it in 1½ hr.

PAGE ENGINEERING CO., Chicago, Ill.

The display in Booth 3826 will feature an exact replica of the first dragline bucket built in 1903 by Page and im-

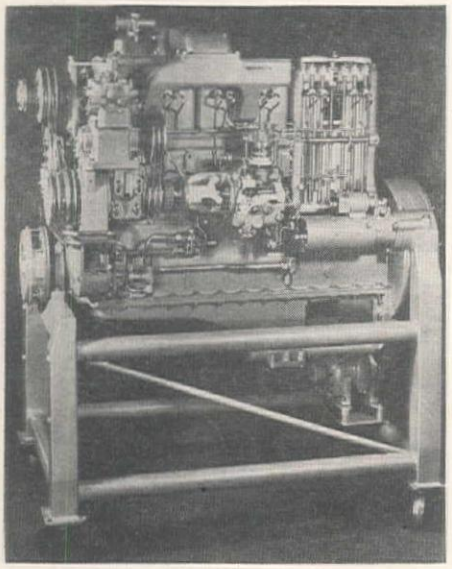


mediately next to it the world's largest dragline bucket having a 30-cu. yd. capacity. Other buckets and accessories

will be on display and a special invitation has been extended to distributors and contractors to visit the Page plant while in Chicago.

CUMMINS ENGINE CO., INC., Columbus, Ind.

The Model NHBS600 Cummins Diesel to be displayed by the company in Booth 1011 has been sectionalized to show clearly the internal structure and operation of the exclusive Cummins fuel system, cylinder and liners, valves, pistons,



supercharger, gear train, oil cooler, etc. In addition to this cutaway and internally activated model, six different models of complete engines will be shown. In addition, Cummins engines will be found on much of the equipment displayed by other manufacturers at the show. Cummins personnel will include: **L. W. Beck,** vice-president, sales; **P. J. Every,** sales manager; **R. H. Wills,** Northwest regional manager; **A. S. Leonard,** Southwest regional manager; **W. L. Lawrence,** Rocky Mountain regional manager; **G. W. Stevens,** Midcontinent regional manager; **W. N. Westland, H. M. Brusman, M. W. Brooks** and **W. G. Turner.** The cutaway model is shown in the photo.

E. D. ETNYRE & CO., Oregon, Ill.

Latest models and new equipment in bituminous distributors and street-flushers will be on display in Booths 3406 and 3605. Models will include a 4,000-gal. hauling tank, a 1,200-gal. street flusher, a 3,500-gal. distributor with folding spray bar and low-pressure burners, a 2,000 gal. distributor with full circulating spray bar and others. Etnyre personnel to be in attendance includes: **Horace Etnyre, Sam Etnyre, C. T. Hvass, Marshall Taylor,** and **J. W. McCoy.**

PACIFIC CAR & FOUNDRY CO., Renton, Wash.

A large display of working models and cutaways of the latest Carco tractor equipment will be displayed at the show, including the Hydradozer, Cabledozer, power control unit and winches. Virtually all of these are new equipment developed to fit the smaller range of wheel and crawler tractors. **Mike Conway,** advertising manager and several field representatives will be at the show to answer questions.

BLAW-KNOX CO., Pittsburgh, Pa.

The complete line of Blaw-Knox mechanized construction machinery will be on display at the show, including two new items: the automatic cement weighing batcher and the automatic aggregate weighing batcher; six recent items: the Hi-Boy Trukmixer, the precision subgrader, the roller gate concrete bucket, the articulated flexible forms for curb and gutter, the twin cement weighing batcher and twin aggregate batcher; five improved items: the concrete paving spreader, the vibratory finisher, the widening finisher, the portable cement batching plant and the preinsulated steel building. Altogether the firm will exhibit 12 carloads of equipment on their ¼-ac. location.

FOUR WHEEL DRIVE AUTO CO., Clintonville, Wisc.

The new Model ZU truck announced in May by FWD will be exhibited for the first time at the road show. The new truck has a rating of 33,000 lb. gross vehicle weight, and has a number of new advanced design features.

LUBRIPLATE DIVISION, Fiske Bros. Refining Co., Newark, N. J.

Lubriplate will have an attractive exhibit in Booth 1842. Two moving exhibit

units will be used to demonstrate the suitability of the company's lubricants for all sizes and types of machinery used in the construction field. A number of sales and service engineers will be in attendance at the exhibit to discuss lubrication problems with all visitors.

BAY CITY SHOVELS, INC., Bay City, Mich.

Bay City will feature three machines in Booth 3874. They will be: the rubber tired 20-ton capacity CraneMobile, which is equipped to handle booms up

to 110 ft.; the Model 30 back hoe, which is rated as a 6-ton crane and a ½-cu. yd. shovel, and is fully convertible for use as shovel, crane, clamshell, dragline or hoe; and the Model 65 shovel with 1¼-cu. yd. capacity and 20-ton crane rating, also convertible to other uses. Shown in the photo is the CraneMobile mounted on a specially designed carrier of the 3-axle type with all-wheel drive and powered by a Waukesha 6-cylinder gasoline engine.

ARMCO DRAINAGE & METAL PRODUCTS, INC., Middletown, Ohio.

The Armco exhibit will be housed in a standard Steelox building in Booth 3804. Featured will be a flow model showing the advantages of pipe arches and end sections; also standard corrugated and Multi-plate drainage structures, bin type retaining walls, tunnel liner plates and other Armco products.

Company representatives to attend the show will include: **S. R. Ives, H. D. Neill, G. E. Shafer, H. L. White, W. T. Adams, J. M. Robertson, O. M. Carter, W. J. Kropf, J. H. Cox, R. K. Leedom, C. W. Carleton, S. M. Gross, H. E. Ingwersen** and **W. H. Spindler.**

MICHIGAN POWER SHOVEL CO., Benton Harbor, Mich.

These pioneer manufacturers of truck shovel cranes will exhibit in Booth 2608. Four models representative of the Mich-

igan line and including all the latest postwar developments will feature front end equipment most common to each model and show the versatility of each machine with regard to type of digging and lifting equipment available. Company officials, branch managers and members of the service organization will be in attendance. The photo shows a Michigan truck mounted crane in use on a large building project.

BETHLEHEM STEEL CO., Bethlehem, Pa.

The Bethlehem standard dowel unit which can be completely assembled as a contraction joint or an expansion joint will be featured in the Bethlehem exhibit at the show. Also to be shown are the tubular bridge rail, utilizing standard cold rolled sections, the standard cable guard rail and the standard combination guard rail and hub guard, using cold formed sections.

LINK-BELT SPEEDER CORP., Chicago, Ill.

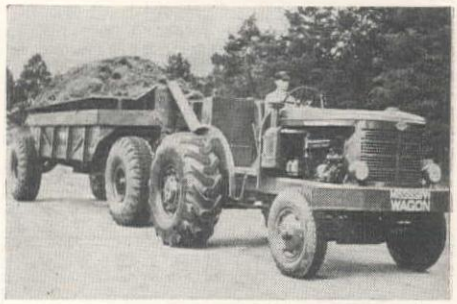
A complete picturization of the Link-Belt shovel-crane will be shown in the company's booth. Dozens of "on the job" demonstrations will be condensed in the colored motion pictures. They will cover performances in the shovel, crane, and dragline classes, with units varying from ⅜ to 3 cu. yd. in capacity, and the conditions covered will vary from usual to the most unusual.

MACWHYTE COMPANY, Kenosha, Wisc.

In Booth 1600, Macwhyte will display preformed internally lubricated wire ropes for shovels, scrapers and other equipment. Special braided wire rope slings will also be shown and a motion display showing wire rope stocks and locations of more than 400 distributors will be seen. Contractors are invited to visit the Macwhyte mills on their way to or from Chicago.

M-R-S MANUFACTURING CO., Jackson, Miss.

The makers of the famous Mississippi Wagon will be showing a new 125-h.p. all-purpose Diesel wheel tractor at the road show. This will be its first exhibi-



tion to the public. In addition several of the Mississippi Wagon models will be on display and the tractor mentioned above will also be exhibited with a 4-wheel scraper and an M-R-S bulldozer. Managers of the exhibit will be **H. E. Brown,** sales manager and **C. M. Chumley, Jr.,** secretary-treasurer. Also in attendance at the show will be: **L. R. Simmons,** president; **C. H. King,** vice-president; **E. S. Tierney,** service manager, and **C. R. Morris,** sales representative.

Shown in the accompanying photo is the new 125-h.p. tractor, and a Model 110 17-ton Mississippi Wagon.

PETTIBONE MULLIKEN CORP., Chicago, Ill., and GEORGE HAISS MFG. CO., New York, N. Y.

These two companies are exhibiting jointly in Booth 2618. To be shown are: the Haiss portable trough conveyor, belt type under-car unloader and wheel-mounted bucket loader; and the Pettibone Mulliken speedloader, portable batch asphalt plant, portable gasoline hammer and various shovel buckets.

HYATT BEARINGS DIVISION, General Motors Corp., Harrison, N. J.

Hyatt will exhibit a complete line of roller bearings in Booth 1025. This line includes the Hy-Load bearings made with separable inner races, separable outer races and non-separable types. The component parts of all these bearings are freely interchangeable, thus facilitating assembly of equipment. A wide range of sizes is available. A large number of men will be in regular attendance at the Hyatt exhibit, including, **H. K. Porter, C. L. Newby, J. M. Kelly, F. E. Booth, T. A. Russell, F. H. Webster, J. L. Haynes, R. W. Fraser, L. H. Hill, T. E. Hustead, H. G. Corbet, H. M. Carroll** and **C. C. Wardell.**

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Write immediately for details concerning duties, requirements, and examinations, and for application blanks to the San Francisco Civil Service Commission, 151 City Hall, San Francisco, California.

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SALES ENGINEER

Rock, Sand and Gravel Machinery Manufacturer has West Coast territory open for district manager. Liberal commission basis offers substantial earnings to competent man. Write Box 1037, Western Construction News, 503 Market Street, San Francisco 5, California.

FOR SALE — One Model 200, ½ yd. gasoline driven Osgood Shovel, complete with shovel, dragline, and clam attachments, 35 ft. boom. This shovel is practically new and in perfect condition. You should see the machine to appreciate its value.

IVAN RAY, Rock Springs, Wyoming

FOR SALE

Caterpillar D-8 Tractor, Serial No. 2U 3936, with Garwood Model 515 Sraper
Caterpillar D-8 Tractor, Serial No. 2U 3855, with Bucyrus-Erie Model 152 Scraper
Two International TD-18 Tractors with Cable Dozers
Caterpillar RD-8 Tractor with Power Unit
Five Tournapulls, Model Super C
Euclid Bottom Dump Hauling Unit, 23 Yard Capacity
Two Buckeye Cranes, Model 70, Serial No. 6283 and 70-121
Koehring Crane, Model 205, Serial No. C-5879
Caterpillar Motor Grader Model 12
Lima Dragline, Model 802, Serial No. 3145, 3 Yard Capacity
Five New DW-10 Hauling Wagons
Concrete Mixers, Air Compressors, Welders, Wagons, Drills, etc.

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Chief of Party	350-420
Instrument Man	280-340
Surveyor's Field Assistant	240-290
Inspector of Public Works Construction	270-330

Residence requirements have been waived. The Civil Service Commission will endeavor to make arrangements to hold examinations at convenient places throughout the United States.

Write immediately for details concerning duties, requirements, and examinations, and for application blanks to the San Francisco Civil Service Commission, 151 City Hall, San Francisco, California.

Closing date for receipt of applications, July 26, 1948.

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