WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

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JULY • 1946

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$4.00 PER YEAR

IN THIS ISSUE

HIGH WATER in the Skagit River overflowed Ross Dam, Seattle City Light structure, on May 14 when an estimated 18,000 sec.-ft. passed the construction site, flowing over blocks 11 and 13 as well as through the two valves at El. 1340 in block 15, and at two lower outlets. High point of concrete in this photo is block 15 at El. 1445.

Take a LOAD off your Engines

DON'T let power-stealing by-products of oxidation put an extra load on your heavy-duty gasoline and Diesel engines. Lubricate them with *Texaco Ursa Oil X★★*. This great oil has extremely high resistance to oxidation, and is both detergent and dispersive.

Texaco Ursa Oil X★★ keeps engines clean and holds deposit-forming materials in suspension until drained — assures free rings, better compression and combustion. It reduces engine wear and protects alloy bearings against corrosion.

You get greater efficiency, more power — spend less for fuel and servicing.

To get better performance from air compressors, contractors everywhere give them the effective lubrication of *Texaco Alcaid, Algol or Ursa Oil*. These famous oils assure wide-opening, tight-shutting valves, free rings, continuous air supply, fewer repairs and overhauls.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York

TEXACO
REG. T.M.

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS

PERFORMANCE

on jobs like this make repeat orders!

FOURTEEN NORTHWESTS

for the M & K Corporation

San Francisco, California

Look at this job. Here's a deep trench with clean straight walls. Traffic is open. There is no bulky equipment to clutter up the street. Loaded trucks move with the traffic and don't have to turn.

The Northwest loads quickly and smoothly and with the "Feather-Touch" Clutch Control, which assures him the feel of the load, the operator spots the dipper over the truck and dumps with the minimum of spillage to the street.

It's things like this plus the low maintenance costs and high output that have placed fourteen Northwests on M & K Corporation jobs. There is no better endorsement than a repeat order. Follow the Northwest Crowd and plan ahead to have a Northwest and the kind of Shovel, Crane, Dragline and Pullshovel service you have been looking for.

NORTHWEST ENGINEERING CO.
1736 Steger Building
28 E. Jackson Boulevard
Chicago 4, Illinois

Sales Representatives:

CHEYENNE, WYOMING
Wilson Equipment Supply Co.

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Balzer Machinery Co.

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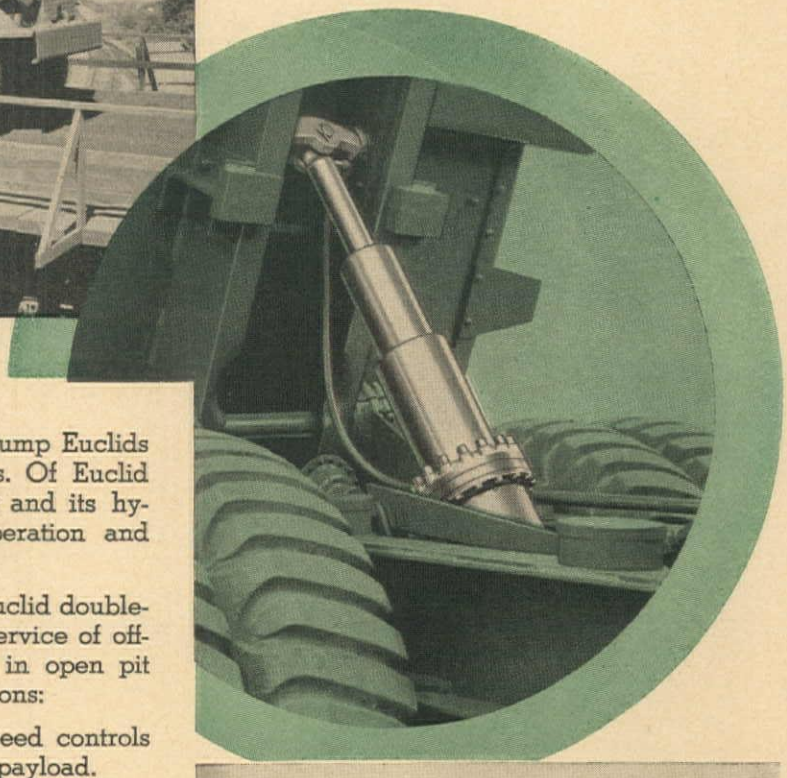
NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

EUCLID *fast-acting* HOIST *Speeds Dumping*



THE three-stage hydraulic hoist of Rear-Dump Euclids saves time and reduces hauling costs. Of Euclid design and manufacture, the powerful hoist and its hydraulic system provide fast, dependable operation and ample capacity for the rated payloads.

Here are some of the features that make the Euclid double-acting hoist unequalled for the heavy duty service of off-the-highway work on construction projects, in open pit mines and quarries, and on industrial operations:

Raises Loaded Body Fast . . . Engine speed controls dumping speed; ample hoist capacity for full payload.

Dumps the Load Clean . . . Hoist has 37" stroke which raises body to 70° from horizontal.

Provides Complete Control of Body . . . Conveniently located hoist valve has four positions: raise, lower, float, and hold. All or part of the load can be dumped according to job requirements.

Lowers Body Quickly . . . Hoist is double-acting in third stage . . . lowers the body under power to the point where it settles quickly by gravity.

Ask your Distributor or Representative to show you how all Euclid models, Rear-Dump and Bottom-Dump, are built throughout for efficient, long life in off-the-highway service.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLIDS *Move the Earth*

Brown, Fraser & Co., Ltd., Vancouver, B. C.; A. H. Cox & Co., Seattle, Wash.; Hall-Perry Machinery Co., Butte, Mont.; Lively Equipment Co., Albuquerque, New Mexico; Constructors Equipment Co., Denver, Colorado; Pacific Coast Branch: 3710 San Pablo Ave., Emeryville, Calif.; Intermountain Equipment Co., Boise, Idaho, and Spokane, Washington.
REPRESENTATIVE: M. H. Johnson, W. 2411 Crown Avenue, Spokane, Washington.

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

Covering the Western Half of the National Construction Field

Contents for July, 1946

J. M. SERVER, JR.
Editor

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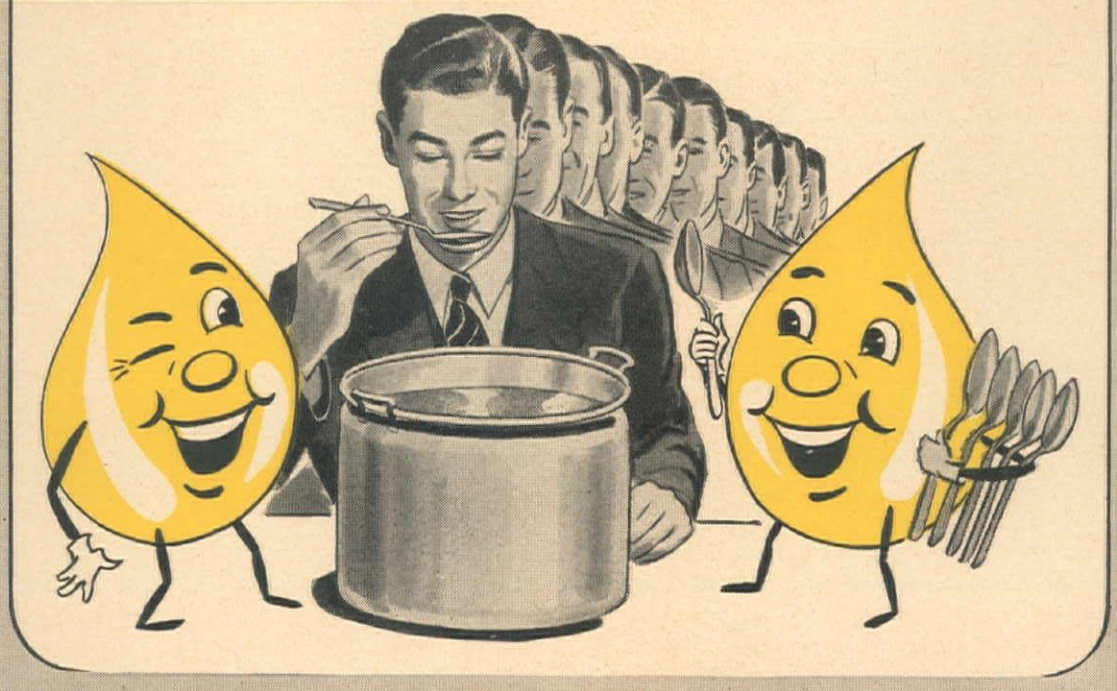
Call the

SHELL LUBRICATION ENGINEER as the FIRST STEP to the RIGHT SOLUTION of any LUBRICATION PROBLEM



They even made a TASTE TEST of a SHELL RUST PREVENTIVE!

PROBLEM: Specifications in contract for making U. S. Army cooking kettles called for a protective coating that came off easily with cold water. Absolutely no taste or odor could remain. The manufacturer preferred a coating to be applied by dipping at room temperature.

SOLUTION: When the Shell Lubrication Engineer surveyed the problem, he recommended a Shell Ensis Oil. As a test, this material was applied to utensils of the plant cafeteria. These were washed in cold water—then placed in normal use. *Not one employee could detect the slightest trace of the Rust Preventive used.*

CONCLUSION: It pays to consult the Shell Lubrication Engineer, regardless of the nature or size of your lubricating problem. Write for a copy of Shell's 40-page booklet on Rust Preventives. Shell Oil Company, Incorporated, 50 West 50th Street, New York 20, New York; or 100 Bush Street, San Francisco 6, California.

No one really cares what a Rust Preventive tastes like, but the maker of U. S. Army cooking kettles had to be sure that the Rust Preventive could be completely removed *so that it would not taste!*

SHELL RUST PREVENTIVES

OILS . . . FLUIDS . . . COMPOUNDS

SHELL

WHEN YOU'RE BACKING IN BATCH TRUCKS THAT *EXTRA* FOOT *HERE* COUNTS A LOT

● The skip of the Koehring 34-E *Twinbatch* Paver is 10 feet wide, approximately a foot wider than other paver skips. When you're backing batch trucks into a paver skip, fast, that extra foot means a lot. You're in and out just a little faster. And "just a little faster" means big money on a paving job.

For the Koehring *Twinbatch*, that big 10-foot skip is just right because the *Twinbatch* is a big, Heavy-Duty paver, almost 12 feet wide, weighing 60,400 pounds, and every pound working weight.

Double, continuous, self-equalizing cables raise the skip in 8 seconds. Each cable alone is strong enough to raise the loaded skip. Replaceable liners keep abrasive wear away from the skip throat. Welded lip, with extra tire tread plates, acts as a ramp, makes it easier for trucks to get into skip on a rough grade.

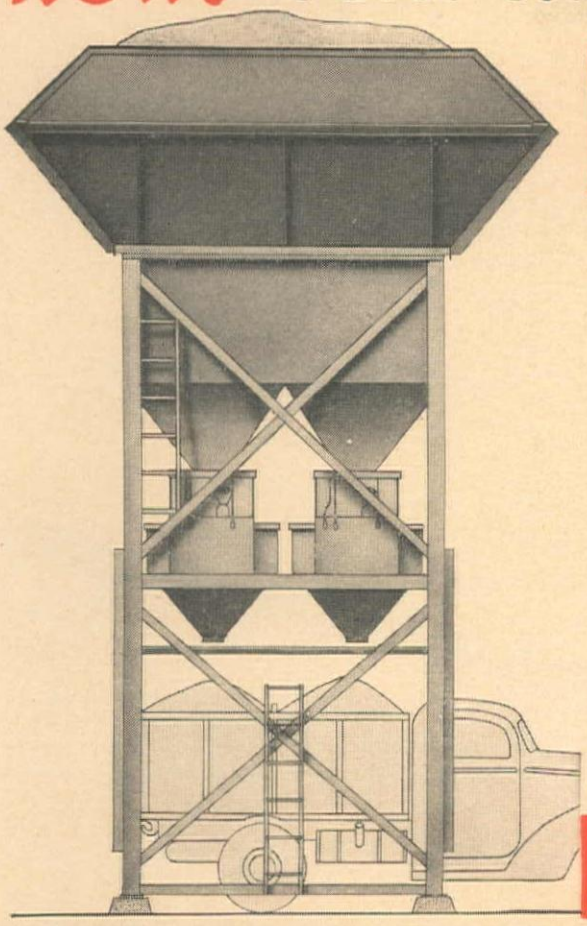
KOEHRING
34-E
twinbatch
PAVER
TWO COMPARTMENT DRUM

KOEHRING COMPANY, *Milwaukee 10, Wis.*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

NOW! 1-STOP LOADING FOR 2-BATCH TRUCKS



AT YOUR *AGGREGATE PLANT* AS WELL AS YOUR BULK CEMENT PLANT

With the new Johnson Dual Aggregate Batching Plant, you can now take full advantage of 1-stop loading of 2-batch trucks at both the aggregate and the bulk cement plant. Johnson Dual Aggregate Batching Plant discharges both batches into a 2-batch truck simultaneously. Extra "spot-stops" are eliminated. On most jobs, the number of hauling units can be reduced. 100 yard, 3 compartment portable section bin is equipped with 2 multiple material batchers. One operator controls both batchers. (Of course, all Johnson Bulk Cement Plants may also be equipped with 2 batchers—for 1-stop loading of 2-batch trucks.)

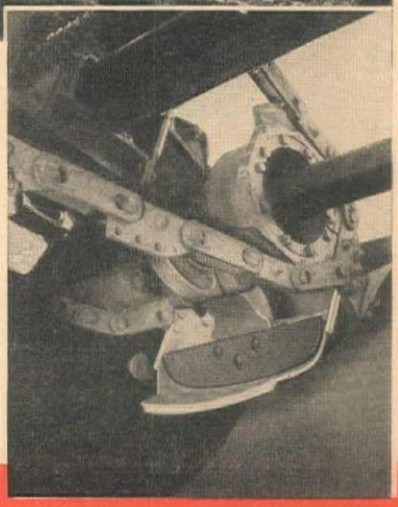
THE C. S. JOHNSON COMPANY
KOEHRING SUBSIDIARY • CchampaIGN, ILLINOIS

GETS BIGGER BITES *with* CLEANER BUCKETS

Clean trencher buckets take bigger bites. On the Parsons 250 Trenchliner each bucket that bites into the trench is clean. Spring loaded bucket scraper (see picture below) cleans out sticky materials as bucket load is dumped, leaves each bucket empty. Gumbo clay can't stick, can't cut down trenching efficiency. Here are more reasons why the bucket line on the Parsons 250 Trenchliner can dig more trench per day: 1. Light weight, high strength digging buckets have wear resisting cutting lips. 2. Bucket teeth are forged of abrasion-resistant alloy steel. 3. Same teeth are used for both bucket and side-cutters. 4. Excavator chain links are heat hardened. 5. Connecting pins are self-locking, have no cotters.

PARSONS 250 TRENCHLINER

Spring loaded bucket scraper scoops out sticky material. Cleaned-out buckets take bigger bites.



THE PARSONS COMPANY
KOEHRING SUBSIDIARY • NEWTON, IOWA

When You're Traxcavating, You're PROFIT-MAKING!

TRAXCAVATORS get things done! Put them to work digging, loading, carrying, grading and watch your hourly production climb — your operating costs fall. TRAXCAVATORS are seldom idle because these versatile, multi-purpose machines combine the usefulness of a shovel, loader, scraper, bulldozer — and with the available interchangeable attachments, they are the "workingest" machines you ever saw. More work, on more jobs, more days in the year mean low-cost, top notch performance and greater profit.

TRAXCAVATORS are built in several sizes — for every job and purpose — with bucket capacities from ½ to 2½ cubic yards. Each is a balanced unit with the rugged "Caterpillar" track-type tractor by which it is powered. Learn now why it pays you to *traxcavate*—get the facts from your TRACKSON-"Caterpillar" dealer or write direct to TRACKSON COMPANY, Dept. WC-76, Milwaukee 1, Wisconsin.

Top Views: TRAXCAVATOR on Illinois sewer job —clearing, grading and transporting concrete pipe
Lower Right: Grading and leveling around new home
Lower Left: IT4 TRAXCAVATOR digging a house basement

DIGS GRADES

TRAXCAVATOR

REG. U. S. PAT. OFF.

THE ORIGINAL TRACTOR EXCAVATOR

LOADS CARRIES

Tailor-made site for 300 new homes

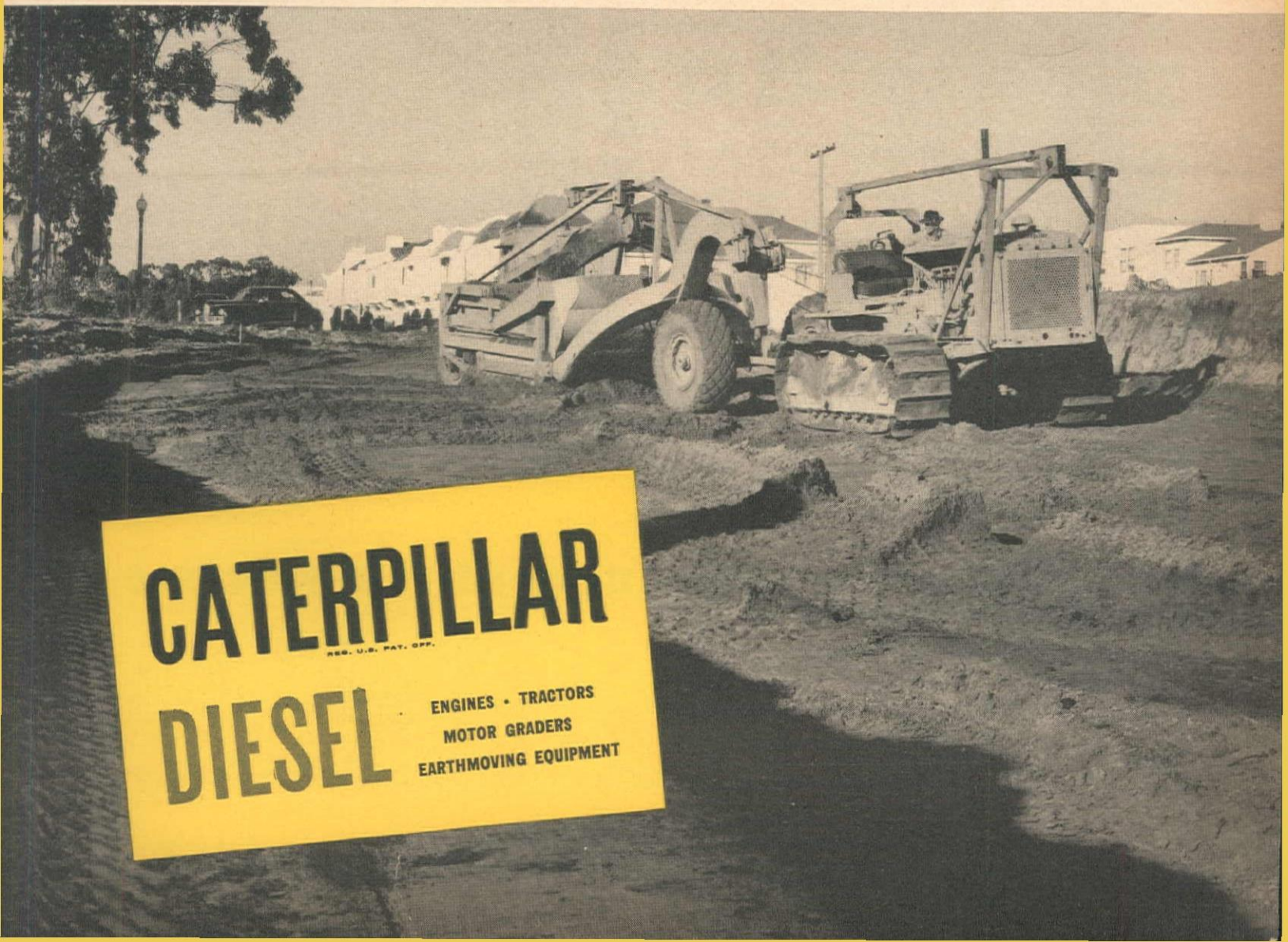
THE DEVELOPMENT of many a municipal or suburban area would be virtually impossible but for the might of such land-clearing and earthmoving equipment as "Caterpillar" Diesel Tractors, Scrapers, Motor Graders and Bulldozers. With them practically no job is too tough, no cut too deep, no fill too big. Million-yard projects are ordinary undertakings when you have the proper set-up.

"Caterpillar" today builds just what you need for earthmoving. "Caterpillar" units of the right type and size enable you to ZONE YOUR EQUIPMENT for doing the job in the *best and quickest way, and at lowest cost on earth.*

And, the "Caterpillar" service-dealer organization is the best in the world for keeping that equipment in tip-top working condition.

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

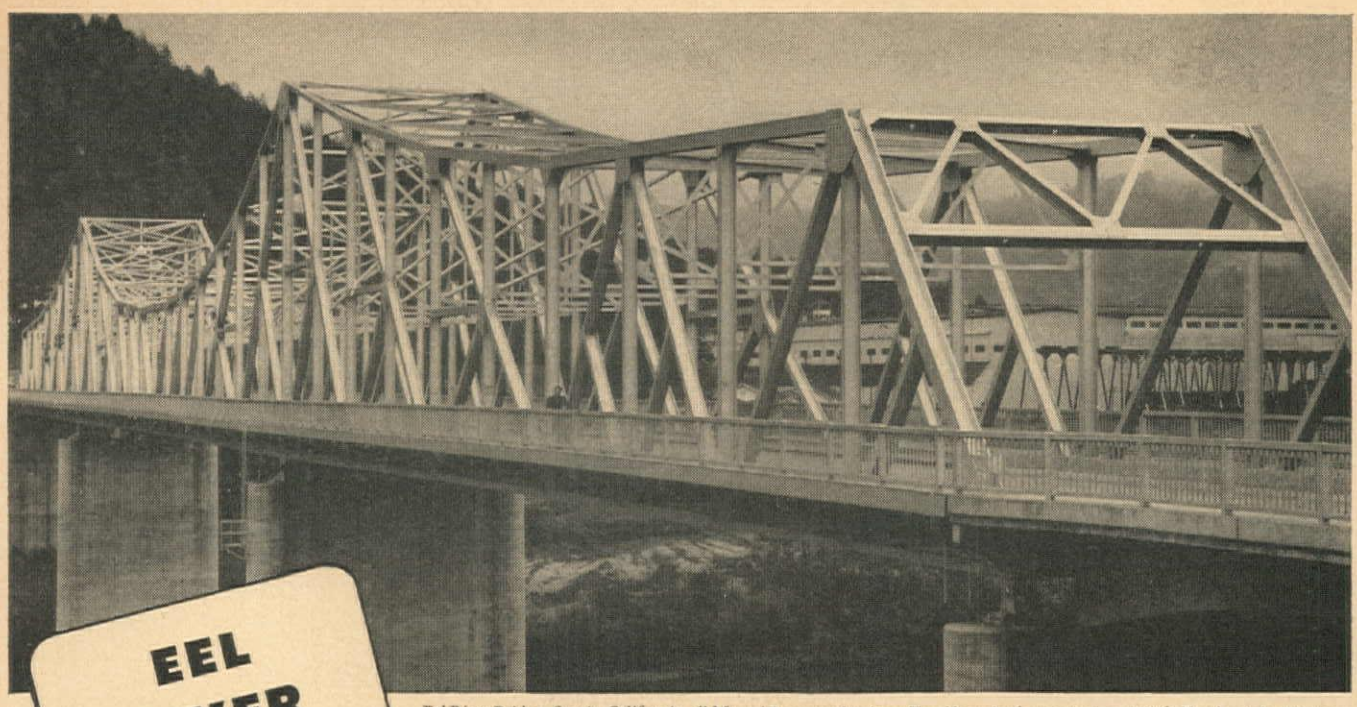
MAKING NEW HOMESITES — Lakeshore Park, in the San Francisco Bay area. Moving half a million yards on 22 acres. Cuts as deep as 42 feet, fills up to 38 feet. Bulldozing equipment used also for clearing — moving logs to fire area. "'Caterpillar' does all right by us," says E. J. Schulhauser, Gen. Supt. for Standard Building Company, contractor.



CATERPILLAR

REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



Eel River Bridge, Scotia, California, all Mayari R except the rivets. Total length of trussed spans, 802 ft. Total weight, 975 tons.

BUILT OF Mayari* R

RESISTS ATMOSPHERIC CORROSION

Mayari R steel was used throughout the Eel River highway bridge to resist the salty atmospheric corrosion encountered in the locality.

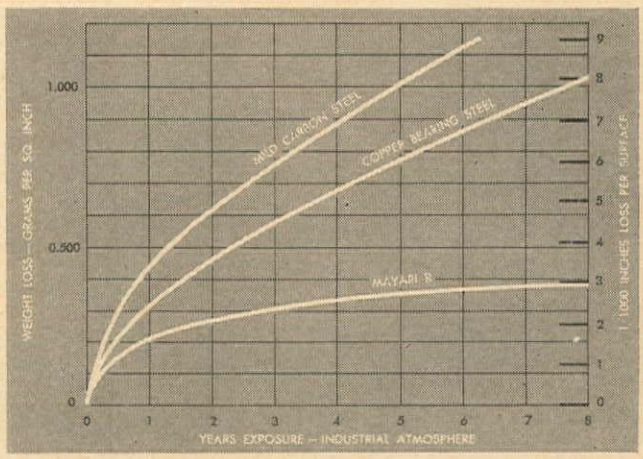
Located north of San Francisco, 30 miles from the coast, this bridge was completed in 1941. Recent surface inspection shows the bridge to be in excellent condition, with little evidence of corrosion, while another bridge of different types of steel constructed at the same time in the same locality already shows marked corrosion of the superstructure.

Although corrosion-resistance is a big factor in selecting bridge steel, Mayari R has another property equally important to the designer: high strength. Mayari R, with its minimum yield point of 50,000 psi, can be used in lighter shapes and gages to reduce weight materially without sacrificing strength.

The use of this high-strength, low-alloy, corrosion-resisting steel results in longer bridge life and lower cost of maintenance. In addition, the savings in weight often mean lower initial cost.

Mayari R is rolled in most sizes of structural shapes as well as plates, bars and sheets. Write for copy of new Mayari R catalog, giving detailed information including suggested stresses for bridge design.

*Mayari pronounced to rhyme with "fiery"



Comparative test results covering 8 years of atmospheric corrosion effects on Mayari R, mild carbon steel and copper-bearing steel.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

General Offices: San Francisco

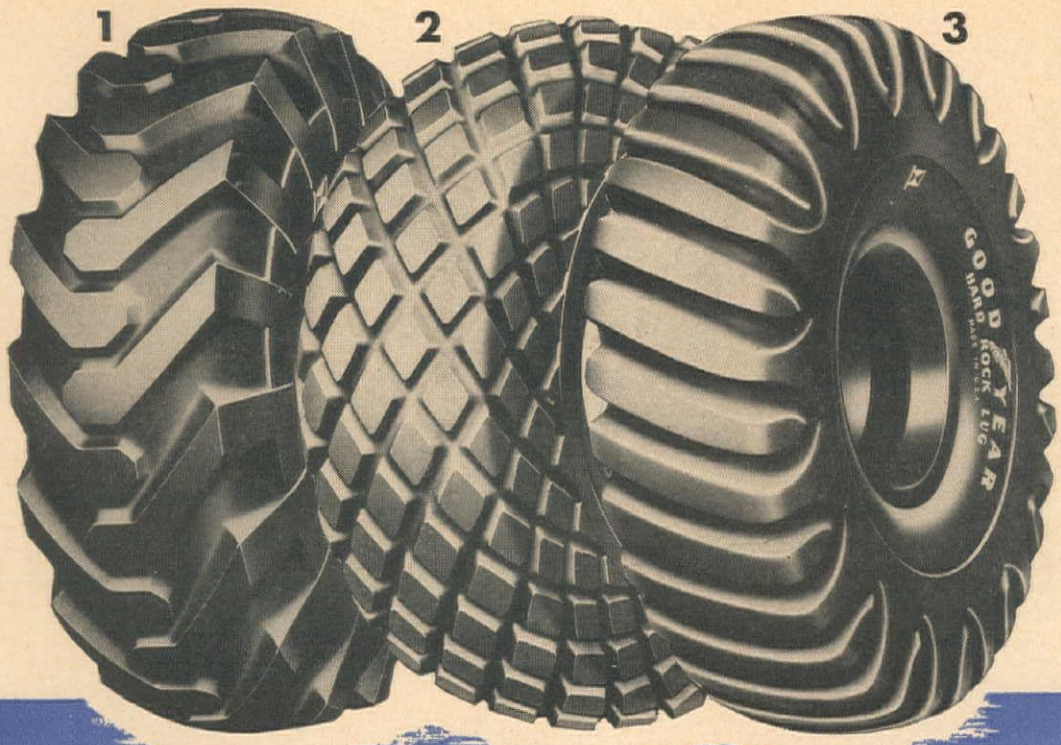
District Offices: Los Angeles, Portland, Seattle, Salt Lake City, Honolulu

Steel Plants: South San Francisco, Los Angeles, Seattle

BETHLEHEM PACIFIC

★ BETHLEHEM STEEL ★

Mayari R *makes it lighter... stronger... longer lasting*

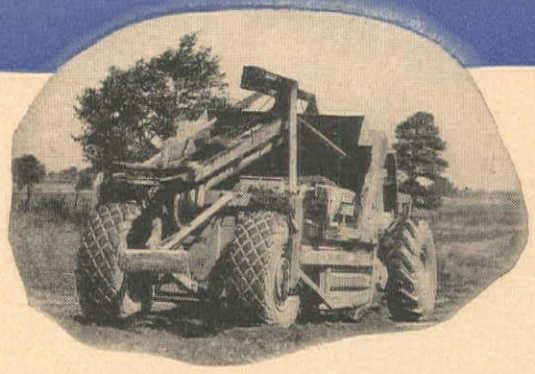


1
SURE-GRIP EARTH MOVER
— super-traction for drive wheels on all soils (left)

2
ALL-WEATHER EARTH MOVER
—sure-roll for drawn vehicles and for general traction (center)

3
HARD ROCK LUG
— super-armored for all rough and rugged rock work

TOUGH TRIO *that tops 'em all!*



TAKE the word of men who use them — these three "toughies" are unbeatable for lowest-cost, most efficient off-the-road haulage: The Goodyear Sure-Grip for drive wheels, where hard-working, keep-going traction is needed; the Goodyear All-Weather Earth Mover on drawn vehicles for smooth, easy rolling; the Goodyear Hard Rock Lug for any tough terrain.

The Sure-Grip's self-cleaning, *open center* tread is especially designed to pull through mud and soft soil. Its husky, deep lugs give you power-packed, dependable traction in the stickiest going. The All-Weather Earth Mover with its wide, rounded contours, is made for steady moving with minimum roll resistance. The Hard Rock Lug fights its way in rough and rocky going that cuts other tires to pieces.

These great Goodyear performers provide the most economical work-tire combinations obtainable. Big contractors, who keep accurate records, account them the lowest-cost-per-ton-mile of all off-the-road carriers.

BUY and SPECIFY GOODYEAR —*it pays!*

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

GOODYEAR

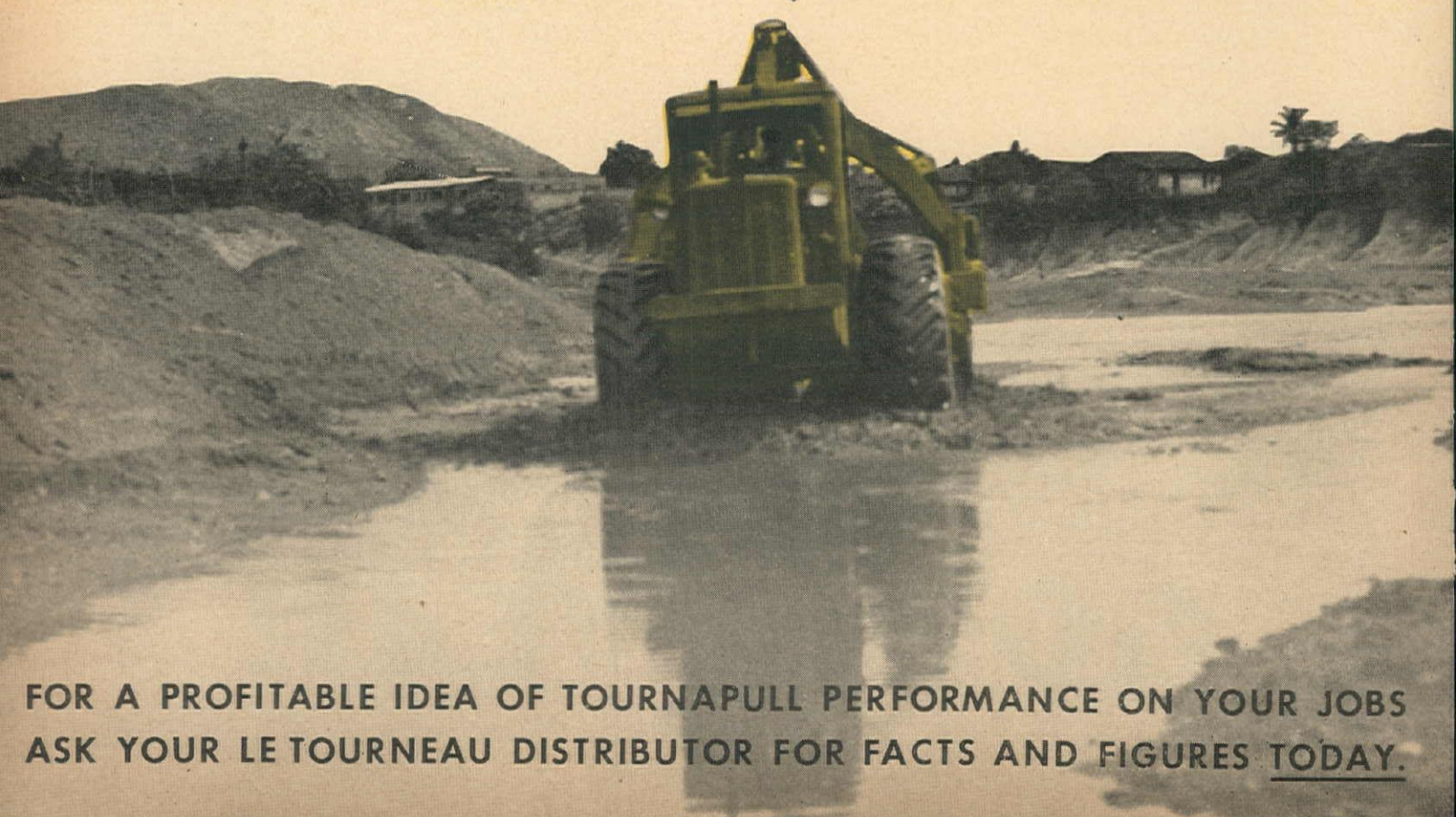
MORE YARDS ARE MOVED ON GOODYEAR OFF-THE-ROAD TIRES THAN ON ANY OTHER KIND

Tough JOB CONDITIONS

HANDLED BY TOURNAPULLS

Here are just a few of many case histories showing how contractors have proved Tournapulls' ability to profitably lick the toughest haul, weather and job conditions. With job-proved Tournapulls, you too, can assure lowest-net-cost-per-yard on all your future requirements.

Tough Footing . . . 4 Tournapulls loaded gravel in a river bed . . . hauled through the water . . . pulled loaded up a 12% adverse grade from the river . . . and traveled 4000' to a railroad siding where they stockpiled their loads. Rigs are working for Constructores Mexicanos S.A. to supply ballast for a section of railroad near Ixtepec, Oaxaca, Mexico. In these extremely tough off-road conditions the Tournapulls' big 21.00 x 24 tires gave ample traction and flotation . . . 2-wheel design provided plenty of weight on the drive wheels to furnish pulling power to climb the adverse river grades.



FOR A PROFITABLE IDEA OF TOURNAPULL PERFORMANCE ON YOUR JOBS ASK YOUR LE TOURNEAU DISTRIBUTOR FOR FACTS AND FIGURES TODAY.

Steep Grades

. . . Nathan A. Moore's 9 Tournapulls loaded and hauled down 40 to 50% grades . . . returned up 27% climb while moving ½ million yards from a mountainside at Camp Pendleton, Oceanside, Calif. Material was sandstone, mixed with clay, heavy but dry, rooted for fast loading. Despite mountainous grades and tough materials, Moore's superintendent reports that their Tournapull fleet, working over ½-mile, 1-way haul, placed 6,000 yards on the fill every 9-hour shift.

Rooted Shale

. . . Potts & Callahan Contracting Co., Inc., found what Tournapulls could do in tough rooted shale on Pennsylvania highway job, near Harrisburg. Using 4 Tournapulls on a 700', 1-way haul, each rig averaged a complete cycle of load, haul, spread and return every 3.55 minutes . . . made 14 round trips hourly. By using a LeTourneau Rooter, smart contractors like these are extending low-cost Tournapull operation into materials formerly considered work for specialized equipment.

Rain and Snow

. . . Talbott & Myers Construction Co.'s 2 Tournapulls licked tough winter conditions on construction of a new General Electric building site at Lexington, Ky. Material was clay—very soggy from several weeks of rain. Next came a 4½" snow storm . . . but Tournapulls proved their ability to keep loading, hauling and spreading. Positive load ejection and big-tired traction and flotation kept rigs rolling through soft, sticky fill. Hauls were short on this job —525' 1-way; Tournapulls moved 45,000 of total 50,000 yards.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

JOB-PROVED Over 4400 Built and Shipped

TOURNAPULLS*

*Trade Mark Reg. U.S. Pat. Off. C45

SAWMILLS

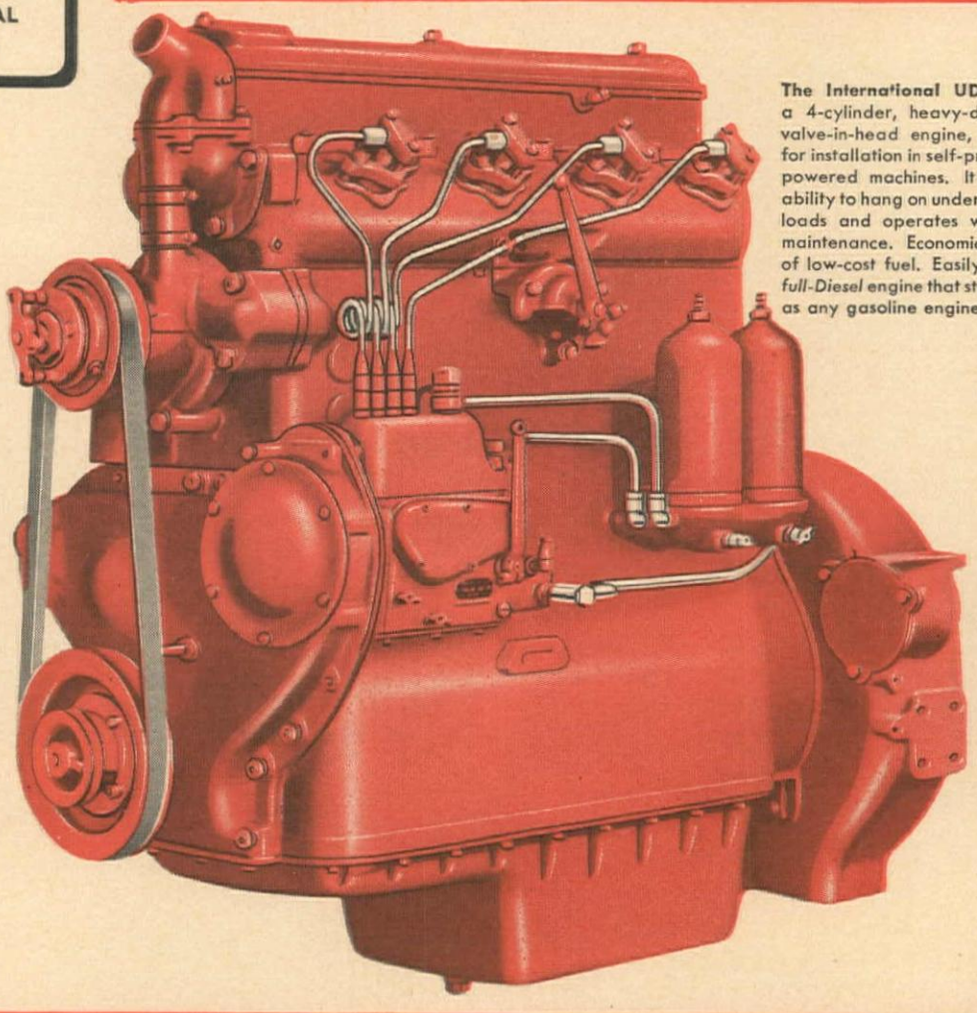
ROCK CRUSHERS

HOISTS

POWER SHOVELS

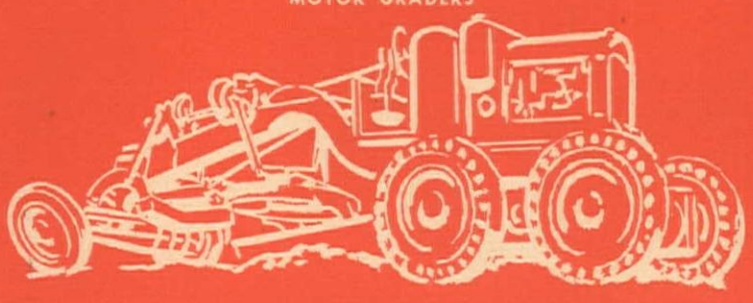
INTERNATIONAL HARVESTER

INTERNATIONAL



The International UD-14 Diesel, a 4-cylinder, heavy-duty, 4-cycle valve-in-head engine, as supplied for installation in self-propelled and powered machines. It has unusual ability to hang on under heavy overloads and operates with minimum maintenance. Economical in its use of low-cost fuel. Easily serviced. A *full-Diesel* engine that starts as easily as any gasoline engine of like size.

MOTOR GRADERS



COMPRESSORS

INTERNATIONAL INDUSTRIAL POWER DISTRIBUTORS

J. G. Bastain
Redding, California

Brown Motors
Reno, Nevada

Brown Tractor Company
Fresno, Madera, Reedley, Cal.

Farmers Mercantile Company
Salinas, California

MARINE

PUMPS

ICE MACHINES

GENERATORS

DIESEL ENGINES

for Full-Diesel Economy

If it's powered by an International Diesel Engine you have assurance of *full-Diesel* performance and matchless operating economy in the powered equipment you buy. With it you get more work accomplished per dollar of cost for fuel and maintenance.

International Diesels are smooth-running, 4-cycle, *full-Diesel* engines. Advanced design fuel injection and combustion assures full use of the fuel consumed. And International's positive, instant starting system makes any International Diesel as easy to put to work as any gasoline engine of like size and horsepower. That means no excess weight, no wasted time, no hesitation when you want power on the job!

There are many features that give International Diesel engines long life with minimum maintenance. *Tocco-hardened crankshafts; valve-in-head design; replaceable, long-life cylinders of heat-treated alloy steel; full-pressure lubrication through rifle-drilled passages; heavy-duty precision bearings of replaceable type; full-floating piston pins; full-floating water pump shaft; by-pass type thermostatically-controlled cooling; large-capacity air, oil and fuel filters; etc.* Only International Diesels have all these features!

Any powered equipment is, therefore, better equipment because of the dependable International Diesel Engine that powers it. Visit any distributor who handles International-powered equipment for further facts and help in selecting the equipment you need. For International Diesel Crawler Tractors, Wheel Tractors or Power Units, see your nearest International Industrial Power Distributor.

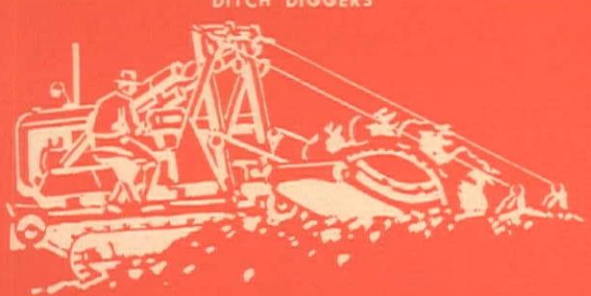
Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

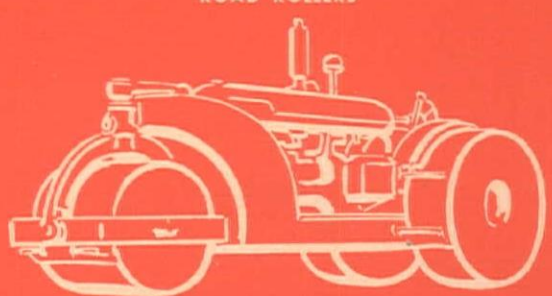
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL Industrial Power

DITCH DIGGERS



ROAD ROLLERS

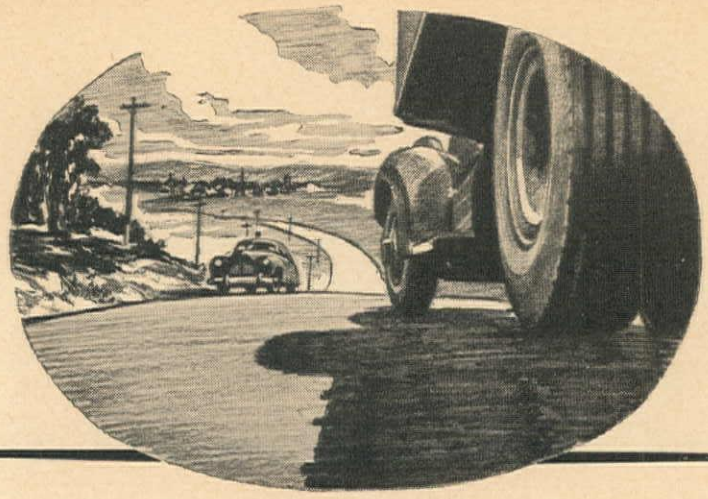


INTERNATIONAL INDUSTRIAL POWER DISTRIBUTORS

Sutton-Morf Tractor Company
Sacramento, California

Thompson-Saga, Inc.
Stockton, California

Valley Equipment Company
San Jose and San Francisco, Cal.



NATIVE SOILS
will bear the traffic

There are probably hundreds of miles of roads in your area which have not carried enough traffic to justify the high cost of paving.

These are the roads that have been neglected. But they are now the roads that can benefit through the new methods of soil stabilization. For here is a process that makes it possible to build highly serviceable roads utilizing native, in-place materials, thus reducing to a minimum—or eliminating—one of the major cost factors in road construction.

With its long experience in designing earth-handling machinery, P&H has worked in cooperation with road-building authorities to produce a machine that now fulfills the 8 basic requirements in processing native soils in the most efficient manner—*at a single pass.*

The *P&H Single Pass STABILIZER* is capable of handling all types of admixtures and providing the accurate control that makes it possible to build all-weather roads of pre-determined load-bearing ability in a way that will cut both building and maintenance costs.

Those interested in the building of base courses, light traffic roads, streets, airport-runways, etc., should obtain complete information.

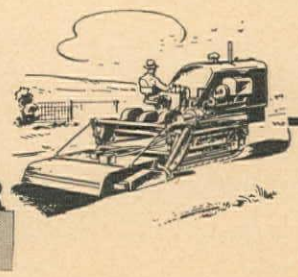
P&H

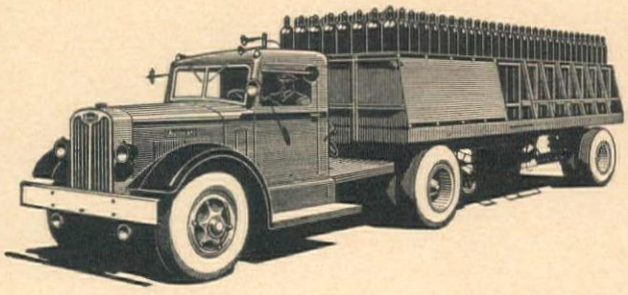
SINGLE PASS STABILIZERS

4490 W. National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

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





BY MASTER ENGINEERS

Autocar engineers are a restless lot. Never for one moment do they relax in their determination to see that Autocar Trucks are the finest heavy-duty trucks that brains can build and money can buy. That's why Autocars do America's heaviest hauling with less trouble and lower costs. That's why the trend is to heavy-duty Autocars. . . . Autocar Trucks cost more *because they're worth more.* Autocar's master engineers see to that.

AUTOCAR TRUCKS

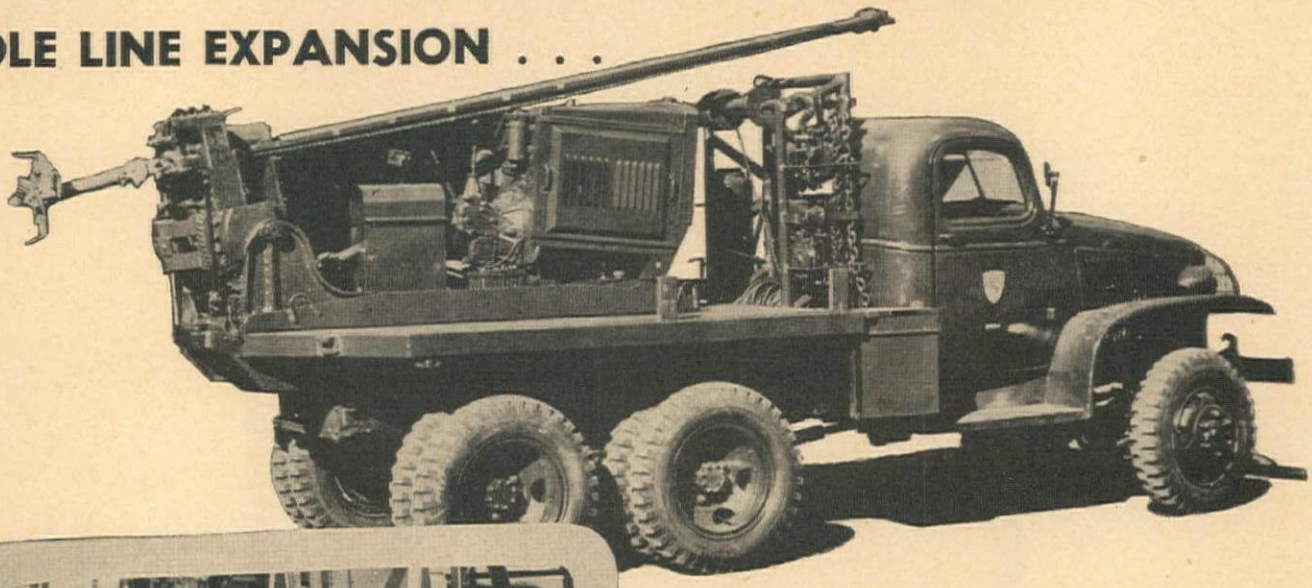
FOR HEAVY DUTY

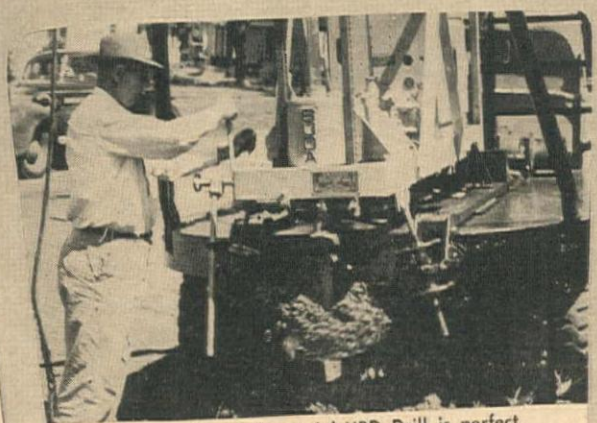
MANUFACTURED IN ARDMORE, PA.

FACTORY BRANCHES AND DISTRIBUTORS FROM COAST TO COAST

Cash in on R. E. A. and Power Company

POLE LINE EXPANSION . . .





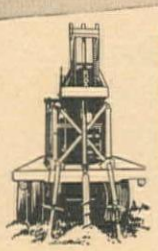
Above: The Buda Model HBD Drill is perfect for many drilling jobs where overhead clearance height is not of prime importance. Below: An HBD Drill mounted for drilling guard rail post holes.

. . . with this versatile *Earth Drill*

Extensive pole line expansion programs are now in progress. You can be in a position to handle the drilling work—profitably and with speed, by adding a Buda Earth Drill to your present equipment.

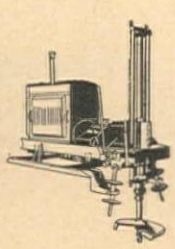
No "makeshift" rig, the Model HBE Earth Drill (illustrated above) was primarily designed for fast, low-cost post and pole hole work. Completely portable, this self-powered drill is quickly moved from job to job—and can be rapidly set up to drill. Its dependability is backed by Buda's 65 years of manufacturing experience. See your nearest distributor or write us.

Buda HBH Deep Hole Drill, for smaller diameter holes up to 100' deep. Tops for soil testing — prospecting.



BUDA

15424 Commercial Avenue
HARVEY (Chicago Suburb), ILLINOIS



Buda Model HBD Earth Drill. Rigid head. Designed and built for a wide range of construction work.

Earth Drill Distributors:

LOS ANGELES, CALIFORNIA	**Fornaciari Company**
SAN FRANCISCO, CALIFORNIA	**Coast Equipment Company**
PHOENIX, ARIZONA	**Brown-Bevis Equipment Co.**
DENVER, COLORADO	**Ray Corson Machinery Co.**
SALT LAKE CITY, UTAH	**Arnold Machinery Co., Inc.**
BILLINGS, MONTANA	**Western Construction & Equipment**

You don't have to handle a rugged product, such as cast iron pipe, with kid gloves. However, use reasonable care in unloading, distributing and lowering it into the trench, and you give cast iron pipe a good start on the century or more of useful life cast into it at the foundry. A level trench bottom, without humps or hollows, and a tamped backfill (in all but sandy soils) are also important. Under normal conditions, cast iron pipe, so laid, need never see daylight again for centuries. But if population shifts require re-routing, or replacing with larger pipe, you can take up the original line, sell it or re-use it elsewhere. Cast Iron Pipe Research Association, T. F. Wolfe, Engineer, 122 S. Michigan Ave., Chicago 3.

CAST IRON PIPE
SERVES FOR CENTURIES

DIESEL POWER

WHAT'S IN A NAME PLATE?

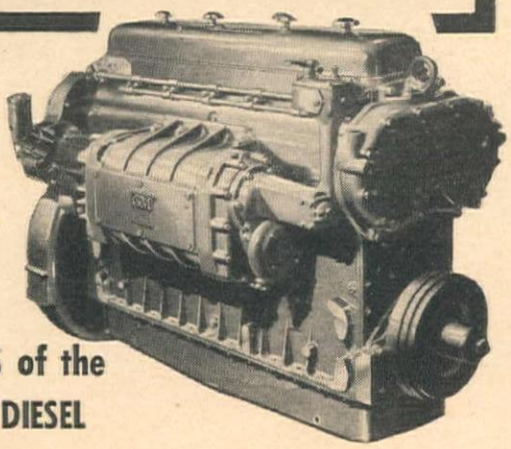
IN THIS CASE the name plate holds the secret of the satisfaction you will have with Diesel power.

For this name plate is evidence of some of the most intensive work ever undertaken in the General Motors Research Laboratories.

It started back when all Diesels were cumbersome, stationary engines. But the Diesel idea looked good. Maybe it could be made more useful. So GM experts went to work on it.

THEY MADE IT two-cycle—quick to respond to additional loads because power is furnished on every downward stroke of each piston. They eliminated all the old surplus weight and size of former Diesel engine practice and built in a more than ample supply of horsepower. They developed unit injection—did away with high-pressure fuel tubing. They designed Uniflow scavenging—made a clean-burning, efficient engine. Then to top it all, they simplified the design and made wearing parts easy to get at, and interchangeable even between engines with different numbers of cylinders.

ALL THIS has added up to today's sturdy, hard-working, money-saving GM Diesel—a Diesel that brought the era of the GM locomotive and its streamliners, a Diesel that has changed the picture of marine propulsion—a Series "71" industrial Diesel engine ready to take on the toughest jobs of road transportation, construction, fishing, mining, lumbering and anything else you have to offer. Yes, ready to take them on and do them reliably, at low cost.



FEATURES of the GM "71" DIESEL

- Compactness
- Quick starting under all conditions
- 2-cycle, smoother operation
- Easy accessibility of wearing parts
- Unit injectors—no high-pressure piping
- Maximum parts interchangeability regardless of number of cylinders
- Uniflow performance at high altitudes

A nation-wide organization of GM Diesel sales and servicing dealers stands ready to handle every need for parts and service.

DETROIT DIESEL ENGINE DIVISION

DETROIT 23, MICH. • { SINGLE ENGINES . . *Up to 200 H.P.* / MULTIPLE UNITS . . *Up to 800 H.P.* }

GENERAL MOTORS

On the job--- DIGGING AT A PROFIT!

HENDRIX *Lightweight* DRAGLINE BUCKETS

10% to 14% Manganese
Chains and fittings are standard
on all types and sizes.

⅜ to 30 Cubic Yds.

We've taken the weight out of the bucket itself, to let you put bigger loads inside. Here's how: Because the HENDRIX Lightweight is 20 to 40 per cent lighter than other buckets, type for type, you can use larger buckets on your machines, designed for smaller operations. The same holds true for long boom operations... and in either case this can be done without exceeding the allowable loaded weight. In wet digging, you get bigger pay loads by leaving the water in the pit!

- ★ 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 diggings.
- ★ Perfect Balance; handles easier, fills faster, dumps cleaner.
- ★ Three Types; light, medium, and heavy duty. With or without perforations.

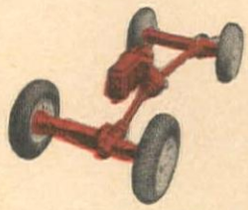
WRITE FOR DESCRIPTIVE LITERATURE—
OR ASK YOUR DEALER

DESOTO FOUNDRY, INC. • MANSFIELD, LOUISIANA

IN MUNICIPAL SERVICE ONE FWD TRUCK DOES *Many* JOBS

FOUR-WHEEL-DRIVE

A "Plus" that Pays in Many Ways!



There are scores of jobs an FWD truck can do in municipal service . . . new road construction, road maintenance, land clearing, refuse disposal work, heavy hauling, snow clearing, and many other heavy-duty jobs. These rugged, dependable, all-weather, all-season, all-purpose trucks give the taxpayers a big "money's worth" on their investment.

The true FWD four-wheel-drive principle at its highest development, with center differential . . . driving-power and traction on all wheels . . . and other important advantages are reasons why FWDs are the first choice among municipalities who know FWD performance-proved features.

See your FWD dealer, or write for information on FWD trucks now available.

THE FOUR WHEEL DRIVE AUTO COMPANY, Clintonville, Wisconsin U. S. A.

Canadian Factory: KITCHENER, ONTARIO

For 36 years, owners have said: "FWD—the BEST truck built!"

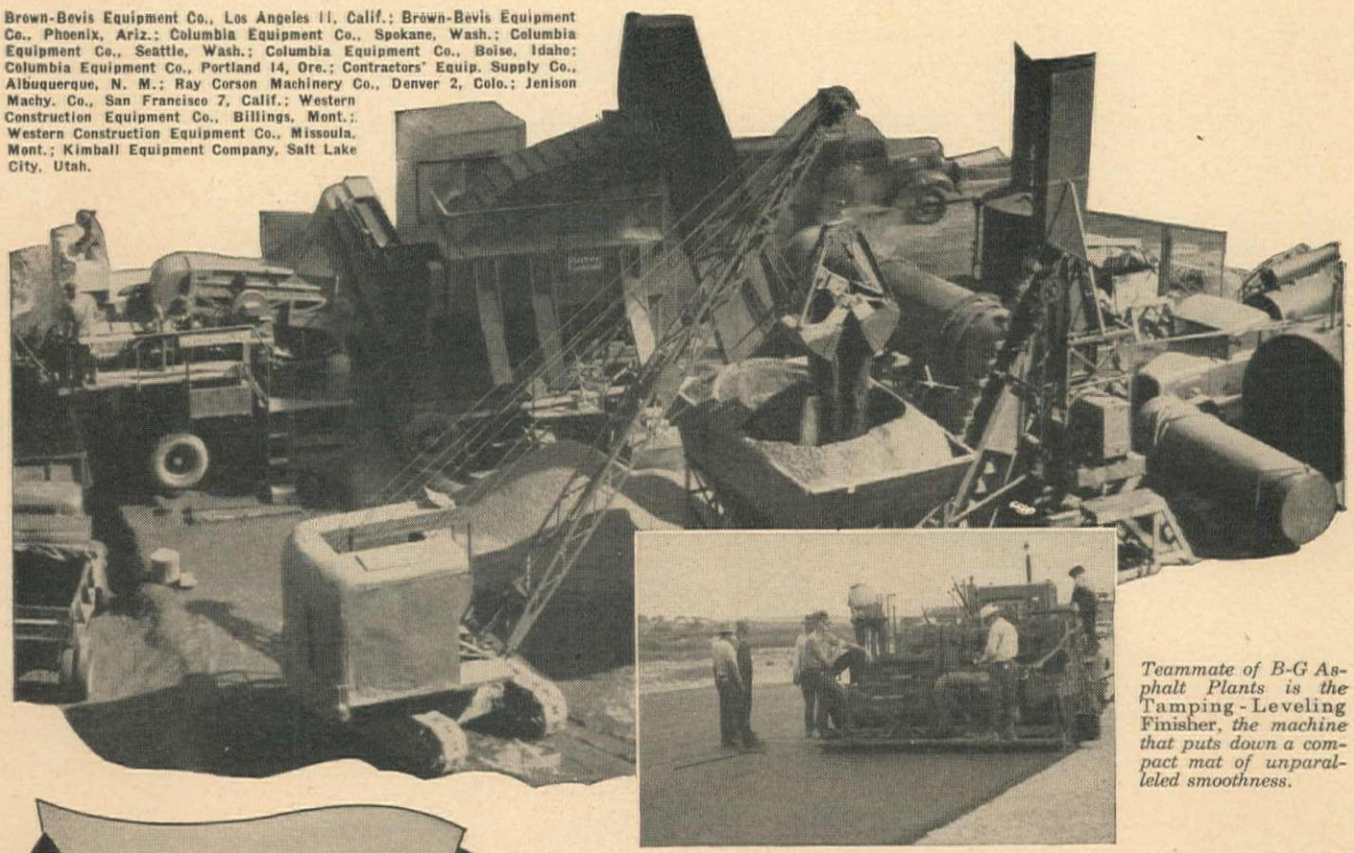
How a B-G *Central Plant* Provides Positive Control of Aggregate Gradation

• There is positive gradation control of aggregate in a Barber-Greene Central Plant when the Gradation Control Unit is used. The aggregate is accurately sized *after* the drying operation, and there is no manual weighing or processing required.

A continuous flow of material in a relatively small stream from stock pile to finished mix in the trucks removes any problem of segregation. Locked calibrated gates maintain a uniform flow of aggregate. The aggregate feeder is interlocked with the bitumen pump, keeping the proportion well within the most rigid specification requirement.

These Central Plants are low in cost, quickly set up or moved, and can produce any type of mix required. Write for illustrated catalog, explaining the continuous mixing principle exclusive with the Barber-Greene line. Barber-Greene Company, Aurora, Illinois.

Brown-Bevis Equipment Co., Los Angeles 11, Calif.; Brown-Bevis Equipment Co., Phoenix, Ariz.; Columbia Equipment Co., Spokane, Wash.; Columbia Equipment Co., Seattle, Wash.; Columbia Equipment Co., Boise, Idaho; Columbia Equipment Co., Portland 14, Ore.; Contractors' Equip. Supply Co., Albuquerque, N. M.; Ray Corson Machinery Co., Denver 2, Colo.; Jenison Machy. Co., San Francisco 7, Calif.; Western Construction Equipment Co., Billings, Mont.; Western Construction Equipment Co., Missoula, Mont.; Kimball Equipment Company, Salt Lake City, Utah.



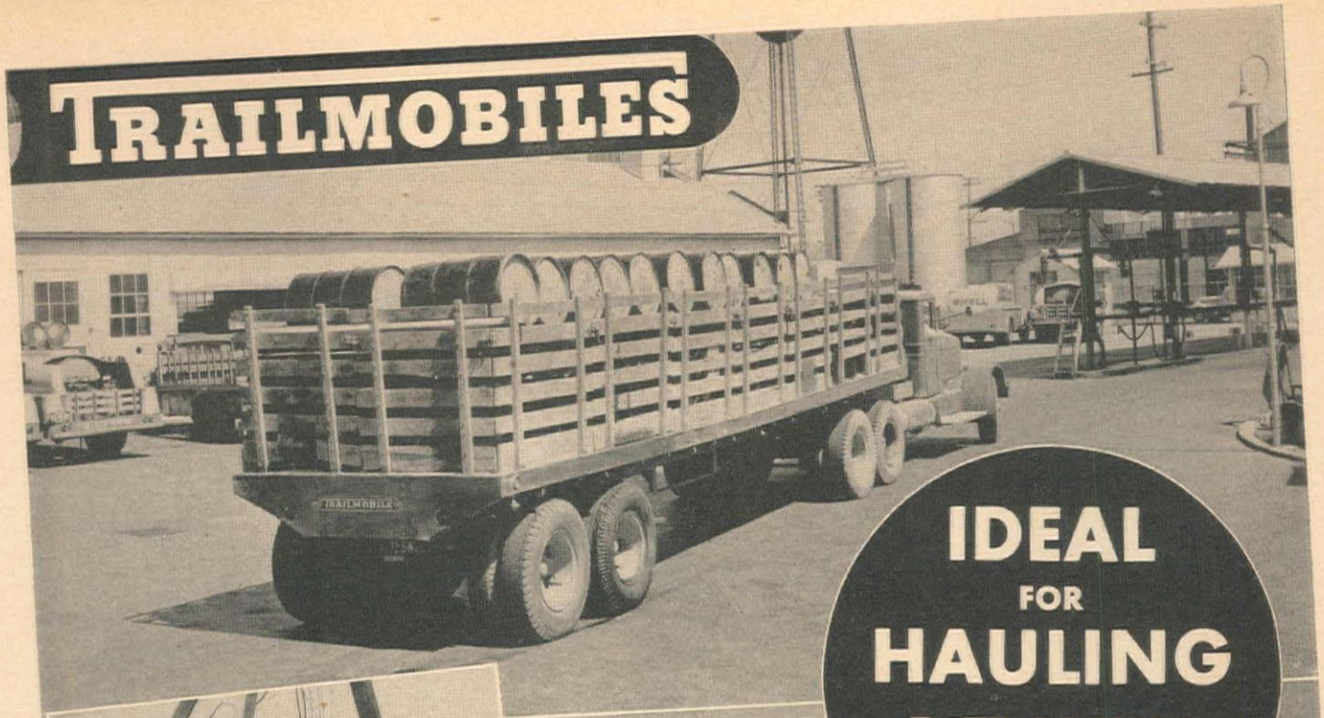
Teammate of B-G Asphalt Plants is the Tamping-Leveling Finisher, *the machine that puts down a compact mat of unparalleled smoothness.*

46-9

B-G Barber-Greene CONSTANT FLOW EQUIPMENT

LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

TRAILMOBILES



IDEAL FOR HAULING PETROLEUM PRODUCTS

Shown above is a TRAILMOBILE owned and operated by the Western Transport Company of Oakland, California, contract haulers for the Shell Oil Company. This TRAILMOBILE hauls finished products from the refinery at Martinez to bulk stations throughout central and northern California.

TRAILMOBILE flat bed rack trailers have long been favorites in the petroleum industry, not only in the distribution of finished products from the refineries and bulk stations to retail outlets, but also in the hauling of pipe, casing, and other supplies in the oil fields.

TRAILMOBILE also furnishes thousands of trailers for tanker distribution of finished products to filling stations, and for the transportation of crude from certain oil fields to refineries. TRAILMOBILES are sturdily built to withstand the fatigue of daily long hauls over the highways, and the strains of operating over the rough roads characteristic of the oil fields.

If you are hauling petroleum, crude or finished, bulk or packaged, investigate the TRAILMOBILE trailers designed for all petroleum hauling applications.

THE TRAILMOBILE COMPANY

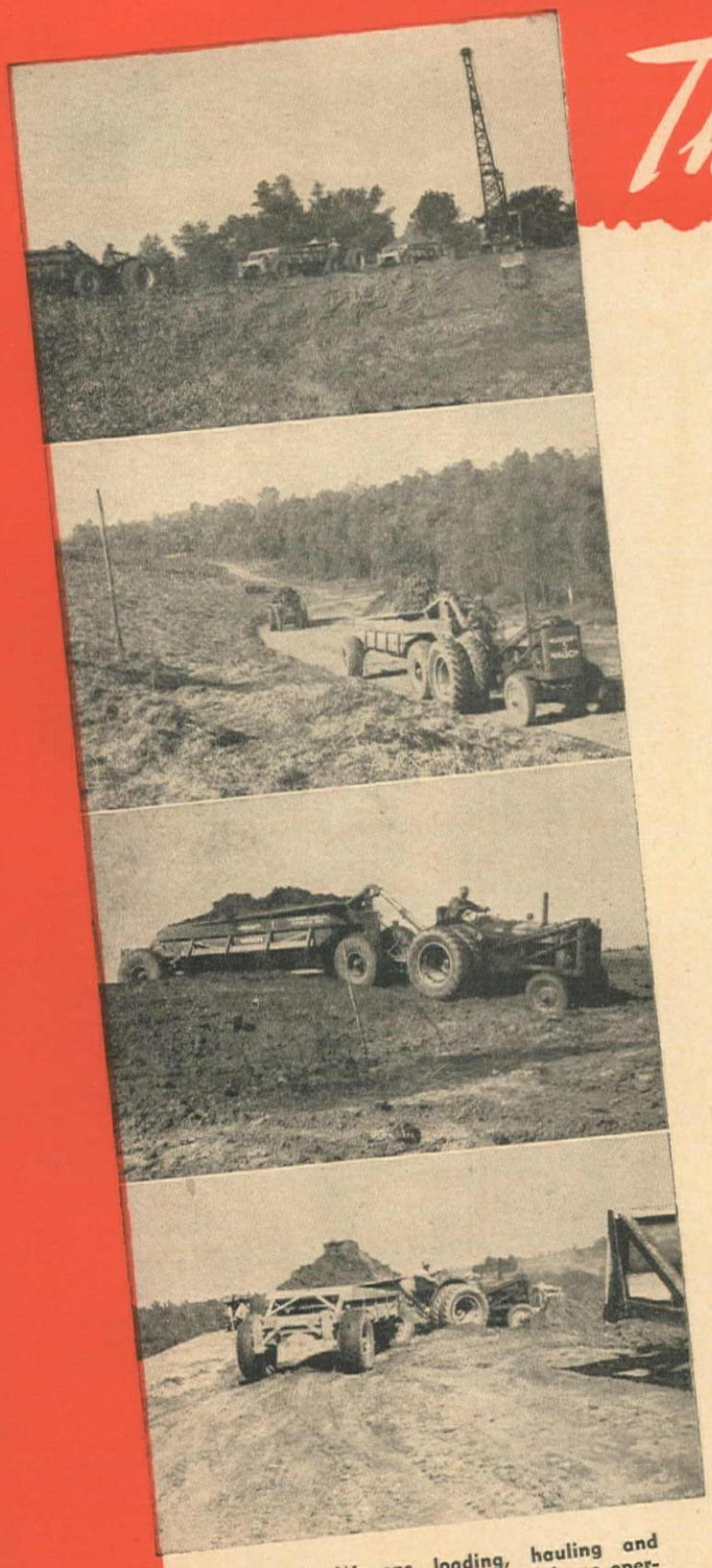
BERKELEY · CALIFORNIA

TRAILMOBILE

Los Angeles • Berkeley • Sacramento • Santa Rosa • Fresno • San Jose • Bakersfield • Stockton • Ogden • Seattle • Honolulu

"MISSISSIPPI WAGONS GIVE US

The Cheapest Ya



Mississippi Wagons loading, hauling and dumping on the Mississippi River levee operations of T. H. Stout Construction Company

HEMMING in Ol' Man River is a tough, never-ending job that goes on in all seasons and weather. Levee construction calls for tough, never-quitting hauling equipment . . . if work is to go forward on schedule and at a profit.

The ability of Mississippi Wagons to keep going in rough going is well known along the levees. But the full degree of their freedom from expensive repairs, and consequent ability to haul at rock-bottom costs-per-yard, is best revealed by the cost records of owners—such as the T. H. Stout Construction Company, of Cleveland, Miss.

"Worst Conditions in 25 Years"

The T. H. Stout Construction Company purchased seven Mississippi Wagons in September, 1944, to handle contracts for levee work at points south of Greenville, Miss.

After encountering normal conditions during the first construction season, the company resumed work in June, 1945, in ground still waterlogged from floods. Heavy intermittent rains kept the ground from drying out during the entire remainder of the year. "Operating conditions," says T. H. Stout, owner of the company, "were the worst that have been known along the Mississippi River in any construction season in the last 25 years."'

In 15 months, nevertheless, the seven Mississippi Wagons hauled a total of 724,000 yards of earth to the levee, for ar average of 103,428 yards per unit. Some of the dirt was carried from considerable distances, and much of it was hauled to the top of the embankment, as the company's contracts included heightening the levee by five feet.

1 1/6¢ Per Yard For Repair Parts

During these 15 months the Stout company used a total of $8,421.56 worth of repair parts on its Mississippi Wagons — an average of $1,203.08* per unit. Figured on a yardage

*Broken down as follows: Motor, $277.95; fuel pump, $79.96; master clutch, $32.64; transmission, $282.35; rear end, $206.66; miscellaneous, $126.66; trailer, $198.86.

For further information on Mississippi Wagons, consult your nearest distributor or write direct.

M-R-S MANUFACTURING COMPANY
JACKSON, MISSISSIPPI, U. S. A.

rdage We've Ever Hauled!"

—T. H. STOUT, Mississippi Levee Contractor

basis, the repair parts cost came to just one and one-sixth cents per yard of dirt hauled.

"For Mississippi River levee operations, and particularly under last season's conditions, this is an almost unbelievably low figure," declares Mr. Stout. "And it would undoubtedly have been even lower, had we not been forced to use our head mechanic as job superintendent, making it impossible for him to properly supervise the maintenance of our equipment."

Easy, Efficient Operation

"In addition to the low maintenance cost of our Mississippi Wagons," says Mr. Stout, "we are highly pleased with their ease of operation, operator comfort, superior flotation on soft ground, accessibility for making repairs, and short turning radius.

"With their all-round operating economy, I am convinced that Mississippi Wagons give us the cheapest yardage we've ever hauled. And I am also convinced that any hauling equipment that could operate successfully and economically for us during the past season, can do likewise on any construction job anywhere!"

Only MISSISSIPPI WAGONS Give You Both These Important Advantages:

1. FOUR-AXLE CONSTRUCTION

- Puts more tire surface on the ground, providing maximum flotation over soft earth on construction work.
- Enables you to haul payloads of up to 27,000 pounds on highways without exceeding state axle-loading limits.
- Relieves the tractor of all trailer weight (except when needed for traction), thus prolonging tractor life and cutting repairs to a minimum.

2. HYDRAULIC WEIGHT TRANSFER

The simple hydraulic cylinder transfers weight from trailer to tractor when extra traction is needed. This patented feature is found exclusively on Mississippi Wagons. It makes possible their four-axle design, which gives you both construction and over-the-highway equipment in a single unit . . . for a single investment.

★ MISSISSIPPI WAGON

★ *The World's Most Modern Hauling Unit*

Better Trucks Make Possible Better Standards of Public Service

AFTER WORLD WAR I, America showed the world how amazingly mass production methods could lower the price of goods . . . make them within the reach of millions and, by so doing, create a higher economic standard of living than any other people ever achieved.

This time, *distribution* offers the best opportunities for still greater cost reduction. And more efficient motor transportation is the key to much of the improvement that can be made.

SINCE MOTOR TRUCKS SUPPLY so many of the transportation links in the chain between producer and consumer, their performance affects the distribution costs of practically everything the public buys.

As a pioneer manufacturer of motor trucks . . . and a leader in the field of truck transportation during all the years of its tremendous development . . . White sees in the era just starting the greatest challenge trucks have ever faced—namely, the opportunity to supply trucks that will not only enable their owners to reduce distribution costs materially, but also make possible better standards of service to the public.

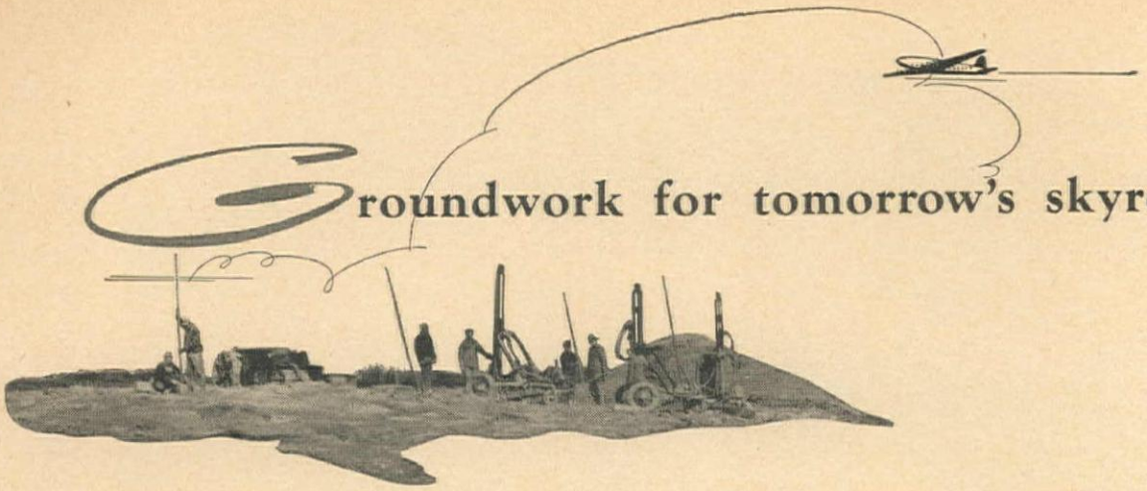
IN LINE WITH THIS THINKING, no truck owner is likely to have a better opportunity than now to reappraise his truck requirements in the light of the full possibilities of what the best in modern truck transportation can do.

To such a program, White has dedicated its full resources in engineering, manufacturing and service through its nation-wide system of Branches, Distributors and Dealers.

THE WHITE MOTOR COMPANY • Cleveland

FOR MORE THAN 45 YEARS THE GREATEST NAME IN TRUCKS

White



Groundwork for tomorrow's skyroads

Another huge job is just ahead for you who have built America's highways. For America is taking to the air—and that means a network of airports. You can speed up airport construction and cut cost, too—if you have Gardner-Denver construction equipment to back up your men.

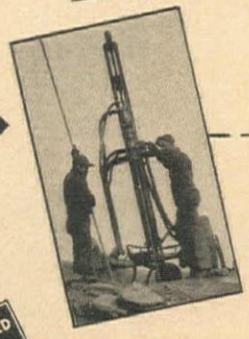
Gardner-Denver equipment can help you step up the pace of construction, for it stays on the job. Endurance has been built into it to assure efficient service without frequent "time out" for maintenance. For complete information, write the Gardner-Denver Company, Quincy, Illinois.

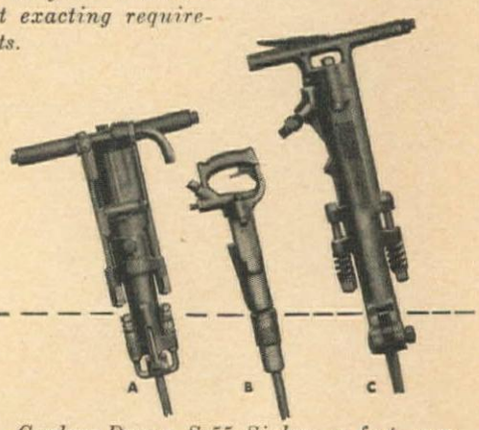
Western Branch Offices: Butte, Mont.; Los Angeles, Calif.; Portland, Oregon; Salt Lake City, Utah; San Francisco, Calif.; Denver, Colo.; Seattle, Wash.; Wallace, Idaho; El Paso, Texas.

Gardner-Denver Gasoline or Diesel Water-cooled Compressors are completely water-jacketed for efficient, continuous operation in any climate or altitude.

Gardner-Denver Backfill Tamper is easy to walk over the fill—meets the most exacting requirements.

Gardner-Denver UM-99 Wagon Drill . . . fast, powerful and highly maneuverable.





A. *Gardner-Denver S-55 Sinker—a fast, easy riding drill with remarkable hole-cleaning ability.*

B. *Gardner-Denver 28 Spader reduces digging time. Available with a variety of tools.*

C. *Gardner-Denver B-72H Paving Breakers strike powerful blows for rapid, economical demolition.*

GARDNER-DENVER

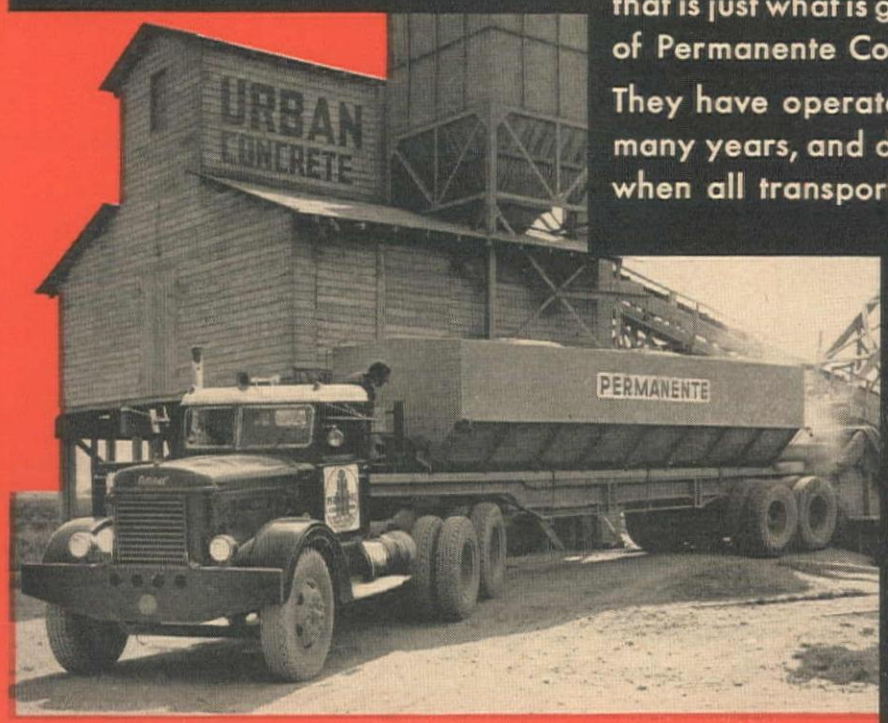
Since 1859

FROM MILL TO MIXER

Hauling bulk cement direct from the cement mill to the concrete mixing plant, that is the type of heavy hauling job in which you would expect a ***Peterbilt*** to turn in an exceptional performance record. And that is just what is going on at the huge modern plant of Permanente Corporation near Los Gatos, Calif.

They have operated a fleet of ***Peterbilt*** trucks for many years, and during the strain of the war years when all transportation equipment was put to the test, the ***Peterbilts*** made a record that was a credit to their design and construction, and to capable and intelligent maintenance by the operator.

The pictures here show how the twin screw hopper boxes are loaded at the Permanente mill and how they are unloaded at the mixing plant. The job is done quickly, with a minimum of dust.



Peterbilt Motors Company

107th AVENUE AND MacARTHUR BOULEVARD · OAKLAND · CALIFORNIA

"They say it's the best way to reach hard-to-get-to places!"

And they're right! For with Rex Pumpcrete, *the pump that pumps concrete through a pipe line,* you can reach places difficult to get to with ordinary concrete-placing methods . . . without expensive preparatory work.

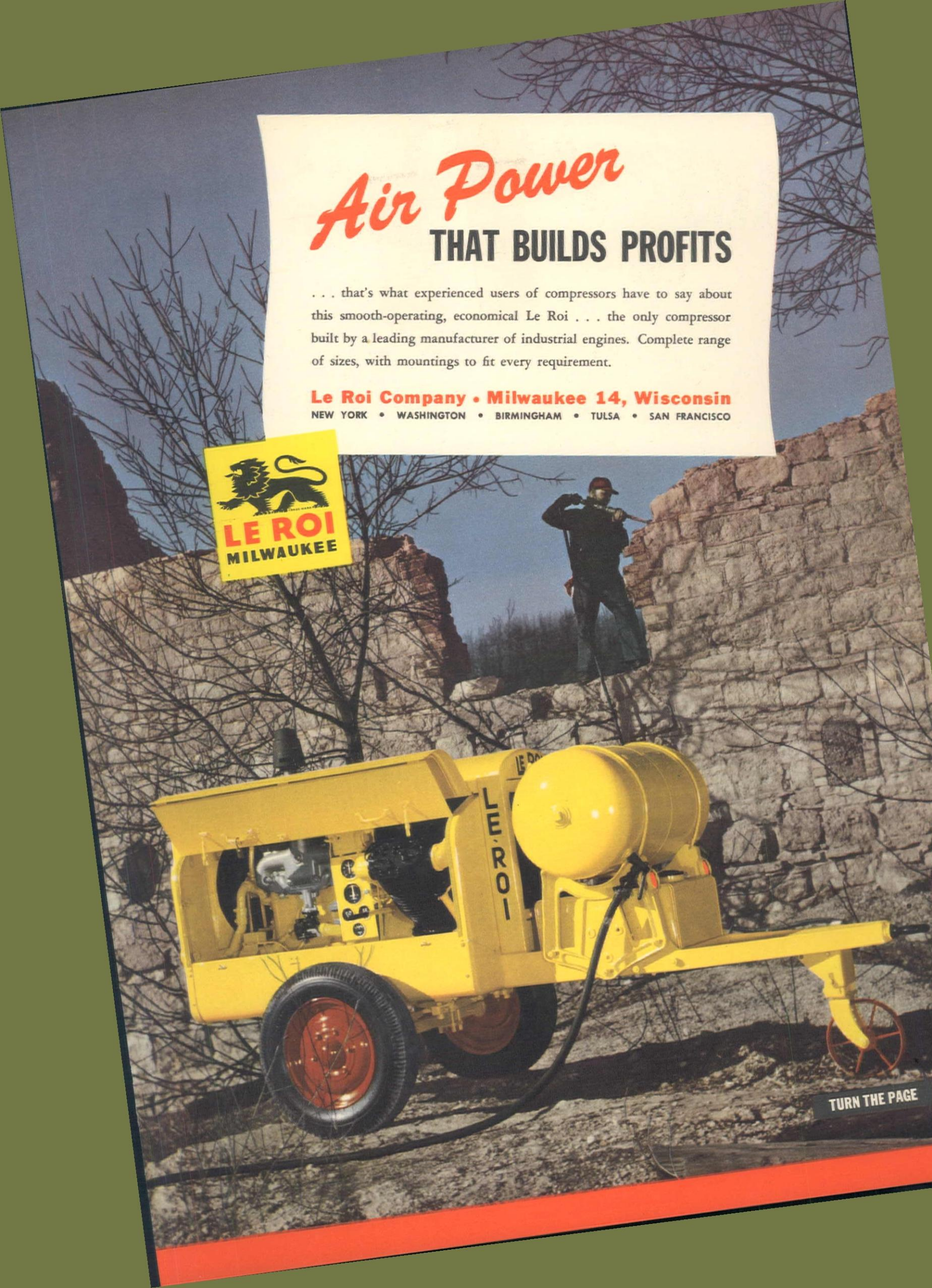
Pumpcrete transports on one or more levels . . . elevates or lowers and distributes concrete in one operation, advances construction schedules and usually cuts concreting costs on many types of jobs.

Check your next job to see whether or not it's a Pumpcrete job. And get your copy of Bulletin No. 466 that contains the facts about *concrete by pipe line.* See your local Rex Distributor

Brown-Bevis Equipment Co., Los Angeles 11, Calif.; Brown-Bevis Equipment Co., Phoenix, Arizona; Construction Equipment Co., Spokane, Washington; Contractors Equipment and Supply Co., Albuquerque, New Mexico; Ray Corson Machinery Co., Denver, Colorado; Hall-Perry Machinery Co., Butte, Montana; Industrial Equipment Co., San Francisco, Calif.; Industrial Equipment Co., Oakland 3, Calif.; Intermountain Equipment Co., Boise, Idaho; Loggers & Contractors Machinery Co., Portland, Oregon; Star Machinery Co., Seattle, Washington; Arnold Machinery Co., Salt Lake City 1, Utah.

REX

CONSTRUCTION MACHINERY


Air Power
THAT BUILDS PROFITS
. . . that's what experienced users of compressors have to say about this smooth-operating, economical Le Roi . . . the only compressor built by a leading manufacturer of industrial engines. Complete range of sizes, with mountings to fit every requirement.
Le Roi Company • Milwaukee 14, Wisconsin
NEW YORK • WASHINGTON • BIRMINGHAM • TULSA • SAN FRANCISCO
LE ROI
MILWAUKEE
LE ROI
TURN THE PAGE

BIG OR SMALL...

Construction Machinery "Takes It on the Chin"

. . . and it pays to pick the leading makes powered with HEAVY-DUTY Le Roi engines

Le Roi builds *only* heavy-duty engines — has specialized for more than a quarter-century in licking the tough power jobs. Whether it's a small mixer or a big shovel, be sure that you get the benefit of this experience by selecting equipment that is Le Roi-powered. Write for bulletin.

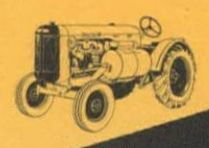
Le Roi Company • Milwaukee 14, Wisconsin

NEW YORK • WASHINGTON • BIRMINGHAM • TULSA • SAN FRANCISCO

LE ROI ENGINE-GENERATOR UNIT

ROI-CENTAUR MOWER

LE ROI 315 AIRMASTER



LE ROI TRACTAIR

Look for the Le Roi Nameplate on

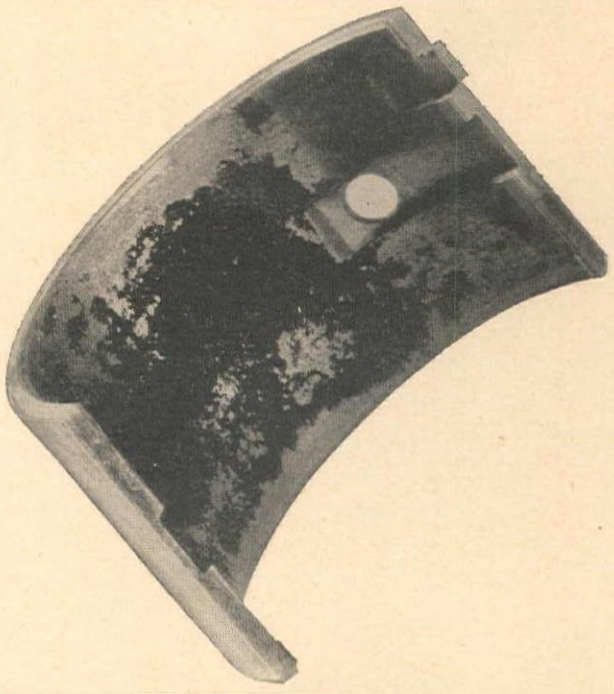
PUMPS CRUSHERS LOADERS
HOISTS MIXERS FINISHERS
— and other construction machinery

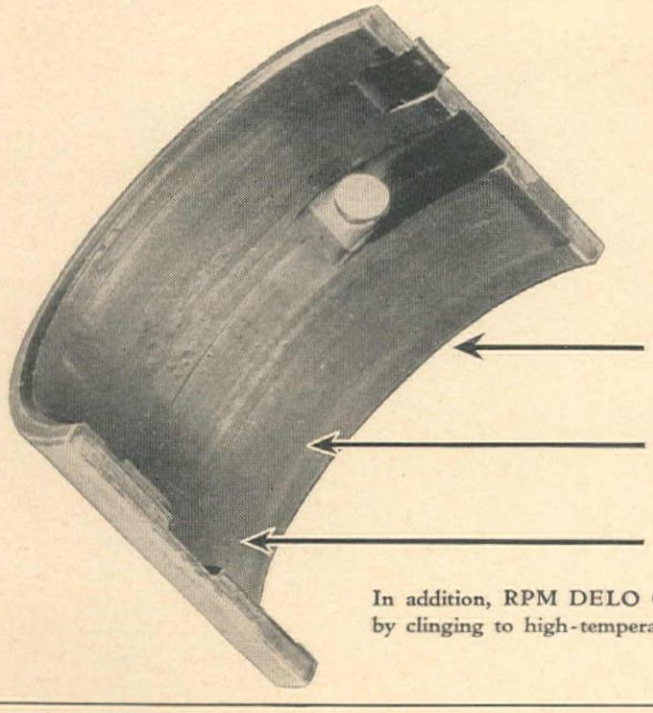
LE ROI MILWAUKEE

Diesel Engine DANGER points

Alloy bearings corroded by unstable lubricants

The high pressures and temperatures in present-day Diesel engines greatly accelerate oxidation of some lubricants. Under such conditions, these oils tend to become corrosive and attack the lead in the copper-lead structure of alloy bearings. This leaves a porous copper shell which breaks down under pressure. The illustration shows how an alloy bearing looks after operation with an uncompounded oil.





RPM DELO Oil gives bearings 3-way protection against corrosion

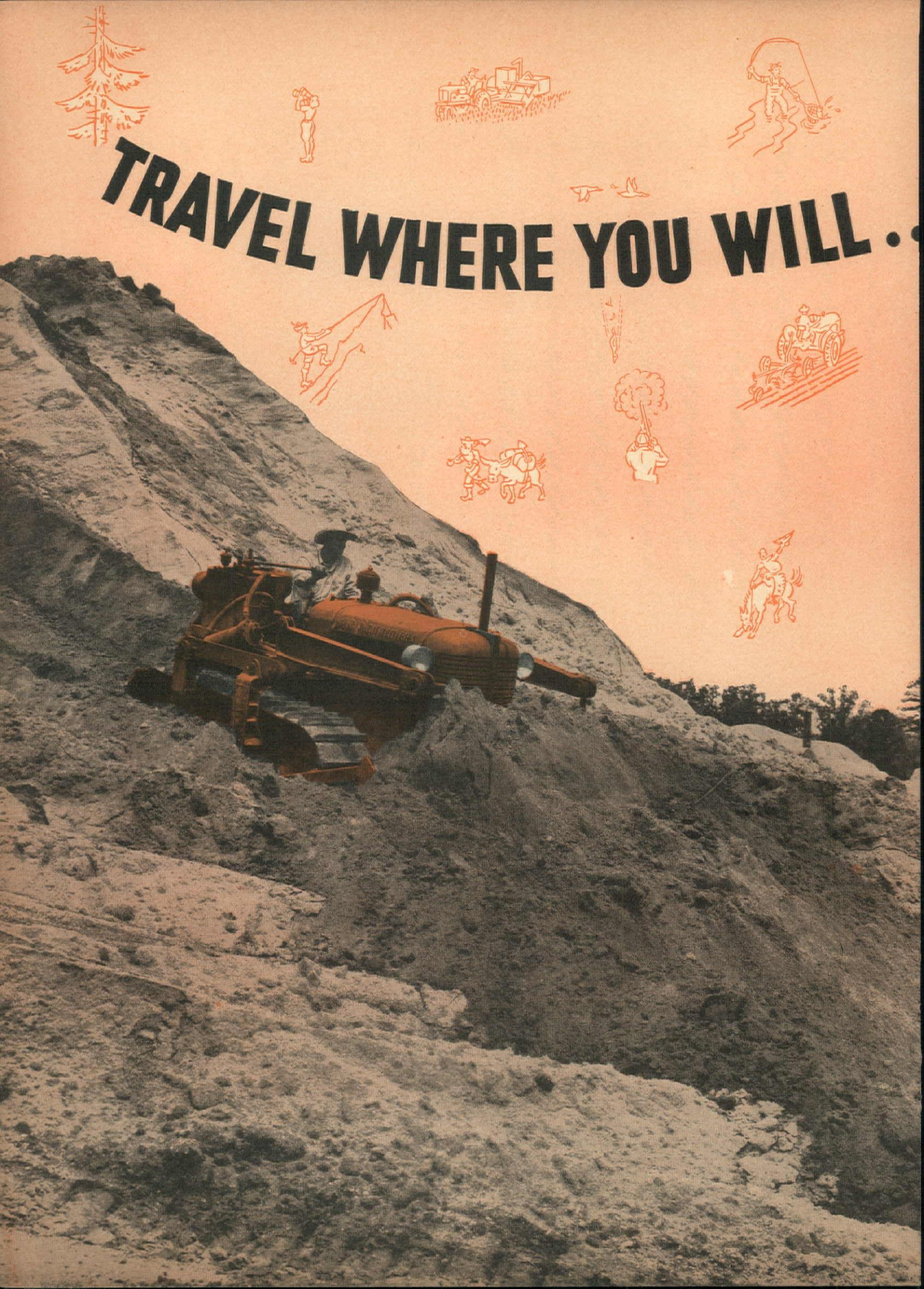
1. RPM DELO Diesel Engine Lubricating Oil base stocks are naturally resistant to oxidation, the cause of most lubricants becoming corrosive.
2. RPM DELO Oil is *compounded* to further reduce the danger of oxidation.
3. RPM DELO Oil's oxidation inhibitor gives bearings direct protection against corrosion.

In addition, RPM DELO Oil is compounded to prevent ring-sticking, to reduce wear by clinging to high-temperature areas most oils leave bare, to eliminate foaming.

To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line—RPM HEAVY DUTY MOTOR OIL—RPM COMPOUNDED MOTOR OIL—RPM GEAR OILS AND LUBRICANTS—RPM GREASES.

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help—make your maintenance job easier. Call your local standard Representative or write STANDARD OF CALIFORNIA, 225 Bush Street, San Francisco 20, Calif.

DIESEL ENGINE RPM DELO LUBRICATING OIL


TRAVEL WHERE YOU WILL . .

an HD-7 will cross your path

It's a country-wide hit! East Coast, West Coast, North and South . . . popular Allis-Chalmers Model HD-7 2-Cycle Diesel Tractor is in demand everywhere . . . by contractors, states, counties, townships, ranchers, loggers, miners, gravel and quarry pit operators . . . for a multitude of jobs! Just the right size for most bulldozing work, ideal for operating 2-wheel scrapers — provides 60 drawbar h.p., speeds to 5 m.p.h. . . . it's easy on fuel, easy on maintenance cost, easy to maneuver. Starts instantly! Travel where you will . . . you will find the HD-7 keeping production up . . . costs down. It will pay you to get all the facts from your Allis-Chalmers dealer.

USE IT
On Bulldozing

USE IT
On Scraper Work

USE IT
As a Combination Bulldozer and Scraper

ALLIS-CHALMERS

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

speed in California stamina economy

D. D. PAGE, Operator, says, *"It's a good shovel – plenty fast and easy to operate."*

C. O. JOHNSON, oiler, states, *". . . Very little trouble keeping this baby in shape."*

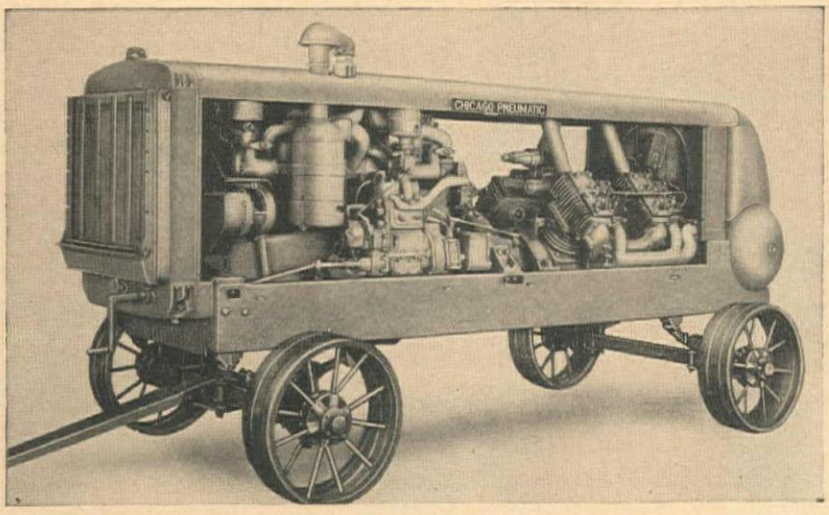
From FRANK HICKEY–*"One of the best I've ever worked with . . . done a fine job on hard formation . . . fast, easy to handle, has a lot of power . . . easy on cables . . . doesn't use much fuel."*

SPEED! ACTION! See the MANITOWOC SPEED-SHOVEL on the job in California at the new General Motors plant at Van Nuys. Performing at record-breaking speed, Frank Hickey's MANITOWOC is scooping up 3000 cu. yds. in 9½ hrs. – loading 9 3/10-yd. trucks in 75 seconds. This is performance that means profitable operation. You'll find Speed-Shovel's 1¼-yd. capacity well suited to any kind of digging. Its surplus power comes in handy on hard formations where digging is tough. Maneuverable . . . easy to handle . . . and easy on hoist cables, the MANITOWOC SPEED-SHOVEL is now available. Demand this rugged construction, economy of operation, easier handling and long trouble-free service in your shovels – GET A MANITOWOC.

Early birds come first for MANITOWOCS. That's why thoughtful buyers are placing their orders now for a new high-speed MANITOWOC. Order now – Call KImball 7141.

EQUIPMENT HELPS CONTRACTORS TO KEEP JOBS

moving on schedule!



500 CUBIC FEET OF AIR ON WHEELS

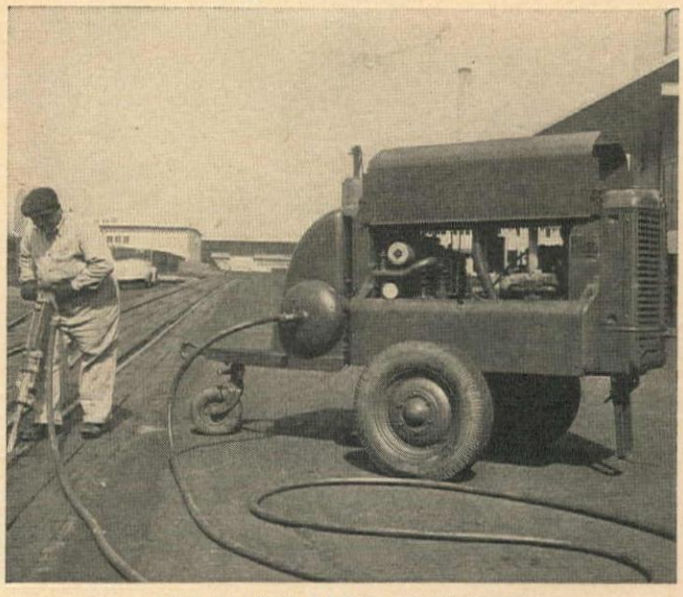
That's what is available with the Model 500 CP Diesel-driven Portable Compressor. Fuel is saved, maintenance reduced, by the *Gradual Speed Regulator,* which varies the engine speed in proportion to the demand for air. Other Chicago Pneumatic gasoline-driven and Diesel-driven portable models range from 60 to 315 c.f.m., actual capacity.

CP SUMP PUMP NEEDS NO PRIMING

Turn on the air and lower the CP Portable Sump Pump into the water – and it starts to work at once. Watertight casing; muck cannot get into motor.

4 FEET A MINUTE THROUGH GRAVEL

That's easy with the CP-116 Sheeting Driver, which does as much work as ten men with mauls. As there is no "brooming", sheeting can be used repeatedly. Has only one moving part, hence maintenance is low.



FOR SPEEDY DEMOLITION WORK

Operating without kick-back, CP-117 Demolition Tool is recommended for use on hard cement and hard-to-extremely-hard materials. Economical in air consumption and low in maintenance. Shown is a CP Model 60 Compressor.

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WESTERN MACHINERY CO.
760 Folsom Street
San Francisco 7, California

WESTERN MACHINERY CO.
Spokane, Washington

WESTERN MACHINERY CO.
500 North 16th Street
Sacramento 2, California

CHICAGO PNEUMATIC TOOL COMPANY

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

SMOOTH LANDINGS ASSURED WITH ADAMS GRADING THE JOB

★ Pictured above is a typical airport construction job, with an Adams Motor Grader building the landing strips.

This particular job is on the Patton Brook Airport, Plainville, Conn., where three large landing strips are now under construction. With a main landing strip 600 ft. wide by 3000 ft. long, Patton Brook will be one of the largest privately-owned airports in New England when completed, capable of accomodating planes up to the Army's C-47.

In the course of the next seven years, thousands of airports are to be built or enlarged in this country, under the CAA national airport program. Obviously, this is going to mean a lot of extra business for alert contractors. Many of these contractors will choose Adams Motor Graders for their work . . . because they know that Adams have everything it takes for smooth, accurate, high-speed grading—the kind that pays off in faster, better jobs and higher profits.

Get the complete time-saving, money-saving facts from your local Adams dealer. You'll find there are no finer motor graders built—*at any price.*

J. D. ADAMS MANUFACTURING CO., INDIANAPOLIS, IND.

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J. D. ADAMS MANUFACTURING CO.
230 7th Street, San Francisco 3
Adams Distributors at: San Francisco, Los Angeles, Sacramento, Redding, Riverside, San Jose, Fresno, Stockton, Salinas, Santa Rosa, Modesto, Visalia, Merced, Bakersfield, Santa Maria and San Diego

ALASKA—Glenn Carrington & Co., Fairbanks
ARIZONA—O. S. Stapley Company, Phoenix
COLORADO—McKelvy Machinery Co., Denver
IDAHO—Intermountain Equipment Co., Boise, Pocatello
MONTANA—Industrial Equip. Co., Billings, Missoula
NEVADA—Brown Motors, Reno

NEW MEXICO—Hardin & Coggins, Albuquerque
OREGON—Howard-Cooper Corp., Portland, Eugene
UTAH—The Lang Company, Salt Lake City
WASHINGTON—Howard-Cooper Corp., Seattle
Intermountain Equipment Co., Spokane
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The Lang Company, Salt Lake City, Utah

HERCULES

DUMP BODIES AND HYDRAULIC HOISTS
SPLIT SHAFT POWER TAKE-OFFS • COAL CONVEYORS

Harry Hatfield & Co. Move a Mountain!

600,000 cubic yards of stone—enough to make a mountain of respectable size—is being moved in ten of these Hercules Rock Body dump units, owned and operated by the Harry Hatfield Co., Barboursville, West Virginia. Moving a mountain is no easy task, and Mr. Hatfield will need all the help he can find.

And he'll get plenty of help from these sturdy Hercules Rock Bodies! Built-in stamina, the result of years of design and manufacturing experience, will enable these units to stand up under the punishing task of hauling heavy loads over irregular, rough terrain. When the job is done, they'll be ready for more heavy-duty service!

Maybe you aren't planning to move a mountain at the moment, but if you've got a hauling and dumping job that's tougher than you figured, you'll want to know why Hercules Rock Bodies can deliver low-cost, dependable performance on the toughest jobs. Details are available . . . just address Department P.

HERCULES STEEL PRODUCTS COMPANY . . . GALION, OHIO

A SLOW, POWERFUL PISTON-PUNCH

GIVES YOU LOW-COST AIR POWER!

Get the New

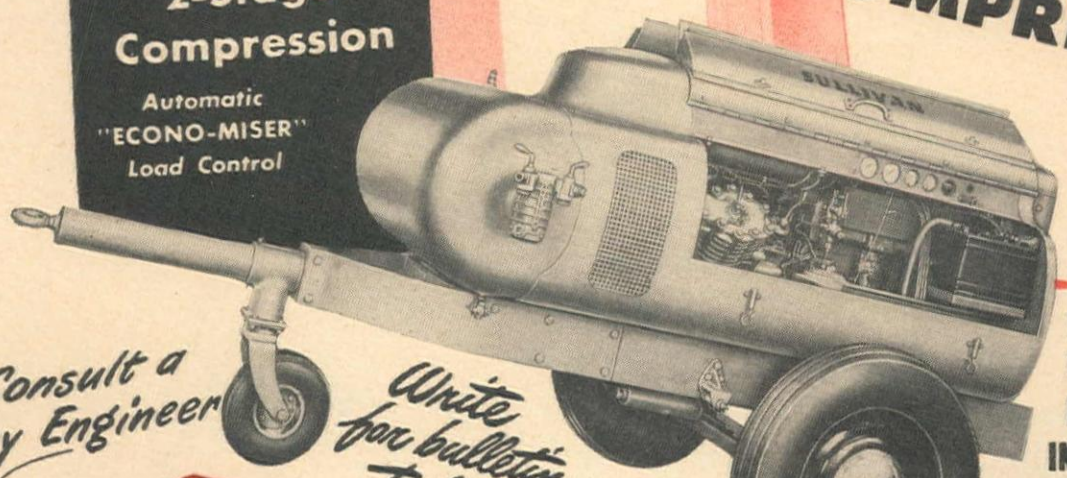
SULLIVAN

Series 80

PORTABLE AIR COMPRESSORS

2-Stage Compression

Automatic
"ECONO-MISER"
Load Control



100 P.S.I. WORKING PRESSURE IN THE MOST COMPACT PORTABLE AIR PLANT YOU HAVE EVER SEEN

Consult a Joy Engineer

Write for bulletin today!

SULLIVAN

PORTABLE AIR COMPRESSORS FROM 60 TO 630 CFM

SULLIVAN DIVISION

JOY MANUFACTURING COMPANY

General Offices: Henry W. Oliver Bldg., Pittsburgh, Pennsylvania

FACTS YOU SHOULD KNOW ABOUT ELECTRODES

Are you familiar with the mechanical properties of electrodes? . . . Do you know the different types of electrodes for welding cast iron — mild steel—high tensile, low alloy steels . . . which electrode will do the job better, faster — at less cost?

This, and other vital information is all contained in Airco Catalog No. 120. Compiled by leading technicians in the field, this definitive work gives authentic, understandable information on electrodes . . . application, welding procedure, mechanical properties and specifications are thoroughly covered.

Every metal man will find almost daily use for this big, helpful manual. It will save him time, effort and needless worry. It will answer almost any question regarding the proper electrode for welding any particular base metal — for any given type of work.

Send for this valuable, informative guide today! Just fill in the coupon, and mail it to: Air Reduction, General Offices, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, General Offices, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

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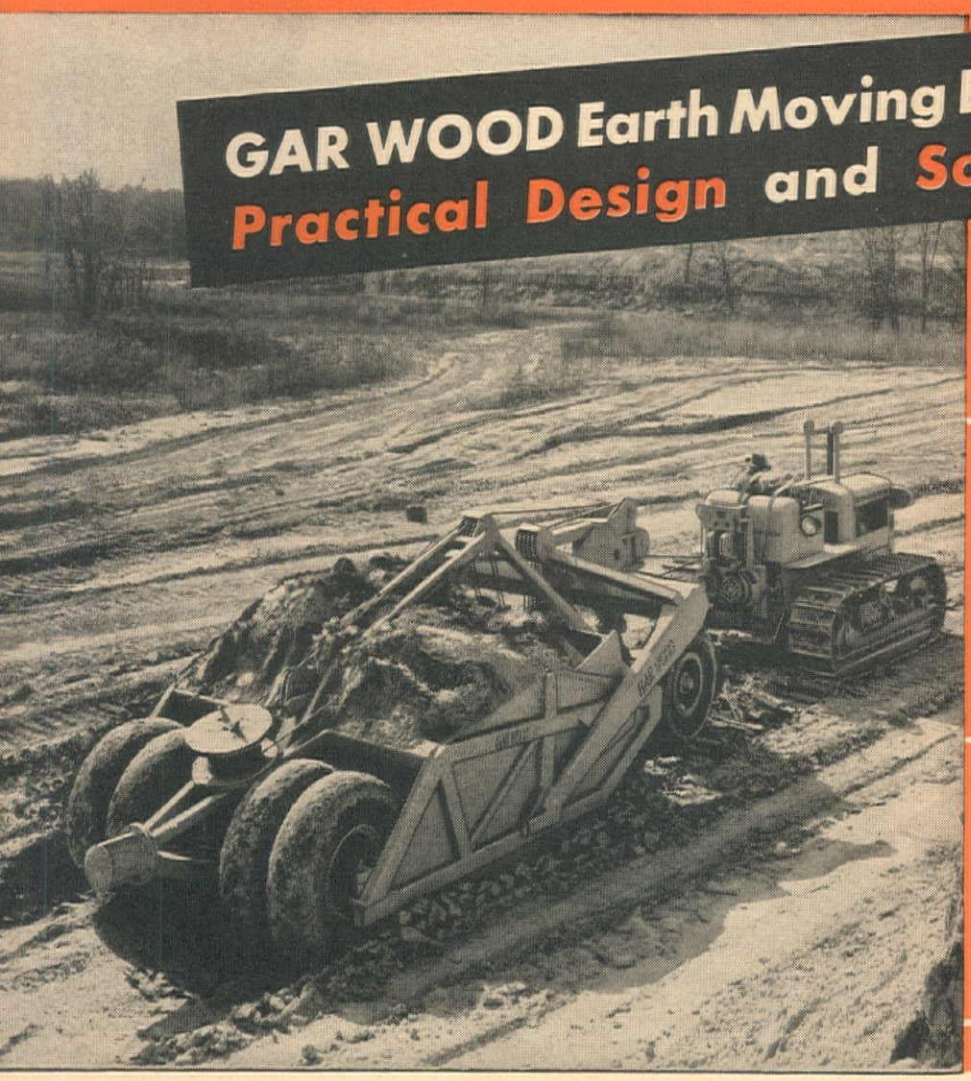
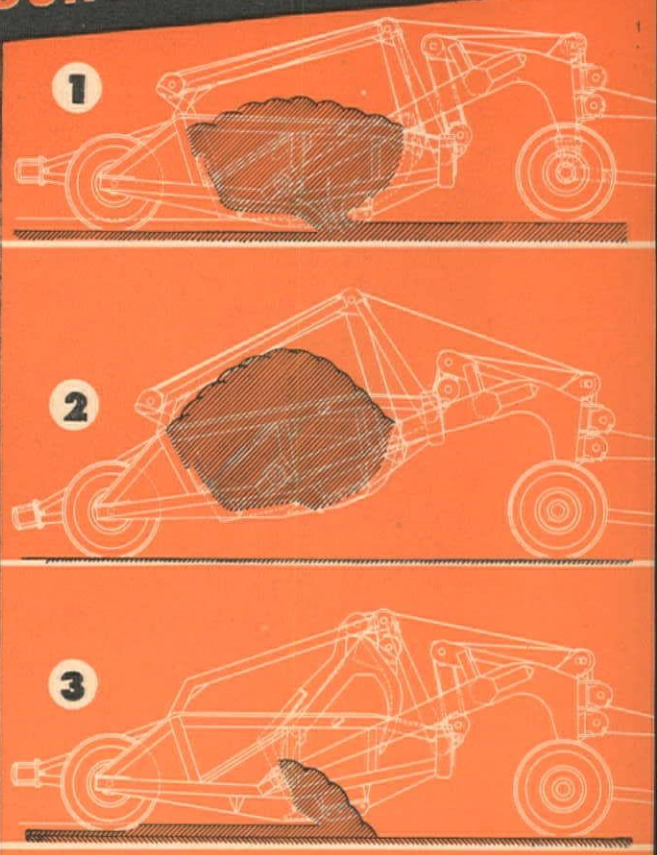
HEADQUARTERS FOR OXYGEN, ACETYLENE, AND OTHER GASES...CARBIDE...GAS WELDING AND CUTTING APPARATUS AND SUPPLIES . . . ARC WELDERS, ELECTRODES AND ACCESSORIES

Down-to-Earth Engineering

GAR WOOD Earth Moving Equipment Features Practical Design and Sound Construction



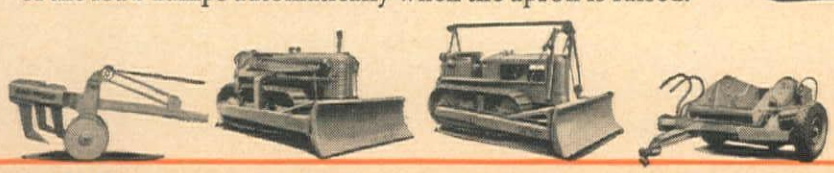


GAR WOOD 4-Wheel Cable Scrapers are *all scraper*, well engineered, honestly built of high quality materials, developed and proved over a period of many years—scrapers that *hold together* and get big yardage jobs done at consistently good speed with an absolute minimum of down time. Some of the many outstanding engineering features, as well as the rugged simplicity of the mechanism, are shown in the three drawings above:

1. LOADING: The self-loading is by positive digging to depths down to 12". "Boiling" action of dirt loads bowl and patented apron evenly by reason of proper angle of the cutting edge. Positive digging action is assured in all types of materials by proper location of draft point.
2. CARRYING: This position provides extremely high clearance of cutting edge, essential in traveling over uneven ground and in discharging sticky materials. Proper weight distribution with exceptionally low center of gravity assures stability—provides for maximum tire life.
3. DUMPING AND SPREADING: The first portion of the load dumps automatically when the apron is raised. The remainder is forced out by *positive rolling ejection.* Note extremely large apron opening to facilitate this ejection of all types of materials. Cutting edge remains stationary throughout cycle, providing for even, *accurate control* of the spread by the heavy duty *Gar Wood Cable Control Unit.*

Contact your Allis-Chalmers dealer. He will be glad to show you Gar Wood earth moving equipment and arrange for you to see on-the-job performance in your locality.

GAR WOOD ROAD MACHINERY
WITH ALLIS-CHALMERS DIESEL POWER



Heavy Duty Rippers | Hydraulic Dozecaster | Cable Dozecaster | 2-Wheel Hydraulic Scrapers

OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • TANKS • WINCHES AND CRANES • HEATING EQUIPMENT • MOTOR BOATS

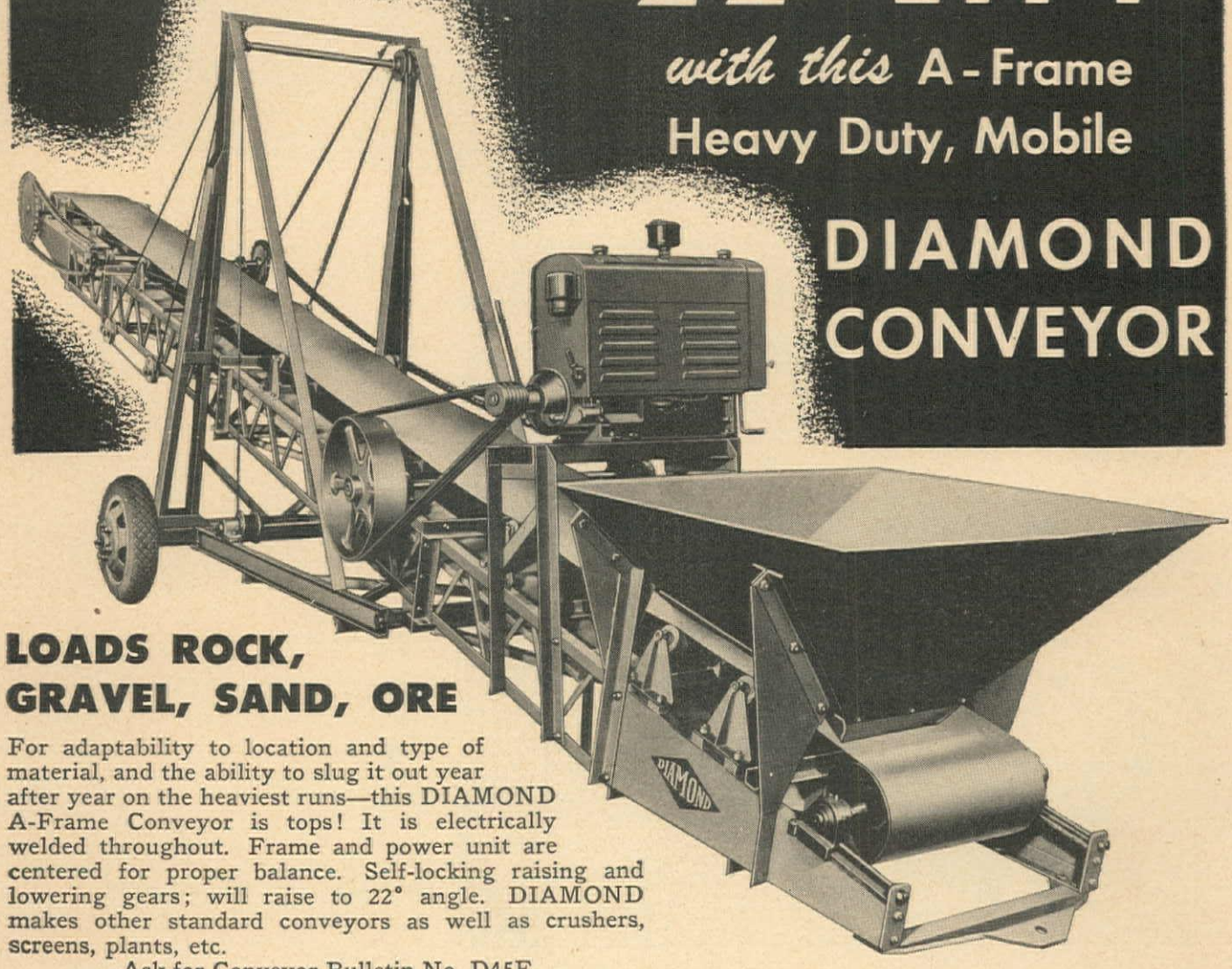
Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, INC.
DETROIT 11, MICHIGAN

22° LIFT

with this A-Frame Heavy Duty, Mobile

DIAMOND CONVEYOR



LOADS ROCK, GRAVEL, SAND, ORE

For adaptability to location and type of material, and the ability to slug it out year after year on the heaviest runs—this DIAMOND A-Frame Conveyor is tops! It is electrically welded throughout. Frame and power unit are centered for proper balance. Self-locking raising and lowering gears; will raise to 22° angle. DIAMOND makes other standard conveyors as well as crushers, screens, plants, etc.

Ask for Conveyor Bulletin No. D45E

DIAMOND CONVEYOR ROLLS have rugged electric welded steel frames and greased-for-life ball bearings sealed against dirt. Ask your DIAMOND dealer or write us for details, prices, etc.

"THERE'S NOTHING TOUGHER THAN A DIAMOND"

DIAMOND DEALERS

Oakland	SOULÉ EQUIP. CO.
Los Angeles	GARLINGHOUSE BROS.
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Salt Lake City	C. H. JONES EQUIP. CO.
Phoenix	O. S. STAPLEY CO.
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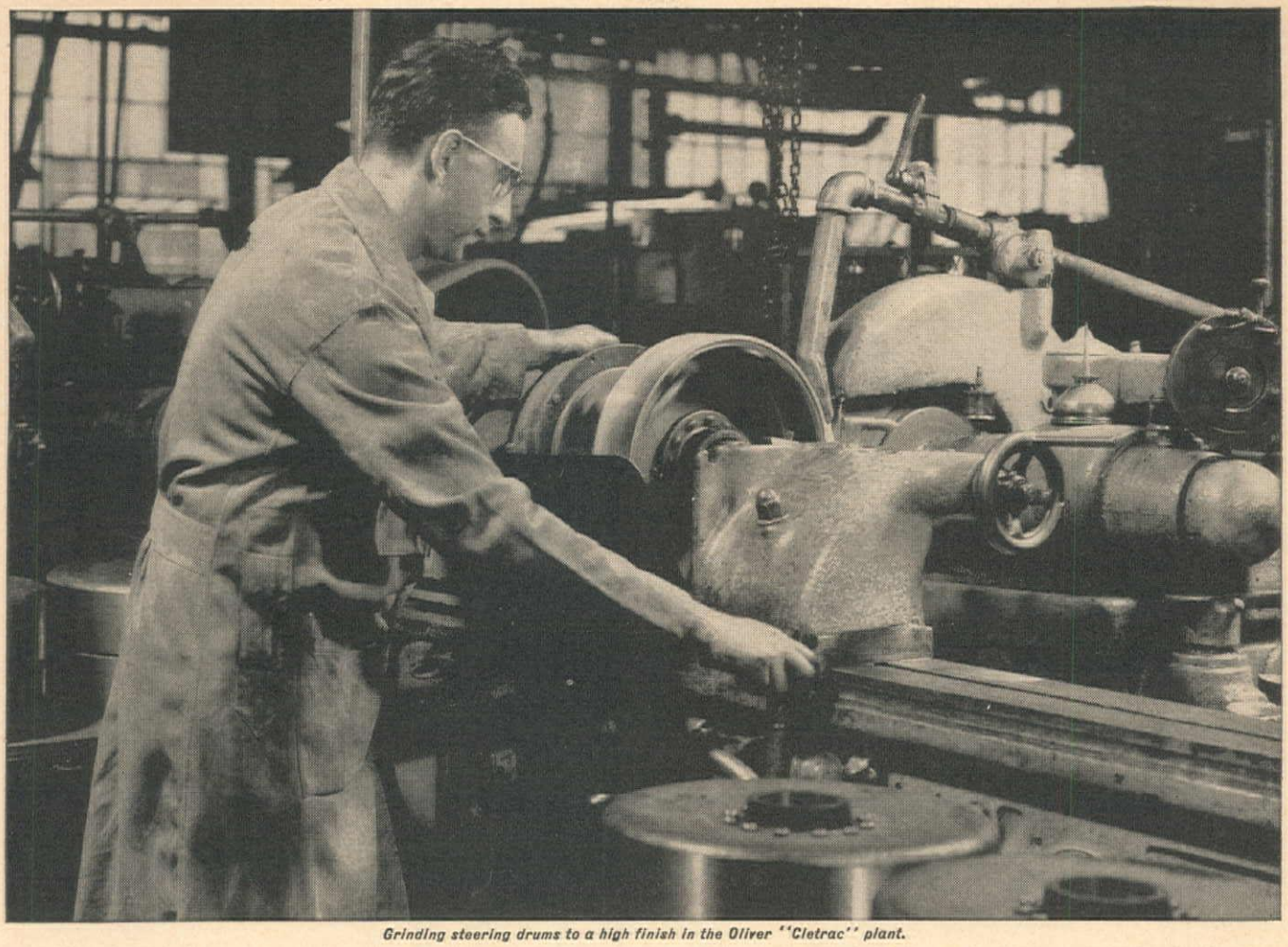
Missoula	MOUNTAIN TRACTOR CO.

DIAMOND

DIAMOND IRON WORKS, INC.

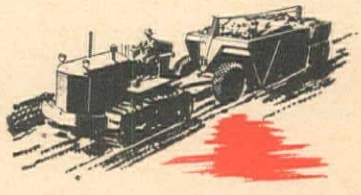
AND THE MAHR MANUFACTURING CO. DIVISION

1818 SECOND STREET NORTH MINNEAPOLIS 11, MINNESOTA



Grinding steering drums to a high finish in the Oliver "Cletrac" plant.

You can't Beat this drum!



For sheer quality, you'll find it hard to beat the steering drums on an Oliver "Cletrac" crawler tractor. Made of the highest quality materials, drums are ground and polished to a high finish, providing maximum contact and longer life for the steering bands. They're another example of the *extra* quality built into Oliver "Cletracs."

The manufacturing knowledge of Oliver "Cletrac" engineers, the modern production methods, and up-to-date equipment plus experienced, capable craftsmen, permit the addition of these high quality design features without the penalty of added cost to the user. *Extra* quality is standard on Oliver "Cletracs."

Maintenance of this standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors . . . for your every need.

CLETRAC THE OLIVER CORPORATION Cletrac

a product of **The OLIVER Corporation**

State of Arizona: Choguill Tractor Co., Phoenix. *State of California:* Gustafson Tractor Co., Eureka; Mechanical Farm Equipment Dist., Inc., San Jose; Comber & Mindach, Modesto; Tractor Service Company, Inc., 820 Broadway, Chico; Tractor & Equipment Co., San Leandro; Flood Equipment Co., Sacramento; W. J. Yandle, Santa Rosa; Hamsher Tractor Co., Stockton. *State of Washington:* Inland Truck & Diesel Company, Spokane; Pacific Hoist & Derrick Co., Seattle; Melcher-Ray Machinery Co., 202 East Alder Street, Walla Walla; Coleman-Jones Equipment Co., Chehalis; Central Tractor and Equipment Co., Wenatchee. *State of Oregon:* Loggers & Contractors Machinery Co., Portland and Eugene. *State of Idaho:* Idaho Cletrac Sales Co., Lewiston; The Sawtooth Company, Boise. *Western Montana:* Western Construction Equipment Company, Billings and Missoula. *State of Nevada:* B & M Tractor & Equipment Corp., 1420 S. Virginia St., Reno. *British Columbia:* Pacific Tractor & Equipment, Ltd., 505 Railway Street, Vancouver.

LIGHT VISIBILITY

Dark surfaces steal light; glare imposes too much. Both are wrong. Color Engineering recommends what's right in *your* plant for better seeing, better work.

WORK EFFICIENCY

Any worker's efficiency rises when his surroundings are attractive and comfortable, his well-being protected, his routine made easier to follow. Make it so he *can* do better and he *will* do better—whether or not he realizes why.

EMPLOYEE MORALE

Color increases light, color relieves strain, color high-spots work areas, color warns of dangers, color guides operations—all combine for greater employee security, less discontent, more self-respect and pride, less labor turnover.

SAFETY

Color Engineering provides a safety color code for every production hazard. More—proved eye-rest colors decrease your accident rate; decrease your insurance costs.

TRAFFIC FLOW

Color Engineering speeds up material movement by planned traffic flow systems, automatically guiding work and workers where wanted.

WANT MORE AND BETTER WORK for the wages you pay?

***Color Engineering* by Fuller will cut fatigue, accidents, absenteeism; build morale, improve housekeeping, increase productivity.**

Color, scientifically used, will show a profit on your production cost sheets. That's no swivel-chair theory. It's a practical fact already proved in many Western plants.

Color Engineering by Fuller is a scientifically planned system that literally paints out trouble by dramatizing danger; lifts the level of employee effort by removing irritations; and increases interest in the job, and pride in "the outfit I work for." *Color Engineering* is an asset—it goes on the Resources side of your financial statement.

An interesting hour with our newest free book, "*Color Engineering* by Fuller," will give you ideas. Illustrated in color to show you the why, where, how and when! Write for it!
W. P. Fuller & Co. Factories: San Francisco, Los Angeles, Portland. Branches in principal Western cities.

FULLER *Color Engineering* PAINTS

There is an INSLEY for your excavating or material handling job

EXCAVATORS ★ INSLEY ★ CONCRETE EQUIPMENT

World's Largest Exclusive Manufacturers of Small Excavators

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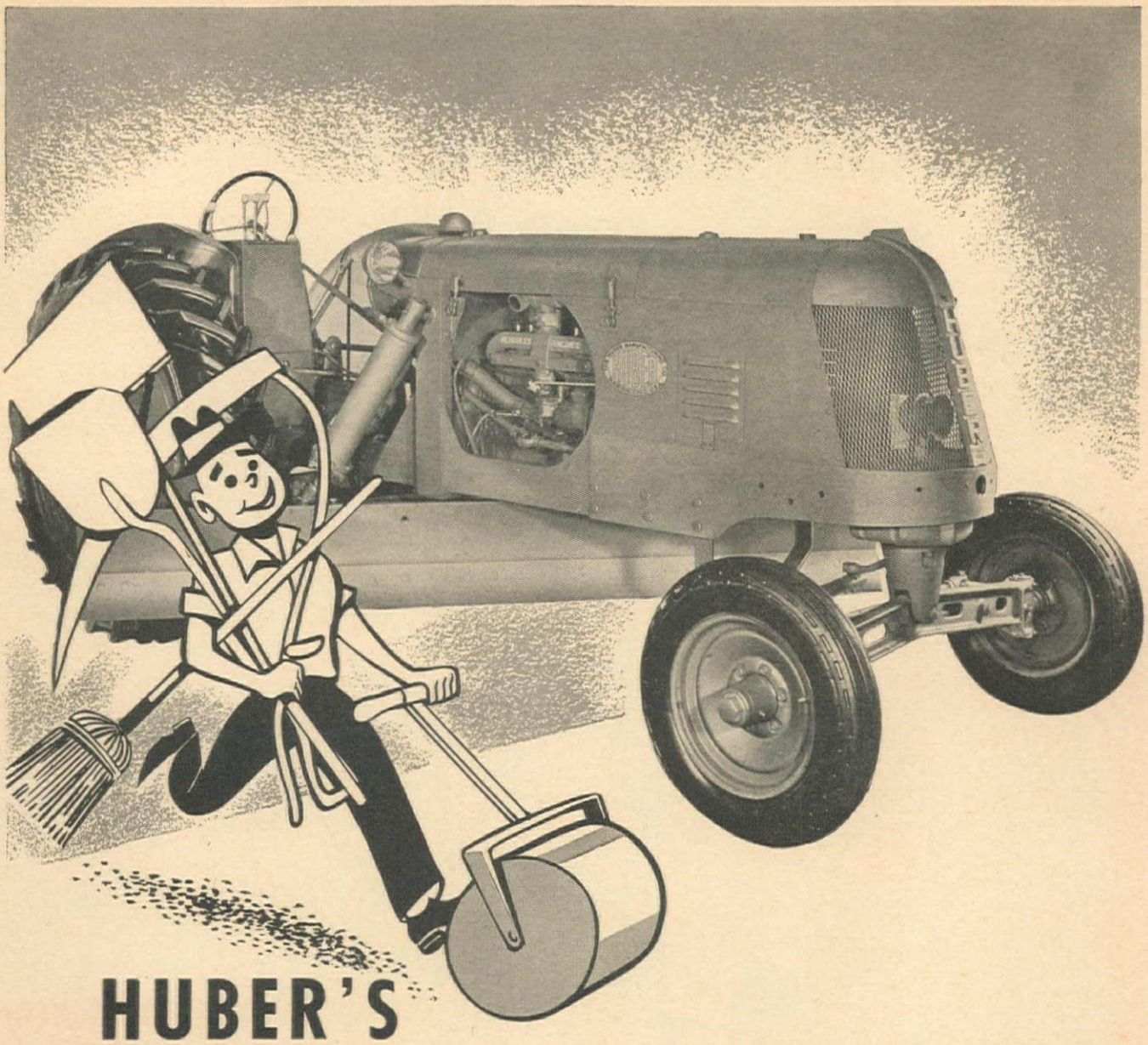
SHAW SALES AND SERV. CO...5100 Anaheim-Telegraph Rd., Los Angeles 22, Calif.



HUBER'S

ONE-MAN MAINTENANCE CREW

Wouldn't you like to have a street, highway, and airport maintainer that readily becomes a mower, bulldozer, snowplow (V-type or one-way), broom, patch-roller, and lift-loader? You can get this type of a versatile worker in a HUBER MAINTAINER—all "wrapped up" in a single investment. We have nicknamed it the "HUBER ONE-MAN MAINTENANCE CREW" because only one man is needed to put it through its many paces. Put the HUBER MAINTAINER high on your MUST SEE list as soon as your local distributor gets one. You'll be glad you did.

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

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JENKINS & McCLOUD	Reno, Nevada
THE MINE & SMELTER SUPPLY CO.	Denver 17, Colorado
CONTRACTORS' EQUIPMENT & SUPPLY CO.	Albuquerque, New Mexico
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FEENAUGHTY MACHINERY CO.	Seattle 4, Washington
FEENAUGHTY MACHINERY CO.	Spokane 2, Washington
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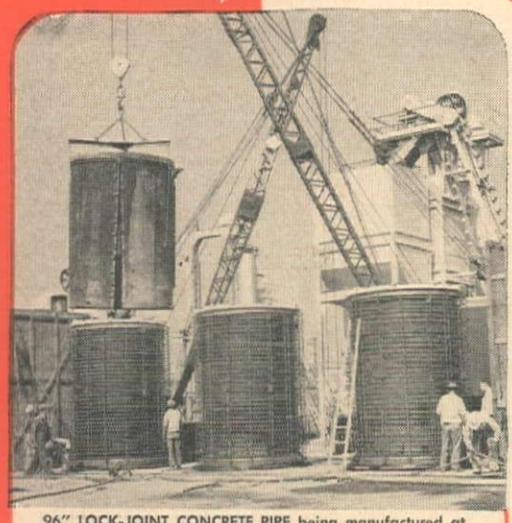
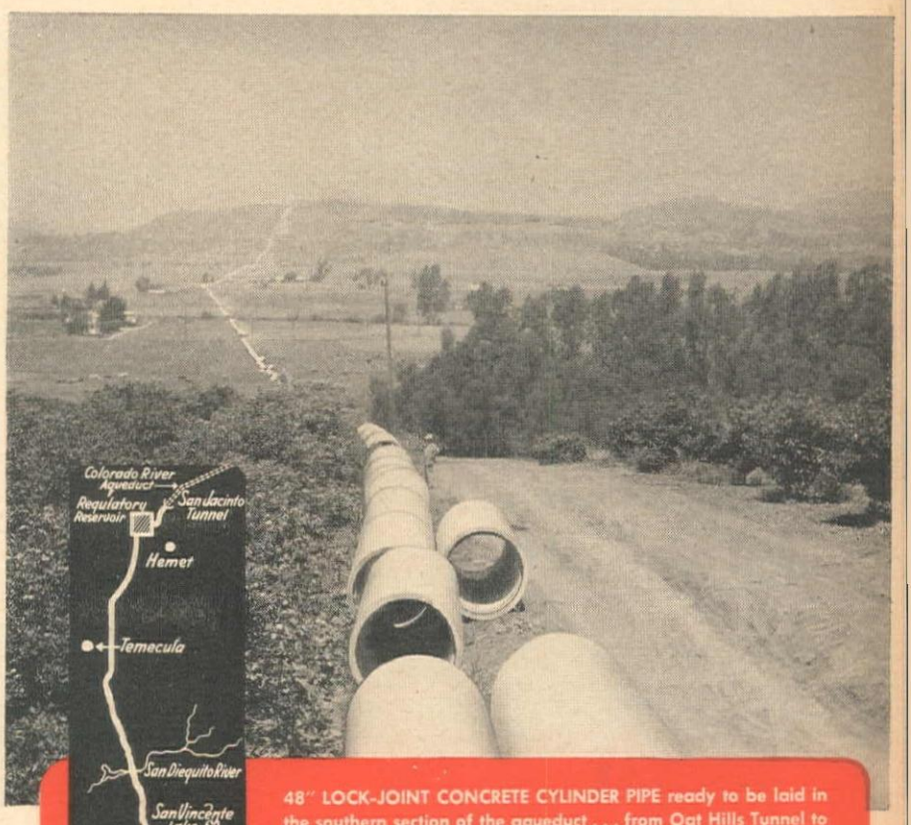
THE *San Diego Aqueduct*

...ANOTHER PERMANENT WATER ARTERY FOR THE WEST!



96" LOCK-JOINT CONCRETE PIPE being manufactured at the South Gate Plant of AMERICAN PIPE AND CONSTRUCTION CO. . . . for that section of the aqueduct from the West Portal of the San Jacinto Tunnel to the Regulatory Reservoir, approximately 2 miles to the south.



48" LOCK-JOINT CONCRETE CYLINDER PIPE ready to be laid in the southern section of the aqueduct . . . from Oat Hills Tunnel to San Vincente Reservoir . . .

Approximately 65 miles (total length 71.3 miles) of the San Diego Aqueduct will be constructed of *Lock-Joint Concrete Pipe,* a *permanent,* economical type of construction with high initial and *sustained* carrying capacity!

The San Diego Aqueduct will carry water from the Colorado River Aqueduct of the Metropolitan Water District of Southern California to the San Vincente Reservoir some 20 miles northeast of San Diego. It will provide, when finished, another permanent water artery for the rapidly developing West!

TWO BULLETINS . . . FOR YOUR INFORMATION

Interesting data and factual information have been assembled into these two bulletins. They describe the use of Reinforced Concrete Cylinder Pipe in present main water supply lines in the Los Angeles and San Diego areas. ***Write for them!***

AMERICAN PIPE & CONSTRUCTION CO.
manufactures and installs:

- Lock-Joint Concrete Cylinder Pipe
- PRESTRESSED Lock-Joint Concrete Cylinder Pipe
- AMERICAN Concrete Cylinder Pipe
- Hume Centrifugal Concrete Pressure Pipe

THE COMPANY also manufactures concrete pipe for storm sewers, sanitary sewers, culverts, highway and airport drainage, and many other uses.

MAIN OFFICE AND PLANT ADDRESS
4635 Firestone Blvd., South Gate, Calif.
Mailing Address
P. O. Box 3428, Terminal Annex, Los Angeles 54
OFFICES AND PLANTS
Oakland, San Diego, South Gate, California
Portland, Oregon

American PIPE & CONSTRUCTION CO.
LONG-LASTING WATER SUPPLY LINES

THERE'S A *Timken Rock Bit*

FOR PRACTICALLY EVERY KIND OF ROCK

The M series; an intermediate bit to the H and D series, designed largely for mining with heavy-duty equipment.

The R series; a bit used in soft formations such as limestone and sandstone.

The H series; a general purpose bit for light and medium weight drills adaptable to any popular hollow drill steel section.

The D series; a bit used with heavy drilling machines and large section drill steels.

The F series; a sturdy bit designed to achieve fast drilling by virtue of its small gauge.

Introduced fourteen years ago, the Timken Rock Bit of today bears a remarkably close resemblance to those on the market in 1932. Improvements have been made—streamlined then, it's more streamlined now; heavy wing sections have become heavier—but basically it's the same design. Fourteen years' experience has confirmed its correctness.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

ROCK BITS

This bulletin announcing Speed-O-Matic Hydraulic Control was first published in 1936, 10 years ago.

Speed-O-Matic

TOPS ALL BETS!

PERFORMANCE BEATS CLAIMS MADE 10 YEARS AGO

Speed-O-Matic Hydraulic Control on Link-Belt Speeder "shovel-cranes" has passed its first 10-year milestone . . . ahead of schedule!

. . . 10 years ago we believed this development would mark a new era in power shovel design; that it would assure greatly increased output; and abolish "operator fatigue."

. . . Today our expectations have been exceeded by results. Reports from every part of the country show increased outputs of 25% or more regularly.

Replacing human muscle with positive hydraulic pressure eliminates lost motion in operating clutches and brakes, saving minutes in every hour; reduces wear and tear on machine parts, and by eliminating effort and fatigue, enables the operator to deliver capacity yardage right up to the last minute of the shift.

Speed-O-Matic demonstrates Link-Belt Speeder's leadership in engineering and building shovels, cranes, draglines which will do more work, more kinds of work, more of the time!

For Prompt, Efficient, Convenient Sales and Service:
There is a Link-Belt Speeder Distributor Located Near You

10,354

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

A fleet of TERRA-COBRAS widening *Ignacio-Santa Rosa Highway* north of San Francisco for Harms Bros., contractors.

Full loads of 18 cu. yds. on this 1800 ft. round-trip haul, trip after trip, are the rule rather than the exception, with Wooldridge Terra-Cobras. Steep climbs to the top of the cut—fast downhill loading—fast break-away and rapid acceleration to top speed contribute to maximum yardage efficiency. Power and speed combined with positive steering control make possible the handling of tons of earth in less time at a lower cost—and with greater safety to operators and equipment. Easier all-around handling of the Terra-Cobra results in less operator fatigue and higher hourly averages. Why not plan to key your earth-moving operations to Wooldridge Terra-Cobras? Get full details, today.

WOOLDRIDGE
MANUFACTURING COMPANY
SUNNYVALE, CALIFORNIA · U.S.A.

TERRA COBRA
Hi-Speed Self-Propelled **EARTHMOVERS**

WOOLDRIDGE
EARTHMOVING EQUIPMENT
Includes

★ **SCRAPERS**
Tractor-drawn for handling heaping yardages from 6 to 28 cu. yards.

★ **POWER CONTROL UNITS**
Single and multiple drum with universal or roller fairleads.

★ **BULLDOZERS**
Tough and rugged design for standard makes of tractors.

★ **TRAILBUILDERS**
Adjustable angle-blades for standard tractor mounting.

★ **RIPPERS**
Available in light, medium and heavy duty models with two sizes to each model.

DISTRIBUTOR SALES & SERVICE FACILITIES IN ALL PRINCIPAL AREAS & FOREIGN TERRITORIES

...MARLOW "WATER WIZARDS"

There are no troublesome parts in Marlow "Water Wizards." These astonishing self-priming centrifugals contain no ports, by-pass valves or other auxiliary priming devices. The impeller alone moves the liquid. There is no recirculation or wasted motion; no parts which require adjustment or manipulation.

Moreover, Marlow "Water Wizards" are made throughout with an extra margin of stamina which enables them to stand up far beyond ordinary job requirements. No other pumps have such performance records. Made in 1½ to 10-inch sizes —3,000 to 240,000 gallons per hour. Send today for all of the facts about these reliable pumps.

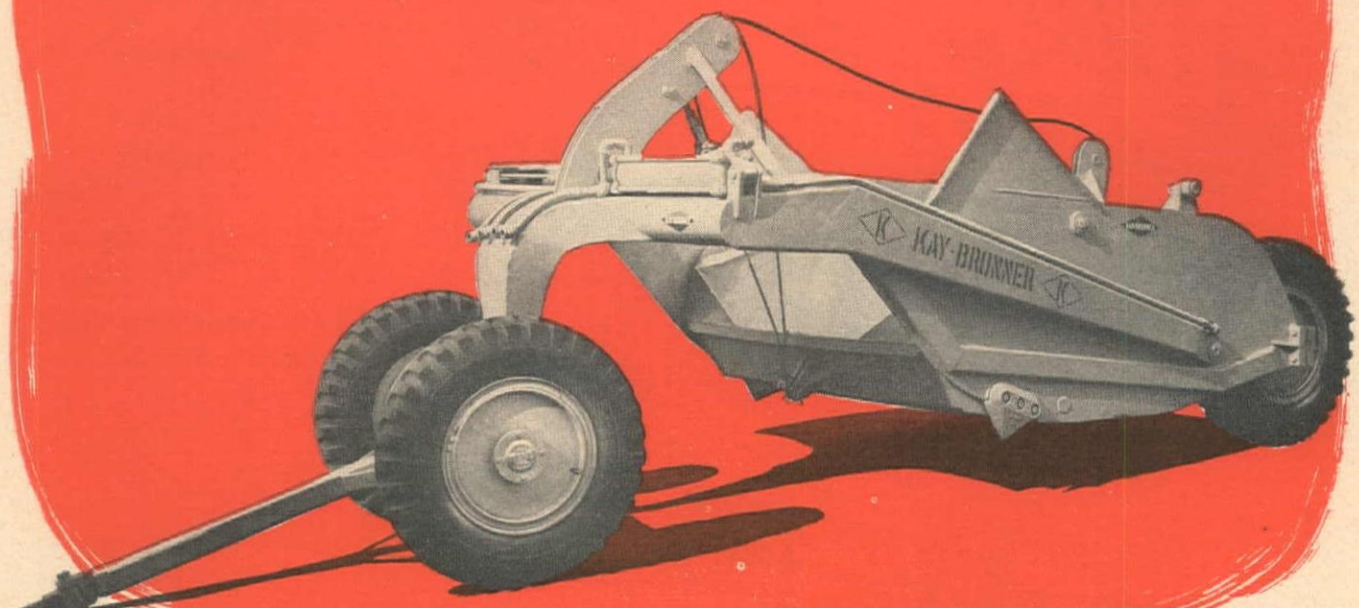
MARLOW PUMPS ★ RIDGEWOOD, NEW JERSEY

Manufacturers of the World's Largest Line of Construction Pumps

WAREHOUSED FOR WEST BY George M. Philpott Co., San Francisco, Calif. DISTRIBUTED BY: Glenn Carrington Co., Seattle, Wash. (For Interior Alaska); Alaska-Pacific Supply Co., Seattle, Wash. (For Alaska Coastal Regions); General Machinery Co., Spokane, Wash; Clyde Equipment Co., Portland, Ore., and Seattle, Wash.; Montana Powder and Equipment Co., Helena, Mont.; Nickerson Machinery Co., Salt Lake City, Utah; Le Roi-Rix Machinery Co., Los Angeles, Calif.; Burdick & Burdick, El Paso, Texas.

KAY-BRUNNER *hydraulic or cable controlled*

CARRYING SCRAPER

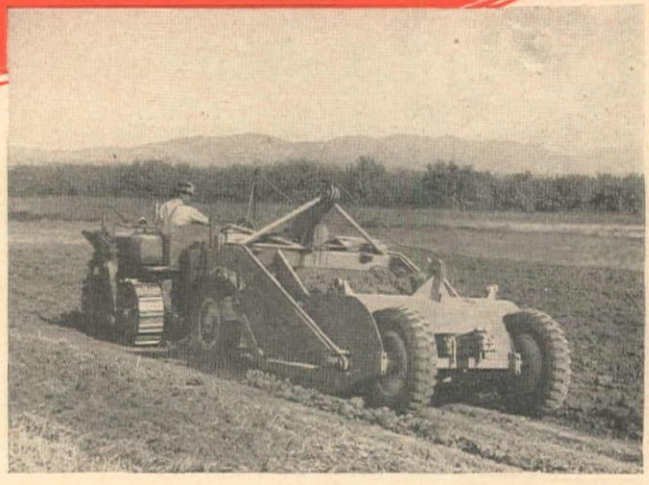


EASY CONTROL MEANS *Extra yardage*

The easy, positive control of this new K-B Carrying Scraper means more yardage moved at less labor cost. Men can do more work with tools that are easy to handle. Like all Kay-Brunner earth-moving equipment, this new scraper is designed for maximum ease and efficiency of operation.

You will find in this scraper, too, such practical features as replaceable side wearing bits; reversible cutting blade on the bowl; big, heavy-duty hydraulic rams that eliminate need for excessive pressures. These are typical of Kay-Brunner construction details that contribute to longer life and lower operating costs.

Kay-Brunner has for 23 years built in the West for Western customers. It has made possible close touch with the performance of their products in the field under all sorts of conditions. Every piece of Kay-Brunner equipment reflects the practical knowledge gained directly from the experience of users.



Available now in 4-yard capacity. For complete details and specifications, see your nearest Caterpillar dealer or write,

KAY-BRUNNER STEEL PRODUCTS, INC.
2721 ELM STREET, LOS ANGELES 41, CALIFORNIA

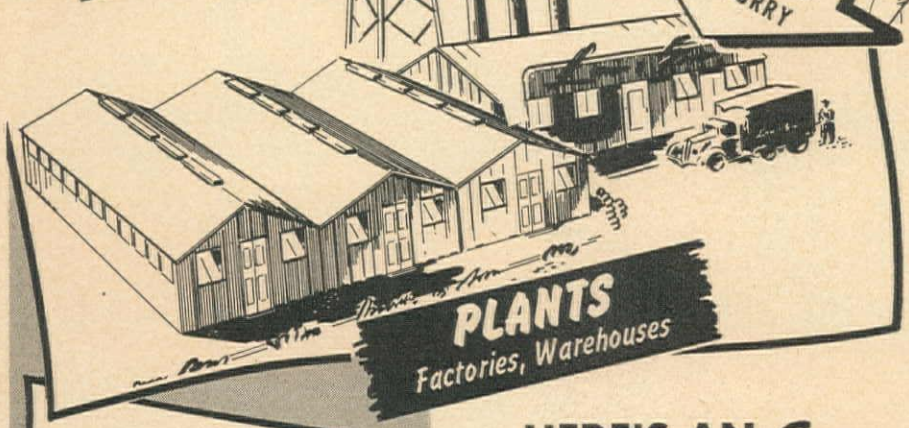
BULLDOZERS ★ TRAILBUILDERS ★ RIPPERS ★ POWER CONTROL UNITS ★ TAMPING ROLLERS ★ BACKFILLERS

Here's the answer to quick, moveable quarters-on-the-job

pre-fabricated BUILDINGS

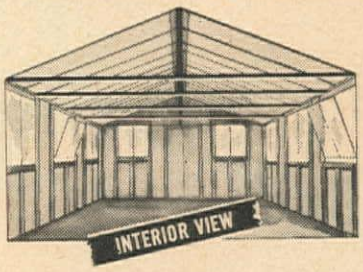
(Limited Quantity • Government Surplus)

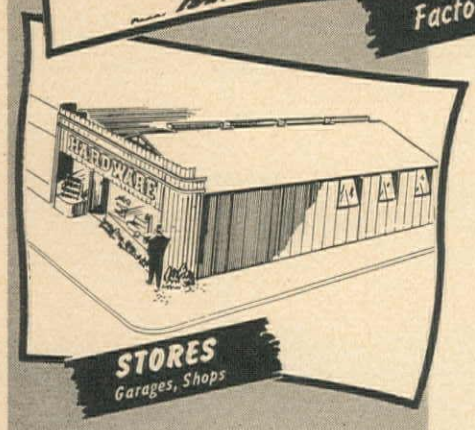
TO THIS IN A HURRY



20 x 48 ft.

Steel & Aluminum Building Units
Pre-fabricated in 2 ft. Sections





HERE'S AN *Easy... Economical* WAY TO LICK CONSTRUCTION PROBLEMS!

With a minimum of expense and labor . . . you can erect a complete camp almost over night! With a little planning these pre-fabricated building units are easily adaptable to functional dormitories, mess halls, company offices, shops and garages!

SPECIFICATIONS:

1. SIZE: 20 x 48 ft.
2. FRAMEWORK: Steel
3. SIDES & ROOF: Aluminum
4. INTERIOR WALLS & CEILING: ½ in. Insulating Panels
5. FLOOR: ½ in. Waterproof Plywood
6. 16 Windows and Screens
7. 4 Doors with Ventilating Screens

TOOLS & DIRECTIONS FOR ERECTION

A complete building manual and all necessary tools furnished with each unit. Anyone who can use a wrench can put these buildings together.

Hurry! Don't Delay

This is government surplus: when these units are gone, no more will be available. Compactly crated,—you can store 3 or 4 units in an ordinary garage.

DUE TO GOVERNMENT CONTRACT TERMINATION we are able to offer these building units at a price far below their cost to the Government!

2212⁹⁷

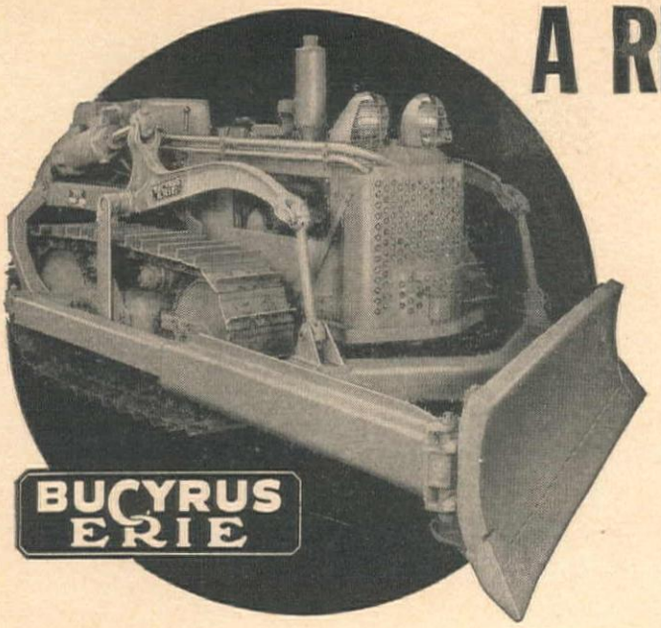
F. O. B. Our Yards, San Francisco
TERMS ARRANGED IF DESIRED!

- **EACH UNIT is compactly packaged in 32 crates**—Easily stored in a small area if you have not yet property on which to construct it.

Write, wire or telephone for further information—or better still, come and see an erected Sample Building.

CLEVELAND WRECKING COMPANY

2800 THIRD STREET SAN FRANCISCO, 7



A REAL DIGGING TOOL THAT'S EASY ON THE TRACTOR

Bucyrus-Erie Bullgrader-International TracTracTor combinations are powerful, economical dirt-moving teams—powerful because the Bullgrader applies the power of this tractor most efficiently; economical because the Bullgrader safeguards the tractor from undue wear and maintenance. Here are the specific reasons why every Bullgrader, designed and built exclusively for International TracTracTors, permits its owner to take full advantage of tractor power; here are reasons, too, why maintenance is so low:

1 ORIGINAL TRACTOR BALANCE IS MAINTAINED

The Bullgrader is mounted to the TracTracTor in such a way that its balance point is not affected. This enables the tractor to do the work for which it is designed, lets it travel both forward and backward without tipping. It means that you get the full tractive effort of the track belt. Track roller loads are distributed evenly. Excessive wear and strain on front track idlers and rollers is eliminated.

2 LOADS ARE APPLIED AT THE PLACES DESIGNED TO TAKE THEM

The main frame of the Bullgrader is attached to the tractor at the point of rotation of the tractor tracks, so that digging thrusts are carried directly to pivots on the rear support brackets. All superstructures are mounted on the track frame, relieving the tractor main frame, engine, transmission case, final drive housing, etc., of damaging stress and shock loads.

Let your International TracTracTor Distributor show you these features. Be sure to ask him about other Bullgrader features, too: hydraulic control that gives you positive digging down pressure, scientifically curved blade, quick angling and tilting, unobstructed vision.

31T45

BUCYRUS-ERIE COMPANY

SO. MILWAUKEE
WISCONSIN

See Your INTERNATIONAL TracTracTor Distributor

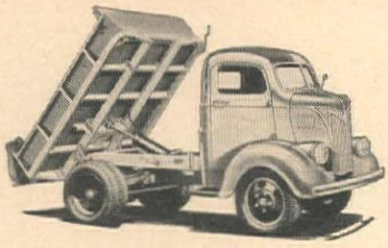
ARIZONA: John P. Duncan, Yuma; The Lines Co., Safford; F. Ronstadt Hardware Co., Tucson; The O. S. Stapley Co., Phoenix. **CALIFORNIA:** J. G. Bastain, Redding; Braman-Dickerson Co., Riverside; Brown Tractor Co., Fresno, Madera and Reedley; Edgar Implement Store, El Centro; M. Eltiste & Co., Inc., Santa Ana and Anaheim; Exeter Mercantile Co., Visalia and Exeter; Farmers Exchange, Alturas; Farmers Mercantile Co., Salinas, Hollister, King City and Watsonville; Gallagher Tractor & Impl. Co., Merced; Hanson Equipment Co., Santa Maria; A. H. Karpe's Implement House, Bakersfield; L. G. Maulhardt Equipment Co., Oxnard; Smith Booth Usher Co., Los Angeles; Southern Equipment & Supply Co., San Diego; Stanislaus Implement & Hardware Co., Modesto; Stevenson Equipment Co., Santa Rosa; Sutton-Morf Tractor Co., Sacramento; Thompson-Sage, Inc., Stockton, Lodi and Tracy; Valley Equipment Co., San Francisco and San Jose. **IDAHO:** Intermountain Equipment Co., Boise and Pocatello. **NEVADA:** Brown Motors, Reno; Clark County Wholesale Mercantile Co., Inc., Las Vegas. **NEW MEXICO:** Hardin & Coggins, Albuquerque. **OREGON:** Howard-Cooper Corp., Portland and Eugene. **UTAH:** The Lang Co., Salt Lake City. **WASHINGTON:** Howard-Cooper Corp., Seattle; Intermountain Equipment Co., Spokane and Walla Walla. **WYOMING:** Wilson Equipment & Supply Co., Cheyenne and Casper.

TRACTOR BUCYRUS ERIE EQUIPMENT TE-2

The BEST COSTS LESS

TRADE MARK

For years Gar Wood has consistently offered truck and trailer equipment of utmost utility and outstanding value. Leadership in this field resulted from this policy. Gar Wood equipment costs less in the long run because it is better built to give peak performance and lasting satisfaction.



Type C12 Body and Model D6 or D7 Hoist. Dumping angle 55°.

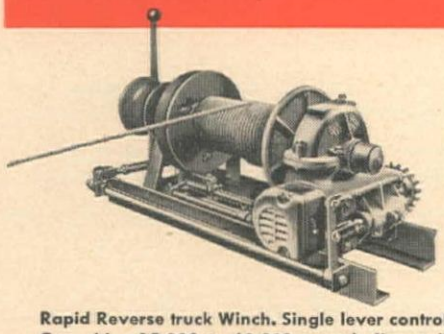
Type X-112 Extra heavy duty Body with automatic downfolding tailgate.

Special rock Body, scoop type rear end. Model F4CA cam and roller Hoist.

Type W12 Body. Model F4C cam and roller Hoist. Capacity 6 cu. yds.

Type X-112 Extra heavy duty Body, scoop end, with Model T-4440 Hoist. Capacity 19 cu. yds.

Type W12 Body, front recessed for Model TV83 Hoist. Capacity 15 cu. yds.



Rapid Reverse truck Winch. Single lever control. Capacities 15,000 to 60,000 pounds line pull.

West Coast Special W-12 Body, Model F8C cam and roller Hoist. Capacity 10 cu. yds.

Telescopic boom Crane. Radius 8 to 20 feet.

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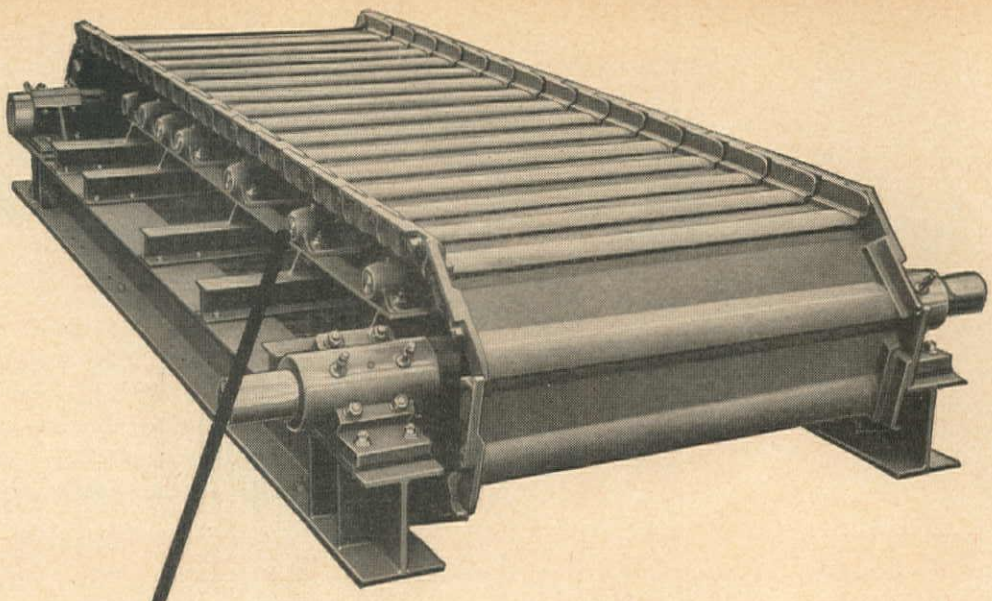
7924 RIOPELLE ST. • DETROIT 11, MICH.

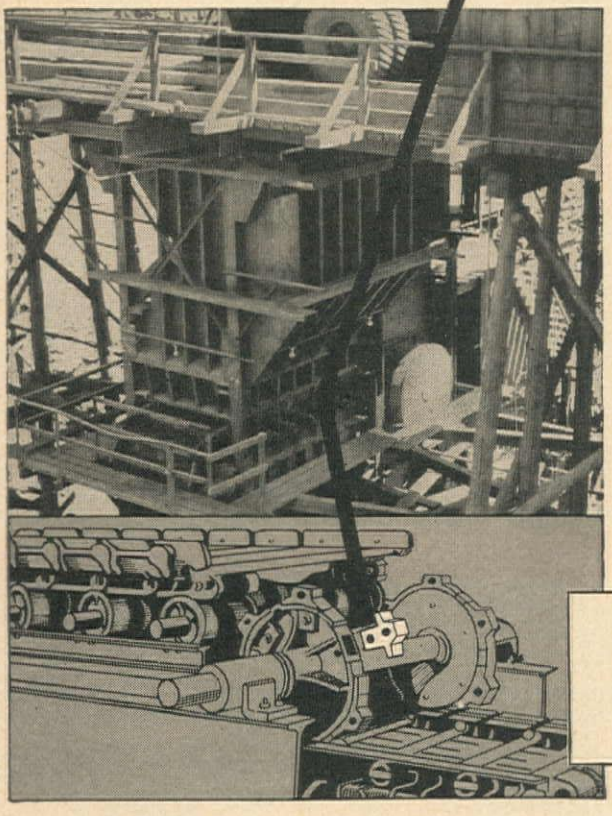
WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: • TRUCK TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS



for Heavy Abrasive Materials...

PIONEER-ORO
MANGANESE STEEL APRON FEEDER



STOP the flow of material to your primary crusher and you stop production throughout your entire plant. Whether it's iron ore or rock, your primary feeder is the first important unit in your plant for boosting tonnage.

When you're handling iron ore, slag or other heavy abrasive materials, the PIONEER-ORO MANGANESE STEEL FEEDER assures high capacities at low cost, holding maintenance to a minimum.

All wearing parts are ORO SUPERMANG steel, a superior grade of manganese steel. The apron consists of a series of ORO SUPERMANG double beaded, overlapping and interlocking pans with vertical reinforced side flanges. Pans are heavily ribbed on the under sides to withstand impact and pressure.

If you're handling heavy abrasive materials, the PIONEER-ORO FEEDER will give you high capacity at low cost. Write for complete details.

PIONEER ENGINEERING WORKS, INC.
1515 CENTRAL AVENUE • MINNEAPOLIS 13, MINNESOTA

- OFF TO A GOOD START... the PIONEER-ORO FEEDER supplies a steady, controlled flow of iron ore from a 30 ton loading pocket.
- SUPERMANG teeth on head sprockets can be reversed or renewed without removing sprocket centers from the shaft or disconnecting pans.

Engineers and Manufacturers of Quarry—Gravel and Mining Machinery

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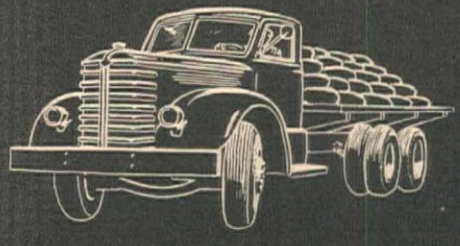
improved.. even finer than before



Veedol 100% Pennsylvania Motor Oil

Finer, improved Veedol Motor Oil is now additive-treated to give longer engine life, lower engine wear, lower maintenance costs, less sludge and varnish deposits, positive protection against bearing corrosion. In SAE Grades 10, 20, 30, 40, 50, 60, and 70.

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Developed and proven in war, *Finer Improved Veedol* gives you these additive-imparted qualities PLUS the superior stamina and lubricating qualities of the famous 100% Bradford, Pennsylvania, base crude which has made Veedol the "Aristocrat of Motor Oils." For the maximum safety margin in the protection of all your gasoline-powered automotive equipment, specify Finer Improved Veedol Motor Oil.

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Correct Lubrication is Machinery's Most Vital Need

TIDE WATER ASSOCIATED OIL COMPANY

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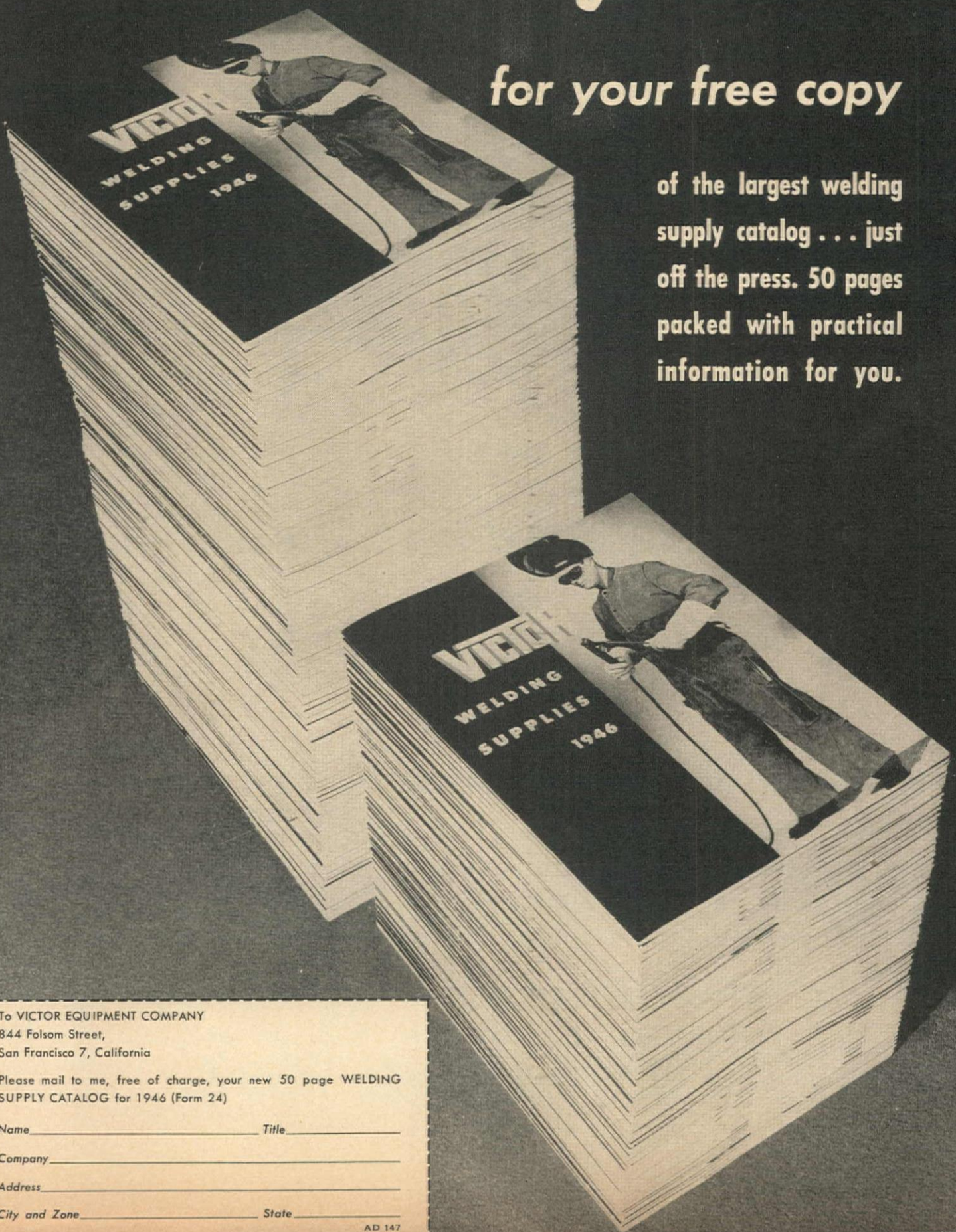

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Please mail to me, free of charge, your new 50 page WELDING SUPPLY CATALOG for 1946 (Form 24)

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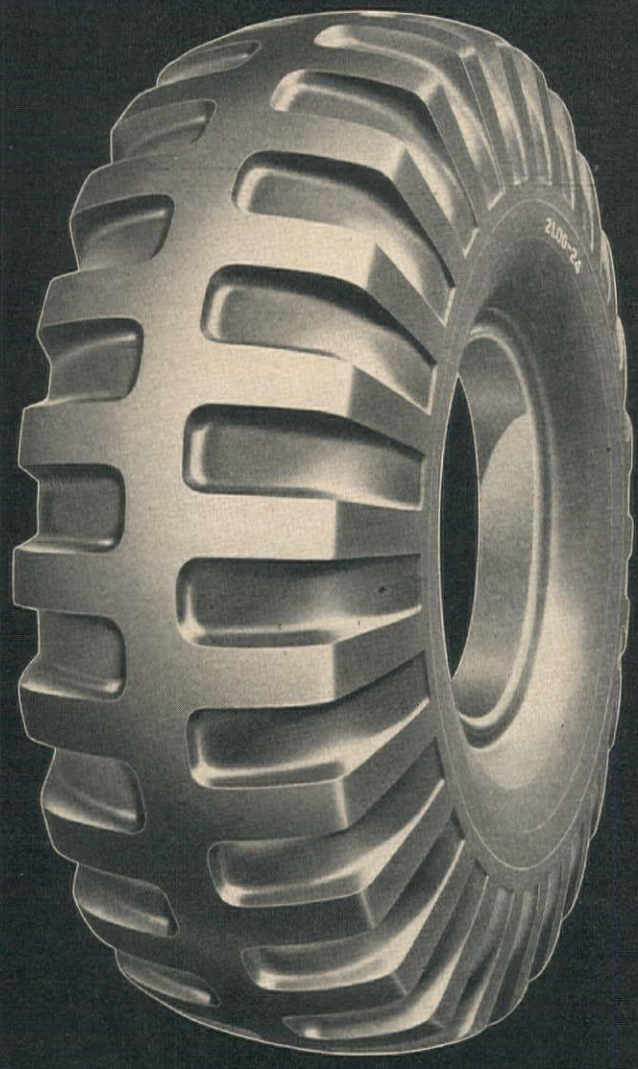
AD 147

Reduce operating costs on your next big job with this **NEW** retreading service!

THOMPSON *Special Purpose* TREADS



SIZES 6.00x16 through 21.00x24

NOW Earthmover and Rock Service Tires Treaded in 48 Hours!

No longer do you have to wait for weeks to get your big tires back from the factory, or worry about how many will be returned, when, and in what condition.

Now they can be retreaded in San Francisco in special mold equipment that's readily adjustable, and will not buckle the tire.

• NEW TREAD DESIGN

And look at that tread design! It's an improvement on the one used so effectively by the U. S. Army throughout the world. The lugs and running rib have the correct slope to prevent undercutting when the tire is heavily loaded. The non-directional tread provides tremendous traction, yet permits reversing the tire for uniform wear and longer service. This new design has been engineered to carry heavy loads through mud, snow, sand, and gravel, over rocks, and along highways.

• A FULL RETREAD— NOT A TOP CAP

The Thompson *Special Purpose* Tread is not a top-cap nor a full-cap, but a FULL RETREAD. We remove all of the old rubber down to the cord from side to side, exposing shoulder, ply or breaker separation, cord damage and other injuries. Thus we are able to repair these hidden injuries which would otherwise shorten the life of the tire. Finally we apply *nearly twice as much rubber* to the casing as is done in top-capping or full-capping.

• PRECISION BALANCE

What's more, all Thompson *Special Purpose* Treads are statically balanced before curing to avoid pounding and premature wear...accurately balanced to aircraft specifications!

To save time and reduce tire costs on your next job, specify Thompson *Special Purpose* Treads. Call UNderhill 2860 for free pick-up service near San Francisco.

On distant jobs, ship your smooth tires to us prepaid...we absorb return shipping costs.

THOMPSON TIRE COMPANY

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CONSTRUCTION PLANT AND EQUIPMENT FROM SHASTA DAM, CALIFORNIA

AVAILABLE FOR SALE **IMMEDIATE DELIVERY**

CABLEWAYS AND HOISTS

3—Lidgerwood, 3-drum electric hoists with 500 h.p. G. E. motors. Ward Leonard control, complete with controls and all electric equipment.

2—Lidgerwood, 3-drum electric hoists with 500 h.p. Westinghouse motors complete with controls and all electrical apparatus.

5—Cableway towers, structural steel, 3—125 ft.; 1—75 ft. and 1—45 ft., complete with travel mechanism.

6—Complete sets of carriages, main and auxiliary, fall and dump blocks, fall rope carriers, buttons, takeup bars and takeup sheaves.

1—American pillar crane. Cap. 5 T. at 48½ ft. and 15 T. at 25 ft. radius.

1—Colby elevator hoist, double drum, 75 h.p., equipped with brakes and emergency equipment, including one hoist cage. 15 ton capacity.

12,000 lin. ft. of used 3" dia. locked coil cable in length from 500 to 2600 lin. ft.

Misc. lot of sheaves, jewels, blocks, etc.

CEMENT PLANT

1—Dual No. 265 Fuller Fluxo cement pump, duplex type complete with gravity feed and automatic control equipment. 400 bbls. per hr. capacity. Pumping distance 3300 ft.

1—C-200 Fuller single stage rotary compressor Westinghouse motor 100 h.p.

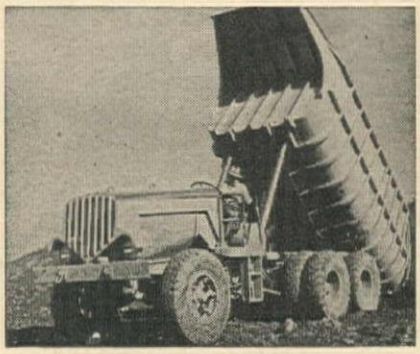
CONVEYORS

30—Motor-operated gates for sand and gravel up to 6" cobbles with 1-h.p. Allis-Chalmers gear motor.

2—Complete sets, including 42" tandem drive pulleys, 42" head pulleys, 36" tail pulleys.

3—150 h.p. Westinghouse gear motors, 144 r.p.m., 2300 volts, 3-phase, 60 cycle.

1—Airplane tripper for 36" belt with two 17' wing belts, capacity 1,000 T. per hour, complete with pulleys, drives and gear motors.



10—White Dump Trucks Model 1580-691, 24 cu. yd. capacity in good condition.

DRILLING EQUIPMENT

2—Mod. 315 I-R portable compressors, gas driven.
5—I-R paving breakers.
8—I-R drifters DA35.
1—I-R-54 drill sharpener.
10—I-R jackhammers.

TANKS AND RECEIVERS

10—8 cu. yd. steel hoppers, including gates and air rams.
2—Water filters.
2—Wallace & Tiernan chlorinators.
1—9500 bbl. all welded water tank, 48' dia., 30' high.
1—5400 bbl. all welded water tank, 36' dia., 30' high.
1—200 bbl. steel water tank.
10—Sandblast tanks 24" x 96" with hoppers and fittings.
10—Lubricator tanks 14" x 30"; 24" x 48"; and 24" x 60".

PUMPS

2—Bingham type SVD submersible pumps.
10—I-R No. 25 sump pumps.

MIXING PLANTS

1—3000 cy. bin with 5 compartments for aggregates, 2 compartments cement, incl. turnhead, gates.

1—Complete set C. S. Johnson fully automatic batching equipment for 5 aggregates, cement and water for 4 cy. batchers.

5—4 cy. Koehring concentric zone mixers, including batchmeters, timers, consistency meters.

MISCELLANEOUS

1—P.A.X. automatic telephone switchboard with 76 phones.

Pole line hardware.

Floodlites—500 to 1500 w.

1—1¼ cu. yd. heavy duty clamshell bucket.

12—Muck skips, 7—14 cu. yds.

50—Chicago pneumatic concrete vibrators, Nos. 417, 518 and 519.

Several sizes of monkey wrenches, wood borers, chipping and riveting guns.

New and used rubber hose, ¾" to 4".

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1—125 kw. motor generator set, 275 volts D.C.

Complete stock of warehouse supplies.

Complete line of transformers and electric motors.

ALL ITEMS SUBJECT TO PRIOR SALE

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OWEN CLAMSHELL BUCKETS INSURE A BIGGER DAY'S WORK

with a MOUTHFUL AT EVERY BITE

For faster digging, ease of handling on difficult jobs and lowered operating costs, "get a line on an Owen Bucket".

Owen designs and builds to meet your every general or specific requirement.

The workings of an improvement-conscious engineering department are evidenced in field performance everywhere on dredging, excavating and material handling jobs.

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OWEN BUCKET CO., LTD.
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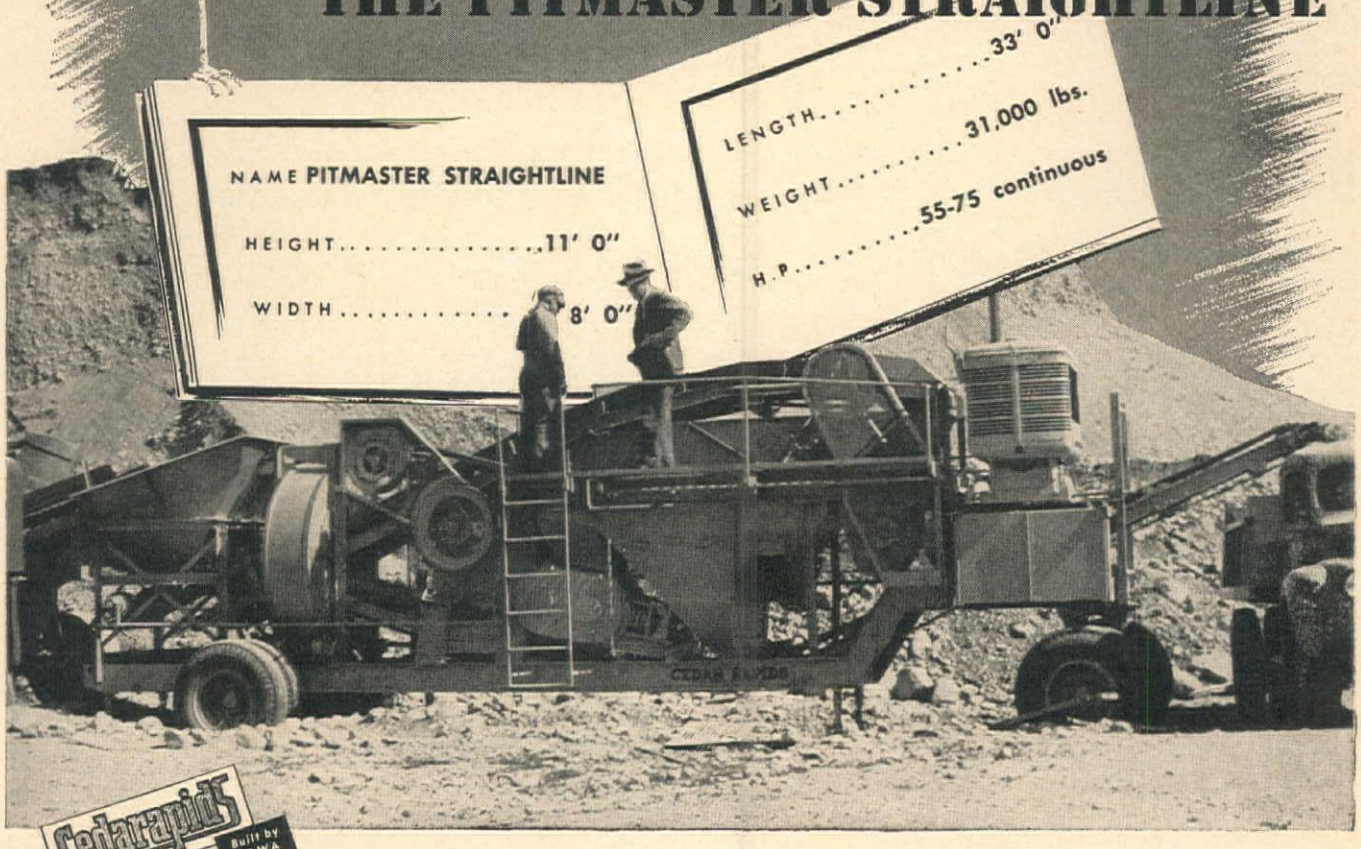
Announcing...

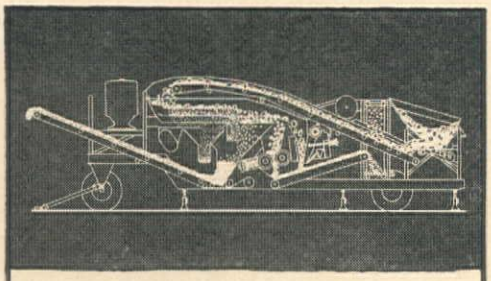
the arrival of another new Cedarapids Portable Crushing Plant

THE PITMASTER STRAIGHTLINE



Cedarapids Built by IOWA

small in size but **BIG** in low-cost production



THE IOWA LINE

of Material Handling Equipment is distributed by

HOWARD-COOPER CORP., Seattle, Washington, and Portland, Eugene and Medford, Oregon; HALL-PERRY MACHINERY CO., Butte, Great Falls, Missoula, and Billings, Montana; INTERMOUNTAIN EQUIPMENT CO., Boise and Pocatello, Idaho, and Spokane, Washington; WORTHAM MACHINERY CO., Cheyenne, Wyoming; KIMBALL EQUIPMENT CO., Salt Lake City, Utah; BROWN-BEVIS EQUIPMENT CO., Los Angeles, California; H. W. MOORE EQUIPMENT CO., Denver, Colorado; EDWARD F. HALE CO., Hayward, California; ARIZONA-CEDAR RAPIDS CO., Phoenix, Arizona; R. L. HARRISON CO., INC., Albuquerque, New Mexico; SIERRA MACHINERY CO., Reno, Nevada

Yes, sir! We're the proud parents of a new husky youngster that gives every promise of living up to the records of low-cost production of quality aggregate established by its big brothers, the Cedarapids Junior and Master Tandems. Operators are reporting production of more than 50 tons per hour of ½" material with 55% crushing.

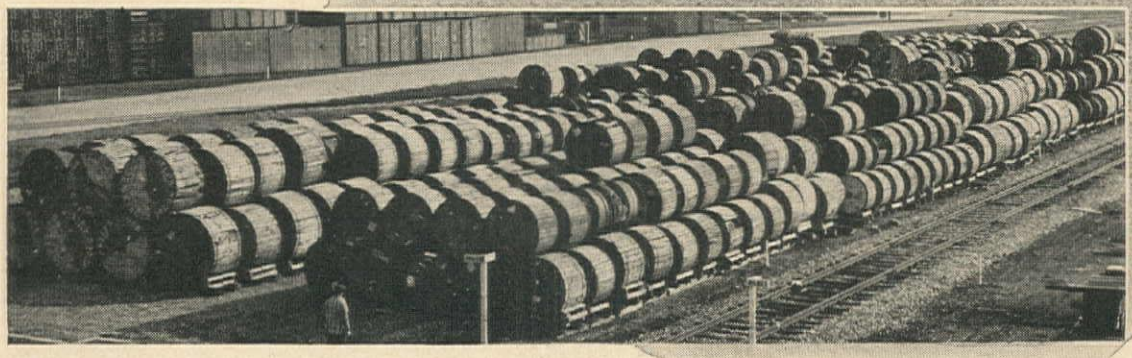
10" x 16" roller bearing jaw crusher and 16" x 16" roller bearing roll crusher give you plenty of crushing output. Horizontal vibrating screen assures greater capacity, closer grading, higher efficiency and requires less head room. Available with chip screen, hopper and feeder or swivel feed conveyor. Fast, easy set-up and take-down minimize lost time between jobs. No drives to connect. Conveyors swing easily into position.

When buying a crushing plant — buy the best — buy Cedarapids. If your requirements are moderate — buy a Pitmaster Straightline.

Iowa Manufacturing Company
Cedar Rapids, Iowa

For Quick Sale . . .

ELECTRIC WIRE AND CABLE



The War Assets Administration has a large inventory of government surplus Wire and Cable. It was made by leading manufacturers for war purposes under close supervision to exact technical specifications.

Some of the types and sizes are standard and conform to underwriters' code. Others, while non-standard, are adaptable to a wide variety of uses.

Some suitable applications are circuits for:

power and light, radio, telephone and signalling,
ignition and control, plus battery charging,
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Priced far below its acquisition cost, it will appeal to construction contractors, oil well and mine operators, and ship builders. Ingenious engineers will find many ways to use this material to their advantage.

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319-2

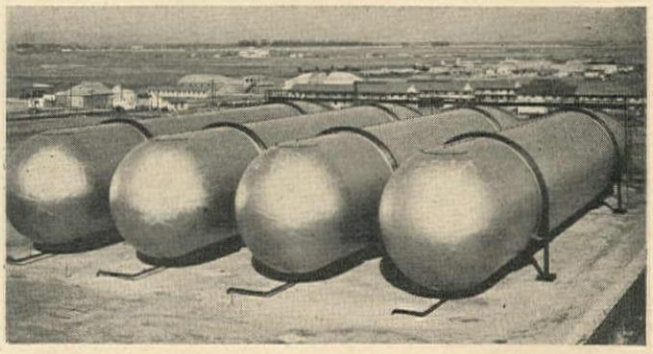
VETERANS OF WORLD WAR II: To help you purchase surplus property, a veterans' unit has been established in each WAA office

SOUTHWEST WELDING & MANUFACTURING COMPANY field erected four High Pressure GAS HOLDERS, 34' in diameter x 205' overall in length, totaling 2,000,000 cubic foot capacity, under subcontract to Bethlehem Steel Company, for the City of Long Beach, California.

These huge GAS HOLDERS were completely fabricated from A-212 Grade B Firebox Plate, and constructed to withstand an operating pressure of 55 pounds PSI. To insure quality in field-welding, all seams were Magnafluxed, and upon completion, GAS HOLDERS were subjected to a 60.5 pound PSI air test. Approximately 1,500 tons of steel were required in the erection of the four GAS HOLDERS.

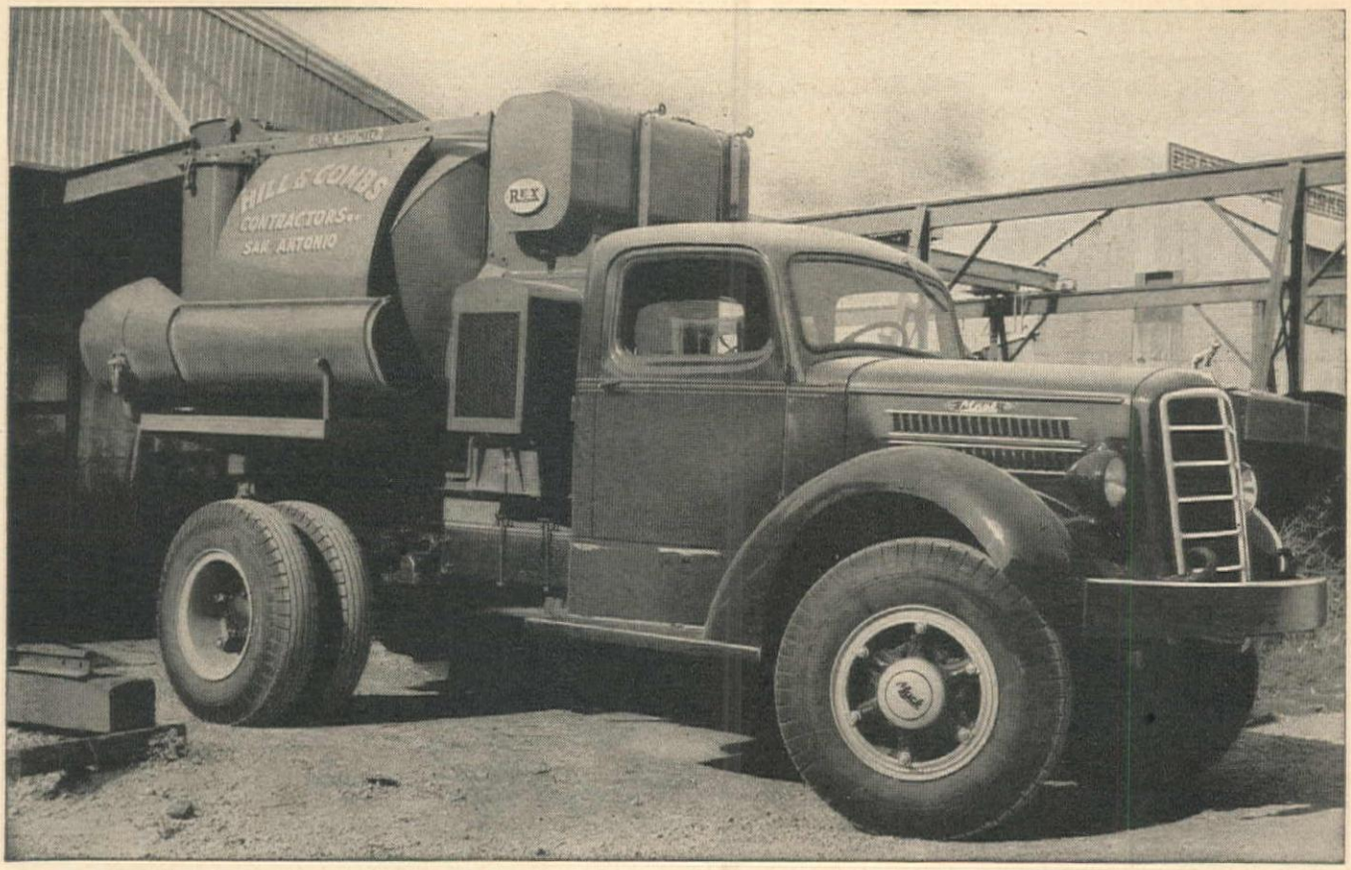
SOUTHWEST'S efficient engineering personnel, supervision and field crews are your assurance of receiving good workmanship on any type of steel construction, including pressure holders, penstocks, syphons, caissons, field storage tanks of any size, capacity or location.

Consult us on your future requirements



Southwest Welding & Manufacturing Co.

Alhambra, California



"SUPERIOR

TO ANYTHING WE HAVE YET USED"

That's Mr. Hill's description of his Mack trucks.

In the first six months of service, the three Mack EHX's, purchased by **Hill & Combs, General Contractors, San Antonio, Texas,** poured 22,500 cubic yards of concrete . . . operating through heavy, waxy mud, with Mack hauling the load!

Mr. Hill also writes—"We found these trucks plowed through to deliver the load *whenever* and *wherever* it was required."

This owner-praise is not new for Mack . . . but it again spots Mack doing a specific job—a tough job—efficiently, and at minimum cost. Check Mack for service and long-run economy before you buy your next truck!

Mack
TRUCKS
FOR EVERY PURPOSE

Performance Counts!

Mack-International Motor Truck Corporation. Los Angeles, Sacramento, San Francisco, Seattle, Portland Factory branches and dealers in all principal cities for service and parts.

PRIVATE *Water Company*

. . . . uses 50,000-gal. Horton ellipsoidal-bottom elevated tank to help provide a dependable water supply for 650 domestic users

★

THE Home Water Company—being sold on the advantages of a *gravity* water supply—recently installed the 50,000-gal. Horton ellipsoidal-bottom elevated tank shown at the right to serve National City, a subdivision near Tucson, Ariz. The only other water in storage in the distribution system, besides the 50,000 gals. in the elevated tank, is 5,000 gals. in a reservoir. The water is taken from three wells located at the tank site. The 650 domestic customers require an average of 137,000 gals. of water per day. According to the company a pressure of 37 lbs. to 41 lbs. is maintained in the distribution system at all times.

Horton ellipsoidal-bottom elevated tanks have a relatively large diameter and shallow depth which reduces the variation in pressure between the upper and lower levels. The riser on a tank of this type is connected directly to the tank bottom. There is no expansion joint to require inspection or packing. The table below shows standard capacities in which Horton-designed ellipsoidal-bottom elevated tanks are available.

WELDED ELLIPSOIDAL-BOTTOM TANKS

Capacity U. S. Gallons	TANK DIMENSIONS			
	Diam.	Shell Height	Depth in Roof and Bottom	Range
50,000	22′0″	11′0″	4′0″	19′0″
60,000	24′0″	11′0″	4′0″	19′0″
75,000	26′0″	11′0″	5′0″	21′0″
100,000	28′0″	14′0″	5′0″	24′0″
125,000	30′0″	16′0″	5′0″	26′0″
150,000	32′0″	15′0″	6′0″	27′0″
200,000	36′0″	16′0″	6′0″	28′0″
250,000	40′0″	15′0″	7′0″	29′0″
300,000	42′0″	17′0″	7′0″	31′0″
400,000	46′0″	19′0″	7′0″	34′0″
500,000	50′0″	19′0″	9′0″	37′0″

Horton elevated water storage has many advantages for both municipal and industrial service. Write nearest office for complete details and quotations.

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WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
July, 1946 Vol. 21, No. 7

Slow! Guardians at Work

PROTECTION OF THE PUBLIC against the adoption of unproven designs and methods is a service of the engineering profession that is in constant operation, yet it seldom becomes apparent because it is so fundamental. Sanitary engineers of the Pacific Northwest presented an unusually clear example of this guardian service last month when the Pacific Northwest Sewage Works Association broadcast a warning against the high-pressure tactics being used in that area for adoption of a new method of sewage treatment.

In opposing the immediate adoption of the ozone method of sewage treatment the engineers make it plain that it is not the method itself which they disapprove, but rather the sale of the method before its success has been sufficiently well proven either on the basis of efficiency or of cost to justify the installation of other than experimental plants. Although the report of the PNWSWA committee does not so state, it is safe to assume that if and when a majority of the individual engineers are convinced by definite proof that the ozone method of sewage treatment is at least approximately equal to other methods, no objection will remain.

It should be emphasized that the sanitary engineers as a group have no personal interest in the use of one method in preference to any other. As a matter of fact, a new method of sewage treatment would provide them with an additional tool which they could use to advantage. Further, the engineers have indicated their willingness to provide for a complete investigation that would either prove or disprove claims which have been made for the method. Thus, the action of Northwest sanitary engineers can be regarded as an indication of continuing public service, and as such is well worthy of commendation.

Highways on Water

SENATOR VANDENBERG of Michigan has introduced in the Senate a bill numbered S. 2302, which would change the method of distribution of the federal-aid highway funds authorized under the postwar highway bill of 1944, and any other federal highway money. He is supported in his proposition by Sen. LaFollette of Wisconsin.

Under the suggested new method, the area factor in the mathematical formula by which federal-aid funds are allocated to the several states would be changed. At present, only the land area of each of the various states is considered. Senators Vandenberg and LaFollette would add to this the water area within the boundaries of the states. The area factor has been applied successfully and without question since 1916, when it was adopted to "produce a fair distribution of these federal-aid funds as between the states."

It is probably natural for Sens. Vandenberg and LaFollette to introduce the new factor, since their states would benefit more bountifully than any others. In fact, virtually every other state would lose money under the scheme. Michigan embraces the most water area of any of the 48 commonwealths, 38,575 sq. mi., and Wisconsin is second with 10,062 sq. mi.

Since the total underwater area in all of the states is approximately 74,000 sq. mi., Michigan, with over half, would gain noticeably on its area factor. However, since the total amount of money to be distributed is not increased, the apportionment per unit of area must be reduced. In the states represented by the two Senators, the increase in number of area units would be so great that the reduced number of dollars per unit will not work adversely, but in virtually every other state the increase in number of units would be too small to overcome the decrease in funds brought about by the lowered unit value.

This would be particularly felt in the West, where water surface is important only in Washington, with 2,397 sq. mi., and even in that state the increased area allowance would not overcome the reduced unit allotment. It is hoped that Congress, and particularly Western congressmen, will forcefully resist this attempted raid. There is, of course, no justification for including the water area since, obviously, no highways can be built on submerged land, nor does it develop traffic which will use the existing roads.

Seismology Studies

THE STRUCTURAL ENGINEERS of California have addressed a letter to Secretary of Commerce Henry A. Wallace, asking the expansion of the Section of Seismology of the Coast and Geodetic Survey, a branch of the Commerce Department. *Western Construction News* is completely in accord with the suggestions in the engineers' letter.

Because it is the job of the structural engineer to design buildings and other edifices for safe occupancy and use, and because high in the list of factors, particularly in the geologically young West, against which their structures must be designed are the variable and unpredictable forces generated by seismic disturbances, they ask that the Section be expanded so that all possible data on acceleration, amplitude, period, location, probability, and effects on various soils, be made available to the engineers.

While certain colleges have made notable studies in this field, the overall federal agency through which the knowledge developed in each of them can be correlated and added to that obtained in foreign countries and in widespread investigations of new quakes, should be supported and expanded. It should be regarded as a non-political engineering agency for the development of technical knowledge and its findings made available to all structural engineers.

Another Sad Loss

AGAIN THIS MONTH, it is our sad duty to chronicle the death of an outstanding and valuable citizen of the West. Ora Bundy, president of the National Reclamation Association and a most successful Utah construction contractor, died last month after a short illness.

To list the contributions Ora Bundy made to Utah and the West is almost an impossibility. He built irrigation systems, highways, bridges, and other structures which will long stand as memorials to his ability. He served the contracting industry as president of the Intermountain Branch of A. G. C. and as a national director of the organization. He served his city, Ogden, as Mayor, and his state in numerous capacities.

As a citizen of the entire West he devoted many years as a director of the vitally important Reclamation Association, and for the past year and a half was its president.

His death came as a distinct shock to his host of friends across the nation, and leaves a very serious opening in the ranks of those far-sighted people who work for the great Western Empire as a whole.

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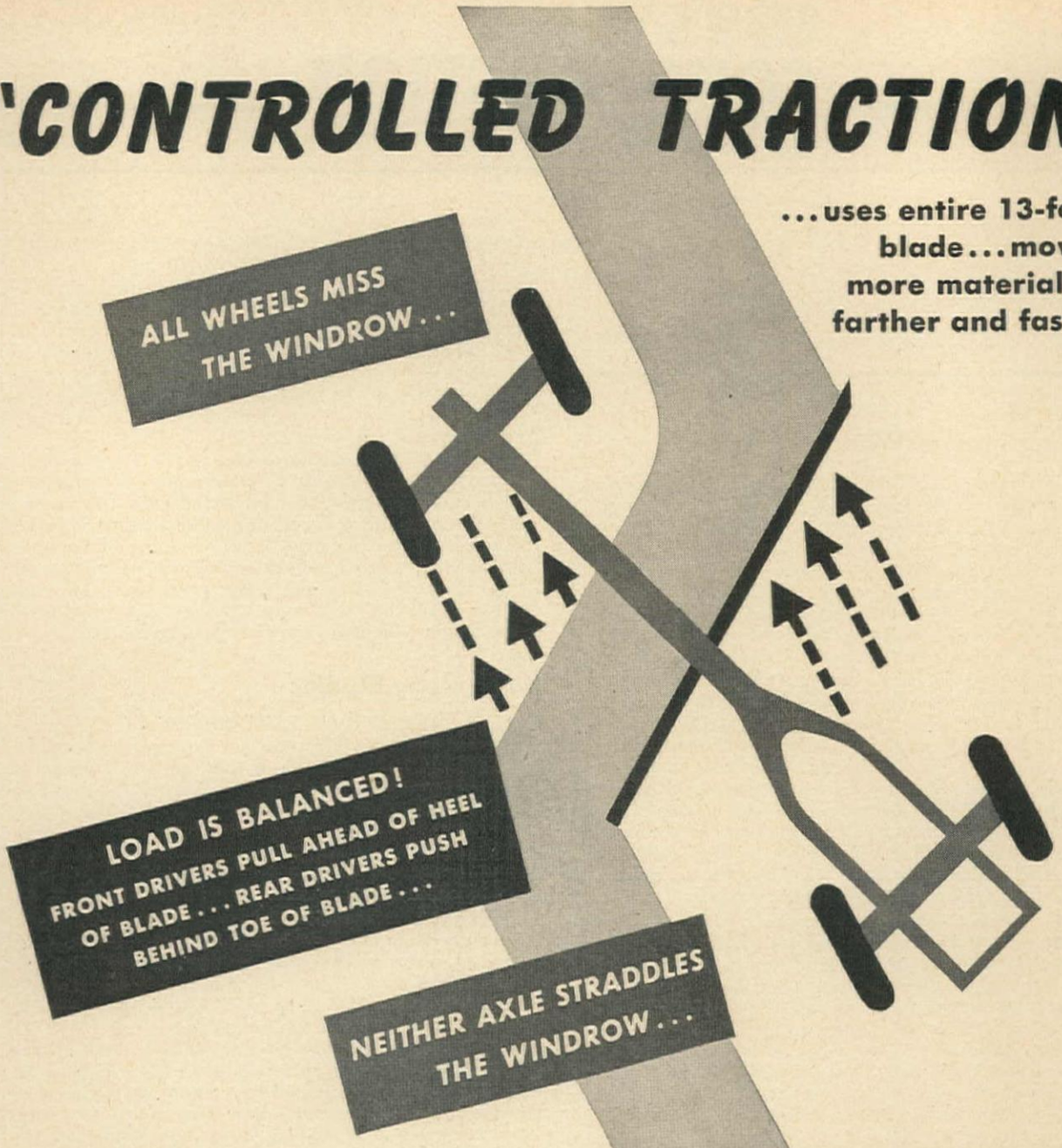

CONTROLLED TRACTION involves steering the rear wheels, and angling the frame, until the combination of rear wheels pushing behind the toe of the blade, front wheels pulling ahead of the heel of the blade, and blade practically at right angles to the frame in its angled position, *balances the load,* and makes it easy for the "99-M" to move straight ahead with a blade load that would either stall an ordinary Motor Grader, or cause it to slide sideways.

CONTROLLED TRACTION is another reason why no Motor Grader without All-Wheel Drive and All-Wheel Steer can hope to equal the all-around performance of the "99-M"

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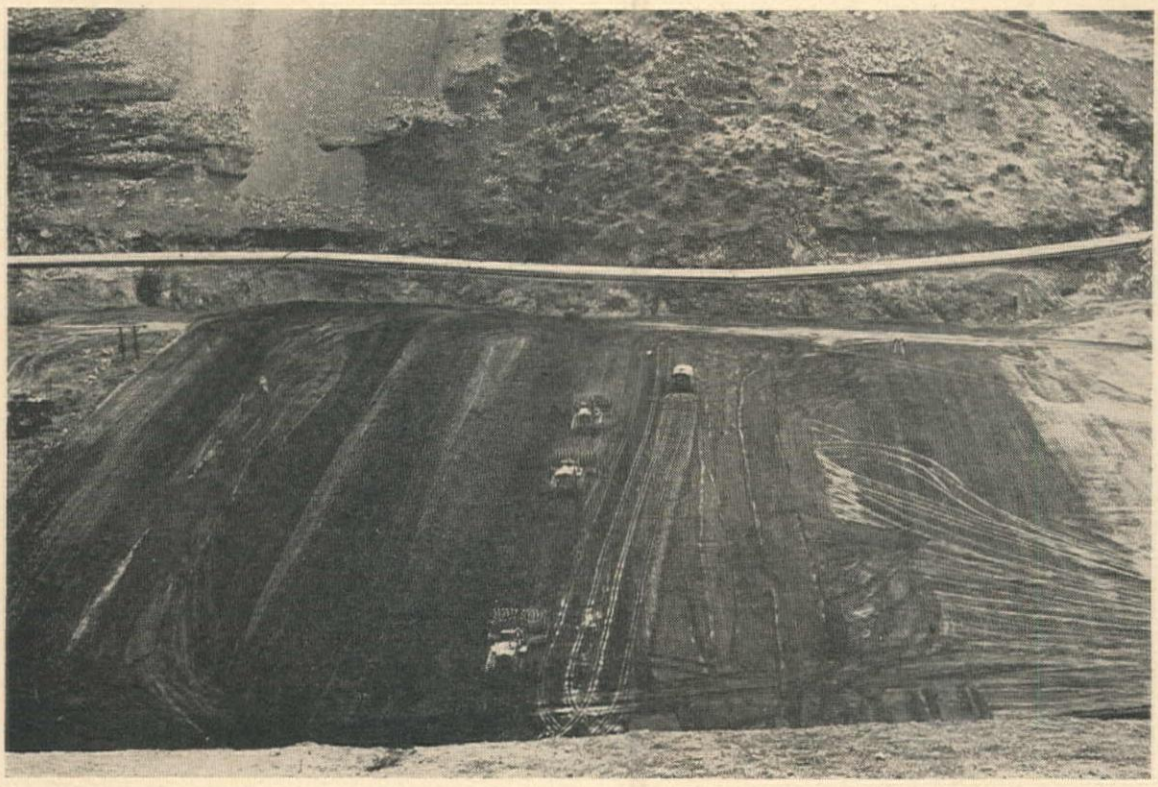


CREEK DIVERSION was being handled through the 48-in. CMP shown on the opposite abutment at the time this picture was taken, but was changed the following week to pass through the 6½-ft. dia. outlet tunnel which passes through same abutment.

Outlet Tunnel Serves Multiple Purposes at Rector Creek Dam

State of California designed, is building, and will operate 170-ft. earthfill structure to supply domestic and irrigation water — Outlet tunnel carries temporary water supply line as well as creek diversion during construction

DESIGNED, being constructed by, and intended for the use of the State of California, Rector Creek dam, 11 mi. north of Napa on the northern fringe of the San Francisco Bay area, is one of the few, if not the only structure of its kind to come so exclusively under the direction of the California Division of Water Resources. Further, the dam site and all borrow pits from which will come material for the 1,339,500 cu. yd. of earth and rock fill are located on the state-owned land. Water for the construction plant is available from the existing state system which will be superseded by Rector Creek reservoir and appurtenant works. Right-of-way acquisition was definitely not one of the preconstruction problems in connection with this project.

Completion of Rector Creek dam will provide a greatly increased water storage capacity to be drawn upon by four state institutions located in the Napa River Valley. Three of these, the veterans' home, game farm, and hospital farm, are at the present time receiving their domestic water from Rector Creek, the intake being located at a small diversion dam a little more than a mile upstream from the present construction. Upon completion of this project it is contemplated that these institutions will draw both domestic and irrigation water from the reservoir and water will also be supplied to the state mental hospital through a line to be constructed in the future. Existing facilities below the diversion dam, which will be within the reservoir area of the new dam, include a 10-in. cast iron pipeline running down the canyon through the dam site to a chlorination plant 1,600 ft. below the site.

Alternate designs

Two plans were prepared for the embankment, and bids taken on both as alternates. Plan No. 1, for which bids were $9,176 lower and is the construction plan adopted, calls for a rolled earth and rock fill in three zones. Zone 1, consisting of select impervious material and extending from clean bedrock to crest, has slopes of 0.75 to 1 on both sides. Zone 2, of select material with some rock up to 5-in. diameter permitted, is placed equally on both sides of Zone 1 with outside slopes of 1.6 to 1. Zone 3 is a rock and boulder fill on both upstream and downstream faces with outside slopes 2½ to 1. From bedrock to the crest of the dam at El. 380 is about 170 ft. The finished crest will be 30 ft.

wide, of which 10 ft. will be Zone 1, 5 ft. on each side Zone 2, and the outer 5 ft. on each side Zone 3. Normal high water will be at El. 370.

The alternate plan called for the entire embankment to be constructed of selected impervious material except for a layer of rock facing on the upstream slope. On the upstream slope Zone 1 material would have a slope of 2 to 1 and the rock blanket 2½ to 1. The downstream slope would be 3 to 1 from foundation to El. 290, 2½ to 1 to El. 355, and 2 to 1 to the crest. Bids on plan No. 2 requiring 269,900 cu. yd. more select material and 322,600 cu. yd. less rock averaged about 1¼ per cent higher than plan No. 1. Excavation quantities were considerably higher on plan No. 2, calling for 8,000 cu. yd. more low level and 52,500 cu. yd. more high level excavation than plan No. 1. Excavation and embankment items were the only ones varying in the two alternate plans.

Spillway and outlet

On the right abutment a concrete-lined spillway cuts through a steep bank, running 610 ft. from weir to end of lining with an additional 120 ft. of unlined section. Water approach to the weir is through an unlined semicircular basin with floor at El. 365. The cut slope of the basin is broken by a 5-ft. berm at El. 380. The weir crest at El. 370 is designed as an arc 141.5 ft. long with an 85-ft. radius, and will be protected by an extension of the grout curtain which runs the length of the dam axis. Protection of the spillway is provided by cutoff walls 3 ft. deep by 2 ft. wide at 100, and 210 ft. from the weir, and then at 100-ft. intervals to the end of the lining. Two 4-in. porous drain pipes in 12 x 12-in. gravel trenches will extend longitudinally under the spillway channel from the weir to the end of the lining with laterals 1 ft. upslope from each cutoff wall. The drain system is provided with outlets half way down the spillway and at the end of the concrete lining.

In cross section the spillway channel will be 20 ft. wide at the bottom with sides on a ½ to 1 slope. Slope of the channel varies from about 10 per cent just beyond the weir to 30 per cent in the last 200 ft. of lining. Height of the concrete walls of the channel lining varies from 15 ft. near the weir to 9 ft. at the end of the lining. Thickness of the lining is 12 in. for the bottom, reinforced by ¾-in. bars on 12-in. centers both ways, and 8 in. for the sides reinforced by ⅝-in. bars on 12-in. centers both ways.

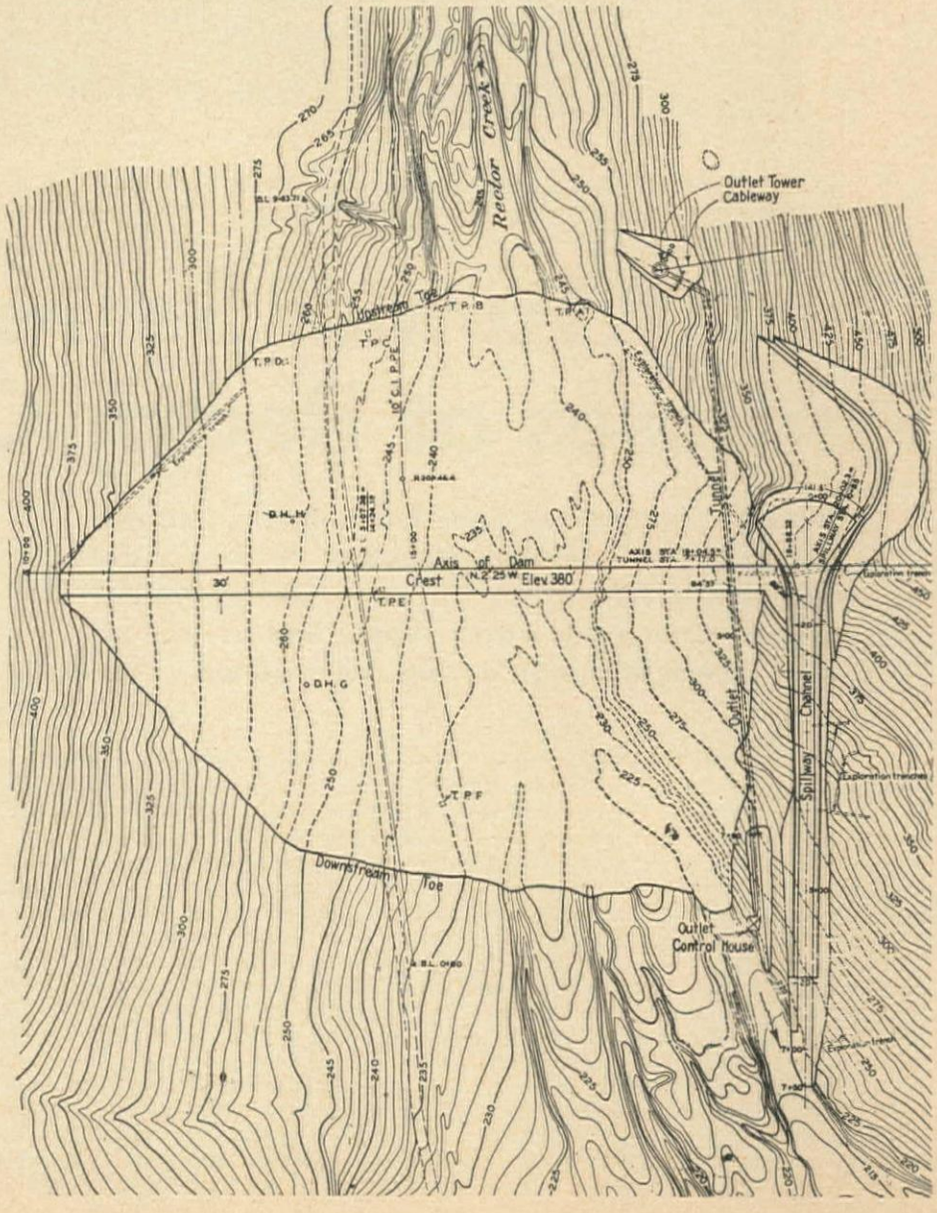
Three structures comprising the outlet works are an intake tower, tunnel, and control house. The intake tower is a reinforced concrete structure about 129 ft. high with an 8-ft. inside diameter. The 20-ft. diameter foundation is stepped back in four 12-in. lifts to provide a 24-in. wall from the foundation to El. 300 where it is decreased to 18 in. Provisions for water intake consist of a 30-in. gate valve 2¼ ft. about the floor of the tower, and six 18-in. gate valves placed spirally at 16 to 18-ft. intervals of elevation. To permit access to the top of the intake tower for water measurement and operation of the valves a small cableway will extend from an anchor in the left abutment 157 ft. to an A frame to be erected on the top of the tower. A 4 x 2-ft. pulley car will be hand operated over the cableway.

Tunnel

A 734-ft. tunnel runs from a short connection with the intake tower through the left abutment below and slightly to the right of the spillway line. In addition to serving as the future outlet from the reservoir, the tunnel is also a part of the river diversion system during the construction period, and will carry the temporary water service line in the same period. With a 6½-ft. inside diameter and a 6-in. unreinforced concrete lining, the tunnel will carry a 30-in. welded steel pipe. After construction operations are nearly completed the upper end of the tunnel will be plugged from the inlet portal a distance of 72 ft. which will take it around the 60-deg. turn, the only change in direction in the tunnel line. However, the lower end of the tunnel will be gated so that it will remain open for inspection the greater part of its length.

From the intake tower through the tunnel plug water will be taken through a 30-in. cast iron pipe embedded in 4½ x 4½ ft. of reinforced concrete between the tower and tunnel portal and in the tunnel plug, a distance of 18 ft. Six feet beyond the end of the plug the pipe will change to 30-in. welded steel which will run through the remainder of the tunnel and to the control house 115 ft. beyond the outlet portal. Within the tunnel the pipe will be carried on a 1½-ft. concrete cradle which will place the centerline of the pipe a foot to the right of the tunnel centerline and raise it nearly 2 ft. from the bottom of the lining. Pipe anchors will be placed at the outlet portal and

GENERAL LAYOUT of Rector Creek dam indicates the positions of the multiple purpose outlet tunnel and the spillway as well as appurtenant structures in relation to the earthfill. The 10-in. cast iron pipe shown running through the center of the plan was removed during the early construction period and replaced by a 12-in. line which was first laid on a bench on the left abutment and later hung from the tunnel crown.



100 ft. from the portal inside the tunnel, also 90 ft. beyond the portal and at the control house entrance.

Tunnel pipe anchors will be 3-ft. reinforced concrete walls closing a little more than half the tunnel area, but leaving room at the top of the tunnel for the temporary 12-in. service line at the inside anchor. The outside anchor is 6½ ft. wide, to permit a 15-deg. turn in the pipe toward the control house and will be 10 ft. long at the base by 5 ft. high. Inside the tunnel a concrete walkway 6 in. above the centerline elevation will be constructed to facilitate inspection.

The control house will be a 14 by 14-ft. reinforced concrete structure with framed roof and floor, the latter at about the mid elevation of the building. It will house a 30-in. wye and gate valve, 30 x 24-in. reducer and 24-in. gate valve. There will be, then, two service connections available at the control house, one 24-in. and one 30-in.

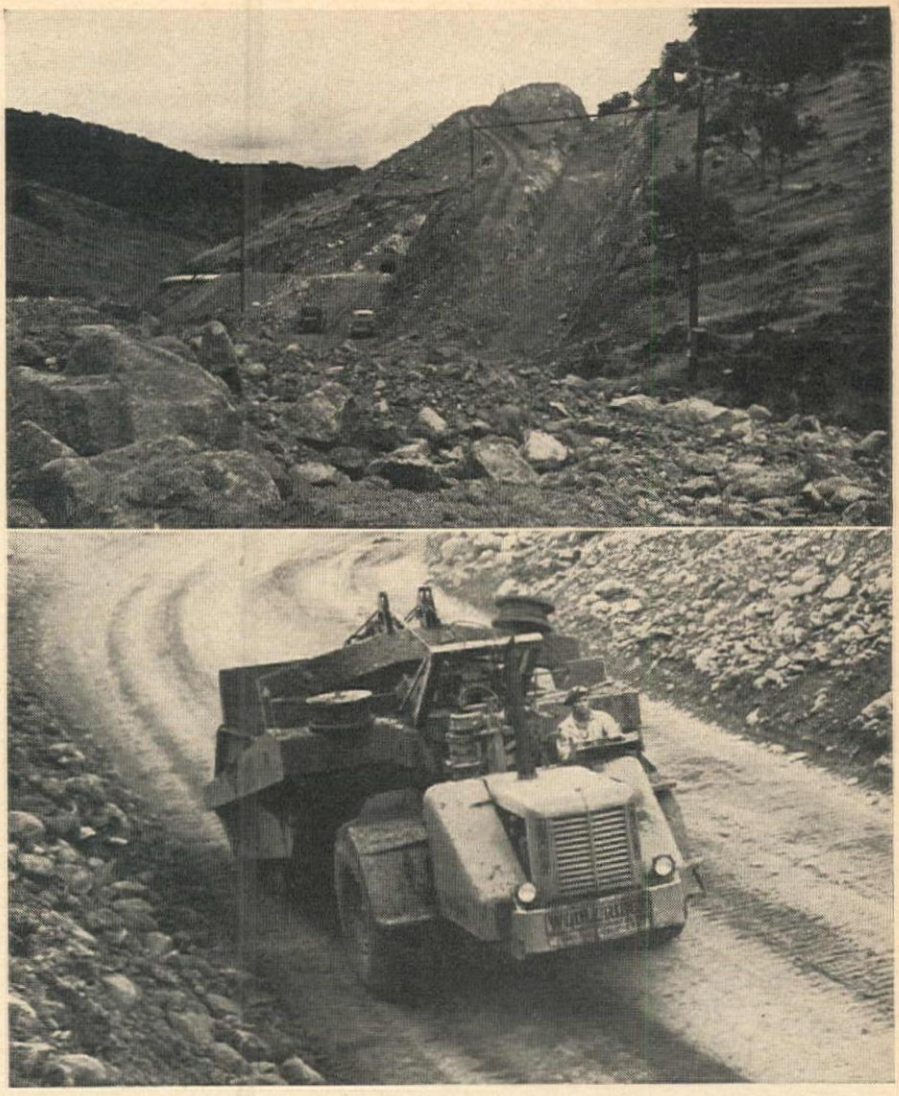
River diversion

Contract for construction of Rector Creek Dam under plan No. 1 was awarded to the joint venture firm of H. Earl Parker, Marysville, and N. M. Ball Sons, Berkeley, Calif., in December, 1945, on a low bid of $1,123,191. Work under the contract was begun January 7 of this year. The construction schedule set up by the contractor calls for completion of the work early in November, and to date work is fairly well on schedule, indicating that the completion date will be met without difficulty. One other contract is also in progress on the project, that of clearing the reservoir area which was let to the Barker Corp., Patterson, Calif., who bid $260 per ac. for the 76½ ac. in the reservoir area.

Installation of a temporary 12-in. water service line to permit removal of the existing 10-in. line which ran through the construction site was the first order of business. Although the temporary line will be carried through the tunnel during a large part of the construction period, in order to permit a start of excavation in the dam foundation before the tunnel was completed, the contractor first placed the temporary line on the left abutment along with a 48-in. corrugated iron pipe which was used for the early period of river diversion.

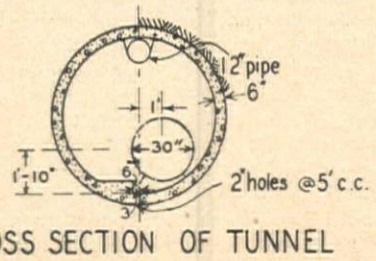
Starting about 1,000 ft. upstream from the axis of the dam, a dragline excavated a new channel for the creek along the left abutment as far as the excavation for the intake tower and tunnel intake portal. From here the 48-in. line carried the diversion to a point near the tunnel outlet portal where the water is returned to the old channel. Both the diversion pipe and the temporary water service line were laid on a bench bulldozed on the side hill. By the last week in May progress on the embankment had reached a point where it became necessary to remove these two lines.

The diversion flow was turned directly into the tunnel, which had been concrete lined by that time and the corrugated pipe dismantled. The temporary service line, in accordance with plans of the designers, was removed from the hillside bench and hung from the crown of the tunnel lining. Hangers of ¼ x 2-in. strap iron on 10-ft. centers were fastened to pairs of ⅜-in. anchor bolts placed 8 in. from both sides of the crown line. At the tunnel portal it was reconnected to the lower portion of the temporary line as originally installed, including a riser section about 12 ft. high which permitted the line to be carried overhead to higher ground and out of the way of heavy equipment excavating the spillway.



SPILLWAY CUT (top) through solid rock was excavated with tractors and scrapers, after shooting, working up grade to protect workers at the tunnel outlet portal. Roads from the borrow pits (bottom) are two lanes in width and one way in direction to permit both high and low speed equipment to move back and forth without interference.

INSIDE DIAMETER of the outlet tunnel is 6½ ft. Although the tunnel is eventually to be plugged at the inlet portal, the major portion of its length will remain open with inspection facilitated by construction of walk on right.

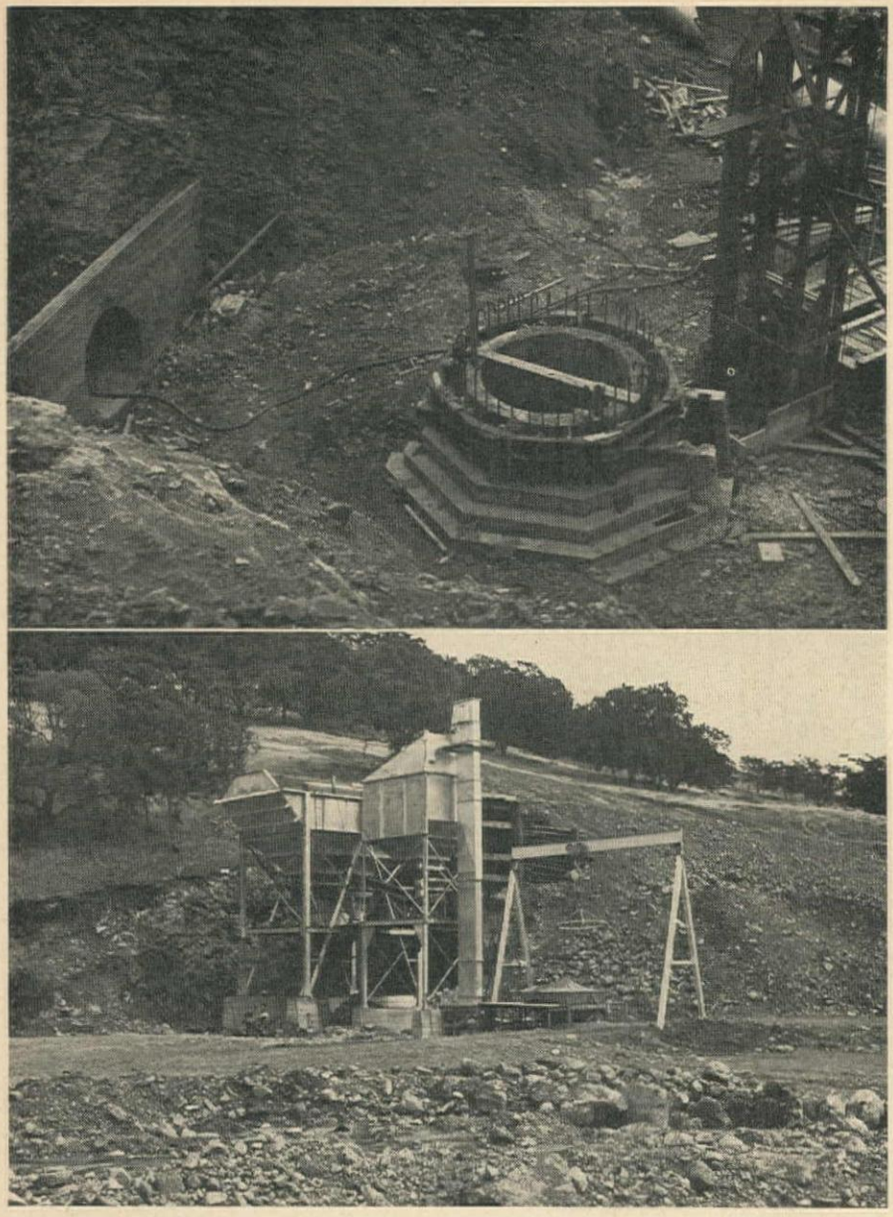


CROSS SECTION OF TUNNEL

Excavation

With three structures requiring major excavation, three separate methods were employed by the contractor. First to get under way was the tunnel, which was driven from both portals in 5-ft. rounds. At the lower heading the smallest size Gardner-Denver mucking machine was used advantageously in removing the loosened material, but at the inlet heading all excavation after shooting was performed by hand. The ground proving to be sufficiently stable, timbering was not required during the short time that the ground remained unsupported.

At the same time driving of the tunnel was in progress, excavation of the spillway was started. Close proximity (but 25 ft. increase in elevation) of the lower spillway channel site to the tunnel outlet portal required that some care be observed during the early spillway excavation to prevent accidents. In order that loose material might not be dropped onto the tunnel workers, all spillway excavation was carried on from the outlet end. This necessitated loading of the scrapers on a plus grade, having at times as much as a 30 per cent slope. Drilling and shooting was required for



TUNNEL INTAKE portal (top) and foundation of the 129-ft. intake tower are shown here with a portion of the concrete elevator tower visible. The concrete batching plant (bottom) is located down stream from the dam and on a hillside so that a direct gravity flow of materials is available with aggregates dumped from a high road above.

all of the spillway excavation except for the stripping, but actual movement of the material was done entirely by tractor and scraper, using a pusher tractor to load upgrade. The material, although being firm in place, exhibited a tendency to disintegrate upon excavation and did not present sharp edges, so that wear on the equipment was not as serious as might have been expected.

Excavation for the foundation of the dam was carried on largely by power shovel, the material above bedrock being cemented boulders. In fact the material was so well cemented that during the progress of the excavation it was not unusual to see a boulder break rather than the cemented material adhering to it. When a satisfactory foundation had been uncovered it was found to be so irregular in profile that the engineers determined that no cutoff trench would be required and this item was eliminated from the work.

As bedrock was uncovered a 20-ft. fault zone was discovered crossing the axis of the dam at about a 15-deg. angle. Traces of the fault were also discovered in the tunnel and spillway excavation. However, the fault is believed to be well sealed by the grout curtain placed underneath the axis of the dam and extended around the tunnel and under the spillway weir. Very little grout could be placed at depths of more than 50 ft., and no exceptional quantities of grout were taken at any level.

Embankment

During the latter part of May, embankment reached normal ground surface and was proceeding at the rate of 1½ to 2 ft. per day with material being placed in all three zones. Haul conditions were about average, there being borrow pits located both farther and nearer for future operations. Selected impervious material was being hauled about 4,800 ft. by highspeed, pneumatic-tired tractors and scrapers which were making four to five round trips per hour. Zone 2 material was being hauled about 2,500 ft. by tracked tractors and scrapers.

In order to eliminate traffic congestion which might be caused by the use of both low- and high-speed equipment the contractor was using two one-way, two-lane, approach roads from the borrow pits. High-speed machines used the right lane approaching the center of the embankment loaded, and leaving the right abutment empty while the low-speed equipment utilized the left lanes of both roads. This system avoided any possibility of the high-speed equipment losing time by being caught behind slow equipment with no chance to pass.

Moisture control was being exercised largely in the borrow pits by sprinkling the material before excavation and transportation to the embankment. Occasionally it was found necessary to add water during the compaction. Moisture content was being held between 13 and 15 per cent, preferably toward the lower limit. Tests indicated that compaction was generally running about 110 to 115 lb. per sq. in. in Zone 1.

Occasional rocks in the Zone 1 and 2 materials were requiring some hand picking of the embankment, but the contractor was planning to put a tractor drawn rake into operation to relieve this. For later operations in less choice borrow pits it was expected that select material might be passed through a grizzly or trammel screen to remove oversize before placing.

Concreting

For mixing the concrete required in various phases of the job, the contractor erected a small demountable steel batching plant on the hillside downstream from the spillway. The plant is so placed that materials can be dumped directly into the bins from a high level road above the plant, and mixed concrete dumped into trucks on a low-level road.

Placing of the tunnel lining was accomplished by the use of a Pumpcrete machine operated from one end of the tunnel. Wooden forms were employed for the lining, but for erection of the intake tower steel forms were used. The tower was poured from a scaffold using a self-tipping concrete bucket. Form work for the spillway lining had not begun late in May.

Organization

Design and construction of Rector Creek dam and appurtenant work is the responsibility of the California Division of Water Resources of which Edward Hyatt is chief engineer. T. B. Wadell is supervising hydraulic engineer in general charge of design and construction, and Medill Thiebaud is resident engineer on the project. Supervision of the excavation and embankment is under the direction of E. C. Marliave, engineer-geologist.

For the contractors, H. Earl Parker and N. M. Ball Sons, D. L. Ross is general superintendent.

Glen B. Bump, president and general manager of the Barker Corp., is personally supervising the clearing of the reservoir for that organization.

Land Leveling—New Contracting Field

A 60-ft. PACIFIC land plane operating on a final leveling job on a farm in Washington. This type of equipment is adjusted to cut or fill just a few tenths of a foot after heavy equipment has completed preliminary leveling.

Soil Conservation Service program of land leveling for Western farmers opens new and extensive field of operations for construction contractors, with many opportunities to utilize their heavy equipment during otherwise slack employment periods

By KARL O. KOHLER, JR.
Regional Engineer
Soil Conservation Service
Portland, Oregon

THE OPPORTUNITIES for construction contractors in the land-leveling program in Western United States have been greater since 1943 than at any other time in the history of American agriculture. It is estimated that during the past three years more land has been leveled with heavy equipment than had been leveled with all kinds of equipment during the previous 15 years.

There are a number of reasons for this large increase in land leveling activity, among which are:

1. Increased farm income that would allow land development.
2. Education of farmers to the benefits of land leveling and the practicability of using heavy equipment.
3. AAA payments.
4. Federal land development on new irrigation projects.
5. The reduction of wartime contracts, making equipment available for land development.
6. Soil Conservation Districts in action.

Efficient farming

Land leveling on irrigated farms has been carried on since the first acre of land was put under irrigation. A properly leveled field allows the most efficient distribution of the irrigation water. This should result in a saving in both irrigation labor and water and a maximum production of a more uniformly graded crop.

The first irrigation on newly-cleared land displays the need for leveling. The low spots are too wet and the high spots are too dry. The usual farm practice was for the farmer to lower the high spots and fill the low spots, working on the land in the fall after harvest, and in the spring before planting, with whatever equipment he had available on the farm. This procedure became an annual practice and required years of light earth moving before the fields were in the desired condition.

The advent of heavy earth moving and floating equipment and working to a surveyed datum, makes it feasible to level a field to the desired condition in one season. As soon as the field is leveled the farmer is able to farm it in the most efficient manner and usually floating between crops is the only additional smoothing required.

Extent of leveling

The degree of leveling is dependent upon the soil profile and the method of irrigation to be used. Many of the farms now being irrigated in the West have relatively shallow top soils. If these soils are removed, or if the remaining soil depth in the cuts is insufficient for a satisfactory root growth, production will be less than maximum. The degree of final leveling varies. Where borders or basin irrigation is to be used on slopes up to 3 per cent, the tolerance can be 0.1 ft. At the other extreme, on steeper slopes, the major differences in the land forms are corrected by general leveling for better down slope irrigation.

An accurate survey should be made, and the objective irrigation system should be planned before any irrigated field is to be leveled. The reasons are:

1. To prevent undesirable soil disturbance.
2. To make the leveled field a complementary part of the farm irrigation system.
3. To level the land in the most economical manner.

Equipment

The types of equipment used for land leveling can be classed in two categories, scraper type and float type. Scraper type equipment is used for the initial leveling to make the major cuts and fills and to make the long hauls. This includes all sizes and makes of carryall-type scrapers and bottomless scrapers.

The float type equipment is used to do the final leveling and to prepare the field for irrigation. It is usually adjusted to cut and fill a few tenths of a foot as it is pulled across the field. This is necessary to smooth out the irregularities left by the heavy earth-moving equipment. This equipment is made in various sizes that can be pulled with tractors ranging from 10 to 90 hp.

Most contracting done today on farm leveling in the western states is on an hourly rental basis. The fields are staked. Equipment operators may be given a colored cut-fill map of the field to use in conjunction with the stakes, or they may have to depend entirely on survey stakes.

Where the work is done on a yardage basis the leveling is divided into three classes for bidding, based on the yardage to be moved per acre. The three classifications of light, medium and heavy leveling are not standardized, but can be approximated as:

Light Leveling, 75-150 cu. yd. per ac.

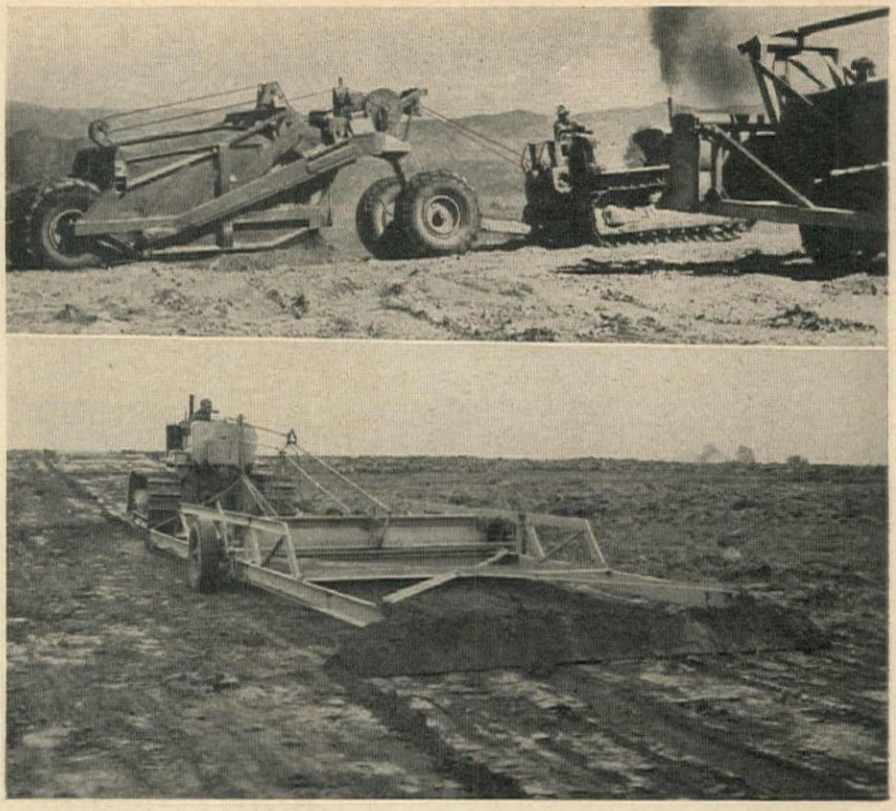
Medium Leveling, 150-350 cu. yd. per ac.

Heavy Leveling, 350-up cu. yd. per ac.

Planning for leveling

The soil conservation district program has been one of the great incentives for land leveling in the Western United States. Each of the 17 western states has a state law enabling farmers to organize soil conservation districts for the conservation of their soil and water resources. These farmer organizations arrange for assistance from the Department of Agriculture and other agencies for carrying on their operations. Under this arrangement the Soil Conservation Service assigns to districts, engineers, agronomists and other technicians to work for the farmers on their individual farm and farmer group conservation problems. Leveling is a major land development practice in soil conservation districts that include irrigated lands.

Planning of land development on a large number of farms in soil conservation districts allows contractors to line up a succession of jobs during the land-leveling season. Leveling jobs vary from fields of five acres in size to farm units having several hundred acres to be leveled. At the present time a considerable number of contractors are working in soil conservation districts in the western states on irrigation and other work.



LAND LEVELING contractors in Nevada using two different types of equipment. At top, a Terra-Clipper unit is loaded on preliminary cutting, by aid of puller and pusher tractors. Below, an Eversman land leveler is pulled by a medium tractor.

Many contractors operate only one or two units of earth-moving equipment, while others employ four or five large earth-moving units for seasonal land leveling. In addition to land leveling, the contractors are working on drainage ditches, irrigation structures, gully stabilization structures, and irrigation and drainage system rehabilitations. In some districts private engineers are being used extensively to assist with this work.

The individual jobs as a whole are not large in size and may be scattered over quite a large area. The work must be organized in advance to keep the equipment operating on a continuous basis.

Contractors interested in this type of work should consult with county agricultural agents and county AAA committees. Where soil conservation districts have been formed contractors can obtain information about the work from the governing bodies of the districts.

At the present time, 103 of the 122 soil conservation districts in the five western states are doing irrigation and drainage work as part of the conservation programs. In the 17 western states that have irrigated agriculture, farmers have formed a total of 739 soil conservation districts. Approximately 375 of these districts have irrigation or drainage problems.

A LARGE carryall scraper is pulled by a heavy tractor on leveling project in Oregon. Water in foreground emphasizes one need for leveling program—farm drainage.

San Diego Tunneling Methods

Construction methods, equipment, and progress on the seven tunnels of the San Diego connection to the Colorado River aqueduct are reported in full detail—6-ft. diameter limits choice of equipment and methods

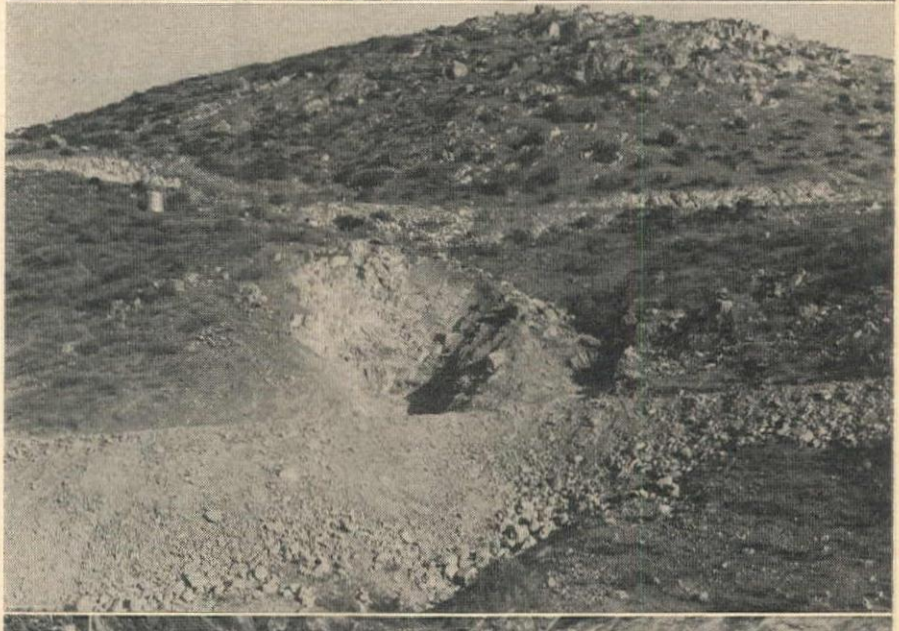
By H. J. DICKINSON
Division Engineer, U. S. Navy
Escondido, California

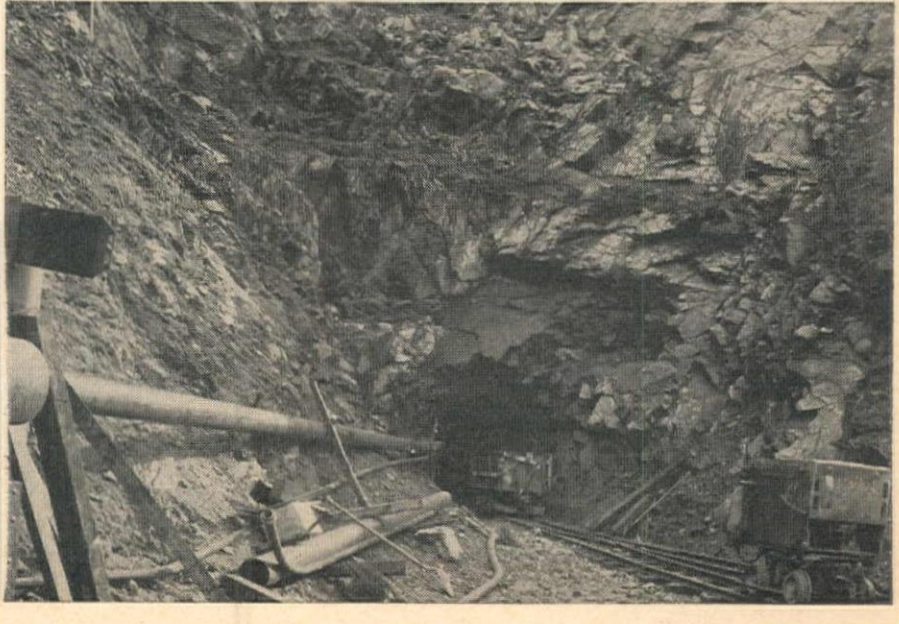
CONSTRUCTION PROGRESS on the pipe and reservoir sections of the $17,500,000 aqueduct to relieve the overburdened water resources of San Diego city and metropolitan area was reported in the April issue of *Western Construction News*. Work at that time was just beginning on the seven tunnels included in the project, and the first report on progress of that work is presented here.

The aqueduct is being financed by the Navy, but costs are to be repaid by the San Diego County Water Authority over some thirty years. The project will receive water at the outlet portal of the San Jacinto tunnel of the Metropolitan Water District, and will conduct it 71.3 mi. to San Vicente reservoir, one of the main storage reservoirs of the City of San Diego. Included are a diversion structure, a regulatory reservoir, seven tunnels, three large siphons and about 70 mi. of reinforced concrete pipe.

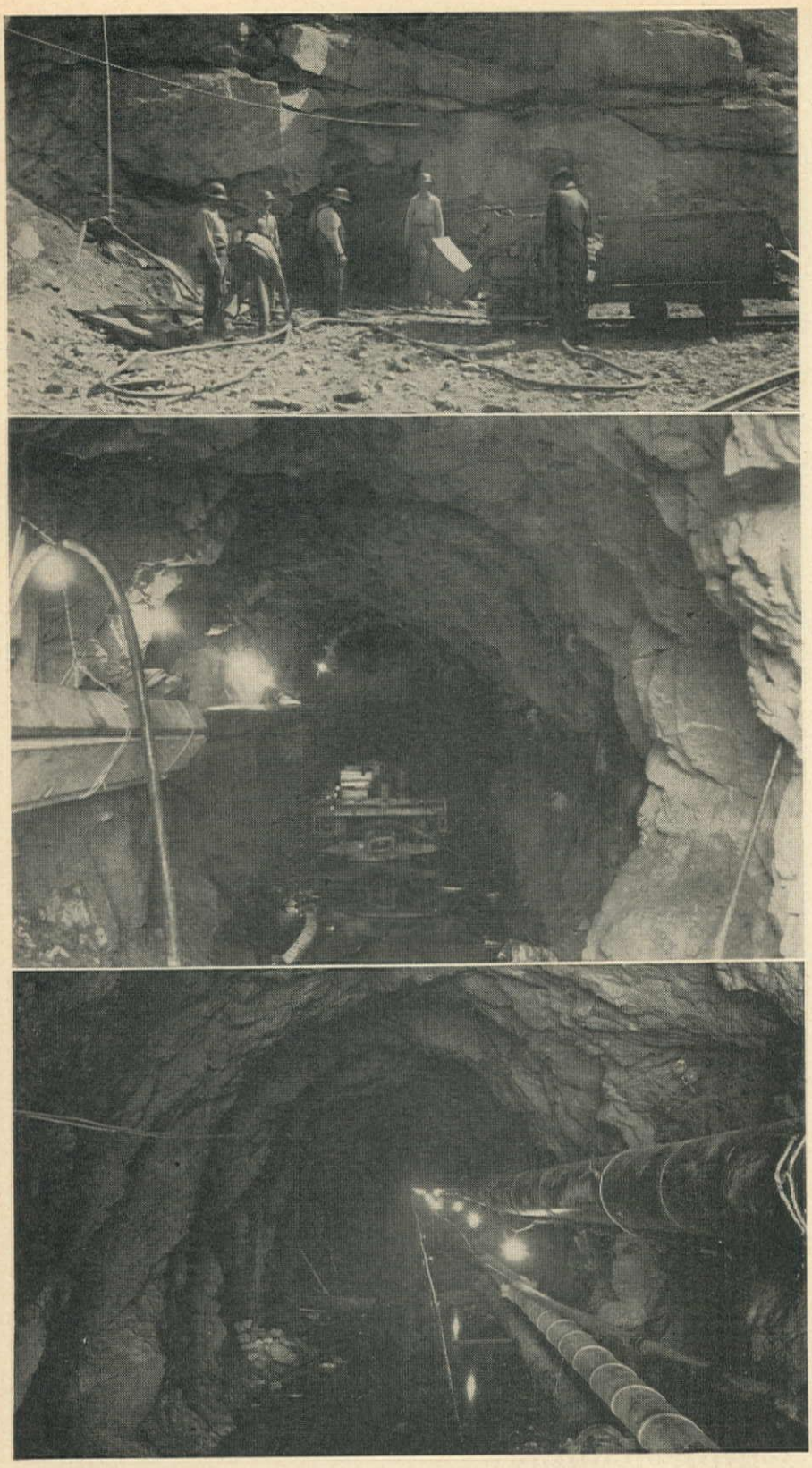
Tunnel sections

Construction of San Vicente (2,400 ft. long), Fire Hill (5,700 ft. long), and Poway (3,180 ft. long) tunnels, is included in a contract awarded to Grafe-Callahan Construction Co. and Gunther Shirley Co. of Los Angeles. The contract for the other four tunnels, Rainbow (4,700 ft.), Lilac (500 ft.), Red





PORTALS of three of the seven tunnels shown in the four pictures on this page indicate the type of materials encountered and the equipment used. Top, Rainbow; center and bottom right, San Vicente; and below, Red Mountain, all inlet portals.



AIR-OPERATED mucking machine (top) and muck car outside the Red Mountain tunnel. Unusually hard material (center) encountered in San Vicente tunnel. Seepage flow (bottom) in Red Mountain tunnel has not exceeded 20 gallons per minute.

Mountain (3,000 ft.), and Oat Hills (3,590 ft.) has been awarded to S. A. Healy Co. of White Plains, N. Y., who has sub-contracted the work to J. S. Barrett of Newport Beach, Calif.

The aggregate length of the seven tunnels to be constructed on the San Diego Aqueduct is 4.51 mi. The tunnels are designed for a capacity of 100 m.g.d., which is the quantity of Colorado River water allocated to the City of San Diego by the river compact. The inside diameter of the concreted horseshoe tunnel section is 6 ft. In the unsupported tunnel section the pay line for excavation ("B" Line) is seven inches outside the inner concrete surface. In the supported section the "B" line conforms to the outer perimeter of the tunnel supports.

The steel-ribs for tunnel supports, each weighing 241 lb., are fabricated from 13.8-lb., 4 in. "H" beams. The quantity of "B" line excavation amounts to only 1.57 cu. yd. per lin. ft. for the unsupported section and 1.67 cu. yd. for the supported section.

Because of the unusually small size of the tunnels, the contractors are limited in the type of equipment and methods which can be efficiently employed. The "drill jumbo" used by Grafe-Callahan consists of two 4-in. diameter vertical columns mounted on a flat car. The columns are fitted with air jacks at the bottom for wedging them tightly against the roof of the tunnel. Each of three Gardner-Denver drills, type D99, is mounted on a short horizontal arm which is clamped to one of the two columns. The drills may be moved horizontally on the arm, which in turn may be raised or lowered.

The drill carriage being used by J. S. Barrett on the other four tunnels is specially designed and differs from that employed by Grafe-Callahan. Two radial arms, on each of which is mounted a drifter drill, extend forward from the front end of a flat car. The arms are hydraulically operated and pivot both vertically and horizontally about their bases. The machines are moved laterally by hand and are held in the desired position by a special locking device. The drill car is anchored in position by a 4-in. diameter vertical column mounted in the center of the car and equipped with a hydraulic jack at the bottom for wedging it tightly against the roof of the tunnel. On both contracts the detachable bits, drill rods, and extra drill machines are carried to the heading in a separate flat car which is conveniently arranged with compartments and racks for the different sizes. The machines used on the J. S. Barrett contract are automatic feed, drifter drills, type D99 Gardner-Denver and Sullivan No. 350.

Muck handling

At San Vicente and Fire Hill tunnels the muck is loaded with a Gardner-Denver air-operated mucking machine which is equipped with a small dipper at the front end. The dipper is maneuvered into the muck pile by moving the whole machine forward. The muck is cast back over the top of the machine into a hopper which empties onto a long conveyor belt mounted on a gantry framework. The gantry conveyor, which rides on a 48-in. gauge track, has a length of 100 ft. and provides enough clearance to permit a full train of ten cars to be pushed underneath. Side dump cars, having a capacity of 2½ cu. yd., are loaded one at a time by pulling them into the loading position under the discharging end of the conveyor belt. The cars are pulled by a 5-ton locomotive. The 24-in. gauge track of 30-lb. rails is laid on practically zero grade between the heading and the dumping area near the portal.

At Rainbow and Red Mountain tunnels a similar air-operated mucking machine, manufactured by Eimco, is used

for loading the broken rock directly into the muck cars. A car-changing device, commonly known among the tunnel workers as a "cherry picker," has been devised which elevates an empty car above the track and places it to one side of the tunnel until the loaded train passes. The "cherry picker" consists of an air hoist supported by a 4-in. vertical column which is tightly wedged in place, close to the side of the tunnel. The air hoist is mounted on a horizontally swinging arm, one end of which is attached to the column. The arm is swung out over the car, cables are hooked on each end, and by operating the air hoist, the car is elevated above the track and pushed by hand to the side of the tunnel.

A seven-car train is brought into the tunnel with one empty car ahead of the locomotive. This car is pushed directly to the heading and is coupled to the mucking machine. The locomotive then pushes the other cars back from the heading, stopping the train so that the end car is directly opposite the "cherry picker," usually located about 150 ft. from the heading. This end car is placed to one side of the tunnel. The train returns to the heading and pulls back the loaded muck car beyond the "cherry picker." The empty car is then swung back on the track and is pushed up to the mucker. This process is continued until the entire train of cars is loaded. A battery locomotive is used to pull the tipover type muck cars, which have a capacity of one cubic yard. The cars being only 32 in. in overall width, it is possible to use a passing track which permits two trains to be in the tunnel at the same time. The 24-in. gauge track is delivered to the worksite assembled in sixteen-foot sections with metal ties attached.

Power and air

The electric power required for charging the locomotive batteries, for operating welding and other equipment, and for lights and charging blasts is developed at the portal by Diesel-driven generators. The compressed air is supplied by Diesel-operated compressors capable of producing from 350 to 500 c.f.m. at 105-lb. pressure. To insure a constant pressure and to provide a means for removing excessive moisture from the air lines, large receiving tanks have been installed.

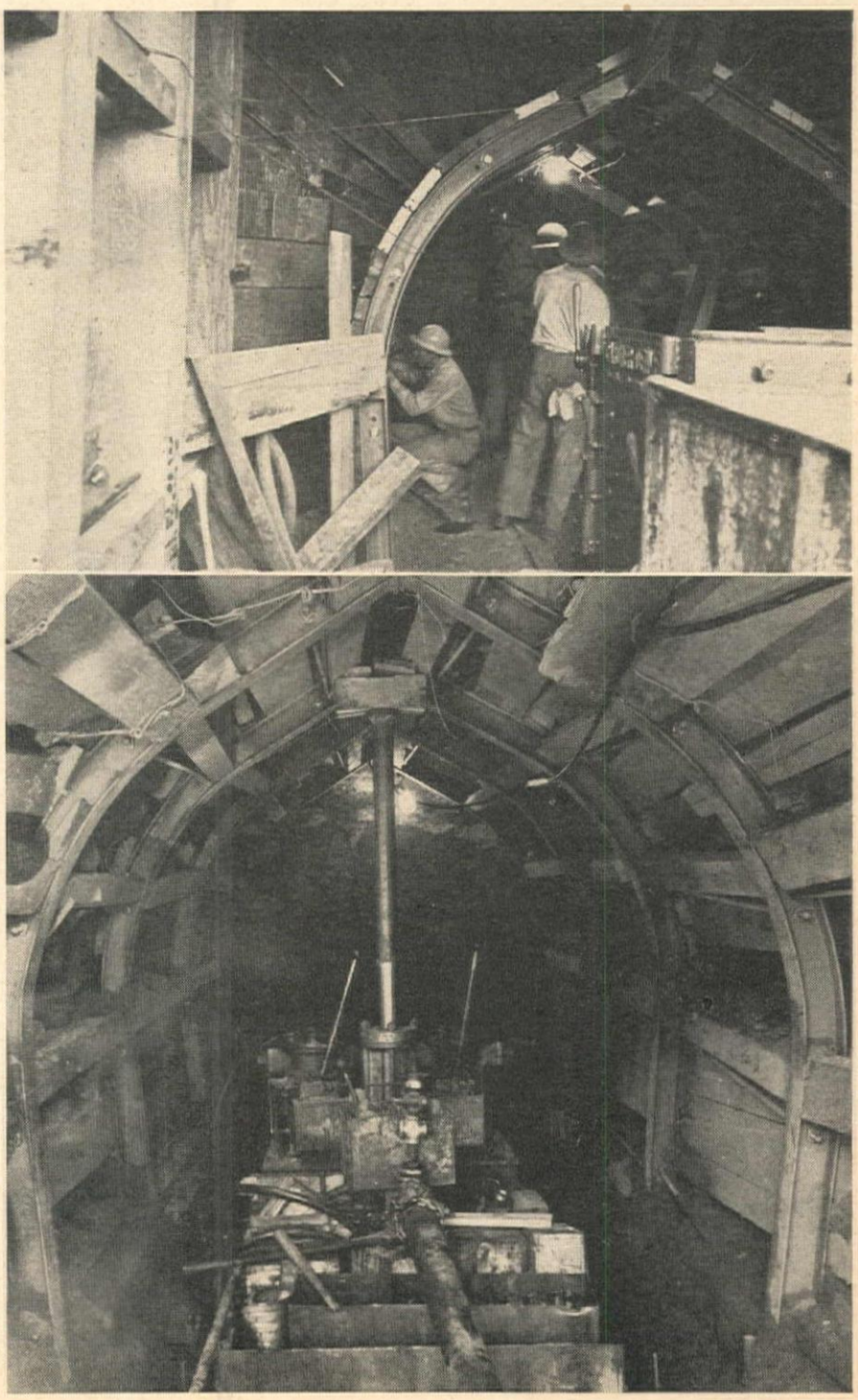
All the tunnels are being ventilated by blowers driven by either gasoline or electric motors. The fresh air is blown into the heading at approximately 2,000 cu. ft. per min. through 10-in. steel pipes. Following each blast the direction of the air flow is reversed for approximately 20 min. to remove the fumes and smoke from the heading.

The detachable drill bits, ranging in size from 2⅛ to 1⅞ in., are resharpened by the manufacturers and in most cases it is possible to resharpen a bit three times without affecting the gauge beyond use.

San Vicente

A portal open cut was completed and the excavation of the bore of the 2,400-ft. San Vicente Tunnel was begun on December 12, 1945. Progress in driving this tunnel has been slow because of the time required to drill the unusually hard rock. It is necessary to change drill bits approximately every 12 in. of hole drilled. After experimenting with several different drill patterns and cuts, the contractor found that a modified 5-hole "V" cut accomplished the best results in the rock thus far encountered. For each round an average of 27 holes are drilled to a depth of 6 ft. and loaded with approximately 115 lb. of 60% gelatin dynamite for blasting. No stemming is being done. The blasts are detonated by No. 6 strength caps ranging from instantaneous to No. 6 delay and are fired by 120 volts.

As of May 18, 1946, 1,797 ft. of the San Vicente Tunnel had been excavated. The rock encountered has been a granitic diorite of fine texture and extreme hardness and requires no tunnel supports. There has been no seepage. During a representative period of 50 shifts, the tunnel was advanced 277 ft., for an average of 5.5 ft. per round. The average drilling time during this period was 3 hr., 20 min., and the mucking time averaged 1 hr., 45 min. The heading crew normally consists of 3 miners, 3 chuck tenders, 1



TIMBERING CREW (top) placing forwards near the east portal of Fire Hill tunnel. Hydraulic jack (bottom) on drill jumbo wedged against tunnel roof just inside the portal of Red Mountain tunnel.

steel nipper, and a shifter. Tunneling operations are in progress during three eight-hour shifts per day and it is expected that the excavation of the San Vicente Tunnel will be completed during July, 1946.

Fire Hill

The construction of the 5,700-ft. Fire Hill Tunnel, which is the longest on the project, was started at the outlet portal on November 16, 1945. On February 5, 1945, the portal excavation was completed and the driving of the tunnel was begun. The material encountered in the portal excavation was a partially cemented gravel with strata of sandy clay. Steel supports were placed on 2½-ft. centers in the first 25 ft. of the tunnel and this section was solidly lagged with 2-in. planking. From this point steel supports were set on 5-ft. centers with spaced lagging in the crown only. As of May 18, 1946, 2,003 ft. of the Fire Hill Tunnel had been excavated. At present the supports are being installed six feet apart with very little lagging. The material encountered is a formation locally called "Poway Conglomerate" and consists of cemented gravel and rounded boulders up to 18 in. in diameter with numerous sandy clay seams. There is no seepage, the material being quite dry.

In preparation for blasting, approximately twelve holes are drilled to a depth of seven feet, the holes being placed to shape the arch of the tunnel and to break up the material. Approximately 60 lb. of 60% gelatin dynamite is used for each round. The steel tunnel supports are installed by the heading crews. The tunnel is supported to within approximately forty feet of the face at all times. During a representative period of 50 shifts Fire Hill Tunnel was advanced 325 ft., for an average of 6.5 ft. per round. The average drilling time this period was 2 hr. and the mucking time averaged 1 hr. 50 min. The heading crew normally consists of three miners, three chuck tenders, one steel nipper, and a shift boss. Tunneling operations are in progress during three eight-hour shifts per day. The contractor is contemplating driving 2,000 ft. of Fire Hill Tunnel from the inlet portal, and in all probability the excavation will be completed during the month of November, 1946.

Poway

On April 20, 1946, the excavation of the open cut at the outlet portal of the Poway Tunnel was begun, but as yet has not been completed. To provide a flat grade approach to the tunnel portal the contractor is excavating approximately 1,000 ft. of the pipe line trench adjacent to the portal cut. The material encountered is mostly a decomposed granite with some cemented gravel. The contractor plans to excavate the 3,950-ft. Poway Tunnel entirely from the outlet portal.

The field office and equipment yard of Grafe-Callahan Construction Co. and Gunther & Shirley Co. are located in Slaughterhouse Canyon, four miles north of Lakeside, near the Ramona Highway. To facilitate the transportation of the construction materials and the workmen, an access road was constructed over the Fire Hill Mountain to the inlet portal of this tunnel and continuing to the outlet portal of Poway Tunnel, which is approximately 2½ mi. from the contractor's field office.

Rainbow

The construction of Rainbow Tunnel was begun at the inlet portal on December 1, 1945. To gain access to the portal on a flat grade 600 lin. ft. of open cut has been excavated. Considerable hard, blocky granite requiring heavy blasting was encountered in the open cut. No supports are required at the portal. The excavation of the bore of this 4,700 ft. tunnel was begun on January 30, 1946. As of May 18, 1946, 1,704 ft. had been excavated. The material encountered has varied from a badly decomposed granodiorite to a hard granite gneiss. Approximately 400 ft. of the tunnel thus far excavated requires tunnel supports. Some seepage has been encountered but the flow from the tunnel has never exceeded 20 gal. per min.

After varying the drill patterns, types of cuts, and depths of holes, the contractor decided that the most satisfactory results could be obtained by drilling the common "burn cut." Twenty-five holes are drilled to a depth of six feet for each round. The blasts are detonated by No. 6 strength blasting caps, ranging from instantaneous to number six delay. Approximately 115 lb. of 60% gelatin dynamite are required for the round. During a representative period of 50 shifts, the tunnel was advanced 298 ft., with an average of 5.9 ft. per round. The average drilling time during this period was 3 hr. and the mucking time has averaged 2 hr. At the present rate of progress the excavation of the Rainbow Tunnel will be completed during the month of December, 1946.

Red Mountain

Red Mountain tunnel is being excavated from two access portals located at the extremities of a 54-ft. cut-and-cover section which is approximately midway between the portals. Very little open cut excavation was required, the tunnel grade being only 15 ft. below the ground surface at this point. When tunnel excavation was begun on February 1, 1946, separate crews were used for the drilling and mucking operations and work was done during two eight-hour shifts per day. After each heading had advanced approximately 300 ft. from the access portals this system was discontinued and one crew at each heading completed all operations. At this time three eight-hour shifts per day were begun. As of May 18, 1946, a total of 1,646 ft. had been excavated. The material encountered thus far has been a comparatively hard, seamy granite gneiss, requiring no tunnel supports except near the portals. No seepage has been encountered at either heading. During a representative period of 50 shifts a total of 245 ft. of tunnel excavation was completed, with an average of 4.9 ft. per round. The average drilling time during this period was 2 hr., 20 min., and the mucking time averaged 1 hr., 35 min. It is expected that the excavation of Red Mountain Tunnel will be completed during September, 1946.

Work has not yet begun on Lilac and Oat Hills Tunnels.

Annexation application

The contract for construction of the San Diego aqueduct was undertaken by the Navy early in 1945. With the termination of the war it was announced that they would not proceed with construction but San Diego municipal officials and state authorities urged that the matter be reconsidered. It was finally agreed that the Navy would continue with construction and that the city should refund the cost over a 30-year period.

The source of the water to be conveyed to San Diego is the Colorado River. It will be carried through the existing aqueduct of the Metropolitan Water District of Southern California as far as the west portal of their San Jacinto tunnel. In order for the San Diego area to make use of the Metropolitan facilities it is necessary to annex to the Metropolitan District. An application has now been made to the Metropolitan Water District and negotiations are currently under way.

The essential requirement for annexation to the District is the payment of an amount corresponding to that which it would have paid had it been one of the original member cities of the Metropolitan District. In return the Metropolitan District will give credit to San Diego for half of the cost of building the new San Diego aqueduct. On the basis of the available information the aggregate amount of back taxes which would be payable by the San Diego applicants would amount to approximately $13,000,000 and would be payable in equal annual installments over a period of 30 years; the annual payment would approximate $433,000.

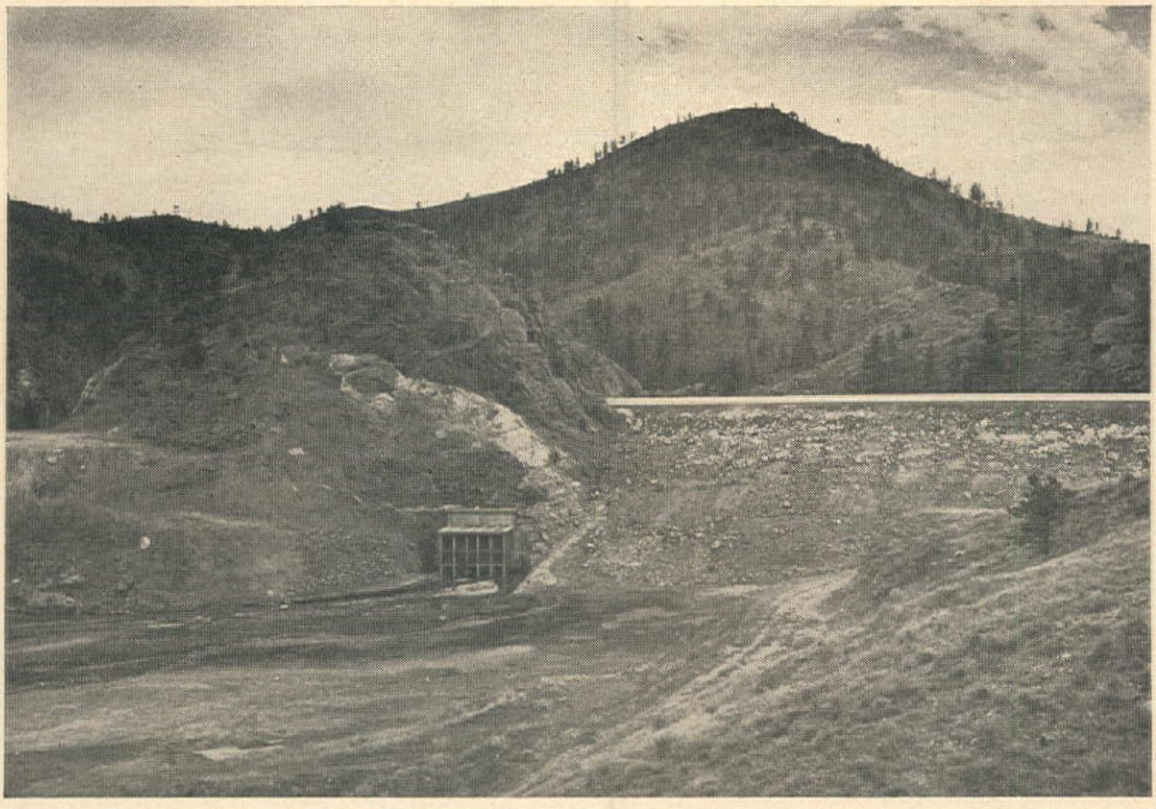
In assuming half of the cost of the new aqueduct the Metropolitan District agrees to pay to San Diego $250,000 annually until the entire amount is paid, these payments to be credited against the former sums. This arrangement will not be valid until approved by the voters of the City of San Diego and the San Diego County Water Authority.

Organization

Administration of the construction is under Capt. Alden K. Fogg, Public Works Officer of the Eleventh Naval District. He is assisted by Comdr. R. D. Thorson, Resident Officer-in-Charge of construction, and Lieut. D. A. Gray, Division Resident-Officer-in-Charge. H. J. Dickinson is division engineer and A. Bock, senior inspector.

Charles Clapp, general superintendent for the Grafe-Callahan Construction Co. and Gunther & Shirley Co., is assisted by Paul Guinn and Milan Roych, tunnel superintendents. Jack Tully, general superintendent on the tunnels being constructed by J. S. Barrett, is assisted by Sam Ross and R. B. Wickisier, tunnel superintendents.

Drouth Insurance—
Greeley Completes New Water System



MILTON SEAMAN DAM, a 112-ft. earth and rock fill structure on the north fork of Cache la Poudre River, is the key unit of a new water distribution system to provide Greeley, Colo., and vicinity with an 8,000,000-gal. per day domestic supply.

Effect of wide variations in river flow will be minimized by operation of storage reservoir—City will be supplied through a 38-mi. steel pipe line, terminal reservoirs and treatment plant

A RECENTLY COMPLETED earth and rock fill dam on the north fork of the Cache la Poudre river, two sedimentation basins, a 38-mi. steel pipeline and three terminal reservoirs, as well as a new water distribution system, have made the city of Greeley, Colo., and surrounding communities, about the most secure, from the standpoint of water supply, of any Western city of comparable size.

Although average precipitation in the area, as measured over a 54-year period, is only 12.97 in. annually, the storage and utilization program adopted by the city of Greeley has resulted in a maximum daily available supply of 8,000,000 gal. daily from the Poudre River source alone.

The original source of water for the city, the Poudre River, is subject to wide variations in flow, and has on occasion caused serious shortage during drought periods. The flow is as high as 5,000 cu. ft. per sec. in the spring and early summer, and sometimes drops to 10 cu. ft. per sec. in the winter months. The early waterworks were an intake, one sedimentation basin, two sand filters, and a wood stave pipeline 42 mi. long. Even though this system was increased periodically, it was still inadequate for the modern city's needs and the expansion program was undertaken in 1940.

Milton Seaman dam

The Milton Seaman dam, newly-constructed key unit, is an earth and rock fill structure 112 ft. high above the foundation, across a narrow gateway in the streambed. About 160,000 cu. yd. of material was required to construct the main embankment. Of this 65,000 cu. yd. is of impervious clay core, 105 ft. thick at the base and tapering, on a slope of 1½:1, to 10 ft. at the crest. Blanketing this both upstream and downstream, are zones of semi-impervious material, about 95,000 cu. yd. of which was used. Outside the semi-pervious zone is a layer of pervious rock, varying from 3 ft. in thickness at the top to 10 ft. at the downstream toe, and 25 ft. at the upstream toe. The final upstream slope of the embankment is 3:1 and that on the downstream face is 2:1.

The impervious and semi-pervious sections were placed in 8-in. layers of carefully selected material and after being moistened, were compacted by sheepsfoot roller. At the junctures with the canyon walls, compaction was by air hammers, to secure a tight contact.

A core wall trench 5 ft. deep and 20 ft. wide was cut in the stream bed and canyon walls for the entire contact perimeter of the fill, and the rolled clay was compacted tightly in this trench as a key wall.

Thickness of the dam at the crest is 26 ft., which allows a 12-ft. freeboard and a 4-ft. concrete parapet wall. Storage available behind the new structure is over 6,000 ac. ft. Drainage area of the north fork of the Poudre River, above the dam, is slightly over 200 sq. mi.

An overflow spillway was constructed over a saddle in the rock shoulder on

the left abutment. A maximum rock cut of 73 ft. was required, the material being subsequently used as riprap and rock facing on the dam. Total spillway excavation, practically all rock, was about 50,000 cu. yd.

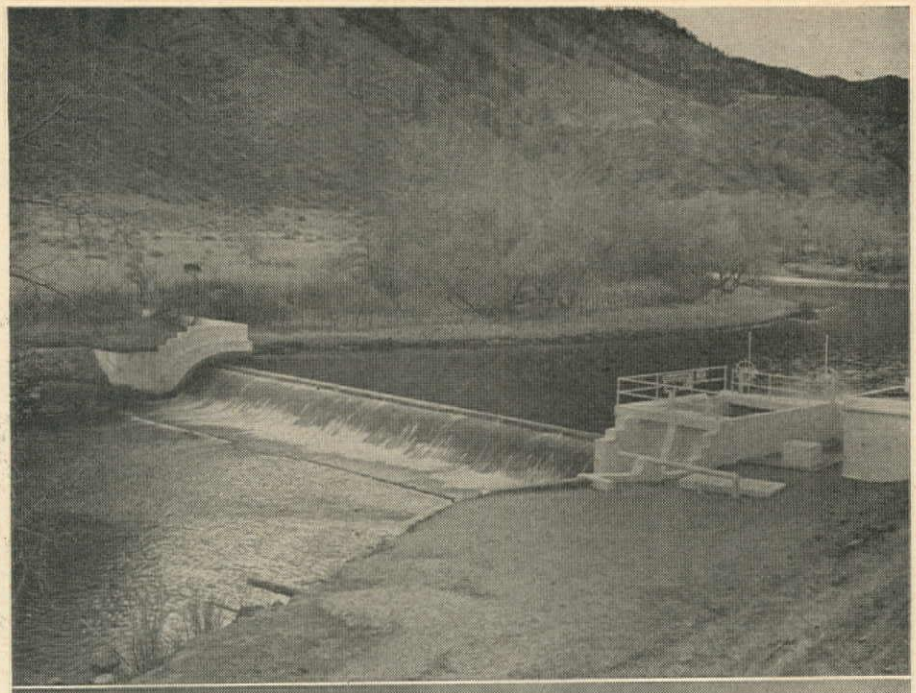
The spillway is 100 ft. wide and 308 ft. long, and at a flow depth of 8 ft. will discharge 18,000 cu. ft. per sec.

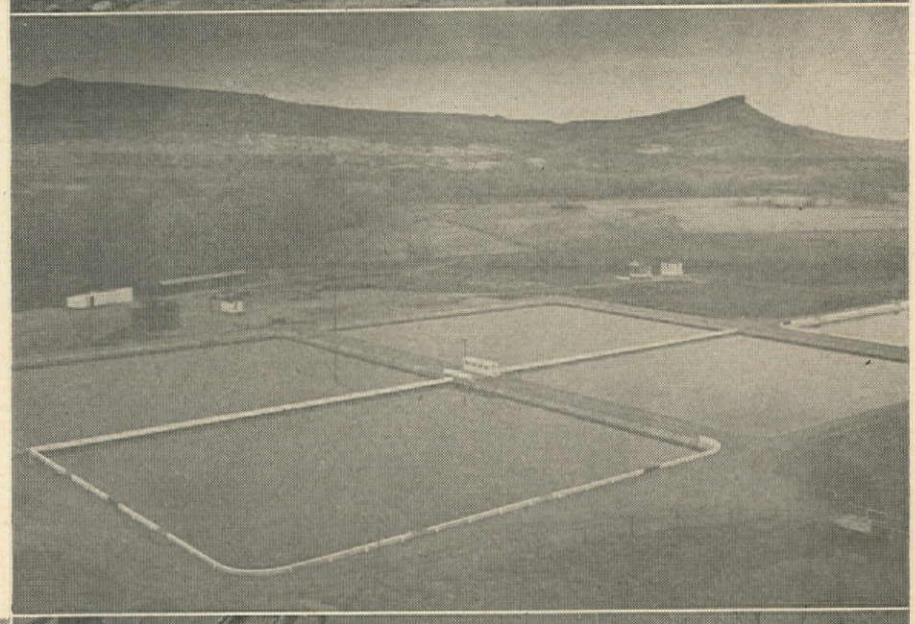
Outlets

To handle diversion of the river during construction, an 18-ft. tunnel was driven through the rock shoulder of the left abutment. The horseshoe-shaped bore was not lined, being in solid, hard rock for its entire length. Following completion of the dam, gates and trash racks were installed at the upstream portal of the tunnel, and it now serves as the controlled outlet for the reservoir.

In constructing the gates, it was necessary to widen the original tunnel mouth and scale some broken material from the face of the rock to make a solid bond. This rock was piled as a temporary cofferdam during the first pouring operations.

Behind this cofferdam, the footings for the gates and trash rack pillars were poured with a Pumpcrete machine. The structures were later completed in two more lifts. There are five gate openings, the center one being three feet square, the two on each side measuring 4 x 6 ft. in area. The gates are of close-grained cast iron, moving in gate guides and





DIVERSION of the city supply (top) is made at a concrete weir 5 mi. below Seaman dam. From the dam to the two 5-ac. sedimentation basins (center) water is carried 1½ mi. through a double 20-in. steel pipe. After settling and sand filtering the water enters a 24-in. steel pipe line (below) to flow 38 mi. to the municipal storage reservoirs southwest of the city of Greeley.

frames of phosphor bronze and operated by steel gate stems.

The guides are set in concrete pilasters each 2½ ft. wide and 21 ft. high, and running into the tunnel opening variously from 15 to 19 ft. These pilasters also support the oil cylinders by which the gates are hydraulically operated.

The trash racks which protect the gates from debris are composed of steel bars set in the concrete at the intake end of the gate structure, and strengthened with horizontal concrete connecting sections on three levels.

The control house for the outlet gates is located on the downstream face of the dam, and houses the main oil storage tank and two gasoline-operated pumps which serve to actuate the gates. In addition two emergency manual pumps are available. Oil lines between the main oil storage reservoir and the gate oil cylinders are suspended from the roof of the tunnel by anchor bolts.

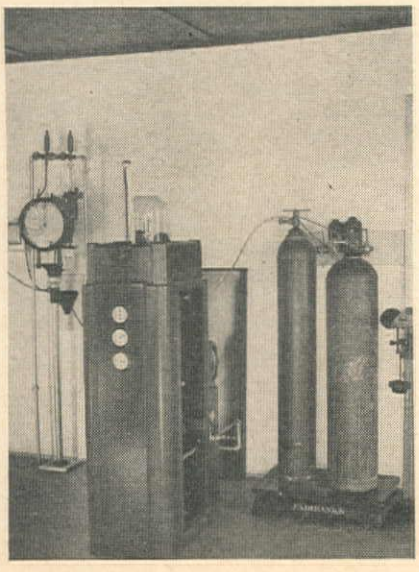
Lower works

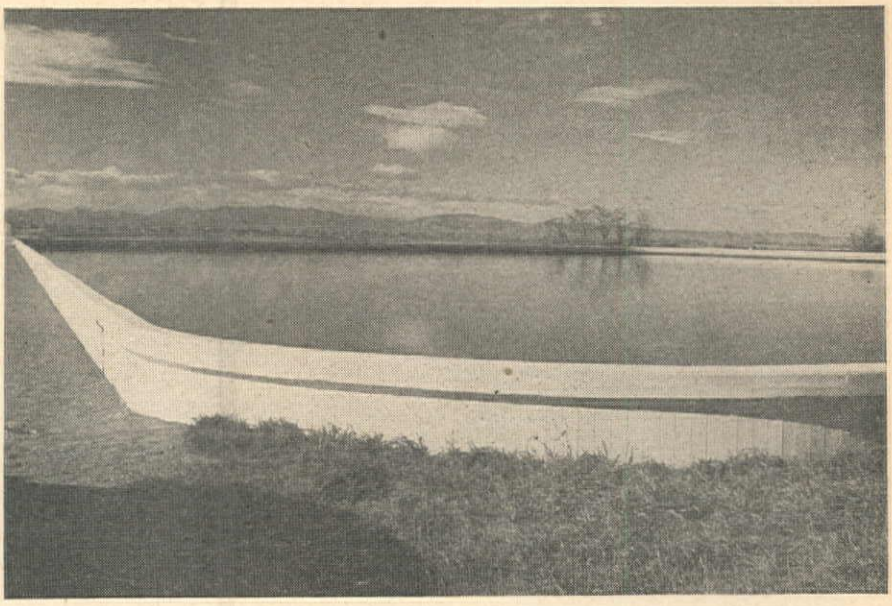
A short distance below Seaman dam, the controlled outflow joins the main stem of the Poudre River. About 5 mi. below the dam, the combined stream is caused to flow over a low concrete weir-type diversion structure, 110 ft. wide, on the left abutment of which is the intake for the Greeley water system.

From the intake, the water flows through 1½ mi. of double 20-in. steel pipeline to two sedimentation basins. The area of these pools is approximately 10 ac. and they are over 18 ft. in depth. Total storage in these basins is 100 m.g. of water, roughly a 10-day supply for the city of Greeley and the system's other customers, which include the towns of Windsor and Timnath, farms, sugar beet and other refining plants, two railroads and six independent pipeline companies.

The water is discharged from the settling basins into six slow sand filters, each 1¼ ac. in area. From there it enters a newly-constructed 24-in. steel pipeline, enamel coated inside, which conveys it for 38 mi. to the municipal storage reservoirs.

CHLORINATION of the city water supply takes place between the terminal reservoirs and the distribution mains where a control station and automatically operated chlorinators are situated.





FINAL STORAGE of the city's water takes place in three concrete-lined earth embankment reservoirs of 7,500,000-gal. capacity each. The reservoirs are not sufficiently high to maintain a head in the distribution mains, pumps being used for this purpose.

The pipe was delivered from the fabricator in 40-ft. lengths, and was field-welded into 120-ft. lengths, each weighing over 7,000 lb. The 120-ft. lengths are then joined by bolted collars.

Ditches for the 24-in. line were dug by dragline and the pipe was lifted into place by slings on a truck-mounted crane. Backfilling of trenches was done by crawler tractor and bulldozer. Because the line traverses valuable farm land, pipe-laying was carried out only in the spring and fall, so as not to interfere with agricultural activities.

The line terminates in three concrete-lined earth embankment reservoirs located 3 mi. southwest of Greeley, each with a capacity of 7½ m.g. of water, and from these the distribution mains radiate through the city, passing first through a control station and automatic chlorinators. Inasmuch as the city is located on practically flat land, head in the distribution mains is maintained by electrically-driven centrifugal pumps.

Organization

The construction of Seaman dam and the various distribution units was under direction of R. E. Seaman, water superintendent for the city of Greeley. M. C. Hinderlider, State Engineer of Colorado, acted as a consultant on the project, and L. L. Stimson, County Engineer of Weld County, assisted in site studies. John Vanderwilt, geologist of Denver, made necessary studies of foundation and aggregate materials.

Construction of the dam was begun in 1940, using mostly WPA labor, with some skilled men and supervisors furnished by the city on a force account basis. After war was declared, WPA assistance gradually was withdrawn. In the fall of 1942, some assistance was secured from a conscientious objectors' camp, and the work was finished last year by force account, using equipment leased from the Edward Selander Construction Co. of Denver.

Survey Progressing in Dangerous Hell Canyon

A COAST AND GEODETIC Survey field party will complete this year a level-line survey through Hell Canyon on the Salmon River in Idaho as part of a general survey of the Columbia River basin, according to the Department of Commerce.

This region is described as more rugged than the Grand Canyon of the Colorado. In some places the gorge is a mile deep.

The survey is being made in connection with power, navigation, and reclamation developments in the Columbia River basin. The Salmon River empties into the Columbia and the establishment of level marks in Hell Canyon is an important engineering development.

The survey work in this instance started from a point outside of the canyon near the town of Salmon. The initial operations ended in the vicinity of Lewiston, where work is being resumed this year. The survey will extend to Graingeville, covering a total distance of about 80 mi. through the canyon.

Transportation in Hell Canyon is by light boats. The boats are handled by guides who know the canyon and its tricks. Travel is in one direction only, as the rapids are too treacherous and the flow of water too swift to navigate upstream. At some points the rapids cannot be navigated even downstream, and short portages are necessary.

When the field party gets through with its tough assignment in Hell Canyon it is due to tackle one said to be even tougher—the canyon of the Snake River, which also empties into the Columbia.

Value of Snow Survey Data Increased By Studies in New Sierra Laboratory

By CLYDE J. GORMAN
Chief
Technical Information Branch
Corps of Engineers
Sacramento, California

UP ON CALIFORNIA'S top side four U. S. Engineers have just worked through the first of what promises to be seven long winters.

Some day, because of their work, men will know more exactly how much water, when, and how fast it will roll into the valley from any Sierra stream. Some day they will get this information from basic weather data and a few simple measurements.

But right now, the Central Sierra Snow Investigation Laboratory in Placer Co., Calif., is purposely over-instrumented. A lot of loose ends on the fringe of present-day knowledge will have to be woven into a reliable pattern. For example, what will happen on the Kings, the Kern, the American, or the Feather rivers after a certain number of hours of sunshine and the movement of different types of air masses over the snow fields? A joint venture has been formed of the men of the United States Army Engineers and the Weather Bureau to find out. To use the words of an official report, "Practically nothing is known about the water storage capacity, transmission rate and melting rate of the various types of snow packs in this critical zone."

For a number of years snow surveys, largely conducted by the State, have been carried on. These give a good idea of the amount of snow, and it is a valuable supplement to present studies. However, dams and reservoirs are precision structures, and precise knowledge will get the most out of them. In a sense, the great dams are something like an afterbay to the big snow fields, where a melting zone of some 2,000 ft. migrates up and down the mountains with the seasons. Merrill Bernard, head of the Weather Bureau's hydrology section, puts it this way: "Snow fields in the mountainous West are to be considered vast reservoirs just as truly as man-made dams."

So one of the first civil jobs at war end found the U. S. Engineers, Sacramento District, rushing to completion a full-fledged laboratory high in the Sierras, between Soda Springs and Donner Summit, off Highway 40 a bit, in an area called the Castle Creek Basin. This spot was picked because it is fairly typical of the range, it is reasonably accessible, and all the water from 4½ sq. mi. has to drain through one point.

What goes on up there in the snowy California Sierras is told in the pictures and text on these pages.

Picture No. 1 looks like a nice winter scene. To the scientists on topside it is "snow erosion." One - hundred - mile winds are not uncommon to the high Sierras; and the pack shifts from one watershed to another. Dark line in foreground is southern Pacific tracks and snow sheds.

In No. 2 are the four mountaineers on whose notes the future design and operation of foothill reservoirs will depend; left to right are Dr. Robert W. Gerdel, physicist and head of the laboratory; Ashton Codd, hydraulic engineer; Parley Merrill, engineering aide, and Bill Enloe, meterologist. Codd, from the University of Nevada, is handiest on skis. Merrill and Enloe, back from Alaskan assignments, think California is balmy here.

Seasonal snow storage gauge in No. 3 is an important field instrument outside the lab building. Inside the round tank is a solution of calcium chloride that melts falling snow, so that it is possible to measure snowfall in terms of precipi-

tation. Vanes around top cause practically the same amount of snow to enter gauge as falls on the ground. Meterologist Enloe is taking a reading from the arrangement, which was designed by Dr. Gerdel.

In No. 4, Dr. Gerdel uses a gadget that's his prime weapon to prove or disprove a physical landmark that has been a theory for 50 years—the Fourier equation, concerning the diffusion of heat through a nonuniform mass. His hands are full of "electrical resistance thermometers" with which he measures snow temperatures at several depths. In background is an anemometer to check speed of air moving over the snow surface.

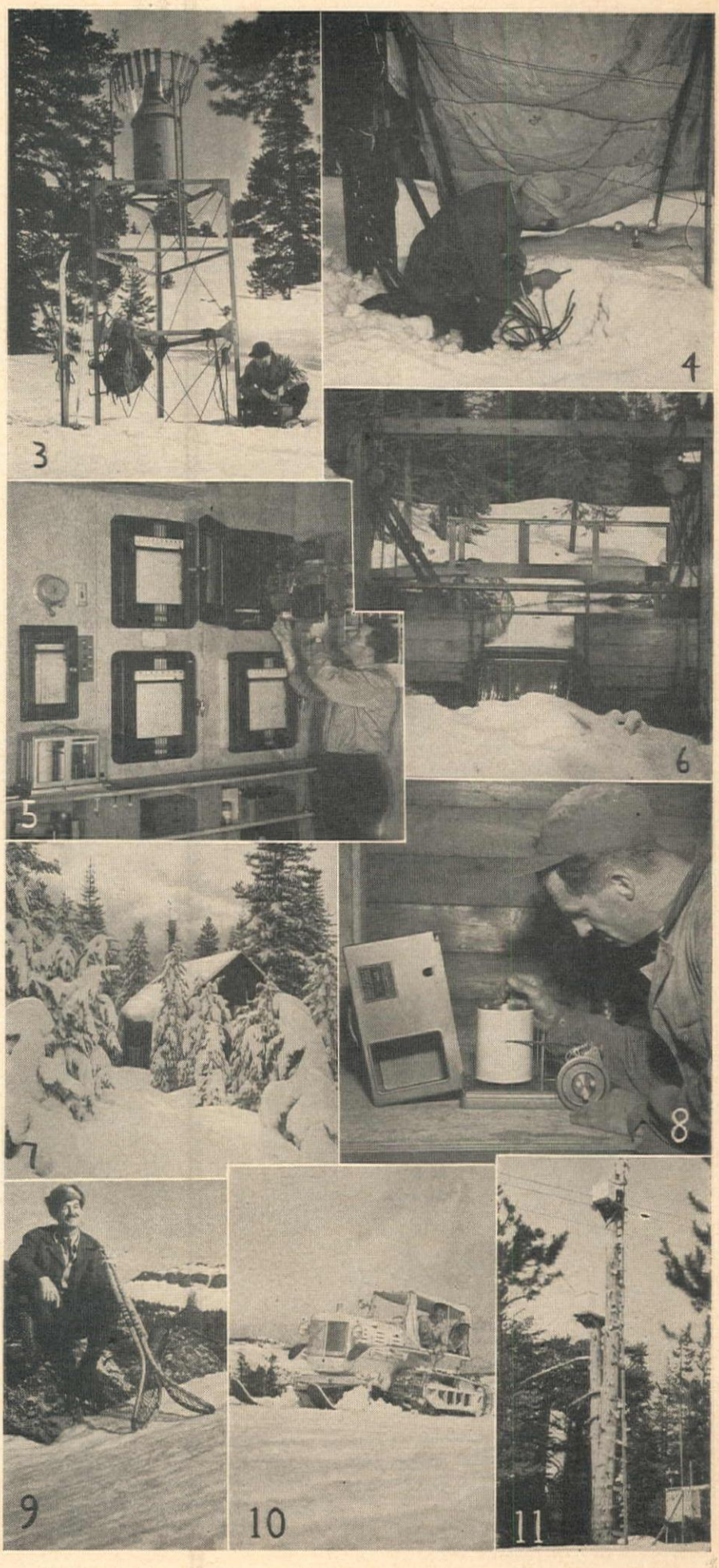
The inside of the lab, in No. 5, looks like the belly of a submarine. All instruments are hooked up to outside stations. From left to right, round object that looks like a compass, and glass-doored instrument under it, are recorders for registering wind velocity, wind direction and duration of sunshine from several different outside stations at one-minute intervals. Machine in glass case on shelf is microbarograph that makes the continuous record of barometric pressures. Of the big and expensive instruments, the first two (vertically, left to right) are micromax recorders that pick up soil, snow and air temperatures from 28 separate outside points at one-minute intervals in terms of quarter-degree Fahrenheit. The next two (top one opened by Enloe) record information gathered by pyrheliometer (see No. 14). The jumbled cables that feed instruments on the reverse of the wall are incredibly accurate.

A simple, but absolutely necessary installation, is shown in No. 6. This is where the run-off is measured. All the melting snow behind it must pass through this weir (unless it slips past underground, in which case three shafts keep tab on the movement of ground water). From this point in Castle Creek Basin, run-off heads for Lake Van Nordin and from there down the Yuba River to the Sacramento, and so, unless put to work, out through the San Francisco Golden Gate. Around Fresno, Sierra streams reach the Pacific only in times of high water, as Kings, Kaweah, Tule and Kern rivers normally head for Tulare Lake, which can overflow into San Joaquin River and then out to sea.

Snow laboratory, No. 7, settles down for its first of seven winters. Well instrumented, but not as completely as it will be next year, it has contributed a start in solving the silent riddles that affect the lives of people in the valley below.

The pay-off instrument in No. 8 is located in the little house in back of the weir. This stage recorder makes continuous record of the depth of the pool behind the weir. The average depth for a 24-hour period can be translated into the exact amount of water that flows out of the basin in any one day. At the moment, the flow is running about 7 cu. ft. per sec.

Clyde J. Gorman, author of this article, is shown in an action shot in No. 9.



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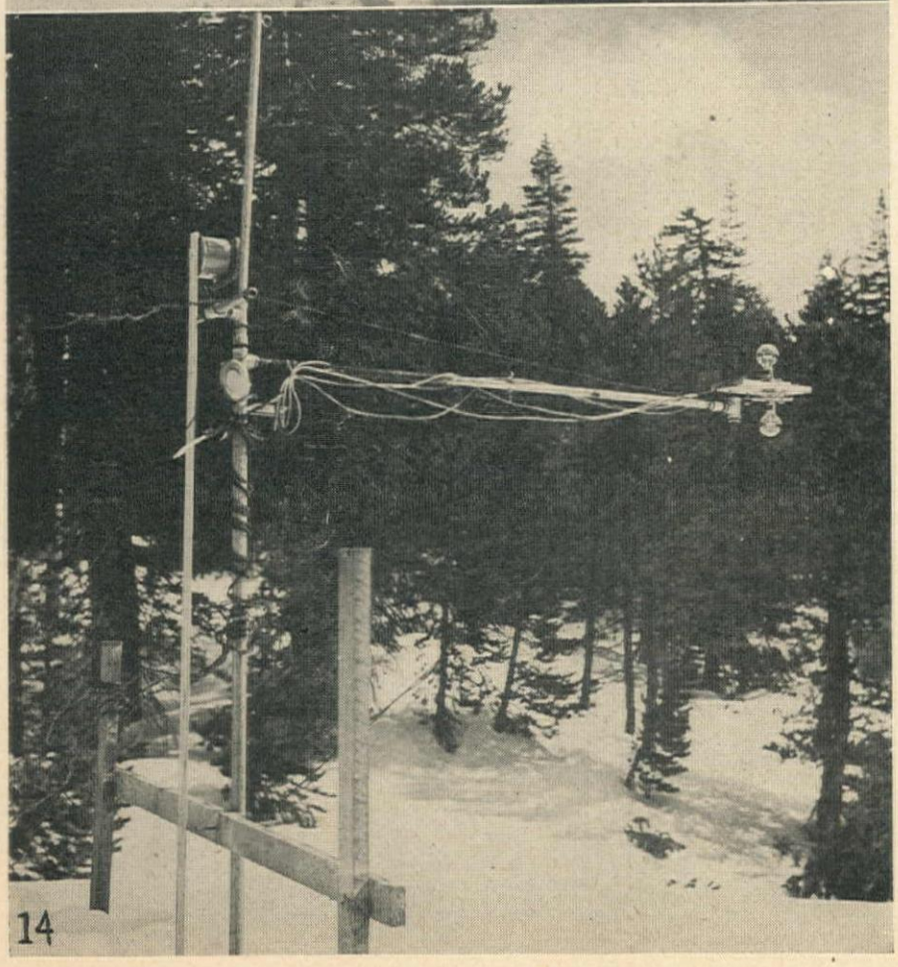


14

In back of the appropriately dressed engineer-writer can be seen Castle Rock, from which the laboratory basin gets its name.

The snowmen go faster and farther in one hour with this snow tractor, No. 10, than they used to go in one day. Built for the Army's arctic campaigns by Allis-Chalmers and powered by a Jeep engine, the snow tractor has a fighting weight of 2,700 lbs. Merrill is at the controls and Codd is in the back seat. The rig is steered like an automobile with skis in front and tracks behind. In a tight spot, tracks are utilized in steering as in a regular tractor. Spare skis are mounted on the side.

No. 11 shows the little boxes familiar to all weather stations perched just outside lab headquarters. Here, a close-cropped Ponderosa pine provides a vertical spread to collect data from several levels. This array picks up temperature, humidity, air speed and wind direction.

Merrill (with notebook) and Codd are making measurements familiar to all snow surveys in No. 12. Long tube is plunged in pack to bring up sample, and here it is pushed down to extract core. Snow core is checked for quality at different depths from inspection slots on side. Samples over the basin inform the men of the quantity and kind of snow they have to work with—the first essential information. Next, the tube will be weighed on a spring scale to determine its water content.

Hydrologist Codd performs a simple little trick in No. 13. Vacuum bottles are half full of hot water when he leaves lab. Upon arrival at site, he uncorks bottle, measures temperature of water. Then he dumps in a snow sample, stirs until dissolved and measures water temperature again. On his return to the lab he weighs the bottle and contents. Thus he knows how much snow it took to change the temperature of a given quantity of water a certain number of degrees. And so he knows how much heat it took to melt the snow.

No. 14 shows the pyrheliometer, the prima donna of the laboratory. The top bulb picks up the amount of solar radiation in terms of calories. The bottom bulb catches the amount reflected back from the snow. The difference is the amount of heat absorbed by the snow. It takes 80 calories of heat to melt one gram of ice or snow at 32 deg. F.

One winter's work has been done, and six more loom ahead for the scientists. If you know what the weather is, know how much and what kind of snow you have, and know how much water comes down the mountain from this set of conditions, you can in time develop a formula that will work for the whole valley.

The annual snow survey report of investigators in every state of the West, interpreted in terms of stream runoff forecast for 1946 appeared in the May issue of *Western Construction News*, with late revisions noted in the June issue. This 1946 forecast was prepared by the Soil Conservation Service, which at the present time correlates the surveys of all agencies.

Exploring Dam Foundations—I

With the beginning of the extensive postwar dam building program, a new consciousness is necessary among engineers of the value of thorough and competent site and foundation explorations —An experienced foundation engineer here gives the first of two informative articles on the subject

By RUSH T. SILL
A. I. M. E.
Partner, Ruscardon Engineers
Los Angeles, California

TO PROPERLY PRESENT the exploration of dam sites, it is necessary to understand Geology, and in any discussion of Geology, as applied to Engineering, it will be of interest first to consider sketchily the formation of the earth.

The earth is one of a group of nine known planets which revolve around a common central orbit, the sun, whose mass is 332,000 times that of the earth. The sun's surface temperature is estimated to be 10,800,000 deg. F., and the temperature at its center is estimated to be 72,000,000 deg. F. Its fires may be stoked either by utilizing subatomic energy in the building up of the heavier chemical elements from hydrogen, or by the annihilation of matter—the rushing together of electrons and protons, their mutual destruction and transformation into radiant energy.

The geological record shows that the sun has been supplying light and heat to the earth at a uniform rate for hundreds of millions of years; that it travels at a rate of 12 mi. per sec., and is losing weight at the rate of 4,000,000 tons per sec.

The earth's diameter is 7,926.667 mi., with a superficial area of 196,950,000 sq. mi.—139,440,000 sq. mi. of water and 57,510,000 sq. mi. of land.

Earth's formation

According to the most recent development of the Nebular Hypothesis, a passing star actually collided with the sun in a grazing incident, which probably accounts for the rotation of the sun on its axis. The matter torn from the sun by the collision was pulled out as an incandescent filament which condensed in detached separate masses to form the planets. In this version of the theory of the origin of the solar system, the earth is supposed to have passed through a fluid state.

Accepting the nebular origin of the earth as a convenient working hypothesis, we may regard it in its early stages as an intensely heated body of partially liquid, partially solidified rock magma of varied composition mingled with various gases and vapors which were continually being discharged into an already dense atmosphere. As the globe radiated heat into space, it became at least sufficiently chilled, though still very hot, to allow a strong shell or crust to form on its surface. This would be formed the sooner because much of the globe material does not conduct heat readily; it would be formed of the specifically lighter components, owing to the action of gravity and partially also from the fact that in general the earth components of low specific gravity are less readily fusible than those of higher specific gravity.

The first formed crust no doubt differed to some extent chemically from the still fused materials upon which it rested, that is, there has been some amount of differentiation of substance from the very first. Perhaps it was like a crust of pumice floating on a sea of lava, but there soon must have been a more notable differentiation. Reference has been made to the dense atmosphere surrounding the globe in its early stages. The more condensible vapors of this atmosphere would be rapidly and continuously precipitated on the new formed crust in proportion to the lowering of the temperature, partly as solids, more likely as liquids, and so the first separation of land, sea and sky would result, each somewhat resembling their present counterparts.

With solid, liquid and vapor in juxtaposition, gravity would of necessity gather the liquids into any existing low places to form seas in which there could not fail to be, as now, tides and currents. The atmosphere would be violently agitated by storms, and the surface of the dry land would be fractured by unequal contractions and expansions from variations of temperature, dissolved by corrosive fluids and worn away by heavy rains gathering into torrents and rivers. All of these agencies might be expected to prevail just as at present, only with greater intensity; the detrital deposits so formed, mingled with and consolidated by chemical precipitates from the highly charged waters, would form the first truly stratified (sedimentary) deposits. Such early sediments formed under these conditions would of necessity differ greatly from those formed at later periods when the earth and sea had become considerably cooled down, their youthful energies, so to speak, moderated. While these rocks would, in all probability, be highly crystalline they would, nevertheless, be true sedimentary rocks, and subject to the same mechanical and

FOUNDATION PREPARATION at Shasta Dam on the Sacramento River illustrates the obvious reasons for adequate pre-construction investigation. The foundation is bisected by several fault lines which must be sealed, but they were found to be inactive.

physical laws as their latest successors.

Earth's crust

The present day earth's crust, the outer shell, can be conceived as an elastic zone of igneous, sedimentary and metamorphic rock.

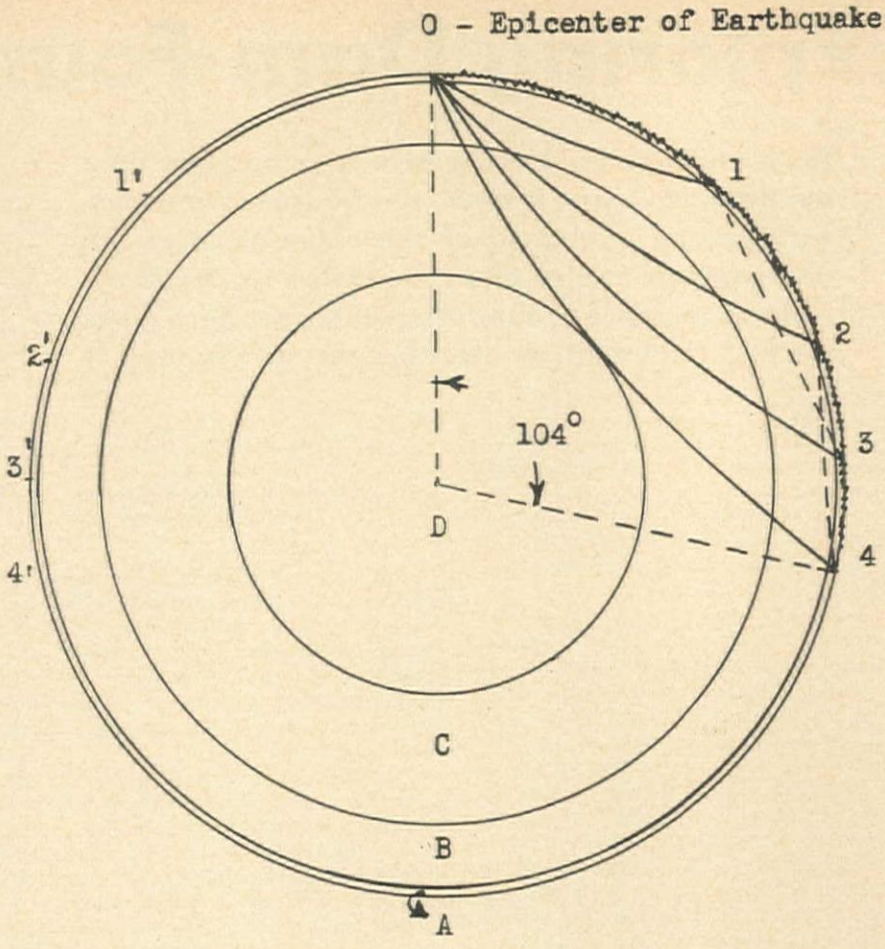
Below the earth's outer shell or lithosphere is a zone which must necessarily, because of the action of gravity, be of greater density called the barysphere. The upper part of the barysphere is of less density, more refractory and acidic in composition, i. e., a granitic type of rock; the lower much more fusible and dense and basaltic in composition. The earth's crust or lithosphere is of complex composition and its components have been greatly altered chemically and mechanically from their first condition and are, in fact, subject to continuous alteration always and everywhere.

There are many reasons for thinking that the earth's outer crust or lithosphere has at present a mean thickness of about 25 mi. and a mean density or specific gravity of about 2.68, but is somewhat thinner and more dense beneath the ocean, thicker and less dense in the mountains. Of these 25 mi., the upper portion is ordinarily in a state of tension and contraction and secular cooling, thus accounting for its disturbed and fractured condition.

Earth's interior

Now let us examine the latest studies of the earth's interior. The most reliable information about the earth's interior today is furnished by earthquake waves. Vibrations which are transmitted through the body of the earth and recorded by seismographs at varying distances from an earthquake focus reveal the elastic properties at different depths. The so-called long waves which move around the earth in the rocks directly beneath the surface, travel at higher speed through the deep sea floors than through the continental mass. For example, a seismograph record received in Japan of an earthquake in California shows a greater speed for the long waves than a record of the same shock received in New York. We conclude that granite, the predominant rock in the continental masses does not form the deep sea floors.

Both primary and secondary waves traveling through the earth increase in speed with increasing depth of path down to a depth of about 1,800 mi. There is strong evidence that most of the major earthquakes result from sudden yielding to strain in the elastic earth's crust, either by the formation of a new fracture, or by abrupt displacement along the walls of an already existing fault. These abrupt displacements create wave impulses which move out in all directions, and each wave front would be spherical. The first, smaller, rapid preliminary tremors are caused by a compressional or longitudinal wave, the primary, which travels several miles per second. The secondary or large vibration, the distortional wave, represents a transverse wave motion which travels by a longer route around the earth, and at about one-half the speed of the primary wave.



A - Outer Shell (Lithosphere) - Thickness 25 Miles
B - Dense Rock (Barysphere) - " 600 "
C - Oxide - Sulphide Zone - " 1200 "
D - Nickel-Iron Core - Diameter 4000 "

Distance of Receiving Station from earthquake focus in degrees	Velocity in Miles per Second Primary	Secondary
30 deg.	5.4	3.0
60 deg.	6.8	3.7
90 deg.	7.9	4.3

The principal cause of more efficient transmissions at greater depth is compression by gravity which increases the rigidity and, consequently, the elasticity of the material. At a depth of about 1,800 mi. the behavior of the waves changes abruptly; the speed of the primary drops from about 8 to 5 mi. per sec., and the secondary wave becomes very faint. As a result of these changes, most stations located farther than 104 deg. from the epicenter of an earthquake get no record of secondary vibrations. It is, therefore, evident that the earth has a core with a diameter of more than 4,000 mi. which differs radically in composition, from the thick shell that surrounds it. Although the velocity of the waves continues to increase down to a depth of 1,800 mi., at a depth of 600 mi. there is an abrupt falling off in rate of increase. Seismic waves testify that the earth is rigid to a depth of 1,800 mi. and, therefore, the material between 600 and 1,800 mi. cannot be ordinary rock. Most scientists favor the view that the core of the earth, more than 4,000 mi. in diameter, is metallic, probably composed of iron-nickel with an oxide-sulphide zone between the 600 and 1,800-mi. limits. The specific gravity of the rocks would vary from 2.7 at the surface to 9 or 10 at the core, and 5.6 for the oxide-sulphide zone. The temperature at the center of the earth would exceed 630,000 deg. F., and the pressure would amount to 2,000,000 to 3,000,000 tons per sq. ft.

Rock classification

The rocks of the earth's surface are classified according to the way in which they were formed as igneous, sedimentary and metamorphic.

The igneous rocks are of two types, those formed beneath the surface by slow cooling, and the solidification of liquid rock material, of which granite and diorite are the most abundant type, and those effusives formed on the surface from molten lava forced up from depth. Typical lavas are rhyolites, andesites and basalt.

The black streamlike masses of volcanic rock so prominently displayed in Owens Valley, Calif. are basalt flows. The basic basalt lava when ejected flows like water, which accounts for the long narrow snake-like deposits, and the flat

topped mesa so common in the southwestern United States.

Mono Craters near Mono Lake, Calif. are of the acid or rhyolitic type of rock. Acid lavas are not fluid as ejected, but are stiff and stringy, and build up into steep craters, or as in the Mono Craters where lava was extruded at intervals along a prominent fault, many craters formed a steep narrow mountain range some 10 to 12 mi. in length. The highest peak is about 3,500 ft. above the plane upon which it was formed.

Sedimentary rocks, those loose, incoherent and highly porous sediments laid down in water, or by wind or ice, and converted into rocks by compaction, the welding of adjacent grains, or deposition of cementing material in the pore spaces, underlie 80 per cent of the area of the United States. They are of great practical interest, because they contain coal, oil and gas, and many other mineral supplies, notably the sedimentary iron ores, the most valuable of metallic resources. They also contain most of the fossil evidence from which the geologic history of the earth is determined.

The most conspicuous feature of sedimentary rocks is their layered or stratified structure. Each layer is a bed or stratum separated from the beds below and above it by distinct surfaces along which it parts readily.

Sedimentary strata at the time they were laid down were horizontal or nearly so. By the present time, many of the strata have been deformed by movements of the earth's crust.

In conglomerates and breccias, the fragments cemented together range from pebbles a fraction of an inch in diameter to boulders many feet in diameter. Sandstones are composed of cemented sand grains consisting of quartz. Shale is a clay which has been consolidated by the weight of overlying rock.

Limestones are the consolidated equivalent of calcareous mud, calcareous sand or of accumulation of shell fragments, or a combination of all three. Limestone under certain conditions is soluble in surface waters. Solution cavities and our large caverns are formed by the solution of the limestone by underground waters.

Metamorphic rocks are rocks of other types which have been changed in texture or composition by exterior agencies. The most important agencies are heat, moisture and pressure. By heat and pressure, as the result of burying at depth, if trees and other carbonaceous matter were present, coal is formed, shales are changed to slate, and limestone is changed to marble; quartzite is metamorphized, quartz sandstone formed by the deposition of secondary silica between the original quartz grains of the sandstone. These are but a few typical metamorphic rocks.

The practical value of recognizing one rock from another is readily apparent in the study of sites for great dams to make storage reservoirs.

The mountains

Dams and reservoir sites are usually located in the mountainous areas, and mountains are of great importance in the study of geology since they furnish a large part of the information on which the science is based.

In most of the dominating mountain units now in existence, the major relief has been determined either directly or indirectly by localized crustal movements which have caused more or less severe disturbance of the rocks, resulting in large scale faulting and deforming of the strata.

The Sierra Nevada Mountains of California, 400 mi. in length and 75 mi. in width, are a great tilted fault block. Its eastern edge has been lifted two miles or more to form an almost perpendicular face facing eastward, and in the Great Central Valley of California, sediments thousands of feet deep have accumulated on the depressed portion of the rotated mass.

The Sierra Nevada attained its present altitude by at least 2 great uplifts. The earlier uplift amounted to about 2,500 ft. followed sometime later by a second and major uplift, which raised the range to its present altitude, producing a scarp about 6,000 ft. high west of Owens Lake. The rotating of this great mountain mass depressing it to the west produced 2 great fault systems paralleling the western face of the Sierra Nevada, along which have been developed the mines of the Mother Lode and the east belt.

The Inyo Mountains are typical of another type of mountain making in which sedimentary rocks have been folded into complex structures, and through faulting have attained their present altitudes.

In the block faulting of igneous, or sedimentary rock masses or the folding of sedimentary rocks into mountain ranges, there is bound to occur fracturing, faulting and weakening of the rock, and it is with these conditions that we are vitally concerned within the geological investigations of dam site and reservoir areas.

Penetration of water

The fracturing and faulting of rock masses with the resulting crushing, along or between the planes of movement and the fracturing of the adjoining rock, allows atmospheric waters to percolate and move downward through the rock mass.

Rain water, with oxygen, carbon dioxide, and other substances in solution, dissolves the more soluble minerals with liberation of colloidal silica, and the formation of carbonates of lime, iron, magnesia and the alkalies. The iron carbonate is almost instantly oxidized, forming a visible rusty coating, a precipitate of ferric hydroxide. The lime, magnesia and alkali salts remain partly in solution, to be washed away, together with much of the dissolved silica.

By solution, oxidation and hydration, then, a solid rock is converted into an aggregate of loose material, which may remain in place as soil or be removed by the mechanical agency of running water.

But rain water is not the only chemical agent for affecting rock decomposition. Below the surface, the ground water is at work and contains an accumulation of the salts formed during the earlier stages of the process. These processes weaken the rock structure, and the extent to which the rock mass has been weakened must be known before a dam can be designed for any given location.

Faults and fractures may become passage ways for the flow of large volumes of water, or allow water to enter porous beds of sedimentary rock and thereby affect holding capacity of a reservoir.

Dam foundations

The condition of the foundation is one of the most important factors in the choosing of a dam or reservoir site. The foundation of a dam must have adequate bearing power to provide stable support for the superimposed structure under all conditions of loading, and must be sufficiently watertight, or capable of being made so, to prevent seepage under the dam.

From the foregoing discussion, it can be realized how important it is to study, in the greatest detail, the geological conditions of the dam or reservoir site, to analyze and draw the correct conclusion as to the rock classifications, the type and extent of fracturing, faulting or folding, and the chemical alterations, decompositions or disintegration of the rock mass.

The type of dam to be built at a given site will depend upon foundation conditions, the quantity and quality of the materials available for construction and other economic considerations. The selection of the type of dam, its design to meet existing foundation conditions and the proper preparation of deficient foundations must be based upon sound judgment and mature experience.

It is possible to construct a safe dam on almost any foundation, provided the foundation has been thoroughly explored and tested, and the design adapted to the conditions.

Foundation examination

After the preliminary investigation of the dam site has been made, and the general type of dam to be built has been selected, thorough geological studies must be made. These studies usually begin with a review of geological maps, reports and data available in publications of the United States Geological Survey, State Geological Departments, and other public and private agencies, and are followed by detailed field examinations in which all rock exposures are classified and mapped as to age, origin, character and structure.

The dip and strike of sedimentary beds, the slope and magnitude of folds, together with location, dip and strike of all faults, and the direction, extent and width of all crevices must be determined.

After surface conditions have been thoroughly investigated, sub-surface conditions must be determined with the greatest care and in the minutest detail to determine the kind and character of the underlying rock, its probable bearing power, the steps necessary for the prevention or reduction of seepage and other special treatment necessary to

meet the requirements for a sound foundation.

Here are some of the details that must be known about the rock and materials at a dam site:

1. If it is an earth fill dam, what is the quantity of the material in the overburden suitable for the fill?
2. If a concrete dam is to be built, what is the hardness, strength and durability of the foundation rock?
3. Does the underlying rock contain seams or veinlets of easily soluble materials, solution caverns, joint planes, faults, crevices or solution channels?
4. Is the bedrock weathered and to what depth will the weathered rock have to be removed, in order to form a suitable foundation?
5. Are there crevices, fault planes, joint planes or seams that will require grouting?
6. Are there faults which might cause structural weakness of the rock mass?
7. If the dam site is located on sedimentary rocks, are there soft strata present which might fail, or upon which the dam might slide when pressure is applied through the filling of the reservoir?
8. Are there porous strata exposed in the reservoir area along which water might be lost?
9. Are there porous strata in the foundation of the dam along which water might be lost through seepage with the possibility of endangering the safety of the structure?

Exploration techniques

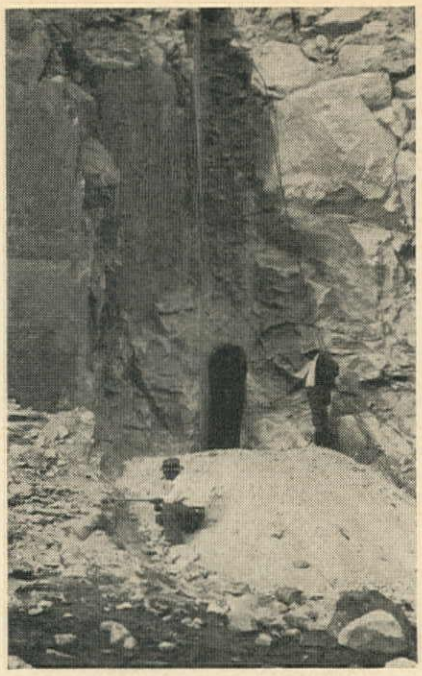
Sub-surface exploration of igneous rock may differ materially from the methods used in the investigation of sedimentary rocks, so the several methods of sub-surface exploration generally used will be briefly discussed.

Geophysical methods, both seismic and electrical, are used where the overlying sediments are deep, and it is necessary to know the depth to rock in canyons, etc., in order that contours of the underlying rock can be mapped.

The seismic method, the method of exploding small charges of dynamite in shallow holes and recording at some distance the velocity and magnitude of the elastic waves produced in the rock formation, is based upon the fact that the velocity of waves produced in the earth's crust differs greatly in different rock formations. The dynamite charges are light, varying from ¼ to 2½ lb., and are buried to a depth of 3 to 4 ft. The charges are fired at increasing distances from the point of recording. The maximum shooting distance is from 3 to 4 times the depth to which information is sought.

Sand, clay and gravel transmit wave disturbances at velocities of roughly 800 to 8,000 ft. per sec., while igneous and other rigid rocks transmit such disturbances at from 10,000 to 20,000 ft. per sec.

The electrical resistivity methods of solving problems connected with foundations, tunnels and location of gravel deposits and water supply, use an apparatus by means of which a current is sent into the ground through one or two



EXPLORATION TUNNEL in the wall of a canyon at a proposed damsite. The tunnel is along a seam or fault which has been filled with crushed rock or ash.

input electrodes, and observations are taken with meters or whetstone bridges attached to two or more search electrodes.

The electromagnetic or inductive methods are useful in location of buried metals, such as mines, shells, treasures and in the tracing of pipelines. These processes are based on the fact that secondary currents and electromagnetic fields are induced underground when an alternating current passes through a wire loop or antennae on the surface. The anomalies or variations in such induced fields are mapped by means of observations taken with portable direction finding receivers. In most of the electro-methods a low frequency current is passed through an insulated wire, having dimensions of the order of several hundred feet which is laid on the surface of the ground, and direction finding observations are made in the area within the loop. Most of the inductive methods, on the other hand, employ a portable vertical transmitting loop, and use higher frequencies than the electromagnetic methods. They are, however, distinct from the so-called radio methods in which frequencies of the order used for commercial radio broadcasts are employed.

The method of exploration of both igneous and sedimentary rocks, giving the most detailed and satisfactory data are test pits, shafts and tunnels, but if these methods were depended upon exclusively, the cost of thorough sub-surface exploration would frequently be prohibitive.

Consolidated or metamorphosed sediments and igneous rocks are usually tested by pits, shaft, tunnels, diamond drills and Calyx shot bit core drills.

Diamond and Calyx drill cores give a continuous, accurate and permanent record for determining the nature, extent, and structure of the rock drilled through. Diamond drill cores for foundation exploration may vary in diameter from 1⅛ to 4 in., and Calyx cores usually vary from 4 to about 8⅝ in. At some of the recently-built larger dams, Calyx shot bit holes 30 to 36 in. in diameter have been drilled in the foundation, down which engineers and geologists were lowered to study the rock section exposed.

Diamond drilling

The diamond drill consists of a rotating head and feed mechanism driven by gasoline engine, air motor, electric motor or steam engine, and a hollow boring column with a core barrel at the lower end for holding the core, and a diamond bit screwed in the lower end of the core barrel.

In the early days, black or bortz diamonds were set by hand in a soft iron bit. Four or more diamonds were set in the bottom of the bit extending outside of the bit, and the same number extending on the inside of the bit to cut a hole of sufficient size so that the rods would clear in the hole and the core inside of the core barrel. Water is pumped through the drill rods to remove the cuttings from the hole.

For setting the stones, cavities are drilled in the end of the bit with a hand drill and shaped for each individual stone. Stones are usually surrounded with a light strip of copper; then the metal of the bit is carefully tamped tight around the stone with light blows of a hammer and punch. Stones are set with a clearance of from 1/28 to 1/32 in., so that their cutting edge or surface slopes away from the direction of rotation of the bit. The outside stones in a bit do the most work and are the largest.

At present the bortz diamond bit in general use is a mechanically set bit in which many small diamonds are imbedded in beryllium copper or other alloy. In the manufacture of these bits many small diamonds are placed in a mold and the molten metal is poured around them. This process insures a uniformity of contour and gauge, allowing one bit to follow another with a minimum of reaming necessary.

Calyx shot drills use steel shot as the abrasive. The bit is a steel cylinder with a diagonal slot in the lower edge. It is screwed into the core barrel and chilled steel shot are fed through the rods, and pass between the core and the inner wall of the bit to the bottom of the hole where they cut by a milling action.

In core drilling, the larger the diameter of the core removed, the easier it is to interpret the geological structure encountered. Seldom will the length of core removed represent 100 per cent of the hole drilled. To attempt to visualize the character of that portion of the foundation material for which no core is recovered, and upon this inadequate information design the dam, making an assumption that any weakness of foundation later discovered can be remedied, is hazardous and may lead to serious construction difficulties and involve a greatly increased cost of construction.

It quite often happens that after a site has been explored by dry sample or wash boring, additional information is required to properly solve the foundation problem. Test pits give the best possible data on the character, strength and permeability of the overburden, and undisturbed samples may be secured for test.

For the sampling of soft strata overlying solid rock, driver pipe sampling, wash boring, hand augers, churn drills and rotary drill rigs are used. Drive samplings of clay or silt is accomplished by driving a pipe, usually ¾ to 2 inches in diameter, to refusal by means of a sledge hammer or drop weight. The pipe is in 4- to 5-foot lengths, which can be secured together as they penetrate the soil. When the required resistance or refusal is reached, the string of rods is pulled by means of a chain and purchase. The sample can be ejected from the several lengths of pipe for correlation and testing.

In wash boring, a drive pipe of the required diameter is sunk. The core is broken up by a jet of water or, if necessary, by a chisel bit, and the disintegrated material is brought to the surface by the current of water. The water is run into barrels or other receptacles, and the solids collected for study. For penetrating soft ground, a smaller pipe carrying water under pressure is worked ahead inside the drive pipe and, as fast as loosened, the material is carried to the surface. In such material the drive pipe sinks of its own weight, or can be made to do so by rotating it with cross-bars or other means. In harder material, a chisel bit is attached to the lower end of the wash pipe, and churned up and down to cut a hole below the drive pipe. If the cuttings are not carried to the surface by the stream of water issuing from holes in the sides of the bit, the drill rods and bit are removed from the hole and a sand pump is run into the hole, and by raising and lowering a few feet the pipe is filled. It is then hoisted to the surface and dumped.

Hand augers are used for prospecting soft ground. The equipment consists of a small, low derrick, windlass, auger, rods and handles for rotating the rods. Augers vary from 1½ to 24 inches in diameter. Holes to 700 ft. in depth have been bored with this type of rig. Two men can operate a hand auger to a depth of about 25 ft.

Light well drill rigs, or churn drill rigs, have been used in prospecting. The hole is cased with a drive pipe, and drilling bits of many types are used in putting down the hole. Sand pumps are used to remove the cuttings.

For prospecting the material in borrow pits, for use in earthfill dams, a power-driven auger, mounted on the back end of a truck, will put down a hole rapidly, and give a good sample of the material for testing.

The importance of thorough exploratory work properly interpreted cannot be over-emphasized. A true picture is necessary, and it is only with a true picture of foundation conditions that an engineer can design his structure with assurance of both safety and economy.

(The second installment of Mr. Sill's article will appear next month.)

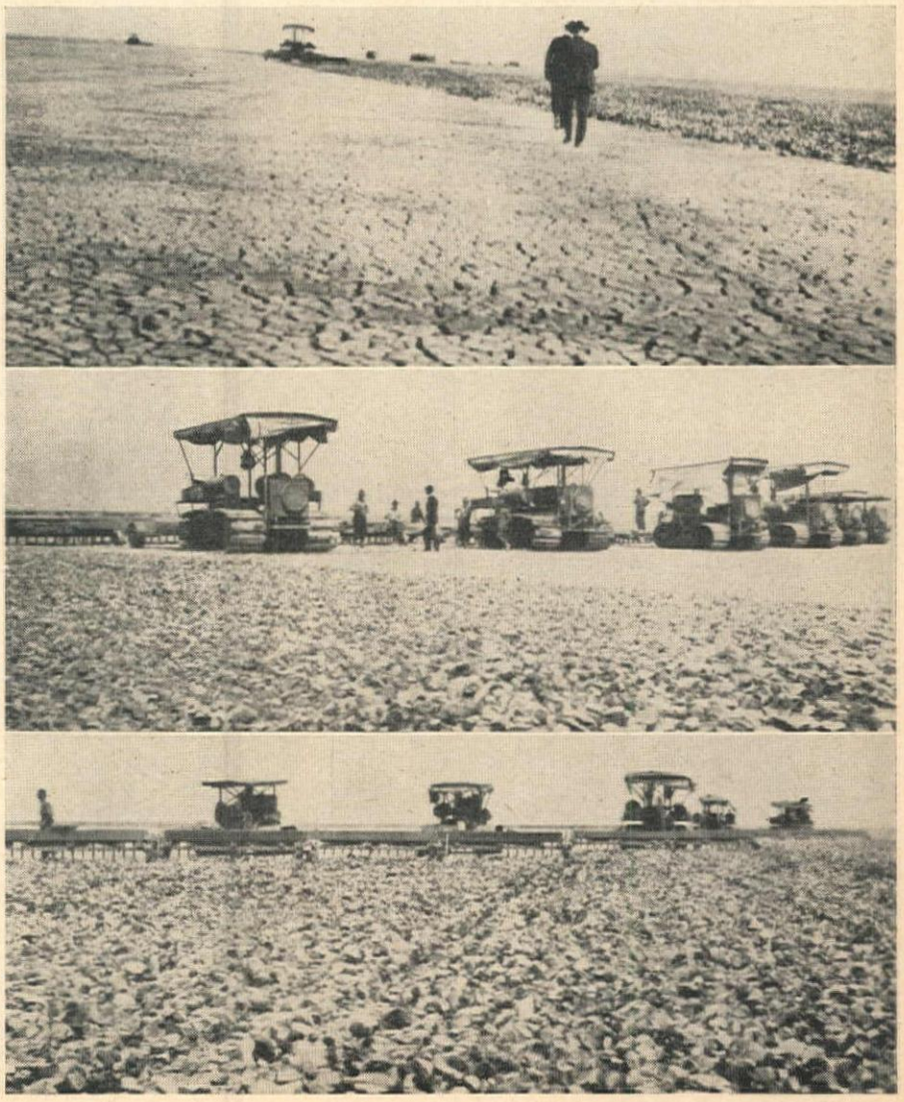
Engineering a Mass Crop Production

After World War I engineers were able to produce a bumper wheat crop on 20,000 ac. of Tulare Lake bottom by the application of production line methods to fertile ground unsuitable for normal methods of cultivation

By WILLIAM Q. WRIGHT
Consulting Engineer
San Francisco, California

A GLOBAL WHEAT shortage appeared after World War I, similar to what we are now facing. Strenuous appeals by Government to produce more grain during the cropping season of 1918-19 suggested the possibility of planting about 20,000 ac. of Tulare Lake bottom in California, which was then drying up after having been submerged for many years.

Although there was but a short time for organizing and planting such an extensive area, and labor and equipment were short due to the war, nevertheless any opportunity to relieve starvation abroad could not be overlooked. This proposal then involved a favorable climate for wheat, and about 30 sq. mi. of open flat land free from weeds and obstructions, pre-irrigated, generously fertilized with enriching sediment, and practically ready for seeding. In addition to the problem of planting in proper sea-



GROUND CAKED to a depth of 6-in. over moist soil (top) was planted by special drills (bottom) which placed seed 8 in. deep and were pulled by wide-tracked tractors (center) recruited from the San Joaquin Valley.

CROPS PRODUCED on the Tulare Lake bottom land surpassed the expectations of everyone connected with the project, yielded approximately double the normal yield. The engineered methods employed were considered utterly impracticable by farmers.

son, levee protection against possible reflooding during the spring and summer of 1919 was required. It thus appeared more of an engineering project than a farming enterprise.

No attempt will be made here to describe construction of levee, necessary to protect the crop from spring and summer flow into the lake; nor to outline difficulties in harvesting a phenomenal crop about double the ordinary yield. In this connection it should be stated that tractors and equipment of 1919 did not have the years of evolution for perfection which present-day machinery enjoys. Therefore credit for management and maintenance of operations, so important to such a project, should be given to the late D. W. Lewis, pioneer lake farmer and reclamation contractor and to John Kelly, successful delta farmer of Stockton, Calif.

Water sources

Rainfall in the Tulare Lake region is usually insufficient for crop production. Irrigation here utilizes water from Sierra snows when available, from deep wells, and at times from Tulare Lake. Many years ago, channels were dredged into Tulare Lake bottom, where excess water was drained in times of plenty and from which storage, water was pumped for irrigation in times of shortage. During the fall of 1918, when the appeal for more wheat was broadcast, irrigation water was scarce and farmers around Tulare Lake pumped heavily from that storage to pre-irrigate their land by flooding in checks before planting.

Before the end of 1918 it appeared that the lake would be pumped dry and a planting program was possible only provided quick action and proper equipment could be obtained. After the lake bottom was uncovered, evaporation rapidly dried the surface, developing shrinkage cracks, and forming sediment slabs which curled and separated from the moist soil below. These sediment slabs, about 6 in. thick, became bone dry, while the soil below retained its moisture. Land preparation by mixing the dry surface slabs with the moist soil below was impractical since tractors, even with extended cleat treads, were found to mire down and puddle the soil. Finally only a few weeks remained to plant this area in proper season.

On account of the soft nature of the soil, it was necessary to use a special type of caterpillar tractor, originally designed for the soft soil of the San Joaquin Delta. The original Holt Caterpillar Tractor was invented in Stockton, Calif., and the type best suited for this operation had been designed especially for the soft delta lands. On account of war conditions, the only opportunity to obtain such tractors without delay, was to negotiate with the Delta farmers. Six of the required tractors with operators for day and night driving were thus obtained.

It was next necessary to build six sets of two 10-ft. special grain drills. These were pipe drills built especially strong to withstand the rumbling through the 6 in. of dry sediment slabs and drill at least 2 in. into the moist soil below; thus placing the seed about 8 in. below the cloddy surface. After proper equipment was assembled and ready for operation, there was no time available to accomplish more than the initial drilling of the seed, which left the surface covered with a coating of large dry clods.

Non-standard farming

Some authorities at the time questioned the plan of not working the ground either before or after planting, especially since some of the seed remained visible in the V-slots made by the drill in the moist, plastic soil. The simple drilling and stirring of the dry clods on the surface in one operation seemed inadequate to the conventional farmer. But since the moisture below the clods was somewhat excessive in certain locations, the open cloddy covering provided necessary ventilation, and proved to be the correct procedure. The seed thus placed a couple of inches into the wet soil without being covered, sprouted and soon reached the light that filtered through the clods.

A vigorous growth followed this "mud drilling," proving that further working of the soil was unnecessary. As an experiment, to satisfy some authorities, a small area was worked after planting, according to their specifications; but little wheat got through. There is a natural structure in such sediment soil, which must not be disturbed too much or puddled. The moisture necessary for that 1919 crop was there and available only for seed mud-drilled as described.

The object of this outline is not to display bumper crop records or describe the ordinary farming and engineering features of this project; but to concentrate on the "mud-drilling" or "production line" method for creating under conditions stated, the equivalent of two crops of grain on the same area in the same season, where no crop would otherwise have been grown.

Proposed Stevens Pass Tunnel Found Unfeasible by Engineer

A 29-MI. VEHICULAR tunnel through the Cascades at Stevens Pass, Wash., has been found unfeasible from preliminary surveys. Gov. Mon C. Wallgren of Washington reported recently after conferring with New York engineer Ole Singstad.

Singstad said that a two-lane tunnel at the 2,500-ft. level on Snoqualmie Pass, approximately two and a half miles in length, would assure year-round vehicle traffic between eastern and western Washington. He believes that a tunnel this long would repay its cost over a period of years, but that a longer one would be economically unsound.

"The two and a half mile tunnel would still be the longest vehicle tunnel in the world," Wallgren said.

Highway Officials Meet in Salt Lake

Make-Work Jobs and Politics Out as Officials Urge Improved Federal-State Building Program

HIGHWAY OFFICIALS of the western states were charged with the responsibility of building highways to meet future needs and not engaging merely in setting up make-work projects or building political fences as they held a successful 1946 meeting in Salt Lake City's Hotel Utah, June 10-11-12.

At the conclusion of the three-day session, the assembled members of the Western Association of State Highway Officials elected A. F. Winkler, chairman of the Montana State Highway Commission, as association president by unanimous vote. Winkler succeeded P. G. Poore, Helena, Mont., who was chosen president to preside over the conference after Bernard Touhey, Phoenix, Ariz., was unable to attend.

T. Matt Hally, Boise, director of highways in Idaho, was elected vice president; Tom W. Holman of Seattle, chairman of the Washington State Highway Administration, was reelected chairman of the executive committee, and H. R. Bromley, superintendent of the Wyoming State Highway Department, and Robert A. Allen, Nevada state highway engineer, were reelected committee members. E. V. Miller of Phoenix, planning engineer of the Arizona Highway Department, was elected secretary-treasurer, succeeding W. L. Anderson of the Utah State Road Department.

Resolutions adopted

Following three days of addresses and discussions dealing with technical, financial and political aspects of western highway problems, the association members unanimously adopted the following resolutions:

1. Urging immediate steps to increase compensation of technical employes in state highway departments, together with assurance of greater security, in order to alleviate the present critical manpower shortage.

2. Recommending that each state purchase controlled access rights when purchasing future right-of-way on federal aid and other important routes in order to assure adequate access control.

3. Recommending to Congress that the entire three million dollars authorized under the Public Land Authorization Act be appropriated to the full amount of the authorization, to maintain contract standards relative to federal aid and secondary highways.

4. Urging a uniform legislative program throughout the western states to standardize state highway financing on a sound economic basis. The resolution urged the executive committee to report its findings to the governors, chairmen of the roads committees of the House and Senate, and to legislatures of the western states.

5. Requesting the president of the American Association of State Highway Officials to place in the hands of the proper committee of the association the problem of framing a proposed legislative bill to be presented to Congress to provide for continuation of federal aid highway construction.

6. Recommending that Congress continue the allocation of federal forestry funds to continue adequately a program guaranteeing construction and reconstruction of forestry roads in the western states.

7. Urging that in projects where a mutual agreement cannot be reached between state and railroad companies as to benefits accruing from such projects (grade crossings, etc.), that the Public Roads Administration allow construction of the projects and that the Commissioner make final cost allocations.

8. Reiterating the opposition of the association and its members to lowering of present highway standards and authorizing a resolution to convey such opinion to the governors of the western states.

9. Re-endorsing the association's policy of supporting programs for locating, maintaining, signing and designing highways to provide maximum safety and to cooperate in educational programs and with law enforcement agencies in the current national safety program.

10. Recommending that whenever the Reclamation Bureau, Army Engineers or other federal agencies relocate existing highways that the agencies shall assume not only the cost of replacing the facilities in kind but also assume the additional cost of building the highway to the standards required by the amount and character of traffic.

11. Recommending that funds recently denied the new section of the U. S. Geological Survey, with headquarters in Denver, for mapping purposes, be restored.

Addresses

Addressing the second day's session, Clarence B. Shain, Director of Highways in Washington, stressed that "highways must be planned."

"Even if we had all the money we wanted and all the materials, we could not build all of our proposed projects in one year," he said. "Roads have to be planned. To me it seems logical that a complete study should be made of the needs of the entire western region and that some definite recommendations be adopted for presentation to our legislative bodies.

"Every mile of road added to the state system means an ultimate investment of $40,000, more or less. It must serve our highway users for at least thirty years before replacement or obsolescence. Its location and priority of construction must be based upon facts, not guesswork. It should be a highway—not a political fence.

"The West is young. Our opportunities are unlimited. But let us not, in our

CHIEF HIGHWAY engineers who attended the annual conference of the Western Association of State Highway Officials held at Salt Lake City June 10-11-12 are, left to right, ROY W. McLEESE, Utah; T. MATT HALLY, Idaho; R. H. BALDOCK, Oregon; C. B. SHAIN, Washington; GEORGE T. McCOY, California; D. C. GREER, Texas; ROBERT A. ALLEN, Nevada; MARK U. WATROUS, Colorado. The three-day meeting, composed of speeches and discussions on technical, financial and political aspects of western road building, was concluded with unanimous adoption of 11 resolutions.

justifiable enthusiasm, forget that roads cost money. We must plan carefully. Each and every mile of road added to our system should be selected as if it were to be paid for out of our own pay check. It is my opinion that this can be best accomplished by joint studies and joint determination of common factors important to all of us.

"And let us not forget that highways create jobs. There are perhaps no better job producers to be found anywhere than our great highway systems. Not relief projects, but real jobs—permanent jobs."

Discussing "Rights of Way and Through Highways," J. M. Devers, counsel of the Oregon State Highway Commission, pointed out that in the present-day world "the modern type of highway is a vital necessity."

"A quarter of a century has wrought great changes in road building," Devers declared. "What was modern and adequate a short while ago is now obsolete and not only inadequate, but, in fact, hazardous. Then we tempered the grade to the horsepower of the vehicle. Now we are forced to conform not to the horsepower of the vehicle but to the size, speed, capacity, purpose and volume of traffic for which we build.

"Early factors considered by highway builders were base, grade, drainage and curvature. There now is another factor which is of equal, if not greater, significance. That factor is rights of way, with which there is closely related the controls which rights of way make possible.

"To make such controls possible the public must acquire more complete and more exclusive interest in properties dedicated for right of way purposes. In other words, highway engineers and highway officials are now denied the right to design, construct, maintain and operate a type of highway which public welfare demands merely because of property rights remaining in the abutting owner."

In summary, Mr. Devers said:

1. Transportation by motor vehicle, whether by private car, by bus or truck, has made necessary highways constructed and operated under conditions which permit and insure control of access.

2. Such controlled access requires acquisition by the public of all property rights defined as access easements.

3. Such controlled access calls for a designed highway which provides for a separation of grades between through highways and secondary or local roads.

4. For the accomplishment of controlled access comprehensive legislation must be enacted.

5. Highway engineers and highway officials have a duty to perform and a responsibility to meet. On them falls the greater part of the job in carrying to the public the value and the need of such legislation.

Congressman J. W. Robinson of Utah, chairman of the House Roads Committee, was the featured speaker at the association banquet, when he explained features of the Federal-Aid Highway Act of 1944 and congressional views of the nation's post-war highway program.

1946 Washo Officials

NEW OFFICERS of the highway group are, left to right, president, A. F. WINKLER of Montana; secretary-treasurer, E. V. MILLER or Arizona; executive board chairman, T. W. HOLMAN of Washington, and executive board member, J. R. BROMLEY of Wyoming.

"The Congress," said Rep. Robinson, "in enacting this legislation during the midst of World War II, did several things:

"First, it indicated its complete confidence in the Federal-State highway relationship developed over the past quarter of a century. At a time when recrimination and controversy are more common than commendation and agreement, this expression of confidence speaks well for all of us.

"Second, the Congress took a farsighted view in anticipating the highway needs of this great nation by authorizing its largest appropriation for highway construction — five hundred million dollars per year for three years—to be matched by a like amount from the states. A total of three billion dollars for road work in three years! While all of us know this is not an unreasonable program, in the light of even present highway needs, it is large in comparison with previous programs. There is no reason to doubt that if it is properly carried forward, more and quite possibly larger programs will follow.

"Third, the Congress made two major modifications in previous procedure in enacting the new program. It recognized for the first time the very real problem of secondary, or farm-to-market roads. It recognized the bottleneck in our national traffic movement — the urban streets. Two separate procedures were established for these two new phases of highway development; two separate funds were authorized for them; two separate formulae were established for the allocation of these funds.

"I wonder if all of us appreciate the responsibility that this one Act placed upon the state highway departments? The Congress enacted this legislation and even some of its original critics now agree that the legislation is good. It made you, the state highway officials, responsible for its satisfactory operation. You are the ones who must work out necessary operating procedures, systems, programs and priorities, with the local levels of government. The success with which you carry out this undertaking will determine just how much support, or opposition, you may have from these same cities and counties two years, three years hence, when you come before the Congress in the interest of carrying forward a new legislative program."

The Public Roads Administration was represented at the conference by Lawrence S. Tuttle of Washington, D. C., assistant commissioner. Stressing the importance of good urban roads, he declared:

"Surveys have shown that rural traffic wants to get into—not around—cities. A wheel-like system of urban highways is essential to good transportation in and around urban centers.

Tuttle also urged an "overhauling" of state highway departments with a view toward getting increased compensation for personnel, together with securing increased personnel for needed administrative and technical work. Such increases in salaries and personnel are of "prime importance," he asserted.

Missoula, Montana, was tentatively chosen as the site of the 1947 convention, scheduled for July of next year.

Conference with contractors

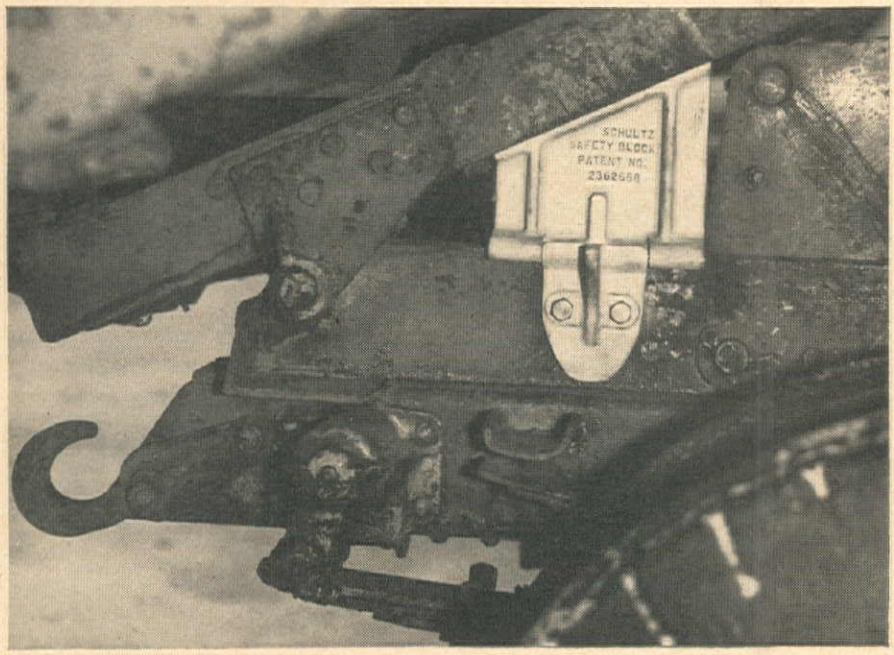
A special conference between state highway engineers, officials of the Public Roads Administration, and representatives of the Associated General Contractors was held during the Salt Lake City meeting to discuss various problems which have arisen in connection with contract construction during recent months. Principal topic was the apparent lack of agreement between contractors' bids and engineers' estimates.

In this connection it was pointed out that present construction prices are lower than those of 1920 when considering mile for mile completed cost of roadways, in spite of the fact that wages have doubled in the same period. Further, the 1940 base, which was taken arbitrarily as a foundation for price increases, is hardly a fair year since cost studies indicate that contractors' profits in that year fell as low as 1½ per cent as compared to 8-9 per cent in 1939. Among the factors contributing to the increased costs of today were listed uncertainty of material prices and deliveries, uncertainties as to future wage rates and working conditions, drop in efficiency of labor generally, and lack of really skilled labor.

Remedial measures suggested were simplification in design, elimination or reduction of hand work such as sloping, rounding slopes, hand-finishing concrete surfaces and the like. The Public Roads Administration announced that contracts could be approved locally for awarding where bids ran 35 to 50 per cent above the engineer's estimate instead of the former 35 per cent ceiling. Where bids were in excess of 50 per cent above the estimates, P.R.A. would consider approval in cases where the engineers believed the higher costs could be justified.

HOW IT WAS DONE

JOB AND SHOP TIPS FROM THE FIELD



Dump Truck Safety Block Saves Lives

ONE OF THE MOST serious hazards recognized by dump truck operators is that of creeping or falling truck beds catching men working underneath. This type of accident has happened enough to demand a construction safety order which requires the insertion of a block under a raised truck body before working on it.

To simplify the application of this safety practice, the B. F. McDonald Co., West Coast manufacturers and distributors, is introducing a new dump truck safety block. Made of rustproof, copper-alloyed aluminum, the blocks are bolted permanently to the dump bed of the truck, one on each side. When the truck bed is raised they are flipped into position, photo at left. They can't slip, and it's unnecessary to lower the hoist or bed onto the safety block for adequate grip. They are made for both heavy and light trucks.

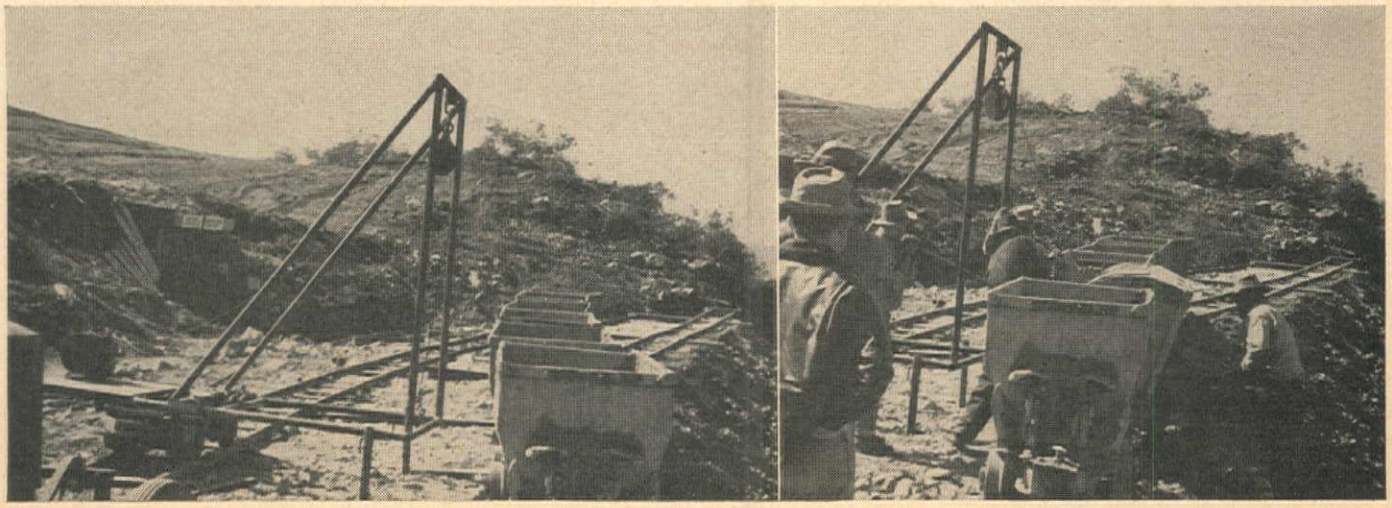
Water System Communication Plan

LACK OF INSTANT communication facilities to report mechanical difficulties of a city water system to a headquarters point so that repair crews may be sent immediately is an urgent problem.

At the Wardlow watershed and plant, main source for Long Beach, Calif., water system, a central control communications system was installed (photo at right) which gives immediate amplified-voice communication over the entire plant area. The system consists of a master station and selector at the central desk, two trumpet speakers to cover the outside yard areas and eight substations.

The Executone master station and selector were placed in the center panel of a specially constructed communications desk. On the right side, lights show location of cars out on emergency calls, and a short-wave transmitter operates to the City Hall several miles away.

MINE CAR DUMPING RIG employed by J. S. Barrett, contractor, on the Red Mountain Tunnel of the San Diego Aqueduct (see article on tunnel construction, page 85, this issue). Granby type cars are used in the work; they are filled by mechanical mucking machines and shifted by "cherry pickers" at the working face. At the dump, this A-frame dumping device is used for unloading. A hook is attached to the under side of the car carriage and the cable tightened by the air tugger on the back platform. The car is righted by hand. The tipping device is mounted on wheels on a parallel track so as to be easily movable. Surface rock contained an altered feldspar which produced a sticky clay muck, but the face rock is hard granite gneiss, which dumps easily. Barrett, Newport Beach, Calif., contractor, is subcontractor under S. A. Healy, White Plains, N. Y., prime holder.



Construction Design Chart

LXXIII . . . Fixed End Moments in Beams with Uniform Load

By JAMES R. GRIFFITH
James W. Carey & Associates
Seattle, Wash.

THERE IS A definite trend toward the use of higher allowable working stresses in structural framing materials. This is no doubt justified on the basis of better production controls, increased knowledge of materials due to research, and more accurate methods of design by consideration of full continuity. Back in the old days, a railroad signal bridge was designed as a truss supporting the vertical loads. The legs were designed as columns to support the truss, and to withstand horizontal wind loads. Finally knee braces were added, apparently for good measure. When we designed the catenary structures and signal bridges for the Illinois Central Chicago Terminal electrification as stiff frames by the old conventional method of slope deflection in 1924, the saving of material was hard to believe. Yet when actually built, the signal department reported that the lighter structures were more rigid than those of former design.

The Joint Committee Report (1940), par. 801b, states: "In regard to the elastic frame theory the committee takes the position that the design of a monolithic frame as an aggregation of isolated members is not tenable." The American Concrete Institute Building Regulations For Concrete (1941) par. 701a, states: "All members of frames or continuous construction shall be designed to resist at all sections the maximum moments and shears produced by dead load, live load and wind load, as determined by the theory of elastic frames."

When the simultaneous equations of the slope deflection solution became too involved on the Illinois Central problems, we adopted the model analysis which was the first commercial application of the Beggs deformiter equipment. At the time, we did not have available the method of distributed moments so ably presented by Prof. Hardy Cross[1]. The method of distributed moments, with devious abbreviations and modifications by others, has gained tremendous popularity. Basically, each beam or unit is first considered as a single beam with fixed ends. It then becomes necessary to compute the end moments for all fixed end beams under existing loads. Various authorities have presented tables giving the fixed end moments for conventional loadings [2,3].

The accompanying chart is one of a series to be presented for use in the method of distributed moments, giving the various moments in a fixed end as well as simple span beam. This particular one has been prepared for uniformly distributed loads. A straight line intersecting all scales is necessary for a solution. I have drawn a solution line on the chart for the following conditions.

Given: Uniformly distributed load = 3.3 kips per ft.

Beam span = 16 ft.

On the chart at the intersection of the solution line with the other scales will be found the following values:

End shear = 26+ kips,

Fixed end
Max. (—) Moment = 70 ft. kips,
Max. (+) Moment = 35 ft. kips,

Simple span
Max. (+) Moment = 70 + 35 = 105 ft. kips.

As a check on these values, we then have by formula

$$\text{End shear} = \frac{wL}{2} = \frac{3.3 \times 16}{2} = 26.2 \text{ kips},$$

Fixed End Beam

$$\text{End moment} = (-)\frac{wL^2}{12} = \frac{3.3 \times 16^2}{12} = 70.3 \text{ ft. kips},$$

$$\text{Mid-span mom.} = (+)\frac{wL^2}{24} = \frac{70.3}{2} = 35.15 \text{ ft. kips},$$

Simple Span Beam

$$\text{Max. Mom.} = (+)\frac{wL^2}{8} = \frac{3.3 \times 16^2}{8} = 105.315 \text{ ft. kips}.$$

1. "Continuous Frames of Reinforced Concrete," Cross & Morgan, John Wiley & Sons, Inc.
2. "Reinforced Concrete Design Handbook," American Concrete Institute.
3. "Continuity in Concrete Building Frames," 3rd Edition, Portland Cement Association.

NEWS OF WESTERN CONSTRUCTION

JULY, 1946

Sewage Works Association Criticizes "Ozone" Promotion

RECOMMENDING that any claims as to the ozone method of sewage treatment made by proponents of the method be rejected until success of the system can be proven by operation, the Pacific Northwest Sewage Works Association last month sent copies of its special committee's report to all officials of the cities and towns in Washington, Oregon, and Idaho. Behind the committee report, and in fact formation of the committee, is the recent invasion of the fertile Pacific Northwest sewerage field by a commercial concern promoting a new and relatively untried method of sewage treatment.

Since early this year representatives of an organization known as Amozone of Oregon with apparent backing of a Chicago, Ill., firm known as the American Ozone Co. have been carrying on an intensive selling campaign among city officials of the northwest states in an effort to convince those officials that adoption of the ozone method of sewage treatment would be advantageous. As a result of this campaign and the construction of a plant at West Kelso, Wash., a committee to investigate the merits of the method was appointed by C. V. Signor, then president of the Pacific Northwest Sewer Works Association.

Headed by R. E. Koon, consulting engineer of Portland, the committee membership included R. G. Tyler, professor of sanitary engineering at the University of Washington, Carl E. Green, consulting engineer of Portland, Fred Merryfield, professor of sanitary engineering at Oregon State College, Curtiss M. Everts, Jr., Oregon State Board of Health, and H. C. Clare, Idaho Division of Public Health. Two advisers assisted the committee in its investigation, David B. Charlton of Charlton Laboratories, Portland, and Roy M. Harris, Washington Department of Public Health.

The committee report, approved by the association at the annual meeting in Gearhart, Ore., May 22, 1946, arrived at the conclusion that although ozone would undoubtedly destroy the organic matter in sewage provided sufficient quantities were used and effective methods employed, no important data to support statements of efficiency had been submitted. The committee membership recommended that if and when the plant at West Kelso is finished and operating in a manner satisfactory to the builders, a thorough investigation of its operation be made by competent technicians. Pending such investigation cities should be discouraged from entertaining proposals which claim ozonization as the principal means of sewage treatment. The final recommendation stated in part ". . . to advise officials against the making of any contract for a system of sewage treatment and disposal which is not accepted by state health officers on the basis of adequate design and as being of a type which experience has shown to be reasonable in cost and successful in operation."

Copies of the committee report have been sent to officials of all cities and towns in Washington, Oregon, and Idaho, together with a statement from the association outlining the background of the committee members and strongly urging that the recommendations of the committee be followed. Continuance of the committee's activities was authorized at the association meeting, and it is expected that the technical investigation will be conducted and results made available to the public as soon as possible.

RIBBON FOR ENGINEER-CAPTAIN

CAPT. G. A. DUNCAN, public works officer of the 13th Naval District in Seattle and ranking captain of the Navy's civil engineer corps, is awarded a commendation ribbon with bronze star for carrying out unprecedented expansion of district shore activities for support of forces afloat, by ADM. RANDALL JACOBS, commandant.

More Power Sought In Arizona Drought

EMERGENCY MEASURES are being taken by the Bureau of Reclamation to alleviate a serious power shortage in central Arizona, it is announced by Regional Director E. A. Moritz of the Bureau's Region III.

Power production at the Salt River hydroelectric plants near Phoenix is falling off rapidly as reservoir levels drop, and more power is needed for pumping irrigation water from large wells in the area, said Mr. Moritz.

The emergency program includes the following measures:

1. Temporary installation of a 10,000-kw. railway-mounted steam plant owned by the Navy and now located at the Mare Island Navy Yard, Calif. The equipment will be moved to the Phoenix area immediately.

2. Provision for the generation and importation of additional power from "standby" steam generating plants in Southern California.

3. Pooling of all power generating facilities, including private power companies, in the area through the interconnected transmission system, thus making maximum power for irrigation pumping available in the most critical areas.

"It has been estimated that power production for the affected areas without outside aid will be about a hundred million kilowatt-hours short of require-

ments this year. The present and this anticipated shortage requires drastic steps," declared Mr. Moritz.

There are six storage reservoirs providing water for 1,400 mi. of canals and laterals on the Salt River Project; however, large sections in the area depend on 188 wells with electric pumps.

Supplemental power for the Phoenix area is supplied by hydroelectric plants on the Colorado River. Insufficient snowfall in the mountains and lowered rainfall have brought about a less intensified but similar condition in the Colorado River watershed. Secondary power production has been halted at Boulder Dam since the level of Lake Mead is low, but Lake Havasu behind Parker Dam is being held at the highest possible level consistent with safety and minimum flood control requirements to permit maximum power production during this critical period. The Siphon Drop powerplant near Yuma will also be maintained in operation.

Southern California has no readily available power for transmission into the area; however, certain "standby" steam plants are available for emergency use and it should be possible to obtain some aid from this source. The amount of power that can be transmitted into Arizona from Southern California will be limited by the existing 33,000-kva. transformer bank linking the Parker System with the transmission lines of the Metropolitan Water District of Southern California. A 90,000-kva. bank is under construction but will not be ready before June 1947.

Army Engineers $25,000,000 Alaska Construction to Start This Summer

CONSTRUCTION will commence this summer on projects totaling nearly $25,000,000 for architect-engineer and construction services for postwar Army Engineer construction in Alaska, it was announced in Seattle last month by Colonel James D. Lang, District Engineer, Alaska District, U. S. Army Engineers. Work will be located at Ladd Field and Fort Richardson.

Negotiated in the Office, Chief of Engineers, Washington, D. C., with details completed in Seattle, contract awards went to Fay, Spofford & Thorndike of Boston for architect-engineer services on a cost-plus-fixed-fee basis for approximately $900,000, and to Birch-Johnson-Lytle, Seattle, for construction services on a cost-plus-fixed-fee basis for approximately $24,000,000. Birch-Johnson-Lytle is a joint venture of S. Birch & Sons Construction Co. of Great Falls, Mont., Al Johnson Construction Co. of Minneapolis, Minn., and C. F. Lytle Construction Co. of Sioux City, Iowa.

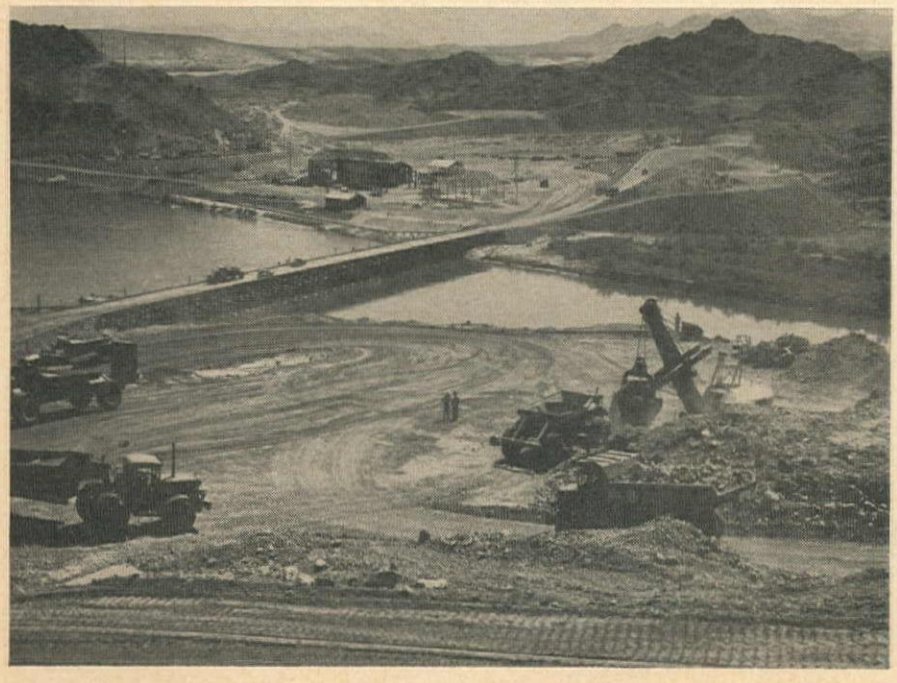
Both the contractor and the architect-engineer will maintain offices in the Textile Tower, Seattle, with Roy Cheney, manager for Birch-Johnson-Lytle, and B. A. Bowman, manager for Fay, Spofford & Thorndike. The Seattle District U. S. Army Engineers will assist the Alaska Engineer District with special liaison services under Major Walter Little, liaison officer, for the construction program. Services include recruiting of engineering personnel for the Alaska District and assistance with supply, engineering, contract administration and auditing.

Permanent housing facilities to be built under the new contracts at Ft. Richardson will include quarters for 104 military families, bachelor officers quarters, a 400-man military mess hall, enlisted men's barracks, civilian family quarters, civilian bachelor quarters, a 400-man mess hall for civilians and rehabilitation of existing buildings. Technical facilities include a 150-ft. by 500-ft. warehouse, gas and fuel storage and plane parking areas.

Facilities expanding Ladd Field, Alaska, will include temporary housing for 1,000 men and permanent housing facilities including expansion of hospital facilities, a 1,000-man military barracks, quarters for 92 military families, bachelor military quarters, bachelor civilian quarters, quarters for 48 civilian families, a 250-man civilian mess hall and a 250-man military mess hall. Technical facilities include two warehouses, one 120 by 200 ft. and one 120 by 220 ft., a 200 by 300-ft. hangar, gas storage, parking areas and rehabilitation and relocation of existing buildings.

BEGINNING CONSTRUCTION OF DAVIS DAM TO CONTROL COLORADO RIVER

DUMP TRUCKS are loaded with material excavated from the diversion channel on the Arizona side of the Colorado River at Davis dam site and haul it to the Nevada side for storage. The excavated material will be graded and placed later in the Bureau of Reclamation's earth and rock-fill dam. More than three million cubic yards of excavation will be required for the diversion channel and power plant area. Utah Construction Co.'s shop and warehouse buildings are shown under construction.



Missouri Basin Corner Monumenting Under Way

EIGHTEEN survey parties have been assigned to reestablish section and quarter-section corners of the original General Land Office surveys on portions of the area contained in the Missouri Basin development project.

The Cadastral Engineering Service, with headquarters in Denver, is in charge of the work, which entails remonumenting, with iron corner posts, all section and quarter-section corners of the General Land Office surveys, reestablishing missing or obliterated corner monuments and drawing new plats of townships.

In addition to forming the basis for determination of property lines on the units, these corners will serve in connection with the topographic surveys scheduled to be performed in the near future.

William R. Bandy has been assigned engineer in charge of the surveys and will maintain headquarters at Fort Peck, Mont.

Distribution of the parties is as follows: three parties on the Glasgow Bench unit near Glasgow, one on the Farmers Creek unit near Nashua, Mont., one at Wolf Point, Mont., three on the Powder River unit near Broadus, Mont., one on the Powder River unit near Arvada, Wyo., five on the Crosby-Mohall unit in North Dakota, three on the Oaho unit in South Dakota and one on the Grand River unit in South Dakota.

WASHINGTON NEWS

. . . for the Construction West

By ARNOLD KRUCKMAN

WASHINGTON, D. C.—Transmission lines paralleling the P. G. and E. facilities, apparently will be voted by Congress as an enterprise of the Bureau of Reclamation, to be built in the Central Valley. A decisive majority of Senators, most of them from the West slope, voted for the restoration of the appropriation of an additional sum of $4,572,000 for transmission lines and $1,500,000 for switchyards, to be constructed somewhere within the limits thus described in the amendment to the Interior Appropriations Bill: "Shasta to Delta switchyards, via Oroville and Sacramento, 230 kilovolt; Shasta to Delta switchyards (west side lines), 230 kilovolt; Keswick to Sacramento, 115 kilovolt; Contra Costa power distribution system, miscellaneous transmission, feeder lines and facilities, and substations." Sen. Pat McCarran, Nevada, who vigorously opposed the appropriation increase, pointed out: "The sums allowed for lines are not earmarked in this amendment, although the Congress has specifically earmarked all appropriations for this project ever since former Secretary of the Department of Interior, Mr. Ickes, ordered the Oroville line to be constructed **out of unexpended balances after Congress had refused to appropriate money for its construction.** The amendment does not specify how the $4,572,000 should be spent on the several lines listed in the amendment. None of the money is earmarked for any particular line. The Bureau (of Reclamation) would be free to distribute the money in any way which it pleased. **But, even more important,** this $4,572,000 would only be the beginning of a $44,000,000 expenditure for the construction of a transmission system which is not needed as a part of the project, and which would duplicate the transmission system which already completely serves the area.

"The only purpose of such duplication would be to set up a Government-owned system to take customers away from the private utility. The Government does not have to build this $44,000,000 transmission line, nor the $26,000,000 steam plant which the Bureau plans to construct in conjunction with this system in order to generate power. The Bureau's proposed competing power system would require an unnecessary Federal expenditure of $70,000,000."

The Senators from the Western States who made the appropriation possible are: Carville, Nevada; Cordon, Oregon; Chavez and Hatch, New Mexico; Downey and Knowland, California; Gossett and Taylor, Idaho; Hayden, Arizona; Magnuson, Washington; Millikin and Johnson, Colorado; Murdock, Utah; Murray, Montana; O'Mahoney, Wyoming. Those who evaded the vote were Morse, Oregon, and Thomas, Utah.

The sole member of the Senate from the Pacific West who voted against the appropriation was McCarran of Nevada.

The total vote in favor of the transmission lines was 39 against 31. The vote in favor of the appropriation was 44 against 19. The vote which caused particular surprise was the assent registered by Sen. Knowland, the Republican Senator from California. If the deal goes through both Houses, and the appropriation is finally validated, it is considered another victory for the smooth manipulators of the trends toward socialization who have successfully, by indirection in similar proceedings, committed the Congress to the huge Southwest Power enterprise, and other similar projects.

LATE WIRE

AS FINALLY passed by Congress, the Interior appropriation bill gives Reclamation $5,000,000 for general investigations, and these project funds: Boise-Payette, $2,782,659; Anderson Ranch Dam, $1,234,475; Minidoka, $1,000,000; Palisades, $650,000; Rio Grande, $650,410; Tucumcari, $360,675; Lugert-Altus, $2,664,610; Deschutes, $1,716,837; Klamath, $1,281,605; Provo River, $1,345,040; Yakima-Roza, $2,597,000; Kendrick, $1,985,000; Riverton, $3,520,550; Shoshone - Heart Mountain, $1,917,672; Gila River, $2,000,000; Davis Dam, $7,500,000; Central Valley, $12,685,622; Hungry Horse, $867,210; Columbia Basin, $18,000,000; Fort Peck, $932,893; All-American Canal, $5,000,000; Boulder Canyon operation and maintenance, $1,251,530; Boulder Canyon construction, $433,000; small projects, $525,520. Other agencies' appropriations were: Geological Survey, $2,898,672; Bonneville Power Administration, $12,470,000; Southwestern Power Administration, $7,600,000.

Sen. Hayden, chairman of the Senate-House conference committee, reported before passage that all appropriations deleted by the House for transmission lines had been restored. This is significant, showing wholesale trend toward power socialization, each transmission line being forerunner of expansion in an area. The haste of several conferees to get back home to electioneer persuaded Congress to avoid much of a fight for the reductions.

The law as enacted carried the highly significant Amendment 141, which empowers Reclamation Bureau to apply power revenues to cost of operation, maintenance, debt service of irrigation system, or any other purposes in aid of the irrigation system. This in effect wipes out debated law about 50-year payoff and 3 per cent interest.

A lobby investigation

It probably was not merely a coincidence that Sen. James E. Murray, Mont., the wealthy and earnest liberal zealot who heads the Senate Small Business Committee, made a stirring speech in the Senate denouncing those opposed to socialization of power resources, naming particularly organizations such as the National Reclamation Association, and its former mainspring, Floyd O. Hagie; and introducing Senate Resolution 287, which would provide $50,000 to investigate the "power lobby." It is not considered likely that anything Sen. Murray and his followers may do will finally cause the Congress to embark on this witch-hunt. The enterprise might be too full of dynamite for the friends of public power and socialization. If there is any investigation of lobbying and lobbyists, it will unquestionably be sweeping, more sweeping than any of the 82 which have gone before; and the weather-wise politicians on the Hill and in the Hollow are acutely conscious that the people want to know about **all** the lobbies, which would naturally embrace those curious people from the Federal Government agencies who virtually do nothing from one end of the year to the other except flutter, hover, and ubiquitously gadfly all over Capitol Hill; when Congress adjourns or recesses, they frequently "go in the field," where by more amazing coincidences they apparently follow close on the heels of some members of the Congress who need help, or need attention of another kind.

The lobby investigation will unquestionably develop keen interest in the Central Valley. There would undoubtedly be an effort to find out if it is true that a consulting engineer may be employed by an agency such as the Department of the Interior, or by a subordinate part of an agency such as the Bureau of Reclamation, to educate the members of Congress to the viewpoint from which stems a policy which might be in conflict with the social, political, and economic point of view of people in an area such as Central Valley, Columbia Valley, Missouri Valley, and other parts of the West. If it is true that such "educators" are maintained by Federal Government agencies such as, for instance, the Bureau of Reclamation or the Department of Interior, or the Department of Agriculture, the Rural Electrification Administration, the Office of Price Administration, even the Army and the Navy, the question would logically arise why it is evil for the people, and their business units, to maintain similar "educators." It is no secret in Washington that there are representatives of various Federal Government agencies and departments, constantly present in the Capitol who often have desk space, or even office facilities, either in the Capitol building itself or in the House or Senate Office Buildings.

These Government men—and women—sometimes are designated as legislative liaison consultants; or, as consulting engineers, or economists, or statisticians, or public relations experts. They usually have attractive personalities, are good mixers, and good guides for harassed members of the Congress who do not know where to turn for responsible and reliable data and counsel. Sometimes, even, some of them are reported to have demonstrated to Congress, in connection with a particular measure under urgent consideration, what the people "out in the field" may think about a debatable piece of legislation, by causing the people "in the field" to turn loose a barrage of communications by 'phone, telegraph, or letter; or even by bringing delegations of homespun voters from critical points to impress upon the members of Congress that the point of view of the Government counselor is correct. There are cynics here who make the almost unthinkable suggestion that the expenses of some of these delegations (which they call "pressure groups"), sometimes are paid out of Government funds. If an investigating committee, for instance, should find that taxpayers' funds have paid for the junket of a number of people to Washington to oppose the wishes of other people in a place such as the Central Valley, or the Missouri Valley, or elsewhere, Congress certainly would have bared to its scrutiny some strange uses of the funds provided to operate the functional machinery of Government. It is quite possible your Representatives and Senators in Congress will launch such an enquiry if you manifest enough real interest. Obviously, if you do not think this is any of your business, you cannot blame your Congressmen for thinking as you do.

Robinson gives in

The foregoing may supply some illumination for what follows. Persistence is a virtue that does win. The Commissioner of Reclamation and the Assistant Commissioner, and all the other greater or lesser stars in the firmament of the Bureau seem to have worn down Congressman J. Will Robinson, of Utah, to that point where he introduced as a bill (H. R. 6574), their proposals to change the law which now compels the Bureau —despite its solicitor's interpretation— to retire the power obligations of an irrigation underwriting in 50 years, and to pay 3 per cent interest annually. If the new bill, cooked up by someone in the Bureau, really is enacted, the 3 per cent would be collected from those who must pay it, but the money would not be paid into the taxpayers' Treasury of the United States to lift some of the taxpayers' burdens, but would be handed to those who conduct the nation's irrigation business to spend. It might be for more irrigation facilities, or for more overhead connected with the development or for public relations involved in the irrigation business. It has been remarked on the Hill that if a private utility proposed a fiscal subtlety of this kind the SEC would probably put the private utility out of business. Mr. Robinson has made clear he does not imply support of the bill by introducing it, he simply is the head of a committee and wants it out in the open for discussion.

Other appropriations

Navy will spend $4,639,659,000 beginning July 1, which includes $805,760,000 for aircraft and their appurtenances; $275,312,000 for expenditures by the Bureau of Yards and Docks, including $60,052,000 for public works outside the United States, mainly in the Pacific; and $83,000,000 for public works in this country. There is an item of $250,000,000 for research and development, the greater part of which probably will be spent in the West. The Army budget for the same period is $7,091,034,700. The Air Forces will purchase approximately 1,036 new planes and gliders, and spend $388,776,454. Over $175,000,000 was provided for atomic energy development. The House enacted the bill, H. R. 6407, supplying $519,000,000 to the U. S. Army Engineers for rivers and harbors work the next fiscal year. Among the larger projects are the deep water channel in the Sacramento River, to cost $10,742,000; the San Diego and Mission Bay project, $5,858,000; and the Coos Bay, Oregon, improvements, $5,689,000. The bill also includes items for Napa River, Calif.; Columbia River; Honolulu Harbor; Salt Lake, near Garfield, Utah; Point Pinos to San Francisco Bay area; Pendleton, Calif.; Anaheim, Calif.; Port Hueneme, Calif.; Drift Creek, Ore.; Duwamish Waterway, Ore.; Skagit Bay, Wash.; Seattle, Wash.; Olympia Harbor; and improvements in Alaska at Hydaburg, Angoon, Oliver Inlet, Seymour Canal, Tenakee, Pelican, and Gustavus; also at Hilo and Kawaihae, Hawaii. The Flood Control bill, passed by both Houses, provides $950,000,000, including projects in the Great Salt Basin, Utah; Jordan River, Utah; Magna, Utah; Little Valley, Wash. Los Angeles-San Gabriel Basin and Ballona Creek is listed for $25,000,000; Salinas River, $1,905,000; the Willamette Basin, $35,000,000; various items in Alaska total $438,000. The Missouri River Basin is provided with another $150,000,000.

Highway outlook

Federal Works Agency reported, upon return of Public Roads Commissioner Thomas H. McDonald and Maj. Gen. Philip B. Fleming from a world tour, that reconstruction of Philippine highways will cost over $100,000,000. All main roads must be rebuilt, and most bridges must be reconstructed. Road building materials are scant, in the islands, and the engineers predict most of the necessary inventory of cement and other materials must be shipped from the Pacific Coast. Road-building machinery is reported more than plentiful in the Philippines. Reconstruction is calculated as at least a five-year program. It is expected the U. S. will supply aid on the basis of 50-50 share by the Philippine Commonwealth. It is planned shortly to establish an office of the Public Roads Administration in Manila.

Army Engineers, at the direction of the President, also have made studies for a report on the rehabilitation, as well as expansion, of ports and harbors in the Philippines. The Army party was headed by Col. Charles L. Hall, and included Lt. Col. Harry Pockras, Benjamin R. Wood and Clarence F. Wicker. Congress has provided authorization for an appropriation of $120,000,000 to help the Philippine Government build highways, restore and enlarge ports and harbors, reconstruct damaged public buildings, and establish health facilities.

Second apportionment of Federal-Aid Highway Funds include $5,765,114 for Arizona; $22,301,197, California; $7,681,386, Colorado; $4,966,889, Idaho; $4,851,531, Nevada; $7,955,797, Montana; $6,424,039, New Mexico; $7,083,321, Oregon; $4,658,553, Utah; $7,393,816, Washington; $4,823,448, Wyoming; $2,221,541, Hawaii. Funds became available July 1, and may be used for specific projects for two years.

Miscellaneous

Airport aid applications will be authorized by October 1. Congress has directed the CAA to submit plans for development of class 4 or larger airports. CAA has made clear that the new Federal aid airport act includes construction of seaplane bases. . . The St. Lawrence Seaway bill was brought out on the floor of the Senate, but there seems little likelihood it will come up for debate at this session. . . Sen. Downey, Calif., is expected to succeed the late Sen. Bankhead as chairman of the Irrigation and Reclamation Committee. . . Tidal Lands title clearance was approved by the Senate Committee, and will probably pass, when and if the bill comes up for consideration. The Supreme Court, in the meantime, has announced it will rule on Federal claims to coastal tide lands with oil after arguments are submitted in October. . . Columbia Valley Authority hearings were called off by the Senate Committee because the time allotted was insufficient to give all applicants a chance to be heard. It is assumed here the fight will flare vigorously in the Fall.

Late in June hearings had begun in the House Committee on Irrigation and Reclamation on the issue created by Scattergood of Los Angeles; he seeks to secure an adjusted Colorado River compact to assure Southern California's water, basing his contentions upon the Mexican Water Treaty and the recent report by the Bureau of Reclamation on the new Basin-wide studies, covering the potentialities of the river and its tributaries for new projects. . . The death of President Ora Bundy of the National Reclamation Association is expected to further delay the selection of a successor to Floyd O. Hagie, now executive vice president of the Seattle Chamber of Commerce. Robert W. Sawyer, of Oregon, succeeds to Mr. Bundy's office. . . The severity of the drought in Arizona, the shut-down of the Coolidge Dam, and the potential shut-down of the Roosevelt Dam, has aroused much comment here on the uncertainties presumably inherent in this type of water supply. Much is made of the aid required from the Navy's 12,000-kw. mobile power plant at Tempe, Ariz., and the cry for help to the private utilities.

Low Bidders Win Two Latest Friant-Kern Canal Contracts

WITH AWARD on two more Friant-Kern Canal contracts totaling $8,424,409, the drive to meet the critical need for irrigation water in the San Joaquin Valley of California moves another step forward.

The authorized construction will carry the Friant-Kern Canal 42 mi. beyond the Kings River siphon-crossing, within 83 mi. from its final goal, heralding relief for hundreds of thousands of acres of some of the most highly developed productive land in the Nation, which now is suffering from a shortage of irrigation water. Present irrigation supplies from wells are inadequate to maintain full production.

The two contracts awarded by the Bureau of Reclamation provide for construction of the Kings River wasteway and Kings River siphon on the Friant-Kern Canal, and 42 more miles of the canal itself extending to the Kaweah River.

The 156-mi. canal will bring water from the reservoir of Friant Dam into the upper San Joaquin basin of the Central Valley. It will cross the Kings, Kaweah, and Tule Rivers and discharge into the Kern River near Bakersfield.

One contract covering the wasteway and a siphon and 13.2 mi. of the canal was awarded to Morrison-Knudsen Co., Inc., and M. H. Hasler, joint bidders, of Los Angeles, Calif., on their low bid of $3,344,432. The other contract for approximately 29 mi. of the canal will go to the Arizona-Nevada Constructors, Phoenix, Ariz., on their low bid of $5,079,976.

The latter concern is a joint venture composed of six companies and individuals: S. J. Groves and Sons Company, Inc., a Minnesota concern; Tanner Construction Company, Lee Moor Contracting Company, and Bowen and McLaughlin, all Arizona firms; Leo G. Lynch, Phoenix, and L. M. White, Tucson, Ariz.

The wasteway will be located at the Kings River, approximately 18 mi. east of Fresno, and will consist of a concrete gate structure and flume section in the right bank of the Friant-Kern Canal immediately upstream from the siphon. A wasteway channel will lead into the Kings River below the canal. The siphon will be a reinforced concrete tube 24 ft., 3 in. in diameter, with inlet and outlet structures which will carry the Friant-Kern Canal under the Kings River for a distance of 3,048 ft.

The 42 mi. of canal to be built extend to about 10 mi. east of Visalia. About 9 mi. will be concrete-lined. Portions of the balance will require compacted earth lining. The earth section will have a bottom width of 64 ft., a top width of 130 ft., and an average water depth of 16 ft. The concrete-lined section will have a bottom width of 36 ft., a top width of 80 ft., and an average depth of 17 ft.

Pacific Islands Made U. S. Engineer District

MANILA, OKINAWA and Honolulu districts, comprising the Western Ocean Division in the Army Engineers program, have been added to the 46 districts under Engineer control.

Lt. Gen. Raymond A. Wheeler, chief of engineers, by authority of the Secretary of War, created the new division. Honolulu district, detached from the Pacific division, will embrace the Hawaiian, Line, Gilbert, Marshall, Caroline, Marianas, Bonin, Wake, Marcus, Johnston and other islands lying between the 159th meridian, east longitude, and 108th meridian, west longitude.

Okinawa district will include the Ryukyu Islands of the Japanese Archipelago while Manila district will have headquarters in Manila and include the islands of Philippine Archipelago.

The newly-created Western Ocean Division will maintain headquarters in San Francisco, with Col. George Mayo as acting division engineer. Col. Mayo holds the same position in Pacific Division.

In carrying out their peacetime mission of improving rivers and harbors, flood control and other construction, Army Engineers now have jurisdiction in 12 divisions. It is planned the new division will care for military construction in the Pacific.

Inter-Agency Group Gets Together On Problems of Boise River Basin

BOISE RIVER BASIN problems were the subject of discussion by members of the Columbia Basin Agency Committee at the second meeting of that organization on June 5 in Boise. Headed by Col. Theron D. Weaver, division engineer, North Pacific Division, U. S. Engineer Dept., the committee is made up of members representing Federal agencies with a major interest in the development of the Columbia basin. In addition to Col. Weaver, committee members include R. J. Newell, director of Region I, Bureau of Reclamation, Robert W. Putnam, Department of Agriculture, Dr. Paul J. Raver, Bonneville Power Administration, and Lester S. Wing, Federal Power Commissioner.

Representatives of six of the seven basin states, usually the state engineer, attend committee meetings to take part in discussions and advise committee members of the interests of their respective states. Washington is not represented among the advisers due to Governor Wallgren's opposition to the organization. In addition representatives of various other Federal agencies with lesser interests in the basin sit in on committee sessions.

At the first meeting of the committee held in Portland May 10-11, problems of the Willamette Valley were the subject of discussion. The next meeting of the committee is tentatively scheduled for August 12-13 at Missoula, Mont. Principal function of the committee is to provide a vehicle for coordinated planning of multiple purpose project within the Columbia River basin.

MEMBERS OF the Columbia Basin Inter-Agency Committee who met in Boise to plan development of the land and water resources of the region are, left to right, ROBERT W. PUTNAM, Department of Agriculture; J. S. MOORE, Department of Interior; R. J. NEWELL, Bureau of Reclamation; ROY W. SCHEUFELE, U. S. Engineers and executive secretary; L. C. BISHOP, state engineer of Wyoming; COL. THERON D. WEAVER, War Department and chairman; DR. PAUL J. RAVER, Bonneville Power Administration; MARK R. KULP, reclamation engineer of Idaho; CHARLES E. STRICKLIN, state engineer, Oregon; LESTER S. WING, Federal Power Commission.

Time Tidal Wave Hits Foreseen from Records

TIDE-GAGE RECORDS made during the recent destructive "tidal wave" in the Pacific Ocean, which followed a severe marine earthquake in Alaskan waters, provide a basis for predicting the time of arrival at various points of waves of similar origin in the future.

The predictions depend on whether or not a large wave is actually produced. Submarine earthquakes cause such waves only in rare instances. The approximate epicenter of the submarine disturbance also must be known. This can be determined with fair accuracy by comparing the records of two or more first class seismological stations.

Records from tide stations at more than a score of Pacific Ocean points are now being analyzed in the Division of Tides and Currents of the Coast and Geodetic Survey. These stations extend from Alaska to Chile and include Honolulu and other outlying points as well as coastal installations. The records show the exact time at which the tide gages picked up the oscillations from the seismic sea wave and followed them over a period of hours.

Computations made by tide experts of the Survey, based on known ocean depths, which largely govern the speed of such waves, fixed the time of arrival of the wave in Hawaiian waters within four minutes of the time shown on the record of the gage in Honolulu harbor. The average speed of the wave between the epicenter of the disturbance and Hawaii was computed at 500 m.p.h. Because of the great depth of water in the vicinity of the epicenter the maximum speed of the wave occurred close to that point and was computed at 600 m.p.h. As the wave approached land masses, where water depths are not so great, its speed was much slower.

One of the latest records received by the Survey was made on a tide gage operated cooperatively in the Harbor of Valparaiso, Chile, 8,000 mi. from the epicenter of the marine earthquake. This record indicates that the oscillations of the wave at Valparaiso were as marked as those recorded on a similar instrument in Honolulu harbor, only 2,300 mi. from the center of the disturbance.

The wave was recorded at Valparaiso 18 hours after its start, indicating that in the vast depths of the open Pacific it maintained tremendous speed over most of the 8,000-mi. journey. Survey experts computed the probable time required for the wave to reach Valparaiso and missed the exact figure by only 40 min.

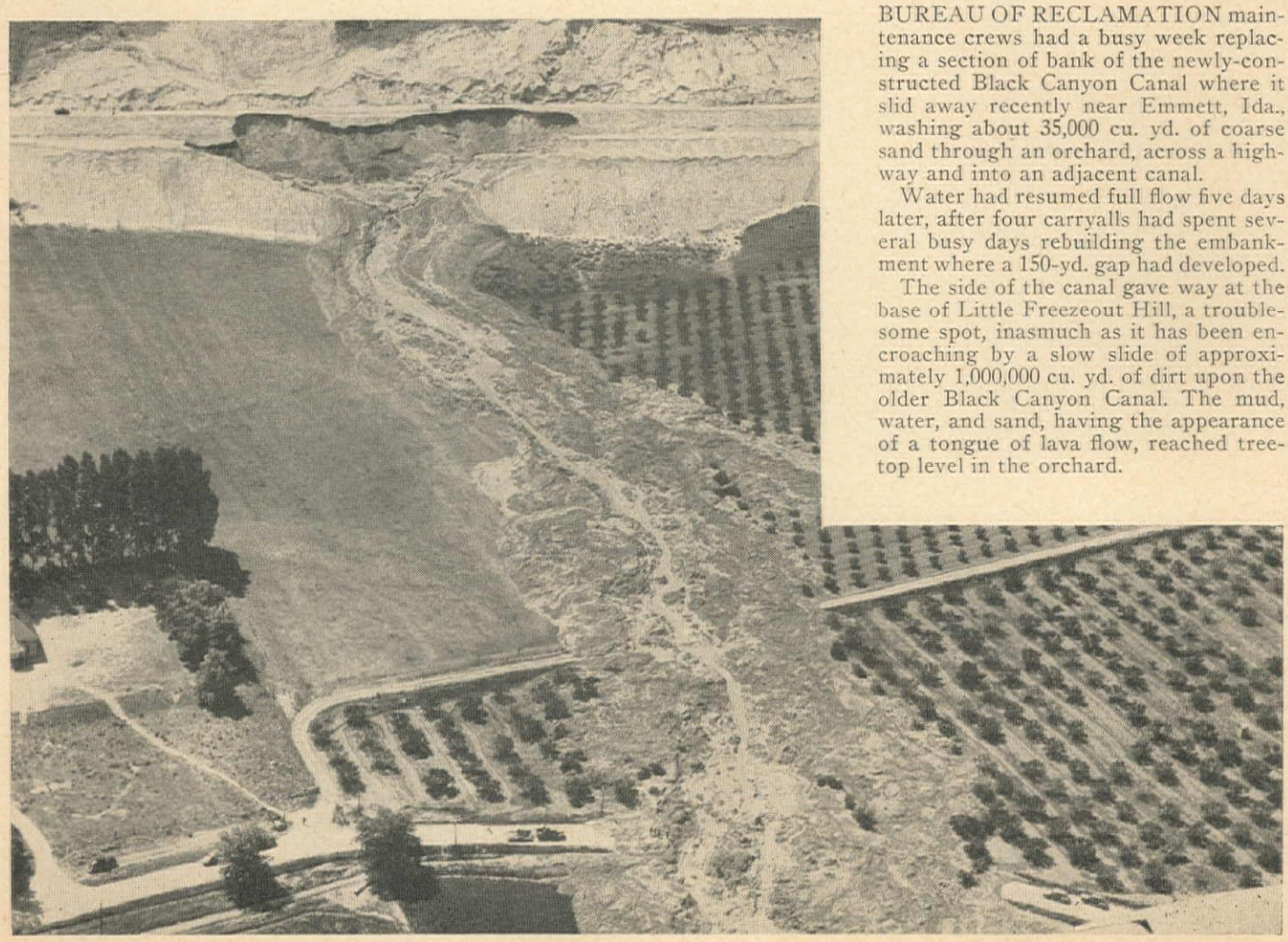
Utah Canal Ready for Final Concrete Lining

NOW THAT Deer Creek Reservoir contains more than a two-years' storage supply and the high water run-off on the Weber River has subsided, diversion of Weber River water through the Weber-Provo Diversion Canal has been discontinued and final concrete lining of the canal will be started, according to E. O. Larson, Region 4 director of the Bureau of Reclamation.

Scheduled for completion by Nov. 1, 1946, placing of the concrete lining will wind up construction work on the canal, with the exception of clay lining some sections, Mr. Larson said.

Preliminary work is already started in preparation for the concrete placing, and actual construction is expected to be under way in the near future. Some 4,400 ft. of the nine-mile long canal will be lined, including 600 ft. in the vicinity of Kamas and 3,800 ft. at the lower end of the canal before it joins with the Provo River. Concrete was placed two years ago on an additional 1,800 ft. of the canal in the vicinity of Kamas and the Fitzgerald drop.

Mud, Water, Sand Pour Over Orchard As Bank of Idaho Canal Slides Away



BUREAU OF RECLAMATION maintenance crews had a busy week replacing a section of bank of the newly-constructed Black Canyon Canal where it slid away recently near Emmett, Ida., washing about 35,000 cu. yd. of coarse sand through an orchard, across a highway and into an adjacent canal.

Water had resumed full flow five days later, after four carryalls had spent several busy days rebuilding the embankment where a 150-yd. gap had developed.

The side of the canal gave way at the base of Little Freezeout Hill, a troublesome spot, inasmuch as it has been encroaching by a slow slide of approximately 1,000,000 cu. yd. of dirt upon the older Black Canyon Canal. The mud, water, and sand, having the appearance of a tongue of lava flow, reached treetop level in the orchard.

PERSONALLY SPEAKING

L. N. McClellan, assistant chief engineer of the Bureau of Reclamation at Denver, and **S. E. Schultz,** chief engineer of the Bonneville Power Administration, Portland, Ore., are in Paris, France, as official Department of Interior delegates to the International Conference on Large Electric High Tension Systems just concluded there. This was the eleventh session of the conference, the last one in 1939. The purpose is to study production, transmission and distribution of high tension electric energy.

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Don E. Akins' appointment as city engineer of Ellensburg, Wash., has been confirmed by the city council; and Akins advanced the proposition that he supervise both Kittitas Co. and city of Ellensburg engineering work, which would be an experiment on cooperation of engineering facilities. His plan has not yet been formally acted upon by the board of county commissioners. Akins is county engineer, and served as acting city engineer after the resignation of **F. L. Breckon.**

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Col. Ernest W. Everly, New Mexico construction contractor for 15 years, has just left Albuquerque to return to China where he will be connected with the Chinese government as technical advisor to the Minister of Communications. Colonel Everly already has been awarded the Special Breast Order of the Cloud and Banner by Chiang Kai-Shek for meritorious service which "rendered valuable assistance to the Chinese government in setting up their war transportation board which controlled all traffic in China for approximately one year prior to V-J Day." He was U. S. Army Chief of the Highways Division and chief engineer officer in Services of Supply.

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North Coast Engineers, Inc., has opened office in Portland, Ore., as successors to DeWitt C. Griffin & Associates, civil and mechanical engineers. Griffin will continue to operate out of its old offices, according to **R. B. Lewis,** president of the new company, who formerly headed Griffin's Portland office. North Coast Engineers was incorporated by Lewis, a chemical engineer; **D. H. McGogy,** mechanical engineer, vice president; **Harry Hemperely,** electrical engineer and director, and **Harry R. Powell,** structural engineer and director. The firm is already doing engineering work on several of Oregon's largest projects.

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Milton H. Irvine, formerly employed by the Navy as a civilian engineer at Camp Pendleton in Southern California, has succeeded **Lee Nafzgar** as city engineer of Riverside, Calif. After 30 years with the city, Nafzgar retired, along with **A. E. Dayton,** field and office engineer, and **Glen Francis,** senior draftsman.

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Chester H. Steele, Butte, Mont., geologist, was elected president of the Montana Society of Engineers at the 59th annual meeting, succeeding **E. W. Schilling** of Bozeman. Other newly-elected officers are **Dr. S. R. Cooke,** first vice president; **R. E. Gibbs,** second vice president; **Carl Davis** and **W. F. Flynn,** trustees, and **Fred Schwanz,** secretary-treasurer.

COL. HARRY F. HANNIS has relieved LT. COL. REUBEN E. COLE as district engineer at the Albuquerque, N. M., Army Engineers. Col. Hannis has seen service in Hawaii, Manila, New Guinea and a number of U. S. posts. Col. Cole will continue with the district as executive officer.

E. W. Thorson heads a new district office of the Portland Cement Association in Denver, Colo., as district engineer. This office will be headquarters for the group's activities in Colorado and Wyoming, taking over the services of the Western Portland Cement Association. Thorson has been with the association since 1934 when he joined as a fieldman. In 1941 he was called to active duty in the Civil Engineer Corps, U. S. Navy. On his release in 1945 he became a structural engineer for the association in Minneapolis.

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Frank E. Cave, formerly assistant and acting bridge engineer of the North Dakota Highway Department, has been appointed chief bridge engineer to succeed **Clifford Johnson,** who resigned to enter private practice in Denver, Colo. Cave has been with the department since 1925.

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Maj. Douglas M. Pelton of Milwaukie, Ore., has been awarded the Army commendation ribbon for exceptionally meritorious service as chief of the Alaska Division of the Seattle U. S. Engineer district from Sept., 1944, to May, 1945. Pelton has now returned to contracting and construction at Milwaukie.

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H. O. Walberg, engineer from Skagit Co., Wash., was elected president of the Washington State Association of County Engineers at the 40th annual convention. Engineer **A. G. Hanson** of Klickitat Co. was elected vice president and **C. E. Neville** from Lewis Co. became secretary-treasurer. Retiring president of the organization is **H. L. Blanton.**

Frank Waldeck is now a civil engineer in charge of laboratory operations on concrete control, Delta Division, Region II of the Bureau of Reclamation. With the Maritime Commission during the war, Waldeck joined the War Assets Administration last March, and in April transferred to the Bureau of Reclamation with headquarters at Antioch, Calif.

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Dirk A. Dedel, design engineer in the dam section of the Bureau of Reclamation Denver engineering office, has been appointed regional progress control officer of the Bureau's Region III, and transferred to Boulder City, Nev. Dedel had been in the Denver office since 1934, where he supervised detailing, estimating and designing of spillway structures and appurtenant works.

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Walter A. Schwarz has been appointed resident engineer of Dorena Dam for the Portland District, U. S. Engineers. Dorena Dam is a unit of the Willamette Valley project and work was recently started at the site with award of a contract for relocation of a municipal water supply line and highway to Leonard & Slate and E. C. Hall, Portland. Schwarz will make his headquarters at Dorena, Ore.

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Harris V. Crawshaw is back with the Los Angeles Metropolitan Water District after spending several years with the Morrison-Knudsen-Twaits Co. Crawshaw, now on the engineering staff of the Operation and Maintenance Division, started on the Colorado River aqueduct project in 1926 and later was an engineer in the Distribution Division.

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W. W. Johnston, formerly regional director for the Bureau of Reclamation at Boise, Ida., has been named supervisor of project development on the million-acre Columbia Basin project in Washington, with offices at Ephrata. Johnston will direct the comprehensive program for the development of the project, exclusive of construction.

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Col. Warren E. Carey has been appointed by Gov. Earl Warren of California chief of the state master airport planning staff of the State Reconstruction and Reemployment Commission. Col. Carey, national authority on airports and air safety from Los Angeles, will direct a study of ways in which California can take advantage of the $18,000,000 allotted to California under Senate Bill 2.

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W. A. Beaubein, Phoenix, Ariz., contractor, was recently elected president of the Building Contractors of Arizona, succeeding **J. R. Porter. J. A. Brown** was elected first vice president; **H. C. Catlin,** second vice president; **Cecil Apperson,** secretary, and **Louis Karpe,** treasurer.

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George Schilling, acting city engineer of Sparks, Nev., during the war years and project engineer on five municipal jobs there since the war, has retired to enter private construction business. Schilling took **Calvin Dodson's** place as city engi-

neer when the latter was in the Army, and when Dodson returned, Schilling was named project engineer. He intends to specialize in heavy jobs, including bridge and dam construction, with headquarters in or near Sparks.

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Anthony Bous and **George E. Tripp** have retired from construction work and have established the Valley Tire Service at Redding, Calif. Bous was master mechanic for 14 years with **Frank T. Crowe** during the construction of Boulder, Parker and Shasta dams. Tripp also worked for Crowe for 14 years, being in charge of transportation at Parker and Shasta dams.

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S. Carl Smithwick, civil engineer of Spokane, resigned from the Portland Cement Association July 1. He was in charge of the territory of eastern Washington and northern Idaho for the association for the past 15 years. **R. P. Newland,** for the last two months Smithwick's assistant and formerly district engineer of the Washington Department of Highways, succeeds him as district engineer of the group.

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Maj. L. H. Henderson is a consulting engineer with the Los Angeles District, U. S. Engineers, but is a civilian now. He worked with the same district during his Army service and also from 1931 to 1939.

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John K. Rohrer has the job of district engineer for the newly-established Bureau of Reclamation Lower Colorado River District at Yuma., Ariz. Holding other key positions in the new district are: **Tom A. Clark,** construction engineer on the Gila Project; **C. S. Hale,** construction engineer on the Coachella Division; **W. A. Boettcher,** superintendent on the Yuma Project; and **J. P. Collopy,** superintendent on the Gila Project.

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Art Sauer, formerly employed by the Division of Architecture at Sacramento, Calif., and more recently a Navy commander in Seattle and Japan, has opened an office in Sacramento for his private practice of civil and structural engineering.

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S. W. Marshall, Jr., consulting engineer with offices in New York, Washington, Chicago and Dallas, has just opened a new one in Los Angeles. Engineer in charge of the new office is **J. L. Vaughan, Jr.**

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Mac Silvert, recently discharged from a captaincy in the Army Engineers, is now construction engineer with Ben C. Gerwick, Inc., of San Francisco. Silvert served in both the Pacific and Atlantic theaters overseas.

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Howard R. Williams, Salt Lake City veteran of five years in the Army, has been named manager of the Planning Survey of the Utah State Road Commission, succeeding **William F. Hughes** who resigned to accept a post with the Utah Sand and Gravel Co. Williams served as assistant to Hughes since March.

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Garth Duell, city engineer of Monrovia, Calif., and **Karel Tonglet,** water superintendent of the same city, tendered their resignations last May 7. Duell joined the city's engineering department in 1924, and Tonglet has been assistant engineer and water superintendent for 23 years.

J. LYLE CUNNINGHAM of Boise and HAROLD T. NELSON of Yakima have been appointed assistant regional directors in the Northwest office of the Bureau of Reclamation at Boise. Cunningham has been serving as an assistant to the director and Nelson was construction engineer on the Roza Division of the Yakima Project.

A. W. Trout is commissioner of streets and public improvements in the city of Cheyenne, Wyo., and is also superintendent of the Cheyenne branch of the Lock Joint Concrete Pipe Co.

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Ross Miller of Sacramento has secured the position of city manager of Santa Rosa, Calif., succeeding **Joseph Ladner.**

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Warland Cutler, office engineer at Washington State Highway Department district headquarters in Yakima, has resigned his position, and a successor has not yet been named.

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A. E. Niederhoff, a frequent contributor to *Western Construction News,* is now a senior engineer at the Inyokern, Calif., Naval Ordnance Test Station, where he is kept busy writing specifications for construction jobs there, among them the $5,000,000 laboratory building and the conversion of steel barracks into apartments.

COL. JAMES D. LANG has been named district engineer of the new Alaska Army Engineer District with headquarters at Anchorage. Lang has been in Seattle since 1938 when he came as resident Army engineer during construction of Mud Mountain Dam.

J. E. Hergert has been appointed assistant manager to **C. R. Wilcox** by the board of trustees of the Mountain Pacific chapter of the A. G. C. Hergert served nearly four years with the Air Transport Command in Pacific area headquarters as air priorities officer. Since his discharge he has been working for Northwest Airlines.

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Lt. Col. T. K. McManus has returned to his place as a partner in the Underground Construction Co., of Oakland, Calif., after being away more than four years with the Army. McManus' firm does general construction and utility work.

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Vincent D. Kemp is maintenance engineer in charge of operation and maintenance of Fern Ridge and Cottage Grove reservoirs, completed units of the Willamette Valley projects. Kemp will be located at Eugene, Ore.

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Capt. Harold R. Sanderson was recently appointed post engineer at Fort Douglas, Utah, replacing **Lt. Col. G. P. Long,** recently discharged from Army duty.

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Clyde V. Taylor has the presidency of the Associated Private Civil Engineers of Nevada. Newly-elected vice president is **E. P. Osgood,** and secretary-treasurer is **John Curran.**

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R. G. Hills and **L. W. Savage** are partners in the newly-established business of the Empire Construction Co. of Vancouver, British Columbia.

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Francis E. Bryan and **Joseph H. Murphy,** civil engineers, have opened a new office in Berkeley, Calif., for the practice of land surveying, estimating, and structural and hydraulic design.

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Ralph Brittsan, after 19 years as an engineer with Pacific Gas and Electric Co. in Stockton, Calif., has joined the staff of Stanley Electric Motor Co. of the same city.

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Robert Rasmussen, highway engineer with the Montana State Highway Department and the Bureau of Public Roads, has filed for nomination on the Republican ticket for Missoula County surveyor.

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Lt. Col. E. M. Hilton has returned to his former position as park engineer with the National Park Service at Yosemite National Park. During the war Hilton was post engineer at Camp Roberts, Calif.

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Charles S. Rippon is construction engineer for the Bureau of Reclamation on Kortes Dam, southeast of Casper, Wyo., the first unit of the Missouri basin development. Rippon was formerly chief inspector at Shasta Dam and engaged in tunnel improvement work at Boulder Dam.

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Kenneth B. Aldrich takes over as acting director of the Arizona Power Authority, after the resignation of **J. R. A. Hobson, Jr.**

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C. L. A. Bockemohle, structural engineer formerly of San Diego, recently opened an office for his practice in Los Angeles.

SUPERVISING THE JOBS

Ogden R. Odman is general superintendent for J. H. Pomeroy Co., Inc., San Francisco, on construction of Marysville-Yuba City bridge over the Feather River. State engineers on the job are **Harry Carter, Tom Bradley, Jack Neff, Gerry Brumund** and **Harry McCready.** Other important Pomeroy personnel are **J. N. Pomeroy, Albert R. Retzlaff, Fred A. Divita, Forest E. Davis, J. D. Nelson, John J. Kissinger, William F. Urban, Ben Lee, Joseph H. Turnipseed, Bert E. May, Jewell R. Brown, Paul Guerne, George W. Simmons, Frank C. Schott** and **James Stanton.**

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S. D. Fraser is supervising construction of the $700,000 Sears-Roebuck building addition going up at 5820 S. Vermont in Los Angeles. L. E. Dixon Co. has the contract and **Ray Pearson** is resident engineer. Carpenter superintendent is **Dean A. Thie;** carpenter foreman, **Don L. Davidson;** labor foreman, **Ben Morris, Jr.;** steel foreman, **Glenn Jakobsen;** electrical foreman, **Joe Watts,** and plumbing foreman, **George Smith.**

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Arne Royther is project manager on the construction of a three-story telephone building that P. J. Walker Co. of Los Angeles has been contracted to build at the corner of Ventura and Kester in Sherman Oaks, Calif. **L. S. Small** is resident engineer; **Les Barnett,** carpenter foreman; **Frank E. Smith, Sr.,** labor foreman; **J. B. Evans,** job engineer; **Barney Smith,** project auditor, and **Paul E. Davis,** paymaster and timekeeper.

On another P. J. Walker project for the Telephone Co. in Van Nuys, Calif., **Les Walsh** is project manager, **John Timmons** is job engineer, **C. H. Burkhalter** and **J. F. Simor** are carpenter foremen and **John Ford** is labor foreman.

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R. B. Reith is superintendent for Sacramento, Calif., area jobs that A. Teichert & Son, Inc., of that city are building. **Stanley Buchanan, Howard E. Gould, Wilfred Staring** and **Charles Coyle** all hold top positions in the same area. Key men on the Sacramento Signal Depot that Teichert is building with M. & K. Construction Co., are **John C. Gist, Harry Rotruck, R. J. Gwinn** and **A. J. Twohy.** On a state highway job in Monterey Co., **A. H. Bauer** is superintendent and **G. C. Weeshoff** is engineer. In the Stockton area **Martin Green, Jr.,** is superintendent, **Marc Fosgate, Jr.,** is engineer and **Herman Smith,** foreman. And at the Perkins Gravel Co. **Crawford A. Williamson** is superintendent and **B. F. Batchelor** is master mechanic.

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Glenn Fredrickson is supervising construction of Vacaville-Dixon California state highway work for Fredrickson Bros. of Oakland. **Peter J. McHugh** is his assistant and foremen are **Fred Butler, Ray Austin, A. J. Ingwersen, Gene Dougherty, H. W. Keeler, O. B. McMullen, A. E. Nelson, Gus Wallin** and **W. H. McNutt. Howard H. Gibson** is office manager and **W. R. MacMaster** and **Ed Kilkenny** are timekeepers.

PAUL OLINGER, left, electrician for Grafe-Callahan Construction Co. of Los Angeles, and W. C. TERRILL, right, Navy inspector, at the west portal of San Vicente Tunnel of San Diego aqueduct.

Eugene P. H. Willett is general superintendent for Prepakt Concrete Co. of Chicago, Ill., on refacing and stabilizing the existing structure at Barker Dam, the source of water supply for Boulder, Colo. Dam superintendent is **Harold Brunyer** and assistants are **Hank Frizzell** and **Bill Holford.** Concrete superintendent is **Oliver Johnston,** expediter is **C. G. Pelley** and office manager is **Roy Settles.** Engineering for the Public Service Co. of Colorado, owners, is in charge of **R. E. Davis** of the University of California, and the resident engineer is **Fred Neelands.**

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William E. Cowan is general superintendent for Granite Construction Co. on a grading and paving job on Highway 101, south of Salinas, Calif. **L. L. Funk** is resident engineer, graders are **Fred H. Rehrman** and **Art Collins,** timekeeper is **Ralph J. Damm** and operators are **M. L. Shirk, Orville Smith, P. L. Brown, A. Benedette** and **E. S. Scott.**

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John W. Carrel is general superintendent for Dimmitt & Taylor on the grading and plant mix surfacing of 18 mi. of highway near Goleta, Calif. **J. C. Adams** is engineer for the State of California, **James H. Taylor** is resident engineer and **Walter S. Cooper** is project manager. Other key men on the job are **Todd A. Smith, H. B. Arnold, Robert Crouch, Robert Olive, Marvin Tehan, W. J. Curran** and **T. E. Condon.**

Homer R. Bosse and **John Fisher** are supervising the demounting, packing and loading of housing units at Vanport City, Ore., and Ogden Meadows housing project, Vancouver, Wash., respectively, for Daley Brothers, Belmont, Calif. Houses are being taken apart, crated and shipped complete with all facilities to various housing-shortage localities for re-erection for the Federal Public Housing Authority.

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W. W. Hoagland is acting as project manager for Hoagland Findlay Engineering Co. on the erection of a temporary chlorination plant in El Segundo, Calif., for the city of Los Angeles. The job is part of a $23,000,000 project which will be completed probably by the middle of August. **A. H. Veltzen** is general superintendent and **K. A. Salskov** is office manager.

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Jesse C. Moore is at Rawlins, Wyo., as general superintendent on a road job on the edge of Rawlins being done by Taggart Construction Co. of Cody. **Lloyd W. Taggart** and **C. B. McFarland** are foremen on the project, **Louis Corch** is labor foreman, and **R. C. Pennock** is office manager. **C. M. Smith** of Thermopolis is subcontractor on structures.

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M. R. "Morry" Gavel is in Pasadena, Calif., with Nordstrom & Anderson as general superintendent of construction of a three-story and basement, steel frame, office and warehouse building on Arroyo Seco Parkway. **Art Gavel** is general foreman, **Bill Jacobs** is steelworkers foreman, **B. A. Rautert** is labor foreman and **W. D. Coffey** is consulting structural engineer.

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Floyd A. McMahan is superintendent for John L. Surber Co. who have a crane and rigging contract from the Navy at Inyokern, Calif. **Robert J. Hildreth, Lonnie Wallace, G. L. Weisenberger, O. G. Chadwick, George E. Riddle, R. J. Rush, James A. Radford** and **C. E. Marty** are foremen. **E. J. Rabenberg** is office manager and **E. G. Brand** is his assistant.

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Mike Evans is with Big Horn Construction Co. of Sheridan, Wyo., as job superintendent on grading, draining and surfacing 8.1 mi. of Big Timber-Harlowton Rd. in Sweet Grass Co., Mont. **Jack Altig** is general superintendent on the $174,565 project, **Art Wood** is foreman and **John Wehr** is office manager.

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W. C. Hosack is general superintendent for The Austin Co. of Los Angeles on the Upjohn Co. warehouse and office building being built at Cahuenga Blvd. and Willoughby St. in Hollywood. **Avery J. Timms** is resident engineer; W. F. Williams, carpenter foreman; **E. J. Westlake,** labor foreman, and **N. W. Erwin,** office manager.

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Floyd Baker has returned to Hutcheson & Massey of Denver as field foreman, after three years as a major in the Army Engineers.

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C. A. Butterfield is general foreman on construction of a restaurant building at San Antonio and Atlantic Blvd. in Long Beach for contractor William C. McDean.

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Scotty Borthwick is general superintendent for Lembke Construction Co. of Albuquerque, N. Mex., on the telephone build-

ing going up there. **Dave Arnold** is engineer and **Louie Hesselden** is associate architect. **Ray Pearson** is piledriver and excavation foreman. The job, of structural steel set on 30-ft. by 8-in. steel piling, can only be worked on at night, because of having only one truck entrance which is in constant use during the day.

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Neal Saul is employed by J. E. Haddock, Ltd., of Los Angeles as general superintendent on golf driving range being built at Santa Monica and Wilshire Blvds. in Beverly Hills, Calif., for Loyola University. **H. Rollston** is general foreman and **Joe Petrotta** is dozer and blade operator.

On another J. E. Haddock building, the $700,000 administration building for Universal Studios in North Hollywood, **Roy Stonaker** is general superintendent and **H. C. Bailey** is general foreman. **L. J. Ward** is engineer.

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J. C. Henson, co-owner of W. J. Henson Construction Co. of Prescott, Ariz., is superintendent on 13.4 mi. of work on U. S. Highway 77, 12 mi. south of Holbrook, Ariz. **Angus Chadwick** is engineer for the state. The Al Green Co. are acting as project engineers. Other key men on this federal job are **Jack Orr** and **G. Bigaouette.**

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Otto Bonnesen is superintending grading and surfacing on separation and approaches on Bayshore Freeway at Santa Clara St. in San Jose, Calif. Fredrickson & Watson Construction Co. of Oakland was awarded the contract for $379,442. **J. Hurley** is grade superintendent and **Robert T. Calon** is timekeeper.

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V. C. Walden is general superintendent on all quonset hut contracts for J. D. Leftwich Construction Co. of Lubbock, Tex., and **Earl Martin** is superintendent on work at Boulder, Colo., where they are building 120 dwelling units. Other key men are **J. R. Ligon, Clarence Wood, George Hoos** and **Leon W. Feather.**

* * *

George Erno is general superintendent for Stanton & Reed of Los Angeles on the four-story office building being erected on Beverly Drive in Beverly Hills. His assistant is **Ed Enstram,** and **W. D. Coffey** is engineer on the all reinforced steel and structural concrete edifice.

* * *

Holding key posts with Lowdermilk Bros. of Denver on the Rams Horn Tunnel construction near Estes Park, Colo., are **Jack Guthrie, James Harding, Roy Kees, Wilbur Hall, James Mathis, Charles Phillips, E. L. Durham, A. M. Brown, Robert Harles, Andrew Lotis, Wilmer Lapp** and **Paul Walters.**

* * *

George Young is project manager on the portion of state highway under construction from Weed to Yreka, Calif., by Clements & Co. of Hayward. Superintendents are **Len Krull** and **Jack McGuire** and other top men are **Don Fraser, Bill Davis, Stan Pacheco** and **T. Dyer.**

* * *

A. F. Geiger is now in Bingham Canyon, Utah, as assistant superintendent under **G. M. Paulson** on construction of the Bingham and Magna railroad for Utah Copper Co. by Utah Construction Co. The railroad is approximately 18 mi. long and has four underpasses.

C. R. GETTY

C. R. Getty has the general superintendent spot at the new Beverly Hills, Calif., Ford Co. building on Wilshire Blvd. Being built by Los Angeles contractor C. L. Peck, this will be one of the most modern automobile showrooms in the country. It will have a full basement garage with a ramp entrance. The underpinning required to support the adjoining building was installed in alternate sections to prevent stress and strain. Carpenter foreman on the structure is **George H. Etter,** superintendent of steel is **George Paul,** ironworkers foreman is **Harry B. Patton** and general field superintendent for Peck is **A. G. Buchanan.**

Al A. Merrick, formerly with Del E. Webb Construction Co., is now cost engineer and paymaster for Peck who is erecting several large buildings at the Broadway-Crenshaw shopping center in Los Angeles. Other key men working there are **A. J. Buchanan** and **Tom Condon.**

* * *

R. E. Batie is in Klamath Co., Oregon, with Warren-Northwest of Portland as job superintendent on 1.8 mi. of grading and paving on a section of Klamath Falls-Lakeview highway. **Marion Stoddard** is crusher foreman and **Bill Johnnie** is foreman of asphalt paving plant. Amount of the contract is $361,800.

* * *

H. M. Eschenburg is engineer for Kirchhof Construction Co. of Denver, Colo., who is building the new addition to the U. S. Mint in Denver. **Henry T. Osborne** is general superintendent and **Joe Price** is foreman. **Hugh Doherty** is superintendent for the ironworkers.

* * *

Carl D. Edwards is general superintendent on two store buildings that R. E. Campbell is building in Long Beach, one at 4321 Atlantic Blvd. and the other at 505 E. Ocean Ave. **Bill Drinkward** is carpenter foreman on the first, and **Bob Wholfarth** is carpenter foreman on the latter.

* * *

M. G. Curtis of the Curtis Gravel Co., Spokane, Wash., is supervising construction of the Mill Creek Forks-The Dalles section of Mill Creek County Rd. in Wasco Co., Ore. **Glenn C. Curtis** is his assistant on the $156,123 state contract; **Fred D. Curtis** is crusher plant superintendent; **Bill H. Rowley,** grade superintendent, and **K. E. Dehlbom,** excavation superintendent.

* * *

W. Gilbert is in charge of a large dredging job the Newport Dredging Co. is doing at Newport Beach, Calif. The firm is making a beach and a fill for a new housing project to be built just north of the arches at Newport Beach.

* * *

H. B. Dillon is job superintendent at the Davis Dam site on the Arizona-Nevada border on the construction of 20 homes being built by W. S. Ford of Kingman, Ariz., for $198,205. **J. T. Bowling** is concrete foreman and **Ed Schnatzmeyer** is carpenter foreman.

* * *

Alfred Schaff is job superintendent, and **James Cagle** is his assistant, on completion of an embankment and spillway at Santa Fe Dam on the San Gabriel River near Azusa, Calif. The $483,578 contract was awarded to Guerin Brothers of Los Angeles.

* * *

William Hammer is at Boulder, Colo., with Platt Rogers Co. of Pueblo, as general superintendent on the veterans' housing project at the University of Colorado. **Herbert Snow** is his assistant and foremen are **Erling Jensen, A. G. Lane, Otto Erickson** and **Ernest James.** Timekeeper is **M. C. McClure.**

* * *

Tony Langendorf has the general superintendent position with Vernon Houghton Contracting Engineers, Los Angeles, on a modernistic store building of nine units being erected in Inglewood, Calif. General foreman is **George Belden.**

* * *

Ed B. Shockley, after working for 18 months in the Canadian Northwest, is general superintendent on construction of a factory for California Almond Orchards, Inc. **C. E. Pumphrey** has the general contract and **Hal Bennett** has the equipment contract.

* * *

Vernon "Dick" Lund, who was a carpenter foreman for Haddock Engineers at Camp Pendleton, Oceanside, Calif., prior to his Army service, is now superintendent for Arthur B. Merrill on $100,000 worth of store buildings going up in La Mesa, Calif.

* * *

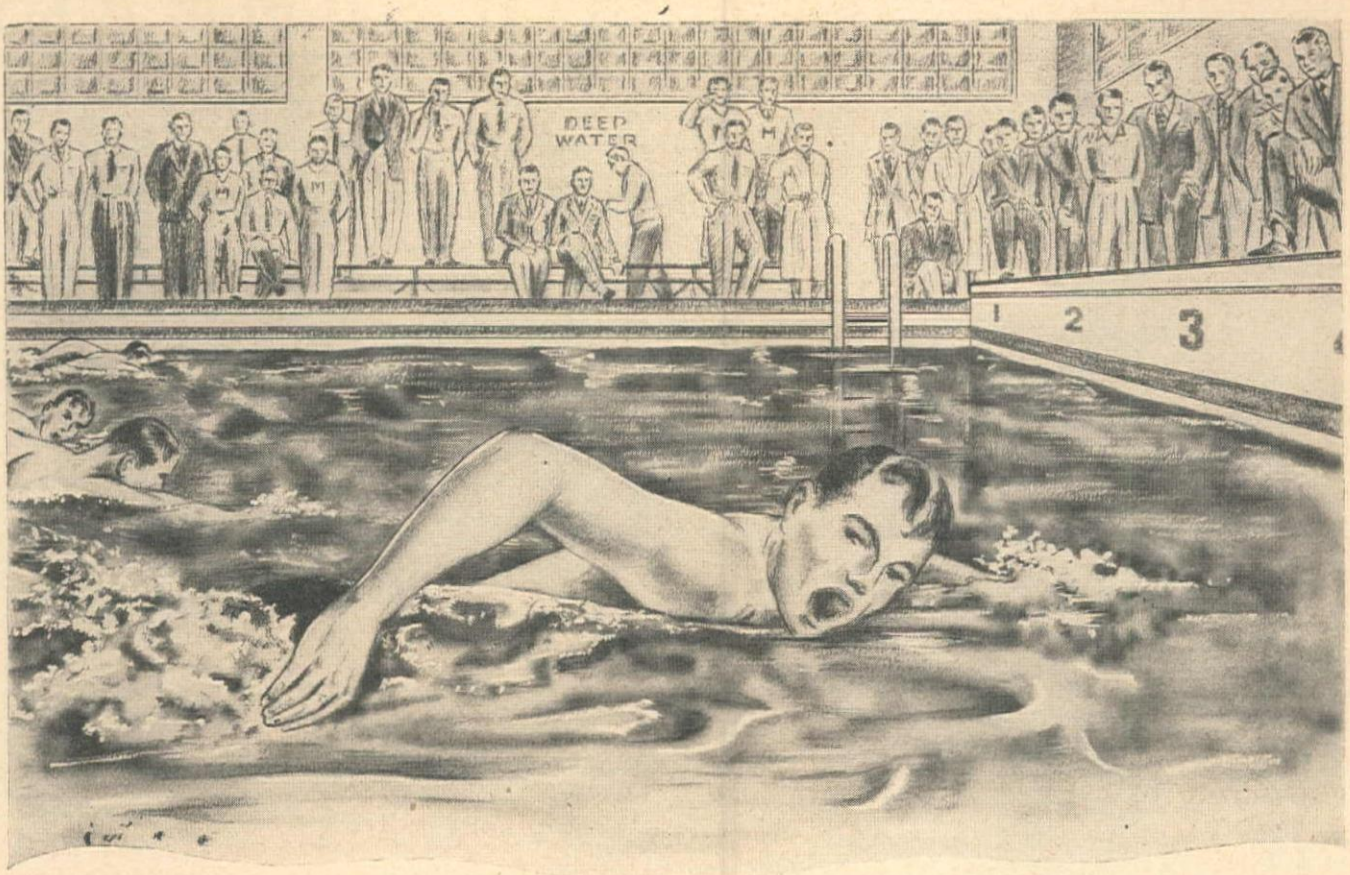
G. H. Spindle has the superintendent position on a $2,400,000 dormitory project for Texas Technical College in Lubbock. T. C. Bateson Construction Co. of Dallas has the contract to erect the two buildings, and **J. D. Jefcoat** is project engineer.

* * *

Dell Martin of San Pedro, Calif., is superintendent for J. E. Haddock Co. of that city on construction of several sea walls at Newport Beach. **Jack Erwin** of Hynes is foreman on the jobs.

* * *

Irvine A. Mabey is job office manager for Del E. Webb Construction Co., Phoenix, Ariz., who is building factories for Kraft Cheese Co. at Kansas City, New Orleans and Toledo. The Webb company is



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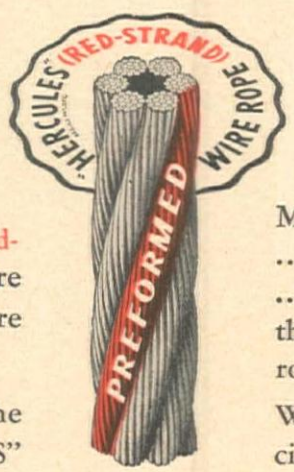

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SEATTLE 4 . . . 3410 First Avenue South

also building for itself a new office building in Chicago, with **Joe Ashton** in charge of construction.

* * *

In Los Angeles Del E. Webb Construction Co., Phoenix, Ariz., is building the new Nassour Studios on Sunset Blvd. **Ed Davies** is general superintendent and other important posts are held by **Dick Eden, A. B. Graham** and **Dale Griffith.**

* * *

Bert Lalonde is job superintendent for Albert Lalonde Co. of Sidney, Mont., on $127,615 worth of highway work on the Scobey-Opheim road in Daniels Co., Mont. Lalonde's assistant there is **O'Neil Jones.**

* * *

R. G. Nicklas and **John Grastell** are engineers for T-S Construction Engineers, Inc., of Los Angeles on a six-story structural steel frame building being erected at S. Boylston and Maryland, Los Angeles. **Paul B. Tichenor** is project manager, **Jack Melvin** is superintendent and **Les Cole** is carpenter foreman.

TOP MEN working on the Circle Drive housing project, Fort Collins, for Harry G. Worsham Constructors are, left to right: L. D. WILKERSON, office manager; BERT G. REDD, general superintendent; BILL DEINES, carpenter foreman, and EARL BUCKENDORF, labor foreman.

* * *

Bert G. Redd is general superintendent on construction of 40 brick houses at Fort Collins, Colo., by Harry G. Worsham Constructors of Denver. **William Deines** is carpenter foreman, **Earl Buckendorf** is labor foreman and **L. D. Wilkerson** is office manager.

* * *

Harold Reed is acting as project manager on a factory building at Venice Blvd. and Berendo St. in Los Angeles for Stanton-Reed Co. Resident engineer is **L. Parker,** general superintendent is **Bill Frank,** and carpenter foreman is **C. F. Ramiller.**

* * *

Tom McCurdy of Santa Fe, N. Mex., is personally supervising construction of a new home for the Willard Rich Auto Co. in that city. **Lupe Sanchez** is superintendent on the job.

* * *

C. E. Bruce is superintendent and **S. Hammerstrom** is carpenter foreman on a school addition being built by R. J. Brennen Co. for Los Angeles' Immaculate Heart High School. **Jim Neubauer** is concrete foreman.

* * *

H. L. Leventon, who superintended building of the Navy's 20 underground storage vaults at Red Hill, near Pearl Harbor, and was later project manager of un-

(Continued on page 118)

UNIT BID SUMMARY

Dam . . .

Colorado—Bent County—U. S. E. D.—Completion of Dam

Morrison-Knudsen Co., Inc., Boise, Idaho, with a bid of $1,298,117 was low bidder to the U. S. Engineer Office, Albuquerque, New Mexico, on completion of the John Martin Dam at Caddoa, Colo. The original structure was built by Warner Construction Co., but the work was terminated before completion at the outset of the war. Unit bids were as follows:

(1) Morrison-Knudsen Co., Inc. $1,298,117
(2) Grafe-Callahan Construction Co. and W. K. McIlyar 1,451,194
(3) Engineer's estimate $1,017,362

		(1)	(2)	(3)
43,800	sq. yd. bitum. road surf.	.90	.60	.342
29,300	lin. ft. highway guard rail	2.10	2.50	1.54
4,150	cu. yd. conc., bridge and roadway	70.00	84.00	43.59
250	cu. yd. conc., miscellaneous	55.00	80.00	48.39
17,900	lb. furn. reinf. steel	.05	.07	.061
770,500	lb. place reinf. steel	.04	.06	.028
150	lb. furn. struc. steel	.50	.60	.168
86,130	lb. instl. struc. steel	.15	.10	.071
2,425,680	lb. furn. steel, Tainter gate	.145	.14	.166
2,449,800	lb. instl. steel, Tainter gate	.06	.10	.034
1,100	lb. furn. steel, miscel.	.25	1.50	.218
45,900	lb. instl. steel, miscel.	.185	.12	.152
100	lb. furn. steel, corrosion-resisting	1.00	1.75	.277
7,050	lb. instl. steel, corrosion-resisting	.33	.50	.131
40	lb. furn. steel castings	1.00	1.50	.492
114,570	lb. instal. steel, castings	.07	.10	.068
10,150	lb. instl. miscell. steel, forging	.30	.18	.073
4,720	sq. ft. steel gratings	2.65	3.00	1.03
35	lb. furn. cast iron	1.00	1.00	.254
1,905	lb. instl. cast iron	.27	.40	.072
32,520	lb. furn. miscl. non-ferrous metals	1.00	1.50	.943
32,520	lb. instl. miscl. non-ferrous metals	.23	.10	.089
130	lb. steel water stops	2.00	2.00	.487
630	lin. ft. rubber seal, moulded, spillway	4.25	17.50	9.95
1,025	lin. ft. instl. rubber seal, moulded spillway	2.00	2.20	1.32
585	lin. ft. furn. rubber seal, moulded side seal	4.25	15.00	5.78
1,100	lin. ft. instl. rubber seal	2.00	3.00	1.09
6,360	lb. furn. black steel pipe	.15	.25	.245
39,510	lb. instl. black steel pipe	.17	.10	.027
1,020	lb. furn. cast iron pipe	.15	.30	.246
7,560	lb. instl. cast iron pipe	.13	.30	.062
Lump sum,	hand-operated service truck	130.00	650.00	378.14
2.0	M.F.B.M. timber, treated oak	320.00	450.00	463.00
Lump sum,	elevator	$23,600	$12,000	$16,514
Lump sum,	power, lighting and telephone systems	$46,000	$38,000	$33,327
Lump sum,	Tainter gate oper. machinery, elect. equip.	$41,200	$65,000	$59,474
Lump sum,	Tainter gate oper. machinery, mech. equip.	$14,000	$25,000	$10,670
Lump sum,	Tainter gate oper. machinery, spare parts	$11,500	$6,000	$5,617
Lump sum,	elect. contact rail, monorail hoist	$17,000	$18,000	$13,301
Lump sum,	spillway servicing equip.	$30,000	$30,000	$27,599
3,600	sq. yd. stripping	.40	.20	.074
3,350	cu. yd. embankment, access road	2.00	.80	.563
590	cu. yd. base course, gravel	3.25	2.00	3.46
155	cu. yd. roadway surf., gravel	9.50	4.00	3.38
41,000	sq. yd. existing road preparation	.065	.12	.056
Lump sum,	doors, adits and storeroom	$1,200	$1,000	$1,648
Lump sum,	reroofing, pier house	390.00	300.00	198.42
Lump sum,	repainting existing work	$10,000	$8,000	$1,275
Lump sum,	cleaning conc. surfaces	$29,000	$5,000	$3,922
Lump sum,	removal of temporary structures	200.00	$2,000	$1,042
Lump sum,	storing bulkheads, spillway crest and conduit	$3,000	$4,000	$1,185
Lump sum,	drainage system grouting gallery	$17,000	$18,000	$10,712
Lump sum,	stand-by generating station building	$13,000	$12,000	$6,737
Lump sum,	stand-by generating station equipment	$16,000	$10,000	$7,605

Washington—Grant County—Bur. of Reclam.—Earthfill

Roy L. Bair & Co. and James Crick & Sons, both of Spokane, with a bid of $2,771,887 were low to the Bureau of Reclamation at Coulee City for construction of South Coulee Dam, the southern end of the main regulating reservoir of the Columbia Basin irrigation project. The dam will have a height of about 60 ft. and a crest length of about 10,000 ft. About 1,500,000 cu. yd. of earth and rock will be needed for the fill. The North Coulee Dam has not yet been contracted; it is about 27 mi. north in the Grand Coulee. The reservoir will have a capacity of about 700,000 ac. ft. Nine hundred days are allowed for completion of the South Coulee project. The following unit bids were submitted:

(1) Roy L. Bair & Co. and James Crick & Sons $2,771,887
(2) N. Fiorito Co. 2,781,152
(3) J. A. Terteling & Sons 2,804,240
(4) Utah Construction Co. and Winston Bros. Co. $3,181,700
(5) Guy F. Atkinson Co., W. E. Kier, D. G. Gordon and Bressi-Bevanda Constructors, Inc. 3,333,000
(6) Morrison-Knudsen Co., Inc. 3,773,545

		(1)	(2)	(3)	(4)	(5)	(6)
50,000	cu. yd. excav., strip borrow pits	.30	.25	.30	.43	.25	.45
130,000	cu. yd. excav., com., foundation of dam	1.00	.35	.60	1.20	1.00	1.50
6,000	cu. yd. excav., rock, foundation of dam	4.00	3.50	1.80	4.85	6.00	5.00
5,500	cu. yd. excav., rock, ftgs. conc. cut-off wall	20.00	10.50	15.00	24.25	20.00	16.00
165,000	cu. yd. excav., com., appr. chan. & main canal	.30	.30	.44	.50	.50	.30
530,000	cu. yd. excav., rock, appr. chan. & main canal	1.10	1.10	1.00	1.53	1.52	1.90
3,000	cu. yd. excav., com., canal headworks struct.	.40	1.00	.75	1.70	3.50	1.00
85,000	cu. yd. excav., rock, canal headworks struct.	3.00	1.25	1.25	1.70	3.50	2.00
1,000	cu. yd. excav., com., drain. chans. & conc. culv.	2.00	1.00	.75	1.25	1.40	1.35
4,000	cu. yd. excav., rock, drain. chans. & conc. culv.	5.00	3.00	1.75	3.65	6.00	2.65
120,000	cu. yd. excav., com., E. Coulee City borrow area	.50	.45	.60	.75	.60	.57
150,000	cu. yd. excav., com., W. Coulee City borrow area No. 1	.60	.45	.60	.67	.60	.65
475,000	cu. yd. excav., com., W. Coulee City borrow area No. 2	.45	.40	.55	.48	.50	.75
530,000	cu. yd. earth fill in embankment	.15	.25	.20	.24	.25	.35
20,000	cu. yd. tamp or puddle earth fill	.60	1.00	3.00	2.45	3.50	2.50
105,000	cu. yd. sluiced sand and grav. fill in embankment	.60	.25	.32	.31	.25	.40
920,000	cu. yd. rock fill in embankment	.15	.25	.30	.16	.15	.20

(Continued on page 118)

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Connelly Machinery Company, Billings and Great Falls, Montana
Sanford Tractor & Equipment Co., Reno, Nevada
The Mountain Tractor Co., Missoula, Montana
The Tractor & Equipment Co., Sidney, Montana
P. L. Crooks & Co., Portland 10, Oregon
Lee Redman Company, 2020 West Grant St., Phoenix, Arizona

derground storage construction at the Hanford, Wash., atomic bomb project, is now supervising redesigning and reconstruction of the Morrison-Knudsen Co., Inc., crusher at Granite Canyon, Wyo.

* * *

W. M. Edwards is superintendent for Robert E. McKee of Los Angeles on the $280,500 Standard Gypsum project in Long Beach, Calif. **W. C. Barton** is field engineer on the job, which will consist of a two-story factory building, steam plant, trestle driveway to the dock, alteration of a storage building and a two-story addition to another building.

LaMar Wilson was named project manager by contractor Robert E. McKee on construction of a $7,500,000 prison camp being built for the United States government at Camp Cooke, Lompoc, Calif. **Frank Huddleston** is resident engineer; **Robert S. Hardie,** general superintendent; **R. Bailey,** carpenter foreman; **F. J. McClain,** labor foreman; **Vernon Ragsdale,** office manager; **Carl Marrs,** field engineer; **C. K. Kistenmacher,** engineer; **E. Thomas,** concrete engineer.

H. A. Harbordt is general superintendent on another Robert McKee job in Lompoc, the $400,000 Johns-Manville building. Other key men are **B. E. Kunkle, D. C. Rodruck** and **Ed Shipsey.**

* * *

Oscar Erickson is general superintendent on the seven million dollar General Motors Chevrolet assembly plant, warehouse, loading dock and administration building that contractor William Simpson of Los Angeles is building in Van Nuys, Calif.

William Massey is resident engineer for General Motors, and **Ralph Kinsey** is engineer for Simpson. **Carl Erickson** has the position of carpenter superintendent; **Tobe Wight,** general foreman; **George Mahan,** labor superintendent; **Sam Hughes, George Short, "Breezy" Huddleston,** carpenter foremen; **"Dick" Bennett and "Whitey" Wright,** labor foreman; **Ed Speich,** chief of party; **Willard H. Spiegel,** office manager; **George Lenhan,** expediter; **R. J. Nolan,** timekeeper; **J. G. Starr,** materials, and other key men, **Ted Johnson** and **J. Wesley Bruce.**

* * *

Bill Murphy is in Humboldt Co., Calif., supervising $92,375 of highway work for Mercer-Fraser Co. of Eureka. Street foreman is **Freddie Bott;** labor foreman, **Vic Stephani,** and foreman of the hot plant, **Bill King.**

* * *

U. S. Siegrist of U. S. Siegrist Construction Co., Denver, is acting as job superintendent on an 8 mi. road job on U. S. Highway 40 between Massadona and Elk Springs, Colo. **Dan Ratliff** is foreman.

* * *

Joseph W. Price is resident engineer for the U. S. Engineers on the dredging and jetty construction at Moss Landing Harbor, Calif. San Francisco Bridge Co. has the contract.

* * *

Ray Burton is superintendent for J. E. Skousen on 5.4 mi. of rock asphalt road work 3½ mi. east of Gallup, N. Mex. **Walter Brown** is engineer for the state.

* * *

Lawrence Lopez is general superintendent for R. J. Stempel on two projects, a market building in Richmond and 100 homes in Walnut Creek, Calif.

300 cu. yd. backfill	3.00	.25	.50	2.45	5.00	2.00
100 lin. ft. 6-in. sewer drains, uncem. jts.	1.10	1.00	1.20	1.95	1.00	2.50
3,600 lin. ft. 8-in. sewer drains, uncem. jts.	1.50	1.50	1.30	1.95	2.00	2.50
650 lin. ft. 12-in. sewer drains, uncem. jts.	1.50	1.70	1.60	2.75	2.50	3.30
200 lin. ft. 18-in. conc. pipe, cem. jts.	1.50	3.00	1.75	3.00	3.00	3.00
10,000 lin. ft. grout holes, under 35-ft. percus. drills	1.96	1.00	1.00	1.25	1.00	1.00
10,000 lin. ft. grout holes, 0 to 35 ft.	1.96	2.60	3.50	2.75	2.50	3.60
8,000 lin. ft. grout holes, 35 to 60 ft.	1.96	2.60	4.50	2.75	3.00	3.85
4,000 lin. ft. grout holes, 60 to 110 ft.	1.96	3.00	5.00	2.75	3.00	4.00
17,000 lb. place grout pipe and fittings	.30	.30	.40	.31	.15	.35
30,000 cu. ft. pressure grouting	2.00	2.00	1.60	2.45	1.50	2.50
15,000 cu. ft. pressure grouting with packers	2.50	2.50	2.00	3.05	1.50	2.50
5,500 cu. yd. conc., ftgs. of embkmt. cut-off wall	23.00	38.00	28.00	16.50	12.00	12.50
3,000 cu. yd. conc., embkmt. cut-off walls, exc. ftgs.	40.00	46.00	37.50	39.00	42.00	35.00
6,700 cu. ydfl conc., canal headworks structure	35.00	46.00	40.00	43.00	48.00	57.00
3,200 cu. yd. conc., parapet wall	35.00	46.00	32.00	43.00	56.00	79.00
45 cu. yd. conc., culverts, piers, etc.	70.00	60.00	46.50	61.00	85.00	61.00
1,900,000 lb. place reinf. bars	.04	.04	.04	.035	.04	.04
270,000 lb. install radial gates	.09	.15	.10	.085	.07	.04
60,000 lb. install radial gate hoists	.09	.15	.17	.085	.07	.04
57,000 lb. install stop-log guides	.09	.15	.15	.06	.08	.30
1,200 lb. install pipe handrails and ladders	.50	.50	.30	.51	.30	.50
2,500 lb. install met. doors, windows and frames	.50	.50	.30	.60	.50	.35
13,500 lb. install 18-in. pipe crossing	.15	.15	.15	.37	.20	.20
12,000 cu. yd. road surfacing	2.00	3.00	2.00	2.45	5.00	3.45
11,000 lin. ft. highway guardrail	1.00	.60	1.55	1.35	2.00	1.50
1,500 lin. ft. 1¼ in. or less elect. metal conduit	.50	.40	.25	.85	1.00	.70
11,000 lin. ft. 1¼ to 3 in. elect. metal conduit	.60	.40	.25	1.25	1.50	.75
100 lb. install ground wires	1.00	1.50	1.00	1.50	1.50	3.00

California—Ventura County—County—Concrete Arch

Guy F. Atkinson Co., Long Beach, W. E. Kier Construction Co. and Bressi-Bevanda Constructors, Inc., of Los Angeles, submitted the low bid of $1,279,945 to the Ventura County Flood Control District, Ventura, for construction of Matilija Dam on Matilija Creek in Ojai Valley, the first unit of a comprehensive flood control program outlined by engineer Donald R. Warren. The structure is a concrete arch 165 ft. high, with a reservoir capacity of 7,000 ac. ft. Following unit bids were submitted:

(1) Guy F. Atkinson Co., etc. $1,279,945
(2) Macco Construction Co. 1,381,890
(3) L. E. Dixon Co. 1,489,550
(4) A. Teichert & Son and John C. Gist $1,614,600
(5) Grafe-Callahan Construction Co., and Gunther & Shirley 1,873,645

	(1)	(2)	(3)	(4)	(5)
Lump sum, diversion and care of river	$15,000	$5,000	$10,000	$33,000	$20,000
12,000 cu. yd. excav., common, below elev. 1,000 ft.	3.57	1.00	4.30	4.85	2.15
25,000 cu. yd. excav., above elev. 1,000 ft.	3.57	1.00	4.30	4.85	2.15
6,000 cu. yd. excav., rock, below elev. 1,000 ft.	3.57	7.00	4.30	4.85	8.90
18,000 cu. yd. excav., rock, above elev. 1,000 ft.	3.57	7.00	4.30	4.85	8.90
1,400 ft. drill grout holes	2.00	4.00	2.00	2.50	1.00
2,000 cu. ft. pressure grouting	2.50	3.00	3.00	3.00	4.20
15,000 lb. grouting piping	.45	.20	.20	.50	.40
55,000 cu. yd. mass conc. in dam	16.00	19.00	19.50	20.40	25.00
290 cu. yd. conc., parapets, piers and bridge	90.00	25.00	86.00	65.00	95.50
2,200 cu. yd. conc., downstream apron and valve hse. founda.	27.00	19.00	21.00	24.50	29.25
3,000 lin. ft. copper sealing strips	1.75	.50	1.50	1.50	1.00
2,600 lin. ft. galv. sealing strips	1.25	.40	1.10	1.00	1.00
120,000 lbs. reinf. steel in dam, piers, bridge and parapets	.08	.04	.09	.08	.11
300 lin. ft. piping for sluice gates	2.75	2.00	1.50	4.00	4.00
1,000 lin. ft. drainage system	2.00	1.00	1.75	3.00	5.00
44,000 lb. trash rack and stem guide frames	.30	.30	.20	.40	.30
Lump sum, instal. valves, sluice gates & appurt. & furn. plaque	$10,000	$10,000	$10,000	$10,000	$10,000
32,000 lb. piping (water) includ. flanges, coupling & manhole	.25	.30	.20	.30	.30
Lump sum, valve house and control house	$4,000	$2,000	$4,000	$3,000	$5,600
100 squares slip joint	30.00	100.00	25.00	27.00	17.50

South Dakota—Fall River County—Bur. of Reclam.—Concrete Gravity

Utah Construction Co., San Francisco, Calif., submitted the low bid to the Bureau of Reclamation Billings, Mont., on construction of Angostura Dam on the Cheyenne River. This is one of the larger dams of the Missouri Basin project, and the total bid was $4,237,476. The structure consists of a gravity type dam from the left abutment across the river channel and an earth embankment forming the right abutment. It will have a crest length of 1,900 ft. and will rise 150 ft. above the stream bed. The overflow spillway will be constructed over the concrete portion of the dam and overflow energy will be dissipated by a large radius spillway bucket. A river outlet through the concrete portion of the dam will consist of a 54-inch outlet pipe and a canal outlet with a 72-inch outlet pipe. The embankment portion will be a moistened and rolled fill of clay, sand and gravel, with a concrete cut-off wall into bedrock for the full length of the embankment. The following unit bids were submitted:

(1) Utah Construction Co. $4,237,476
(2) Winston Bros. Co. 4,296,000
(3) Martin Wunderlich & Brown & Root, Inc. 4,489,897
(4) C. F. Lytle Co. and Associates $5,128,076
(5) Guy F. Atkinson Co. 5,440,307

	(1)	(2)	(3)	(4)	(5)
Lump sum, diversion and care of river	$190,000	$203,500	$120,000	$195,870	$200,000
20,000 cu. yd. excav., strip. borrow pits	.27	.28	.50	.30	.30
27,000 cu. yd. excav., common, strip embk. found.	.41	.40	.50	.43	.80
43,000 cu. yd. excav., common, dam found.	1.15	.80	1.00	2.00	3.45
130,000 cu. yd. excav., rock, dam found.	3.50	2.50	3.10	2.00	3.45
2,600 cu. yd. excav., found. cutoffs	30.00	22.00	25.00	30.00	33.00
4,800 cu. yd. excav., all classes outlet wks.	.63	4.50	1.50	1.55	1.75
82,000 cu. yd. excav., common, toe drain and cutoff trench	.50	.65	.40	.66	.70
4,000 cu. yd. excav., rock, toe drain and cutoff trench	2.30	3.50	2.00	3.40	2.00
1,000 cu. yd. excav., all classes, cutoff wall less than 20 ft. deep	4.45	10.00	6.00	12.00	15.00
400 cu. yd. excav., all classes, cutoff wall 20 to 30 ft. deep	4.62	11.50	10.00	18.50	24.00
300 cu. yd. excav., all classes, cutoff wall 30 to 40 ft. deep	5.20	13.00	18.00	27.75	35.00
510 cu. yd. excav., rock, cutoff wall footings	37.00	25.00	21.00	27.75	20.00
180,000 cu. yd. excav., com., borrow and transp. to Sec. 1	.46	.33	.50	.55	.60
185,000 cu. yd. excav., com., borrow and transp. to Sec. 2	.46	.33	.50	.48	.44
18,000 cu. yd. excav. rock, borrow and transport	1.25	1.10	1.25	2.60	2.00
11,000 cu. yd. backfill	.52	.36	.60	1.00	.50
6,500 cu. yd. compacting backfill	2.40	2.40	1.50	1.85	3.50
1,300 cu. yd. fill for outlet works	.35	.30	.50	.35	.50
260 cu. yd. riprap for outlet works	2.75	2.70	4.50	3.50	10.00
424,000 cu. yd. earthfill in embankment	.185	.18	.20	.17	.38
58,000 cu. yd. rockfill in embankment	.16	.11	.20	.62	.75
36,000 cu. yd. riprap on upstream slope	1.15	.13	1.00	1.40	1.75
300 lin. ft. core drilling less than 35 ft. deep	9.00	7.50	10.00	10.00	7.00
8,800 lin. ft. drill grout holes 0 to 35 ft. deep	1.25	2.55	2.50	3.05	2.15
6,300 lin. ft. drill grout holes 35 to 60 ft. deep	1.30	2.55	2.50	3.25	2.25
10,700 lin. ft. drill grout holes 60 to 110 ft.	1.45	2.70	2.50	3.30	2.25

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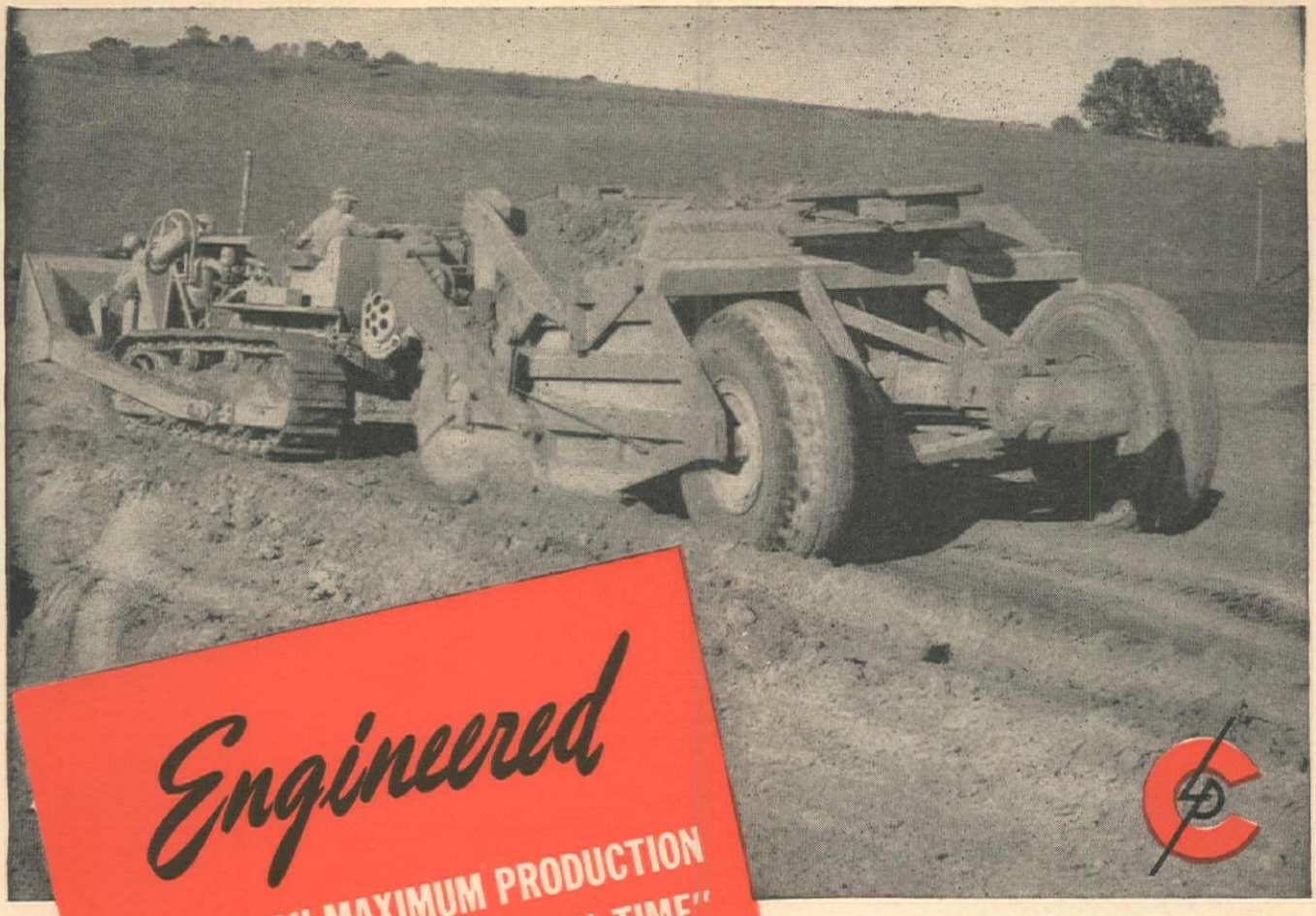

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Job-Proved Equipment... for Lowest Possible Cost in Moving Earth

2,200	lin. ft. drill grout holes 110 to 160 ft.	1.60	2.65	2.50	3.40	2.35
300	lin. ft. drill grout holes 160 to 210 ft.	1.75	2.75	3.00	3.40	2.35
8,000	lin. ft. drill grout holes, percussion drills	1.15	2.45	2.00	2.90	2.00
30,000	cu. ft. pressure grout foundations	1.85	1.50	1.50	1.70	1.50
25,000	cu. ft. pressure grout found. with packers	2.20	1.80	2.00	2.20	1.60
4,000	cu. ft. pressure grout contraction joints, etc.	2.30	2.00	2.00	1.70	2.40
47,000	lb. metal pipe for found. grout, etc.	.14	.35	.40	.31	.15
2,800	lin. ft. drill drain holes 0 to 25 ft. deep	3.17	2.50	2.50	3.75	2.50
2,700	lin. ft. drill drain holes 25 to 50 ft. deep	3.17	2.65	3.00	3.75	2.50
2,200	lin. ft. drill drain holes 50 to 75 ft. deep	3.45	2.65	3.50	3.90	2.60
100	lin. ft. drill drain holes 75 to 100 ft. deep	3.80	2.65	3.50	3.90	2.60
8,000	lin. ft. form 5 in. drain holes in dam	.35	1.10	.75	.77	2.10
160	lin. ft. 6 in. sewer pipe drains, uncem. joints	1.60	2.25	1.50	1.55	1.25
1,800	lin. ft. 8 in. sewer pipe drains, uncem. joints	1.73	3.50	1.50	1.85	1.35
160	lin. ft. 12 in. sewer pipe drains, uncem. joints	1.85	4.20	3.00	2.30	1.50
210	lin. ft. 6 in. sewer pipe drains, cemented joints	1.50	2.50	3.00	2.30	1.00
1,500	sq. yd. grouted paving	7.00	6.65	7.00	7.75	10.00
2,000	lin. ft. drill anchor bar holes and grout bars	1.73	1.50	2.00	.77	2.00
210,000	cu. yd. concrete in dam	8.75	10.25	10.00	12.94	12.74
14,000	cu. yd. concrete in spillway bucket	15.00	11.25	11.00	12.70	14.00
480	cu. yd. concrete in dentated sill	23.00	27.50	35.00	27.00	45.00
150	cu. yd. concrete in sidewalks, curbs, etc.	67.00	80.00	45.00	70.00	75.00
5,500	cu. yd. concrete in spillway retaining walls	17.30	15.65	18.00	13.50	18.00
2,600	cu. yd. concrete in spillway bridge piers	17.30	26.75	26.00	30.00	28.00
80	cu. yd. concrete in trashrack structures	80.00	110.00	90.00	65.00	125.00
2,600	cu. yd. concrete in drifts for found. cutoffs	15.00	19.00	30.00	25.00	30.00
2,000	cu. yd. concrete in foot. for emb. cutoff walls	15.00	12.25	18.00	14.00	17.50
730	cu. yd. concrete in cutoff walls, except footings	35.00	34.00	35.00	41.00	30.00
120	cu. yd. concrete in curves on embankment	57.50	80.00	50.00	80.00	80.00
420	cu. yd. concrete in outlet pipe supports, etc.	35.00	32.00	45.00	31.60	25.00
350	cu. yd. concrete in canal outlet-works stilling basin	40.00	44.00	25.00	41.00	43.00
70	cu. yd. concrete in valve house superstructs.	80.00	125.00	75.00	73.00	98.00
112,000	sq. ft. vacuum concrete processing	.70	.45	.75	.62	.35
90	ea., finishing lighting recesses	8.00	7.50	6.00	5.40	6.00
1,220,000	lb. placing reinforcement bars	.04	.06	.06	.039	.035
8,800	lin. ft. placing metal sealing strips	1.03	.90	1.50	.70	1.25
150	lin. ft. placing rubber water stops	1.15	1.25	1.50	3.90	1.25
Lump sum,	construct. valve houses, except concrete	$1,400	$1,044	$4,000	$2,000	750.00
170,000	cu. yd. cooling concrete in dam	.65	.30	.40	.50	.20
190,000	lb. instal. fittings for concrete cooling system	.20	.18	.20	.22	.25
18,000	lb. instal. fitting for grout. construct. joints	.30	.40	.40	.25	.40
9,000	lb. instal. fittings for grout. drift found. cutoffs	.35	.35	.60	.62	.30
1,800	lin. ft. instal. metal cover plates over vent grooves	.45	.40	.75	.54	.12
151,000	lb. erect. structural steel in spillway bridge	.06	.06	.06	.054	.06
12,500	lb. instal. fixed wheel gate	.06	.04	.08	.08	.15
12,000	lb. instal. fixed wheel gate, frame and guides	.07	.05	.12	.08	.19
108,500	lb. instal. high press. gate, conduit lining, etc.	.06	.05	.10	.06	.05
2,000	lb. instal. high press. gate control apparatus	.17	.35	.25	.40	.50
1,035,500	lb. instal. radial gates	.07	.055	.06	.05	.075
203,000	lb. instal. gate hoists	.07	.055	.06	.05	.10
4,500	lb. instal. gantry crane	.14	.04	.06	.15	.12
4,000	lb. instal. pumps	.14	.10	.15	.40	.50
36,000	lb. instal. trashrack metal work	.06	.045	.06	.045	.05
325,200	lb. instal. outlet pipes	.06	.045	.06	.054	.075
7,600	lb. instal. ice prevention air system	.23	.15	.30	.14	.45
6,500	lb. instal. metal pipe, etc., less than 6 in. diam.	.23	.20	.15	.25	.30
26,300	lb. instal. metal pipe, etc., over 5 in. diam.	.12	.20	.15	.20	.10
11,000	lb. instal. pipe hand railing	.40	.25	.20	.31	.25
34,200	lb. instal. metal stairways	.23	.10	.20	.25	.18
1,500	lb. instal. metal floor plates and gratings	.17	.06	.30	.15	.06
13,500	lb. instal. castiron slide gate and hoist	.06	.06	.20	.14	.15
4,500	lin. ft. instal. elect. conduit up to 1¼ in. diam.	1.15	.90	1.50	.40	.90
1,500	lin. ft. instal. elect. conduit 1½ to 3 in.	1.40	1.25	2.00	.46	1.00
2,800	lb. instal. elect. conductors and ground wire	.35	.50	1.50	.62	.65
5,000	lb. instal. elect. apparatus	.60	.40	1.50	.93	.50
3,000	lin. ft. instal. elect. cable for meters, etc.	1.25	.30	1.50	.54	1.20

Irrigation . . .

California—Fresno County—Bur. of Reclam.—Earthwork and Struct.

Morrison-Knudsen Co., Inc. and M. H. Hasler, Los Angeles, at $1,514,975 bid low on construction of earthwork, canal lining and structures on the Kings River wasteway and Kings River siphon, a section of the Friant-Kern Canal of the Central Valley Project. The work is located 18 miles east of Fresno and consists of lined canals with 36 and 28-ft. bottoms, a concrete lined wasteway 46 ft. wide at the overflow structure and discharging into the Kings River, and a siphon underneath the Kings River of concrete pipe having an inside radius of 12 ft. 1½ in. and a wall thickness of 24 in. The following unit bids were submitted:

(1) Morrison-Knudsen Co., Inc. and M. H. Hasler $1,514,975
(2) T. E. Connolly, Inc. 1,682,865
(3) Guy F. Atkinson Co., W. E. Kier Construction Co. and Bressi Bevanda Constructors 1,734,707
(4) Grafe-Callahan and Gunther & Shirley $1,800,919
(5) Shofner, Gordon & Hinman 1,892,736
(6) A. Teichert & Son, John C. Gist and M. & K. Corp. 2,928,370

		(1)	(2)	(3)	(4)	(5)	(6)
237,500	cu. yd. excav., common, for canal	.56	.46	.53	.70	.505	.75
193,000	cu. yd. excav., rock, for canal	.56	.46	.53	.70	.505	.75
5,500	cu. yd. compacting embankment	.26	.20	.50	.25	.30	.30
40,000	cu. yd. excav., common, for wasteway channel	.34	.60	.50	1.00	1.83	.35
100	cu. yd. excav., rock, for wasteway channel	2.14	.60	2.00	10.00	10.00	5.00
35,000	cu. yd. excav., com., for struct., ex. siphon barrel	1.12	4.00	.80	2.50	2.80	1.50
300	cu. yd. excav., rock, for struct. ex. siphon barrel	3.50	4.00	2.00	10.00	6.00	5.00
200,000	cu. yd. excav., common, for siphon barrel	1.58	1.47	.50	1.00	1.83	5.00
100	cu. yd. excav., rock, for siphon barrel	3.92	1.47	5.00	10.00	20.00	10.00
6,100	sq. yd. trimming earth foundations for conc. lin'g	1.12	.80	.80	.40	.70	1.20
16,000	sq. yd. preparing rock foundations for conc. lining	1.12	.80	1.30	.60	.70	1.20
16,300	cu. yd. backfill about structures	.39	.50	.50	.40	.40	.60
122,000	cu. yd. backfill about siphon barrel	.22	.24	.35	.20	.30	.40
6,200	cu. yd. compacting backfill about structures	2.50	3.00	6.00	6.00	1.80	2.00
6,100	cu. yd. riprap	2.50	5.00	7.00	4.00	5.50	3.00
265	cu. yd. reverse filters	7.30	8.00	10.00	10.00	25.00	10.00
1,250	lin. ft. feeder drains	1.50	1.00	2.00	4.00	3.00	2.00
1,150	lin. ft. 6-in. underdrains with uncem. joints	1.90	1.00	2.00	5.00	3.00	2.50
4,140	cu. yd. conc. in struct. except paving	42.00	48.00	70.00	60.00	55.00	54.00
21,600	cu. yd. concrete in siphon barrel	20.00	24.05	28.60	27.00	26.00	41.00
185	cu. yd. concrete in structure paving	20.00	20.00	70.00	40.00	32.00	20.00
2,070	cu. yd. concrete in canal lining	20.00	12.00	33.00	20.00	24.60	22.00
3,994,000	lb. placing reinforcement bars	.029	.03	.035	.03	.03	.05
785	sq. ft. placing elastic joint-filler material	.56	1.00	1.00	.30	1.00	1.50
280	lin. ft. placing rubber water stop	1.25	2.00	1.00	2.00	2.00	2.00

(Continued on next page)

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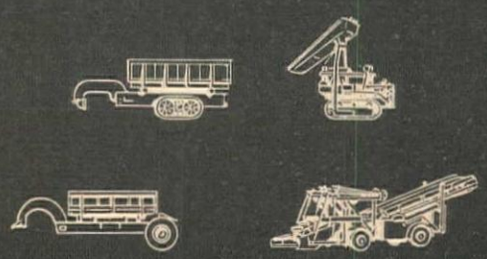


DEPENDABLE HAULING AND LOADING EQUIPMENT

360	lin. ft. clay pipe in reverse filters	1.10	2.00	2.00	.50	1.00	1.00
8,700	lb. cast iron pipe in reverse filters	.10	.20	.15	.50	.12	.15
66	lin. ft. 12-in. asbestos cement pipe	1.90	3.00	5.00	1.00	1.50	2.00
250,000	lb. erecting structural steel in highway bridge	.06	.05	.06	.06	.06	.05
79,500	lb. placing metal water stops in joints	.09	.20	.30	.10	.10	.15
11	MFBM erecting timber railings	125.00	100.00	130.00	100.00	200.00	150.00
61,000	lb. installing radial gates	.06	.08	.07	.10	.10	.10
42,200	lb. installing radial gate hoist and machinery	.06	.08	.10	.10	.10	.20
10,930	lb. installing cylinder gate, gate frames, and hoist	.09	.08	.12	.15	.10	.20
11,900	lb. installing miscellaneous metalwork	.28	.20	.40	.25	.30	.20
125	cwt. placing bitum. material in float drums	2.25	4.00	3.00	2.50	2.00	1.50
1,400	lin. ft. installing electrical conduits	1.00	1.00	1.00	.50	1.50	1.00
550	lb. installing electrical conductors and gd. wires	1.00	1.00	1.00	1.00	1.50	.50
600	lb. installing electrical apparatus	1.00	1.00	1.00	1.00	1.50	.50
0.75	mi. barbed wire right-of-way fence	$1,000	500.00	500.00	500.00	$1,200	$1,000
.20	mi. combination barbed and woven wire fence	$1,000	$1,000	700.00	$1,000	$1,200	$1,500
2	ea. cattle guards	190.00	200.00	150.00	200.00	200.00	250.00

Bridge and Grade Separation . . .

California—Alameda County—State—Overhead

Stolte, Inc. and Duncanson-Harrelson Co., Oakland, with a bid of $1,692,897 were low before the State Division of Highways on construction of an overhead crossing over the tracks of the Southern Pacific and Western Pacific railroads at Fifth Ave. in Oakland, the first unit of the Eastshore Freeway. All materials are to be furnished by the contractor except track materials and track ballast to be used within the S.P. right-of-way, which are to be furnished by that railroad. The unit bids were:

(1) Stolte, Inc. and Duncanson-Harrelson Co. $1,692,897
(2) Chas. L. Harney 1,747,187
(3) A. Soda & Son 1,793,566
(4) Clinton Construction Co. $1,892,612
(5) Fredrickson & Watson Construction Co. and M. & K. Corp. 1,945,468

		(1)	(2)	(3)	(4)	(5)
270	cu. yd. removing concrete	20.00	6.70	7.00	5.50	10.00
3,800	cu. yd. roadway excav.	1.30	.45	1.50	1.40	1.40
15,030	cu. yd. structure excav.	10.00	7.10	9.00	9.80	9.70
1,000	cu. yd. gravel backfill	5.00	4.30	5.00	11.80	5.00
2,000	tons crusher run base	2.70	3.10	3.00	3.00	2.85
8	tons liquid asphalt, SC-1	27.00	22.50	40.00	30.00	30.00
3	tons liquid asphalt, SC-2	27.00	25.00	30.00	30.00	30.00
18	tons sand (pen. treat.)	4.50	6.30	4.00	4.80	4.65
3	tons asph. emuls. (seal coat)	27.00	27.00	30.00	30.00	30.00
500	tons asph. conc. (leveling course)	5.80	5.50	6.00	6.45	6.25
350	tons asph. conc. (Type "B" surf. course)	6.50	6.00	6.00	6.70	6.50
4,450	cu. yd. Class "A" P.C.C. (footing block)	18.00	19.00	21.00	16.80	31.20
10,610	cu. yd. Class "A" P.C.C. (structure)	40.00	36.50	38.00	49.00	44.45
6,500,000	lb. furnishing struct. steel	.08	.083	.085	.084	.088
6,500,000	lb. erecting struct. steel	.011	.02	.02	.0192	.02
140,830	lin. ft. furnishing Douglas fir piling	.45	.71	.60	.455	.55
2,917	ea. driving timber piles	29.00	20.00	26.00	31.00	24.80
2,750,300	lb. furnishing bar reinf. steel	.043	.05	.05	.0445	.0378
2,750,300	lb. placing bar reinf. steel	.016	.014	.01	.0166	.0285
5,150	lin. ft. steel railing	4.50	5.30	5.00	4.65	5.00
100,000	lb. steel drainage equip.	.23	.40	.28	.365	.27
2	ea. frames and grates	65.00	68.00	100.00	67.00	75.00
2	ea. adjusting manholes to grade	24.00	35.00	30.00	33.00	81.00
1,800	lin. ft. removing track	1.00	1.90	1.00	1.00	1.03
3,120	lin. ft. new track	8.00	10.00	8.00	8.30	8.10
6	ea. turnouts	$1,600	$2,100	$1,600	$1,640	$1,593
1,825	tons track ballast	2.80	2.25	3.00	3.00	2.85
2,300	lin. ft. removing track (S.P. right-of-way)	1.00	2.55	1.00	1.00	1.03
2,600	lin. ft. new track (S.P. right-of-way)	4.00	3.30	6.50	4.30	4.15
10	ea. turnouts (S.P. right-of-way)	530.00	632.00	550.00	550.00	535.00
Lump sum, misc. items of work		$4,166	$5,900	$9,000	$4,000	$17,000

Montana—Sweet Grass County—State—Structures

W. P. Roscoe Co., Billings, submitted the low bid to the State Highway Commission for construction of 7 bridges on the Big Timber-Harlowton Highway, with a proposal of $62,122. Included are, a steel and concrete bridge 184 ft. long, three treated timber bridges and three treated timber culverts. Unit bids were as follows:

(1) W. P. Roscoe Co. $62,122
(2) Cahill-Mooney Construction Co. 65,684
(3) J. C. Boespflug Co. $67,272

		(1)	(2)	(3)
118,170	lb. structural steel	.095	.12	.129
41,800	lb. reinforcing steel	.005	.10	.09
228	cu. yd. Class A concrete	38.60	40.00	42.00
117.8	cu. yd. Class D concrete	40.95	40.00	46.00
369.5	lin. ft. concrete curb and rail	6.50	8.00	7.00
461	cu. yd. structure excavation	8.00	10.00	10.00
89.69	MFBM treated lumber	212.00	200.00	214.00
5.34	MFBM untreated lumber	190.00	200.00	175.00
66	ea. 20-ft. treated timber piles	40.00	30.00	31.00
47	ea. 25-ft. treated timber piles	47.50	40.00	37.00
18	ea. 30-ft. treated timber piles	55.50	50.00	44.00
32	cu. yd. gravel ballast	4.00	5.00	5.00
Lump sum, remove. ex. str. and main. tr.		$1,200	$1,500	950.00
Lump sum, remove. ex. str. and main. tr.		400.00	500.00	260.00

Highway and Street . . .

Arizona—Navajo County—Public Roads Administration—Surf.

Andrew A. Larsen, Phoenix, submitted the low bid of $154,841 to the Public Roads Administration, San Francisco, Calif., on 4.5 mi. of the Globe-Showlow National Forest Highway in Sitgreaves National Forest. The work consists of grading, base course and surface treatment on a 28-ft. roadway. The unit bids were as follows:

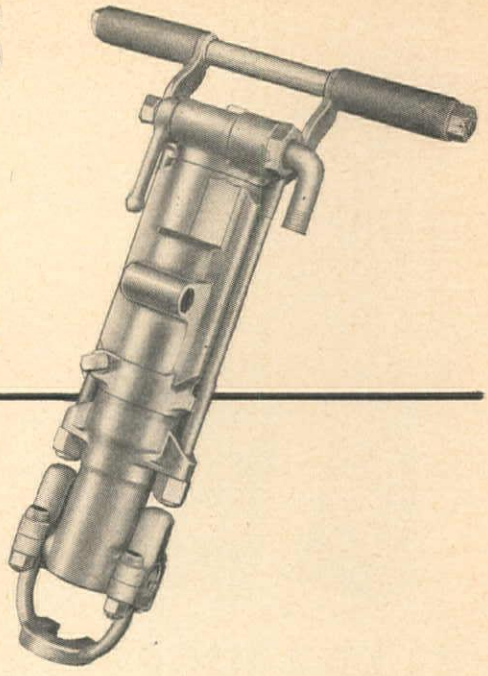
(1) Andrew A. Larsen $154,841
(2) Wallace & Wallace 156,735
(3) Orr & Orr Construction Co. 179,052
(4) W. R. Skousen $206,182
(5) Phoenix-Tempe Stone Co. 209,727

		(1)	(2)	(3)	(4)	(5)
83,000	cu. yd. unclass. excav.	.48	.51	.70	.70	.62
520	cu. yd. unclass. excav. for structures	3.00	2.70	3.00	3.00	2.15
50,500	cu. yd. unclass. excav. for borrow (selected subgrade)	.53	.54	.60	.65	1.20

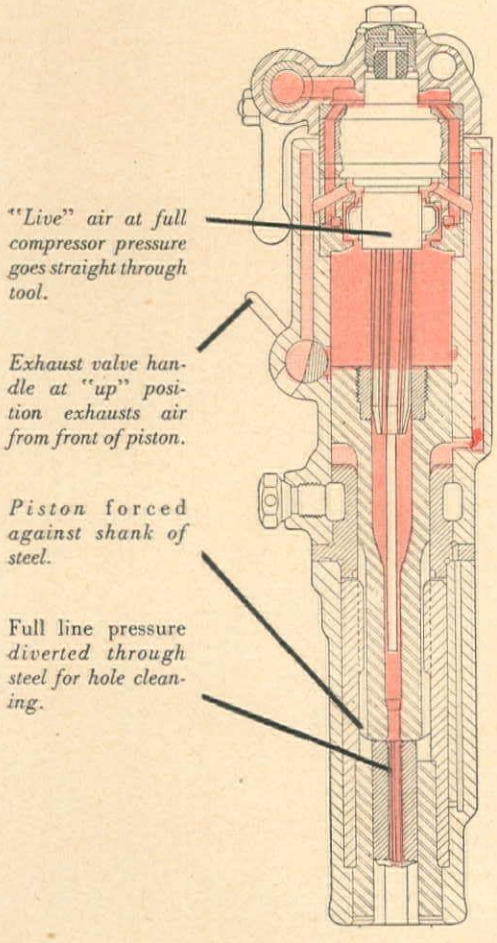
(Continued on next page)

WHY LEADING CONTRACTORS SPECIFY

Thor ROCK DRILLS



DETAIL DRAWING SHOWS Thor SINKER ROCK DRILL IN "BLOWING" ACTION



The FOREMAN knows Thor's "Straight-line" design provides extra blowing power to keep the hole clean and speed drilling

Exceptional Hole Cleaning ability is a major reason why Thor Sinker Rock Drills perform at peak efficiency to give more footage per shift. "Straight-line" design, as shown at the left, puts compressed air at *full pressure* directly through the center of the steel to the drilling face. This heavy blast—controlled by the drill runner—blows the hole clean and adds to the penetration rate. This efficient blowing prevents "stuck steels."

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11,000	cu. yd. unclass. excav. for borrow (pit overbdn. stripping)	.25	.20	.30	.25	.59
318,000	sta. yd. overhaul (500 ft. free haul)	.02	.02	.025	.02	.015
76,000	cu. yd. mi. special overhaul of borrow	.22	.22	.20	.30	.22
150	hr. rolling bottoms of cuts	6.00	6.00	5.50	6.00	7.25
2,800	M. gal. watering embankment	1.75	2.25	2.50	3.00	2.15
400	M. gal. watering subgrade	1.75	2.25	2.50	3.00	2.15
400	M. gal. watering base course	1.75	2.25	2.50	3.00	2.15
Lump sum,	providing and maintaining water plant	$1,000	100.00	200.00	500.00	725.00
17,600	ton cr. gravel or cr. stone base course	1.15	1.20	.90	1.50	1.60
170	ton cutback asph. (Grade MC-2) for prime coat	34.00	31.00	28.00	30.00	34.50
2,700	ton aggr. for surf. treatment	3.00	2.50	5.00	6.00	1.70
175	ton asph. Grade 150-200, for Class A surf. treat.	38.00	35.00	30.00	34.00	34.00
51	cu. yd. Class A concrete	50.00	43.00	50.00	50.00	55.00
4,700	lb. reinforcing steel	.10	.10	.15	.10	.14
171	cu. yd. cement rubble masonry	20.00	22.00	25.00	35.00	30.00
124	lin. ft. 24-in. C.G.S.M. culv. pipe	4.00	4.50	4.50	5.50	4.00
44	lin. ft. 30-in. C.G.S.M. culv. pipe	5.00	5.30	5.00	6.50	5.00
70	lin. ft. 36-in. C.G.S.M. culv. pipe	8.00	7.20	8.00	10.00	8.00
136	lin. ft. 48-in. C.G.S.M. culv. pipe	12.00	10.50	11.00	14.00	10.00
264	lin. ft. removing and stockpiling salv. culv. pipe	2.00	2.00	2.00	5.00	2.15
40	ea. timber culv. markers	5.00	4.00	5.00	6.00	4.50
3	ea. cattle guards	600.00	750.00	725.00	600.00	825.00

Nevada—White Pine County—State—Grade. and Surf.

Sumsion & Glenn, Springville, Utah, submitting a bid of $270,970, was low to the Nevada Department of Highways, Carson City, for construction of Route 2 from McGill to Magnuson's Ranch, a total length of 17.7 mi. The following unit bids were submitted:

(1) Sumsion & Glenn $270,970
(2) Dodge Construction, Inc. 294,622
(3) Carl E. Nelson Co. 310,758
(4) Isbell Construction Co. $321,913
(5) J. C. Compton Co. 381,137
(6) Westbrook & Pope 388,237

		(1)	(2)	(3)	(4)	(5)	(6)
Lump sum,	signs	200.00	500.00	800.00	500.00	500.00	$5,000
120	lin. ft. remove culvert pipe	1.00	1.50	2.00	1.50	1.50	1.00
2	ea. remove headwalls	25.00	15.00	10.00	15.00	15.00	50.00
169,204	cu. yd. roadway excav.	.21	.27	.28	.35	.40	.40
1,791	cu. yd. drainage excav.	.40	.50	.50	.50	.60	1.00
893	sta. "V" type ditches	4.00	5.00	5.00	5.00	5.00	6.00
390,127	yd. sta. overhaul	.015	.015	.015	015	.015	.01
8,004	yd. mi. overhaul	.20	.15	.20	.15	.15	.25
1,399	cu. yd. structure excav.	1.00	1.50	2.00	1.50	2.00	2.50
1,639	cu. yd. backfill	.50	1.00	1.00	1.00	2.00	2.50
6,796	M. gal. water	2.00	1.50	2.00	2.00	3.00	4.00
39,764	ton Type 1 gravel base	.61	.60	.64	.65	.60	.50
102,658	ton gravel surface	.69	.80	.85	.80	1.00	1.00
179	ton liquid asph. MC-2 (seal roadmix)	24.25	26.00	27.00	26.00	32.00	30.00
2,390	ton liquid asph. SC-2 or SC-3 (roadmix)	23.83	23.00	25.00	24.00	30.00	32.00
17.67	mi. roadmix (32 ft. width)	850.00	800.00	900.00	$1,200	$1,500	750.00
1.34	mi. roadmix (22 ft. width)	650.00	500.00	800.00	500.00	800.00	750.00
52	cu. yd. Class "A" conc.	42.00	40.00	50.00	50.00	60.00	70.00
114	cu. yd. Class "B" conc.	42.00	40.00	50.00	50.00	60.00	70.00
8,800	lb. reinf. steels	.10	.10	.10	.10	.10	.10
898	lin. ft. 18-in. C.M.P. (dipped)	2.50	3.50	2.50	2.50	2.50	3.00
678	lin. ft. 24-in. C.M.P. (dipped)	3.50	4.75	4.00	4.00	3.10	5.00
542	lin. ft. 30-in. C.M.P. (dipped)	4.50	5.50	5.00	5.00	4.20	7.50
164	lin. ft. 36-in. C.M.P. (dipped)	6.75	8.00	7.50	8.00	6.40	9.00
1,790	lin. ft. 21½x13½ in. C.M. arch pipe (dipped)	3.50	3.75	3.00	2.75	4.00	3.00
578	lin. ft. 30x17 in. C.M. arch pipe (dipped)	4.50	5.00	4.00	4.25	4.00	4.50
234	lin. ft. 37x21 in. C.M. arch pipe (dipped)	5.00	6.00	5.00	6.00	5.00	5.50
4	ea. move pipe culvert headwalls	30.00	25.00	20.00	25.00	25.00	30.00
190	ea. culvert markers	4.50	5.00	5.00	6.00	5.00	5.00
30	ea. guide posts	5.00	5.00	5.00	6.00	5.00	5.00
68	ea. monuments	5.00	6.00	6.00	6.00	6.00	5.00
971	hr. tamping roller	4.00	7.50	5.00	8.00	7.00	8.00
768	hr. power roller	5.00	4.42	5.00	5.00	6.00	8.00

Wyoming—Johnson County—State—Surf.

Blanchard Bros., Denver, Colo., with a proposal of $138,632 was low bidder to the State Highway Department on grading, draining, base course surfacing, base treatment and stone chip sealcoat on 6.4 mi. of the Kaycee-Sussex Road. Included in the project are ten reinforced concrete culverts and miscellaneous work. The unit bids follow:

(1) Blanchard Bros. $138,632
(2) Inland Construction Co. 140,265
(3) Forgey Construction Co. 140,982
(4) Peter Kiewit Sons Co. 145,575
(5) Knisely-Moore $152,843
(6) H. W. Read 164,822
(7) Northwestern Engineering Co. 176,980
(8) Engineer's estimate 149,681

		(1)	(2)	(3)	(4)	(5)	(6)	(8)
162,000	cu. yd. excavation	.15	.13	.16	.17	.20	.15	.20
96,000	cu. yd. sta. overhaul	.015	.015	.015	.015	.015	.015	.015
1,200	M. gal. watering(emb.)	1.50	2.00	2.00	1.50	2.00	2.50	2.00
1,100	hr. sheepsfootroller	2.25	2.50	3.25	3.00	3.50	2.50	3.50
100	hr. pneumatic tired roller	4.00	3.85	5.00	4.50	5.50	4.50	4.50
866	lin. ft. 18-in. C.M.P.	3.65	2.45	1.75	3.00	2 00	3.00	2.75
282	lin. ft. 24-in. C.M.P.	4.55	3.73	2.80	4.00	3.00	4.00	3.75
204	lin. ft. 30-in. C.M.P.	5.15	4.40	3.50	5.00	3.50	5.00	4.25
314	lin. ft. 36-in. C.M.P.	6.75	6.85	5.59	7.00	6.00	6.00	5.50
112	lin. ft. 42-in. C.M.P.	7.45	8.00	6.53	8.00	7.00	7.50	7.00
50	lin. ft. 48-in. C.M.P.	9.15	10.00	7.45	9.00	8.00	9.00	8.25
45	lin. ft. 135-in. M.P.C.M.P. 83-11	65.50	67.25	67.00	70.00	55.00	55.00	65.00
35	lin. ft. 135-in. M.P.C.M.P. 85-13	65.50	63.00	62.50	70.00	55.00	55.00	60.00
60.33	lin. ft. 135-in. M.P.C.M.P. 87-15	65.50	61.50	43.00	70.00	55.00	48.00	50.00
230	cu. yd. excav. for pipe culverts	1.50	1.40	1.00	1.50	1.50	2.00	1.50
20	ea. right-of-way markers	7.50	8.50	7.50	10.00	5.00	7.00	7.00
2	ea. R. C. project markers	15.00	20.00	20.00	25.00	20.00	35.00	20.00
62,000	lin. ft. standard R-O-W fence	.12	.095	.10	.12	.12	.13	.11
6,200	lin. ft. Type "A" R-O-W fence	.20	.14	.15	.18	.18	.16	.20
110	ea. end panels	9.00	10.00	7.00	10.00	10.00	7.50	8.00
140	ea. brace panels	9.00	7.00	8.00	7.00	8.00	5.50	6.00
350	lin. ft. rem. and reset R-W fence	.10	.09	.10	.10	.10	.10	.06
3	ea. 16-ft. galv. steel gates	25.00	49.00	50.00	50 00	50.00	25.00	50.00
33,000	ton cr. grav. base course (1-in. max.)	.68	.69	.80	.65	.70	.67	.75
800	ton stone chips	4.00	2.90	3 40	4.00	6.00	5.00	4.00
190	ton base treatment MC-1	23.25	28.00	28.00	30.00	21.00	32.00	25.00
135	ton seal coat RC-4	25.00	29.00	28.00	30.00	25.00	35.00	26.00
830	M. gal. watering (base)	1.50	2 00	2.00	1.50	2.00	2.50	2.00
240	hr. roller operation (base)	4.00	3.85	5.00	4.50	6.00	4.00	4.00
2.7	mi. old road obliteration	100.00	150.00	100.00	100.00	200.00	100.00	100 00
300	cu. yd. grouted riprap	8.50	17.00	11.00	12.00	14.00	18.00	9.00
390	cu. yd. Class 1 riprap	4 00	7.00	5.00	6.00	5.00	10.00	6.00
960	hr. mechanical tamping	3.75	3.85	3.75	3.00	4.00	4.50	3.00

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950 cu. yd. structure excavation	1.50	1.50	1.50	1.00	2.00	2.50	2.00
814.2 cu. yd. Class A concrete	31.00	35.00	32.00	34.00	35.00	47.50	32.00
76,830 lb. reinforcing steel	.09	.0725	.0657	.07	.08	.12	.09
Lump sum, removing exist. structs.	200.00	400.00	300.00	500.00	500.00	$1,000	$1,000
3.2 mi. removing and reset tel. line	135.00	280.00	100.00	250.00	100.00	150.00	100.00
20 ea. 20-ft. tel. poles (material)	10.00	14.00	20.00	10.00	15.00	15.00	6.00
100 rod tel. wire (material)	.25	.14	.50	.40	.20	.50	.15
Lump sum, removing and reset straw barn	500.00	200.00	50.00	150.00	100.00	300.00	50.00

California—San Mateo County—State—Grade

Piombo Bros. & Co., San Francisco, submitted the low bid of $270,446 to the State Division of Highways, Sacramento, on grading of 0.5 mi. of highway in South San Francisco. The job is particularly interesting because of the vertical sand drains to be installed for purposes of carrying the highway across marshy land. The following unit bids were submitted:

(1) Piombo Bros. & Co. $270,446
(2) Morrison-Knudsen Co., Inc., and Macco Construction Co. 294,182
(3) Dan Caputo and Edward Keeble 304,671
(4) Chas. L. Harney $328,166
(5) Guy F. Atkinson Co. 333,637
(6) Eaton & Smith 342,135
(7) Peter Sorensen 379,782

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump sum, clearing and grubbing	125.00	$1,000	$1,000	850.00	400.00	$2,197	$1,000
28,500 cu. yd. roadway excav.	.28	.35	.25	.46	.42	.50	.48
120 cu. yd. structure excav.	1.40	2.50	2.50	2.50	2.50	2.47	2.50
500 cu. yd. ditch and channel excav.	.50	1.00	1.00	1.20	.60	.93	1.00
235,000 cu. yd. imported borrow (Type A)	.62	.73	.73	.82	.80	.80	1.00
24,000 tons imported borrow (Type B)	.63	.77	.85	.63	.62	1.02	1.15
48,000 lin. ft. vertical holes (sand drains)	1.00	1.00	1.25	1.04	1.20	1.23	1.10
7,800 tons sand backfill (sand drains)	3.40	2.00	2.00	3.70	2.85	2.86	2.00
6,400 tons sand fill material	2.00	1.80	2.00	1.60	2.40	1.80	2.00
Lump sum, dev. water sup. & furn. wtg. equip.	500.00	$5,000	$2,000	$1,700	$3,000	$1,300	500.00
7,800 M. gals. applying water	1.50	1.25	1.50	1.75	2.35	1.93	2.00
Lump sum, finishing roadway	750.00	$1,500	$1,000	510.00	400.00	$2,331	$3,600
3 cu. yd. Class "A" P.C.C. (structures)	60.00	100.00	50.00	52.00	100.00	66.00	45.00
15 ea. monuments	4.00	8.00	5.00	4.20	5.00	13.00	7.00
183 lin. ft. 12-in. reinf. conc. pipe	2.50	2.50	2.00	1.60	2.00	2.03	2.50
300 lb. bar reinf. steel	.12	.20	.10	.09	.12	.12	.10
1 ea. steel frame and gate	100.00	70.00	75.00	67.00	90.00	93.00	75.00

Colorado—San Juan County—State—Grade.

Colorado Constructors, Inc., Denver, was the sole bidder on grading of 8.1 mi. of State Highway 19 between Durango and Silverton, with a bid of $715,228. This is the largest highway contract proposal in the state for a considerable period of time. By far the largest is the unclassified excavation which at a price of 90c per cu. yd. amounts to over $588,000. The total is $150,000 over the engineer's estimate and is being reviewed by the Public Roads Administration before awarding. The unit bids were:

(1) Colorado Constructors, Inc. $715,228
(2) Engineer's estimate 565,865

	(1)	(2)
Lump sum, clear and grub Unit No. 1	$5,000	$3,500
Lump sum, clear and grub Unit No. 2	$5,000	$5,000
200 lin. ft. relay water pipe	1.00	1.00
Lump sum, remove shed Sta. 7	25.00	50.00
654,000 cu. yd. unclass. excav.	.90	.70
2,400 cu. yd. uncl. ditch excav.	1.00	.75
1,390 cu. yd. dry rock excav. struc.	3.00	2.00
1,390 cu. yd. dry com. excav. struc.	2.50	1.90
470 cu. yd. wet rock excav. struc.	3.00	2.50
470 cu. yd. wet com. excav. struc.	3.00	2.25
830 hr. mechanical tamping	3.00	3.00
2,000,000 sta. yd. overhaul	.02	.015
30,000 yd. mi. overhaul	.15	.15
5,390 lin. ft. 24-in. C.M.P. culv.	3.50	3.50
1,206 lin. ft. 36-in. C.M.P. culv., 12 ga.	5.75	6.65
142 lin. ft. 36-in. C.M.P. culv, 10 ga.	7.00	7.75
200 lin. ft. 36-in. C.M.P. culv., 8 ga.	8.00	8.50
54 lin. ft. 48-in. C.M.P. culv.	10.00	10.55
60 lin. ft. 72-in. C.M.P. culv.	20.00	18.40
86 lin. ft. 84-in. C.M.P. culv.	25.00	25.15
420 lin. ft. 75-in. multi-plate C.M.P.	50.00	40.00
270 sq. yd. dry rub. sl. pave. 24-in.	6.00	5.00
25 cu. yd. riprap	5.00	3.00
350 lin. ft. 6-in. perf. C.M.P. undrain.	4.00	3.00
3 ea. project marker	40.00	25.00

Arizona—Yuma County—State—Grade

Western Contracting Corp., Sioux City, Iowa, submitted the low bid of $540,632 to the State Highway Department, Phoenix, on construction of 7.8 mi. of the Yuma-Gila Bend Highway through the Gila Mountains. The work starts about 15 mi. east of Yuma and consists of grading and draining. The following unit bids were submitted:

(1) Western Contracting Corp. $540,632
(2) Vinnell Co. 564,142
(3) Bowen & McLaughlin 576,815
(4) L. M. White Contracting Co. $606,667
(5) Vinson Construction Co. 612,038

	(1)	(2)	(3)	(4)	(5)
338,765 cu. yd. roadway excav. (unclass.)	.98	1.00	1.08	1.15	1.18
17,000 cu. yd. overbreakage	.735	.75	.81	.8625	.885
9,000 cu. yd. slides	.49	.50	.54	.575	.59
11,422 cu. yd. drainage excav. (unclass.)	1.60	.80	1.25	2.00	.75
1,000 lin. ft. grader ditches	.12	.75	.25	.40	.25
250 lin. ft. crown ditches	.12	1.50	1.00	.40	.25
2,748 cu. yd. structural excav. (unclass.)	3.00	2.40	4.00	4.00	4.00
98 cu. yd. removal of old conc.	21.50	15.00	8.00	10.00	10.00
221,420 sta. yd. overhaul	.015	.015	.02	.02	.04
54,716 cu. yd. mi. haul	.30	.35	.30	.35	.20
15,177 ton imported borrow (CIP)	.68	.60	.65	.80	.63
4,395 M. gal. sprinkling (CIP)	4.50	3.50	2.10	3.00	2.75
1,005 hr. rolling	5.90	6.00	6.50	6.00	6.25
360 hr. mechanical tamping	3.80	5.00	4.00	4.00	4.00
5 cu. yd. Class "AA" conc.	80.00	120.00	95.00	45.00	90.00
1,823 cu. yd. Class "A" conc.	38.00	53.00	43.00	37.50	46.00
21 cu. yd. Class "B" conc.	46.00	58.00	40.00	40.00	44.00
143,827 lb. reinf. steel (bars)	.10	.10	.11	.10	.10
12,260 lb. struct. steel	.22	.20	.30	.22	.25
236 lin. ft. 18-in. C.M.P.	2.90	3.00	3.00	3.50	3.20
1,394 lin. ft. 24-in. C.M.P.	4.10	4.50	4.00	4.50	4.40
240 lin. ft. 30-in. C.M.P.	5.00	5.50	5.50	5.50	5.80
700 lin. ft. 36-in. C.M.P.	7.60	8.00	8.00	7.00	8.40
328 lin. ft. 48-in. C.M.P.	10.20	12.00	11.00	11.50	10.00
60 cu. yd. plain riprap	7.40	10.00	4.00	6.00	5.00
200 lin. ft. rail bank protection (Type "A")	7.00	6.50	8.00	8.00	7.50

Miscellaneous...

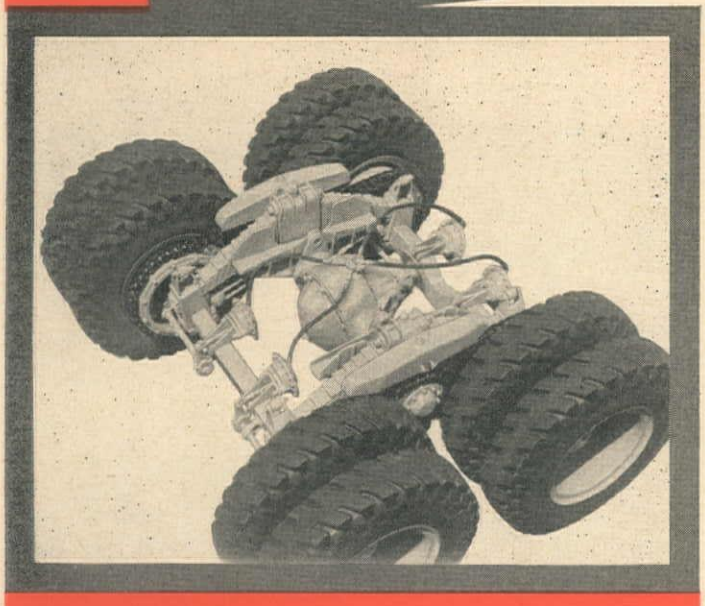
Oregon—Lane County—U. S. E. D.—Relocation

Leonard & Slate of Oregon, Ltd., and E. C. Hall Co., Portland, submitted the only bid to U. S. Engineer Office, Portland, for relocation of the Oregon, Pacific and Eastern Railroad, Market Road No. 30 and the Cottage Grove Municipal Water Supply Line, which at present are located inside the reservoir area to be formed behind Dorena Dam which will be constructed on the Row River near the village of Dorena. This is all a portion of the Willamette Valley flood control plan. Included in the contract are borrow area drainage, one highway and two railroad bridges and some new road. An alternate bid price calling for installation of 14 in. wood stave pipe for the Cottage Grove water line was accepted by the engineer rather than a 12-in. line. Unit bids follow:

(1) Leonard & Slate, Oregon Ltd., and E. C. Hall Co.....$1,248,249

(2) Engineer's estimate $911,261

		(1)	(2)
2	ac. clearing	500.00	405.72
1	ac. grubbing	350.00	393.65
40,800	cu. yd. excavation, common	.60	.33
103,800	cu. yd. excavation, rock	.95	1.59
50	cu. yd. excavation for structures, common	3.00	2.14
15	cu. yd. excavation for structures, rock	10.00	4.18
50	cu. yd. excavation for ditches, common	3.00	2.14
310	lin. ft. 12-in. conc. culvert pipe, in place	2.00	1.54
330	lin. ft. 18-in. conc. culvert pipe, in place	3.00	2.47
180	lin. ft. 24-in. conc. culvert pipe, in place	4.50	3.94
40	lin. ft. 30-in. reinf. conc. culvert pipe, in place	6.00	5.46
40	lin. ft. 42-in. reinf. conc. culvert pipe, in place	10.00	10.07
45,750	cu. yd. dumped stone revetment	5.00	.75
10,000	cu. yd. gravel blanket, in place	3.00	2.23
14,200	cu. yd. sub-ballast, in place	2.75	1.94
10,000	cu. yd. top-ballast, in place	2.90	1.93
100	M. gal. sprinkling	3.00	2.06
750	M.F.B.M. installing cross ties	6.00	13.38
37,670	lin. ft. tracklaying and surfacing	1.60	1.21
6	M.F.B.M. grade crossing	200.00	120.26
20	ea. cattle guard with wing	300.00	116.48
50	lin. rod right-of-way fence	5.00	3.72
	CONSTRUCTION OF COUNTY ROAD—LEFT BANK		
45	ac. clearing	800.00	356.38
25	ac. grubbing	400.00	345.25
257,250	cu. yd. excavation, common	.40	.36
35,750	cu. yd. excavation, rock	1.00	1.674
500	cu. yd. excavation for structures, common	3.00	1.90
20	cu. yd. excavation for structures, rock	10.00	4.27
350	cu. yd. excavation for ditches, common	3.00	2.05
7,800	cu. yd. gravel base course, in place	2.80	1.75
2,850	lin. ft. 18-in. conc. culvert pipe, in place	3.00	2.475
45	lin. ft. 24-in. conc. culvert pipe, in place	4.50	3.94
190	lin. ft. 36-in. extra strength reinf. conc. culvert pipe	9.00	7.95
660	lin. ft. 48-in. extra strength reinf. conc. culvert pipe	15.00	12.65
9,000	cu. yd. dumped stone revetment	5.00	.75
1,800	cu. yd. gravel blanket, in place	3.00	2.23
200	cu. yd. gravel backfill, in place	4.00	4.17
5	ea. right-of-way fence gates	50.00	62.35
850	lin. rod right-of-way fence	5.00	3.72
1.3	M.F.B.M. grade crossing	200.00	96.25
200	M. gal. sprinkling	3.00	2.06
49,000	cu. yd. excavation, common	.60	.33
43,000	cu. yd. excavation, rock	.95	1.22
30	cu. yd. excavation for structures, common	3.00	2.14
50	cu. yd. excavation for ditches, common	3.00	4.18
100	lin. ft. 12-in. conc. culvert pipe, in place	2.00	1.54
280	lin. ft. 18-in. conc. culvert pipe, in place	3.00	2.475
3,250	cu. yd. dumped stone revetment	5.00	.75
680	cu. yd. gravel blanket, in place	3.00	2.23
6,700	cu. yd. gravel base course, in place	2.80	1.94
1,600	cu. yd. crushed stone leveling course, in place	2.90	2.34
160	M. gal sprinkling	3.00	2.06
21	ton furnishing and placing RC-3 cut-back asph.	40.00	38.25
20	ton furnishing and placing 200-300 pen. paving asph.	40.00	39.40
250	cu. yd. mineral aggregate, in place	4.40	2.34
70	ea. highway guard posts	5.00	5.18
6	ea. right-of-way fence gates	50.00	62.35
150	lin. rod right-of-way fence	5.00	3.72
5,000	sq. yd. repair existing asph. surf.	1.00	.39
	RELOCATION OF COTTAGE GROVE MUNICIPAL WATER SUPPLY LINE		
4	ac. clearing	$1,000	353.33
6,400	cu. yd. excavation for structures, common	2.00	1.90
3,200	cu. yd. excavation for structures, rock	3.00	3.50
75	cu. yd. conc. in miscel. structures	60.00	40.00
500	cu. yd. gravel backfill, in place	4.00	4.17
250	lin. ft. 6-in. conc. sewer pipe, in place	1.00	.74
32,520	lin. ft. install 12-in. machine-banded, wood stave pipe	.90	.56
32,520	lin. ft. install 14-in. machine-banded, wood stave pipe	1.00	.58
1,020	lin. ft. 12-in. welded steel pipe, in place	5.00	4.21
1,020	lin. ft. 14-in. welded steel pipe, in place	5.25	4.49
8	ea. 3-in. blow-off valve with box, comp.	150.00	145.30
1	ea. 6-in. blow-off valve with box, comp.	250.00	176.28
10	ea. 1-in. air-vacuum relief valve with box, complete	65.00	110.14
Lump sum,	insulation of pipe	$1,000	429.14
Lump sum,	chlorinating water supply line	500.00	269.08
	BORROW AREA DRAINAGE		
15	ac. clearing	300.00	300.37
12	ac. grubbing	200.00	294.61
60,000	cu. yd. stripping ditch and channel area	.30	.23
64,000	cu. yd. excavation for ditches, common	.35	.34
1,000	cu. yd. excavation for ditches, rock	4.00	3.50
240,000	cu. yd. excavation for channel, common	.35	.34
3,000	cu. yd. excavation for channel, rock	3.00	3.50
1,600	cu. yd. excavation for structures, common	2.50	2.14
100	cu. yd. excavation for structures, rock	10.00	4.18
240	lin. ft. 48-in. conc. culvert pipe, in place	15.00	12.63
150	lin. ft. 60-in. conc. culvert pipe, in place	25.00	23.04
	RAILROAD AND HIGHWAY BRIDGES		
Lump sum,	railroad bridge at Rat Creek, complete	$12,000	$15,105
Lump sum,	railroad bridge at Teeter Creek, complete	18,500	$7,750
Lump sum,	highway bridge at Row River, complete	$49,000	$15,200
20	cu. yd. additional concrete, in place	60.00	25.00



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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 $10,000 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...

Birch-Johnson-Lytle, a Seattle, Wash., combine, will receive about $24,000,000 on a cost-plus-fixed-fee basis for construction of the permanent housing and technical facilities at Fort Richardson in Anchorage and at Ladd Field in Fairbanks, Alaska. The U. S. Engineer Office at Seattle awarded the contract.

Morrison-Knudsen Co., Inc., Boise, Ida., was awarded $6,500,000 by the Idaho Power Co. for additional hydroelectric installations at the firm's Lower Salmon plant on Snake River, and the Malad River plant, as well as a power line to Emmett, Ida.

Arizona and Nevada Constructors, Phoenix, Ariz., received three Bureau of Reclamation contracts totaling $5,530,757 for construction of earthwork, concrete lining and structures in the Friant Division of the Friant-Kern Canal, Central Valley Project. The area of work extends approximately from 18 mi. east of Fresno to 10 mi. east of Visalia.

Grafe-Callahan Construction Co., Gunther and Shirley Co. and **W. K. McIlyar,** a joint venture from Dallas, Tex., have a $5,111,877 contract to build Horsetooth and Soldier Canyon Dams and Satanka Dike, all part of Horsetooth Reservoir in the Colorado-Big Thompson Project near Fort Collins, Colo. It is a Bureau of Reclamation project.

Hinman Brothers Construction Co. and **Rhoades Brothers and Shofner,** Denver, Colo., received a Reclamation contract of $4,319,427 to build earth-filled Dixon Canyon and Spring Canyon Dams, also part of Horsetooth Reservoir in the Colorado-Big Thompson Project.

Lindgren & Swinerton, Los Angeles, Calif., was awarded a five million dollar contract to construct a 485-unit private housing project near Crenshaw Blvd. and Imperial Hwy. in Inglewood, Calif., for Hyatt Dehn and Associates of Los Angeles.

T. E. Connolly, Inc., San Francisco, Calif., will get $3,494,420 for drilling a 2-mi. tunnel through solid rock, building a siphon across Bacon Coulee and constructing 1,000 ft. of the Main Canal at the Columbia Basin Project in south central Washington, from the Bureau of Reclamation.

T. & H. Corp., Portland, Ore., has received a $3,500,000 contract for erection of a 14-story Department of Agriculture office building in Portland.

Hubert H. Everist, Sr., San Francisco, Calif., was awarded $3,530,068 by the Bureau of Reclamation to construct Stations 686 to 1365 of the Delta-Mendota Canal, and the Westley wasteway, near Patterson, Calif., part of the Central Valley Project.

Roger Peabody of Dallas, Tex., has been contracted to build a 17-story, brick, steel and stone office building in Dallas for Murray Samuel of that city at a price of $2,500,000.

Roy L. Bair and **James Crick & Sons,** Spokane, Wash., received a joint award of $2,771,000 from the Bureau of Reclamation to build a 9,000-ft. earth-concrete dam at the south end of the reservoir at Coulee City in the Columbia Basin Project.

Ray Schweitzer of Los Angeles, Calif., will build 109, nine-family, frame and stucco apartment buildings with 32 rooms in each for C. C. Tatum and Lustgarten of Los Angeles in the Van Nuys district. The contract award was for $4,174,000.

Morrison-Knudsen Co. of Los Angeles, and **M. H. Hasler** of

Santa Ana, Calif., will build Stations 1932 plus 75 to 2631 of the Friant-Kern Canal, Friant Division of the Central Valley Project. They will receive $1,829,457 for the work from the Bureau of Reclamation.

Cahill Bros., San Francisco, Calif., will build a two million dollar addition to the merchandise mart building in San Francisco for the Capitol Co., and a $2,200,000, 13-story and basement building plus an additional 10 stories to a three-story office building of the Pacific Gas and Electric Co. in the same city.

Case Construction Co. of Alameda and **American Pipe and Construction Co.**, South Gate, Calif., have a $1,586,380 contract from the U. S. Navy for dredging, disposal and filling at San Francisco Naval Shipyard.

Stolte, Inc., Oakland, Calif., and **Duncanson-Harrelson**, San Francisco, will receive $1,692,897 from the California Division of Highways for building an overhead crossing over the Southern Pacific tracks, at 5th Ave. and East Shore Freeway in Oakland.

T. E. Connolly, Inc., Case Construction Co., and **Peter Kiewit Sons' Co.** of San Francisco, Calif., were awarded a $7,447,700 U. S. Engineers contract to construct 8,650 ft. of detached breakwater and to restore 12,500 ft. of detached breakwater in the Los Angeles and Long Beach Harbors.

J. A. Terteling & Sons, Inc., Boise, Ida., will get $1,548,060 from the Bureau of Reclamation for building 5.4 mi. of the main irrigation canal of the Columbia Basin Project in Washington.

Highway and Street...

Arizona

COCONINO CO.—**Bowen-McLaughlin**, Box 4037, Phoenix, and **L. G. Lynch**, Phoenix—$356,439 for constr. of 10.6 mi. access rd. at Grand Canyon-Old Trail, Kaibab National Forest—by Public Roads Administration, Phoenix. 6-13

COCONINO CO.—**Kolob Construction Co.**, 731 N. 19th St., Phoenix—$122,960 for grade., drain. and surf. 7 mi. hwy. from Flagstaff to Fort Valley—by State Highway Department, Phoenix. 6-7

COCONINO CO.—**W. R. Skousen**, Box 71, Phoenix—$229,295 for 12.9 mi. hwy. constr., Project Ariz. FH2-F1-G1-H1, Flagstaff-Clintswell—by Public Roads Administration, Phoenix. 6-14

MARICOPA CO.—**Arizona Sand and Rock Co.**, Box 1522, Phoenix—$15,473 for reshaping rd. surfaces and bitu. surf. on 1 mi. of U. S. 80, 12 mi. W. of Phoenix—by State Highway Department, Phoenix. 6-14

MARICOPA CO.—**Bartol and Shearer**, S. 7th Ave., Phoenix—$42,168 for grade, drain. and surf. 3 mi. hwy. approx. 5 mi. S. of Phoenix—by State Highway Department, Phoenix. 6-13

PIMA CO.—**P. D. O. C.**, Luhrs Bldg., Phoenix—$413,199 for drain., grade., and base and surf., on 10.6 mi. of Tucson-Ajo hwy. beginning 15.5 mi. NE. of Sells and continuing E.—by State Highway Department, Phoenix. 6-7

YAVAPAI CO.—**Arizona Sand & Rock Co.**, Box 1522, Phoenix—$168,934 for grade., draining, base and surf. of U. S. 89 from Kirkland SE. 4.5 mi.—by State Highway Department, Phoenix. 6-21

California

ALAMEDA CO.—**Lee J. Immel**, Box 65, Sta. A, Berkeley—$268,418 for reconstr. of streets, including tracks, curbs, manhole frames, storm inlets, catchbasins and valve boxes, Naval Supply Depot, Oakland—by Bureau of Yards and Docks, Washington, D. C. 6-27

ALAMEDA CO.—**A. S. Jones**, Box 3067—Brown's Valley Rd., Napa—$158,786 for repairing 7.6 mi. S. Hwy. 5, betw. Dublin and Mission San Jose; and S. Sign Rt. 17, betw. Alvarado and San Leandro—by Division of Highways, Sacramento. 6-10

ALAMEDA CO.—**Ransome Co.**, 4030 Hollis St., Emeryville—$42,720 for resurf. roads in Tilden Regional Park, Berkeley—by East Bay Regional Park District, Oakland. 6-27

ALAMEDA AND CONTRA COSTA COS.—**J. R. Armstrong Construction Co.**, 400 Central, El Cerrito—$79,669 for repairing approx. 10.5 mi. shoulders and constr. of decelerating lane—by Division of Highways, Sacramento. 5-31

KERN CO.—**Lewis Construction Co.**, 214 S. Vermont Ave., Los Angeles—$167,000 for all earthwork, grade., pave., walks, conc. valve boxes, hydrant guards, etc., of roads, parking areas and walks, Area FH, Naval Ordnance Test Station, Inyokern—by Bureau of Yards and Docks, Washington, D. C. 6-28

LOS ANGELES CO.—**Griffith Co.,** 1060 S. Broadway, Los Angeles—$54,925 for premix oil macadam surf. of Angelus Ave. and other streets in Glendale—by City Council, Glendale. 6-7

LOS ANGELES CO.—**Macco Construction Co.,** 815 N. Paramount Blvd., Clearwater—$232,921 for constr. of 2.1 mi. of roadway in Swartout Angeles National Forest—by Division of Highways, Sacramento. 6-7

MENDOCINO CO.—**C. M. Syar,** Box 1431, Vallejo—$33,764 for 1 mi. repairing with base and surf. betw. Burke Hill and 1 mi. N.—by Division of Highways, Sacramento. 6-26

MERCED CO.—**Gunnar Corporation,** 5575 Valley Blvd., Los Angeles—$62,350 for surf. and repairing shoulders on 3.2 mi. hwy. betw. Atwater and 2 mi. N.—by Division of Highways, Sacramento. 6-3

MERCED CO.—**Frank B. Marks & Sons,** 203 Berverdor St., Tracy—$82,422 for 3 mi. repairing with rock base and surf. betw. San Joaquin River and Madera Co. line—by Division of Highways, Sacramento. 6-27

MODOC CO.—**Morgan Construction Co.,** Pleasanton—$10,662 for seal coating 7.8 mi. rd. betw. Lakeview Junction and Cedar Mountain maintenance station—by Division of Highways, Sacramento. 6-3

NAPA CO.—**E. A. Forde,** 640 Sir Francis Drake Blvd., San Anselmo—$28,872 for surf. 3.5 mi. rd. in Wooden Valley, 3 mi. rd. on Howell Mountain and 4 mi. rd. in Conn and Chiles Canyon —by County Board of Supervisors, Napa. 6-3

ORANGE CO.—**John J. Swigart Co.,** 20530 S. Normandie Ave., Torrance—$92,082 for 8.3 mi. widening shoulders and resurf. portion betw. 1.4 mi. N. of El Toro Rd. and south city limits of Tustin—by Division of Highways, Sacramento. 6-24

ORANGE CO.—**John J. Swigart Co.,** 20530 S. Normandie Ave., Torrance—$29,363 for resurf. hwy. and widening shoulders betw. Verano St. and W. city limits of Santa Ana—by Division of Highways, Sacramento. 6-12

PLACER CO.—**Fredrickson & Watson Construction Co.,** 873 81st Ave., Oakland—$614,493 for 2.6 mi. grade. and resurf. with conc. pave. .1 mi. W. of Nevada St., Auburn, and 1 mi. NE. of N. city limits of Auburn—by Division of Highways, Sacramento. 6-26

SACRAMENTO CO.—**The Sheldon Oil Co.,** Main St., Suisun —$39,990 for 3.4 mi. hwy. repairs betw. Antioch bridge and Emmaton—by Division of Highways, Sacramento. 6-21

SACRAMENTO AND YOLO COS.—**Harms Bros.,** Rt. 4, Box 2220, Sacramento—$38,405 for 6.1 mi. of hwy. repairs betw. Sacramento city limits and .5 mi. E., and betw. .04 mi. and 9.6 mi. N. of Solano Co.—by Division of Highways, Sacramento. 6-21

SAN BENITO CO.—**Granite Construction Co.,** Box 900, Watsonville—$59,959 for 1.6 mi. hwy. repairs betw. Prunedale Jct. and Santa Clara Co. line—by Division of Highways, Sacramento. 6-21

SAN BERNARDINO CO.—**R. R. Hensler,** 816 Allen Ave., Glendale—$79,500 for approx. 13.8 mi. of surf. and seal coat betw. Squirrel Inn and Big Bear Dam—by Division of Highways, Sacramento. 6-13

SAN BERNARDINO CO.—**George Herz & Co.,** Box 191, San Bernardino—$38,367 for 4.7 mi. hwy. repairs betw. Victorville and Oro Grande Underpass—by Division of Highways, Sacramento. 6-21

SAN DIEGO CO.—**N. M. Ball Sons,** 649 S. Olive St., Los Angeles—$56,995 for base and surf. 6.2 mi. hwy. betw. Leucadia and San Mateo Creek—by Division of Highways, Sacramento. 6-3

SAN DIEGO CO.—**Walter H. Barber,** Box 1523, San Diego—$52,657 for reinf. conc. bridge, 340 ft. long and 24 ft. road width. across Sweetwater River near Sunnyside on County Rd.—by San Diego County Board of Supervisors, San Diego. 6-21

SAN DIEGO CO.—**R. E. Hazard Contracting Company,** 2548 Kettner Blvd., San Diego—$110,398 for base and surf. betw. San Ysidro and Chula Vista, betw. Rt. 2 and Imperial Beach, and betw. Grossmont and El Cajon—by Division of Highways, Sacramento. 6-3

SAN FRANCISCO CO.—**Eaton and Smith,** 715 Ocean Ave., San Francisco—$182,232 for Clipper St. extension from Portola Drive to Douglas St., San Francisco—by Division of Highways, Sacramento. 6-3

SAN FRANCISCO CO.—**Pacific Pavements Co., Ltd.,** 85 Barstow St., San Francisco—$49,995 for repaving streets and/or sidewalk openings where paving removed for water department.

San Francisco—by Public Utilities Commission, San Francisco. 6-28

SAN LUIS OBISPO CO.—**Fairy-Hammond, Inc.,** 564 Market St., San Francisco—$95,700 for 2.1 mi. of hwy. repair betw. Santa Maria River and 1.5 mi. S. of Nipomo—by Division of Highways, Sacramento. 6-21

SAN MATEO CO.—**Guy F. Atkinson Co.,** Orange and Railroad Aves., S. San Francisco—$627,782 for 2.2 mi. of grade. and pave. with conc. on crusher run base, Bay Shore Freeway from Broadway in Burlingame to State St. in San Mateo—by Division of Highways, Sacramento. 6-27

SAN MATEO CO.—**L. C. Smith,** First and Railroad, San Mateo—$270,169 for improvement of streets in San Mateo Knolls No. 2—by City Council, San Mateo. 6-6

SHASTA CO.—**Oilfields Trucking Co.,** Box 751, Bakersfield, and **Phoenix Construction Co.,** Box 906, Bakersfield—$206,124 for 10.8 mi. of grade. and surf. betw. Cottonwood and Anderson—by Division of Highways, Sacramento. 6-13

SISKIYOU CO.—**Utah Construction Co.,** 1 Montgomery St., San Francisco—$552,675 for grade. and base 16.5 mi. on Rt. 72, betw. Dorris and Hatfield—by Division of Highways, Sacramento. 6-7

TULARE CO.—**Valley Paving & Construction Co.,** Box 1349, Fresno—$32,160 for 3 mi. of surf. and seal coat starting .4 mi. S. of Kingsburg—by Division of Highways, Sacramento. 6-12

TULARE AND FRESNO COS.—**George E. Murray,** 1702 E. Mariposa Rd., Stockton—$141,599 for 5 mi. of hwy. on Ten Mile-Hume, Sequoia National Forest—by Public Roads Administration, San Francisco. 6-27

YOLO CO.—**A. Teichert & Son,** Box 1113, Sacramento—$71,525 for resurf. of 7.3 mi. of hwy. betw. Davis and Swingle and betw. 2.5 mi. N. Arcade Station and junction of Rte. 6—by Division of Highways, Sacramento. 5-31

YUBA AND SUTTER COS.—**Lester L. Rice,** 605 14th St., Marysville—$594,471 for 2 mi. of four-lane divided hwy. and surf. with asph. conc. pave. on cement treated base, betw. D St. bridge, Marysville, and Rt. 15, Yuba City—by Division of Highways, Sacramento. 6-26

Colorado

ARCHULETA CO.—**Colorado Constructors Inc.,** Denver—$192,277 for grade. S. Hwy. 10 betw. Pagosa Springs and Wolf Creek—by State Highway Department, Denver. 5-24

MONTEZUMA CO.—**Gardner & Eskridge,** Glenwood Springs—$50,554 for gravel resurf. of 10.2 mi. of SH 145 betw. Dolores and Rice—by State Highway Department, Denver. 6-14

Idaho

BOISE CO.—**Whiting & Haymond,** Springville, Utah—$450,603 for constr. of roadbed, drainage structs. and surf. on 6.4 mi. of S. Hwy. 15, Horseshoe Bend Hill Section—by Bureau of Highways, Boise. 6-7

KOOTENAI CO.—**Standard Asphalt Paving Co.,** 603 Chronicle Bldg., Spokane, Wash.—$23,856 for resurf. and constr. of surf. for 2.6 mi. and seal-coating .3 mi. of U. S. Hwy. 10 betw. Kootenai Co. line and Pine Creek—by Bureau of Highways, Boise. 6-14

LATAH CO.—**Shoshone Co.,** Twin Falls—$101,986 for surf. 8 mi. of Moscow-Bovill hwy.—by Bureau of Highways, Boise. 6-14

Kansas

BARBER CO.—**Stuart Simpson,** McPherson—$30,826 for 4.5 mi. base and surf., $2,343 for .3 mi. surf., and $12,229 for 8.3 mi. asph. surf. treat.—by State Highway Commission, Topeka. 6-20

CLARK CO.—**Broce Construction Co.,** 214 S. 2nd, Dodge City—$4,716 for 5.9 mi. bitu. sealing, $4,884 for .4 mi. dense graded surf., and $11,354 for .7 mi. dense graded surf.—by State Highway Commission, Topeka. 6-20

CLARK CO.—**H. J. Taylor Construction Co.,** United Life Bldg., Salina—$9,816 for .4 mi. grade., and $26,837 for .7 mi. grade—by State Highway Commission, Topeka. 6-20

EDWARDS CO.—**Cook & Cone,** 337 N. Dellrose St., Wichita—$12,558 for 20.4 mi. bitu. sealing—by State Highway Commission, Topeka. 6-20

FINNEY CO.—**Harry Henery,** Ottawa—$16,131 for 18.3 mi. bitu. sealing—by State Highway Commission, Topeka. 6-20

GRAHAM CO.—**H. M. Thompson & Co.,** Box 327, Ellinwood—$69,261 for 14 mi. bitu. reconstr. and surf.—by State Highway Commission, Topeka. 6-20

GRAY CO.—**Harry Henery,** Ottawa—$8,857 for 13 mi. bitu. sealing, $7,931 for 10.9 mi. bitu. sealing, and $46,585 for 12.9 mi. bitu. reconstr. and single asph. surf. treat.—by State Highway Commission, Topeka. 6-20

GRAY CO. — **San-Ore Construction Co.,** McPherson — $93,159 for 10.9 mi. subgrade modification and dense graded surf.—by State Highway Commission, Topeka. 6-20

GREELEY CO.—**Broce Construction Co.,** 214 S. 2nd., Dodge City—$11,792 for 16.4 mi. bitu. sealing—by State Highway Commission, Topeka. 6-20

HASKELL CO.—**Harry Henery,** Ottawa—$39,959 for 11 mi. bitu. reconstr. and single asph. surf. treat.—by State Highway Commission, Topeka. 6-20

HODGEMAN CO.—**Broce Construction Co.,** 214 S. 2nd, Dodge City—$7,625 for 11.5 mi. bitu. sealing, and $15,810 for 19.8 mi. bitu. sealing—by State Highway Commission, Topeka. 6-20

HODGEMAN CO.—**Broce & Smith Construction Co.,** Dodge City—$135,964 for 12.3 mi. subgrade modification and dense graded surf.—by State Highway Commission, Topeka. 6-20

LOGAN CO.—**Broce Construction Co.,** 214 S. 2nd, Dodge City —$20,145 for 30 mi. bitu. sealing, and $1,376 for 2 mi. bitu. sealing—by State Highway Commission, Topeka. 6-20

MEADE CO.—**San-Ore Construction Co.,** McPherson—$100,796 for 12.6 mi. subgrade modification and dense graded surf.—by State Highway Commission, Topeka. 6-20

NESS CO.—**Broce & Smith Construction Co.,** Dodge City—$142,256 for 12.5 mi., and $7,014 for .6 mi. subgrade modification and dense graded surf. course—by State Highway Commission, Topeka. 6-20

NESS CO.—**N. C. Carrol & Sons Gravel Co.,** Pratt—$13,187 for 11 mi. light type surf.—by State Highway Commission, Topeka. 6-20

NORTON CO.—**H. M. Thompson & Co.,** Box 327, Ellinwood—$19,775 for 4.1 mi. bitu. reconstr. and surf.—by State Highway Commission, Topeka. 6-20

PAWNEE CO.—**Cook & Cone,** 337 N. Dellrose St., Wichita—$16,988 for 27.8 mi. bitu. sealing—by State Highway Commission, Topeka. 6-20

ROOKS CO.—**Inland Construction Co.,** 3867 Leavenworth St., Omaha, Neb.—$75,295 for 17.4 mi. dense graded surf.—by State Highway Commission, Topeka. 6-20

WALLACE CO.—**D. G. Hansen,** Logan—$108,655 for 16.8 mi. dense graded surf.—by State Highway Commission, Topeka. 6-20

Montana

BEAVERHEAD CO.—**R. P. Herrick Co.,** 208 Lewisohn Bldg., Butte—$72,202 for surf. and road mix oiling on 6.5 mi. of Dillon east section of Dillon-Twin Bridges road—by State Highway Commission, Helena. 6-20

BEAVERHEAD, DEER LODGE AND SILVER BOW COS.—**L. A. Woodward Construction Co.,** Missoula—$117,564 for grade., drain. and surf. 4.4 mi. of Wisdom-Divide Rd.—by State Highway Commission, Helena. 6-20

CASCADE CO.—**Nilson-Smith Construction Co.,** Box 1147, Great Falls—$127,642 for grade., drain., and road mix on 4.9 mi. of Great Falls-Fort Benton Rd.—by State Highway Commission, Helena. 6-20

DEER LODGE CO.—**L. A. Woodward Construction Co.,** Missoula—$88,221 for grade., drain. and surf. of 3.9 mi. of Ralston-Anaconda Rd.—by State Highway Commission, Helena. 6-20

FLATHEAD CO.—**Union Construction Co., Inc.,** Box 1845, Great Falls—$63,680 for grade., drain., surf. and road mix oiling on 4 mi. of Kalispell-Half Moon Rd.—by State Highway Commission, Helena. 6-20

LEWIS AND CLARK CO.—**Nilson-Smith Construction Co.,** Box 1147, Great Falls—$67,367 for grade., drain., surf. and bitu. treat. of 4.5 mi. of Helena-Canyon Creek Rd.—by State Highway Commission, Helena. 6-20

Nevada

ELKO CO.—**Hunt and Frandsen,** Reno—$144,631 for portion of state hwy. 46, from Elko to 12 mi. SE. toward Lamille—by Department of Highways, Carson City. 6-14

HUMBOLDT CO.—**Silver State Construction Co.,** Fallon—$165,559 for constr. of 14.9 mi. of S. Hwy. System from junction with U. S. 95, approx. 31 mi. N. of Winnemucca to Sod House—by Department of Highways, Carson City. 6-12

LANDER CO.—**Dodge Construction, Inc.,** Fallon—$313,511

for constr. of 10.3 mi. of S. Hwy. System 9.3 mi. E. of Battle Mountain to approx. .8 mi. W. of Lander-Eureka Co. Line—by Department of Highways, Carson City. 6-12

LYON CO.—**A. A. Tieslau,** 1220 Eastshore Highway, Berkeley, Calif.—$238,624 for base., surf., etc. 2.3 mi. F. Hwy. 6, Dalzell Canyon, Toiyabe National Forest—by Public Roads Administration, San Francisco. 6-12

WHITE PINE CO.—**Sumsion and Glenn,** Springville, Utah—$270,970 for constr. of 17.7 mi. of S. Hwy. System from a point in McGill to Magnuson's Ranch, Rt. 2, Section E—by Department of Highways, Carson City. 6-12

New Mexico

CATRON CO.—**Floyd Haake,** 1201 Sierra Vista, Santa Fe—$103,824 for ballast, leveling course and bitum. top course surf. on 10 mi. of U. S. 60, betw. Pietown and Quemado—by State Highway Department, Santa Fe. 5-31

CHAVES CO.—**Armstrong & Armstrong,** Box 873, Roswell—$147,714 for grade., ballast, leveling course, bitum. top course, etc., on 14.5 mi. S. Hwy. 83, betw. Elk and Hope—by State Highway Department, Santa Fe. 5-31

CURRY CO.—**G. I. Martin,** 520 S. Tulane, Albuquerque—$65,301 for drain. structures, leveling course, watering and rolling 10.9 mi. S. Hwy. 89, betw. Weber City and Claud—by State Highway Department, Santa Fe. 5-31

DE BACA CO.—**Armstrong & Armstrong,** Box 873, Roswell—$119,249 for grade., minor drain., surf. and leveling course on 10 mi. of S. Hwy. 20 betw. Fort Sumner and Roswell—by State Highway Department, Santa Fe. 5-31

DONA ANA CO.—**Henry Thygesen & Co.,** Box 876, Albuquerque—$80,752 for 6 mi. of grade., drain., top course surf. betw. Mesquite and San Miguel on S. Hwy. 228; betw. Berino and junction with S. Hwy. 28 on S. Hwy. 226; and betw. Vado and S. Hwy. 28 on S. Hwy. 227—by State Highway Department, Santa Fe. 5-31

QUAY CO.—**G. I. Martin,** 520 S. Tulane, Albuquerque—$32,437 for grade., drain., structs., watering and rolling, and leveling course on 4.9 mi. of S. Hwy. 231, betw. junction N. M. 88 and Wheatland—by State Highway Department, Santa Fe. 5-31

RIO ARRIBA CO.—**E. M. Silver,** Box 1062, Albuquerque—$200,692 for reprocessing present surf., leveling course and top surf. of 20.6 mi. of U. S. 84, betw. Abiquiu and Parkview—by State Highway Department, Santa Fe. 5-31

SIERRA CO.—**Walter L. Denison,** 207 S. Hermosa Ave., Albuquerque—$118,207 for grade., drain., ballast and surf. on 13 mi. of S. Hwy. 180, betw. Hillsboro and junction with U. S. 85 near Caballo—by State Highway Department, Santa Fe. 5-31

VALENCIA CO.—**D. D. Skousen,** Springer Bldg., Albuquerque—$118,708 for grade., drain. structures, base course surf., top course surf., etc., on 11.4 mi. of S. Hwy. 47, betw. Los Lunas and Veguita—by State Highway Department, Santa Fe. 5-31

Texas

CALLAHAN CO.—**F. M. Reeves & Son,** Box 972, Austin—$94,396 for 11.1 mi. flexible base and surf. on U. S. 183 and State 279, 14 mi. S. of Bair to Coleman Co. line, and from Cross Plains to Brown Co. line—by State Highway Department, Austin. 6-12

CASTRO CO.—**Fred Hall & Son,** Box 1188, Waco—$153,599 for 8 mi. grade., structs., flexible base and triple asph. surf. from 8 mi. SE. of Dimmit to Hart on Hwy. 194—by State Highway Department, Austin. 6-19

DALLAS CO.—**Texas Bitulithic Co.,** Box 5297, Dallas—$155,154 for 14.8 mi. of asph. conc. pave. on U. S. 80 and State 1, Tarrant Co. line to Rosemont St. near Dallas, and from Jct. U. S. 80 to 375 ft. W. of Beckley Ave. overpass, Dallas—by State Highway Department, Austin. 6-19

EASTLAND CO.—**A. L. Bucy & Son,** Brownwood—$57,823 for 5.5 mi. grade., structs., base and surf. on FM 569, from U. S. 80, 1 mi. W. of Cisco to SW. of Nimrod—by State Highway Department, Austin. 6-12

FRIO CO.—**Brazos Valley Construction Co.,** Majestic Bldg., Fort Worth—$80,998 for 12.4 mi. grade., structs., base and surf. on FM 140, Pearsall to 12.4 mi. E.—by State Highway Department, Austin. 6-12

GONZALES CO.—**Holland Page,** Box 1811, Austin—$243,251 for 16.4 mi. grade., structs., base and surf. on FM 108, Smiley to junction with State Hwy. 200, E. of Cost—by State Highway Department, Austin. 6-12

HALE CO.—**Grafe-Callahan Construction Co.,** Continental Bldg., Dallas—$216,247 for 18.3 mi. asph. conc. pavement on U. S. 87, Swisher Co. line to Hale Center—by State Highway Department, Austin. 6-19

HOOD CO.—**A. L. Bucy,** Brownwood, and **Wallace & Bowden,** 5513½ E. Grand Ave., Dallas—$193,825 for 18.4 mi. grade., drain. structs., base and asph. surf. on Hwy. FM. 7—by State Highway Department, Austin. 6-19

JONES CO.—**Ernest Lloyd,** Box 1120, Fort Worth—$51,153 for 11 mi. grade., structs., base and surf. from Stamford to 10.8 mi. SE. on Hwy. FM 142—by State Highway Department.

KAUFMAN CO.—**O'Neal Construction Co.,** Dallas—$26,602 for 47,000 sq. yds. asph. conc. resurf., Terrell—by City Council, Terrell. 6-20

SWISHER CO.—**Bell & Braden,** Herring Hotel Bldg., Amarillo—$61,795 for 11 mi. grade., structs., base and surf. on U. S. 146 and 214—by State Highway Department, Austin. 6-12

TRAVIS CO.—**F. M. Reeves & Sons,** Box 972, Austin—$246,001 for .4 mi. of MK&T and T&NO Ry. overpass and embankment approach on Hwy. 9—by State Highway Department.

WISE-TARRANT COS.—**Wallace & Bowden,** 5513½ E. Grand Ave., Dallas—$32,708 for 22.8 mi. of asph. underseal for conc. pave.—by State Highway Department, Austin. 6-19

WILLACY CO.—**E. B. Darby,** Pharr—$104,524 for 11.8 mi. grade., structs., base and surf. on Hwy. FM 498—by State Highway Department, Austin. 6-12

WILSON CO.—**Dudley R. Cloud,** 2166 W. Kings Hwy., San Antonio—$53,230 for 6.7 mi. grade., structs., roadbed treat., and surf. on FM 541 from U. S. 181 in Poth to Dewees—by State Highway Department, Austin. 6-12

ZAVALA-DIMMIT COS.—**Dean Word,** Box 330, New Braunfels—$270,769 for 8.6 mi. grade. and structs. on U. S. 83, Loop 155 and FM 65, 1.3 mi. S. Zavala Co. line to 4.5 mi. N. of Crystal City—by State Highway Department, Austin. 6-12

Utah

MORGAN CO.—**Reynolds Construction Co.,** Springville—$58,212 for constr. of 12.6 mi. road from Porterville to Peterson—by Board of Commissioners, Morgan County. 5-31

SEVIER CO.—**L. A. Young Construction Co.,** Richfield—$68,646 for 2-in. bitu. surf., SH 118 betw. Monroe and Joseph—by State Road Commission, Salt Lake City. 6-14

Washington

CLALLAM CO.—**Rush & Baird,** Seattle —$25,679 for seal treat. on 12.8 mi. state hwy. 9, Fairholm E., and surf. treat. on 10.6 mi. hwy. 9-A, Twin to Pysht—by Department of Highways, Olympia. 6-24

FRANKLIN CO.—**McAtee & Heathe,** Box 2188, Spokane—oiling 8-mi. stretch of road from Kahlotus to Adams Co. line below Lind—by County Engineer, Pasco. 6-11

KITTITAS AND CHELAN COS.—**Joslin & McAllister,** Box 1174, Spokane—$52,084 for manufacturing and stockpiling crushed stone surf. top coarse and mineral aggregate on hwy. from Iron Creek to Leavenworth, Gaynor to Leavenworth and Plain to Leavenworth—by Department of Highways, Olympia. 6-18

KITTITAS AND FRANKLIN COS. — **Connell Diesel Oil Sales Co.,** Seattle—$22,204 for seal coating 7 mi. of S. Hwy. 7, betw. Highline Canal and Alkali Ikes; and 10.6 mi. of S. Hwy. 11, betw. Sagemoor and Connell—by Department of Highways, Olympia. 6-7

PACIFIC CO.—**N. Fiorito Co.,** 1100 Leary Way, Seattle—$289,626 for 3.3 mi. constr. of state hwy. 13, Grays Harbor Co. line to Smith Creek—by Department of Highways, Olympia. 6-24

SPOKANE CO.—**Standard Asphalt Paving Co.,** 603 Chronicle Bldg., Spokane—$107,530 for paving 69.3 mi. of hwy.—by County Commissioners, Spokane. 6-18

WHITMAN CO.—**F. F. Barnes,** Spokane —$36,639 for grade. and surf. on 2.5 mi., surf. .32 mi. and constr. of light bitu. surf. treat. on 2.8 mi., Olson Rd.—by Department of Highways, Olympia. 6-24

WHITMAN CO.—**F. H. De Atley & Co.,** Lewiston, Idaho—$85,956 for grade. and surf. 4.9 mi.; and light surf. treat. on 6.9 mi.; and constr. of pile trestle on Diamond-Endicott Rd.—by Department of Highways, Olympia. 6-7

Wyoming

ALBANY CO.—**Northwestern Engineering Co.,** Box 1392, Rapid City, S. Dak.—$83,189 for surf., oil treatment, stone chip seal coat, etc., on 8.5 mi. of Laramie-Cheyenne Rd.—by State Highway Department, Cheyenne. 5-31

FREMONT CO. — **Knisely Moore Co.,** Box 77, Douglas—$783,917 for 16.6 mi. of grade. and drain., and constr. of reinf. conc. slab bridge and culverts on Lander-Farson rd.—by State Highway Department, Cheyenne. 5-31

NATRONA, JOHNSON AND CAMPBELL COS. — **Teton Construction Co.,** Box 197, Cheyenne — $209,811 for base course surf., oil treatment, stone chip seal coat on 30.8 mi. of the Midwest-Pine Tree Rd.—by State Highway Department, Cheyenne. 5-31

SUBLETTE CO.—**Woodward Construction Co.,** Box 1046, Rock Springs—$101,465 for base course surf., oil treatment, sand seal coat, etc., on 10 mi. of the Farson-Pinedale Rd.—by State Highway Department, Cheyenne. 5-31

Bridge . . .

California

ALAMEDA CO.—**R. G. Clifford,** Box 168, S. San Francisco, and **Louis Biasotti & Son,** 40 W. Clay St., Stockton—$427,966 for bridge and overhead crossing and apprs. across Alameda Creek and over Western Pacific tracks, 2.7 mi. W. of Sunol—by Division of Highways, Sacramento. 6-27

ALAMEDA CO.—**Stolte, Inc.,** 8451 San Leandro St., Oakland, and **Duncanson-Harrelson Co.,** 1404 DeYoung Bldg., San Francisco—$1,692,897 for overhead crossing over Southern Pacific tracks, 5th Ave. and East Shore Freeway, Oakland—by Division of Highways, Sacramento. 6-25

ORANGE CO.—**C. B. Tuttle,** 269 Belmont Ave., Long Beach and **Schmidt Bros.,** 1389 Gladys Ave., Long Beach—$200,806 for widening reinf. conc. bridge across San Juan Creek; trestle above San Juan Creek overflow channel; about .4 mi. surf. on approaches; and surf. betw. Dana Point and Doheny Park—by Division of Highways, Sacramento. 6-3

PLACER CO.—**Fred D. Kyle,** 714 W. Olympic Blvd., Los Angeles—$177,730 for bridge over N. fork of middle fork of American River, Tahoe National Forest — by Public Roads Administration, San Francisco. 6-12

SAN BERNARDINO CO. — **Bent Construction Co.,** 5359 Valley Blvd., Los Angeles—$94,370 for bridge and apprs. across Mill Creek, 8 mi. E. of Redlands—by Division of Highways, Sacramento. 6-27

SAN BERNARDINO CO. — **Denni Investment Corporation,** 736 N. Avalon Blvd., Wilmington—$652,359 for grade. and surf. 3.2 mi. of hwy. betw. Highland Ave. and City Creek bridge, and for constr. of bridge across City Creek—by Division of Highways, Sacramento. 5-24

SAN DIEGO CO.—**Walter H. Barber,** Box 1523, San Diego — $52,657 for reinf. conc. bridge, 340 ft. long and 24 ft. road width, across Sweetwater River near Sun-

nyside on County Road — by San Diego County Board of Supervisors, San Diego. 6-21

SAN JOAQUIN CO. — **Fredrickson & Watson Construction Co.**, 873 81st Ave., Oakland—$811,180 for 8.2 mi. grade. and pave. and constr. of three bridges betw. Calaveras River and Lodi—by Division of Highways, Sacramento. 6-27

Colorado

PITKIN CO. — **Babb Construction Co.**, Greeley—$20,732 for reinf. conc. bridge and apprs. on SH 133 near Redstone—by State Highway Department, Denver. 6-14

Kansas

CLARK CO.—**Harry Henery**, Ottawa—$33,118 for conc. slab bridge—by State Highway Commission, Topeka. 6-20

Montana

BLAINE CO.—**O'Neil Construction Co.**, Havre, and **Nilson-Smith Construction Co.**, Box 1147, Great Falls—$153,089 for grade., drain., surf. and constr. of 323 lin. ft. of treated timber bridges on 11.9 mi. of Harlem N. Rd.—by State Highway Commission, Helena. 6-20

DANIELS CO.—**L. V. Lockwood**, Box 227, Glasgow—$14,242 for 113 lin. ft. of treated timber bridges on Scobey-Opheim Rd.—by State Highway Commission, Helena. 6-20

FERGUS CO. — **Stanley H. Arkwright, Inc.**, 208 Securities Bldg., Billings—$153,314 for grade., drain., bitu. surf. and constr. of 171 lin. ft. of treated timber bridges on 6.4 mi. of Moore E. section of Armington-Lewiston Rd.—by State Highway Commission, Helena. 6-20

PHILLIPS CO.—**Nolan Bros., Inc.**, Minneapolis, Minn.—$149,916 for grade., drain., surf. and bitu. surf. treat. and constr. of 315 lin. ft. of treated timber bridges on 5.9 mi. of Grass Range-Malta Rd.—by State Highway Commission, Helena. 6-20

ROSEBUD CO.—**Stanley H. Arkwright, Inc.**, 208 Securities Bldg., Billings—$172,591 for grade., drain., and constr. of 234 lin. ft. of treated timber bridges on 12.4 mi. of Sumatra-Ingomar section of Roundup-Forsyth Rd.—by State Highway Commission, Helena. 6-20

Texas

HAMILTON CO.—**Austin Bridge Co.**, Box 1590, Dallas—$66,996 for .075 mi. of two bridges, Warren and Little Bear Creeks, W. of Hamilton on State Hwy. 36—by State Highway Department, Austin. 6-19

WILLIAMSON CO. — **Ross Anglin and Hugh T. Field Construction Company**, Box 302, Austin—$123,000 for Mustang Creek Bridge and approaches, and base and surf. on Hwy. 95 in Taylor—by State Highway Department, Austin. 5-28

Utah

EMERY CO. — **Grant Construction Co.**, Springville—$121,220 for 2-in. bitu. surf. and conc. bridge, FAS S-101 betw. Huntington and Forest boundary — by State Road Commission, Salt Lake City. 6-14

MILLARD CO.—**Bether Brothers**, Heber City—$41,738 for conc. and steel bridge over Sevier River, Hinckley-Delta — by State Road Commission, Salt Lake City. 6-15

Washington

COWLITZ CO.—**Peter Kiewit Sons Co.**, 1403 W. 45th St., Seattle—$179,582 for grade., surf. and constr. of conc. pile and flat slab bridge on 8.4 mi. on hwy. 1-R—by Department of Highways, Olympia. 6-21

KING CO. — **Neukirch Bros.**, Seattle — $179,745 for steel and reinf. conc. overcrossing struct. to carry S. Hwy. 15 over Great Northern Railway tracks, near Scenic—by Department of Highways, Olympia. 6-7

KITSAP CO.—**M. P. Butler**, 3419 13th Ave., SW., Seattle—$102,664 for constr. of railroad transfer bridge and unloading platform at Naval magazine, Indian Island—by Bureau of Yards and Docks, Washington, D. C. 6-22

Wyoming

BIG HORN CO.—**Cal M. Tebbs**, Cowley—$14,812 for constr. of one 168 ft. pipe culvert and approaches at Jolly Draw on Deaver-Cowley Rd.—by State Highway Department, Cheyenne. 5-31

Airport . . .

Arizona

MARICOPA CO. — **Daley-Tulloch Construction Co.**, 2400 S. 16th St., Phoenix—$158,668 for extension of East-West runway at Sky Harbor Airport, Phoenix—by City Council, Phoenix. 6-21

Water Supply . . .

California

SAN DIEGO CO. — **N. P. Van Valkenburgh**, 8609 San Vicente, South Gate —

$115,744 for additions and alterations to existing water and toilet facilities, Oceanside—by 11th Naval District, San Diego. 5-31

SAN MATEO CO.—**Pioneer Construction Co.**, Box 411, San Mateo—$24,029 for constr. of water mains, including fittings and valves, in Homeview area, Belmont—by Belmont County Water District, Belmont. 6-19

Oregon

DOUGLAS CO.—**Warner Brothers**, Eugene—$45,000 for installation of water mains in downtown Reedsport—by City Council, Reedsport. 6-18

Texas

DALLAS CO.—**E. L. Dalton Company**, Great National Life Building, Dallas—$28,508 for water mains in Hillcrest Park Addition and Sam Lobello Estates, Dallas—by City Council, Dallas. 5-27

DALLAS CO.—**O. J. Parrott Construction Co.**, Tower Petroleum Bldg., Dallas—$22,611 for water mains in various parts of Dallas—by City Council, Dallas. 5-27

MC LENNAN CO. — **Brown and Root**, Box 3, Houston—for rebuilding spillway apron on cost-plus basis at Lake Waco Dam, Waco—by Water Department, Waco. 5-28

Utah

WEBER CO.—**Clarence Waterfall**, 423 Kiesel Bldg., Ogden—constr. of 1,000,000 gal. reservoir, Ogden—by City Council, Ogden. 6-15

Sewerage . . .

Arizona

PIMA CO.—**M. M. Sundt Construction Co.**, Box 2592, Tucson—$29,337 for outfall sewer line from 6th Ave. and Elm St. W. to outfall trunkline, Tucson—by City Council, Tucson. 6-21

PIMA CO.—**A. C. La Rue Construction Co.**, 1310 N. 12th Ave., Tucson—$36,772 for sanitary sewers, pumping sta., grade., backfill, etc., Tucson—by City Council, Tucson. 6-14

California

ALAMEDA CO.—**E. J. Tobin**, 1000 Carleton St., Berkeley—$5,700 for installation of booster system, Newark—by Union Sanitary District, Newark. 6-21

LOS ANGELES CO.—**Artukovich Brothers**, 7320 Atlantic Ave., Hynes—$303,170 for portion of District No. 3 outfall sewer from Broad and Bond Sts. to 1,555 ft. E. of Alameda St.—by County Sanitation District No. 3, Los Angeles. 6-21

LOS ANGELES CO.—**Artukovich Bros.**, 7320 N. Atlantic Ave., Hynes—$91,794 for installation of sewer lines in Riverside Dr. and Tyron Ave. District, near Van Nuys—by Board of Public Works, Los Angeles. 6-17

LOS ANGELES CO.—**Bebek & Brkich**, 238 W. Florence Ave., Los Angeles—$21,140 for 70th Way extension trunk sewer, from County Sanitation District No. 2 main trunk sewer, Garfield Ave., 1,000 ft. S. of Jackson St. to Orange Ave. and 70th Way—by County Sanitation District No. 2, Los Angeles. 6-21

LOS ANGELES CO.—**Bebek & Brkich**, 238 W. Florence Ave., Los Angeles—$59,-

810 for portion of Victoria St. trunk sewer on Broadway, 620 ft. S. of 174th St. to Compton Blvd. and McKinley Ave.—by County Sanitation District No. 2, Los Angeles. 6-21

LOS ANGELES CO.—**Burch and Bebek,** 2803 Los Flores, Lynwood—$51,588 for 11,294 lin. ft. of industrial sewers from Cherry Ave. to Clark Ave. along N. side of Long Beach Airport, Lakewood Village — by Montana Land Co., Long Beach. 6-21

LOS ANGELES CO.—**Oberg Brothers,** 401 W. Redondo, Inglewood—$110,900 for reconstr. of invert slab in Arroyo Seco conduit, betw. Seco St. and Holly St., Los Angeles—By Los Angeles County Flood Control District, Los Angeles. 6-18

LOS ANGELES CO.—**R. A. Wattson Co.,** 5528 Vine Ave., North Hollywood—$57,489 for sanitary sewers in Mines Ave. and other sts., to serve the Hughes tract, Montebello. —by City Council, Montebello. 6-7

ORANGE CO.—**Pernel Barnett,** 751 W. Chapman, Orange—$12,328 for installation of sanitary sewer line on Cypress Ave. and Benton St., Garden Grove—by Garden Grove Sanitary District, Garden Grove. 6-14

ORANGE CO.—**N. P. Van Valkenburgh,** 8609 San Vicente, South Gate—$12,241 for 10-in. cast iron sewage force main, etc., Naval Air Station, Santa Ana—by Navy Public Works Department, San Diego. 6-21

SAN DIEGO CO.—**V. R. Dennis Construction Co.,** Box F, Hillcrest Station, San Diego—$32,760 for constr. of storm drain near 30th and El Cajon Blvd., San Diego—by City Council, San Diego. 6-7

SAN FRANCISCO CO.—**Clinton Construction Co.,** 923 Folsom St., San Francisco—$523,900 for struct. and architectural work on enlargement of Richmond-Sunset sewer treat. plant, San Francisco—by Department of Public Works, San Francisco. 6-28

SAN FRANCISCO CO.—**Patrick R. Kelly,** 935 Rockdale Dr., San Francisco—$20,997 for reconstr. of Sutter St. sewer from Presidio Ave. to Baker St., San Francisco—by Department of Public Works, San Francisco. 6-21

Oregon

LINN CO.—**Robert L. Colbert,** Albany—$29,049 for main sewers to connect onto laterals, Albany—by City Council, Albany. 5-28

Texas

HIDALGO CO.—**Rea & Malloy,** 1318 16th St., Corpus Christi—$103,764 for pumping plant, sewage disposal plant, sewer line, etc., Alamo—by City Council, Alamo. 5-27

TARRANT CO. — **Southwest Concrete Company,** W. T. Waggoner Bldg., Fort Worth—$29,887 for storm sewers on Panola and Haynes Sts., Fort Worth—by City Council, Fort Worth. 5-27

TARRANT CO.—**W. R. West,** 3115 S. Adams, Fort Worth—$22,209 for storm sewers on Ott St. and Avenue J, Fort Worth—by City Council, Fort Worth. 5-27

TAYLOR CO.—**Fulton & Brodie,** Lubbock—$37,613 for outfall sewer line, Abilene—by City Council, Abilene. 6-24

Waterway . . .

California

ALAMEDA CO.—**Duncanson-Harrelson Co.,** 1404 DeYoung Bldg., San Francisco—$44,481 for eight pile dolphins, deadman, and connection of dolphins and deadmen with wire rope, San Leandro Bay, Oakland —by Bureau of Yards and Docks, Washington, D. C. 6-27

LOS ANGELES CO. — **T. E. Connolly, Inc., Case Construction Co.** and **Peter Kiewit Sons' Co.,** 461 Market St., San Francisco—$7,447,700 for 8,650 ft. of detached breakwater and restoration of 12,500 ft. of detached breakwater, Los Angeles and Long Beach Harbors—by U. S. Engineer Office, Los Angeles. 6-24

LOS ANGELES CO.—**M. S. Ross,** 4011 Goodwin Ave., Los Angeles—$388,908 to extend existing stone jetties on shoreline of Santa Monica Bay at the outlet of the Ballona Creek Flood control channel, Venice —by Los Angeles Board of Public Works, Los Angeles. 6-4

LOS ANGELES CO.—**Standard Dredging Corp.,** Central Bldg., Los Angeles—$166,430 for bucket dredging of approx. 178,000 cu. yds. of material in front of wharves in the inner harbor and from the Fish Harbor entrance channel, Los Angeles —by Los Angeles Board of Harbor Commissioners, Los Angeles. 6-6

SAN BERNARDINO CO. — **Egglestone & Root,** Box 781, San Bernardino—$248,598 for Warm Creek bank protection, Sta. 10 to Sta. 25 plus 50, Colton—by U. S. Engineer Office, Los Angeles. 6-24

SAN FRANCISCO CO.—**Case Construction Co.,** Box 416, Alameda, and **American Pipe and Construction Co.,** 4635 Firestone Blvd., South Gate—$1,586,380 for dredging, disposal and filling, San Francisco Naval

Shipyard—by Bureau of Yards and Docks, Washington, D. C. 6-25

SAN JOAQUIN CO.—**Ben C. Gerwick, Inc.,** 112 Market St., San Francisco—$344,550 for berthing facilities: three mooring platforms, timber pier, five double butts on wharf, camels from steel pontoons and two boiler houses, Rough and Ready Island, Stockton—by Bureau of Yards and Docks, Washington, D. C. 6-28

SOLANO CO.—**Case Construction Co.,** Box 6, San Pedro—$164,966 for dredging to enlarge Suisun channel from Suisun Bay to the Port of Suisun—by U. S. District Engineer Office, Sacramento. 5-24

Washington

PIERCE CO. — **Manson Construction & Engineering Company,** 821 Alaskan Way, Tacoma—$682,000 for constr. of a new pier and additions to existing piers, for berthing of inactive vessels of the 19th Fleet, at U. S. Naval Station, Tacoma—by Navy Bureau of Public Works, Seattle. 5-31

Dam . . .

California

SHASTA CO. — **American Bridge Co.,** Pittsburgh, Pa.—$491,505 for furnishing and installing three struct. steel buoyant drum gates in spillway section of Shasta Dam, Central Valley Project—by Bureau of Reclamation, Washington, D. C. 6-27

Colorado

BENT CO.—**Morrison-Knudsen Co., Inc.,** Box 450, Boise, Ida.—$1,298,118 for completion of conc. bridge piers and spillway bridge, steel stairs and gratings, the tainter gates, etc., on the John Martin Dam, near Caddoa—by U. S. District Engineer Office, Albuquerque, N. Mex. 5-24

LARIMER CO. — **Grafe-Callahan Construction Co., Gunther and Shirley Co.** and **W. K. McIlyar,** 2034 Amelia St., Dallas, Tex.—$5,111,877 for Horsetooth Dam, Satanka Dike and Soldier Canyon Dam, part of Horsetooth Reservoir, Colorado-Big Thompson Project, near Fort Collins—by Bureau of Reclamation, Denver. 6-28

LARIMER CO.—**Hinman Brothers Construction Co.** and **Rhoades Brothers and Shofner,** Box 2882, Denver—$4,319,427 for earth-filled Dixon Canyon and Spring Canyon Dams, part of Horsetooth Reservoir, Colorado-Big Thompson Project, near Fort Collins—by Bureau of Reclamation, Denver. 6-28

Idaho

VALLEY CO.—**Morrison-Knudsen Co., Inc.,** Box 450, Boise—$1,396,889 for constr. of Cascade Dam and relocation of railroad, Boise Project—by Bureau of Reclamation, Boise. 6-18

Washington

GRANT CO.—**Roy L. Bair** and **James Crick & Sons,** W. 1220 Ide Ave., Spokane—$2,771,000 for 9,000-ft. earth-conc. dam, S. end of reservoir at Coulee City, Columbia Basin Project—by Bureau of Reclamation, Washington, D. C. 6-24

Irrigation . . .

California

FRESNO CO. — **Morrison-Knudsen Co., Inc.,** 111 Sutter St., San Francisco—$1,514,975 for earthwork, canal lining and structs., Kings River wasteway and siphon, Sta. 1591 plus 66 to sta. 1647 plus 75, Friant-Kern Canal, Friant Division, Central Valley Project—by Bureau of Reclamation, Friant. 6-18

FRESNO AND TULARE COS. — **Arizona and Nevada Constructors,** Box 4037, Phoenix—$1,299,663 (sched. 1), $1,980,415 (sched. 3), $2,250,679 (sched. 4), for earthwork, conc. lining and structs., sta. 1647 plus 75 to sta. 3876,Friant-Kern Canal, Friant Division, Central Valley Project, extending from 18 mi. E. of Fresno to 10 mi. E. of Visalia—by Bureau of Reclamation, Friant. 6-18

FRESNO AND TULARE COS.—**Morrison-Knudsen Co., Inc.,** 810 Title Guarantee Bldg., Los Angeles, and **M. H. Hasler,** Box 387, Santa Ana—$1,829,457 (schedule 2) for earthwork, conc. lining and structs., Friant-Kern Canal, Sta. 1932 plus 75 to Sta. 2631, Friant Division, 18 mi. E. of Fresno to 10 mi. E. of Visalia, Central Valley Project—by Bureau of Reclamation, Friant. 6-21

RIVERSIDE CO.—**J. F. Shea Co., Inc.,** 617 So. Olive, Los Angeles and **Morrison-Knudsen Co., Inc.,** Box 450, Boise, Ida.—$990,229 for all earth work, concrete lining and structures for the 7 mi. extension of the Coachella Canal—by Bureau of Reclamation, Boulder City, Nev. 6-6

STANISLAUS CO.—**Hubert H. Everist, Sr.,** 604 Mission St., San Francisco—$3,530,068 for Delta-Mendota Canal, stas. 686 to 1365, and Westley wasteway, Delta Division, Central Valley Project, near Patterson—by Bureau of Reclamation, Antioch. 6-25

Washington

GRANT CO.—**J. A. Terteling & Sons, Inc.** Box 1406, Boise—$1,548,060 for 5.4 mi. of

main irrigation canal, Columbia Basin Project—by Bureau of Reclamation, Washington, D. C. 6-27

Tunnel . . .

Washington

GRANT CO.—**T. E. Connolly, Inc.,** 461 Market St., San Francisco, Calif.—$3,494,420 for 2-mi. tunnel through solid rock, 1,020-ft. siphon crossing Bacon Coulee, and 1,000-ft. section of Main Canal, Columbia Basin Project—by Bureau of Reclamation, Washington, D. C. 6-27

Power . . .

Idaho

GEM AND GOODING COS.—**Morrison-Knudsen Co., Inc.,** Box 450, Boise—$6,500,000 for additional hydroelectric installations at Lower Salmon plant, Snake River, and Malad River plant, power line to Emmett—by Idaho Power Co., Boise. 6-12

Montana

VALLEY CO.—**McLaughlin Construction Co.,** Livingston,—$751,205 for constr. of power house, Fort Peck—by U. S. District Engineer Office, Fort Peck. 6-12

Washington

SNOHOMISH AND WHATCOM COS.—**Agutter Electric Co.,** 952 E. Seneca, Seattle—$249,224 for 71-mi. Arlington-Bellingham-Blaine, 230,000 volt wood pole transmission line and steel tower river crossing for Bonneville transmission system, near Arlington—by Bonneville Power Administration, Portland, Ore. 6-21

Building . . .

Arizona

COCONINO CO.—**E. W. Duhame Construction Co.,** 3719 Central Ave., Phoenix—$101,211 for conversion of barracks to apartments, Williams Field—by U. S. Engineer Office, Los Angeles. 6-21

MARICOPA CO.—**R. E. Bruce Construction Co.,** Rt. 1, Box 76, Phoenix—$100,000 for 2-story and mezzanine, Class-A masonry constr. warehouse bldg. at 246 S. First St., Phoenix—by Stephens Wholesale Furniture Co., Phoenix. 6-7

MARICOPA CO.—**E. W. Duhame Construction Co.,** 3719 Central Ave., Phoenix—$95,677 for conversion of barracks to apartments, Luke Field, Phoenix—by U. S. Engineer Office, Los Angeles. 6-21

MARICOPA CO.—**B. T. Wilkinson,** Rt. 8, Box 666, Phoenix—$50,000 for reinf. conc., osteopathic clinic and maternity home, at First St. and McDowell Rd., Phoenix—by McDowell Clinic, Phoenix. 6-7

NAVAJO CO.—**Shumaker & Evans Construction Co.,** 4007 W. 6th St., Los Angeles—$72,096 for constr. of 48 dwelling units for veterans, Winslow—by the Federal Public Housing Authority, San Francisco. 5-24

PIMA CO.—**M. M. Sundt Construction Co.,** Box 2592, Tucson—$192,110 for conversion of barracks and mess to apartments, Davis-Monthan Field, Tucson—by U. S. Engineer Office, Los Angeles. 6-21

California

ALAMEDA CO.—**John E. Branagh,** 105 Sheridan Ave., Piedmont—$55,477 for one-story, steel and wood frame constr. synchrotron bldg., campus of University of California, Berkeley—by Regents of University of California, Berkeley. 6-11

ALAMEDA CO.—**Christensen & Lyons,** 3545 Harland St., Oakland—$200,000 for one-story, reinf. conc. and structl. steel factory and office bldg. at 1700 5th St., Berkeley—by Dobeckman Co., Emeryville. 6-7

ALAMEDA CO.—**Dinwiddie Construction Co.,** Crocker Bldg., San Francisco—$500,000 for one-story and basement reinf. conc. and struct. steel addition to N. end of factory, 851 81st Ave., Oakland—by Sunshine Biscuits, Inc., Oakland. 6-14

ALAMEDA CO.—**Willis F. Lynn,** 1040 Folger Ave., Berkeley—$299,400 for two-story reinf. conc. and frame parochial school bldg. with 12 classrooms, gymnasium and cafeteria, St. Louis Bertrand Parish School, 101st Ave. and E. 14th St., Oakland—by Roman Catholic Archbishop, San Francisco. 6-25

ALAMEDA CO.—**John J. Moore Co.,** 959 33rd St., Oakland—$150,000 for one-story, conc. block and struct. steel bottling plant, 9th and Camelia Sts., Berkeley—by Canada Dry Ginger Ale Co., San Francisco. 6-27

ALAMEDA CO.—**Stolte, Inc.,** 8451 San Leandro St., Oakland—$100,000 for 4-story, concrete factory bldg. at 1100 78th Ave., Oakland—by The Par Soap Co., Oakland. 6-11

PACIFIC WIRE ROPE COMPANY
LOS ANGELES 21, CALIF., U.S.A. *BRANCHES:*
SAN FRANCISCO HOUSTON PORTLAND

ALAMEDA CO.—**Swanstrom & Stahl,** 2034 Hoover Ave., Oakland—$150,000 for two-story, conc. warehouse at 861 Isabella St., Oakland—by Maxwell Inv. Co., Oakland. 6-11

ALAMEDA AND SAN JOAQUIN COS.—**Erbentraut & Summers,** 696 Pennsylvania, San Francisco—$165,000 for conc. work at Elliot processing plant at Pleasanton and approx. $70,000 on cost-plus basis for conc. work at the Kerlinger aggregate manufacturing plant near Tracy—by Pacific Coast Aggregates, Inc., San Francisco. 6-12

ALAMEDA AND SAN JOAQUIN COS.—**Western Pipe & Steel Co.,** 200 Bush St., San Francisco—$180,000 for steel work at Elliot processing plant at Pleasanton; and $70,000 for steel work at the Kerlinger aggregate manufacturing plant near Tracy—by Pacific Coast Aggregates, Inc., San Francisco. 6-12

FRESNO CO.—**Cahill Bros.,** 206 Sansome St., San Francisco—$300,000 for reinf. conc. distillery, bottling plant and tanks in Clovis—by Italian Swiss Colony, San Francisco. 6-7

FRESNO CO.—**Lewis C. Nelson,** 2345 Keith St., Selma—$72,863 for 6-classroom, frame and stucco, steel reinf. constr. school bldg. on Thompson Ave., betw. Sylvia and Young Sts., Selma—by Selma Elementary School District, Selma. 6-11

INYO CO.—**E. A. Kaiser Co.,** 8825 Olympic Blvd., Beverly Hills—$75,000 for 30 family units, Bishop—by Federal Public Housing Authority, San Francisco. 6-20

KERN CO.—**J. F. Cummins,** 245 E. Olive Ave., Burbank—$147,754 for conversion of hospital bldg. to apartments, Muroc Army Air Field, Muroc—by U. S. Engineer Office, Los Angeles. 6-21

KERN CO.—**Haddock-Engineers, Ltd.,** 129 W. 2nd St., Los Angeles—$197,532 for road, tower, tower alterations, fuse testing bldg., magazine, radio transmitter bldg. and utilities, Naval Ordnance Test Station, Inyokern—by Bureau of Yards and Docks, Washington, D. C. 6-21

LOS ANGELES CO.—**Aldon Construction Co.,** 6233 Wilshire Blvd., Los Angeles—$127,650 for six 4-family, 20-room, frame and stucco apartment bldgs. at 1018-33 Pelham Ave. and in the 600 S. Gretna Green Way block, West Los Angeles—by Merle Ackerson, Los Angeles. 5-31

LOS ANGELES CO.—**Alton Builders Corp.,** 1648 Wilshire Blvd., Los Angeles—$126,000 for four frame and stucco apartment bldgs., Beverly Glen Blvd., W. Los Angeles—by self. 6-14

LOS ANGELES CO.—**The Austin Co.,** 777 E. Washington Blvd., Los Angeles—$1,250,000 for steel frame conc. and steel hangar and maintenance bldg., 6020 W. Century Blvd., Los Angeles—by Western Airlines, Inc., Los Angeles. 6-21

LOS ANGELES CO.—**Bershon Realty Co.,** 6633 W. Manchester Ave., Venice—$575,250 for 39 three-family, 14-room apartment bldgs., 6800 and 6900 blocks W. 85th Pl. and W. 86th St., Venice—by Nate Bershon, Venice. 6-14

LOS ANGELES CO.—**R. L. Blink,** 140 S. Camden Dr., Beverly Hills—$93,600 for a 14-family, 56-room frame and stucco apartment bldg. at 10476-82½ Wilshire Blvd., West Los Angeles—by self. 5-24

LOS ANGELES CO.—**Buttress & McClellan,** 1013 E. 8th St., Los Angeles—$75,000 for one-story rigid steel frame, reinf. conc. factory bldg. at 9th Ave. and Exposition Blvd., Los Angeles—by Pacific Brake Co., Los Angeles. 5-24

LOS ANGELES CO.—**Central Building Co.,** 804 Loews State Bldg., Los Angeles—$200,000 for two-story, reinf. conc. factory bldg. at SE. corner of Pico Blvd. and Soto St., Los Angeles—by Royal Paperbox Co., Los Angeles. 6-21

LOS ANGELES CO.—**Charde & Brindle,** 832 W. 5th St., Los Angeles—$80,000 for two-story, reinf. conc. warehouse bldg., Santa Monica Blvd. and Van Ness Ave., Los Angeles—by Albert Sheetz Co., Los Angeles. 6-21

LOS ANGELES CO.—**Charde & Brindle,** 832 W. 5th St., Los Angeles—$150,000 for two-story reinf. conc. store bldg., 84th St. and Vermont Ave., Los Angeles—by S. H. Kress & Co., New York, N. Y. 6-24

LOS ANGELES CO.—**Daley Bros.,** 420 Bryant St., San Francisco—$128,576 proceed order for 448 family dwelling units, Los Angeles—by Federal Public Housing Authority, San Francisco. 6-26

LOS ANGELES CO.—**Charles A. Eliot Construction Co.,** 927 N. La Cienega Blvd., Los Angeles—$253,250 for 33-family, 82-room, frame and stucco apartment court, 10622 Wilshire Blvd., W. Los Angeles—by Westwood Development Co., W. Los Angeles. 6-14

LOS ANGELES CO.—**Federal Housing Associates,** 3908 S. Vermont Ave., Los Angeles—$100,000 for two 18-family, 24-room, frame and stucco apartment bldgs. at 1330-36 S. Oak St., Los Angeles—by Lillian Gregory Paulson, Los Angeles. 6-7

LOS ANGELES CO.—**David Fein** and **Ruth Coine,** 6022 W. 8th St., Los Angeles—

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2343 — Ransome Paver Model 34E—Full length tractor with power loader, 32' 6" spreading reach and 60 gallon water storage tank. Has 6 cylinder Buda gas engine Model GF638. First sold—September 1941.

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1011 — 4—Model TCR—18 yd. Wooldridge Scrapers. First sold—August 1944.

OUR No.

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1204 — Quincy No. 330 Compressor, cap. 30 cu. ft. w/Westinghouse 220/440—3 phase 5 hp. motor. First sold—October 1944.

LIGHTING PLANTS

1310 — Oman Portable Lighting, Model W3—S50—3 kw.—110 volt. First sold—August 1944.

1311 to 1324 — 6—Fairbanks-Morse Portable Lighting Plants. Model W3—S50—3 kw.—AC. First sold—October 1944.

1333 to 1335 — 2—Fairbanks-Morse Portable Lighting Plants. Model W3—S50—110 volt AC. First sold—August 1944

1339 — Kohler Portable Lighting Plant, Model L, 2 kw.—DC —115 volt. First sold—August 1944.

1340 — Kohler Portable Light Plant, Model 1M21-O, 1½ kw. —DC—115 volt. First sold—August 1944.

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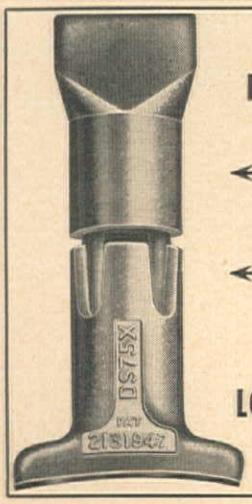

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LOS ANGELES CO.—**W. E. Kier Construction Co.,** 1462 N. Stanley Ave., Los Angeles—$350,000 for one-story, 48-bed, reinf. masonry hospital bldg., E. of Del Mar Ave., on Broadway, San Gabriel—by San Gabriel Valley Hospital, San Gabriel. 5-31

LOS ANGELES CO.—**G. D. King,** 1821 W. Whittier Blvd., Whittier—$187,300 for constr. of 53 five and six-room frame and stucco dwellings in the 4600 block Richelieu Terr. and the 2400 and 2500 blocks Richelieu Ave., Los Angeles—by King and Matter, Whittier. 5-24

LOS ANGELES CO.—**H. S. Lamb,** 3906 Wilshire Blvd., Los Angeles—$83,800 for two, 10-family frame and stucco apartment bldgs., N. Sweetzer Ave., Los Angeles—by Louis E. Schwartzmann, Los Angeles. And $110,000 for 44-family frame and stucco apartment bldg., Cherokee Ave., Los Angeles—by J. C. Dunas. 6-14

LOS ANGELES CO.—**Lindgren & Swinerton,** 605 W. Olympic Blvd., Los Angeles—$5,000,000 for 485-unit private housing project, near Crenshaw Blvd. and Imperial Hwy., Inglewood—by Hyatt Dehn and Associates, Los Angeles. 6-21

LOS ANGELES CO.—**Joshua H. Marks Co.,** 816 W. 5th St., Los Angeles—$97,200 for reinf. brick warehouse bldg. and shipping facilities at 1366 Willow St., Los Angeles—by Scriver & Quinn, Los Angeles. 6-7

LOS ANGELES CO.—**Mead & O'Donnell,** 7769 Melrose Ave., Los Angeles—$100,000 for one-story, frame and plaster factory on Olympic Blvd., W. Los Angeles—by Olympic Freeway Realty Corp., Los Angeles. 6-10

LOS ANGELES CO.—**Mead & O'Donnell,** 7769 Melrose Ave., Los Angeles—$100,000 for one-story, frame and plaster factory bldg. on Olympic Blvd., betw. Bundy Dr. and Centinella, West Los Angeles—by K. E. Howe, Los Angeles. 6-7

LOS ANGELES CO.—**George E. Melton,** 9401 S. Sepulveda Blvd., Venice—$110,500 for 17, six-room houses, 9200 and 9300 blocks, El Manor Ave., Venice—by El Manor Co., Venice. 6-14

LOS ANGELES CO.—**Wm. J. Moran Co.,** 1011 S. Fremont, Alhambra—$140,000 for a one-story, reinf. conc. paper box factory at Leonis Ave. and Seville St., Vernon—by O. E. Clark & Son, Vernon. 5-24

LOS ANGELES CO.—**B. N. Olden,** 2503 Santa Monica Blvd., Santa Monica—$300,000 for 31-family, 105-room, frame and stucco apartment court, 11921 Sunset Blvd., W. Los Angeles—by self. 6-14

LOS ANGELES CO.—**A. V. O'Leary,** 426 S. Manhattan Pl., Los Angeles—$250,000 for 42 six-room, frame and stucco dwellings on Dumbarton and Agnew Aves., Venice—by self. 6-7

LOS ANGELES CO.—**Pacific Construction Finance Co.,** 5143 Sunset Blvd., Los Angeles—$213,400 for eleven 4-family, 20-room, frame and stucco apartment bldgs. on the 1600 S. Bronson Ave. block, Los Angeles—by self. 6-7

LOS ANGELES CO.—**Ryder Nelson Co.,** 1036 Ridgeley Dr., Los Angeles—$150,000 for three-story and basement rear addition to bldg., 21 S. First St., Alhambra—by Southern California Telephone Co., Los Angeles. 6-14

LOS ANGELES CO. — **Santa Catalina Construction Co.,** 1115 Halliburton Bldg., Los Angeles—constr. of air terminal: waiting rm., office, toilets and four-story tower, Catalina Island — Santa Catalina Island Corp., Catalina Island. 6-14

LOS ANGELES CO.—**Ray Schweitzer,** 1341 N. La Cienega Blvd., Los Angeles—$4,174,000 for 109, nine-family, 32-room, frame and stucco apartment bldgs. in Van Nuys district—by C. C. Tatum and Lustgarten, Los Angeles. 6-7

LOS ANGELES CO.—**Stanton-Reed Co.,** 816 W. 5th St., Los Angeles—$200,000 for steel frame, three-story and basement addition to telephone bldg. at 490 Foothill Rd., Beverly Hills—by Southern California Telephone Co., Los Angeles. 5-24

LOS ANGELES CO.—**Fred Stein,** 131 Vista St., Los Angeles—$354,790 for 42 frame and stucco, six-room houses in 8000 block on Irvine Ave. and other streets in Van Nuys—by Crown Construction, Los Angeles. 6-21

LOS ANGELES CO.—**Sidney M. Weisman,** 5504 Hollywood Blvd., Los Angeles—$108,260 for seven three- and four-family apartment bldgs. in 11900 block S. Hoover St., Los Angeles—by Samuel J. and Grace M. Green, Los Angeles. 6-14

MARIN CO.—**Richfield Construction Co.,** 721 Francisco Blvd., San Rafael—$88,000 for remodeling and rehabilitating West End School, San Rafael—by San Rafael Board of Education, San Rafael. 6-18

SAN BERNARDINO CO.—**A. Farnell Blair,** 7052 Santa Monica Blvd., Hollywood —$245,570 for reinf. conc. addition to administration bldg. at Trona—by American Potash and Chemical Corp., Trona. 6-7

SAN BERNARDINO CO.—**J. N. Robinson,** 511 Base Line, San Bernardino—$100,000 for reinf. conc. theater and store bldg. at 456 Highland Ave., San Bernardino—by a San Bernardino Syndicate. 6-7

SAN BERNARDINO CO.—**B. W. Sherman,** 490 21st St., San Bernardino—$500,000 for constr. of 68 dwellings on extensions of 23rd and 24th Sts., betw. Mt. Vernon Ave. and Davidson St., San Bernardino —by self. 6-7

SAN FRANCISCO CO.—**Barrett & Hilp,** 918 Harrison St., San Francisco—$1,240,044 proceed order for reconstr. of 744 family dwelling units, San Francisco—by Federal Public Housing Authority, San Francisco. 6-20

SAN FRANCISCO CO. — **Cahill Bros.,** 206 Sansome St., San Francisco—$2,000,000 for constr. of 9-story and basement, reinf. conc. and structural steel addition to merchandise mart bldg. at 1355 Market St., San Francisco—by Capitol Co., San Francisco. 5-31

SAN FRANCISCO CO. — **Cahill Bros.,** 206 Sansome St., San Francisco—$2,200,000 for 13-story and basement bldg. and additional 10 stories to three-story office bldg., Beale St. near Market St., San Francisco—by Pacific Gas & Electric Co., San Francisco. 6-18

SAN FRANCISCO CO. — **Leo Epp,** 317 Broderick St., San Francisco—$383,214 for 289 family dwelling units, San Francisco—by Federal Public Housing Authority, San Francisco. 6-14

SAN JOAQUIN CO.—**Cahill Bros.,** 206 Sansome St., San Francisco—$400,000 for three bldgs., an office bldg. and tanks, of reinf. conc. at Lockeford—by Lockeford Winery Company, Lockeford. 6-7

SAN JOAQUIN CO.—**Wallace D. Harkins,** Box 1767, Oakland—$306,000 proceed order for 150 family dwelling units, Stockton—by Federal Public Housing Authority, San Francisco. 6-19

SAN MATEO CO.—**Empire Construction Co., Ltd.,** 344 Harriet St., San Francisco—$1,200,000 for constr. of 150 dwellings two blocks from El Camino Hwy. main intersection, Belmont—by Grand Homes, Inc., San Francisco. 6-11

SANTA CLARA CO.—**The Austin Co.,** 618 Grand Ave., Oakland—$210,000 for reinf. conc. and steel cut fruit storage bldg. and steel shop bldg., 7th and Alma-Phelian tract, San Jose—by California Prune & Apricot Growers Assn., San Jose. 6-27

SANTA CLARA CO.—**William Radtke,** 4th and Princevalle Sts., Gilroy—$500,000 for all-steel production unit manufacturing plant, N. of plant on N. Monterey St., Gilroy—by Be Ge Manufacturing Co., San Francisco. 6-18

YOLO CO.—**Stolte, Inc.,** 8451 San Leandro St., Oakland—$500,000 for 50-unit subdivision, redwood, stucco and brick, 30-ac. site on Snavely tract S. of Woodland—by William Crawford, Sr., Woodland. 6-25

Colorado

DENVER CO. — **Mead & Mount Construction Co.,** Denver National Bldg., Denver—$450,000 for five-story, brick and reinf. conc. nurses' bldg., Denver—by Presbyterian Hospital, Denver. 5-24

DENVER CO.—**Mead & Mount Construction Co.,** Denver National Bldg., Denver, —$260,000 for three-story and basement, reinf. conc. research and engineering bldg., 1025 S. Broadway, Denver—by Gates Rubber Co., Denver. 6-21

Idaho

ADA CO.—**J. H. Wise & Son,** Boise—$130,000 for two-story store and office bldg. and one-story wholesale tire plant, Boise—by Broadway Holding Co., Boise. 6-10

Nevada

WASHOE CO.—**Ludwig Flyge,** 1010 Holcomb Ave., Reno—$136,049 for constr. of automobile sales and service bldg. at Virginia and California Sts., Reno—by Gerald Lyons, Reno. 6-7

WASHOE CO.—**M. & K. Corp.,** 200 Financial Center Bldg., San Francisco, Calif. —$132,384 proceed order for reconstr. of 112 family dwelling units, Reno—by Federal Public Housing Authority, San Francisco. 6-27

Oregon

MALHEUR CO.—**Bechtel Bros.-McCone Co.,** 220 Bush St., San Francisco, Calif.—$750,000 for conc. factory bldg., Nyssa—by Avoset, Inc., San Francisco. 6-27

MULTNOMAH CO.—**Ross B. Hammond Co.,** 1241 N. Williams St., Portland—$200,000 combined gymnasium-classroom bldg., 1608 SW. 5th Ave., Portland—by Central Catholic High School, Portland. 6-18

MULTNOMAH CO.—**L. H. Hoffman,** 715 SW. Columbia, Portland—$260,000 for three-floor additions to N. and S. wings of the Public Service Bldg., Portland—by Pacific Power & Light Co., Portland. 5-29

MULTNOMAH CO.—**T. & H. Corp.,** Portland — $3,500,000 for 14-story office bldg., Portland—by U. S. Department of Agriculture, Washington, D. C. 5-3

Texas

BEXAR CO.—**Walsh & Burney Company,** 928 N. Flores St., San Antonio—$150,000 for constr. of three-story school bldg., San Antonio—by Church of St. Peter, San Antonio. 5-27

CAMERON CO. — **W. Bruce Ramsey,** Harlingen—constr. of West Ward school bldg., auditorium wing of Dishman school, alterations and addition to Alamo school, Harlingen — by Harlingen Independent School District, Harlingen. 6-17

DALLAS CO.—**Robert E. McKee,** Box 2848, Dallas — $194,000 for elementary school bldg., Garland—by Garland Independent School District, Garland. 6-21

DALLAS CO.—**O'Rourke Construction Co.,** 1001 W. Commerce St., Dallas—$250,000 for fireproof industrial warehouse bldg., Peeler St., Dallas—by Firestone Tire & Rubber Co., Dallas. 6-14

DALLAS CO.—**Roger Peabody,** Magnolia Bldg., Dallas — $2,500,000 for 17-story, brick, steel and stone office bldg., Commerce and Kendall Sts., Dallas—by Murray Samuel, Dallas. 6-20

DENTON CO.—**Carpenter Brothers,** 1317 Plowman St., Denton—$500,000 for one-story brick and tile office and plant, Denton—by Moore Business Forms, Denton. 6-20

GONZALES CO. — **Chamberlain and Strain,** 609 National Bank of Commerce Bldg., Ottine—combination school bldg., theatre and chapel, Margaret and Wilhelmina Cullen Center; one-story hospital bldg., Houston Unit of Gonzales Warm Springs Foundation; and one-story hospital bldg., Fort Worth Unit of Foundation, Ottine—by Gonzales Warm Springs Foundation, Ottine. 5-28

HUNT CO.—**Homer A. Parks Construction Co.,** 222 Construction Bldg., Dallas—$525,000 for dormitory bldg., Commerce—by East Texas State Teachers College, Commerce. 6-19

WARD CO.—**J. W. Bateson,** 1103 Irwin-Keasler Bldg., Dallas—$336,490 for constr. of school bldgs. in Monahans and Wickett—by Monahans-Wickett Independent School District. 5-27

Washington

CLARK CO.—**L. H. Hoffman,** 715 SW. Columbia, Portland, Ore.—$750,000 for two bldgs. of a bleach plant, part of $11,000,000 plant expansion program, Camas — by Crown Zellerbach Corp., San Francisco, Calif. 6-18

GRAYS HARBOR CO.—**Grays Harbor Construction Co.,** 412 S. Park St., Aberdeen—$200,000 for constr. of cement block cannery bldg. at Markham—by Cranberry Canners, Inc., Markham. 6-5

KING CO.—**Kuney Johnson Co.,** 235 9th Ave. N., Seattle—$150,000 for one-story and part two-story bldg. addition, 1128 W. Spokane St., Seattle — by Schorn Paint Mfg. Co., Seattle. 6-18

KING CO.—**Nadreau Construction Co.,** Douglas Bldg., Seattle—constr. of final 25 homes of $500,000, 58-unit housing program, Beacon Ave., betw. Orcas and Lucille Sts., Seattle—by Andrew Beckton, Frank Christman, James Brenner and Verne Myerotto, Seattle. 5-28

KING CO.—**Strand & Sons,** 3939 University Way, Seattle—$500,000 for equipment and installation of escalators in store bldg., Seattle—by Frederick & Nelson, Seattle. 6-12

SNOHOMISH CO.—**Ole K. Sather,** Everett—$130,000 for two-story, reinf. conc. and brick home for aged, 3322 Broadway, Everett—by Bethany Home for the Aged, Everett. 6-14

WHATCOM CO.—**Chisholm & Eiford,** Box 54, Bellingham — $268,800 for one-story frame and masonry grade school bldg. between Everson and Nooksack—by City Council, Nooksack. 6-6

WHITMAN CO. — **Clyde M. Ludberg,** Box 2211, Spokane—$209,475 for steel and $198,875 for wood to complete E. wing and center section of the engineering lab. at Washington State College, Pullman—by Board of Regents, Washington State College, Pullman. 5-28

Territories

ALASKA—**Morrison-Knudsen Co., Inc.,** Hoge Bldg., Seattle, Wash.—$1,032,000 for two- and three-story, reinf. conc. headquarters bldg. at Fort Richardson, approx. 3 mi. from Anchorage—by U. S. Army District Headquarters, Anchorage. 6-5

MARIANAS AND HAWAII — **Morrison-Knudsen Co., Inc.,** Box 450, Boise, Ida., and **Peter Kiewit Sons, Inc.,** Omaha National Bank Bldg., Omaha, Neb.—$23,572,040 for housing troops at Marianas and Honolulu—by Western Ocean Division, U. S. Engineer Office, San Francisco, Calif. 6-26

OKINAWA—**Guy F. Atkinson Co.,** Russ Bldg., San Francisco, Calif., and **J. A. Jones Construction Co., Inc.,** 209 W. 4th St., Charlotte, N. Car.—$19,234,420 for housing troops at Okinawa—by Western Ocean Division, U. S. Engineer Office, San Francisco, Calif. 6-26

PHILIPPINES — **Johnson, Drake and Piper, Inc.,** 86 Trinity Pl., New York, N. Y.; **Utah Construction Company,** Ogden, Utah, and **Grove, Shepherd, Wilson and Kruge, Inc.,** 247 Park Ave., New York, N. Y.—$29,446,190 for housing troops at Philippines—by Western Ocean Division, U. S. Engineer Office, San Francisco, Calif. 6-26

Miscellaneous . . .

California

FRESNO CO.—**Fred J. Maurer and Son,** 3031 E. St., Fresno—$265,515 for constr. of reinf. conc. stilling basin at toe of Friant Dam; constr. of conc. bridge, water storage tanks and distribution system, a sewer system, etc. at Friant Dam; and for constr. of bridge across Cottonwood Creek—by Bureau of Reclamation, Sacramento. 6-6

LOS ANGELES CO.—**Case Construction Co.,** 2100 Wilmington-San Pedro Rd., San Pedro—$86,902 for excav., drilling and grouting for variable angle launcher project near Morris Dam—by General Tire & Rubber Co., Los Angeles. 6-7

SAN MATEO CO.—**California Paving Co.,** 220 3rd Ave., San Mateo—$263,972 for sewers, sts., conduits, etc. in Rancho Buri-Buri subdivision, South San Francisco—by City Council, South San Francisco. 6-14

SAN FRANCISCO CO.—**M. & K. Corp.,** 200 Financial Center Bldg., San Francisco —$372,000 for installation of sprinkler systems in 24 bldgs. and enlargement of underground water piping, including earthwork, conc. work, paving, electrical utilities, San Francisco Naval Shipyard—by Bureau of Yards and Docks, Washington, D. C. 6-27

Idaho

VALLEY CO.—**Wixon and Crowe,** Box 799, Redding—$191,000 for clearing part of reservoir area of timber and brush, Cascade Dam—by Bureau of Reclamation, Boise. 6-20

North Dakota

MC LEAN CO.—**Okes Construction Co.,** E. 1501 First National Bank Bldg., St. Paul, Minn.—$2,312,263 for building initial stages of Riverdale, construction town for dam site, Garrison—by U. S. Engineer Office, Omaha, Neb. 6-18

MC LEAN CO.—**William A. Smith Construction Co.,** 317 Citizens State Bank Bldg., Houston, Tex.—$398,215 for constr. of access railroad to Garrison dam site—by U. S. Engineer Office, Omaha, Neb. 6-18

Territories

ALASKA—**Birch-Johnson-Lytle,** Textile Tower, Seattle, Wash.—approx. $24,000,000 on cost-plus-fixed-fee basis for permanent housing and technical facilities: homes, barracks, mess halls, etc., and warehouses, gas and fuel storage, and plane parking areas, Fort Richardson, Anchorage, and Ladd Field, Fairbanks—by U. S. Engineer Office, Seattle. 6-19

ALASKA—**Fay, Spofford and Thorndike,** Textile Tower, Seattle, Wash. — approx. $900,000 for architect-engineer services, Fort Richardson, Anchorage—by U. S. Engineer Office, Seattle. 6-19

TRADE WINDS

News of Men Who Sell to the Construction West

CALIFORNIA

E. C. Henning has been appointed manager of the San Francisco branch of the FRUEHAUF TRAILER CO. of Los Angeles, after serving for five years as San Francisco sales manager. Henning is well known among truck and trailer operators in Northern California and the Pacific Northwest.

☆ ☆ ☆

The Security Valve Division of SECURITY ENGINEERING CO., INC., Whittier, Calif., a member of Dresser Industries, Inc., has been bought by Pittsburgh, Pa., valve manufacturer, KEROTEST MANUFACTURING CO. Kerotest has a new manufacturing plant in Los Angeles and also has formed a new company, the KEROTEST PACIFIC CO., to operate as a subsidiary of the Pittsburgh firm. Officers of this new firm are **Edward G. Mueller,** president (also president of the parent firm); **Stanley J. Roush,** vice president and general sales manager, and **Walter G. Swaney,** secretary-treasurer and general manager.

A top position with LINK-BELT SPEEDER CORP., Chicago, Ill., has been given **Ralph G. Robey,** former Army engineer who served in New Guinea. He takes over as district representative and will handle California, Nevada and Arizona, including distributors: Smith Booth Usher of Los Angeles and Phoenix, Edward F. Hale of Hayward, Calif., and Sierra Machinery Co. of Reno, Nev. Robey's headquarters is at San Marino, Calif.

☆ ☆ ☆

One of the West's oldest firms of testing and inspection engineers and chemists, SMITH, EMERY & CO. of San Francisco, has been purchased by PITTSBURGH TESTING LABORATORY of Pittsburgh, Pa., and will be headed by **Parker M. Robinson** as San Francisco district manager. Robinson was formerly with Westinghouse Electric Corp., Western Pipe and Steel Co. and others, and has been a San Francisco resident for 25 years.

☆ ☆ ☆

Another newcomer to Los Angeles is the large ELECTRIC AUTO-LITE CO. of Toledo, O. President **Royce G. Martin** is in the Southern California city negotiating the purchase of his 24th factory, which will manufacture spark plugs, batteries, ignition systems and other automotive parts. Martin believes that the Los Angeles area will soon become the most gigantic motoring center in the world.

FIVE WESTERNERS who attended the recent meeting of American Concrete Pipe Association in Chicago are E. L. JOHNSON, Concrete Conduit Co. of Colton, Calif., new president; G. D. WILLIAMSON, Valley Concrete Pipe and Products Co. of Yuba City; D. A. DUNKLE, American Pipe and Construction Co., Los Angeles; H. W. CHUTTER, Jourdan Concrete Pipe Co., Fresno, and H. A. WEIGAND, Concrete Conduit Co., Oakland.

☆ ☆ ☆

After serving as a lieutenant colonel in the field artillery, **A. E. Ferguson** is back as western sales manager of the AMERICAN LUMBER AND TREATING CO., Chicago, with offices in Los Angeles. He will be in charge of all company sales operations handled through Los Angeles and

San Francisco for California, Oregon, Washington, Idaho, Nevada, Utah, Arizona and New Mexico.

☆ ☆ ☆

Raymond J. Smith has been promoted by THE AMERICAN STEEL BAND CO. of Pittsburgh, Pa., from division to general sales manager. Smith, who has been with the company for 15 years, succeeds **Carl R. Mirth,** who is on his way to the West as sales representative in San Francisco and Los Angeles.

☆ ☆ ☆

INTERMOUNTAIN

A couple of new sales representatives in the West for BARCO MANUFACTURING CO. of Chicago, Ill., have been announced. Distributor of Barco gasoline hammers for the state of Arizona, with the exception of Mohave and Yuma counties, is D. W. JACQUAYS of Phoenix. His service will supplement that of FRANCIS WAGNER CO. of El Paso, Tex. In Oklahoma City, Okla., BROWN MACHINERY CO. is sales agent for the hammers in that state.

☆ ☆ ☆

George Hajek, for 12 years sales engineer for CECO STEEL PRODUCTS CORP. at Chicago, Ill., has been named manager of the sales district at Dallas, Tex., replacing **J. C. Boyce. John W. Anderson** takes over the management at Oklahoma City, Okla., succeeding **R. K. Alexander.** Anderson was formerly assistant manager in Birmingham, Ala.

☆ ☆ ☆

New distributor for DAVEY COMPRESSOR CO., Kent, O., in Reno, Nev., is JENKINS & McCLOUD. The firm will handle the complete Davey equipment line and provide complete parts and service facilities.

☆ ☆ ☆

COLORADO FUEL & IRON CORP. has a new export manager, located in New York City, **Matthew R. Rosse,** authority on export trade and formerly associated with the American Chain and Cable Co. Rosse's management will cover all divisions and subsidiaries. He has been engaged in steel products export for more than 25 years and is well-traveled, particularly in Latin America and Europe.

Colorado Fuel & Iron also has a new advertising manager over all divisions. **Jerry Sabin,** advertising manager of the Colorado Division, has the position and will continue to maintain headquarters in Denver.

☆ ☆ ☆

The Equipment Sales Co. in Phoenix, Ariz., has been named industrial lift truck distributor for Arizona and adjacent territory by HYSTER CO., Portland, Ore. **Fred A. Heinzel** and **Frank Fogal, Jr.,** own the Phoenix firm and also operate a branch in Tucson.

☆ ☆ ☆

PACIFIC NORTHWEST

Portland, Ore., is headquarters for the recently-established Northwest division of the U. S. Tire Division of UNITED STATES RUBBER CO., and **Chester W. Ort** will be divisional manager there. Distribution and sales will be directed from the new headquarters, and branches in Portland, Salt Lake City, Seattle and Spokane are within its jurisdiction. Ort joined U. S. Rubber in 1913 as a salesman. During the war he was in the Detroit plant assisting in organization of the war products section of the automotive division.

H. H. (Curly) Schaper, assistant sales manager of SMITH ENGINEERING WORKS, Milwaukee, Wis., is now on a good-will call through the Northwest to all Telsmith agents in the territory, his first visit since the end of the war. He is contacting Montana Powder & Equipment Co. of Helena and Missoula, General Machinery Co. of Spokane, Wash., Clyde Equipment Co. of Portland, Ore., and Seattle, Wash., Glenn Carrington & Co. of Seattle and Garden Russell, Ltd. of Vancouver, British Columbia.

☆ ☆ ☆

Returned from Army service in Hawaii and Japan to the sales engineer position with KENWORTH MOTOR TRUCK CORP. of Seattle, Wash., is **Donald F. Pennell.** A captain in the Transportation Corps during his extended Army duty, Pennell is well-known in Pacific Coast trucking circles. He originally joined Kenworth in 1936.

☆ ☆ ☆

Purchase of a new plant which will triple Canadian manufacturing facilities was announced recently by **Harold W. Sweatt,** president of MINNEAPOLIS-HONEYWELL REGULATOR COMPANY. The new plant is at Leaside on the outskirts of Toronto, and under the direction of **W. H. Evans,** general manager for Canadian operations, will make and assemble the major share of all of Honeywell's controls for the Canadian market.

AMONG THE MANUFACTURERS

Carl O. Wold recently retired as a vice president of CATERPILLAR TRACTOR CO. after 40 years of service with the Russell Grader Mfg. Co. and Caterpillar. He was executive head of the Russell organization until that company was acquired by Caterpillar in 1928. Also recently announced was the appointment of **Cornell E. Jones** as sales development manager at Peoria, taking over the duties of **Kenneth F. Park** who became engineering consultant on all matters pertaining to the earth-moving field.

☆ ☆ ☆

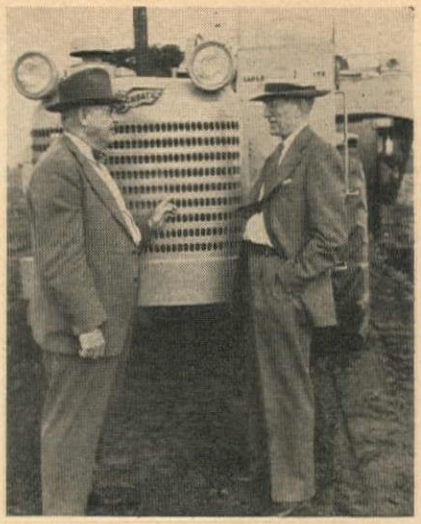
Alfred D. Nutter, Jr., has the position of purchasing agent for the PITTSBURGH PLATE GLASS CO.'s glass division after the retirement of **Homer M. Hoffman.** Nutter has been with the firm for 12 years, the past five as assistant to the position he now holds.

☆ ☆ ☆

Huntington, W. Va., is the locale for the formation of ELLINWOOD INDUSTRIES, INC., which will produce the Cat line of garden tractors under a license agreement with ELLINWOOD INDUSTRIES, Los Angeles. Head of the new firm is **R. S. Ellinwood,** father of **H. Ray Ellinwood** who owns the Los Angeles firm.

☆ ☆ ☆

"The Cleveland Division" is the name of a new manufacturing plant being developed in Cleveland, O., by the LE ROI CO. of Milwaukee, Wis. The division will produce a line of rock drills and related pneumatic equipment for construction, mining and transportation and will be headed by **Russell R. Morgan,** former officer of the Cleveland Rock Drill Co.



ED GALVIN, left, executive vice president and general sales manager of LA PLANT - CHOATE MANUFACTURING CO., INC., Cedar Rapids, Ia., explains his new "LPC" rubber-tired prime mover to FRANK McBATH, president of COLUMBIA EQUIPMENT CO., which will be exclusive distributor for LaPlant-Choate products in Portland, Seattle, Spokane and Boise.

☆ ☆ ☆

At a shareholders' meeting of THEW SHOVEL CO., Lorain, O., it was voted to provide for a flexible number of members on the company directorate, thus increasing the number this year from five to eight. Members of the new board are: **Chauncey B. Smythe,** president; **Alan W. Smythe,** vice president and general man-

ager; **David L. Johnson,** counsel; **Reuben B. Miller,** secretary-treasurer; **Arthur C. Lundgren,** director of purchases; **Everett W. Johnston,** general works manager; **Don G. Savage,** general sales manager, and **Waid V. Clark,** controller.

☆ ☆ ☆

The name of COALTOTER CONVEYOR CO. of Chicago has been changed to MATERIAL MOVEMENT INDUSTRIES. According to **Horton Conrad,** managing partner, the name was changed to show more accurately the company's place in the material-handling field. The firm manufactures electric and gasoline engine-driven portable conveyors for handling bulk and packaged materials.

☆ ☆ ☆

A joint announcement was recently made by **Arthur O. Dietz,** president of C. I. T. CORPORATION, New York, N. Y., and **Saul Gottesman,** president of CREDIT UTILITY COMPANY, INC., that the instalment portfolio of the latter company has been acquired by C. I. T., who will take over the servicing of all former accounts. The C. I. T. Corporation specializes in financing instalment sales in the machinery and construction equipment fields.

☆ ☆ ☆

The Lisbon, O., partnership of Chester Manufacturing Co. has incorporated as CHESTER HOIST CO. and is greatly expanding its business. They recently moved into a large new building specially designed for the manufacture of chain hoists, trolleys and allied products.

☆ ☆ ☆

After 60 years of business the Marion Steam Shovel Co. has changed its name to MARION POWER SHOVEL CO., Marion, O., since the past 15 years have seen production swing to mostly Diesel, gasoline and electric powered machines.

☆ ☆ ☆

DAVID M. SALSBURY, below, steps up from vice president and general manager to executive vice president of WESTINGHOUSE ELECTRIC SUPPLY CO., New York City, succeeding WALTER WILLIAMSON, who has retired. Salsbury has been in the electric supply business since 1915, and went with Westinghouse in 1920. He was appointed general manager of the Supply Company in 1943, and elected vice president the next year.

Robert A. Rankin has the sales manager's position in the Diesel engine division of CHICAGO PNEUMATIC TOOL CO. Formerly assistant manager of his division, Rankin takes the place of retiring **H. W. Buker** who held the spot for the last 20 years.

☆ ☆ ☆

First machine to come off the line at INTERNATIONAL HARVESTER CO.'s newly-acquired Melrose Park Works in Illinois was a UD-18 Diesel power unit. Present at the ceremony were **Brooks McCormick,** assistant general superintendent; **Dante Chimenti,** general superintendent; **H. T. Reishus,** general manager, industrial power division; **George Berg,** assistant general foreman; **R. E. Bloye,** works manager; **Neal Higgins,** manager of sales, industrial power division, and **H. B. Rose,** manager of manufacturing, industrial power division.

☆ ☆ ☆

A new position—domestic sales manager—has been created by R. G. LE TOURNEAU, INC., Peoria, Ill., and is being filled by **Stanley D. Means.** He will have responsibility over all sales in the United States, Canada, Hawaii and Alaska. Means has been with the LeTourneau sales department for the past 10 years. In 1945 he became industrial sales manager and has been instrumental in setting up the company's new railroad distributor organization.

HAROLD E. ROLLIN heads sales engineering at PIONEER ENGINEERING WORKS, Minneapolis, Minn., in a company step to consolidate all service activities. Rollin started with Pioneer as a draftsman in 1929 and worked up to manager of sales engineering by 1945.

☆ ☆ ☆

The NOMA ELECTRIC CORP., through its president, **Henri Sadacca,** announces the appointment of **Mario J. Petretti** as general manager of the company's plastics and capacitors divisions in Holyoke, Mass. The two units have formerly been operated separately, but have now been combined under the management of Petretti.

NEW EQUIPMENT

MORE COMPLETE information on any of the new products or equipment briefly described on these pages may be had by sending your request to the Advertising Manager, Western Construction News, 503 Market Street, San Francisco 5, California.

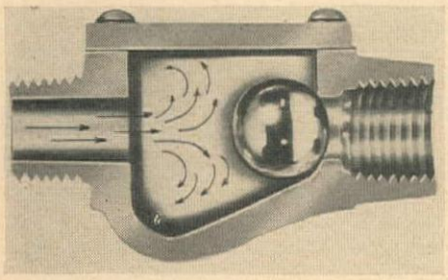
Safety Valve

Manufacturer: Hackett Manufacturing Co., Oakland, Calif.

Distributor: E. D. Bullard Co., San Francisco, Calif.

Equipment: Numatic safety check valve.

Features claimed: The safety check eliminates the danger of wildly whipping compressed air hoses by shutting off air immediately in the event of accidental dis-



connecting or rupture in the line. The check valve is very simple. A steel bar rests in a sump at the compressor end of the valve. The sump slopes upward toward the discharge end where a machined port is available to hold the ball when shutoff is required. Excessive flow of air through the valve causes the ball to roll up the slope until it seals off the port; when pressure is restored to normal the ball drops away and rolls back into the sump. The check removes the necessity for crimping hoses while changing tools, reveals leaks before they can cause danger, and indicates ineffective tools that are wasting air.

Pump Booster

Manufacturer: Derbyshire Machine & Tool Co., Philadelphia, Pa.

Equipment: Accel-O-Rate pump booster.

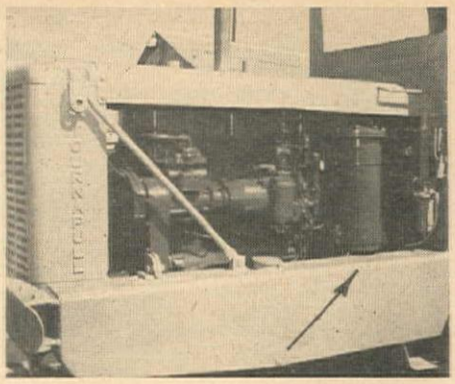
Features claimed: A new pump booster which makes available hitherto inaccessible water supplies or permits drainage of water from pits beyond the reach of standard pumping equipment. The booster will lift water vertically 100 ft. or more. It employs the jet principle, has no moving parts, and weighs but 18 lbs. Installation and use are simple: the unit is submerged in the water supply; after priming, the driving water going through the jet entrains additional water which is returned to the suction side of the pumper.

Oil Conditioner

Manufacturer: Winslow Engineering Co., Oakland, Calif.

Equipment: Oil cleaner for Cummins Diesels.

Features claimed: The oil conditioner is designed for Diesel engines of 150 to 250



hp. It contains 8 Winslow elements with a total filtering area of 684 sq. in. It weighs 35 lb. dry and 65 lb. wet and permits a maximum flow of 15 gal. per min. at 140 deg. F. The oil cannot drain back into the crankcase when the engine is idle, thus eliminating any chance of a flooded crankcase. The first test report showed a performance of 147 hours for the initial set of elements with continually clean oil.

Paving Batcher

Manufacturer: C. S. Johnson Co., Champaign, Ill.

Equipment: Dual batching plant.

Features claimed: This is a new development for road builders, providing dual batching of aggregates. The aggregate bin has 100 cu. yd. capacity, divided into three compartments, with hinge leg sections for fast erection and moving. Two multiple batchers are located so that a single operator can handle both. They are discharged simultaneously into the separate compart-

ments of a 2-batch truck, thus requiring only one spot at the aggregate plant. Also a reduction in hauling units is usually possible due to the saving in standing time at the plant.

Surveying Altimeter

Manufacturer: American Paulin System, Los Angeles, Calif.

Equipment: Surveying altimeter.

Features claimed: An ideal instrument for preliminary survey work. This instrument will stand up under any rugged field service. It comes in a tough leather carrying case. Prior to the war all Paulin instruments were made in Sweden, but the line is now manufactured in America. This instrument is made in several models to

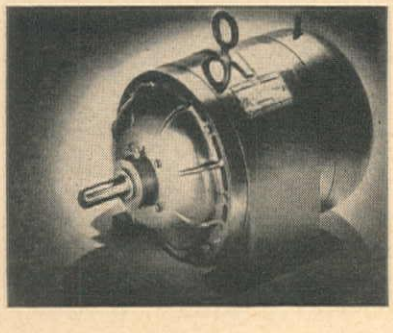
cover all ranges of elevation above and below sea-level and will respond to elevation changes in inches at a sensitivity of better than one part in twelve thousand. In this instrument all pivots, pinions, chains, bearings and levers have been eliminated so that no friction can detract from the sensitivity and the diaphragm movement is read directly in terms of pressure or altitude. Indicators are knife-edged. The diameter of the dial is 4¾ in. and the weight, with the carrying case, 2 lb.

Totally Enclosed Motor

Manufacturer: General Electric Co., Syracuse, N. Y.

Equipment: Enclosed, fan-cooled motor.

Features claimed: Especially designed for use in extremely dusty, dirty or corrosive atmosphere and where dust explosions are a menace, this new motor is available in types from 1 to 1,000 hp. It can be installed in a small space and requires a low starting current, making it suitable for full-voltage starting. The motor features a double shell, cast iron frame and sealed end shields and inside joints for protection from moisture or corrosive elements. Shaft fits are close and long and are supplemented by a rotating seal. A non-sparking, external fan with a screened air intake provides cooling. Greasing can be accomplished without stopping the motor.



Portable Radial Saw

Manufacturer: American Saw Mill Machinery Co., Hackettstown, N. J.

Equipment: Light weight 12-in. saw.

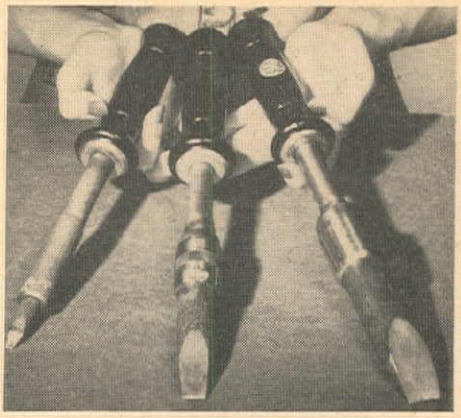
Features claimed: This new radial saw is made of light non-rusting magnesium, so that the unit complete with carrying frame and 1½ hp. motor weighs approximately 200 lb. "One point cutting" is accomplished by a unique design that permits the entire column of the machine to tilt vertically and also to pivot to the right or left so that regardless of the adjustments of the machine the saw blade always travels through the guide fence and cuts the lumber at exactly the same point on the table. The saw assembly moves on ball bearing self-aligning rollers in a smooth glide.

Conveyor Belt

Manufacturer: B. F. Goodrich Company, Akron, Ohio.

Equipment: Griptop conveyor belting.

Features claimed: A new conveyor belt developed with 1,000 small rubber fingers per sq. ft. helps to lift materials up steeper inclines. It can be used to convey materials that have a tendency to roll or slide. For instance, ice is gripped and hauled up 10 deg. slopes, coal up 28 degs. and packaged freight up 30 deg. inclines. A new application for this product is its use for quickly loading and unloading luggage and air express parcels transported by modern airliners.



Improved Soldering Iron

Distributor: Victor Equipment Company, San Francisco, Calif.

Equipment: "Calrod" corrosion resistant soldering iron.

Features claimed: An improved, high-speed soldering iron developed by General Electric Co. provides operators with uniform, low-cost performance. The tips are "calorized"—a process which retards corrosion and eliminates the build-up of oxide on the body and threads peculiar to plain copper tips. Available in sizes from 75 to 1,250 watts and tip diameters of ⅜ to 2 in.

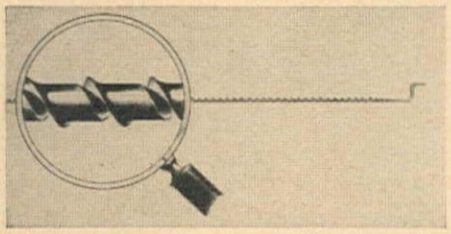
Spiral Cut Saw Blade

Manufacturer: Tyler Manufacturing Co., Santa Monica, Calif.

Equipment: Allways saw blade.

Features claimed: The spiral cut saw

blade permits the operator to change the direction of his cut without turning his saw frame or his work. A cut may be made in any line or arc without binding or breaking; 100 per cent of the blade is a cutting tool. The saw is made from oil-tempered



spring steel and will cut all woods, light metals and plastics and will fit all standard coping saw frames for power-operated jig saws.

Shovel and Crane

Manufacturer: The Thew Shovel Co., Lorain, Ohio.

Equipment: Postwar shovel-crane unit.

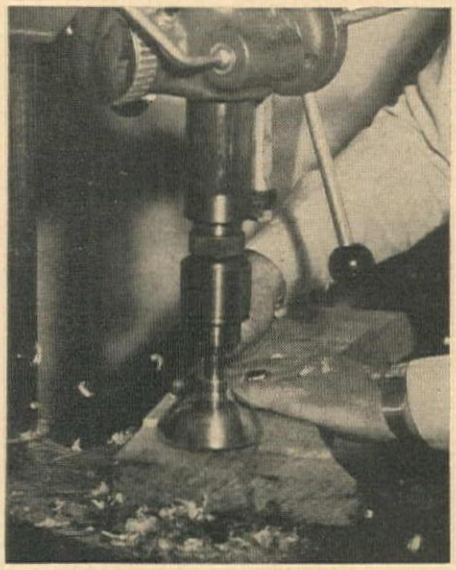
Features claimed: The new TL-20 can be equipped with a choice of five interchangeable booms and ten different types of mountings, enabling it to meet any and all job conditions. Its new turntable design is a unit assembly which enables each major component to be removed as a unit and be replaced with a similar complete unit. Other turntable features are all-welded beds, hook rollers, anti-friction bearings and gears running in constant oil bath. It can be mounted on either crawler tracks or rubber tired mountings. A swing brake is standard crane equipment. The left hand hoist drum may be reversed to drive down the load, slowly and accurately under power control, subject to variable speeds.

Drill Press Planer

Manufacturer: A. D. McBurney, Los Angeles, Calif.

Equipment: Planer for attachment to a drill press.

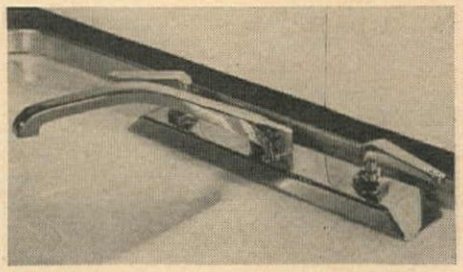
Features claimed: Positive cutting action of a steel shear-type blade eliminates scraping or tearing of any wood, irrespective of grain position. The cutter, which is easily fitted to any drill press in 30 sec., will plane, rout, panel, bead or rabbet to any depth in any wood. The single cutting blade is covered by a bell-shaped guard which directs flying chips downward, thus protecting hands and eyes of operators. Only one setting is necessary for precision work, no movable cutters being involved.



Swing Faucet

Manufacturer: General Tire & Rubber Co. of California, Pasadena, Calif.

Equipment: Swing spout kitchen faucet.



Features claimed: A ledge type swinging faucet offers new graceful lines in keeping with latest home designs. This equipment is a new departure for General Tire & Rubber Co. and is the first in a line of plumbing fixtures to be manufactured by the company. Emphasis on all of its fixtures will be placed on ease of cleaning, maximum coverage and lasting service.

Mobile Loader

Manufacturer: Athey Products Corp., Chicago, Ill.

Equipment: Tractor-mounted loader.

Features claimed: A new MobiLoader designed for use on the Caterpillar wide

gauge D4 tractor. The overhead loading principle common to Athey loaders is retained and operated with a single fingertip control, resulting in the instant response of the full power of the tractor. The design permits great visibility and mounting does not interfere with accessibility to the tractor engine. The mounting is balanced on the tractor to allow the greatest traction and minimum wear on idlers and rollers.

LITERATURE FROM MANUFACTURERS . . .

Copies of the bulletins and catalogs mentioned in this column may be had by addressing a request to the *Western Construction News*, 503 Market Street, San Francisco 5, California.

Universal Engineering Corp., Cedar Rapids, Ia.—A couple of new bulletins from the company are in circulation. No. 56 tells of the 546-P Primary Crushing Unit and its applications. This complete unit is mounted on a gooseneck chassis and equipped with pneumatic tires. Bulletin No. 4 covers the line of WRB series jaw crushers. These are the overhead eccentric type with rugged welded steel plate bases and S.K.F. roller bearings. Both bulletins give structural details and specifications.

The Buda Co., Harvey, Ill.—A new Buda Jack bulletin 1040D illustrates and describes all the various models and types of ratchet, screw and hydraulic jacks manufactured by the firm. Statistical charts give complete data on the lifting mechanisms.

Trackson Co., Milwaukee, Wis.—Model IT4 is Trackson's new Traxcavator which is the subject of a new yellow, black and white folder available to those interested in earth-moving and material-handling equipment. Its main features, specifications and a list of extra equipment are given, as well as a large, clear photograph.

Chain Belt Co., Milwaukee, Wis.—Just off the press is bulletin 481 describing the new Rex 11S and 16S concrete mixers which feature portability, high production, low over-all cost, dependability, easy operation and streamlined appearance. Mechanical details of the mixers are plainly illustrated and described and complete specifications on all parts are included.

Caterpillar Tractor Co., Peoria, Ill.—Forms 9354 and 9356 describe respectively Caterpillar Diesel No. 12 Motor Grader and Nos. 8A and 7A (angling type) bulldozers. The motor grader's construction and production attributes are fully covered, with stress on the long life and economical operation of the product, its 75-hp. Diesel engine and its mechanical power controls. The bulldozer broadside pictures the earth-moving machine in actual operations and highlights the attributes of design and production features.

Keystone Asphalt Products Co., Chicago, Ill.—A new 16-page Keystone paving products catalog has been issued which graphically lists and illustrates the firm's line of paving joints, sealing compounds, concrete curing compounds and sewer joint compounds. The two-color folder also features engineering designs and specifications.

The Warner Brothers Co., Bridgeport 1, Conn.—The Spiratube Division of the company has turned out a simple, fool-proof coupling which is described in a broadside. It claims the coupling makes possible a 10-sec. joining and disconnecting of individual sections of flexible tubing. The Warner coupling is built into the tubing, eliminating the need of fittings and may be compressed to slip inside the end of another section and then released to form a strong, tight joint.

Bellingham Mfg. Co., Bellingham, Wash.—Belco electric plants are the subject of a colorful folder which shows how the engines give "light and power beyond the power lines." Also included is a small chart giving average watt requirements of common household appliances and electric motors.

Copper & Brass Research Assoc., New York, N. Y.—"Radiant Heating" is the title of a new booklet covering the use of copper tube in radiant heating systems. Non-technical in nature, the publication discusses the history and development of radiant heating and enumerates advantages claimed for it in modern construction. A number of examples of successful installations of all types employing copper tube with soldered fittings are cited and illustrated.

R. G. LeTourneau, Inc., Longview, Tex.—The Texas plant's answer to the housing problem is illustrated in Tournalayer Folder No. G-1082 which explains step by step the complete housebuilding process as performed by the Tournalayer. The brochure tells how an attractive, modern concrete home of four rooms and permanent type can be tailored to individual tastes. In the resulting house, the walls, center partition and roof are all cast in one piece, complete with eaves, room outlet and light fixture boxes.

Buckeye Traction Ditcher Co., Findlay, Ohio—Model 120 Trencher is covered in a

new bulletin which gives complete specifications, construction details and numerous job illustrations. The 120 is a boom-type trencher which digs a trench from 18 to 48 in. wide and up to 11 ft. 6 in. deep, and has a tubular bucket line boom.

Tractor Training Service, Portland, Ore.—The inside story of this service is told in a booklet entitled "Diesel, the New Giant That's Moving the World." Tractor Training Service is an international program founded by J. E. Badley to obtain skilled workmen and presents great opportunity both to the worker and employer. And it maintains a continuous placement service all over the world.

Davey Compressor Co., Kent, Ohio—A descriptive booklet on its new Mobile Machine Shop has been published by Davey. It emphasizes that the shop, mounted on standard trucks, includes all equipment normally assembled only in large central repair depots. Basic power units are a 60 cfm. Davey Compressor, 300 amp. welding generator and 5 kw. power generator.

Electric Machinery Mfg. Co., Minneapolis, Minn.—A series of news releases have been prepared by the company to advertise its new Regulectric a-c generator for use in engine generator sets. Construction units that need a standby power will be aided by the Regulectric because this generator supplies current of power-line quality.

M-R-S Manufacturing Co., Jackson, Miss.—Mississippi Wagon is claimed to be "the world's most modern hauling unit" in a bright red, grey and white brochure which is well illustrated with photographs and includes a list of tractor and trailer specifications. According to the booklet, only Mississippi Wagons give you two important advantages: four-axle construction and hydraulic weight transfer.

Pioneer Engineering Works, Minneapolis, Minn.—An attractive green, black and white booklet on "Vibrating Screens" is profusely illustrated with photos and drawings to show all the uses of this machine for mechanical separation of materials according to particle size. There are several types of vibrating screens available for special conditions.

Kwik-Mix Co., Port Washington, Wis.—Outstanding features of the new Kwik-Mix 11-S Dandie concrete mixer are fully described and illustrated in a catalog just published by this subsidiary of Milwaukee's Koehring Co. Complete dimensions and condensed specifications are given for the two-wheel and discharge models and for the four-wheel 11-S Dandies which may be had either as end or side discharge mixers. Particular emphasis is placed on the thorough re-mixing action of the mixer and on its heavy duty construction.

Air Reduction Co., New York, N. Y.—A six-page folder describes the new Air Reduction rail cropping machine. Operating instructions are included, as well as repair and replacement parts list for the machine and its two torches.

Speaking of Employment . . .

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