WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

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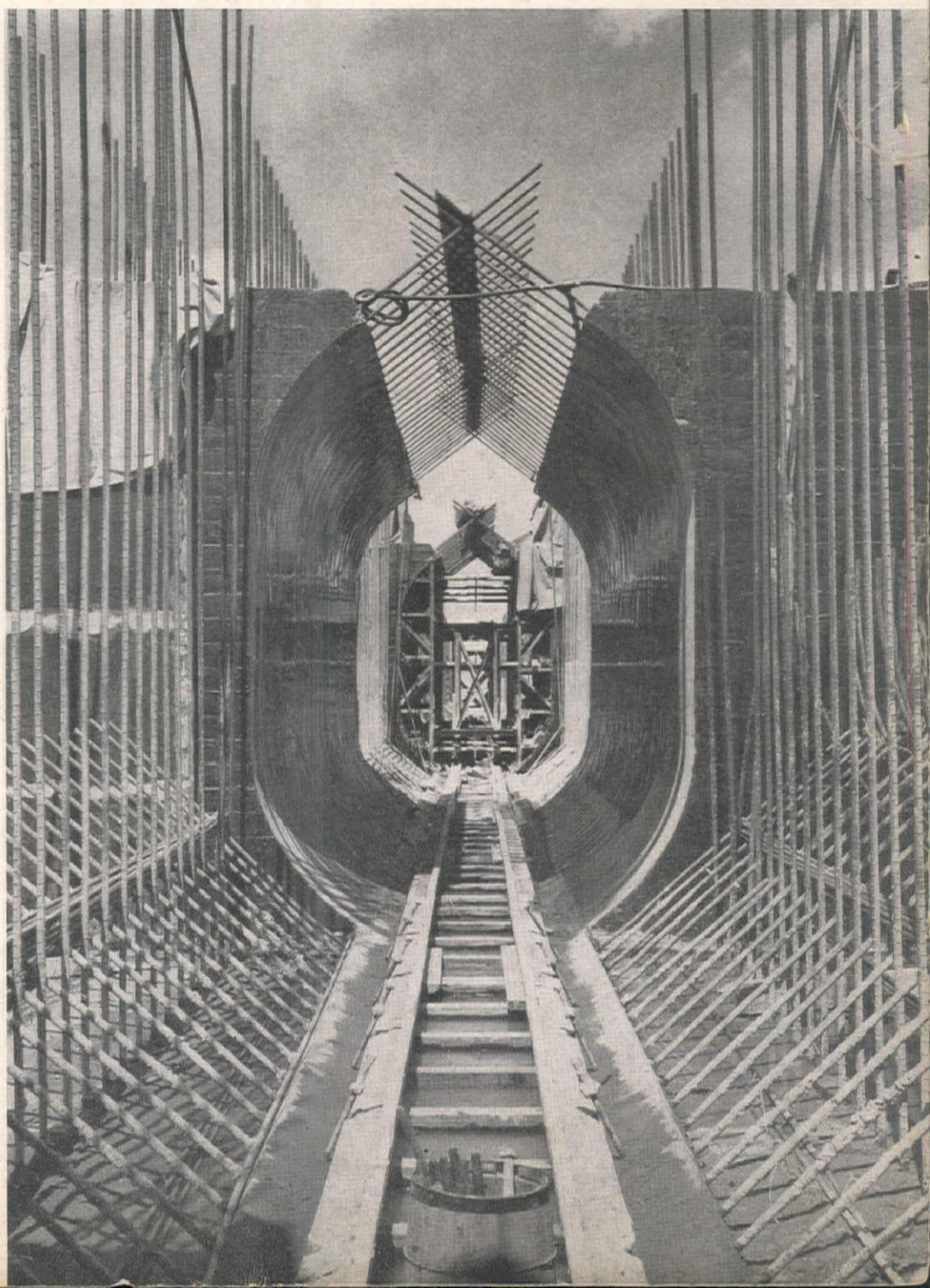
IN THIS ISSUE



ELLIPTICAL BARREL of outlet works for Cherry Creek Dam near Denver, Colo., is being constructed in sections with completed one in center, forms for another in place in background and steel in place for third in foreground. Construction details featured on page 73, this issue.

Photo by Zellers.

FIGHT RUST 3 Ways...and Win

Protect your equipment easily and effectively — with Texaco Rustproof Compound

You won't have big bills for rust damage when the exposed surfaces of your equipment are protected with *Texaco Rustproof Compound* or *Texaco Rustproof Compound (Spray)*. In either form, *Texaco Rustproof* effectively fights rust 3 ways:

1. Guards the metal against rust by sealing it in a soft, self-healing, *waterproof* film.
2. Penetrates existing rust, protects against further rusting.
3. Loosens existing rust, makes it easier to remove.

Texaco Rustproof is long lasting, and is easy to apply — easy to remove with a kerosine-saturated cloth. And the cost of protecting every piece of your equipment is less than you might have to pay to repair rust damage to a single machine.

Get *Texaco Rustproof Compound* or *Texaco Rustproof Compound (Spray)*, and helpful suggestions for their use from 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, N. Y.

☆ ☆ ☆

MAINTENANCE SAVINGS EVERYWHERE—*Texaco Rustproof Compound* can save maintenance costs not only on contractors' equipment, but on gas holders, waterworks, sewage disposal plants, bridges — wherever metal is exposed to weather, or most of the corrosive chemicals and fumes. Read the whole money-saving story in Texaco's 36-page book "Rust Prevention." Send for your copy today.

TEXACO

TEXACO Rustproof Compound

Tune in . . . TEXACO STAR THEATRE every Wednesday night starring Milton Berle. See newspaper for time and station.

A good outfit to ask...

before buying a Rock Shovel

Where to go to get the real story on equipment that will mean profit at the heart of your jobs? Ask Northwest Users—the repeat order buyers who have had long experience with Northwest equipment in the *Key Spots!*

Fredrickson & Watson Construction Co., of Oakland, Calif. is that kind of an outfit. Here is one of the thirteen Northwests they have owned working in a tough rock cut in the heart of a highway realignment job.

Fredrickson & Watson have proved Northwest to be a real Rock Shovel. They can tell you about Northwest low-cost maintenance and high output. They can tell you what Northwest advantages mean. Ask Northwest owners—then let us send you details on the size machine you need. You can plan ahead to have a Northwest in the *Key Spots* of your future jobs. Let us tell you how.

NORTHWEST ENGINEERING COMPANY
135 South LaSalle Street, Chicago 3, Illinois

13

Thirteen NORTHWESTS for Fredrickson & Watson Construction Co., Oakland, Calif.

cal NORTHWEST sales agents

DENVER, COLORADO
The Mine & Smelter Supply Co.

CHEYENNE, WYOMING
Wilson Equipment & Supply Co.

BUTTE, MONTANA
Hall-Perry Machinery Co.

PHOENIX, ARIZONA
State Tractor & Equipment Co.

MEDFORD, OREGON
Cal.-Ore. Machinery Co., Inc.

SALT LAKE CITY, UTAH
Arnold Machinery Co., Inc.

PORTLAND, OREGON
Baizer Machinery Co.

LOS ANGELES, CALIFORNIA
3707 Santa Fe Avenue

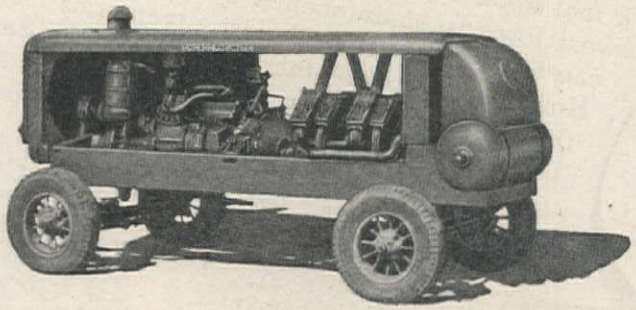
NORTHWEST SALES OFFICES

SAN FRANCISCO, CALIFORNIA
255 Tenth Street

SEATTLE, WASHINGTON
1234 Sixth Ave., South

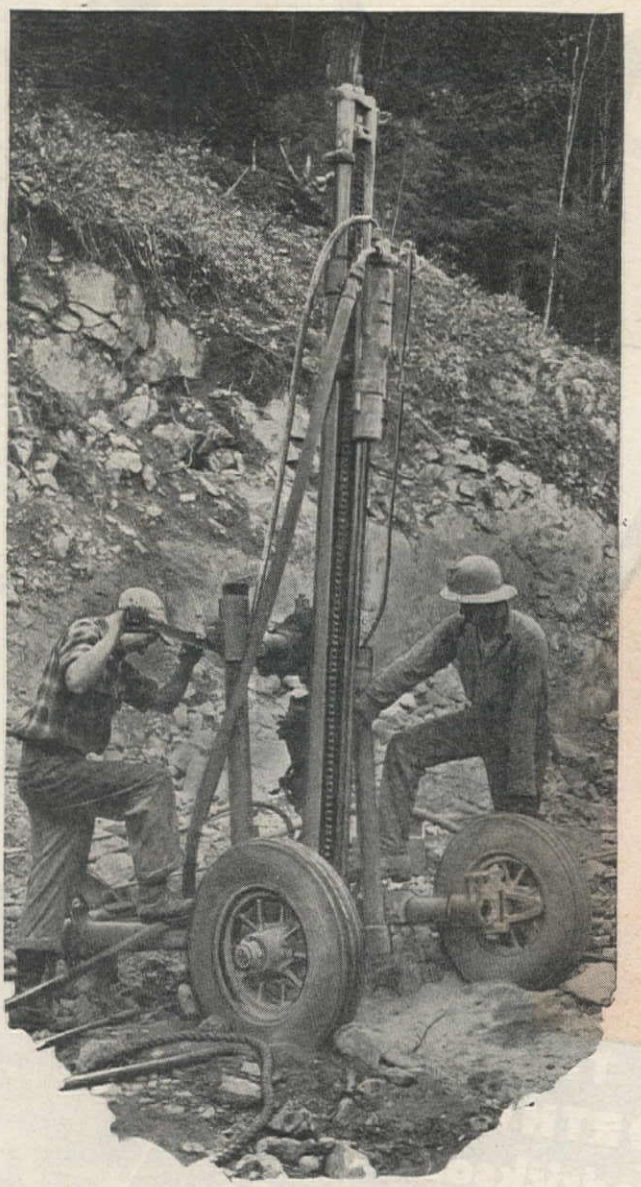
For every construction job there's just the right CP EQUIPMENT

Every item in the wide line of Chicago Pneumatic's construction equipment can be depended upon for efficient and economical performance, because each one has been developed to meet specific requirements.



At any speed CP PORTABLE AIR COMPRESSORS are fuel-thrifty, because the CP Gradual Speed Regulator adapts engine speed to air demands, holding fuel consumption to a minimum. This and other CP features effect fuel savings of 15% to 35%. CP PORTABLE COMPRESSORS are available in gasoline-driven models of 60, 105, 160, 210 and 315 c.f.m. actual capacity, and in Diesel-driven models of 105, 160, 210, 315 and 500 c.f.m.

For general excavation, road work, shaft sinking, or quarrying, the 45-pound CP-32 SINKER DRILL is ideal. With high drilling speed, strong rotation and good hole cleaning qualities, it is easy on air consumption. The complete line of CP SINKER DRILLS range from the 28-pound CP-22 to the 119-pound CP-60N.



Designed to provide fast and easy operation of the more powerful CP drifter drills, the lightweight G-200R WAGON DRILL reduces drilling costs — drills holes at any angle—is easily moved over uneven ground. Available with CP-50N (3″), CP-60N (3½″), or CP-70 (4″) Drifters.

CHICAGO PNEUMATIC TOOL COMPANY

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

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

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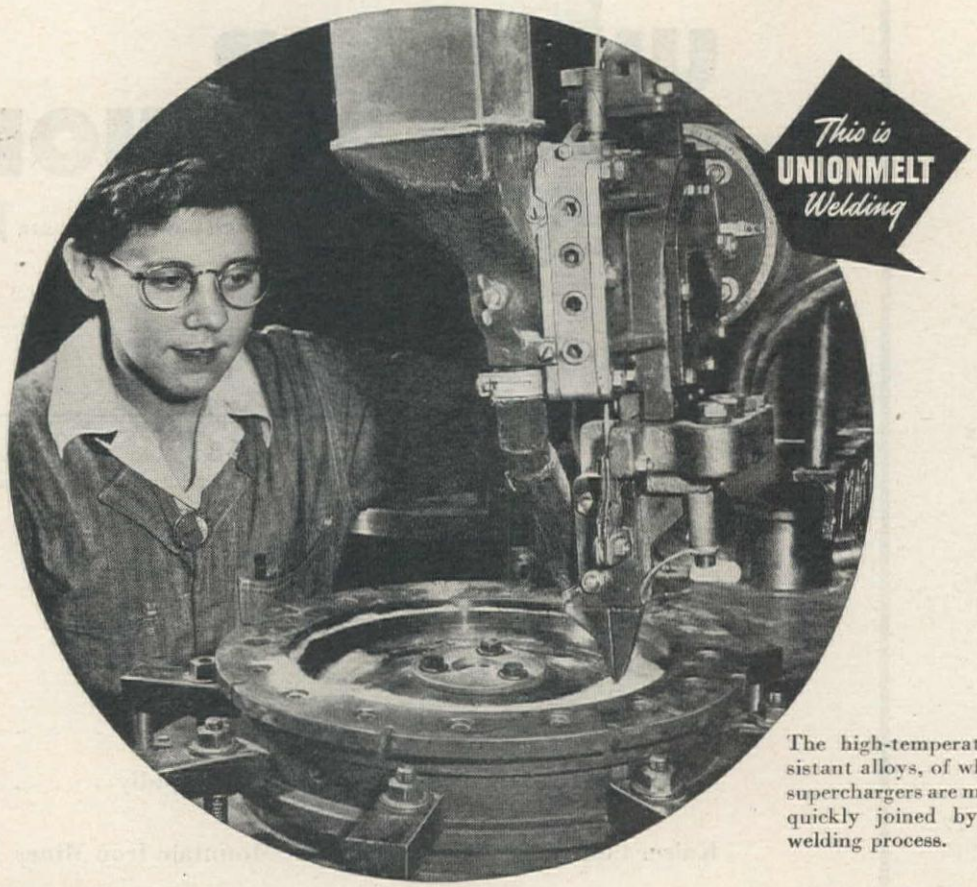
Covering the Western Half of the National Construction Field



The high-temperature, corrosion-resistant alloys, of which aircraft turbo superchargers are made, are easily and quickly joined by the UNIONMELT welding process.

The UNIONMELT Process

a fast, easy way to join plain and super alloys

The UNIONMELT process of welding electrically, without flash, glare, or spatter, produces sound, high quality welds of smooth, clean finish—welds which while hot are protected by a molten covering of fused special welding composition applied in granular form. When cool, the fused composition detaches itself and no chipping or peening is required to finish the weld.

The high welding currents, characteristic of the process, produce uniform welds of extremely deep penetration at high speeds. In welding alloy steels and non-ferrous metals, special welding rod and sometimes special types of the granular welding material are used to produce weld metal of the composition and characteristics required.

LINDE Engineering Service can help you whether your job involves UNIONMELT welding or any other of the numerous LINDE methods for joining, cutting, forming or treating metals.

Call or write any LINDE office for a copy of booklet F-6077, which fully describes UNIONMELT welding.

Linde
Trade-Mark

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

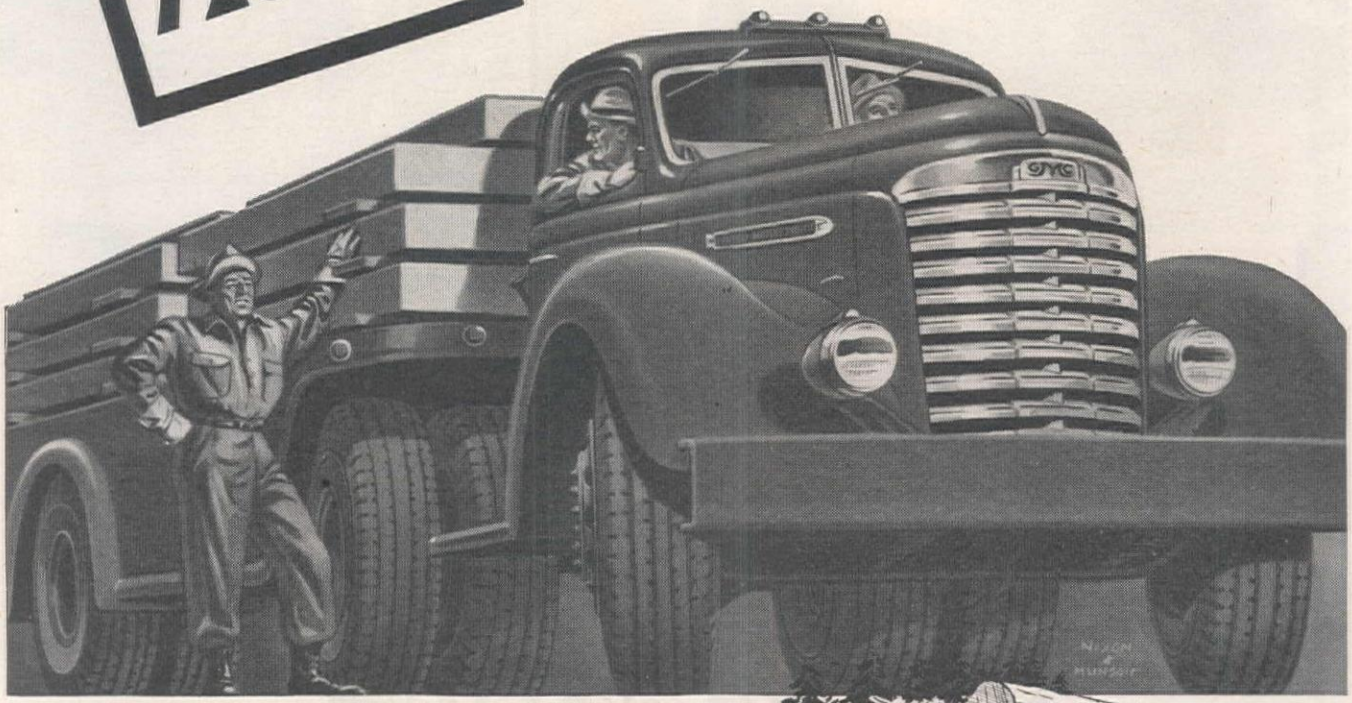
30 East 42nd St., New York 17, N.Y. UCC Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

The terms "Linde," and "Unionmelt," are registered trade-marks of The Linde Air Products Company

GMC SERIES 720 AND 800

Winning Numbers FOR HEAVY HAULERS

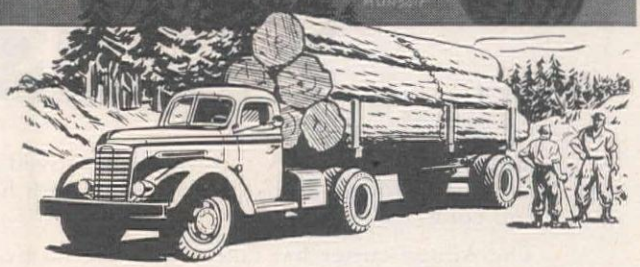


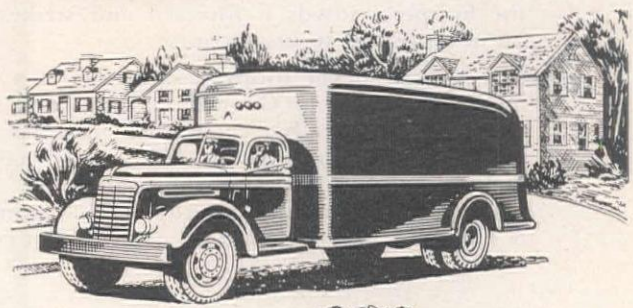
Here's good news for operators hauling heavy loads of milk, petroleum, machinery . . . logs and lumber . . . stone and ore . . . furniture and freight. Substantial production of GMC 720 series Specialized Tractors and 800 series straight truck models, assures quick delivery.

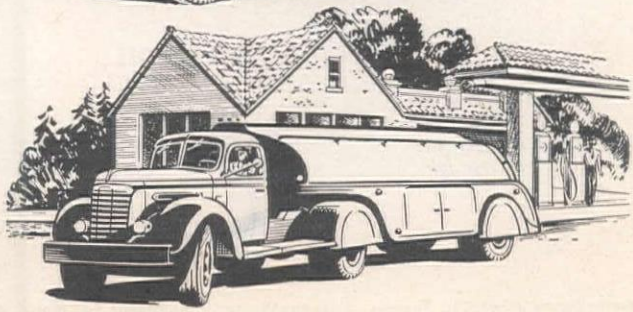
GMC 720 series tractors have gross combination weight ratings of 40,000 pounds . . . the 800 series trucks have gross vehicle weight ratings of 30,000 pounds. Both are offered in wheelbases of 136 to 196 inches, with cab-axle dimensions of 60 to 120 inches. Both have big 426 cu. in. engines of the same basic design as the war famous "Army Workhorse." Both have many other features specific to the jobs for which they are built.

If you need a new truck in either classification, put your money on one of these all-truck, heavy duty GMCs.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION







THE TRUCK OF VALUE

GMC TRUCKS

GASOLINE • DIESEL

THE cutter bar method of laying black top has been proved in many miles of all kinds of black top, both hot and cold.

The Adnun cutter bar takes the material from the hopper, crowds it forward and strikes it off in a smooth accurate course.

The special bevel tooth design provides an initial compression. Overlapping action at the ends of the cutter bar carries the material up and compacts it against parallel course or curb, making a tight joint. The whole cutter bar can be raised hydraulically at either or both ends. A quick lift provides for emergencies. Tilt control makes it possible to ride on the heel of the blade. A fine adjustment cares for banked or wedge courses and a simple control device assures any amount of adjustment for crown.

With the hydraulically controlled end gates, bleeding is easily handled and with cutter blade extensions black top can be laid up to 12 ft.

Here is just another of the many Adnun features that put the Adnun way ahead of competition and assures better black top road.

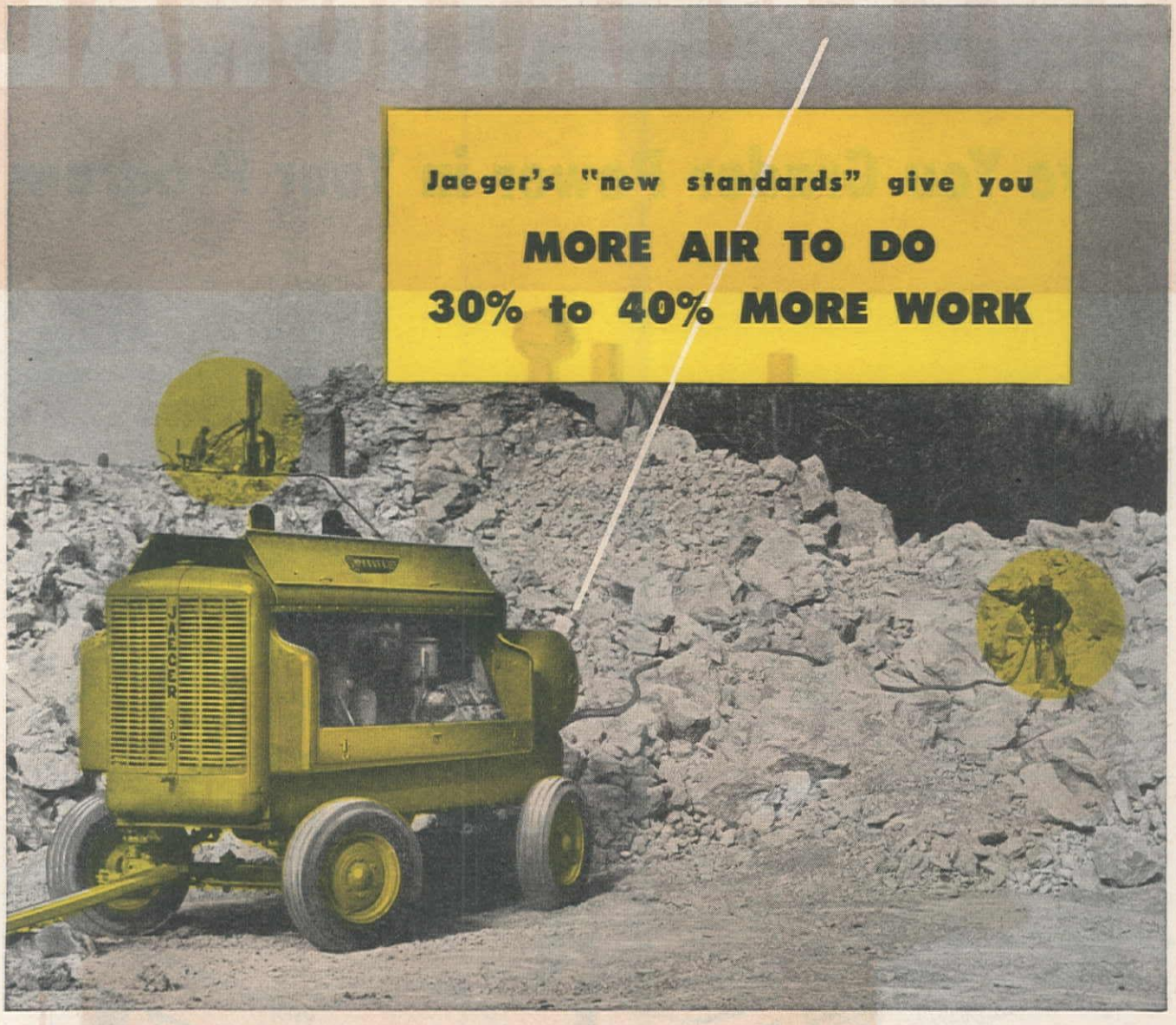
THE FOOTE COMPANY, INC.
1940 State Street • Nunda, N. Y.
Subsidiary of BLAW-KNOX CO.

Ask about the MultiFoote Concrete Paver for your concrete jobs.

FOOTE

MULTIFOOTE CONCRETE PAVERS
ADNUN BLACK TOP PAVERS
Kinetic ASPHALT MIXERS

Smith Booth Usher Co., Phoenix, Arizona; Western Equipment Co., Boise, Idaho, Spokane, Washington; The Colorado Builders Supply Co., Denver 2, Colorado; Lively Equipment Co., Albuquerque, N. M.; The Lang Company, Inc., Salt Lake City, Utah; Howard-Cooper Corporation, Portland 14, Albany, Eugene, Central Point, Roseburg, Oregon, Seattle, Washington.



Example: "New standard" 365 ft. compressor will operate a heavy duty wagon drill plus a rock drill or heavy breaker at full 90 lbs. pressure — doing up to 40% more work than a 315 ft. unit which runs the same tools at a pressure of only 70 lbs.

Because "old standard" compressor ratings, established in 1932, do not match today's air tools and cannot operate these tools efficiently, Jaeger takes the lead in offering complete "new standard" sizes — 75 ft. of air instead of 60 — 125 ft. instead of 105 — 185 ft. instead of 160 — 250 ft. instead of 210 — 365 ft. instead of 315 — 600 ft. instead of 500.

This increased air maintains the steady 90 lbs. pressure at which tools reach their full drilling speed and hitting power, actually do 30% to 40% more work than the same tools under 70 lbs. pressure from undersized compressors.

Because Jaeger's "Fuel Miser" control automatically regulates engine speed to air demand, these units do not consume an ounce more fuel than the smaller "old standard" sizes when their *additional* capacity is not being used. For full details, see your Jaeger distributor or send for new Catalog JC-8.

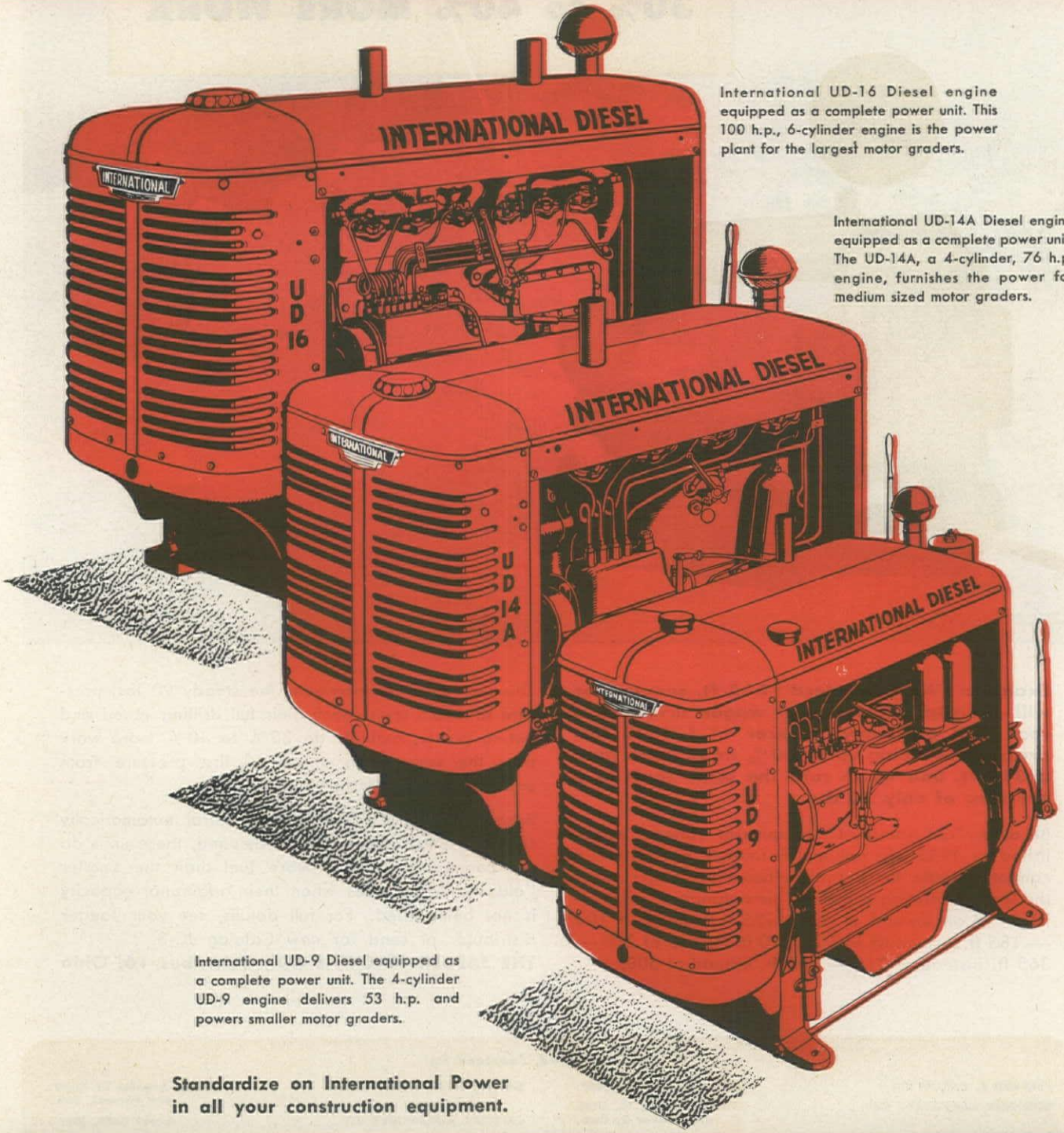
THE JAEGER MACHINE CO., Columbus 16, Ohio

Sold, Rented, Serviced by:

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

INTERNATIONAL

Give You Grader Power in Your Program



International UD-16 Diesel engine equipped as a complete power unit. This 100 h.p., 6-cylinder engine is the power plant for the largest motor graders.

International UD-14A Diesel engine equipped as a complete power unit. The UD-14A, a 4-cylinder, 76 h.p. engine, furnishes the power for medium sized motor graders.

International UD-9 Diesel equipped as a complete power unit. The 4-cylinder UD-9 engine delivers 53 h.p. and powers smaller motor graders.

Standardize on International Power in all your construction equipment.

INTERNATIONAL *Industrial*

DIESELS
for Paydirt

For more work done and bigger profits in your pocket, choose motor graders powered by International Diesel engines.

International Diesels give you exclusive, in-built, gasoline-conversion starting—they start in any weather as easily as your car—to get your motor grader on the job quickly. The International Diesel fuel-injection system leads the field in advanced design. A simple, compact fuel pump with a built-in governor and torque control device gives you precision metering of fuel and instant load-grabbing ability with minimum fuel oil consumption. These and dozens of other features make International Diesels tops in productive performance.

Let your International Industrial Power Distributor show you how International Diesels add efficiency to motor grader performance and pay off in production. Here, again, you'll find International Power the essential specification in your program for paydirt.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY

Chicago 1, Illinois

Power

INTERNATIONAL HARVESTER

Speaking of Leadership

SEALTEX Concrete Curing Compounds were used on the following projects for U. S. Bureau of Reclamation, Columbia Basin Development:

1. POTHOLES DAM . . . . . *Amis-Lytle and Green, Contractors*
2. LONG LAKE DAM . . . . . *J. A. Terteling & Sons*
3. SOUTH DAM, COULEE CITY . . . . *Bair-Crick Construction Co.*
4. PASCO LATERAL SYSTEM . . . . . *J. A. Terteling & Sons*
5. PASCO PUMPING PLANT . . . . . *James Construction Company*
6. SCHEDULE NO. 1 OF CANAL AT COULEE CITY . . . . . *J. A. Terteling & Sons*
7. CONTROL BAY AT COULEE DAM . . . . . *Morrison-Knudsen & Peter Kiewit Sons Co.*

These are specific job applications of Sealtex on the Columbia Basin project. Similarly, this product is being used on leading projects of the Corps of Engineers, U. S. Navy and other federal, state and city agencies throughout the West, Alaska and Hawaii.

SEALTEX Concrete Curing Compounds meet the exacting specifications of the Bureau of Reclamation, Army and Navy, other federal agencies; State Highway Departments, Counties, Cities, Engineers and Architects.

Meet the Specs with **SEALTEX**

CLEAR • WHITE-PIGMENTED GRAY-PIGMENTED • BLACK

THE TECHKOTE COMPANY

821 WEST MANCHESTER AVENUE • INGLEWOOD, CALIFORNIA

Rolls Up the Yardages

Cuts Down the Costs

EARTH MOVER ALL-WEATHER
for drawn vehicles and general traction

BUY and SPECIFY

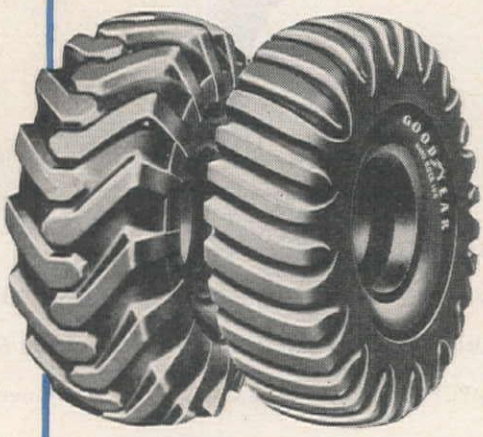
GOODYEAR — *it pays!*

HERE'S the tire that moves big loads at rock-bottom costs — *because it's designed and engineered for the job.* It's Goodyear's Earth Mover All-Weather—the "right" tire for the wheels of drawn vehicles, or for general traction. "*Right*" for rolling, because its wide, rounded contours provide maximum flotation, prevent deep penetration of the ground, reduce sideslip on fill, give sure-footed *easy* going.

Fact is, Earth Mover All-Weather tires—like *all* Goodyear work tires — are first choice with users. And they *stay* first choice because they keep on delivering low-cost, long-life performance. That's why year after year, *more yards are moved on Goodyear off-the-road tires than on any other kind!*

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

A RIGHT TIRE FOR EACH JOB



SURE-GRIP
for maximum traction on drive wheels

HARD ROCK LUG
for super-stamina in all rock work

GOODYEAR

1898 50 GOODYEAR ANNIVERSARY 1948

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

EUCLID EFFICIENCY

SPEEDS ANOTHER TVA PROJECT

Nearly four million cubic yards of earth and rock will go into Watauga Dam, a TVA flood control and power project, near Elizabethton, Tennessee. The dam will have a fill structure 900 feet long and 318 feet high, with a base width of 1,275 feet.

Because of their proved efficiency and rugged staying power, "Eucs" have been widely used for construction of earth-fill dams. At Watauga 26 Bottom-Dump and 15 Rear-Dump Euclids haul earth and rock on a twenty-four hour schedule. A Euclid Loader keeps pace with the speed and efficiency of Euclid hauling equipment by providing fast mobile loading of the Bottom-Dumps.

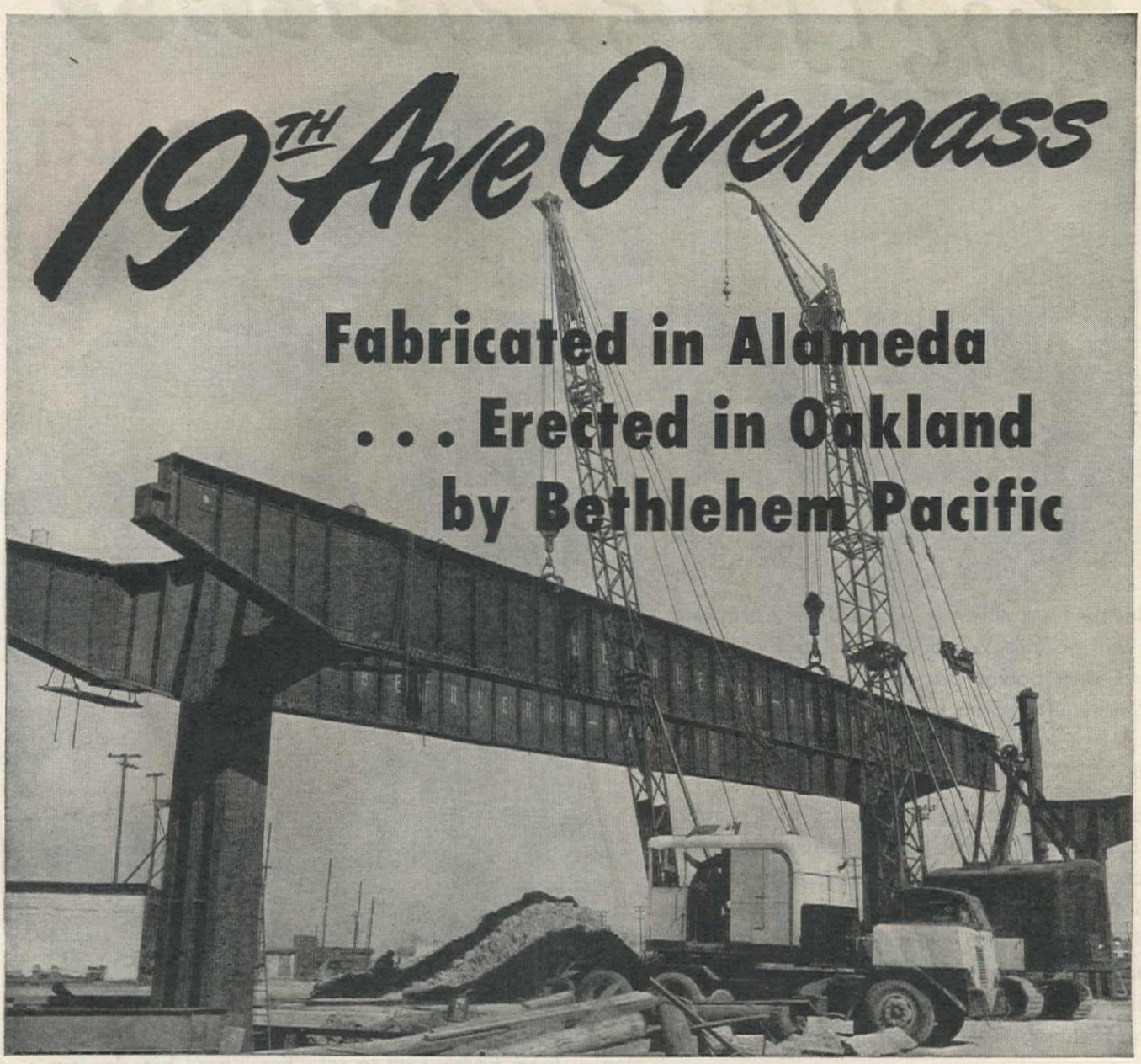
From borrow pit to fill, "Eucs" haul big payloads at Watauga under a wide range of operating conditions. Of sturdy but simple construction, Euclid equipment gives peak performance day after day at low maintenance cost.

Several new models have been added to the Euclid line of earth moving equipment—write or phone your Euclid distributor or representative for descriptive literature and information.

The EUCLID ROAD MACHINERY Co.
Cleveland 17, Ohio

EUCLID THE PIONEER

EUCLIDS *Move the Earth*



Bethlehem Pacific erection crew placing 136-ft main girder in 19th Avenue Overpass. General contractor, Carl N. Swenson Co., Inc.

Shown here during erection is the 19th Avenue Overpass on the East Shore Freeway in Oakland. It is a deck-girder structure, 860 ft in length, supported on single-column bents. This design involved fabrication and erection problems similar to those found in many of the nation's largest bridge jobs.

The 136-ft main girders in the overpass weigh 32 tons each and are supported by 19 - ft transverse girders. Built-up columns that support the roadway range in height from 40 ft for the middle span, down to 20 ft for the approach spans. The entire structure contains approximately 650 tons of steel and was fabricated and erected by Bethlehem Pacific.

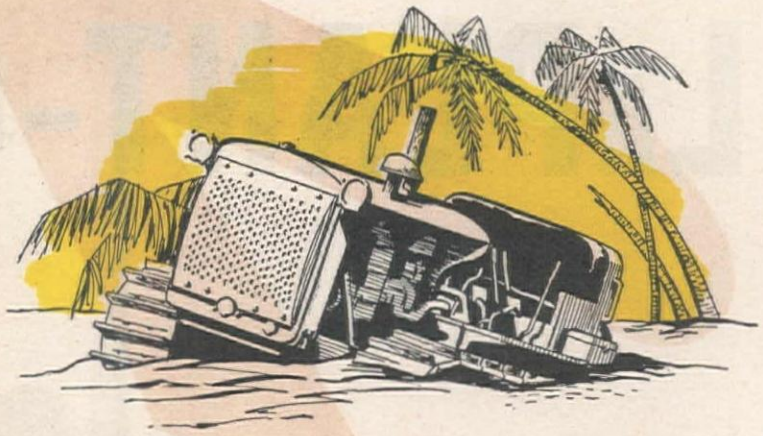
This company handles steel construction jobs on any scale, anywhere in the far West. It operates fabricating works at Alameda, South San Francisco and Los Angeles, and structural shape mills at Seattle, South San Francisco and Los Angeles.

BETHLEHEM PACIFIC COAST STEEL CORPORATION
Fabricated Steel Construction
Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Honolulu

BETHLEHEM STEEL

BETHLEHEM PACIFIC

NEVER TOO OLD TO EARN



DON'T write off your old "Caterpillar" Diesels or sell them short. There are thousands that have looked worse, perhaps endured more—yet they have been restored and continue to make money for their owners.

For instance: On storm-swept islands of the Pacific and on shell-torn battlefields of Europe many an abandoned, crippled, rust-encrusted "Caterpillar" Diesel Tractor was found, salvaged, brought home—and, with the aid of expert "Caterpillar" dealer mechanical service, put back into top condition.

Also working today and still going strong are many of the very earliest Diesel tractors "Caterpillar" ever built.

The built-in qualities of "Caterpillar" Diesels go 'way back in the history of "Caterpillar" design and manufacture. So, whatever their age in years or work-hours, no existing "Caterpillar" machines are ever hopeless.

Today, for any model, there isn't a part that cannot be replaced, a wear that cannot be remedied, a break that cannot be mended. With unexcelled facilities and factory-trained mechanics, your "Caterpillar" dealer can do an outstanding job of rebuilding at a moderate cost.

Glimpse of thirty-five million dollars' worth of new factory—by "Caterpillar."

CATERPILLAR TRACTOR CO. • SAN LEANDRO, CALIF.; PEORIA, ILL.

CATERPILLAR DIESEL

REG. U. S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

LaPLANT-CHOATE

Phelps-Wunderlich-James add fleet of LaPlant-Choate Motor Scrapers for 16,000,000 cu. yd. earthmoving job.

Big jobs need big units to finish them on time—at a good profit. That's why Phelps-Wunderlich-James picked big LaPlant-Choate Motor Scrapers to move the millions of yards of fill needed for the Cherry Creek Dam. These modern earthmoving units are big all over: Big Scraper Capacity—18 heaped cu. yds. per trip; Big Power—225 h.p. Buda diesel engine that provides 16 h.p. per cu. yd. of scraper capacity; Big Tires—21:00 x 29 Earthmovers, interchangeable front and rear; Big Brakes—4-wheel air brakes for maximum safety; and Big Production because every feature is designed for operator's comfort and ease of operation to minimize operator fatigue.

Add to these—fast loading in all kinds of material—high speed travel to and from the fills—power to maintain high speed on grades and soft places—and you have the reasons why LPC Motor Scrapers are making such records at Cherry Creek Dam and on countless other earthmoving jobs throughout the world.

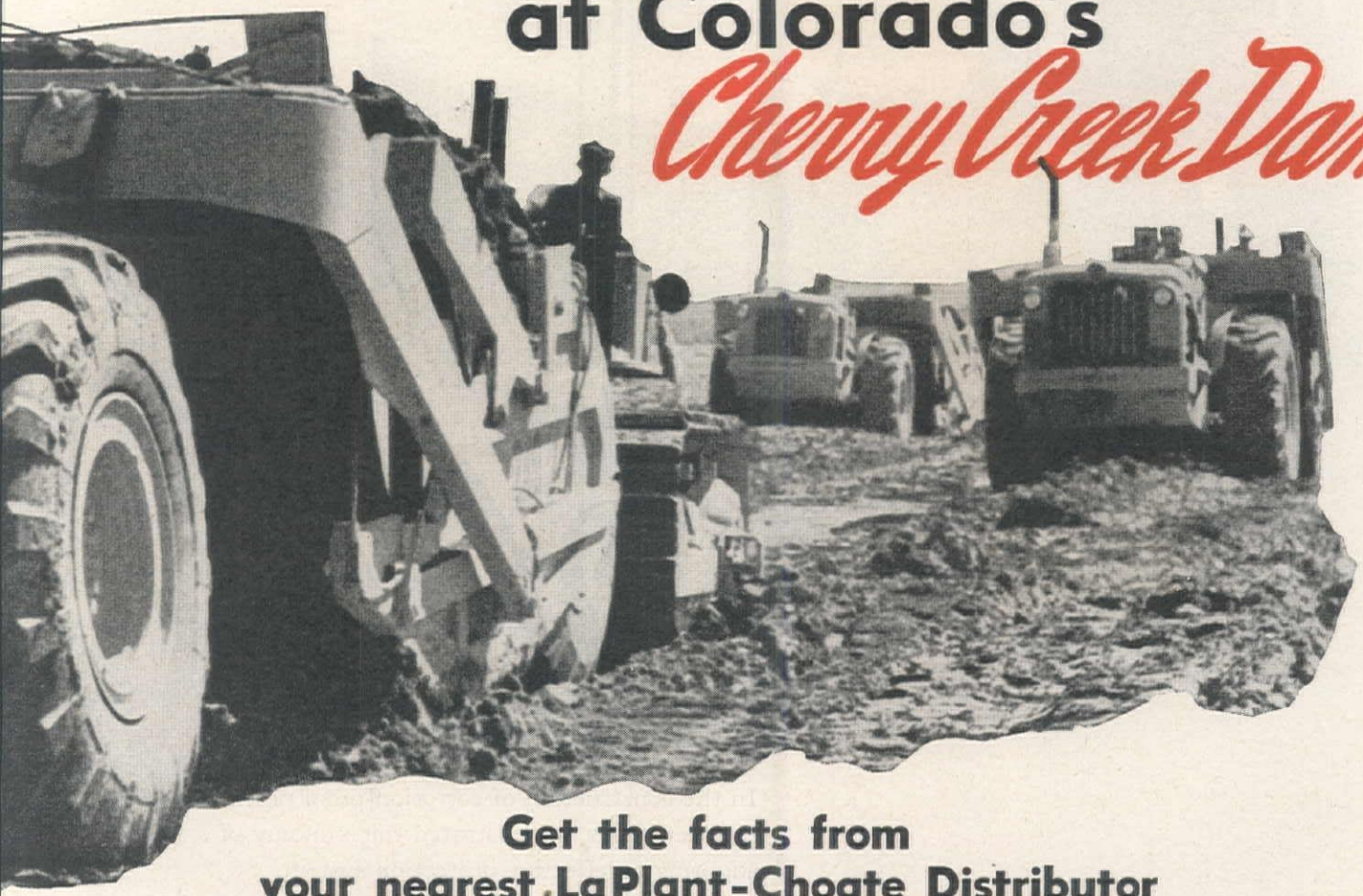
Whether your job is moving millions of yards or a few thousand, you'll make more profit with LPC Motor Scrapers. Ask your nearest LPC distributor for details and new low price of motor scrapers. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, Calif.

LaPLANT-CHOATE

HIGH SPEED EARTHMOVING EQUIPMENT

MOTOR SCRAPERS

speed huge earthmoving job at Colorado's *Cherry Creek Dam*



Get the facts from your nearest LaPlant-Choate Distributor

ENGINEERING SALES SERVICE, INC.
410 Capitol Boulevard
BOISE, IDAHO

GENERAL EQUIPMENT COMPANY
1201 East 2nd Street
RENO, NEVADA

INDUSTRIAL EQUIPMENT COMPANY OF SOUTHERN CALIFORNIA
4441 Santa Fe Avenue
LOS ANGELES 11, CALIFORNIA

HEINER EQUIPMENT & SUPPLY CO.
501 W. Seventh Street South
SALT LAKE CITY, UTAH

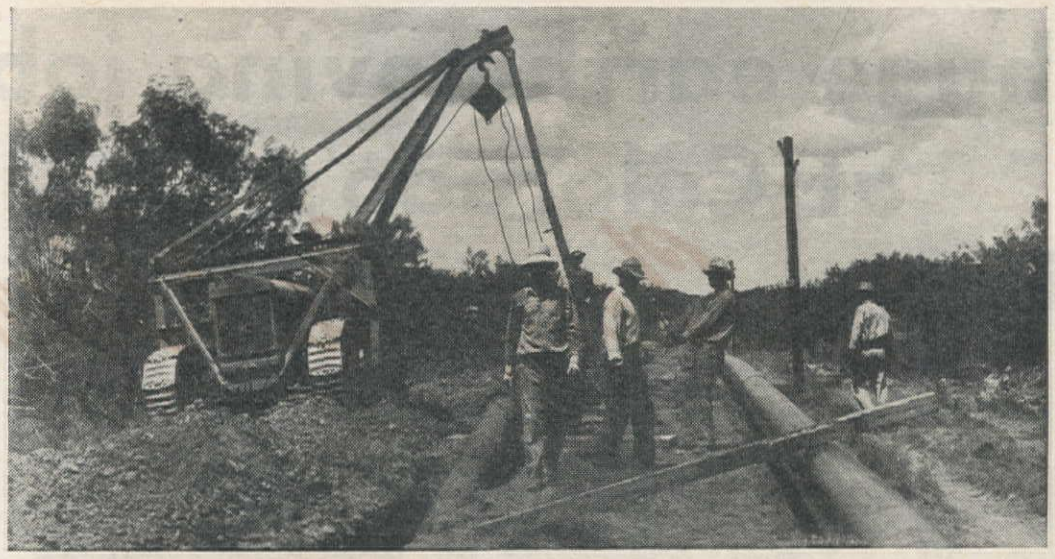
WESTERN CONSTRUCTION EQUIPMENT CO.
505 N. 24th Street
BILLINGS, MONTANA

218 W. Pine Street
MISSOULA, MONTANA

INDUSTRIAL EQUIPMENT COMPANY OF ARIZONA
720 S. 19th Avenue
PHOENIX, ARIZONA

N. C. RIBBLE CO.
1304 N. Fourth Street
ALBUQUERQUE, NEW MEXICO

Do it right at the start...



save 50%

In the construction of corrosion-proof pipelines, experience has demonstrated the economy of adopting an effective protection system.

The use of Barrett* coal-tar enamel assures the economy of your investment and eliminates the necessity in a few years of digging up, cleaning, repairing and recoating a pipeline that was improperly protected when put into the ground.

Because coal-tar enamels provide stable insulation to steel pipe, fewer Cathodic Protection installations are needed, thus reducing capital investment and requiring a minimum amount of electrical current, maintenance and amortization annually.

Barrett* coal-tar enamel, which possesses high dielectric strength, provides constant, uniform and long-lasting stable underground insulation, and retains electrical stability over a long period of years and under varying conditions of soil and climate.

FIELD SERVICE: The Barrett Pipeline Service Department and staff of Field Service men are equipped to provide both technical and on-the-job assistance in the use of Barrett* Enamel.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

*Reg. U. S. Pat. Off.

"WE'VE STANDARDIZED ON BLUE BRUTES"

Millard Buzby Epley, Treasurer of Buzby Brothers, Westfield, N. J.

Buzby Brothers' profit-boosting fleet of Ransome Blue Brute Hi-Up Truck Mixers at their batching plant in Westfield, N. J. The three 3-yd. Mixers at left, bought in 1946, proved so satisfactory that the other five Hi-Ups were added — two in 1947 and three in 1948.

Here's how Ransome Blue Brute Hi-Up Truck Mixers rate with men who use them constantly. Millard Epley, Treasurer of Buzby Brothers, writes:

"All our Hi-Ups have had an absolute minimum of down time. Non-availability has never cost us a penny.

"Every Mixer must be on call for any size and type of job, at any hour. Ransome's quick charging action at the plant, thorough mixing en route and fast discharging at the job allow us to average nearly 200 yds. a day on six-or seven-mile hauls.

"I believe Ransome's better mixing action makes stronger concrete — I know all our customers are satisfied.

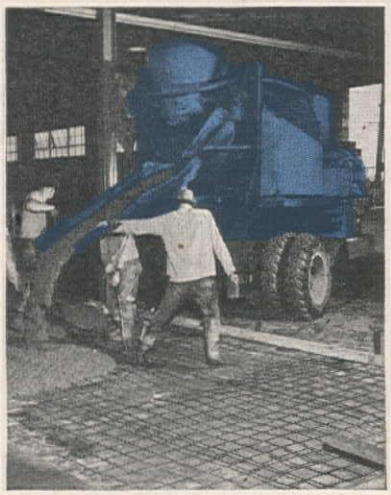
"Due to Ransome's A-1 service and the excellent operation of our Hi-Up Mixers, we have found it profitable to standardize entirely on Blue Brutes."

Get around among Hi-Up users and you'll find this is a familiar story, with smooth-running, efficient Blue Brute Truck Mixers saving time and money on every job. Write for Bulletin 221, or see your nearby Worthington-Ransome Distributor for full proof that *there's more worth in Worthington.*

R8-3

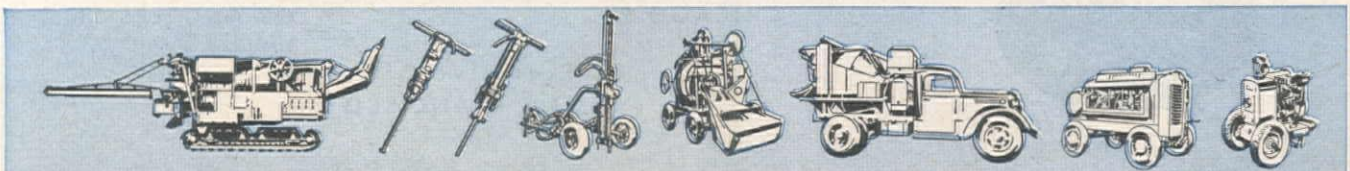
WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION
Worthington-Ransome Construction Equipment Division, Holyoke, Mass.
Distributors in all principal cities

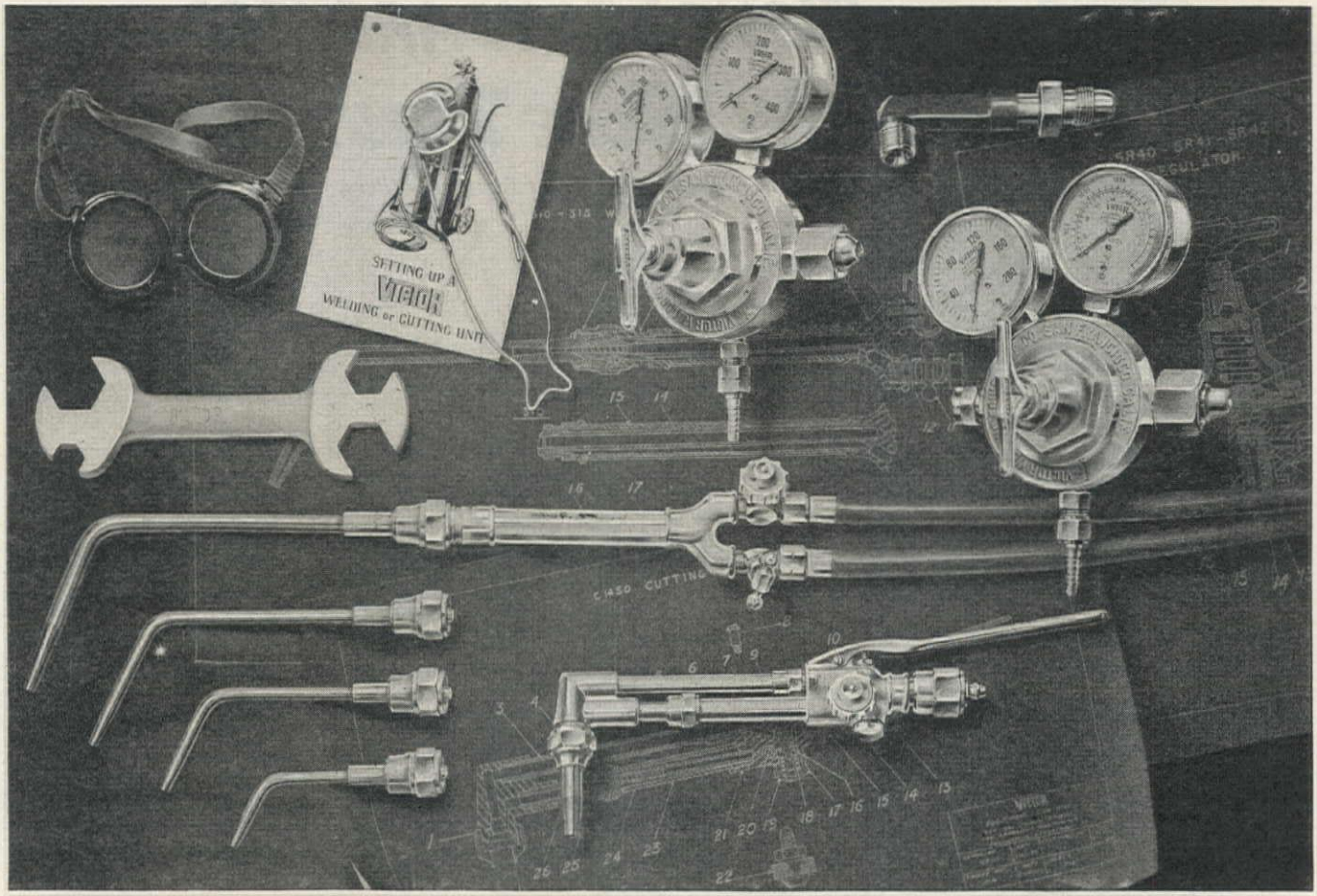


Fast action! One of Buzby Brothers' 3-yd. Hi-Ups, pouring concrete flooring for a new warehouse at Gibbsboro, N.J. This job, 10 miles from the batching plant and totalling 51,000 sq. ft. was completed in 13 days.

BUY BLUE BRUTES



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



by all odds—this modern welding and cutting unit is the choice of experienced welders and buyers everywhere—

WHY? . . . *there must be reasons—and there are.*

The user knows that a welding and cutting unit made by Victor fits his immediate requirements with utmost dependability while offering an unlimited opportunity to add tips or nozzles to meet the unexpected welding or cutting jobs years hence. A glance assures the most experienced operator that here is equipment which is designed and built with expert care. Most Victor boosters used other makes before.

VICTOR EQUIPMENT COMPANY

CHICAGO 7 LOS ANGELES 11

Executive Offices
SAN FRANCISCO 7

Unit No. WC-26

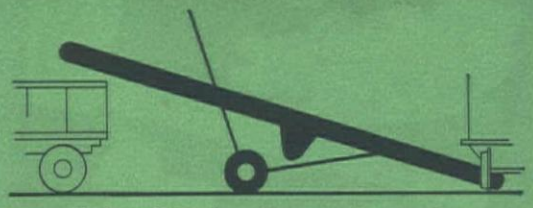
Barber-Greene

847461

Faster..Lowest Cost per Ton..
One-Man Operation

The versatility and one-man usefulness of B-G Portable Belt Conveyors offer almost unlimited possibilities for cutting the cost per ton handled — speeding up loading, unloading, stockpiling and conveying operations wherever they're put to work. These modern high-capacity conveyors handle all materials—stone, sand, gravel, coal, coke, ashes, bulk chemicals, bagged or boxed material — even wet concrete. Available in many sizes (lengths from 25′ to 60′; belt widths from 18″ to 30″) with advanced features that include highly portable, pneumatic-tired wheel trucks, lighter, stronger frames, V-belt drives and speed reducers—no chains or sprockets—and 100% anti-friction bearings. Use the coupon or see your B-G distributor for full information. Barber-Greene Company, Aurora, Illinois.

101



Unloading-loading cars, trucks

Multiple setups for unloading-loading, conveying bulk or packaged material.

Fast, easy towing

New Literature Describes New Advantages of the B-G Portable Conveyors

B G *Constant Flow Equipment*

BARBER-GREENE COMPANY
AURORA, ILLINOIS

FOR SALE BY:

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

Write for new bulletin giving complete details on hoisting machinery

Helpful data and exact specifications on the Superior-Lidgerwood-Mundy Line

HAVE THE STATISTICS AT YOUR FINGERTIPS! Just published! Profusely illustrated booklet, giving facts and figures on hoists you may be using now, and for those which you may need in the future. Also contains convenient data for figuring the rope capacity of drums; and figuring the load in pounds which can be handled with various combinations of sheaves and lines; also a handy table on how to figure carpuller and capstan loads.

Our modern line includes Steam Hoists; Gasoline and Diesel Hoists; Electric Hoists; Capstans and Carpullers; Boom-Swinging Gears; Hoists for special applications, etc.

Superior-Lidgerwood-Mundy hoists have been tested over and over in contracting, mining, and industrial service. Each hoist has behind it over two hundred years of accumulated experience, plus the most recent improvements.

We also build hoisting machinery to meet every special requirement regardless of capacity and power required. Send us your specifications and we will be glad to consult with you and submit a proposal.

Write today for your copy of Bulletin H-414.

OVER 200 YEARS OF ACCUMULATED EXPERIENCE — 1869 MUNDY — 1873 LIDGERWOOD — 1893 SUPERIOR

Superior–Lidgerwood–Mundy Corporation

MAIN OFFICE AND WORKS – SUPERIOR, WISCONSIN

NEW YORK OFFICE—7 Dey St., New York 7, N. Y. EXPORT OFFICE—50 Church St., New York 7, N. Y.

Cable Address — BROSITES, NEW YORK

Announcing

McCULLOCH *1-man 2-man* CHAIN SAWS

FULL 5 HP FOR TIMBER UP TO 5 FEET ★

WEIGHS ONLY 45 LBS. COMPLETE WITH 20" BLADE AND CHAIN ★

CHOICE OF BLADES IN 20, 36, 48, AND 60 INCH LENGTHS ★

HERE'S THE FIRST REAL ANSWER for high-speed, economical land clearing and timber bucking or felling. The McCulloch is a husky wood-cutting wizard, with many new features to speed timber work in construction, railroad, and tree-maintenance operations.

- ★ All-purpose Rip-Cross chain is easily sharpened by hand filing in the field. Its curved cutting teeth never need setting.
- ★ 360° swivel permits close felling and underbucking. In addition, the engine will operate in any position, because of its McCulloch floatless carburetor.
- ★ Automatic clutch stops the chain when the engine is idling. This safety feature also prevents the engine from stalling in a timberbind.
- ★ The handle detaches instantly, for one-man use or to permit pulling the blade through a cut.
- ★ Correct chain tension is automatically adjusted.
- ★ Many other features—*kickproof* recoil starter, stainless-steel blade and conveniently grouped engine controls—save time and effort on the job.

PRICES

20-inch chain saw...$385.00

36-inch chain saw...$395.00

48-inch chain saw...$410.00

60-inch chain saw...$425.00

20-inch bow saw...$425.00

McCULLOCH MOTORS CORPORATION
6101 W. Century Blvd.
Los Angeles 45, Calif.
Dept. MW

Fast-cutting, light-weight McCulloch chain saw simplifies cutting even more in hilly terrain.

SEND FOR FULL INFORMATION

McCULLOCH MOTORS CORPORATION
6101 W. Century Blvd.
Los Angeles 45, Calif. Dept. MW

Please send complete information on the 5-hp. McCulloch chain saw.

Name_____

Firm name_____ Type of work_____

Address_____ City_____ State_____

No MANUAL CLUTCH ADJUSTMENTS

for "warm-up" expansion

KOEHRING 205

Heat compensator spring eliminates need for repeated daily clutch adjustments. Expanding spring maintains full clutch efficiency when operating heat expands drum. Compensators on main drum (above), swing, and traction clutches.

ON the Koehring 205 (½-yd.) repeated clutch adjustments to compensate for heat expansion are eliminated. No longer does operator take time out, when he starts in the morning and after lunch, to tighten cold clutches, then loosen them when clutches warm up. With the 205 you don't lose production for these adjustments.

205 Clutches Compensate for Heat

Koehring puts heat compensator springs on six main clutches of the 205. These automatically keep clutches working smoothly and easily, without manual adjustments. Time saved, plus improved control, steps up production, adds up to extra yardage.

Bay Cities Equipment, Inc., *Oakland*
Columbia Equipment Co., *Portland, Boise*
Harron, Rickard & McCone Co. of Southern California, *Los Angeles*
Kimball Equipment Co., *Salt Lake City*
McKelvy Machinery Co., *Denver*
Moore Equipment Co., *Stockton*
Neil B. McGinnis Co., *Phoenix*
Pacific Hoist & Derrick Co., *Seattle*
The Harry Cornelius Co., *Albuquerque*
Western Machinery Co., *Spokane*

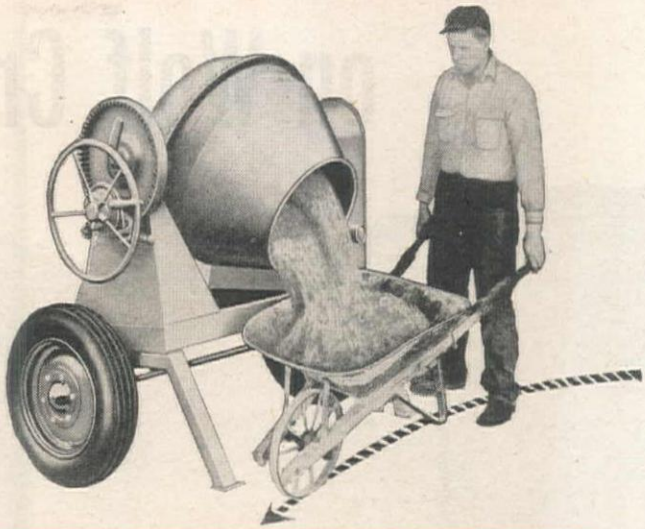
KOEHRING HEAVY-DUTY 719

KWIK-MIX

New 3½-S End Tilter

A New Kwik-Mix Dandie

"Dandie" quality in every detail. Modern high strength welded construction. Thorough mixing action. End discharge saves effort — you don't back and turn loaded wheelbarrow. Approach mixer from either side or from the front. Spotting area is unobstructed. Trails fast, safely, because it rides on leaf springs.



Bay Cities Equipment, Inc.	Oakland
Columbia Equipment Company	Portland, Boise
Harron, Rickard & McCone Co. of So. Calif.	Los Angeles
Kimball Equipment Company	Salt Lake City
McKelvy Machinery Company	Denver
Moore Equipment Company	Stockton
Neil B. McGinnis Company	Phoenix
Pacific Hoist & Derrick Company	Seattle
The Harry Cornelius Company	Albuquerque
Western Machinery Company	Spokane

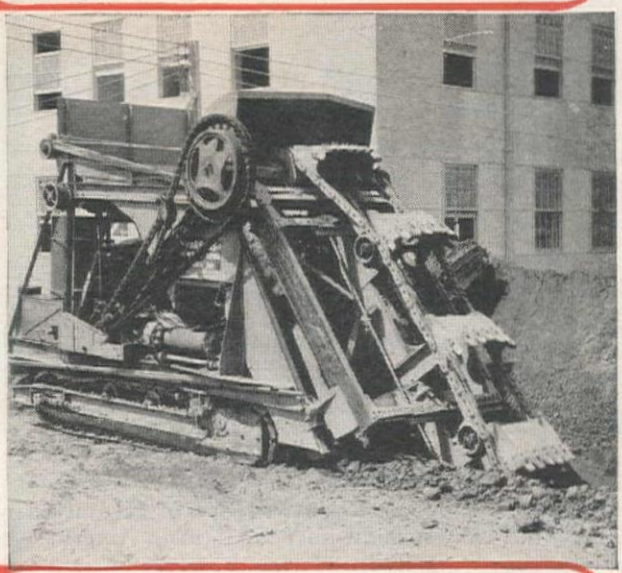
PARSONS

310 Trenches 15′ Deep

Heavy Duty Trenchliner*

Parsons big, husky 310 Trenchliner keeps cost down, profits up on sewer, gas and water main jobs. Built-in strength makes every pound of weight pay off in extra hours of heavy duty trenching. Digs up to 15′ deep, 54" wide. Telescoping boom shifts across entire width of Trenchliner. Power shifts arc type spoil conveyor.

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



Bay Cities Equipment, Inc.	Oakland
Columbia Equipment Company	Portland, Boise
Harron, Rickard & McCone Co. of So. Calif.	Los Angeles
Kimball Equipment Company	Salt Lake City
McKelvy Machinery Company	Denver
Moore Equipment Company	Stockton
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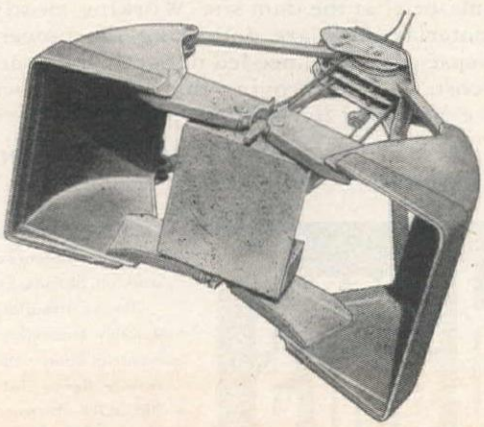
JOHNSON

Big, Deep Bites

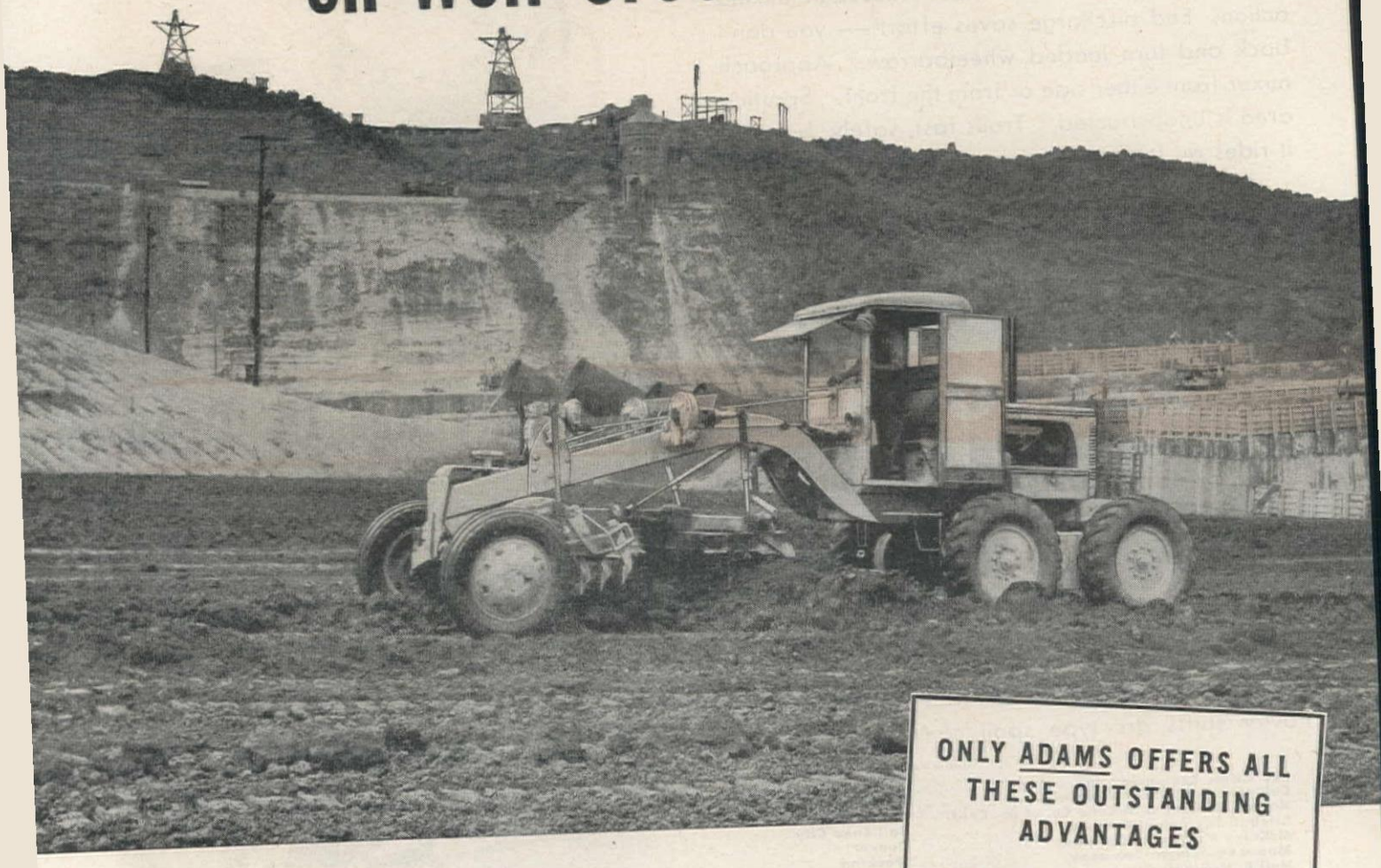
Johnson All-Welded Clamshell

You get capacity loads every time, in any material, with Johnson Clamshell Buckets. Teeth dig straight and deep — hard manganese cutting edge actually gets tougher with use. Large protected sheaves deliver full power to cutting lips. Write for information on increasing production and reducing your bucket costs.



Bay Cities Equipment, Inc.	Oakland
Cramer Machinery Company	Portland
Harron, Rickard & McCone Co. of So. Calif.	Los Angeles
McKelvy Machinery Company	Denver
Moore Equipment Co.	Stockton
Neil B. McGinnis Company	Phoenix
Pacific Hoist & Derrick Company	Seattle
The Harry Cornelius Company	Albuquerque
Western Machinery Company	Spokane
Western Machinery Company	Salt Lake City

Adams advantages pay off on Wolf Creek Dam—



The Wolf Creek Dam Project in Kentucky, when completed, will be the largest multi-purpose dam in America—controlling flood waters, supplying hydro-electric power.

Great fleets of heavy earth-moving equipment give the haul roads into the site a terrific beating, 16 hours a day. To keep the roads in fast travel condition is a tough, round-the-clock job. Several Adams Motor Graders help do it—efficiently, economically—in all weather, good and bad.

Adams Motor Graders are also being used at Wolf Creek to spread hauled-in material at the dam site. Working mostly in loose, hard-to-manage material, they are delivering the power, the traction, the speed and ease of control needed to handle all grading in fastest time, at lowest cost. They're proving that, now as always, Adams Motor Graders are *Your Best Buy—All Ways.* See your local Adams dealer.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, INDIANA

ONLY ADAMS OFFERS ALL THESE OUTSTANDING ADVANTAGES

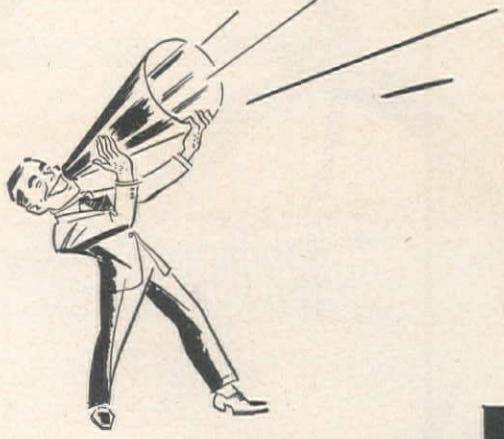
- 8 Overlapping Forward Speeds
- High-Arch Front Axle for Clearance
- Push-Button Starting from Cab
- Positive Mechanical Controls
- Wide Range of Blade Adjustments
- Exceptional Blade Clearance in All Operating Positions
- Balanced Weight Distribution
- Easy Access for Fast Servicing
- World-Wide Dealer Service

LOCAL Adams DEALERS

CALIFORNIA—*Western Factory Branch,* J. D. ADAMS MANUFACTURING CO., 230 7th Street, San Francisco 3; Adams Distributors at: San Francisco, Oakland, 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—The O. S. Stapley Company, Phoenix • COLORADO— McKelvy Machinery Co., Denver • IDAHO—Intermountain Equipment Co., Boise, Pocatello • MONTANA— Industrial Equipment Co., Billings, Missoula; Normont Equipment Co., Great Falls • NEVADA—Nevada Eqpt. Service, Reno; Clark County Whse. Merc. Co., Las Vegas • NEW MEXICO—J. D. Coggins Co., Albuquerque OREGON—Howard-Cooper Corp., Portland, Eugene • UTAH—The Lang Company, Inc., Salt Lake City • WASHINGTON—Howard-Cooper Corp., Seattle; Intermountain Equipment Co., Spokane • WYOMING— Industrial Equipment Co., Billings, Montana; The Lang Company, Inc., Salt Lake City, Utah.

ATTENTION

DAM CONTRACTOR



DON'T stick your neck out.

Before you make a bid involving rubber Gate and Lock Seals, Water Stops, or other molded parts, get accurate costs *FIRST* from a manufacturer who has had plenty of experience in working with dam engineers.

Many a contractor has underestimated the cost of these items . . . not realizing that they are made to accurate specifications from special high-quality rubber compounds that must give trouble-free service for many years.

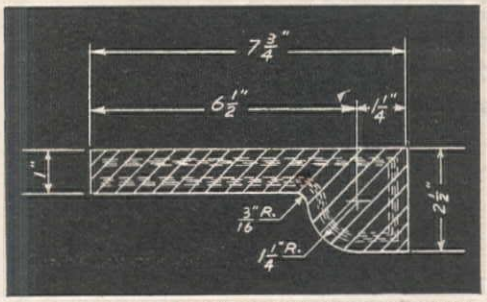
Play safe, consult with an engineer from U. S. Rubber. You'll probably save money, if you do.

Write Molded Goods Sales, United States Rubber Company, 1 Market St., Passaic, New Jersey.

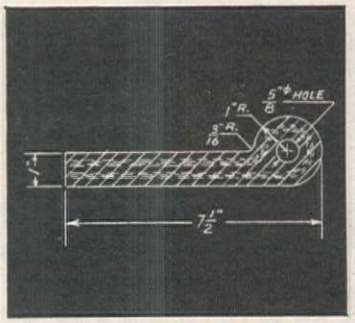
Made by

U.S.RUBBER
SERVING THROUGH SCIENCE

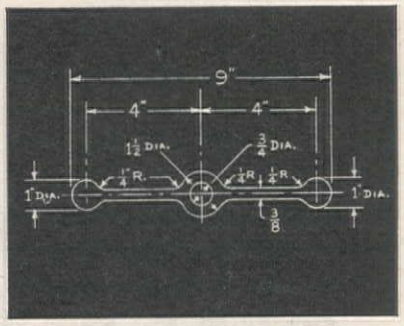
UNITED STATES
RUBBER COMPANY



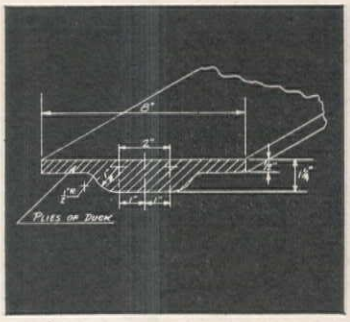
MOLD G-49121—"PORK CHOP" TYPE GATE SEAL



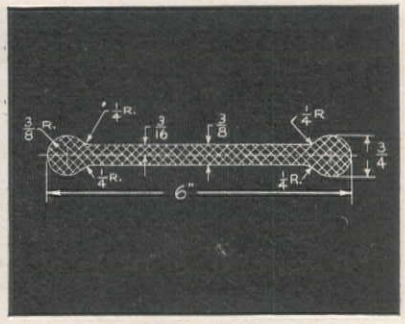
MOLD G-49123—"J" TYPE GATE SEAL



MOLD G-49125—WATER STOP



MOLD G-49143—CAISSON SEAL

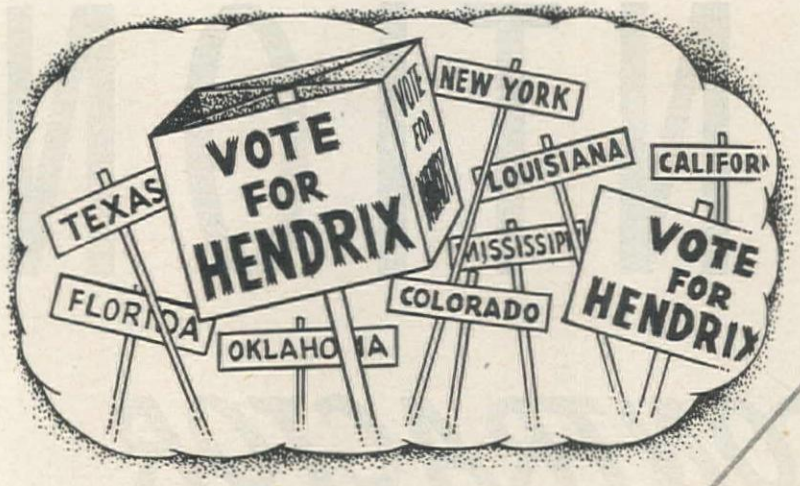


MOLD G-49169—WATER STOP

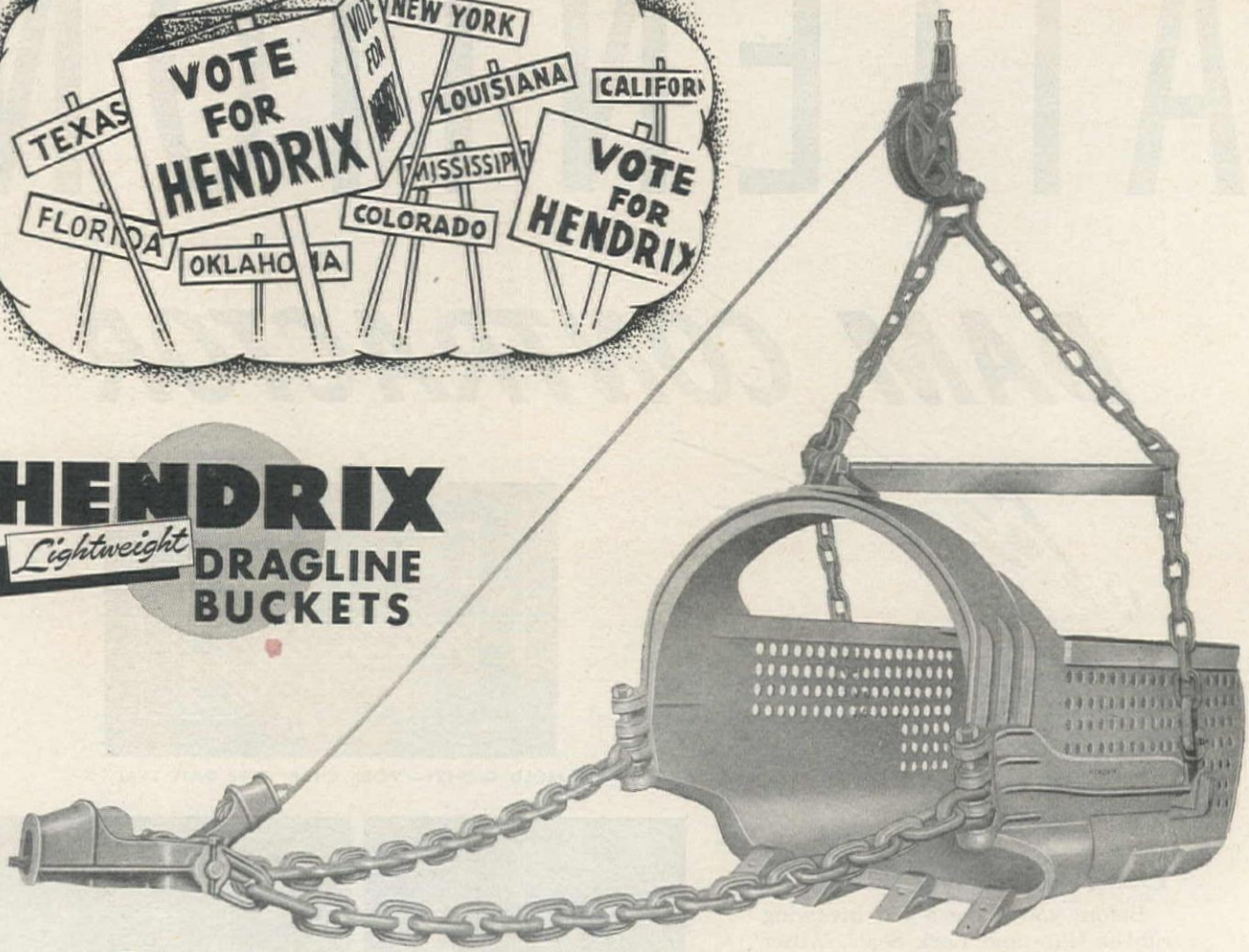
"A few of the many designs for which U. S. Rubber has molds."

"U. S." ENGINEERED RUBBER PRODUCTS FOR THE CONTRACTOR

AIR, WATER, STEAM SUCTION HOSE · CONVEYOR BELTS · V-BELTS · PACKINGS · HYDRON



HENDRIX *Lightweight* **DRAGLINE BUCKETS**



Six PLANKS IN OUR PLATFORM MAKE HENDRIX DRAGLINE BUCKETS A WINNER EVERY TIME!

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ 12% Manganese Steel chains, fittings, and reversible tooth points.
- ★ Full Payload every trip; even in wet digging.
- ★ Perfect Balance; handles easier, fills faster, dumps cleaner.
- ★ Three Types: light, medium, and heavy duty. With or without perforations.

3 TYPES DESIGNED FOR EVERY DIGGING CONDITION

LS . . . . A lighter weight bucket designed for levee and drainage work.

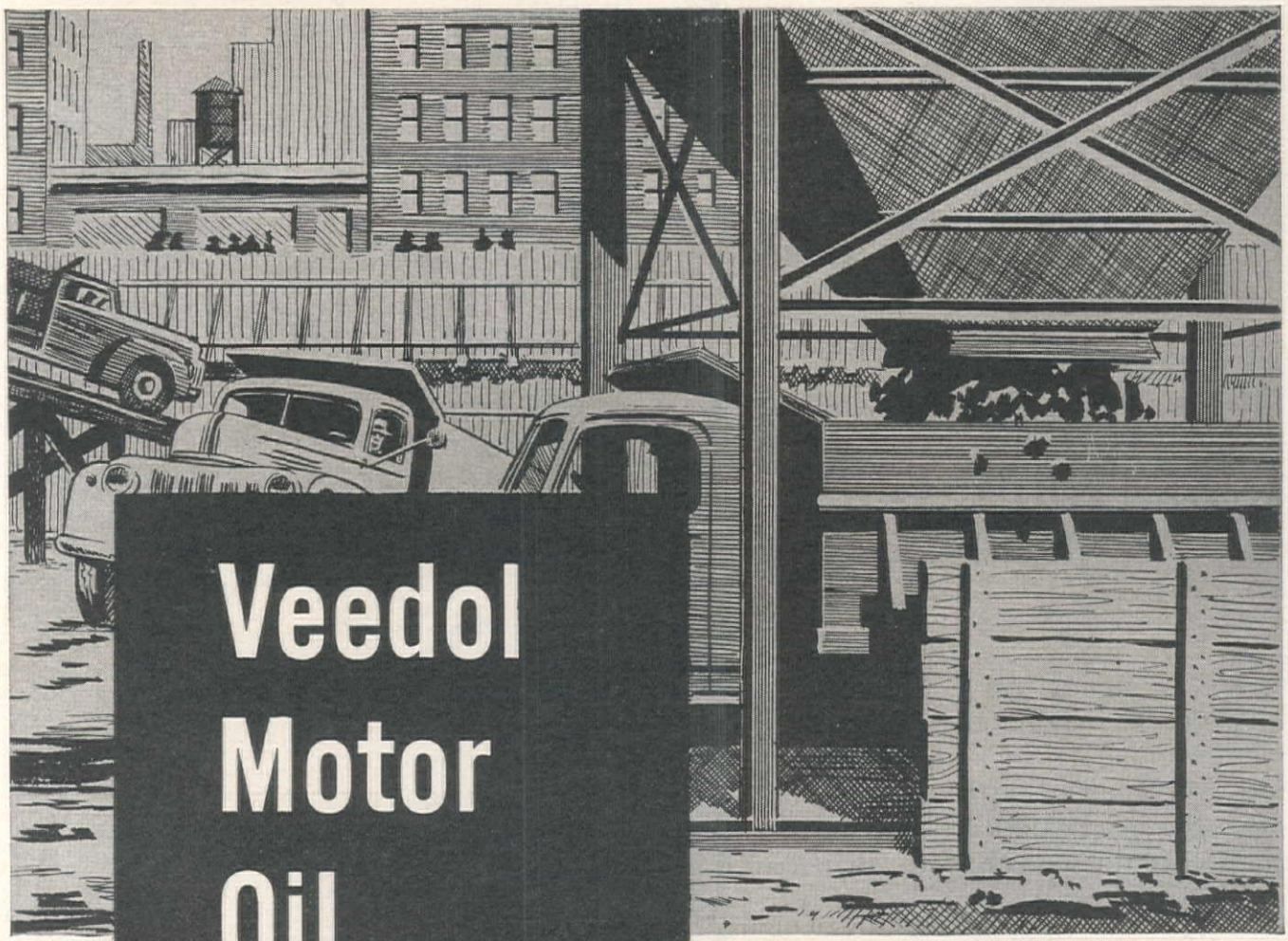
TS . . . . A medium weight bucket, classified as a general purpose bucket.

HS . . . A heavy duty bucket for moving shale or any hard formation. Used widely for stripping coal.

3/8 TO 40 CUBIC YARDS WITH OR WITHOUT PERFORATIONS

Write for descriptive literature or ask your dealer.

HENDRIX MANUFACTURING COMPANY
MANSFIELD INCORPORATED LOUISIANA



Veedol Motor Oil

for efficiency and long engine life

The best motor oil available is mighty cheap insurance on the life and efficiency of costly gasoline-powered equipment. That's why so many maintenance men insist on exclusive use of Veedol, famous for years as "The Aristocrat of Motor Oils."

For Veedol is made 100% from the finest lubricating crude oil in the world—the product of the Bradford Field in Pennsylvania. The stocks made from this base are dewaxed, solvent refined and clay filtered, then blended with an additive that inhibits bearing corrosion and engine deposits. The result is an oil that flows freely at low temperatures, retains its lubricating ability under extreme heat, and gives maximum wear protection under all conditions.

Veedol Motor Oil is available in SAE Grades 10 to 70, in refinery-sealed containers. Telephone for prompt delivery.

Call your Associated Representative for expert help on any lubrication problem

TIDE WATER ASSOCIATED OIL COMPANY

ROCKMASTER
Precision Controlled
BLASTING
not only saves money but avoids plenty of trouble

How to blast over 70 holes in one "shot" in a spot like this, without disrupting train or auto traffic? Even the most skilled blasting men will admit it's a ticklish problem. But Rockmaster blasting methods, under skilled Atlas technical direction, did the trick by controlling throw to an extent that seemed impossible!

With Rockmaster, the blaster can shoot his drill holes at controlled millisecond intervals. In this case, he wanted good breakage of the rock for hauling, but above all, he wanted control to prevent its being thrown on the busy tracks and roadway below.

So he timed his shot like a quarry-type blast—*in reverse!* Notice that the back row shot first—then the middle row, milliseconds later—and the front row last. Thus, the front row was made to throw much of its power toward the rear instead of out over the tracks and road.

Maybe your job calls for *more* throw instead of less. Rockmaster gives you the whip-hand over the situation. And helps control objectionable noise and vibration, too—an important feature when blasting must be done near inhabited buildings.

Call in your Atlas representative and find out what Rockmaster can do on your job—whether it's mining, quarrying or construction work.

Remember, the Atlas Rockmaster Blasting System also incorporates Atlas Manasite. This means decreased sensitivity to impact and friction—no sacrifice of efficiency but less chance of accident!

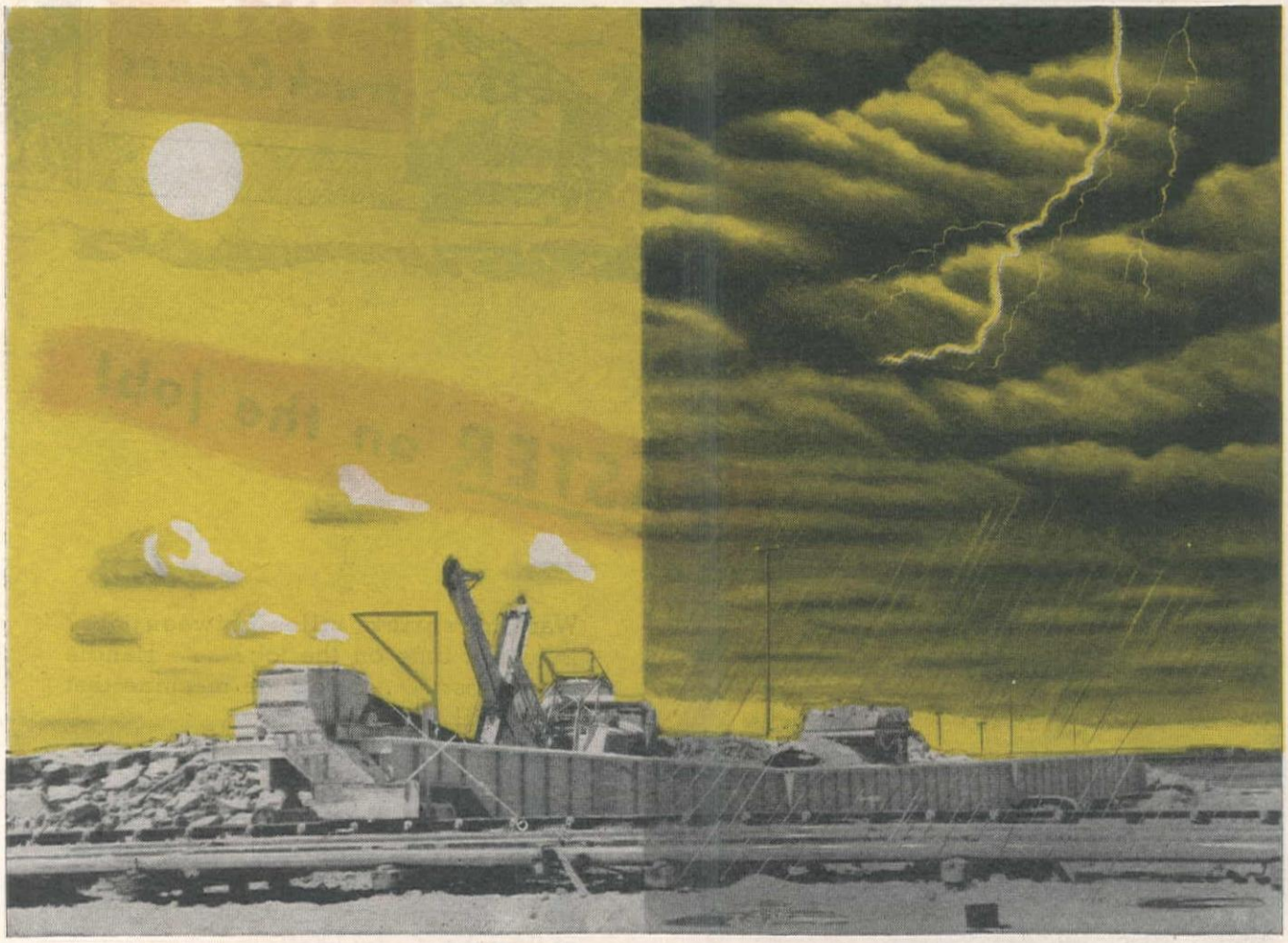
"ROCKMASTER"—Trade Mark
Manasite: Reg. U. S. Pat. Off.

Offices in Principal Cities

ATLAS EXPLOSIVES
"Everything for Blasting"

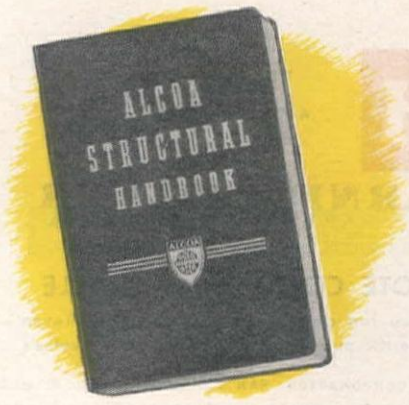
CHEMICALS ATLAS EXPLOSIVES

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



The Sulfur Industry can tell you plenty about

ALCOA ALUMINUM STRUCTURAL SHAPES



Ask your local Alcoa Sales Office for a copy of "Alcoa Structural Handbook".

Sulfur, its compounds and gases, are the commonest corrosive agents in most industrial atmospheres. Yet the sulfur industry uses Alcoa Aluminum for sulfur-handling equipment to take the punishment of clouds of sulfur dust under a hot sun at high humidity.

In addition, aluminum structures are strong, equal in strength to steel structures, at about half steel's weight.

It's easy to fabricate aluminum on your present shop equipment. Erect aluminum structures faster, with fewer men, often without cranes.

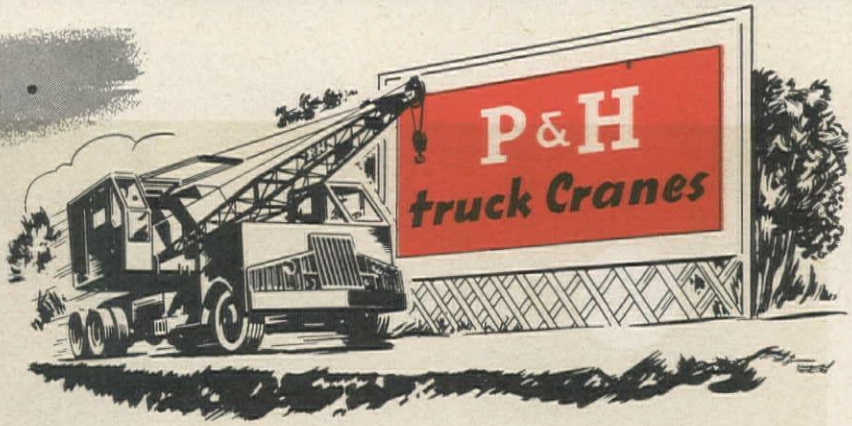
Maintenance costs are less on aluminum. It will never red rust . . . weathers far slower than steel if painting is neglected.

Gain the maximum in all these advantages by *starting* your designs in Alcoa Aluminum. ALUMINUM COMPANY OF AMERICA, 1811 Gulf Bldg., Pittsburgh 19, Pa. Sales offices in San Francisco, Los Angeles, Portland, Seattle, Denver, and 50 other leading cities.

ALCOA **FIRST IN ALUMINUM**

ALCOA ® ALUMINUM 1888 1948 60 YEARS OF SERVICE

fast on the highway . . .



FASTER on the job!

Want to "shrink" miles between jobs? . . . Cut time on the job? . . . Handle more jobs? . . . Here's the machine that will do it!

P&H Truck Cranes are dual powered — with one engine *built* for travel and the other built for *work*. Therefore you get better performance both ways — faster moves from job to job at regular highway traffic speeds. Quicker completion of the jobs.

And where the job demands, you can change over to shovel, dragline, clamshell, hoe or pile-driver. P&H Truck Cranes are profit makers everywhere. Send for literature now.

P&H Added Values

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

Size for size no P&H Truck Crane has ever been outlifted

P&H

TRUCK CRANES
4490 West National Avenue
Milwaukee 14, Wis.

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

P&H REMOTE CONTROL AVAILABLE

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

HARNISCHFEGER CORPORATION: SAN FRANCISCO, Calif., 82 Beale Street

Warehouses Service Stations: SEATTLE, LOS ANGELES, SAN FRANCISCO

PORTLAND 14, Oregon, Loggers & Contractors Machinery Co., 240 S.E. Clay St.; **WILLOWS, Calif.,** Willows Motor Sales Co.; **BAKERSFIELD, Calif.,** Kern Tractor & Equipment Co., 24th & N. 99 Highway—P. O. Box 1695; **NAPA, Calif.,** Berglund Tractor & Equipment Co., 1016-18 Soscol Avenue; **SALT LAKE CITY, Utah,** Western Machinery Co., 748 West 8th, South; **BOISE, Idaho,** Olson Manufacturing Company, 2223 Fairview Avenue; **EL CENTRO, Calif.,** Faure Tractor & Equipment Company, 1414 Main Street; **FRESNO, Calif.,** Allied Equipment Company, 1824 Santa Clara Street; **SAN DIEGO, Calif.,** Southern Equipment & Supply Co., 668 Third Avenue; **SPOKANE 8, Washington,** F. M. Viles & Co., Inc., East 124 Trent Avenue; **RENO, Nevada,** Dennison Tractor & Supply Company, 559 East Fourth Street; **SEATTLE 4, Washington,** Glenn Carrington & Co., 91 Columbia Street.

MAKE YOUR TRACTOR FLEET

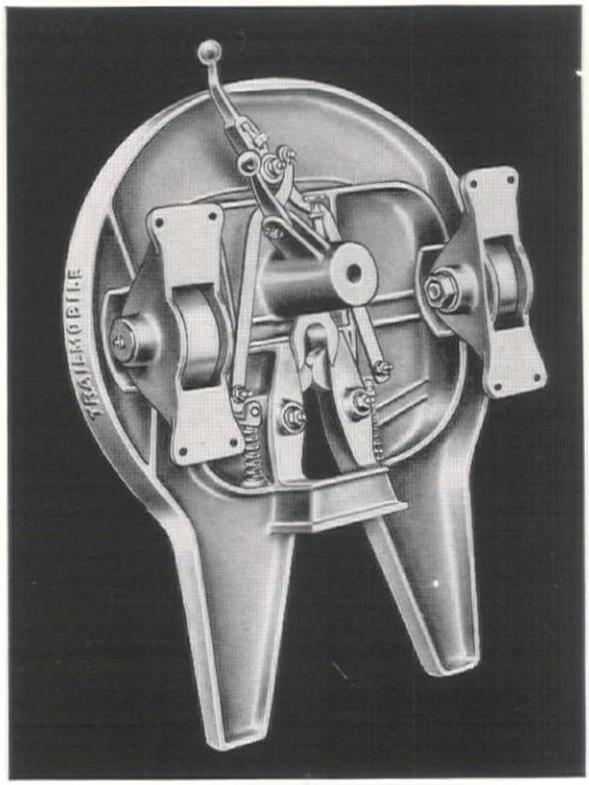
Completely INTERCHANGEABLE

Equip all of your tractors with TRAILMOBILE interchangeable automatic fifth wheels and you immediately expand the scope of operations of each tractor in your fleet. No longer will you have to wait for certain tractors to come in to move given trailers. Equip your fleet so that any tractor can pull any trailer. The TRAILMOBILE fifth wheel illustrated here couples to trailers with the conventional king pin. This fifth wheel has a recessed king pin which is raised when you wish to couple to trailers which require a king pin on the tractor. The greater flexibility and wider use of your tractors soon offsets the small cost of making these conversions. May we supply you with further details?

Check These Important Features of This Improved FIFTH WHEEL:

- √ Longer skid with easy slope for ease of coupling and more pick-up.
- √ Wider bearing surface distributes trailer load with less wear and better balance.
- √ Sturdier swivel or rocking pin with grease fittings.
- √ Four grease fittings within easy reach encourage regular lubrication of working parts.
- √ Jaws are opened manually for uncoupling and are automatically reset for coupling without the need of further manual operations.
- √ Jaws are firmly housed. Pull is against the entire fifth wheel casting—not against latch or jaw lock. Jaws swivel on heavy pins to withstand any pull or wear and do not chatter or become sloppy.
- √ Wide jaw opening permits safe coupling from wider angle.
- √ Grooves in landing surface hold grease to prevent wear of upper fifth wheel plate.
- √ Heavy cylinder of rubber around swivel pins prevents chatter, jar or shock from every direction.
- √ Jaws clamp around the largest diameter at the top of the king pin. The offset horse-shoe fits in the groove of the pin, making a firm connection that does not bend the king pin.
- √ Reinforcing webs are cast in the underside for strength without unnecessary weight, to prevent the fifth wheel from warping.
- √ Compact, sturdy design permits the lowest over-all height above the tractor frame or mounting plate.
- √ King pin (for combination coupling) rests flush with the bearing surface, is raised by a small operating lever and is held in position with a spring lock until manually lowered.
- √ Operating handles are shaped—not square steel bars—so they are safe and do not slip in the hands, even if covered with grease, mud or ice.

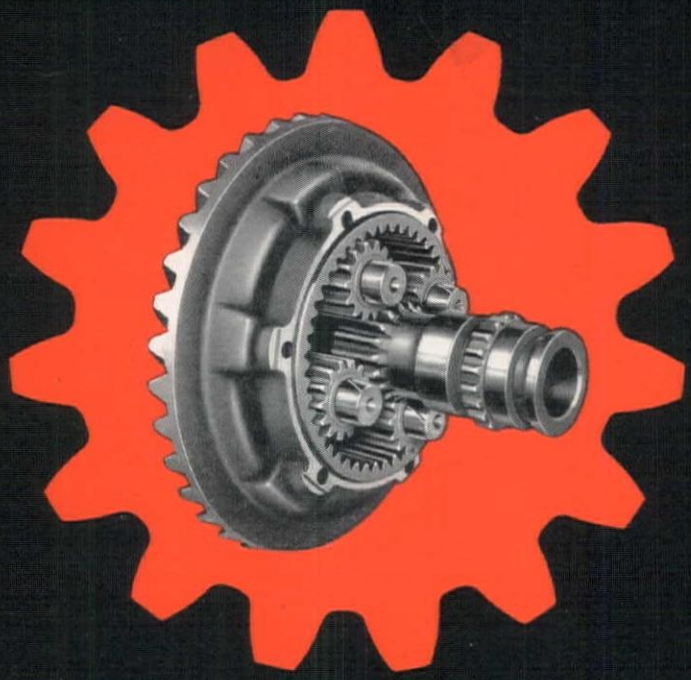
Note the simple design, the small number of parts and the sturdy construction of this universal fifth wheel that operates with every trailer in the fleet.



THE TRAILMOBILE COMPANY
BERKELEY, CALIFORNIA

TRAILMOBILE

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



The Eaton Planetary System Minimizes the Load on Each Gear Tooth with Resultant Longer Life

In Eaton's exclusive planetary system, the gear load is divided over four planetary pinions. Hence, the pound load per inch of gear tooth face is relatively low, and possibility of fracture under severe service conditions is minimized. This feature contributes to the long life of Eaton 2-Speed Axles.

See your truck dealer for complete information.

EATON 2-Speed Truck AXLES

POWER WHEN YOU NEED IT—SPEED WHEN YOU WANT IT

EATON MANUFACTURING COMPANY

Axle Division

CLEVELAND, OHIO

STANDARD ENGINEER'S REPORT

RPM CALOL

TEST DATA

UNIT 6 cyl. gas Truck + Bus Engine

LUBRICANT RPM Heavy Duty Motor Oil

FUEL Chevron Gasoline

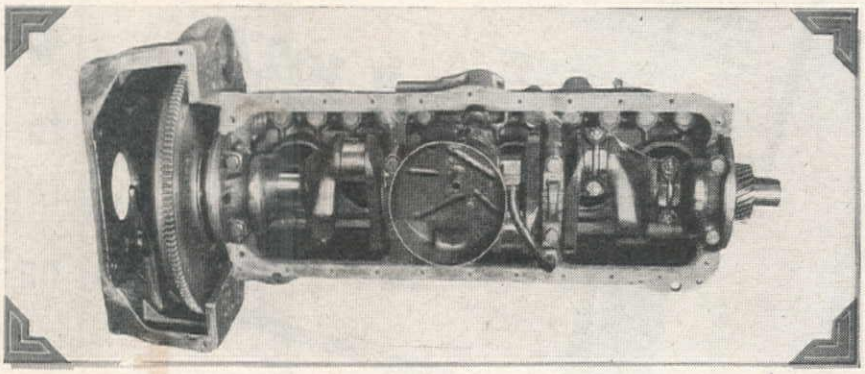
CONDITIONS max. engine loads for prolonged periods

FIRM Mountain Auto Line

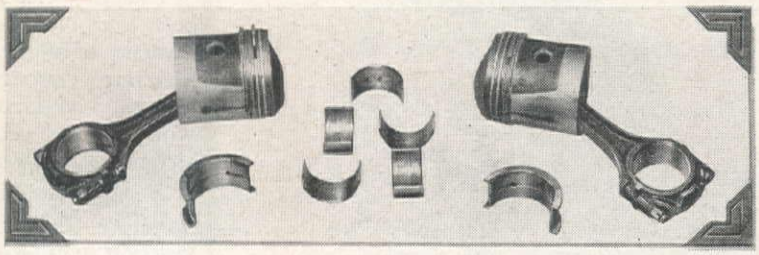
LOCATION San Bernardino, Calif.

TOUGHEST MOUNTAIN SERVICE PROVES RPM HEAVY DUTY KEEPS TRUCK AND BUS ENGINES CLEAN

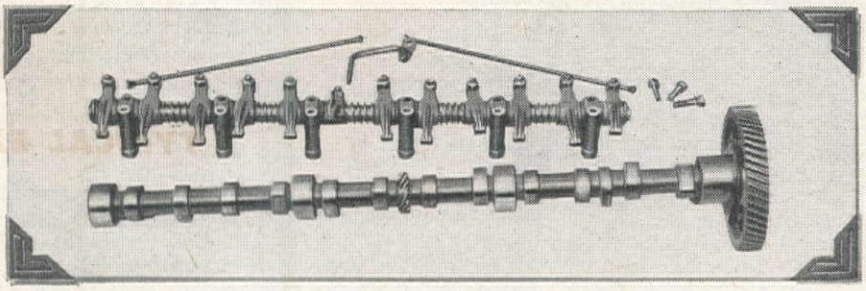
When this engine was pulled out of service for inspection, and the photographs were taken, it had operated on RPM Heavy Duty Motor Oil continuously for 45,000 miles—in service that is about as hard on equipment as any in the country. It is one of 21 units used on a mountain bus and freight run. They climb to a 5000-foot altitude in 15 miles without a stop. Even with 6-bladed fans, pressure-lubricated timing gears and 10-speed transmissions, crankcase temperatures soar above 240 degrees F.



As the pictures at right and above show, the crankshaft, bearings, pistons and rings from the engine were exceptionally clean. RPM Heavy Duty Motor Oil withstands the highest operating temperatures . . . sticks to the hot spots ordinary oils leave bare.



The camshaft was free from lacquer. Pushrods, timing gears and other parts showed minimum wear. RPM Heavy Duty Motor Oil resists oxidation, cleans engines of lacquer and maintains a tough lubricating film. It does this because of inherent properties of its selected base stocks and special compounds.



REMARKS: Many oils, competitive to RPM Heavy Duty Motor Oil, have been tested by Mountain Auto Line in their regular service. Tests have been made in all seasons of the year with atmospheric temperatures ranging from zero to 100°F. above zero in the shade. RPM Heavy Duty Motor Oil is the only oil used that meets every requirement of their engines and prevents clogging with lacquer.

STANDARD TECHNICAL SERVICE conducted and reported this test: If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20.

STANDARD OF CALIFORNIA

NOW! BETTER

with 2 NEW, low cost

Here's the ideal COMBINATION

to get more wear, longer life with utmost economy on all heavy equipment.

FOR YEARS, wear protection on heavy equipment has been a problem because of the many wear factors involved and diversity of application requirements. For example, an alloy with high impact strength sacrifices some wear resistance and vice versa; smooth, fluid deposits defeat position welding; high alloy content with increased wear resistance loses forging qualities. And low cost electrodes are always a major requisite.

Obviously one hard-facing alloy can't do all jobs equally well. That's why Stoody now offers TWO new rods to cover your everyday hard-facing requirements on heavy equipment. No single rod can do what this low-cost combination does because you can now select the *best* alloy for specific wear problems. Each rod has been completely field-tested for over a year on a wide range of applications. Results are positive on recommended uses.

TYPICAL EXAMPLES WHERE STOODY

DREDGE PUMP CASING—*A typical application of Stoody Self-Hardening 21. A ¼" single pass layer is applied manually to the new casing. May be reapplied as needed.*

MULLER TIRES—*Unprotected Muller tires normally lasted 2 years. After applying 75 lbs. of Stoody Self-Hardening 21 this tire shows practically no wear in 5 month's operation, will probably last 3 years or more with greatly increased efficiency.*

WEAR PROTECTION
Stoody Hard-Facing Alloys!

STOODY Self-Hardening 21

DESCRIPTION

A low cost, high alloy fabricated rod (alloys in tubes) composed of chromium, manganese, silicon, carbon and zirconium. Possesses highest abrasion resistance of any rod in low priced field, with good impact strength and excellent weldability. Exceptionally economical on big equipment requiring large hardmetal deposits. Primarily recommended for down-hand application.

WELDING CHARACTERISTICS

Fastest deposition rate of any low cost alloy.
AC-DC application, straight or reverse polarity, on *both* bare and coated rods.
Bare rods run as easily as coated.
Bonds to all types of steels, manganese and cast iron.
Will not spall even when surface checks develop.
Graphite type coating eliminates arc interference and slag. No hot slag hazards, no more slag chipping.
Multiple passes for heavy deposits.
Can be applied in any bead type.

SIZES: Available both BARE and COATED in following sizes: 1/8" Coated, 5/32" Coated, 3/16" Bare and Coated, 1/4" Bare and Coated, 3/8" Bare. Prices range from 50 cents to 85 cents per lb. depending upon rod size and quantity.

STOODY 1027

DESCRIPTION

Low cost coated rod having a steel core wire with all alloys contained in a heavy, extruded, graphite type coating. Composed of chromium, manganese, and carbon. Possesses the ultimate in impact strength with good wear resistance.

WELDING CHARACTERISTICS

Exceptional weldability.
AC-DC application.
Dense deposits.
Freedom from surface checking.
Fast deposition rate.
Deposits forgeable at red heat.
Ideal for position welding.
Multiple deposits without slag chipping.

SIZES: Available COATED only in following sizes: 1/8", 5/32", 3/16", 1/4". Prices range from 50 cents to 75 cents per lb. depending upon rod size and quantity.

Write for free literature

Here's what enthusiastic users say about the new Stoody Self-Hardening 21 . . .

"Stoody Self-Hardening 21 used on cement mixer paddles and tamper heads is lasting twice as long as regular Self-Hardening. Very pleased with cost of application and way rod is going on."

Signed: M. H. Forbush
Foreman
Pollard Bros.
Fresno, Calif.

"We have been using Stoody Self-Hardening 21 for the past year on the top hammers of our Disintegrator on heavy industrial grinding operations. Our experience has been very satisfactory and we have found the rod easy to apply."

Signed: S. P. Wilson
Plant Engineer
Joseph Wagner Mfg. Co.
San Francisco, Calif.

"We are now using Stoody Self-Hardening 21 as our standard crusher maintenance hard-facing alloy after comparing performance with alloys costing as much as $5.00 per pound. It not only performs better but provides a sounder weld when repeatedly applied. Stoody Self-Hardening 21 is the finest hard-facing rod yet developed for this type of work."

Signed: Harry Gravos,
Welding & Crusher
Maintenance Specialist
Spokane, Washington

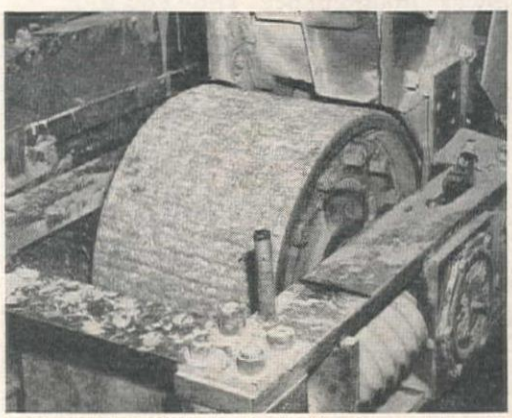
"After two months test on pressure rolls crushing "Haydite" Stoody Self-Hardening 21 shows 50% better wearing qualities than competitive rod."

Signed: Adolph Schaad
Plant Sup't.
McNear Brick Co.
San Rafael, Calif.

"We ran careful tests on a number of hard-facing rods and found Stoody Self-Hardening 21 to have exceptional wear resistance, high rate of deposition and we have eliminated our former trouble with spalling after repeated applications. We always have more demand for roads than money to build them and the low cost of our hard-facing is a help to our budget."

Signed: D. E. Kirchner
King County Road District #2
Seattle, Washington

HARD-FACING ALLOYS ADD LIFE, CUT COSTS



ROLL CRUSHER—*High speed operation in quartzite, etc., chewed off former alloy in 24 hours. Stoody Self-Hardening 21 lasted a full week and does not spall even after repeated applications. Outperforms $2.00 per pound rods.*

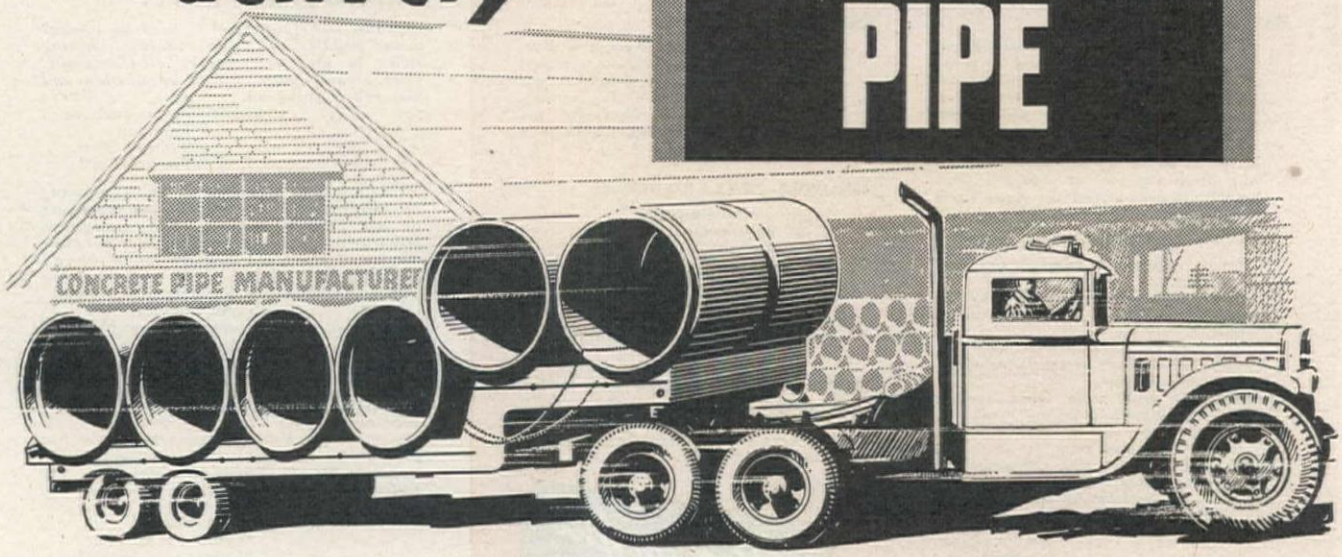
6 YARD DIPPER—*Rebuilt on lips and bottom with 60 pounds of Stoody Self-Hardening 21. High abrasion resistance of alloy keeps bucket out to size. Alloy is redeposited as wear occurs to maintain operation.*

STOODY COMPANY
1156 WEST SLAUSON AVENUE
WHITTIER, CALIFORNIA
Distributors in all important Industrial Areas

for greater STRENGTH and LONGER LIFE

plus - Quickest delivery

USE CONCRETE PIPE



Culverts, Sewers and Drains

Made right in your own district —

In these days of frequent delays in materials and in construction, prompt delivery of the finished product - - - ready for immediate installation - - means even greater savings in time and cost. Couple these savings with the recognized advantages of concrete for permanent performance, increased capacity and lower maintenance and you'll specify concrete every time.

For further information and detailed specifications on any job, write to your nearest member of

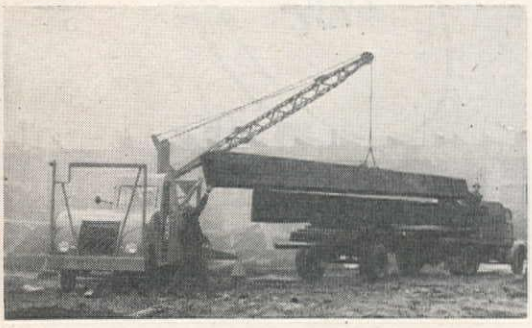
CALIFORNIA ASSOCIATED CONCRETE PIPE MANUFACTURERS

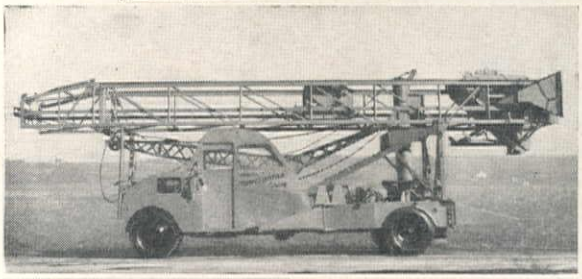
P.O. BOX 152 FRESNO 7 CALIFORNIA

CCP-13

WAGNER Towermobile Crane...

CRANE BOOM is available in lengths up to 40 feet.





WAGNERMOBILE - CRANE can be folded down for transit and travels at highway speeds. This mobile unit can be used on many jobs over a wide area.

TOWERMOBILE, with tower extensions, pours concrete on high buildings. 95-foot towers have been used. New hydraulic tower raising attachment speeds erection of high towers.

...a Mobile Elevating Tower and Truck Crane

Construction of hoisting towers is costly! An investment NOW in a WAGNER TOWERMOBILE CRANE will provide an easy means of hoisting materials for a good many jobs to come, PLUS a crane boom for all around lifting and materials handling. One man operation... can be driven to the job and set up in ten minutes. 35-ft. tower and one 10-ft. extension is standard equipment, additional 10-ft. tower extensions can be added to suit requirements.

Ask Your Nearest MIXERMOBILE Dealer TODAY!

Manufactured by MIXERMOBILE MANUFACTURERS.

Manufacturers of:
SCOOPMOBILE
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TOWERMOBILE
TOWERMOBILE-CRANE
DUO-WAY LIFT
DUO-WAY SCOOP
FOLDAWAY LIFT

WAGNERMOBILE
MIXERMOBILE MANUFACTURERS

MIXERMOBILE DISTRIBUTORS, INC.

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- Constructor's Equipment Co. 3707 Downing St. Denver, Colorado
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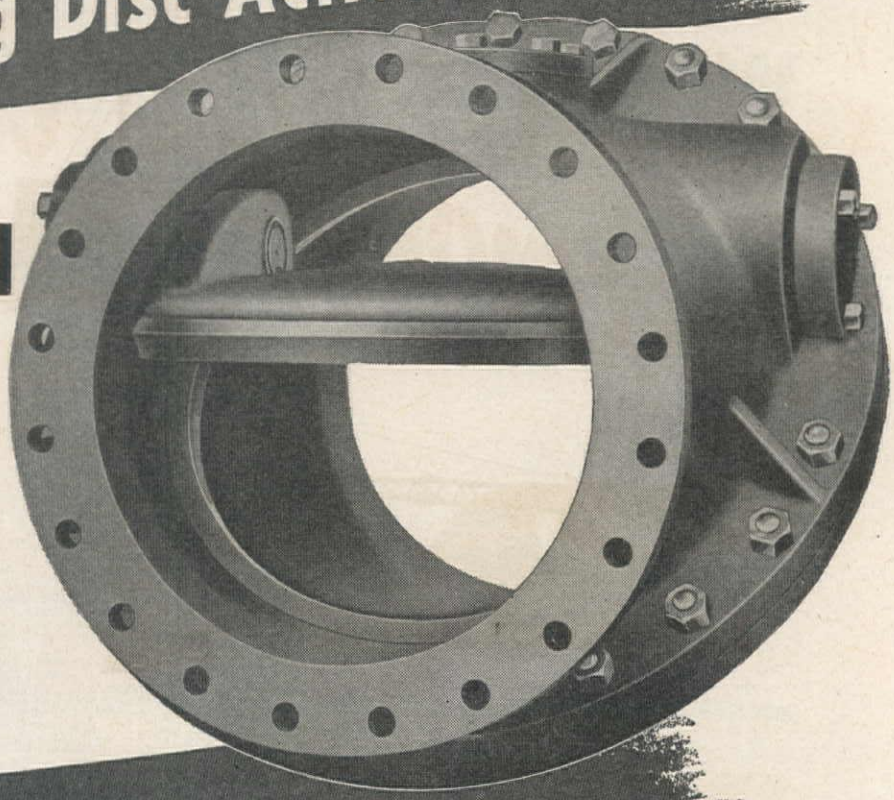
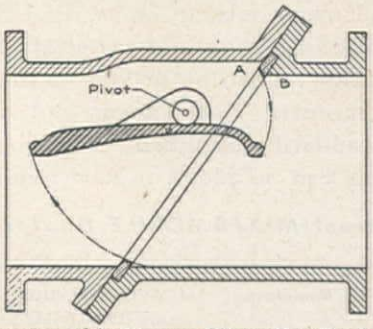
- Heiner Equipment and Supply Co. 501 West 7th So. St. Salt Lake City, Utah
- Lively Equipment Co. 2601 N. Fourth St. Albuquerque, N. M. and El Paso, Texas
- Neil B. McGinnis Co. P. O. Box 3615 Phoenix, Arizona

Floating Disc Action Gives

CHAPMAN TILTING DISC CHECK VALVES



Quick, Quiet Closing



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

Unlike ordinary check valves, Chapman Tilting Disc Check Valves have a balanced hinged-pin disc *which works with the stream.* The disc closes quickly and quietly, with its motion cushioned by the effect of the stream against the short flap. Since there is no slamming of the disc, hammering and pipe line stresses are eliminated.

Not only does this unique valve minimize maintenance costs but it also reduces head losses 65% to 85% over conventional type check valves. When installed on pump discharge lines substantial power savings are possible.

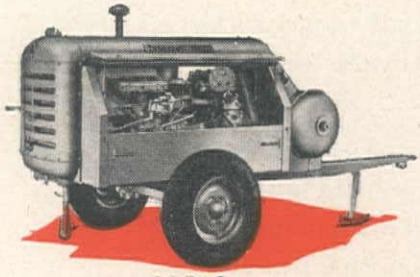
For engineering data and test results send for bulletin.

THE CHAPMAN VALVE MANUFACTURING COMPANY
INDIAN ORCHARD, MASSACHUSETTS

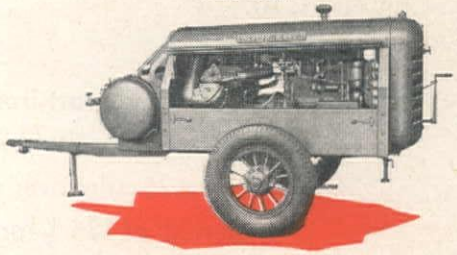
the NEW KA-*series*

Ingersoll-Rand
MOBILAIR
AIR POWER

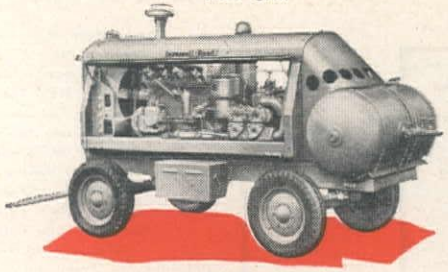
...the line of Compressors full of SupRR features



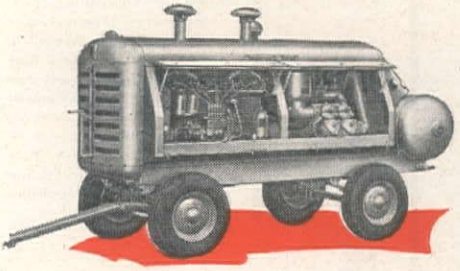
105 cfm



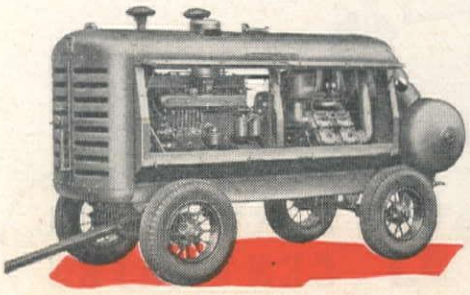
160 cfm



210 cfm



315 cfm



500 cfm

- **HYDRO-SHIFT FLEX-DISC CLUTCH** . . . Finger-tip hydraulic shifter simplifies starting. The clutch is completely self-adjusting, and is the only clutch in which facings can be replaced without major disassembly.
- **DRILL-MORE Multi-Speed Capacity Control** makes Rock Drills and Air Tools work up to 15% faster . . . saves up to 40% in fuel . . . reduces wear on both engine and compressor.
- **IMPROVED CONTROL OF COOLING SYSTEM** . . . Adjustable shutters on radiator and thermostatic control of water circulation.
- **PISTON-TYPE FREE-AIR UNLOADERS** eliminate troublesome diaphragms . . . operate only at half speed.
- **FULL-RANGE AIR FILTERS** automatically maintain their high efficiency at part capacity.
- **HINGED SIDE COVERS** permanently attached, prevent loss and damage.
- **SPRING MOUNTING AND AUTOMOTIVE STEERING** on all sizes.
- **TWO-STAGE AIR-COOLED COMPRESSOR** with Channel Valves and constant-level lubrication.
- **CHOICE OF ENGINES** . . . High-economy gasoline engine or Type "H" oil engine on all sizes . . . International-Harvester easy starting Diesel available on 160, 210, and 315-cfm sizes.
- **ARMORED AGAINST DEPRECIATION** . . . Resistant to break-down, dependable on all kind of weather, and good for many years of hard service . . . easy to operate, service, and maintain . . . tough machines that stay efficient.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 330-2

DON'T STOP WITH A GOOD COMPRESSOR!

Use the RR CONTRACTORS' COMBINATION

Everything you need for rock drilling • Top quality machines that work as a team. • Machines designed, built, sold, and serviced by men who know rock excavation . . . application "know how."

THE SAGA OF 50 MILLION FEET OF CAST IRON PIPE

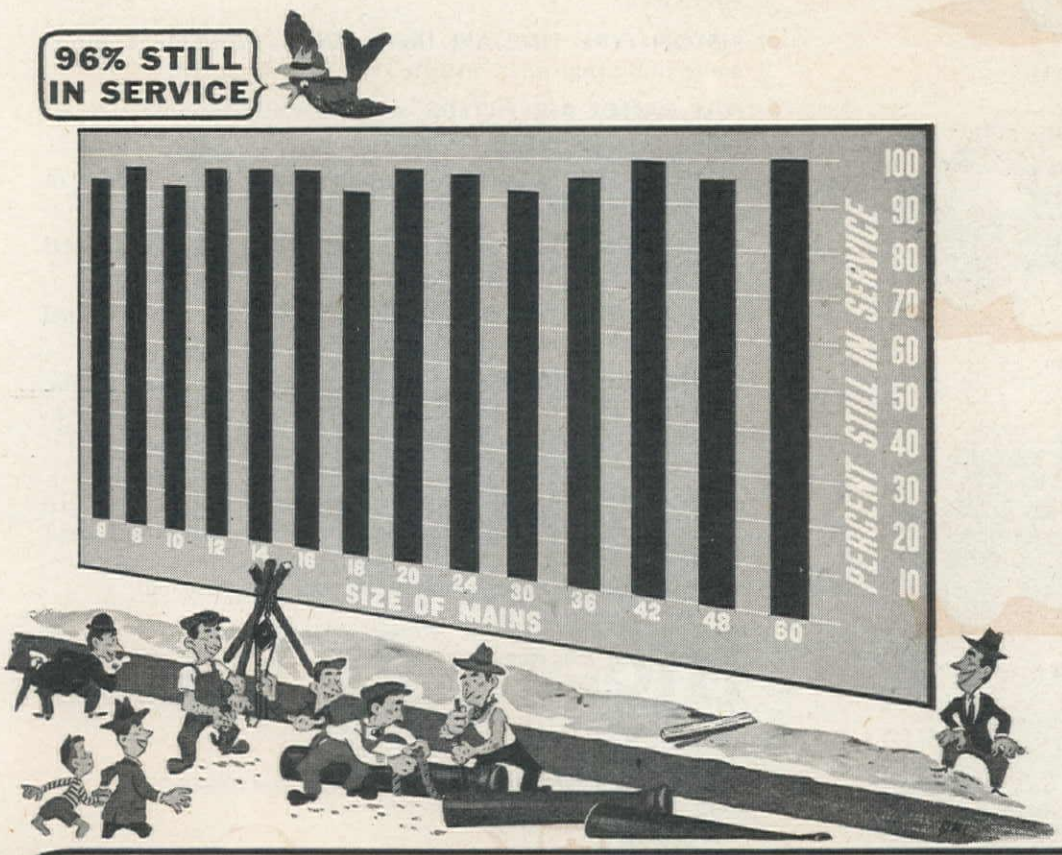
In the 125 years since 1817, 25 cities had laid 50 million feet of cast iron water mains in sizes 6-inch and up. What had happened to those mains and to other facilities? A committee representing three water works organizations determined to find out. For these 25 cities, large and small, stretching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

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

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

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

*Sizes from 6 to 60 inches.



CAST IRON PIPE SERVES FOR CENTURIES

Above: the S. S. Harvester at docks of International Harvester's Chicago Steel Mill.

Quality BUILDS Quality

THAT'S THE INTERNATIONAL WAY

from raw materials to finished trucks

International Truck quality begins long before truck building starts. It begins with control of the raw materials that produce rugged truck strength and power.

Quality Builds Quality! That rule governs the selection and approval of every material and part used in every International Truck. Here's one example:

- International Harvester's own ships bring iron ore from Minnesota's Mesabe Range down the lakes.
- These ships also transport coal from International Harvester's mines in Kentucky. The coal is loaded at the lake port of Sandusky, Ohio.
- Ore and coal are brought to International Harvester's steel mill in Chicago, where *Quality* steel, including one of a special type developed by International Harvester's technicians, is made to rigid specifications for International Trucks and International Engines.

Yes, *Quality Builds Quality.* Note with what success:

For 16 years more new heavy-duty International Trucks have been bought by American commerce and industry than any other make.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY · Chicago

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

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

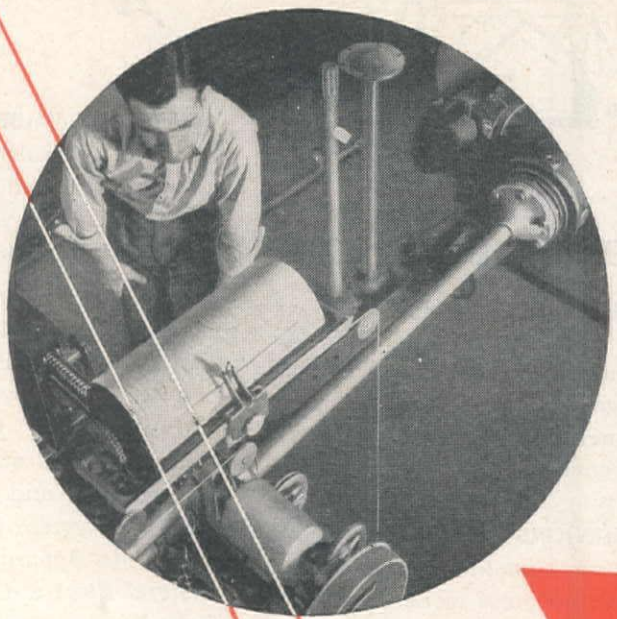
THIS EMBLEM IDENTIFIES GREAT TRUCKS
INTERNATIONAL

INTERNATIONAL Trucks

you get more work out of Mack Trucks

"All of our Mack trucks worked right through the entire war period without a major failure." Thus, Mr. S. H. Bacon of S. H. Bacon Materials Co., Huntington Park, Calif., describes the dependability that has sold him on hard-working Macks.

because..we put more work into Macks



There is no guesswork about the stamina of Mack parts. This testing machine determines the strength and elasticity of Mack axle shafts by imposing measured torque up to point of fracture. Sample shafts are tested to destruction, thus insuring that all Mack shafts fully measure up to Mack's exacting standards.

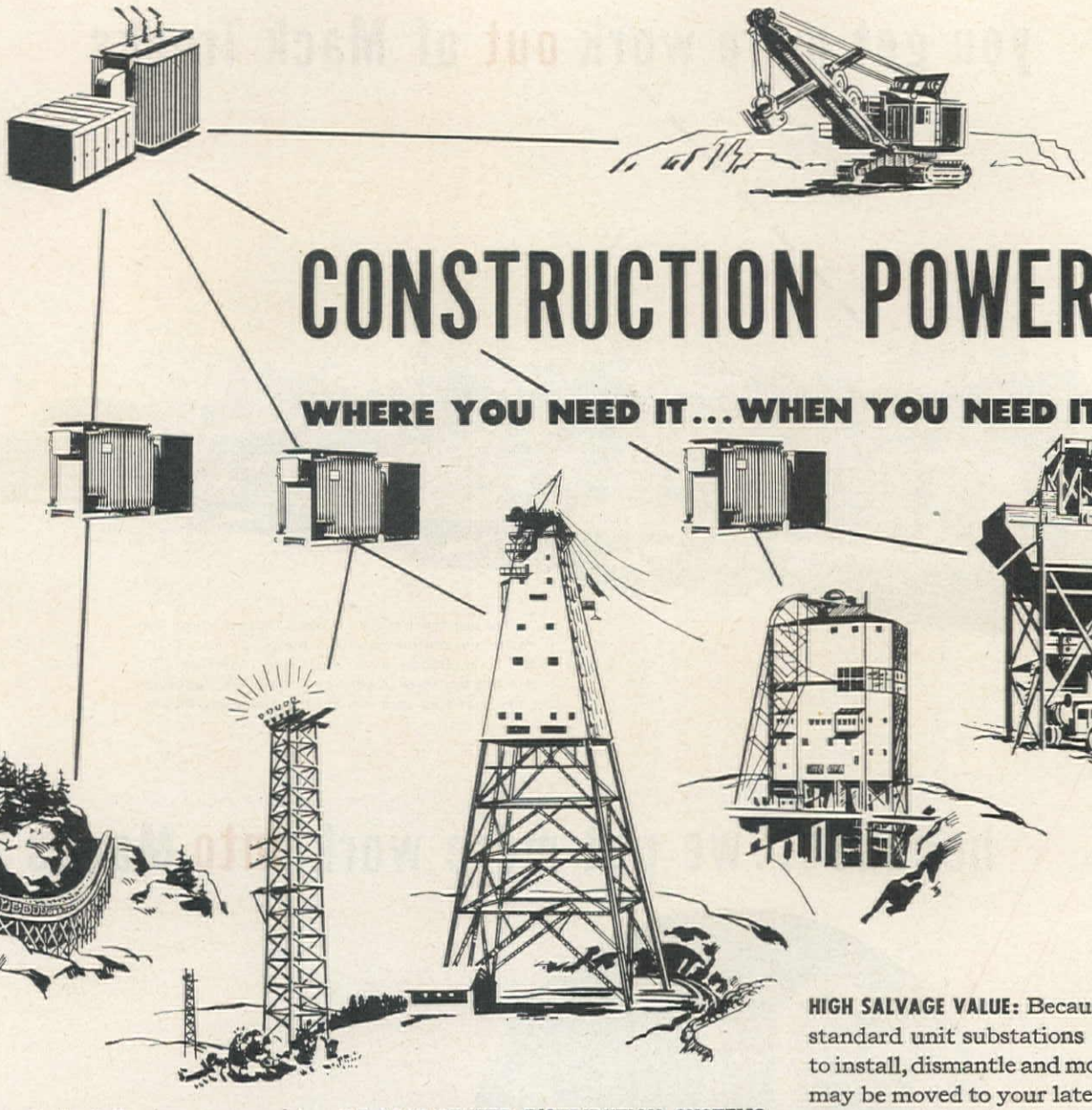
Mack

trucks for every purpose

Mack-International Motor Truck Corp. — Los Angeles • Sacramento • San Francisco Seattle • Portland • Salt Lake City • Factory branches and dealers in all principal cities for service and parts.

6216-1

SINCE 1900, AMERICA'S HARDEST-WORKING TRUCK



CONSTRUCTION POWER

WHERE YOU NEED IT...WHEN YOU NEED IT

Easy to install, move or expand...G-E LOAD-CENTER DISTRIBUTION SYSTEMS offer reliable, flexible power for large construction projects

Here's how General Electric unit substations, used so successfully in strip mining, can be applied to large, long-term construction jobs . . . at a profit. Their high salvage value, portability and ease of installation will appeal to farsighted contractors. Power costs are reduced, too, by locating the substations near their loads, thereby keeping voltage high and cable short and light. Other advantages:

SAFE: Metal-clad unit substations combine transformers and circuit-breakers in one factory-assembled package; breakers protect your equipment from overload, the metal enclosure protects personnel from injury.

EASY SERVICING: Maintenance personnel work *on the ground* safely, quickly; no poles to climb:

ECONOMICAL: Evaluating the good voltage regulation, short-circuit protection and high service continuity provided, G-E load-center distribution systems give you more for your power-equipment dollar.

HIGH SALVAGE VALUE: Because small, standard unit substations are easy to install, dismantle and move, they may be moved to your later jobs at a substantial saving in man-hours.

These are only a few of the advantages of modern load-center distribution systems for construction work. Let your G-E representative show you the entire picture; he will study your power requirements and help you select the best system for your particular needs. *Apparatus Department, General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

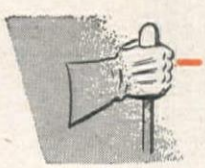
655-61

ELECTRIFIED CONSTRUCTION

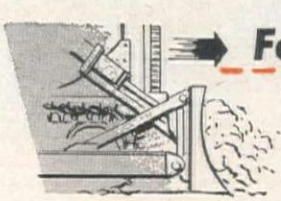
BETTER PRODUCT ★ LOWER COST

POWER and SPEED

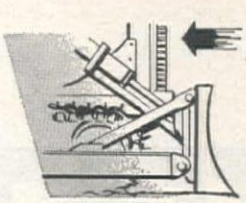
with the AC HD-19 and BAKER Bulldozer



Less Shifting The torque converter does the shifting *automatically* — changes tractor speed in relation to load and grade. Forward and reverse levers are all operator is concerned with — he need not even select the desired travel gear as the torque converter sets the pace. That's why there's no other bulldozer on tracks or rubber that will outproduce the HD-19 and Baker 'Dozer.



Faster Forward The load governs travel speed, not the operator s judgment. When bulldozer is in forward range, travel speed is as high as load and grade will permit. Results in faster dozing cycles, more yardage per shift and greater operator efficiency.



Faster Reverse High reverse is almost instantaneous, for under "no load", tractor zooms into high at 7 miles per hour to return for another pass. Two step shifting not required — merely shift unit into reverse and the torque converter does the rest.

BAKER

SPRINGFIELD • ILLINOIS

Noble's automatic cement control, hairline accuracy, ease of assembly and engineering help will make a hit with you too.

"BILL" WILLIAMS BOUGHT BATCHING "KNOW HOW"

EUGENE SAND & GRAVEL CO.
EUGENE, OREGON

Noble Co. June 5, 1948
1860 7th Street
Oakland 7, California

Gentlemen:

Now that we are operating our new Noble batching plant to capacity we feel that we should tell you how well satisfied we are with it.

We believe construction of commercial buildings and new homes is at its peak here now and we are, due to our new modern plant, better able to meet the demands of our customers. The entire plant works perfectly, enabling us to batch out 60 cu. yards of concrete per hour. We are especially pleased with the automatic cement control.

Periodically we check our batch and have always found each cu. yd. to bulk within close limits to twenty-seven cu. ft. In the past six months we have not had one complaint about our measurement. We feel this speaks well for the accuracy of the mechanics of the plant.

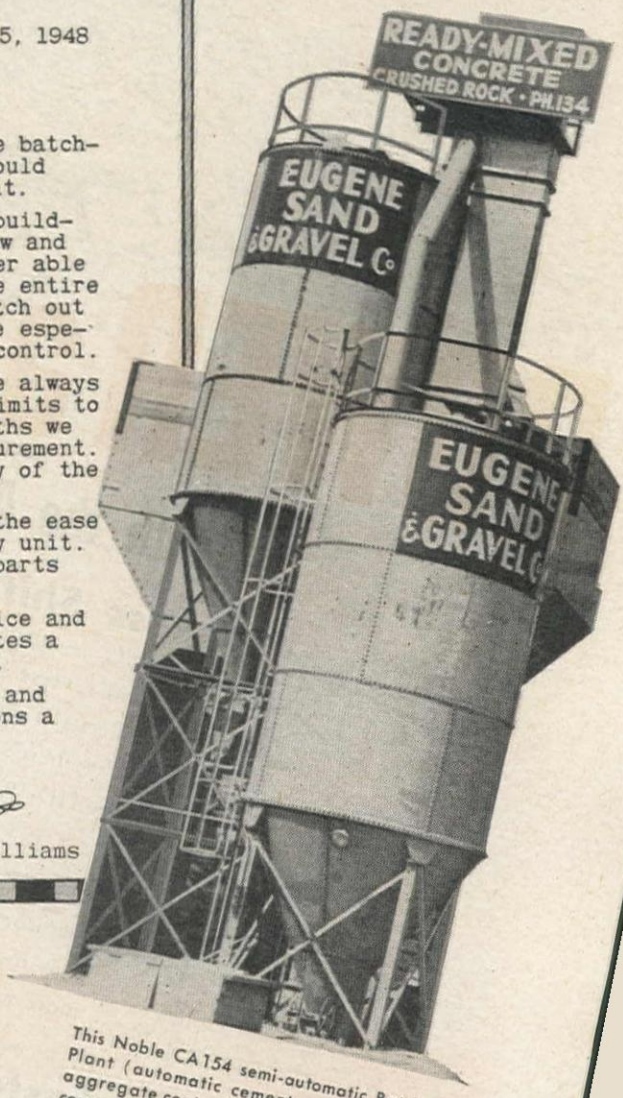
One of the things that pleased us was the ease with which we were able to assemble every unit. No trouble was experienced, in fact all parts were an exact and accurate fit.

We are certainly glad we took your advice and added the extra storage silo, it eliminates a lot of worry about running out of cement.

Thanking you for your many suggestions and recommendations in making our installations a success we are

Yours sincerely,

L. H. (Bill) Williams



This Noble CA 154 semi-automatic Batching Plant (automatic cement control, manual aggregate control) has two 2000 cu. ft. cement silos, and both can be filled from either a truck hopper or car hopper.

Our engineering department will be glad to help you, also, with suggestions and recommendations. No obligation. Write, wire or phone.

DESIGNERS AND BUILDERS OF
CEMENT AND AGGREGATE BATCHING PLANTS • BULK CEMENT PLANTS • CONVEYORS • ELEVATORS • HEAD FRAMES • SWIVEL DISTRIBUTORS AND CHUTES • GATHERING HOPPERS • CALIBRATED WATER TANKS • WATER SCALES • SLIDE GATES • CLAMSHELL GATES • AGGREGATE BINS AND CEMENT SILOS

NOBLE CO.

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

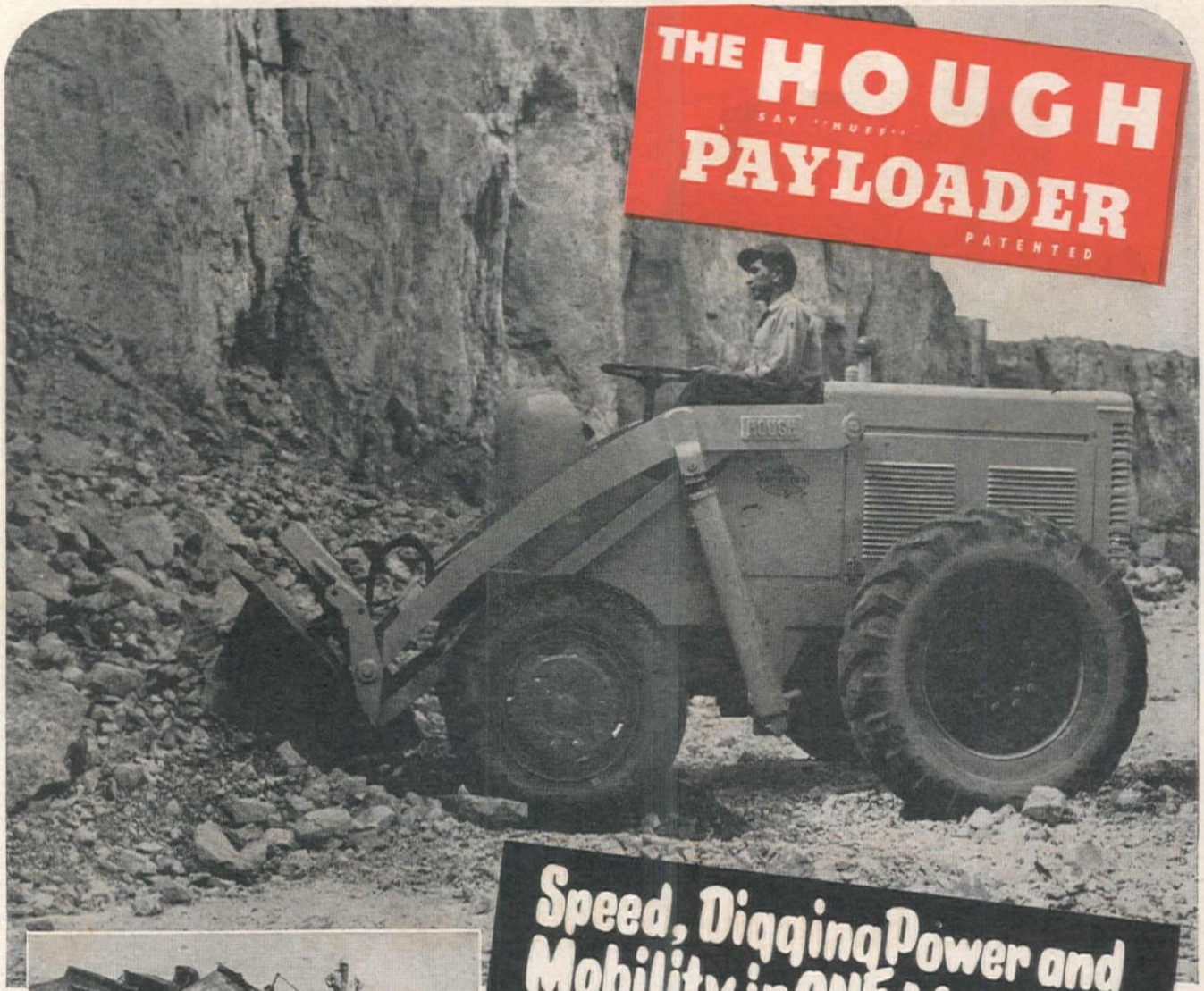
YOUR CHOICE OF MANUAL, SEMI-AUTOMATIC OR FULLY AUTOMATIC PROPORTIONING

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

THE HOUGH PAYLOADER

SAY "HUFF"

PATENTED



Speed, Digging Power and Mobility in ONE Machine!

REAL DIGGING POWER — MODEL HL LOADING BLASTED ROCK.

READILY CONVERTIBLE FOR BULLDOZER SERVICE.

The Hough Payloader is a compact package of speed, power and ability to do a big job even in cramped quarters. Designed and built as a complete unit from the ground up — close-coupled, ruggedly constructed and built low. Large tires give tremendous tractive ability and digging power to excavate at a profit. It will also load and handle a wider variety of materials faster, cheaper and better than ever before possible in a machine of this type. Several travel and working speeds both forward and reverse, make it quick to the job, fast on the job. Complete operator visibility and comfort, fingertip hydraulic control and easy steering promotes top speed output the full shift.

There's the big Model HL (1 yard bucket), Model HF (¾ yard) and Model HA (10½ cu. ft.) to choose from. Quickly attached Bulldozer Blade and Crane Hook also available. See your Hough dealer today or write for complete information.

THE FRANK G. HOUGH CO.

707 SUNNYSIDE AVE. LIBERTYVILLE, ILLINOIS

TRACTOR SHOVELS SINCE 1920

WRAP UP YOUR MAINTENANCE PROBLEMS WITH THIS EQUIPMENT PACKAGE . . .

Allis-Chalmers HD-5 Tractor . with Tracto-Shovel* and Model A-D Motor Grader

*All-'Round, All-Year Machine — Besides 1 cu. yd. standard bucket, interchangeable attachments for Tracto-Shovel include ¾ cu. yd. narrow bucket and bucket teeth, 2 cu. yd. snow loader bucket, bulldozer blade and V-type snowplow. Outfit may be used with Gar Wood 2-wheel scraper, too, using shovel hydraulic system.

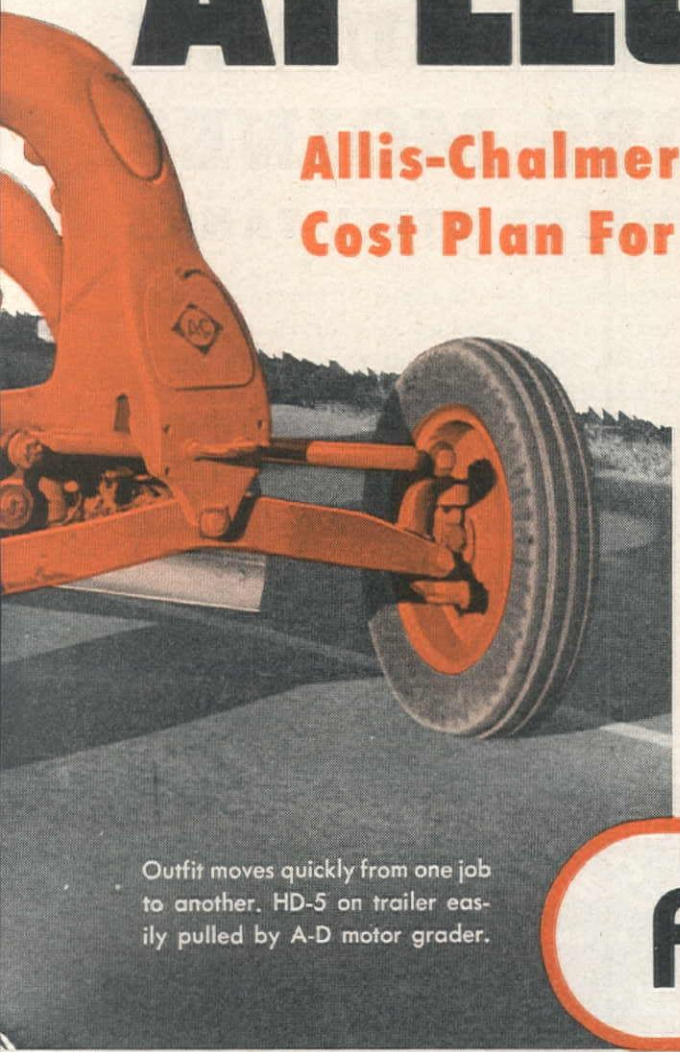
SOME OF THE JOBS YOU CAN DO WITH THIS COMBINATION—*working together or separately:*

- Clean and shape-up ditches
- Cut and smooth backslopes
- Handle regular maintenance
- Widen and reshape roads
- Make driveways
- Build berms
- Scarify roads
- Backfill pipe, culverts, bridges
- Take out cuts
- Make fills
- Do all bulldozing
- Plow, move and load snow
- Skid trees
- Load rocks and stumps
- Dig and load dirt or other material
- Mix black-top
- Do crane work
- Handle hauling or pulling

A TYPICAL JOB TO BE DONE — straightening out road, cutting down hill and making ditches for proper drainage.

ROAD PROTECTION AT LESS COST

Allis-Chalmers Brings You A New, Low Cost Plan For Road And Street Upkeep



Outfit moves quickly from one job to another. HD-5 on trailer easily pulled by A-D motor grader.

No need to make a major investment in equipment to handle various jobs. Any maintenance work . . . and much of your construction . . . is quickly, efficiently done with this versatile combination — AT BIG SAVINGS. There is only a nominal original cost with correspondingly low upkeep . . . but the work accomplished is considerably widened. Take a look at the list of jobs you can do — it's endless! Whatever your maintenance problem, this equipment package will wrap it up at the lowest cost.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

JOB NEARING COMPLETION — all grading handled with HD-5 and Tracto-Shovel and the Model A-D Motor Grader. Surplus dirt loaded into trucks with shovel . . . shaping and finishing done with grader.

CLEANING-UP DITCHES—here the road surface is kept intact, only ditches and slopes made. Accomplished by pulling up dirt with A-D motor grader and loading surplus into trucks with HD-5 and shovel.

CUTTING THE BACKSLOPES — sloping, ditching, rough and fine grading . . . all these jobs are quickly, accurately handled with the greater earth-moving capacity of the Model A-D motor grader. Its extra traction and power make it the ideal machine, too, for scarifying and plowing snow.

200,000-gal. tank in two 100,000-gal. sections, with 200,000-gal. standpipe at base, for fire protection at large assembly plant.

FOR EVERY

Industrial

WATER STORAGE NEED—

PITTSBURGH • DES MOINES

ELEVATED STEEL TANKS

Your requirements for standard or special Elevated Steel Tanks can be satisfied in every particular by Pittsburgh-Des Moines! Let our Engineering Department work with you in determining the design best suited to your needs in type, capacity, and performance—for the storage of water or other liquids—for fire protection—or for treatment, mixing or settling tanks in any manufacturing process. Write, phone or wire for a prompt consultation.

PITTSBURGH · DES MOINES STEEL CO.

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NEW YORK . . . . . Room 919, 270 Broadway
CHICAGO . . . . 1224 First National Bank Building
SEATTLE . . . . . 528 First Avenue, South
DES MOINES . . . . . 921 Tuttle Street
DALLAS . . . . . 1225 Praetorian Building

200,000-gal. Double Ellipsoidal Tank on 125 ft. tower. Columbia Steel Co.

Hemispherical bottom 100,000-gal. tank on 116 ft. tower. Crosley Radio Corporation.

Hemi-ellipsoidal bottom 100,000-gal. tank on 44 ft. tower. El Paso Natural Gas Co.

Double ellipsoidal 150,000-gal. tank on 100 ft. tower. Walt Disney Studios.

HITTING A NEW HIGH...

in low loading Cost!

A bucket close to the tractor when digging, but with high forward reach for loading.

Only one lever hydraulically controls and operates the bucket!

the OLIVER "70"

Industrial Wheel Tractor with Ware Front End Loader

The Oliver "70", a streamlined industrial tractor with modern engineering throughout, together with the Ware Front End Loader attachment, is fast becoming a familiar sight around construction jobs that *move.* It's a tough unit that bites into the high cost of such jobs as hauling, loading, ditching, filling in, or removing snow . . . plus performing a score of other tasks.

Then, too, the Oliver Industrial "70" with the Ware Loader is compact . . . well balanced . . . low to the ground so that it can operate in tight quarters. It makes handling gravel, cinders, loam or other loose material a pushover. Here's a unit that will load up to 8½ feet . . . dump at any height. Substitute a blade for the bucket and you have one of the huskiest, easiest-to-get-around backfillers you've ever seen in operation.

You "go longer" per gallon of fuel because the "70" with the Ware Loader is equipped with the 6-cylinder "Fuel Miser" engine.

Drop in at your Oliver Industrial Distributor. Learn firsthand about the many new engineering features that will help you *hit a new high in lower loading costs!*

Loaded . . . bucket up . . . you can move a full ton . . . accomplish more . . . faster!

THE OLIVER CORPORATION

The OLIVER Corporation

INDUSTRIAL DIVISION: 19300 EUCLID AVENUE, CLEVELAND 17, OHIO

State of Arizona: Guerin Implement Co., 1401 S. Central St., Phoenix. *State of California:* Gustafson Tractor Co., Eureka; Mechanical Farm Equipment Dist., Inc., San Jose; Ashton Implement Co., Salinas; Comber & Mindach, Modesto; Tractor Service Company, Inc., 820 Broadway, Chico; Tractor & Equipment Co., San Leandro; Blood Equipment Co., Sacramento; W. J. Yandle Co., Santa Rosa; Hamsher Tractor Co., Stockton; Ranch Equipment Co., Ventura; Jim Ingle Co., Fresno and Tulare; Oliver Implement Co., Bakersfield; Turner & Chapin, Whittier; Farmers Tractor & Implement Supply Co., Colton. *State of Washington:* Inland Diesel & Machinery Co., Spokane; Pacific Hoist & Derrick Co., Seattle; Melcher-Ray Machinery Co., 202 East Alder St., Walla Walla; 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 Co., Boise. *State of Montana:* Western Construction Equipment Co., Billings and Missoula. *State of Nevada:* B & M Tractor & Equipment Corp., 1420 S. Virginia St., Reno. *British Columbia:* Pacific Tractor & Equipment, Ltd., 505 Railway St., Vancouver.

Now Available

FREE

NEW

HC-70 TRUCK-MOUNTED SHOVEL-CRANE DATA

•

On Location Photographs
Specifications - Clearances
Capacities and Working Ranges

•

Send for Book No. 2335

SAFETY-TYPE INDEPENDENT RAPID BOOM HOIST

Standard equipment on the HC-70, operating independently of other functions of the machine or simultaneously with them, the rapid boom hoist and powerful lowering power transmission ge maximum speed to tha added safety in rapid and pawl, controlled fr when it is not being ra

Completely illustrated with on the job photographs of the Link-Belt Speeder HC-70 Truck Mounted Shovel-Crane—see how this multi-purpose Shovel-Crane is cutting costs for contractors and how they put this equipment to work on dozens of different jobs. The new bulletin is loaded with interesting information for you.

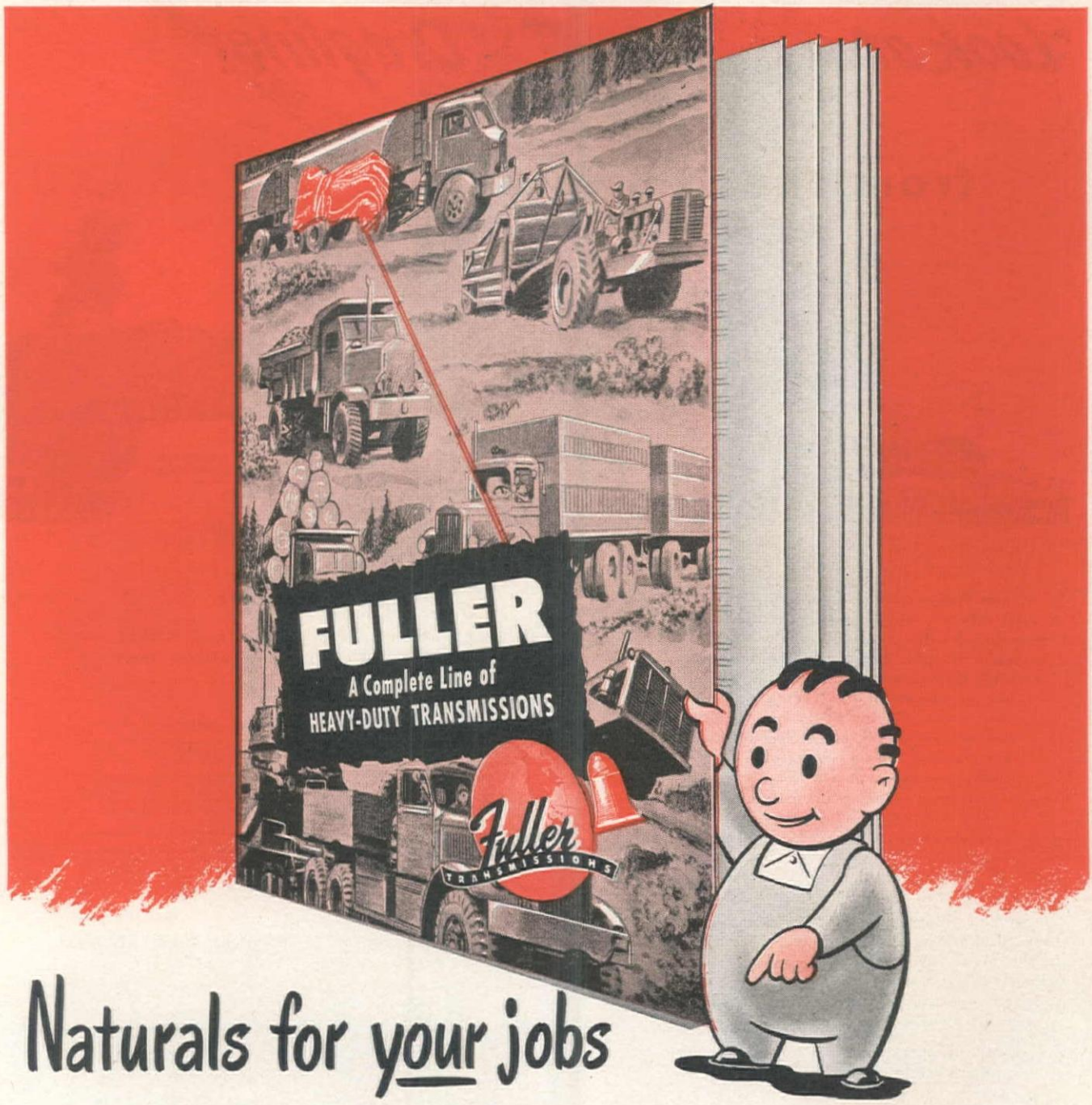
See your local Link-Belt Speeder distributor today or write for this valuable informative catalog.

11.273

LINK-BELT SPEEDER

LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA

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



Naturals for your jobs

Fuller's new, 12-page catalog describes and illustrates the complete line of Fuller Transmissions and Auxiliaries . . . units that are *naturals* for every heavy-duty assignment. Ranging in size from Model 2A65—a two-speed auxiliary—to Model 10A1120—a 10-speed unit-mounted transmission for the biggest trucks and biggest engines—the Fuller line meets every transmission requirement . . . covers a wide range of operations with a great degree of flexibility.

Write for your copy of this new catalog and fill out the simple questionnaire enclosed. Fuller engineers will recommend the transmission that's a natural for your job.

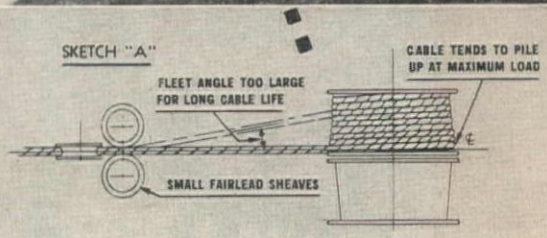
FULLER MANUFACTURING COMPANY, TRANSMISSION DIVISION
KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wisconsin

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

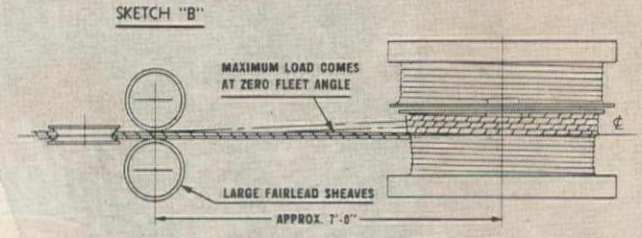
Fuller
TRANSMISSIONS

Look at a LIMA Dragline from these angles



1. Proper fleet angle is an important factor in cable life: the smaller the angle, the less the wear on cable by flanges of the sheave. Sketch "A" at right, shows a common method of cable reeving where large fleet angle and piling at maximum load cause excessive cable wear. Sketch "B" shows the LIMA method, achieving small fleet-angle—with *zero angle at maximum load,* by proper placement of drum with relation to fairlead and large diameter drums with short traverse. Cable wear is further protected by large, deep throated sheaves and grooved drums.

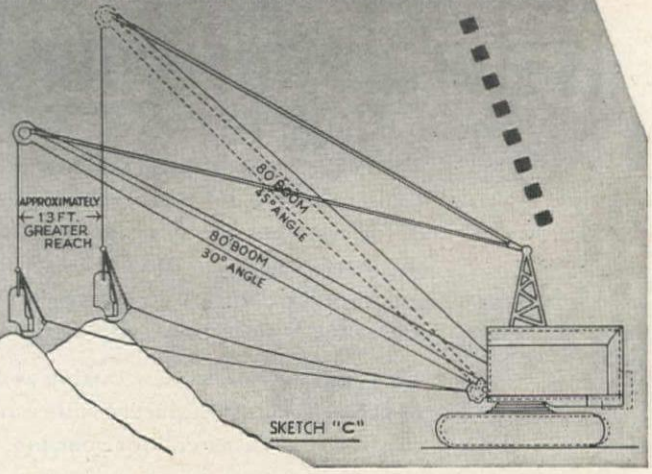
1. SMALL FLEET ANGLE OF THE FAIRLEAD CABLE MEANS LONGER LIFE AND LESS DOWN TIME



2. Sketch "C" illustrates how a well balanced LIMA dragline with 80 foot boom, working at 30° angle, achieves 13 feet greater reach than a light weight machine with same length boom, but which cannot go lower than 45° without tipping.

LIMA draglines have low center of gravity, proper weight distribution and long wide crawlers—all contributing to lower possible work angle of boom and greater working ranges.

2. LOW WORK ANGLE OF THE BOOM MEANS GREATER WORKING RANGE AND INCREASED OUTPUT



LIMA draglines are designed and built for dragline work. Every part is engineered for greatest output with minimum maintenance. Sizes and capacities for practically every requirement. Get all the facts before you buy your next dragline . . . LIMA also makes power shovels from ¾ to 6 yards and cranes from 13 to 100 tons.

Lima Shovel and Crane Division

LIMA, OHIO

LIMA HAMILTON CORPORATION

OTHER DIVISIONS: *Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.*

Our Seattle Office: 1932 First Avenue South, Seattle 4, Washington. Our San Francisco Office: 1315 Howard Street, San Francisco 3, California

Sales Agents: Feenaughty Machinery Company, 112 S.E. Belmont Street, Portland 14, Oregon; 600 Front Street, Boise, Idaho; Smith Booth Usher Company, 2001 Santa Fe Avenue, Los Angeles 54, California; Held-McCoy Machinery Company, 3201 Brighton Boulevard, Denver 5, Colorado; Smith Booth Usher Company, 1756 Grand Avenue, Phoenix, Arizona; Contractors' Equipment & Supply Company, Springer Building, Albuquerque, New Mexico; Modern Machinery Company, Inc., 4412 Trent Avenue, Spokane 2, Washington; Jameson Engineering Sales, Fairbanks, Alaska; Foulger Equipment Company, Inc., 1361 South Second West, Salt Lake City 8, Utah; Thompson-Sage, Incorporated, 400 South Wilson Way, Stockton, Calif.

Why is it?

JUST *why* is it that, year after year, far more Fruehauf Trailers are bought than any other make?

This is a question best answered, of course, by our customers—and we sincerely believe they'd say something like this:

"'Buying a Trailer is like buying a piece of production machinery. The one that delivers the most work at the lowest cost is naturally the best investment.

"Initial investment is a factor—but that is only a fraction of the total cost for a unit which is expected to give years of service.

"It is much more important to us to have equipment which will give *uninterrupted* service and *longer* service than it is to 'save' money in first cost.

"Fruehaufs do that kind of a job—that's why they are cheaper to operate—that's why we continue to buy them."

The Fruehauf policy is a simple one: spare no effort or expense to engineer the best—be satisfied with nothing but the finest materials and workmanship—maintain a liberal, "The Customer is Boss" attitude toward those who buy our product—and provide complete, convenient service facilities across the nation.

This policy brought us to a position of leadership years ago—and it has enabled us to improve that position year after year.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER COMPANY

Western Manufacturing Plant — Los Angeles

SALES AND SERVICE—LOS ANGELES • SAN FRANCISCO • SACRAMENTO
PORTLAND • SEATTLE • FRESNO • SAN DIEGO • PHOENIX
SALT LAKE CITY • EL PASO • SPOKANE • BILLINGS • ALBUQUERQUE
DENVER

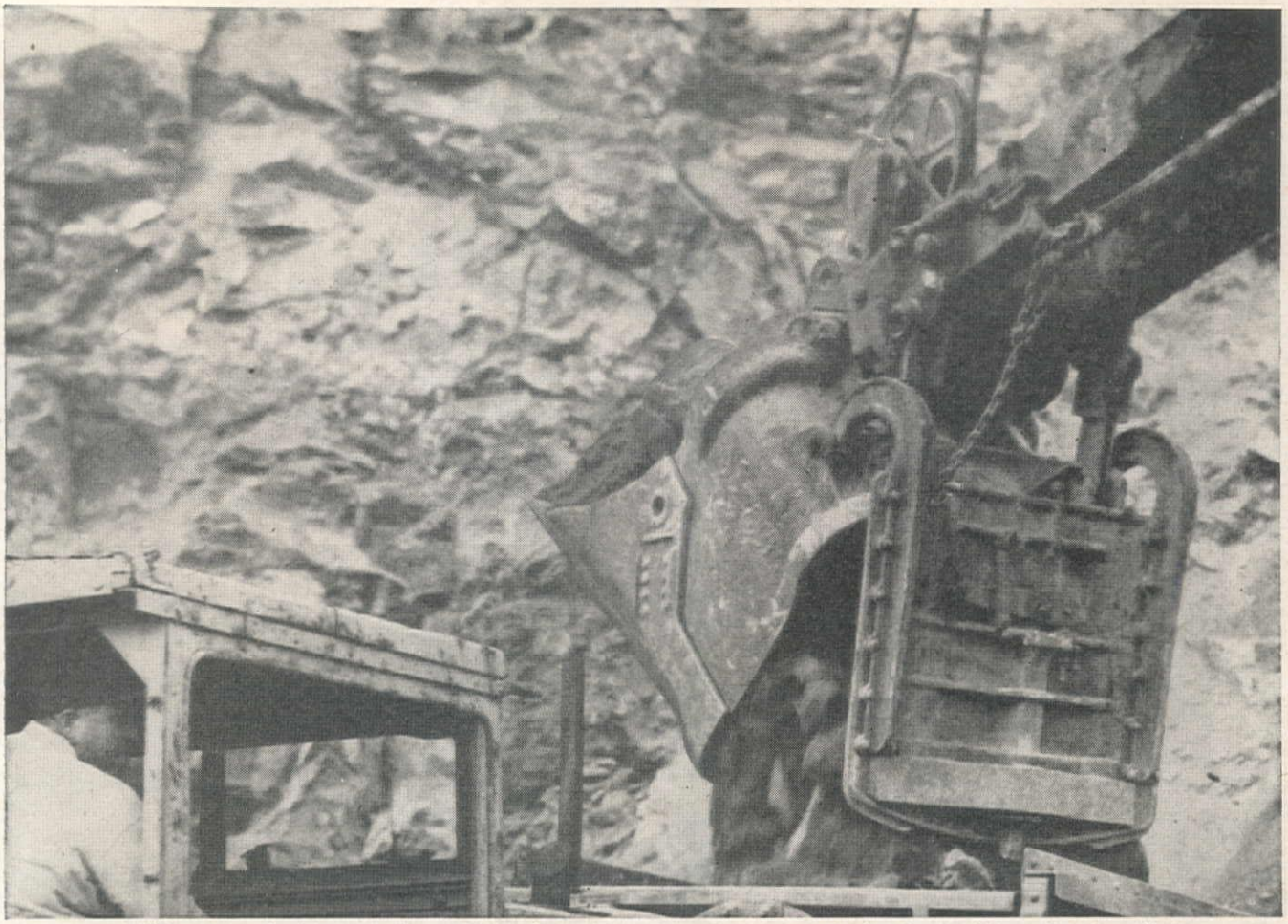
EMERGENCY! In any emergency, the Fruehauf owner is never far from a *Factory Branch* service station. 79 of them are scattered throughout the United States and Canada, each ready and fully equipped to get the Trailer rolling—and earning—again. Hours saved here are dollars saved—and no other Trailer manufacturer includes this Factory Branch "insurance" with his product.

Fruehauf TRAILERS

"ENGINEERED TRANSPORTATION"

PLAIN HORSE SENSE
YOU CAN PULL FAR MORE THAN YOU CAN CARRY!

Hear Harrison Wood, Interpreter of World Events, Every Sunday, 12:00 Noon, Pacific Time, over ABC. Consult Your Local Paper!



ESCO 2½ yard All-Cast Dipper bucket on Northwest 80 shovel, working on irrigation project at Coulee City, Washington. T. E. Connolly is contractor.

HOW TOUGH is your tough job?

BOULDERS, ROCK AND GUMBO do not add up to a digging headache when you have an *ESCO* All-Cast dipper bucket on the job. This rugged cast manganese bucket is made to handle the toughest jobs without trouble, maintenance or "down" time.

LASTS LONGER ON THE JOB

The *ESCO* All-Cast dipper is built of manganese steel, the shock resisting steel that surface hardens in use, reduces friction, gets tougher the more it works.

DIGS FASTER

Bigger payloads result from elimination of needless weight. Due to hollow back-beam construction which is both lighter and stronger, *ESCO* buckets are lighter in weight than comparable dippers of other makes. Parts made of manganese steel need not be cast excessively heavy to allow for wear.

More passes per hour result from the efficient design of *ESCO* dippers. Long, clean cutting front with integrally cast tooth holders reduces resistance and increases capacity. Flaring end teeth give full bite. Tapered box prevents wedging and clogging of material, permits quick, complete discharge.

STANDARD SIZES FROM 3/8 TO 5 YARDS

ESCO also makes the lighter weight Cast-Welded dipper for general purpose work, and dragline buckets of four types—medium, stripping, standard and heavy duty.

For complete information about these buckets, see your nearest *ESCO* representative, or fill in and mail the coupon below. Electric Steel Foundry, 2163 N.W. 25th Avenue, Portland 10, Oregon and 722 Porter Street, Danville, Ill. Offices in Eugene, Oregon; Chicago; Honolulu; Houston; Los Angeles; New York; San Francisco; Seattle; Spokane. In Canada *ESCO* Limited, Vancouver, B.C.

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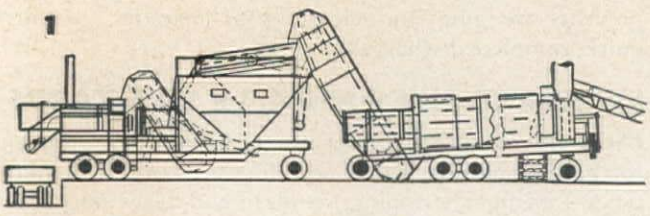
DIPPER AND DRAGLINE BUCKETS

Continuflo Asphalt Plant

WITH ONLY 2 MAIN UNITS

1



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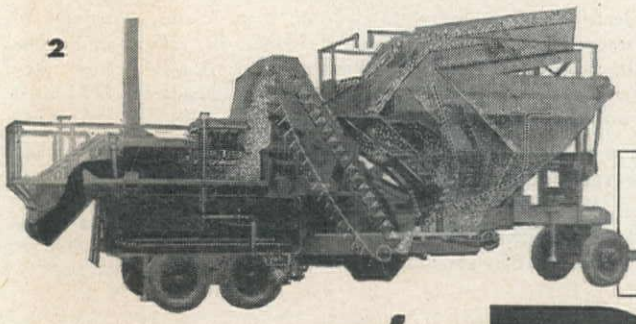

THE NEW *Continuflo* Central Mix Asphalt Plant brings you the most portable and compact continuous process asphalt plant ever built. It is recognized as one of the great developments in asphalt equipment.

Consisting of only 2 main units—the mixer and the drier—*Continuflo* is easier to move . . . easier to locate on the job.

In *Continuflo*, all mixing operations are fully automatic. The asphalt metering pump is interlocked with the aggregate feeder to provide correct proportioning of bitumen and aggregate. There is no variation in the finished product. The human element is out—the correct mix is assured!

Write for complete information about *Continuflo*—the year's outstanding development in asphalt equipment.

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1 *IN A STEADY, CONTINUOUS FLOW* aggregate passes from the feeder conveyor through the drier, hot elevator and gradation unit to the pugmill.

2 *A COMPACT PLANT*—Gradation and Mixing Unit combines on one truck the gradation screen, proportioning unit, transfer elevator and mixer.

BUY BOTH!

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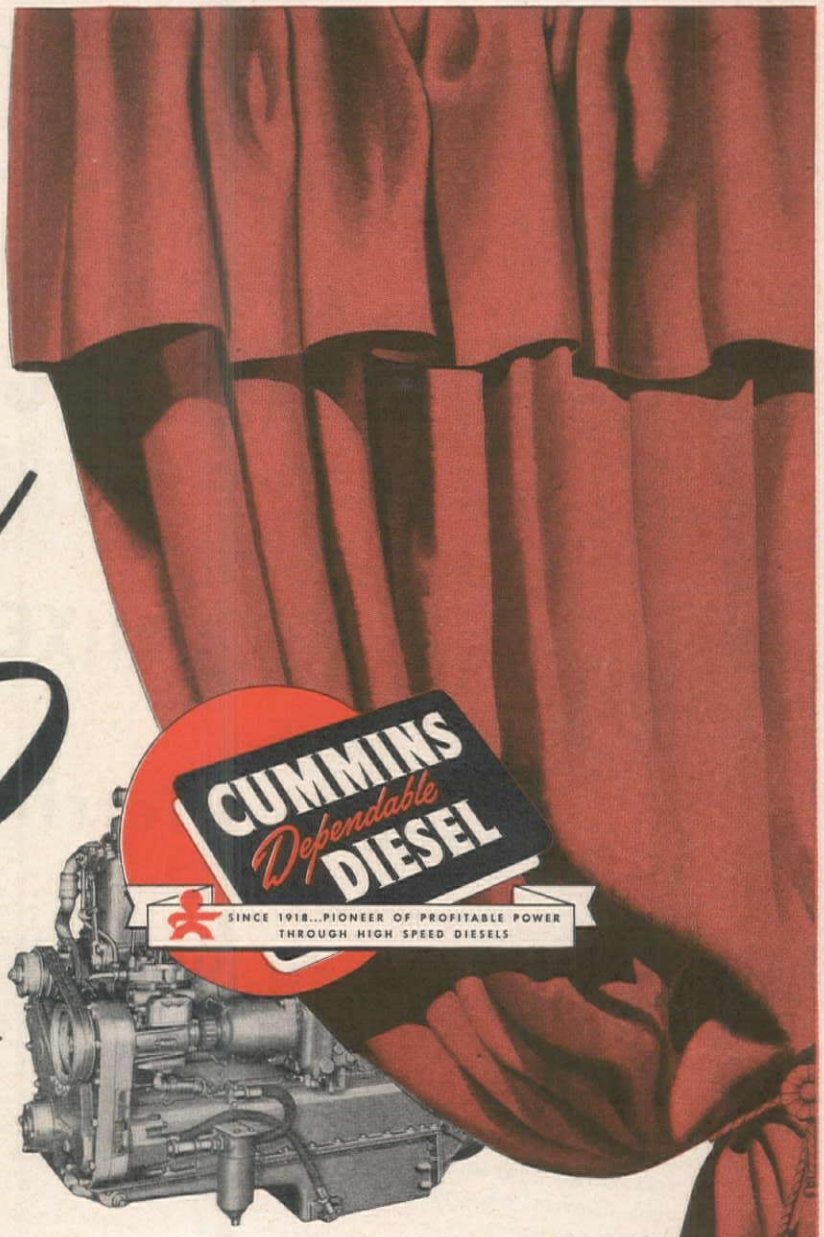
ANNOUNCING

the NEW HR



165 hp at 1800 rpm

Similar in design to the famous "Model H" . . . for 15 years the standard of comparison for high-speed diesel engines . . . the new six-cylinder Cummins HR-600 Engine offers you even more power per engine pound.

Your Cummins Dealer or the manufacturer of your earth-moving and material-handling equipment can show you this newest Cummins Diesel. Your Cummins Dealer can also *convert* your present "Model H" engines. See him.

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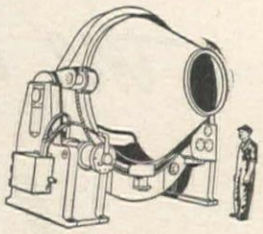
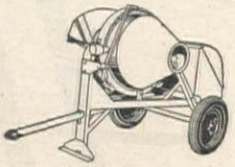
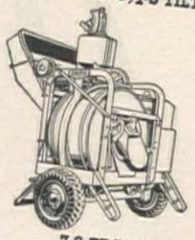


SMITH 112-S TILTER



SMITH 3½-S TILTER



7-S TRAIL-SMITH

SMITH 11-S NON-TILT

SMITH 28-S NON-TILT

Smith continues to be the *first choice* of experienced contractors and engineers. When faced with the problem of producing mass concrete on scheduled time, they generally specify Smith Mixers or Smith-Mobile Truck Mixers. These dependable machines are being built today *better than ever*, for big yardage and long life.

CONCRETE MIXERS

Famous for Performance on the World's Greatest Projects

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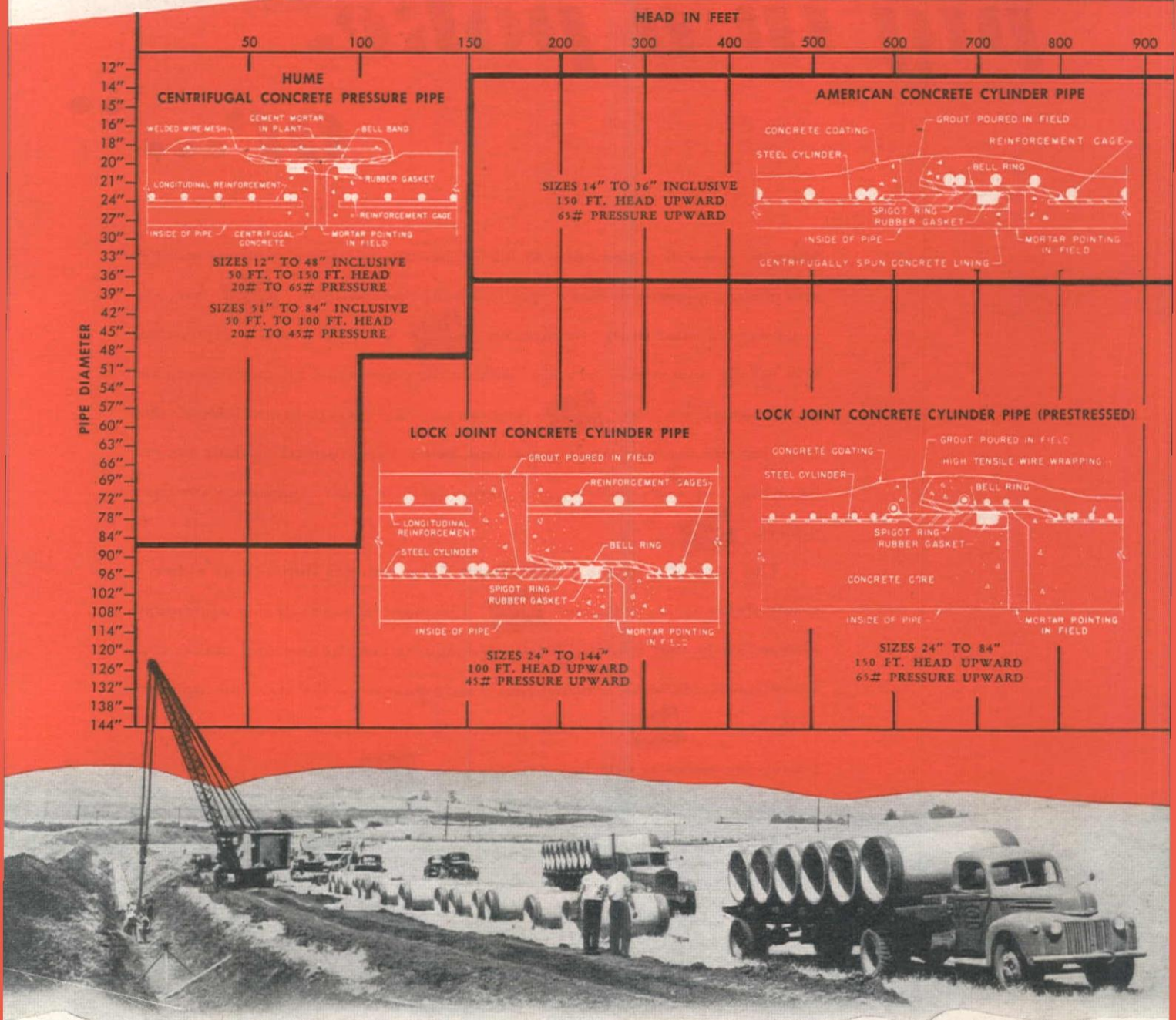
In Western States

4 outstanding types of reinforced concrete pressure pipe cover range of water supply line construction



In any permanent main water supply line project, savings in the cost of delivered water originate with the selection of superior pipeline products designed and manufactured to meet specific job requirements.

These four general classes of reinforced concrete pressure pipe manufactured by American are outstanding for main water supply line construction. Allowing for overlapping from one field to another because of special conditions related to specific installations, or because of the economical range of any of the four types of pipe, the chart shows the general field for each type consistent with the factors of size and pressure.

All are equally effective in their respective fields. Each incorporates the physical properties of steel with the structural properties, protection, and permanency of concrete. Each assures maximum economy in initial cost, ease of installation, sustained capacity, and trouble free service.

Consider these advantages in your project, and write for any additional information desired.

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

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"pig in a poke, or..."

Many of you will remember way back when the buying of concrete mixing and placing equipment was a "pig in a poke" proposition. No two units were similar in size or capacity. It was a virtually impossible task for the owner to accurately estimate the capacity of his machines or to bid accurately on jobs. And not only did this confusion hamper the user, but the manufacturers were also badly handicapped in their manufacturing and sales policies and particularly in their relations with customers.

The founding of the Truck Mixer Manufacturers Bureau was a direct result of this early confusion. The manufacturers of this equipment realized early that it would be of maximum benefit to user and maker if a set of standards were adopted that would guarantee the size and capacity of the mixer. It would protect the user against "outlaw sizes" . . . protect the maker against buyer resentment.

Today, a truck mixer must conform to these standards and as evidence of successful conformance, a Bureau rating plate is prominently displayed on the truck mixer. Look for it! It is your guarantee of accuracy!

Truck Mixer Manufacturers Bureau

Affiliated with The National Ready Mixed Concrete Association

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

NOW! A GREASE THAT REALLY STICKS TO TRACK ROLLERS!

1. Track rollers take a lot of punishment when they churn through sand, dust and dirt and tear through underbrush. Rollers are often submerged for hours when your tractor wallows through mud and water.

2. For this reason your track roller bearings and bushings need an exceptional amount of lubricant protection. The grease you use is their *only* safeguard against wear from the grinding action of grit, mud and dust.

3. In the face of this problem, Union Oil research scientists developed RED LINE Tractor Lubricant—a tenacious grease that *sticks tight* to track rollers no matter how severe your operating conditions may be!

4. RED LINE Tractor Lubricant won't wash away or emulsify. It's an "all-weather" lubricant. Even in extreme hot weather RED LINE stays put. And it remains pumpable at below-freezing temperatures.

For full information on Red Line Tractor Lubricant phone your local Union Oil Representative or write Sales Department, Union Oil Company, Los Angeles 14, Calif.

RED LINE TRACTOR LUBRICANT

76

UNION OIL COMPANY

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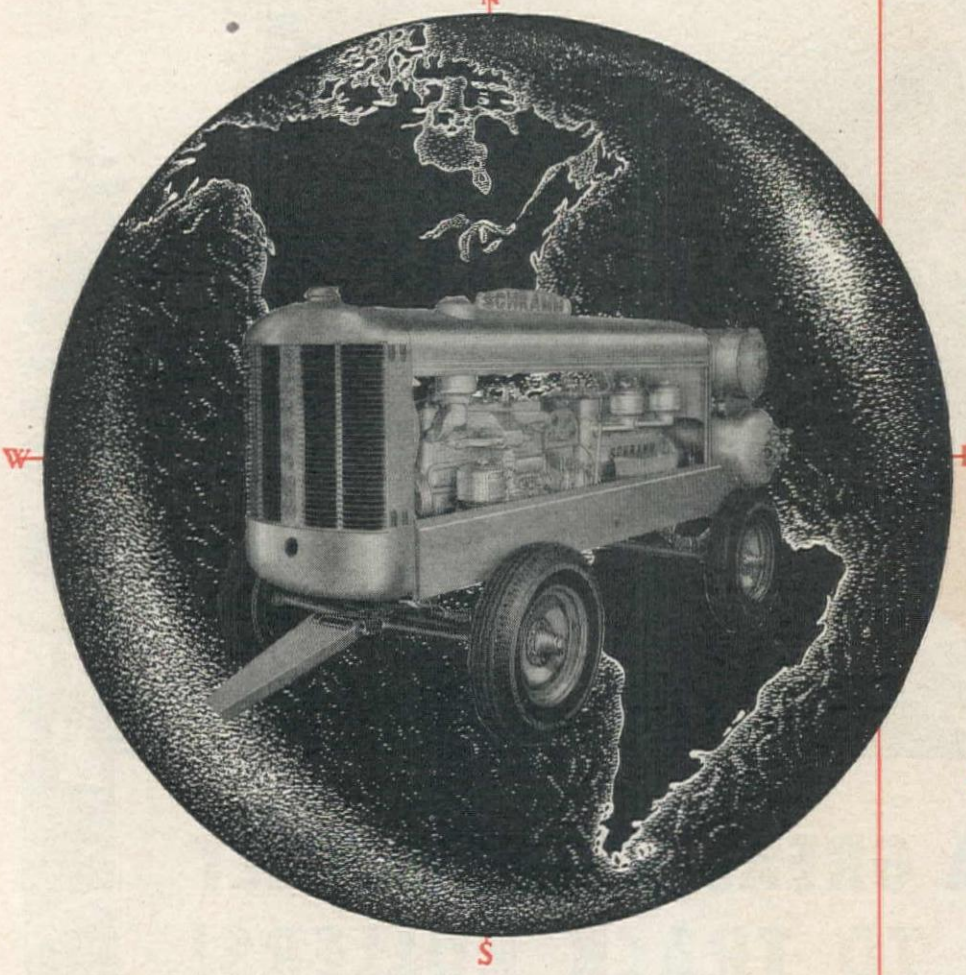
NORTH • EAST • SOUTH • WEST • • IT'S SCHRAMM !

the Air Compressor You Like to Operate



Compact

. . . no waste space, compressor and engine coupled into a single, rigid, permanently aligned unit . . . balanced to reduce wear and increase efficiency!

Lightweight

. . . Portables designed for quick handling to and from the job, stationary units vibrationless.

Easy to start

. . . Just push the built-in electric starter, and the Compressor starts . . . to give you a continuous amount of air.

For these reasons — compactness, lightweight, ease of starting — users of Schramm Air Compressors have said they *like* to operate them.

Other features, however, enter into the usefulness of Schramm. There's 100% water cooled feature, allowing you to operate Schramm perfectly both summer and winter; mechanical intake valve, forced feed lubrication, to mention a few.

Schramm features make them the Air Compressors ideal for your many jobs . . . and the reason they're specified North, East, South and West. Write today for full data.

TOOLS *for the* JOB

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

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

Write for bulletins and prices.

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

THE NEW Thor 70-POUND BREAKER

COMPANION TO THOR'S GREAT "25"

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

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

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

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

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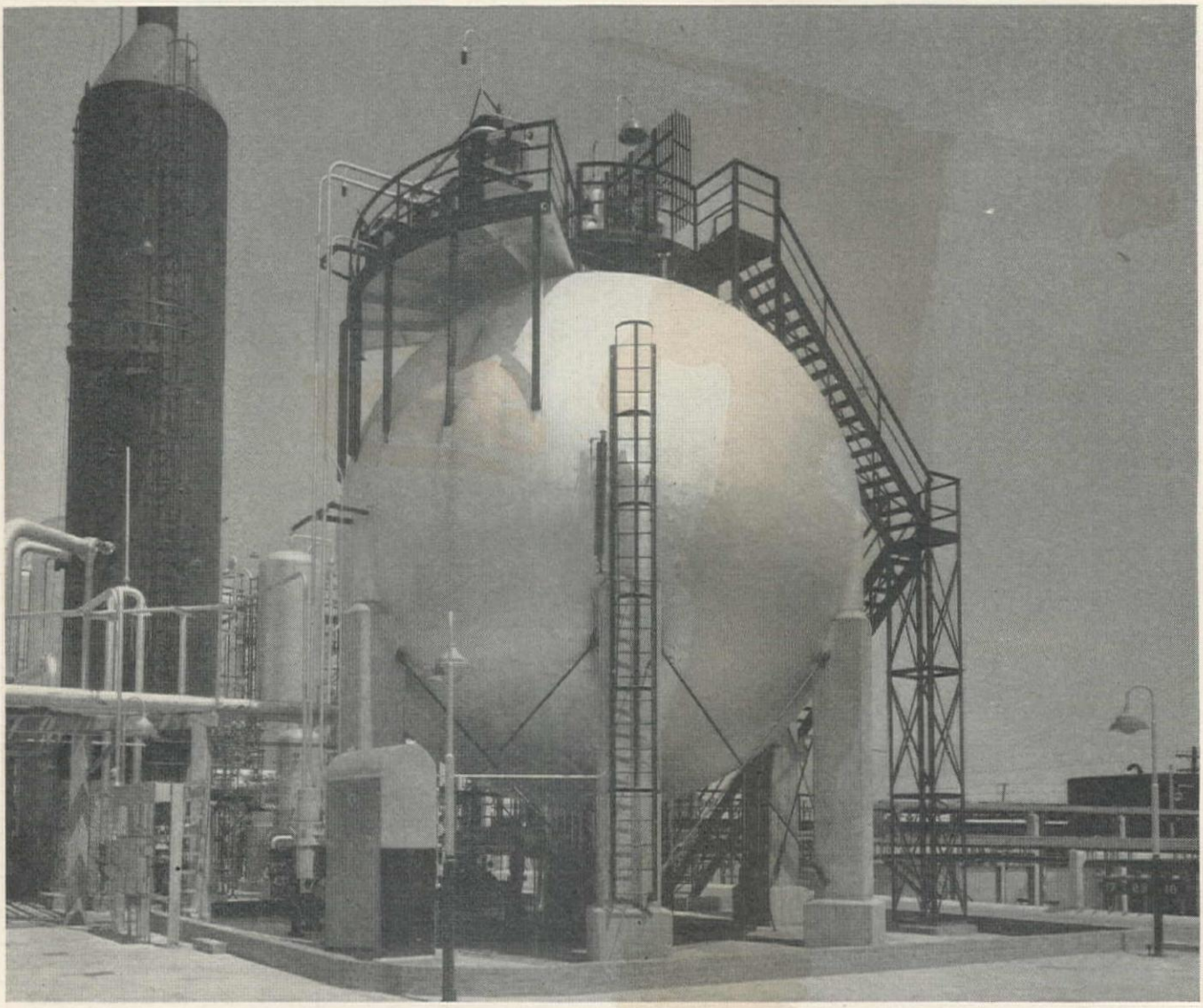
Thor PORTABLE POWER TOOLS



Outside it's a Hortonsphere, but inside . . .

THE FAMILIAR SPHERICAL SHAPE of the tank shown above identifies it as a Hortonsphere —the pressure storage unit well known in the petroleum industry as a container for highly volatile petroleum products.

But here it's fitted for another job—desalting crude oil at the Avon refinery of the Tidewater Associated Oil Company. Special electrical desalting equipment (some of it is visible on top) has been installed in the sphere by the Petroleum Rectifying Company to remove the salt from crude oil before the refining process begins. Crude with a high salt content causes a serious reduction in the efficiency and output of refinery units and necessitates shorter runs.

The desalter shown above removes salt from an average of 30,000 bbls. of crude oil per day, the salt content of which is sometimes as high as 450 lbs. per thousand barrels.

The Hortonsphere is used in other industries, too, for the storage of such liquids and gases as anhydrous ammonia, hydrogen, and carbon monoxide, and at municipal sewage disposal plants to store sewage digester gas which is valuable as fuel. It is an example of the versatility of the welded steel structures which we design, fabricate, and erect to meet the special needs of many industries. When you need steel plate work of this kind, ask our nearest office for information or quotations.

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Chicago 4.....McCormick Building	Los Angeles 14.....1444 Wm. Fox Building	Seattle 1.....1355 Stuart Building
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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA. *In Canada*—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
October, 1948 Vol. 23, No. 10

Too Short a Base?

WE HAVE BEEN extremely gratified at the interest shown in the Rainfall Records article by Henry B. Lynch in our July issue and the Rainfall Forecasting article by Donald M. Baker in our August number. Taken together, the two comprise a highly significant investigation in the rainfall field.

In the course of his studies incident to writing the second article, Mr. Baker wrote this editor a long letter, which is abstracted on this editorial page because of the widespread importance of its subject matter:

"It seems to me that we are spending an awful lot of time and money on water supply studies extrapolating available streamflow records by developing the relationship between precipitation and run-off, and then constructing projects based upon the results of such studies when as a matter of fact the basic data, as far as precipitation records go, are not too reliable. Many of our old records have had the rain gauge moved all over.

"This, in itself, can be cured, but when we are developing these large water projects on the basis of utilizing 100 per cent of the average supply, I am wondering whether we should not apply a factor of safety until we know something more of these long-time up and down swings of precipitation, such as Lynch's records show.

"Take the Mono Lake records (WCN, July-Lynch) for example: here, there is a tremendously long upward swing indicating excess run-off and the swing has now started downward, and we may have a prolonged downward swing. What is going to happen to water supply on the Tuolumne River, including Hetch Hetchy and Dom Pedro and also on Los Angeles' Mono Lake diversions?

"Take Lynch's curve for Northwestern California. This probably would be representative of the Sacramento, the McCloud and the Pit. These are the sources of water to Shasta and are the mainstays of the P. G. & E. power system. The Feather River would also reflect this influence. Lynch talks about the serious dry period in Goose Lake in the early part of the last century.

"Now, we are building up an economy based upon relative short records of stream-flow and some of the longer records of precipitation in this area, figuring on utilizing the entire flow of the Sacramento and its tributaries. I am wondering whether we are too optimistic as to what would happen during a period when Goose Lake did not overflow for so long a time that the waters became highly saline. We have not had any period during the historic record when Owens-Mono, the Los Angeles Area, and the Colorado Basin were all low at the same time, but such a circumstance could occur.

"It is all right to talk about hold-over storage for three or four years, or possibly a little longer, but not for 30 or 40 years, if surface storage is to be used and as far as underground water storage goes, I don't think we know yet how to get vast quantities of water under ground, nor do I know of underground basins of adequate capacity."

This certainly is a field for research and study. *Western Construction News* welcomes Mr. Baker's comments and would appreciate other comments on the subject. Earlier civilizations have risen and then fallen because of dessication. Considering the hardship just one 50 or 60 per cent year caused California in 1948, the picture of what might happen if we had ten 70 per cent years is not pleasant. Our grandchildren may despise us for overplanning the utilization of our water resources.

One Hundred Charts

WE ARE PROUD to present in this issue of *Western Construction News* the one hundredth construction design chart prepared by Dean J. R. Griffith of the University of Portland. The series originally started in 1935, when the author was a professor of engineering at Oregon State College. It was interrupted for several years during the war, when Griffith served as a commander in the Navy Civil Engineer Corps. It was resumed in June, 1946, and has continued to date, and will extend for many more months.

Four times the charts have been compiled in book form, first a group of 12, then 48 were assembled, then 72, and now available is a book including all the first 100.

The charts are nomographic representations of problems encountered in the design and construction of engineering work. The design of concrete beams, columns, slabs, and other elements, concrete forms, various timber and steel structural problems, hydraulic factors, and other problems encountered in standard engineering practice have been covered by Prof. Griffith.

The editors congratulate Prof. Griffith, and with our readers, look forward to the second hundred in the series.

Vote Favors Reber Plan

THE COMMONWEALTH CLUB of California, perhaps the most outstanding group of citizens in the country meeting regularly through the years to discuss and study important public problems, recently submitted a letter ballot to its 7,000 members on their preference in the matter of a second crossing of San Francisco Bay. Over 1,000 who returned their ballots gave a convincing vote in favor of the Reber fill-type crossing.

The matter had been under study in the Highway and Transportation section of the Club for over a year, and the report of the section favored a parallel high bridge. At the time the section presented its report to the meeting of the whole club, this editor was given the opportunity to discuss, on a minority report basis, the Reber fill crossing, and it is with a real sense of satisfaction that he reads the report of the subsequent club-wide vote, in which the question was asked, "Do you favor a fill-type crossing?" to which 586 replied "yes," while only 453 gave negative answers.

There is no question, of course, that a second bridge would for at least a few years, take care of the jammed traffic on the existing structure. (Designed for 81,000 cars daily, the report of August, 1948, traffic shows an average of 75,336 per day, and a high day—Aug. 13—of 82,157.) It would be but a question of time, of course, until a third and a fourth and still other bridges would be required. The Reber fill, on the other hand, provides for an unlimited number of traffic lanes.

But far overshadowing the matter of adequacy of provision for traffic, is the host of concurrent advantages existent in the Reber Plan which cannot possibly be produced by a bridge or bridges. Vastly more important even than the traffic matter is the conservation of some 35,000,000 ac. ft. of fresh water annually wasting to the sea, to permit which is an absolute crime to the water-hungry West. (See the article on page 80 of this issue.) Further, some 20,000 ac. of desperately needed industrial land would be created; transcontinental railroads, for the first time in history would be taken to San Francisco; a metropolitan airport could be created; from a defense standpoint, the strategic area would be infinitely safer; salt water intrusion in rich farm lands would be stopped, and so on through a long list.

It was undoubtedly with these things in mind that the Commonwealth Club gave such a vigorous approval to the efforts of the engineering, military, and civic groups sponsoring the Reber Plan.

There's EXTRA Performance in EVERY Attachment with

all-wheel DRIVE
all-wheel STEER

Bulldozer

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An unrivalled line of attachments is available for the "88-H," "99-H" and Master "99" Power Graders . . . each attachment designed for a type of work ordinarily done by a separate machine. All-Wheel Drive and All-Wheel Steer make it possible to use either a front- or rear-mounted attachment with no sacrifice of operating efficiency, where ordinary graders—handicapped by front-end inertia and lack of rear steer—would be helpless through loss of traction or directional control.

Austin-Western Power Graders—*without* attachments—work more hours each year than ordinary graders; *with* attachments, their uses are multiplied and their value correspondingly increased.

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V-Plow

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CALIFORNIA—EDWARD R. BACON COMPANY.....San Francisco 10
CALIFORNIA—SMITH BOOTH USHER COMPANY.....Los Angeles 54
COLORADO—LIBERTY TRUCKS & PARTS COMPANY.....Denver 1
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MONTANA—WESTERN CONSTRUCTION EQUIPMENT CO.....Billings
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OREGON—COLUMBIA EQUIPMENT COMPANY.....Portland 14
UTAH—WESTERN MACHINERY COMPANY.....Salt Lake City 13
WASHINGTON—COLUMBIA EQUIPMENT COMPANY.....Seattle
WYOMING—WILSON EQUIPMENT & SUPPLY COMPANY.....Cheyenne

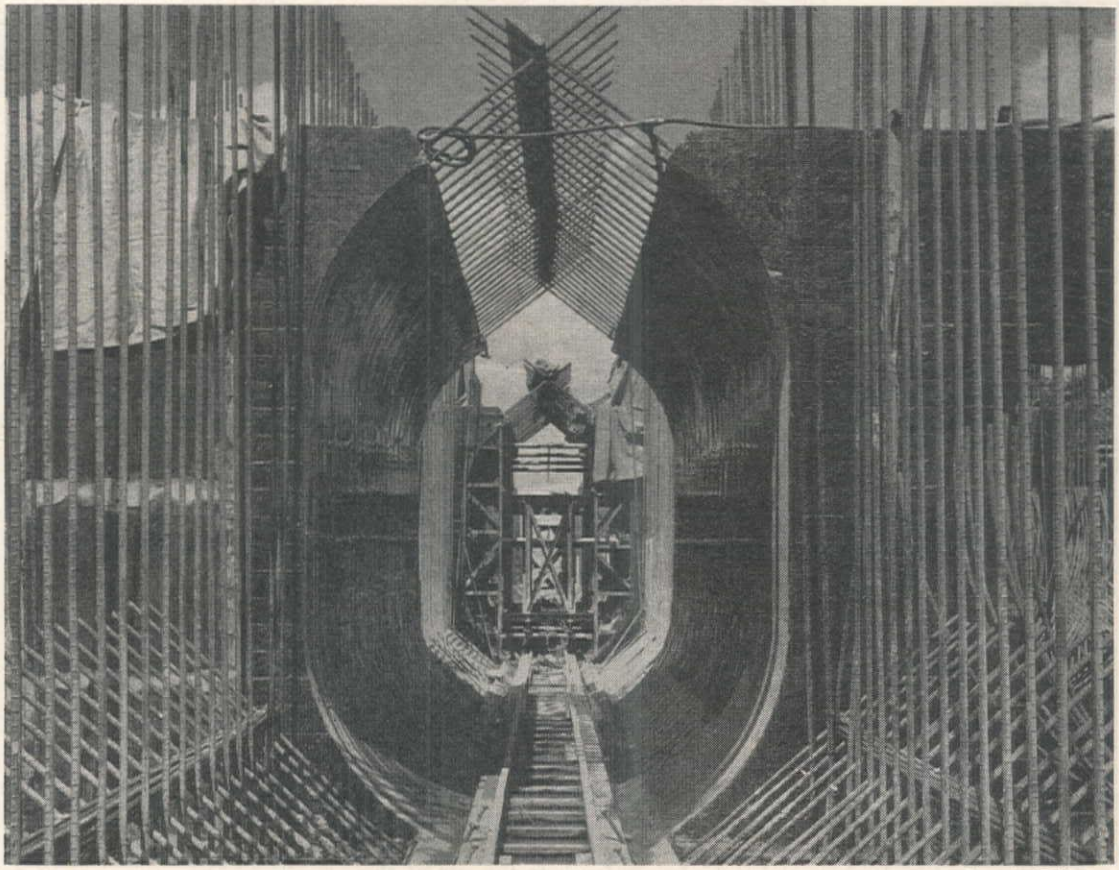


Photo by Zellers.

ELLIPTICAL barrel of the outlet works for Cherry Creek Dam is being poured in sections, with a completed one in the center, another with forms in place in the background, and reinforcing steel in place for another in foreground.

Cherry Creek Dam—
Embankment, Outlet Works Rise Fast

Through the use of modern heavy equipment, the embankment, which will total 13,000,000 cu. yd., is being placed at over 50,000 cu. yd. per day by Wunderlich, while Al Johnson rushes concrete work on outlet structure

By COL. CRAIG SMYSER
District Engineer
U. S. Corps of Engineers
Denver, Colo.

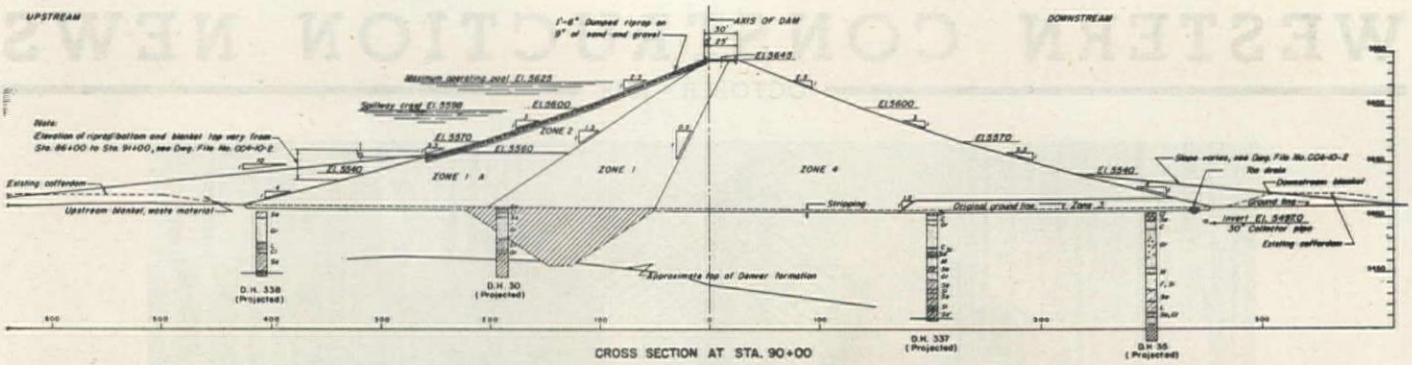
SIX MILES southeast of the Mile High City of Denver, Colorado, construction is rapidly progressing on one of the most interesting projects in the Pick-Sloan Plan for the development of the Missouri River Basin. This project is the Cherry Creek Dam being built under the direction of the Denver District, Corps of Engineers.

The primary purpose of this giant structure is to provide flood protection for the City of Denver from the numerous floods on Cherry Creek which in the past have caused millions of dollars' worth of damages to the downtown industrial and business sections. In addition, when the Blue River Diversion Plan now under study by the Bureau of Reclamation, becomes an actuality, waters from the western slopes of the Rocky Mountains will pass by tunnel through the Continental Divide to be stored behind Cherry Creek Dam for irrigation of land in the Platte Valley.

It is important to remember that water in this section of Colorado (average rainfall 14 in.) is as highly prized as gold, for even secondary rights to water are legally recognized. In fact, the history of the Centennial State is woven closely around those two elements, gold and water, and appropriately for this story, the first strike of pay dirt was discovered near the site where now engineers are striving to harness the occasional violent cloudbursts which occur over the rolling water shed.

Structure design

Cherry Creek Dam is a conventional-type roll-filled earth dam containing approximately 13 million cubic yards of selected impervious, pervious and random materials placed as shown in the typical cross section on the accompanying plate. The maximum height will be 140 ft., with a corresponding bottom width of 1,500 ft., while the crest of the dam will extend nearly 3 mi. The upstream slope is to be faced with 18 in. of dumped riprap placed on a 9-in. blanket of sand and gravel; the downstream



CROSS SECTION AT STA. 90+00

slope will be covered with topsoil and seeded with grasses suitable to the semi-arid climate.

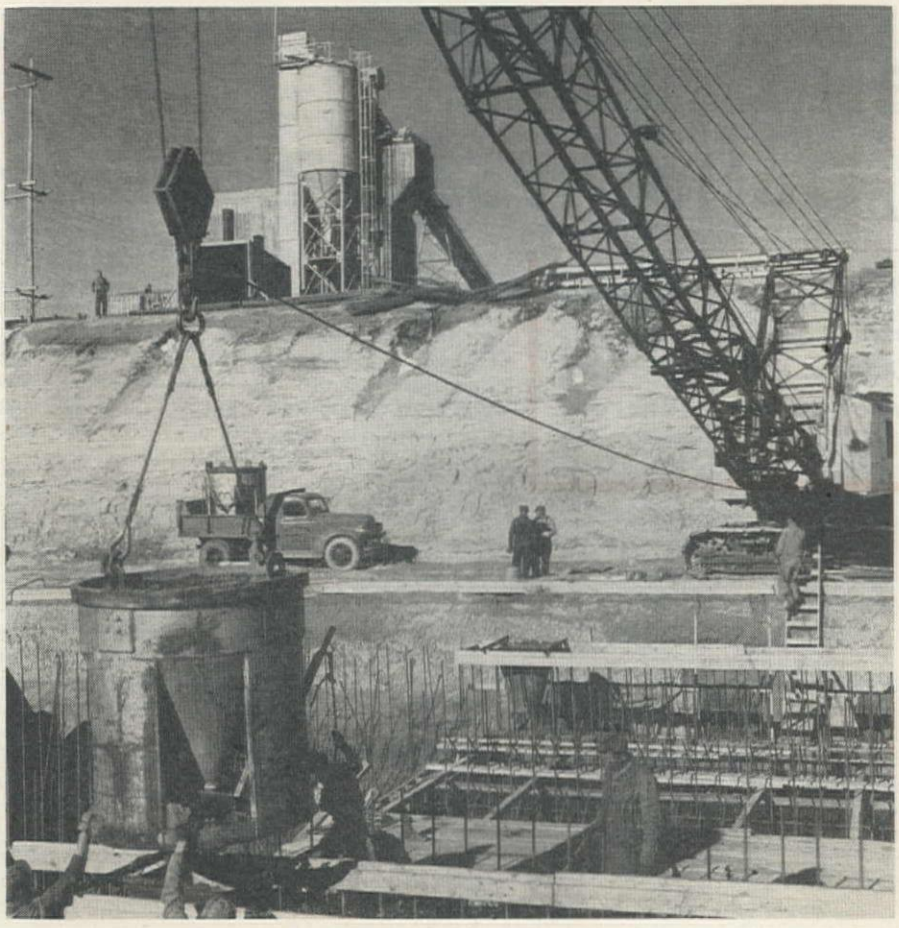
Construction of the cutoff trench for this dam was described in the February, 1947, issue of the *Western Construction News* and readers of the article will recall the valley at the dam site is underlaid with a shale strata known locally as Denver Formation. This formation is approximately 100 ft. below the river bed in the present channel, but slopes upward on each bank to only a few feet below the existing ground.

In order to avoid over-taxing the capacity of the Cherry Creek channel through the city, flood waters exceeding the conservation pool level, will be diverted by a spillway into a small creek which in turn empties into the South Platte River. Thus, all major flood waters will by-pass the Metropolitan area while normal flows up to 7,500 sec. ft. will be routed through the outlet works. The spillway channel in itself is a major construction problem 12,000 ft. long with approximately 3 million cu. yd. of excavation. The bottom width is 67 ft., while the sides are sloped to 1 on 1 in the Denver formation of 2 on 1 for all other types of material.

Embankment and spillway

A contract for placing the embankment and excavating the spillway was awarded by the Corps of Engineers to the Wunderlich Contracting Co. of Jefferson City, Mo., on the 18th day of November of last year for $7,995,125. Completion of this contract is scheduled in Dec., 1949, and the contractor is well ahead of schedule.

CONCRETE HANDLING on the outlet structure is seen here almost in its entirety. At the top of the cut is a Noble batching plant and Smith mixer, from which it is discharged into Gar-Bro concrete buckets and hauled on a truck to the site of the work. Here it is picked up by a crane with 90-ft. boom and conveyed to the forms. All concrete is poured on the second shift, and air entraining agent is always used.



Martin Wunderlich, who it may be recalled, recently purchased a private air force of over 5,000 surplus airplanes from the Government, has amassed an imposing array of the very latest types of earthmoving equipment for the Cherry Creek job. There are 38 bottom dump Euclid wagons normally rated at 24-cu. yd. capacity increased in the field by the addition of side boards to 30 cu. yd. As most borrow areas are composed of uniform horizontal strata of the various materials required for the embankment, two Euclid loaders, Model 9BV, are used in conjunction with the wagons. In addition, two 5-cu. yd. buckets attached to Model 1201 Lima cranes and one Model 80D 2½-cu. yd. Northwest shovel are used to augment the loaders and where constricted operating areas are encountered, the conventional scrapers or Tournapulls are used for the short hauls.

In order to speed up the loading operation, both push and pull tractors are used on the elevating graders so that one 30-cu. yd. Euclid can be filled in less than 45 sec. A continuous stream of "Eucs" are hauling dirt in 2 shifts a day, 6 days a week and the present rate of placement is over 50,000 cu. yd. per day. At night the operation is as well illuminated as at mid-day by huge portable night lighting towers consisting of 12 light towers 45 ft. high; 9 have candlepower of 6,000 watts and 3 have candlepower of 5,000 watts.

After the selected earth materials are placed in their proper zones in the embankment, they are leveled to the allowed thickness (6 in. for impervious and random and 8 in. for pervious) with bulldozers and road graders. According to the specifications, all rocks over 5-in. in size are picked from the fill and, as only a small amount of such rock has been encountered, the removal is handily accomplished by men using a truck.

Wetting and rolling

One of the difficult problems confronting the contractor was the prewetting of the impervious materials. After much experimentation, the most successful method was found to be the digging of small ponds with bulldozers over the entire borrow area and filling these ponds for approximately six weeks prior to use. Materials thus treated are kept uniformly moistened to a depth of approximately 4½ ft. Additional water is added on the fill to bring the materials to the optimum moisture content for, generally speaking, the earth is handled best if placed in the dam at about 2%

below optimum. After placing, the material is compacted by the conventional sheepsfoot rollers having 400 lb. per sq. in. on each foot.

At present, Cherry Creek is being diverted through an open section of the embankment, but upon completion of the outlet works, scheduled for this month, the water will be turned through the latter installation. Closure of the embankment, however, will not be allowed until all of the remainder of the embankment has reached an elevation of at least 5553 but not greater than 5570. These elevations were stipulated by the Engineers in order that Denver might have the same amount of flood protection as now afforded by the small Kenwood Dam just downstream of the present contract, and which is to be removed when Cherry Creek Dam is completed.

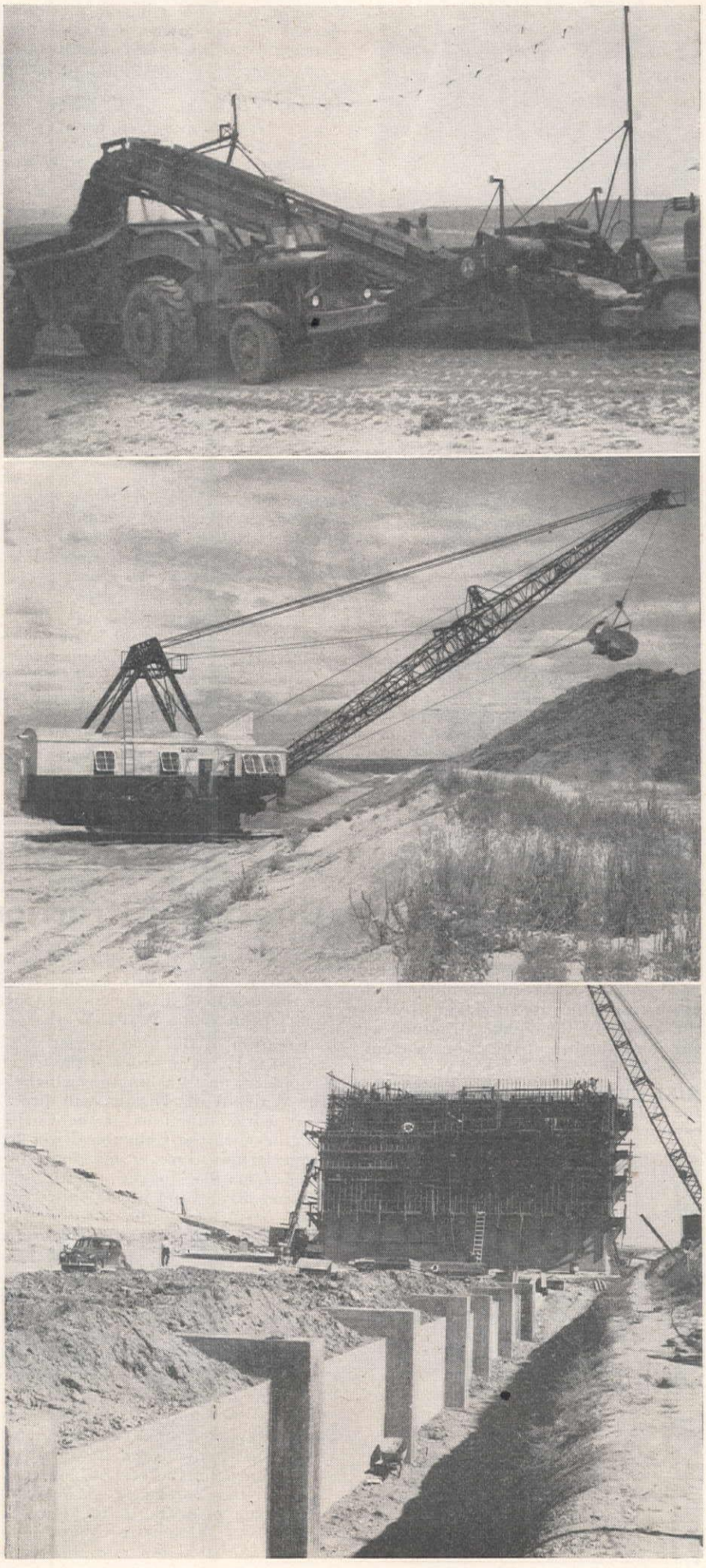
Settlement gages have been placed to measure the actual amount of settlement in the foundation during construction and pressure relief wells have been installed along the downstream toe to release any water passing through or below the cutoff trench. In addition, in order to keep tabs on the critical foundation pressures developed during the construction period, pressure cells have been installed in the clay strata. This furnishes information that is used in regulating the speed at which the fill is raised.

The work for the Wunderlich Contracting Co. is being supervised by George Phelps, project manager, and John New, general superintendent.

Outlet works

The contract for the outlet works was awarded to the Al Johnson Construction Co. of Minneapolis, Minn., for the sum of $1,748,037 and completion is scheduled for the 10th of December of this year. Inasmuch as no suitable coarse aggregate could be located near the Cherry Creek Dam site, material manufactured from crushed granite is being transported from Golden, Colo., approximately 30 mi. away. Most of the concrete is designed for a 3-in. maximum aggregate although in some of the thinner sections this is limited to 1½-in. maximum size. The fine aggregate was secured from alluvial bank deposits just southeast of Denver and is hauled in dump trucks to the dam site.

A most up-to-date mixing and batching plant has been set up at the job site by the Johnson Construction Company for controlling the concrete mix. Aggregates are fed to the elevated storage bins (150-ton capacity) by means of a conveyor belt and chutes while bulk cement is elevated to the cement bin with a bucket conveyor. A Noble batcher proportions the aggregates. The mixer is a Smith tilting-type with 2-cu. yd. batch capacity, capable of mixing



CONSTRUCTION SCENES at Cherry Creek Dam: Top, Euclid elevating grader fills 30-cu. yd. trucks with embankment material in 40 sec.; Center, Bucyrus-Monighan walking dragline with 10-cu. yd. bucket excavating spillway channel; Bottom, pouring concrete for the outlet gate house.

MAJ. GEN. LEWIS PICK, co-author of the Pick-Sloan Plan for the Missouri Basin, left, and MARTIN WUNDERLICH, general contractor for Cherry Creek Dam, view progress on the job.

50 cu. yd. per hr. The mixing time is automatically controlled and the weights of all ingredients of each bin are automatically recorded on a continuous tape.

As is common with most concrete poured in these days, not only is an air-entraining agent used, but the temperature of the concrete is kept low by making pours on the 2nd shift, thus taking advantage in the summer of the cool Colorado nights. Steam coils were installed in the aggregate bins and in the water tank while the boiler was set within the mixing building itself so that no difficulties were encountered in maintaining proper temperature of concrete during the winter.

The concrete is dumped from the hopper at the mixing plant into 1- or 2-cu. yd. concrete buckets set on flat-bed trucks and then hauled to the site of the pour where the buckets are lifted from the trucks by a Northwest crane with a 90-ft. boom. In this manner all concrete has been placed directly from the buckets without the use of buggies. When the height of the intake structure will eliminate the use of the crane, the contractor plans on using an elevator located on the downstream side of the structure to raise the concrete to buggies which will distribute it into the forms.

MIKE GRIPPO, general superintendent for Al Johnson Construction Co., on the contract for Cherry Creek outlet works.

The size of the outlet works can be more readily visualized from some of the quantities of materials required: 394,400 cu. yd. of excavation; 32,310 cu. yd. of concrete; and 4,184,000 lb. of reinforcement steel.

The stilling basin is being constructed to conform to the design developed from model studies conducted by the Bureau of Reclamation laboratory in Denver. The escape channel below the stilling basin is to be lined with derrick stones weighing from 1,000 to 10,000 lb. each and riprap stones weighing 250 lb. each or smaller.

Five hydraulic slide gates were furnished under separate contract by the Willamette Iron and Steel Co. of Portland, Ore., for installation by the Al Johnson Construction Co. The locations for the gates were blocked out and the concrete for the remainder of the intake structure was placed to two lifts above the gates. The gates were then set into place and concreted.

The work under the Al Johnson contract has been under the supervision of Bob Englehart, project manager, and Mike Grippo, general superintendent.

The construction of the Cherry Creek Dam is being performed under the direction of Col. Craig Smyser, District Engineer, Denver District, for the Corps of Engineers. Paul F. Jensen is the resident engineer representing the District Engineer at the job site.

Professional Engineers Ask Draft Deferments

A THREE-POINT program covering drafting of the nation's engineers and engineering students has been proposed to Maj. Gen. Lewis B. Hershey, Director of Selective Service.

National Society of Professional Engineers, made up of 18,000 registered engineers in 48 states proposed:

1. That engineering and science students now enrolled in accredited colleges or universities be allowed to finish their studies for an appropriate degree, provided they maintain satisfactory scholastic standing;

2. That "proper and adequate" procedures be developed to insure a continued flow of new engineering and science students into college classrooms; and

3. That engineers and scientists be fully utilized in essential work in the defense effort.

The engineering group's plan was placed before Gen. Hershey by Paul H. Robbins, executive director. Leading scientists and engineers hold the opinion, the NSPE official said, that selective service should be administered "with full recognition that engineering and scientific skills are indispensable to effective national defense." He cited the danger to the nation of a repetition of World War II's depletion of the ranks of engineers and scientists by cutting off the training of new technicians.

New Engineer District Created to Direct Construction of McNary Dam

A NEW ENGINEER district has been established in the North Pacific Division of the Corps of Engineers with headquarters in Walla Walla, Wash.

Creation of the new district was revealed today in an order of the Chief of Engineers in Washington which said the Walla Walla District will direct all civil works functions of the Corps of Engineers in the Columbia River basin from Irrigon, Ore., 7 mi. downstream from Umatilla, to the mouth of the Yakima River, and in the entire Snake River basin, adding that the new district office will officially start functioning Nov. 1.

Col. Theron D. Weaver, North Pacific Division Engineer, in announcing the new district, pointed out that the step is in line with the traditional practice of the Corps of Engineers of decentralizing to the maximum degree responsibility for direction of civil works. The growing amount of authorized and planned work on multi-purpose navigation, flood control and power projects of the corps in the central and eastern areas of the Northwest, as well as the magnitude of work in the lower Columbia and Willamette valleys demonstrated the need for an additional district so that increased attention could be given to the direction of the vast engineer undertakings in this region, Col. Weaver said.

McNary Dam is the major active construction project in the new Walla Walla District at the present time. In addition, construction operations on Mill Creek at Walla Walla, on the Heise-Roberts project on the Snake River in eastern Idaho, emergency flood control and navigation work elsewhere in the district area are also under way.

The Walla Walla District will be intensively engaged in planning the four authorized dams on the Snake River between its mouth and Lewiston, Ida., and the recently authorized Lucky Peak Dam on the Boise River, and in their construction as funds become available.

Col. William Whipple, who has been executive officer of the North Pacific Division with headquarters in Portland, since May, 1947, is to be the district engineer of the Walla Walla District. Col. Whipple is a graduate of the United States Military Academy, class of 1930, and later took a graduate degree in engineering at Princeton. During the years from 1937 to 1940 he was on river and harbor duty in the Missouri basin.

Kaiser Company Builds Own Railroad

Kaiser Engineers solve many design and construction problems to complete 52-mi. access railroad to Eagle Mountain Mine northwest of Desert Center, Calif. — New line, extending into the mountains from 190 ft. below sea level, is the longest private railroad built in this country since 1926

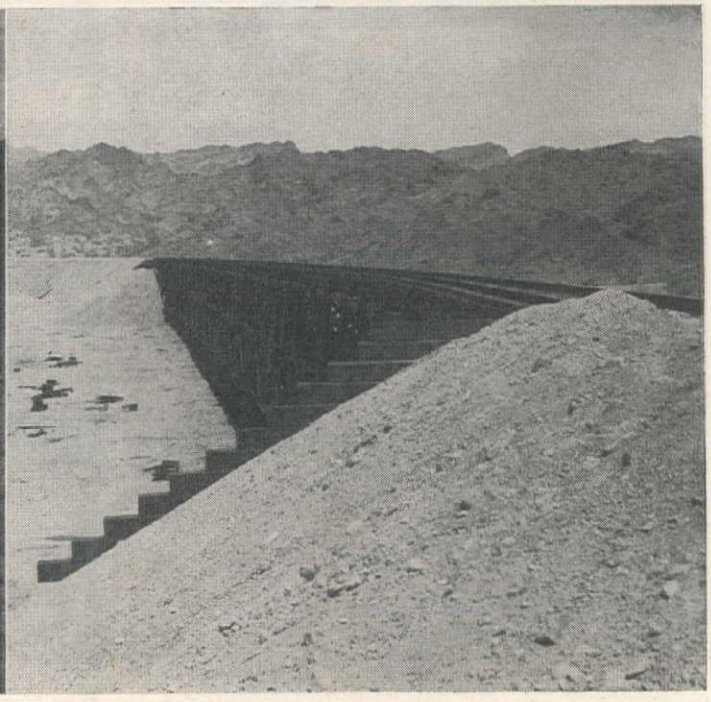
LAST PORTION of the railroad was designed in a giant "S" curve, visible from this vantage point above the mining camp. The curve was necessary to keep grade within the maximum limit. Deepest cut along the route, lower left, required blasting and excavating of 33,000 cu. yd. of solid rock. Right below, the 550-ft. long trestle over Salt Creek Wash is longest of eighteen such structures along the route.

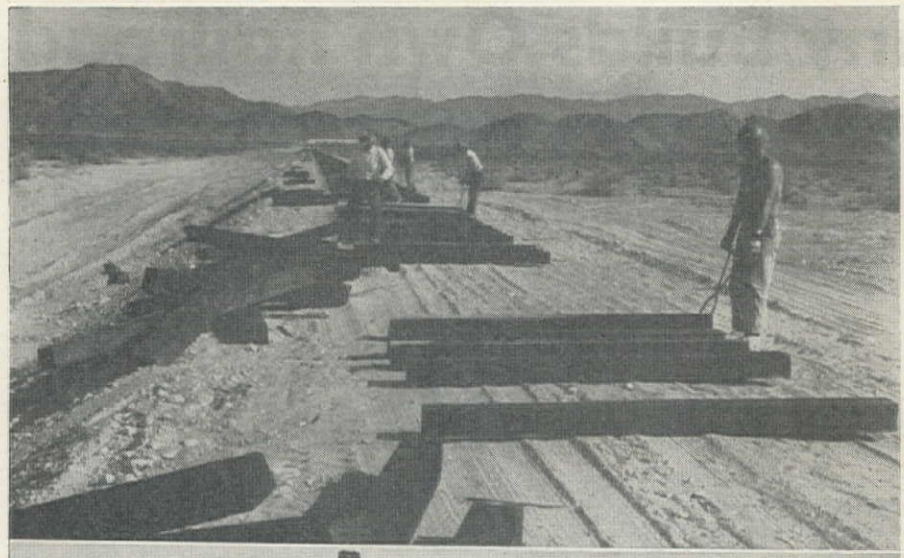
DRIVING of the last spike in the 52-mi. railroad from a Salton Sea terminus to Eagle Mountain Mine, northwest of Desert Center, Calif., marked the completion of the only private railroad built in this country since 1926 and the longest since 1918. Many engineering difficulties were overcome in construction of the unique line across the Colorado Desert, which is generally acknowledged as the hottest area within the United States. In its 52-mi. run, the railroad extends from 190 ft. below sea level at Salton Sea to 1,648 ft. above sea level near the mine.

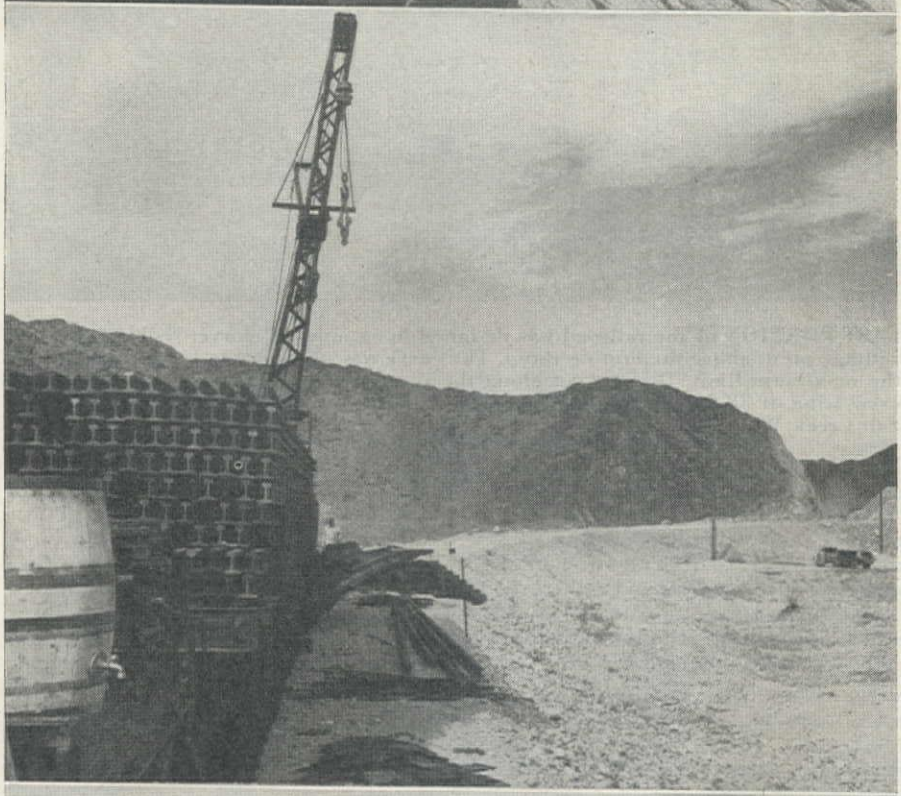
Owner and operator of the new railroad is the Iron and Steel Division of Kaiser Co., Inc., Oakland, Calif., which expended $3,800,000 for the development. Ore from the Eagle Mountain Mine, containing 54 per cent iron, will be hauled by a 1,500-h.p. Diesel-electric locomotive and strings of gondola cars to a junction with the Southern Pacific main line railroad at the Salton Sea. From there, it will go to the Kaiser steel plant at Fontana, Calif. Estimates are that Eagle Mountain contains more than 25 million tons of iron ore.

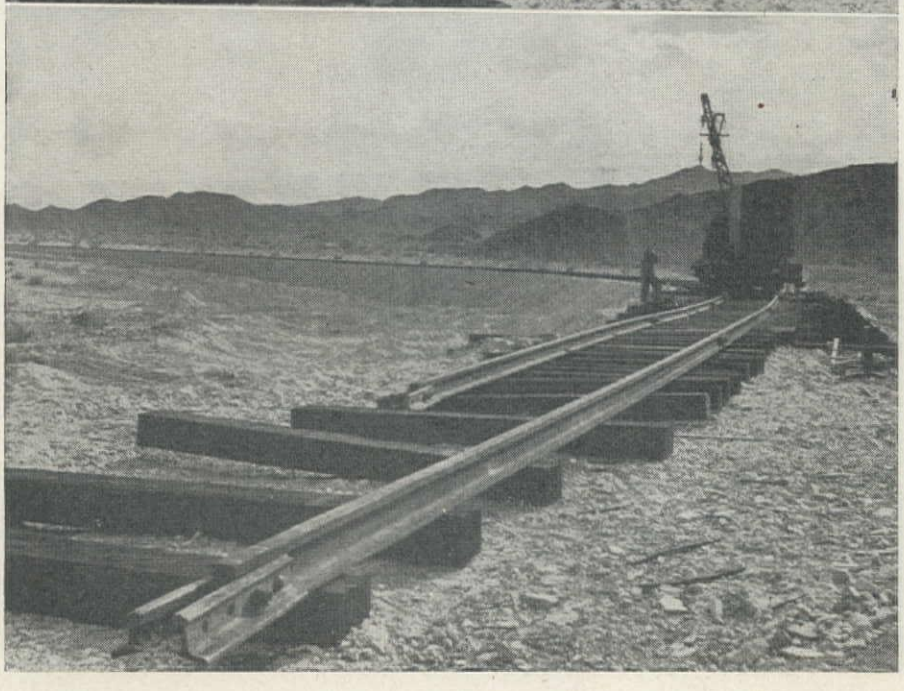
The economics bringing about the decision by the Kaiser Co. to build its own access railroad are evident. At present, ore for the Fontana plant is shipped from Kelso, Calif., and from Iron County, Utah, 500 miles distant from Fontana. The railroad brings the Eagle Mountain source within 153 mi. traveling distance. In anticipation of the cheaper source of ore, the Fontana plant is being greatly expanded.

Kaiser Engineers, Inc., designed the new railroad and supervised its construction. J. F. Shea Co., Los Angeles, Calif., handled the actual construction work as the active participant in a joint venture with General Construction Co., Seattle, Wash., and the Pacific Bridge Co., San Francisco. The survey and preliminary field work was started in Oct., 1946. Actual roadbed construction began in July of 1947, and the entire project was complete in June of 1948. An aver-









age of one mile of track was laid per day after this work actually began.

Both in design and construction methods used, the project presents many unusual features. Despite the fact that the railroad rises 1,848 ft. in its 52-mi. length, Kaiser engineers were able to design the line with a ruling gradient of 2 per cent, with the final four miles at the mine graded at 2.15 per cent, compensated for curvature. Maximum grade against the loaded train moving away from the mine will be one per cent.

Drainage problems

One of the major considerations in the construction was the provision of ample drainage facilities for protection against the unusual cloudbursts which occur frequently in the area during the summer season. Illustrating the force of the cloudbursts in the area is the Salt Creek Wash where Bureau of Reclamation engineers estimated a "possible runoff" of up to 20,000 cu. ft. per sec. Rainfalls of two or more inches in six hours are not unusual. The barren mountain ranges surrounding the route of the railroad contribute to the rapid and heavy runoff following the heavy downpours.

An aerial map was made of the entire district to see where the drainage areas were located. Serious studies were made of the vegetation on the slopes to ascertain their source of water. Washouts were anticipated as much as possible by the planners.

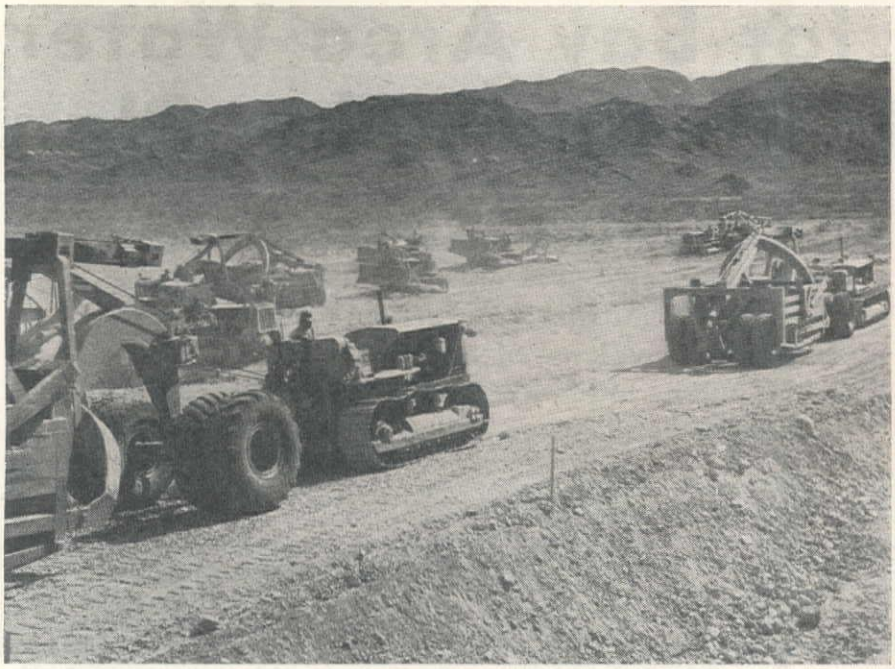
To overcome the problems of drainage, dikes, channels, bridges, trestles and culverts were installed wherever critical drainage situations appeared likely to occur. A total of 14,000 lin. ft. of culverts were constructed along the route, in sizes ranging from 30 to 72-in. diameters. Due to the varied nature of the cloudbursts expected in the area, railroad maintenance against washouts will continue to be an important factor once the line is in operation.

Extreme heat

Another problem which was necessarily considered in the design was that caused by the extreme desert heat, which reaches temperatures of 125 deg. or more. This presented the problem of "heat travel" or linear expansion of the rails. Compensation was made for this undue expansion by leaving a minimum gap of 1/16 in. between the butt ends of the rail lengths. This is also anticipated as a maintenance problem in the future.

Nine different routes were surveyed for the last seven miles of the railroad as it approaches the mine before one was located over which the required grade could be maintained. A giant "S" curve was designed for the approach over the last 4 mi. This is where occurs the maximum grade of 2.15, compensated for the great amount of curvature.

TRACK LAYING proceeded at an unusual rate of speed. Ties were hauled by truck and placed well ahead of the track-laying train, which, carrying a generous supply of rails, moved over unballasted and partially spiked rails ahead of the final work crews.



2,000,000 CU. YD. of natural rock and sand along the route was moved into place by dragline cranes, bulldozers and earthmovers for the roadbed fill and ballast.

A roadbed problem was encountered in the Salton Sink, which is about 100 ft. below sea level. Here, the route passed over an area heavy in clay and with considerable subsurface water. After several cave-ins near this point, it was discovered that these were being caused by the force of water pushing upward in seeking to level with its source in the distant Chocolate Mountains. To solve this problem, the roadbed was excavated 6 ft. below subgrade and filled with gravel covering 12-in. concrete drain pipes.

Fill and ballast

A generous amount of natural rock and sand for the roadbed fill and ballast was available along the route. A total of 2,000,000 cu. yd. of fill was moved for these embankments. The contractor used dragline cranes and bulldozers to move the material from the available deposits to the track area. The sand ballast packed solidly and was determined as ideal for slow and heavy train movements.

Track laying was accomplished at an unusual rate of speed, chiefly due to the method used for transporting ties. They were hauled by truck from the Salton Sea junction and thus were set far in advance of the track-laying train, which was serviced by a 100-ton locomotive and carried 10,000 lb. of rails. As the rails were laid by a crane, they were spiked into position and held apart by track spreaders, which allowed the track train to proceed on ahead of the work crews, who then completed the spiking and straightening.

Deepest cut along the route occurred at Fitch Ridge, where an 80-ft. cut required blasting and excavation of 33,000 cu. yd. of solid rock. Eighteen timber trestles were built along the route, the longest being the 550-ft. trestle over the aforementioned Salt Creek Wash. Maximum height of this trestle is 30 ft. above the streambed, and piles are driven in a minimum of 15 ft. A 66-ft. structural steel bridge was constructed to span the Municipal Water District Aqueduct.

A total of 9,500 tons of 110-lb. rail was purchased from the Southern Pacific Railroad for the construction, while 147,000 standard rail ties were obtained from the Cheney Lumber Co., Tacoma, Wash. Ties were creosoted by the American Treating Co., Wilmington, Calif.

E. T. Larson was the project engineer for the joint venture contracting firm, and Frank Bachman was general superintendent. Ray Fullerton was resident engineer on the job for Kaiser Engineers, Inc.

Seek Funds to Complete Middle Rio Grande Work

IMMEDIATE AUTHORIZATION of the entire $70,000,000 needed for the Middle Rio Grande Project will be asked of the next Congress, it was decided at a recent conference of officials of the Middle Rio Grande Conservancy District and the Bureau of Reclamation at Albuquerque, N. M. The group also tentatively drafted a resolution, to be passed by the Conservancy directors, officially directing the District officials to make contracts with the Reclamation Bureau and Army Engineers to carry out the project.

The Albuquerque meeting was the first of many planned by Conservancy and Reclamation officials to work out details of the plan by which the Bureau of Reclamation would take over operation of the Conservancy District. This would be the first time that the Reclamation Bureau has taken over an organized, operating and solvent irrigation district. Every other such district taken over by the Bureau has been insolvent or had not started actual operation.

Tacoma Plans to Build Dams on Cowlitz River

THE CITY OF TACOMA in Washington intends to build a hydroelectric project on the Cowlitz River in Lewis County consisting of two dams and reservoirs on the tributary of the Columbia River near the towns of Mayfield and Mossyrock despite a chorus of protests from sportsmen and commercial fishermen. They branded the proposed dams as a threat to an important segment of the Columbia River system salmon run, stating that the fish could not pass over the barriers as Tacoma proposed.

In addition to the dams and reservoirs, the project would involve construction of powerhouses, switch yards and a transmission line with a substation in Tacoma. The Mossyrock Dam would be 350 ft. high and 1,300 ft. long, creating a 975,000 ac.-ft. reservoir. Its powerhouse would have an installed capacity of 225,000 kw. Mayfield Dam would be 225 ft. high, 900 ft. long, create a 21,000 ac.-ft. reservoir, and its powerhouse would have an installed capacity of 120,000 kw. The project would be a part of Tacoma's present power system which includes two dams at Cushman, two at Nisqually, and two steam plants at Tacoma.

The fishermen and representatives of the State game and fisheries department expressed their opposition to the project at a legislative committee meeting, arguing that other streams which could be more fully developed before the Cowlitz are still available. They urged that dams be placed on rivers where the fish runs have already been lost by other construction.

Tacoma has spent $300,000 in development work at the proposed sites. The City has been pushing its preparations since the Mayfield Dam permit requires that construction begin before 1952. But oppositionists now promise a "last ditch fight" against the dams.

Huge Sawmill and Sulphate Plant Is Nearing Completion

THE MAMMOTH $6,500,000 Weyerhaeuser sawmill and sulphate plant at Springfield, Ore., is rapidly taking shape with three 720 ft. long shipping sheds, recovery boilers which will take chemicals from the sawmill's waste and a cafeteria already completed along with numerous auxiliary buildings on the company's 240-ac. reservation. Good fall weather is being used to advantage for work on the plant, which will consist mainly of a sawmill designed to cut 300,000 board feet a day and a sulphate plant which will make material for fiber boxes.

The Springfield plant will be fed from 155,000 ac. of timber, the big cut coming from the Fall Creek area up the middle fork of the Willamette River. The mill will employ around 600 persons when production starts early in 1949, with eventual employment being 900. It is the second such plant in Oregon.

Possibilities for Bay Area Water Supply and Control in Reber Plan

Little understood concept of "storage in transit" for consumptive uses shown as an important factor in Reber Master Plan for San Francisco Bay—Tremendous volume of water now wasting to the ocean will be made available—At the same time, damaging flood crests in Upper Bay will be lower

By W. Q. WRIGHT
Consulting Engineer, San Francisco, Calif.

THE PARAMOUNT problem of the San Francisco Bay Area is future water supply; then comes transportation. Without adequate water supply, construction for future transportation—or anything else for that matter—may prove of little value. Since water supply governs the ultimate limit of growth and development, then a plan for maximum water conservation should be the first objective. Whenever the Bay Area seeks additional water, all eyes habitually turn to the High Sierras. While visualizing difficulties, competition, expense and legal tangles involved in gaining that far-away supply, many millions of acre feet of fresh water continue to waste away; virtually passing through the metropolitan areas on the way to the Golden Gate.

The Reber Plan is vitally interested in maximum water conservation throughout the great Central Valley and other areas tributary to the Golden Gate; but it is more directly concerned with those many millions of acre feet of fresh water which annually escape from Central Valley into the Delta; plus that considerable unknown volume draining from areas tributary to the salt marshes and bays. The Reber Plan proposes to conserve as much as possible of this great volume of fresh water now wasting away to the ocean. An approximate 60-year average annual flow of rivers into the Delta from January to June has been about 24,800,000 ac. ft. and from July to December about 6,200,000 ac. ft. inclusive; while that unknown loss from the remaining areas is far too great to be overlooked.

All possible storage

The Reber Plan stresses importance of water storage in the high mountains and all other available locations, especially ground storage wherever possible, in order to decrease the excessive winter flow into the Delta and increase that in the late fall. Such mountain storage is a part of the Central Valley Project, which is supposed to expend sufficient stored water to repel salt invasion into the Delta east of Antioch. In this respect the Central Valley operations end at Antioch; while the Reber Plan proposes to extend fresh water westerly from Antioch through Suisun and San Pablo Bays. This will allow many thousands of acres of salt marsh land to be reclaimed and furnish fresh water to extensive rapidly-growing industries and expanding communities, including a great area of neighboring farm land.

The map of Reber Plan shows a crossing or Salt Water Barrier below San Pablo Bay and a much wider crossing from San Francisco to Oakland, with a channel connecting the north fresh water lake with South Bay. These crossings shut out tides from the areas inside the two barriers. It is assumed the reader is familiar with essentials of this plan; but it must be stressed, nevertheless, that shutting tides from these two areas and providing the channel from Richmond via Oakland to South Bay is the important foundation of the Reber Plan. It has been estimated that up to 4 million acre feet of salt water has rushed through the Golden Gate in approximately six hours. The continuous tidal ebb and flow is felt throughout the bays and delta as far as Sacramento and Stockton, where its effects fade away; but, in South Bay the extremes are magnified, showing a maximum tidal difference of 13½ ft. at Dumbarton Bridge and 14 ft. at Alviso; while the San Francisco extreme is 10.6 ft. The tidal difference at Pinole Point, San Pablo Bay, is 11 ft.; at Selby, Carquinez Straits, 10 ft.; at Pittsburg, San Pablo Bay, 8½ ft.; and at Antioch, San Joaquin River, 6.9 ft.

Tide control important

Although the enormous ebb and flow of tides through these bays and waterways may result in doubtful benefit to a few interests, nevertheless, the erosion, deposition, and abnormal wave action resulting from bay and river tidal currents are extremely destructive. Occasionally freak tides, due to heavy winds and storms at sea, cause high water in the lower delta to within a few inches of record marks, even without the boosting effect of flood waters in the rivers.

Disasters in the delta usually occur when such high tides meet flood crests. It is the ebb and flow of tides through levee breaks that is largely responsible for the major disaster to flooded delta reclamations. The substitution of controlled tideless fresh water for the ceaseless ebb and flow of salt water will prove a great blessing in many ways. It will eliminate high water hazards and promote reasonable cost reclamation of thousands of acres of marshes built up with the best fertility, washed from the highlands. Such land located practically within expanding metropolitan areas, will be transformed through application of fresh water from ugly salt marshes and mud flats into beautiful residential property and useful industrial sites.

The Reber fresh water system created by the salt water barrier below San Pablo Bay will include the Delta with its thousand mile network of rivers, sloughs and cuts; Suisun Bay with its channels, sloughs and cuts; Carquinez Strait and San Pablo Bay with its river channels, sloughs and cuts. The approximate area of this fresh water system is about 160,000 ac.; all of which is more or less affected by tidal action that the proposed barrier will eliminate. Assuming a practical surface fluctuation of 2½ ac. ft., the storage capacity of this system would be 400,000 ac. ft.

Water storage in transit

Some assume erroneously that proper functioning of the Reber Plan depends upon storage in the Fresh Water System. This is not the case, since useful storage here is very small compared to the fresh water which will be seeking entrance. With the allowable fluctuation of 2½ ft. and an annual evaporation of 3½ ft., this capacity for ordinary water storage instead of an asset, would prove a liability. On the other hand, with proper utilization of this capacity for **flood control, trapping fresh water,** and **regulation of water withdrawal and distribution** this capacity becomes of the greatest importance and is one of the essentials for future success of the Reber Plan; therefore, this capacity should be considered only as water storage in transit.

The Fresh Water System thus established provides for trapping those millions of acre feet of fresh water entering the delta, plus that unknown volume entering the system from the remaining extensive tributary areas. Siphon flood gates, to be installed in the San Pablo crossing will be designed to control maximum floods. Measurements made at these gates will reveal the total volume of water conserved and will indicate the amount which must be withdrawn from the fresh water system to prevent irrecoverable loss through the gates. The importance of conserving that enormous volume of fresh water which would otherwise be lost and then holding it "stored in transit" and under control for wide distribution, should not be mini-

mized. After several years of withdrawing and spreading surplus waters over the tributary areas, return water will gradually appear in increasing volume—also to be trapped.

Therefore, withdrawal of surplus water by boosting and conveying in back channels for beneficial use and ground storage, becomes the critical water conservation function of the Reber Plan. Many hundreds of miles of fresh water shorelines, thus created along bays, rivers, creeks, sloughs and cuts, make it possible to organize withdrawals and distribution, so that a maximum of fresh water may be beneficially used and stored. Since water storage here, especially in winter, is of minor importance, the control authority may establish a very low level in the system during flood times, so the delta and salt marsh reclamations may not only avoid hazards now faced by extreme high tides meeting flood crests, but, those flood crests may be safely flattened out in the space thus prepared.

South Bay also fresh

As already stated, the two Bay Crossings, eliminating tides from inside areas, together with the connecting channel from Richmond via Oakland to South Bay is the foundation upon which the San Francisco Bay Project is built. The Project Map shows this channel touching South Bay and from this point on there are several solutions depending on important conditions and information not yet available. Since final determination of such solution will be in hands of proposed Board of Engineers, no comment will be offered here on this "separately treated" southern branch of the Reber Fresh Water System, further than to assure South Bay Counties they can receive fresh water. In this connection, mention should be made of the Santa Clara Valley ground storage, now critically depleted, and which could be served without delay by boosting, conveying and spreading water for percolation from the extended fresh water system. With ample surplus of this system, this ground storage could soon be filled, re-establishing many of the flowing wells which were the pride of Santa Clara Valley in earlier days. This is but one example of many, illustrating water withdrawal and distribution from the Reber fresh water system. Petaluma Creek, southern Alameda County, Napa Valley, Dixon-Vacaville area, and others might likewise be named.

Time is the essence

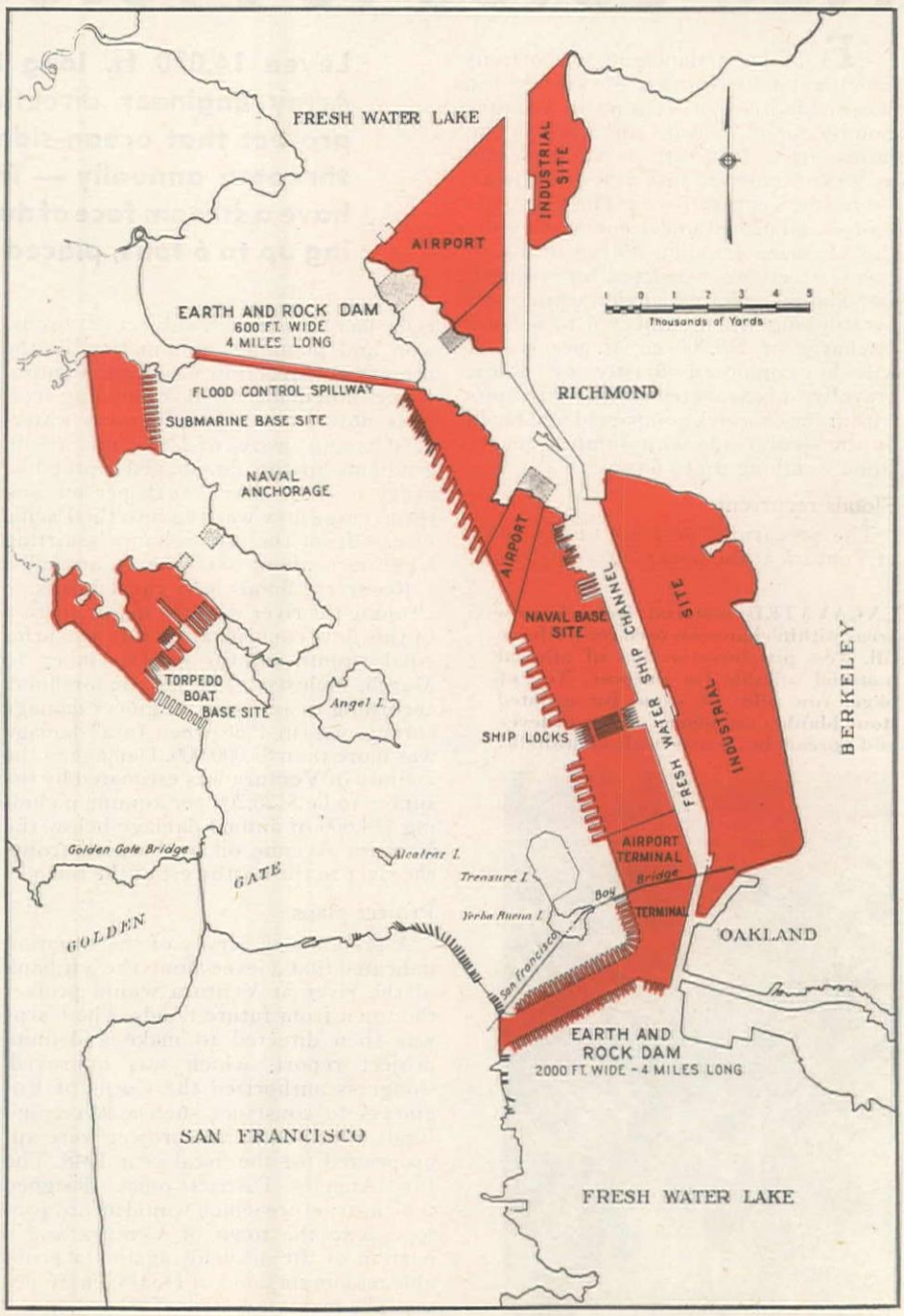
A salt water barrier was suggested many years ago, to prevent saline invasion of the delta, and further investigation made before 1931 finally determined that storage in the high mountains for power and irrigation would develop sufficient surplus water which could be expended for repelling that salt invasion and thereby save considerable expenditure for the salt water barrier. This was very good judgment at the time, and will remain so as long as there is an expendable surplus of water.

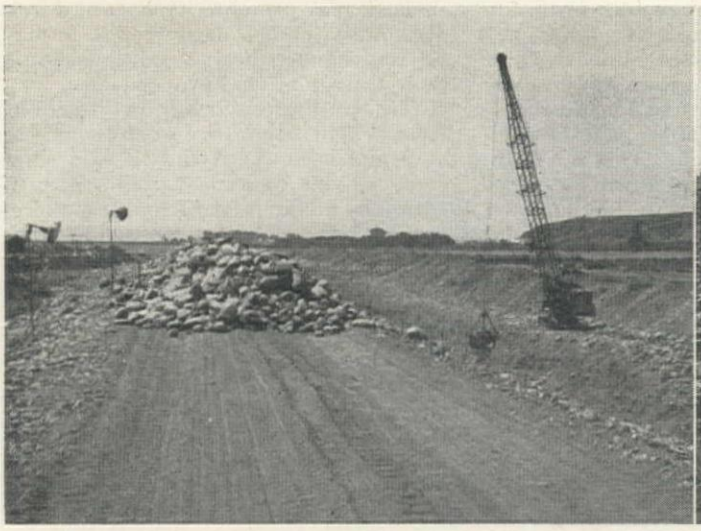
When the Bay Bridge was built, who imagined congestion would force authorities to advocate two more such structures by this time? Similarly, how long will it be before that stored water becomes too precious to waste in forcing back salt? This appears to be a future threat to the delta. The salt water barrier thus establishes a trap, or closed system, which gives maximum water conservation, providing the whole Bay Area with a supply close at hand and under control. The important feature of this plan, however, is that while providing maximum water conservation, it also throws in facilities for maximum bay transportation, as well as many other advantages with self-liquidating possibilities all wrapped up in the same package.

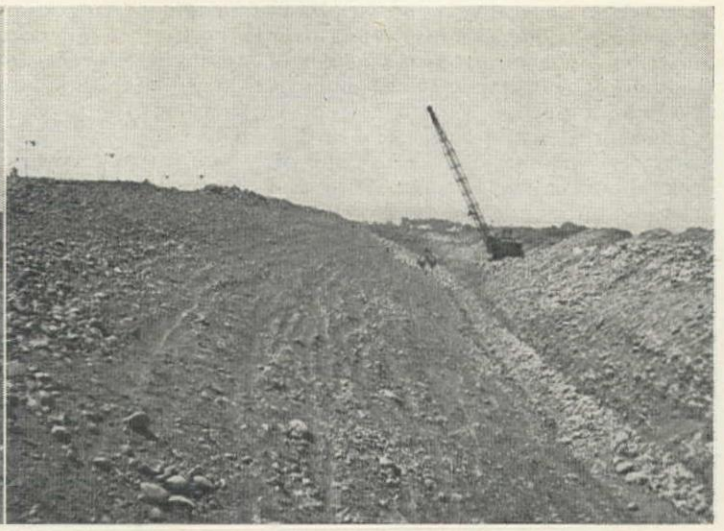
Rapid population increase, now experienced, may promote haphazard development, without a master plan. It may be later than we think, so no time should be lost in adopting a proper plan.

The San Francisco Bay Project (The Reber Plan) sponsors such a master plan and is now striving to gain sufficient backing to initiate proper investigation by eminent engineers. It is therefore high time for bay interests to agree on something for the future. In the process of developing such a plan, criticism and opposition is in order when constructive and based on facts. History has recorded the courage and effort required to overcome opposition to change or to plans necessary for prosperity and security. In this connection we should hark back to the vicious opposition to Gen. Mitchell's ideas.

CONSTRUCTION ELEMENTS of the Reber Plan. All areas shown in red are newly-created fill. Two earth and rock dams across the Bay will not only furnish ample transportation facilities for all conceivable needs, but will create two fresh water lakes, from which municipalities, industry, navigation, and agriculture will secure adequate supplies.







New Levee to Protect Ventura

Levee 14,070 ft. long being constructed under Army Engineer direction at Ventura, Calif., to protect that ocean-side town from floods which threaten annually — The levee, 18 ft. high, will have a stream face of dumped quarrystone weighing up to 6 tons, placed on grouted stone blanket

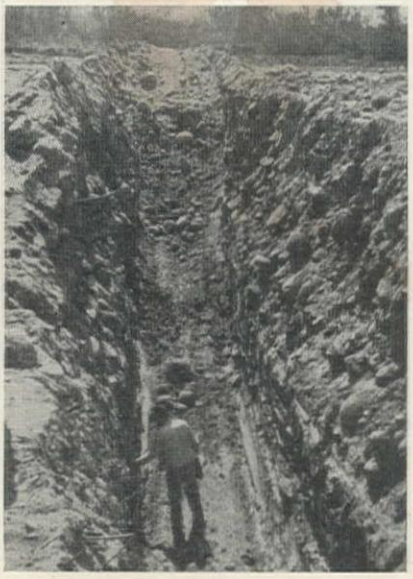
FLOODS of damaging proportions which annually continue to threaten the ocean-side town of Ventura in Ventura County, Calif., will be contained in the future by a 14,070-ft. levee presently under construction just west of the town along the Ventura River. The levee, designed and placed under contract by the Los Angeles District, Corps of Engineers, is being constructed for strength and stability against undercutting and overtopping when subjected to a flood discharge of 150,000 cu. ft. per sec. It will be composed mostly of sandy, gravelly soil excavated from borrow pits within the channel, compacted and faced on the stream side with dumped quarry stone weighing up to 6 tons.

Floods recurrent

The precarious position of the town of Ventura at the lower extremity of the river has long been a subject of discussion and planning, culminating in the present construction program. Ventura River, noted for its flash-flooding, collects flow from a mountainous watershed having an area of 228 sq. mi. Stream gradients in the fan-shaped watershed range to more than 800 ft. per mi. and the average flow wasting into the Pacific Ocean from the wide channel skirting Ventura is about 68,000 ac. ft. annually.

Recurrent floods have caused damage all along the river with the major portion of this flow concentrating into the principal runoff months of December to March, inclusive. The last major flood, according to an Army Engineer damage survey, was in 1938 when total damage was more than $1,000,000. Damage in the vicinity of Ventura was estimated by the survey to be $126,200 per annum, including $84,600 of annual damage below the Ventura Avenue oil field which fronts the river to the northwest of the town.

EXCAVATED material from borrow areas within channel is used for the levee fill. Test pit shows section of alluvial material suitable for purpose. Top of page, row piles of stone for grouted stone blanket are placed on top of levee and spread by cranes with clamshells.



Project plans

A preliminary survey of the situation indicated that a levee along the left bank of the river at Ventura would protect the town from future floods. The Corps was then directed to make a definite project report, which was approved. Congress authorized the Corps of Engineers to construct such a levee, and funds allocated to the project were appropriated for the fiscal year 1948. The Los Angeles District office designed such a structure which would afford protection to the town of Ventura and a portion of the oil fields against a probable maximum flood of 145,000 cu. ft. per sec. The maximum flow of record on the Ventura River, taken in 1938 at a point 5 mi. upstream, and with one tributary between the gaging station and the mouth, is 39,200 cu. ft. per sec.

Plans and specifications were prepared and forwarded to the Chief of Engineers, Washington, D. C., and approved by him. In December, 1947, bid offers were invited, and on January 27, 1948, contract was awarded to A. Teichert & Son, Sacramento, Calif., on their low bid of $984,640.50. Completion time of the contract is 240 days.

The levee will extend from the Pacific Ocean to Canada de San Joaquin, which is about 2.6 mi. upstream. Average

JOHN HEINMILLER is Resident Engineer on the Ventura Project for the Los Angeles District, Corps of Engineers.

height of the levee will be about 18 ft. above the general streambed with the slope of the stream face being 1 to 2.25.

Fill from channel

Excavation from borrow areas within the channel for the levee fill, as well as providing a ready and economical source of suitable material, is serving another purpose. The stream in its natural state as it passes Ventura meandered in such wide curves that the new construction cuts the old bed off at various points. The borrow areas are being graded to realign flows of water so that a channel will be established away from the levee.

Fill for the levee is being placed in horizontal 12-in. layers and compacted. Well graded coarse material from the borrow areas is being routed to the river side of the levee and predominantly fine material is placed on the shore side.

Facing stone from quarry

Quarry-stone of 6-ton maximum weight and of a quality that will not disintegrate under the action of air and water is being obtained from a quarry site in a canyon approximately 20 mi. northwest of the construction, and is being transported to the site by a fleet of dump trucks. The huge stone for the levee face, specified to be angular with greatest dimension not to exceed 3 times least dimension, is quarry run graded with about 50 per cent weighing 3 to 6 tons, about 35 per cent varying from 500 lb. to 3 tons, and the remainder weighing from 10 to 500 lb.

The stone is being placed so that a minimum of voids will result and a reasonably smooth surface obtained, with the variation in height of the exposed surface of any two adjacent stones not exceeding 12 in. The stone is being dumped carefully at the site so that a small amount of barring is required to secure the specified results.

Material for the grouted stone blanket upon which the facing is being placed consists of cobblestones obtained from the borrow excavation. This stone, uniformly graded in weight from 10 to 500 lb., is processed at a vibrator-type grizzly located at the borrow area for the new channel. A dragline crane delivers excavated material to the grizzly which screens and splits the mixture into size below 5 in. which is used for construction of the levee fill and 5 to 12 in. material which is used for the grouted cobble face. The ratio of waste to usable material from the grizzly is about 5 to 1. The cobblestone is conveyed directly into dump trucks at the grizzly.

Placing stone blanket

Row piles of stone are deposited along the top of the levee and the streambed below. A crane above, and one below near the toe of the levee, each equipped

CONSTRUCTION VIEWS. Top to bottom: quarrystone is obtained from canyon site 20 mi. from job location; view in easterly direction from ocean end of partially completed levee, town of Ventura just to right; operations at the grizzly where excavated material from channel is processed, and dressing the slope with dozer-grader team.

INITIAL construction of the stop-log structure, left, which is being provided to allow a railroad branch to cross the levee and will block flow under extreme flood conditions. Drainage structure providing outlet from Ventura under construction, right.

with a clamshell bucket, spread this stone on the slope subgrade to specified depths. This blanket is then dozed in place by a tractor-dozer which travels horizontally along the sloping face of the levee and is held on its precarious course and prevented from tumbling to the streambed below by a second tractor, travelling parallel to it along the top of the levee and holding it in place by means of a steel cable and power unit.

After the stone has been placed, it is flushed with water to wash down the fines prior to grouting, and the stone is kept wet ahead of the actual placing of grout. The grout, with a cement content of 7½ sacks per cu. yd., is being placed in two courses in successive lateral strips 10 ft. in width extending from the toe of the slope to the top of the levee.

The grout is being discharged on the stone using a splash plate to prevent displacement of stone directly under the discharge, with flow being directed by baffles to assure that all crevices are filled. Tight pockets of stone are barred to aid the penetration of the grout. The first course of grout is of sufficient thickness to assure full penetration of the stone blanket, and the second course is placed as soon as the first course has begun to stiffen so that a new flow will not be started by the additional weight of the second course.

Stop-log structure

A stop-log structure of interesting design is being provided where a branch of the Southern Pacific Railroad crosses the levee. This consists of two reinforced concrete cantilever-type abutment walls, "L"-shaped in plan, extending from approximately 3.5 ft. below the top of rail elevation to the top of the project levee. The walls are designed against full hydrostatic pressure of the water face. A concrete sill between the walls will preclude seepage or flow between the base of the rail and the top of the slab, and a narrow bank of plant-mixed bituminous material completes the cut-off to the top of the rails and provides a seat for the lowest stop-log.

The 6 by 6-in. aluminum "H" beams which will span the opening of 20 ft., 6 in. between the vertical walls of the structure will block flows under extreme flood conditions, and are designed as simply supported beams against full water load on the stream side. Clips welded to the flanges of the beams will insure accurate vertical alignment of adjacent beams to minimize leakage. Hand holes provided on each beam section will serve as handles for placing and as a means of chaining the members to a supporting rack for storage at the end of the off-set levee.

Personnel

Colonel A. T. W. Moore is District Engineer for the Los Angeles District, Corps of Engineers. The Operations Division, of which Wm. J. Leen is chief, is in charge of the job. Resident Engineer is John Heinmiller. Robert P. Brock is superintendent in charge of the work for A. Teichert & Son.

Southwest Natural Gas Companies to Construct Extensive New Facilities

THE FEDERAL Power Commission recently authorized El Paso Natural Gas Co., Southern California Gas Co., and Southern Counties Gas Co. of California to construct and operate additional facilities for the transportation and sale of natural gas.

Construction of the authorized facilities will increase El Paso's daily delivery capacity from 166,000,000 to 246,000,000 cu. ft. of gas in Texas, New Mexico and Arizona; from 305,000,000 to 405,000,000 cu. ft. daily at the California-Arizona boundary for delivery to the Southern California companies and will permit the sale, for a three-year period, of 17,000,000 to 31,000,000 cu. ft. per day to the West Texas Gas Co. The additional gas available in Arizona permits service to the cities of Yuma and Nogales. El Paso expects to begin construction of the facilities immediately and to complete them by Oct. 1, 1951. Deliveries of the 80,000,000 cu. ft. daily in Arizona, New Mexico and Texas would commence not later than Jan. 1, 1950, the company said.

The facilities authorized include approximately 450 mi. of 30-in. transmission loop line paralleling a portion of the present 26-in. pipeline from Lea County, New Mexico to the Colorado River near Blythe, compressor facilities with an aggregate of 70,900 h.p. additional branch transmission lines, gathering lines, and appurtenant facilities. Cost of the project is expected to approximate $56,000,000.

The Southern California companies were authorized to construct and operate approximately 88 mi. of 30-in. pipeline to loop in part its existing pipeline from the California-Arizona boundary near Blythe to the Los Angeles area; to build about 15 mi. of 30-in. pipeline extending from a point on the Texas-to-California line near Riviera, Calif., to an existing measuring and regulating station at Slauson Blvd. and West Ave. in Los Angeles; and to add units totaling 4,000 h.p. to its compressor facilities. Cost has been estimated at $10,040,000. The construction would increase the capacity of the two companies' Los Angeles line from 305,000,000 to 405,000,000 cu. ft. daily in order that they can transport to their markets the additional 100,000,000 cu. ft. daily to be received from El Paso near Blythe. The California companies expect to complete construction so that deliveries can be commenced not later than Oct., 1951.

Present financing plans of the El Paso company call for the sale of $20,000,000 at 3½ per cent convertible debentures and $36,000,000 of 3¼ per cent first mortgage bonds at private sale to six insurance companies.

A PIPELINE crew of 140 men is laying 3 mi. of 6-in. pipe a day to link the Pilot Butte Oil Field near Riverton, Wyo., to Casper, Wyo., refineries. The line is being built at the record speed by the C. F. Whitaker Co. of Fort Worth, Texas, for the Stanolind Pipeline Co.

Timber Flume Replaced By Steel on Utah Mountainside

Flowline above Olmsted hydro plant of Utah Power & Light Co. replaced in record time under a "blitz" schedule because of the short time plant could be out of service—Four-legged supporting pedestals, flexible expansion joints and overflow spillway feature design of 102-in. thin-shell coated steel pipe

By HAROLD BOEHMER
Engineer, Utah Power & Light Co.
Salt Lake City, Utah

THE ALMOST Herculean task of demolishing two and three-quarter miles of timber flume 10 ft. wide by 7 ft. high and replacing it with a giant 8 ft., 6 in. diameter steel pipe flowline along a winding and precipitous canyon wall, all in the short span of 91 days, has recently been accomplished at the Olmsted hydroelectric plant of the Utah Power & Light Co. in Provo Canyon, about 40 mi. south of Salt Lake City.

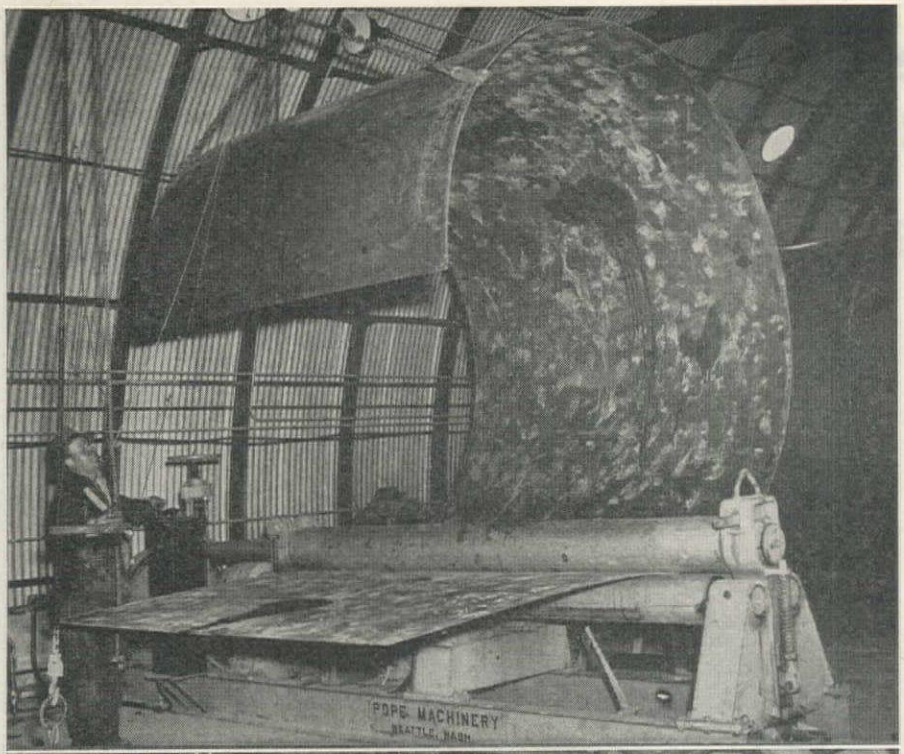
An interesting sidelight to this saga, and one which truly reflects the progress of the West, is the fact that only about 40 years ago when the nearby Battle Creek hydroelectric station was constructed, the 3,300 ft. of steel penstock pipe (of much smaller diameter than this one) was imported from Germany via boat to Galveston, Tex., and then overland by rail to the plant site, a total distance of some 8,000 mi., whereas today steel plate for the "big fellow" at Olmsted came from the Geneva Steel Plant, practically at the doorstep of the Olmsted plant, and was fabricated as close at a temporary shop set up for the job by Morrison-Knudsen Co., Inc., and Olson Manufacturing Co., joint contractors for the project.

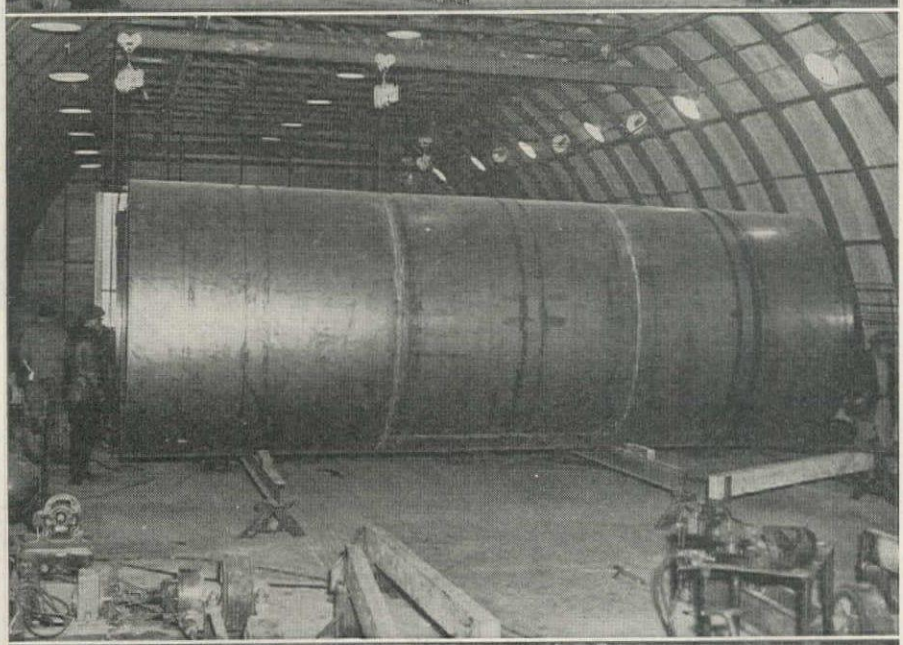
It was indeed this proximity factor which, together with the general economy of the design, effected a price differential of considerable proportion in favor of the adopted design over numerous other types of waterways studied, including concrete flume, timber box flume, semi-circular wood stave flume, semi-circular metal flume, etc.

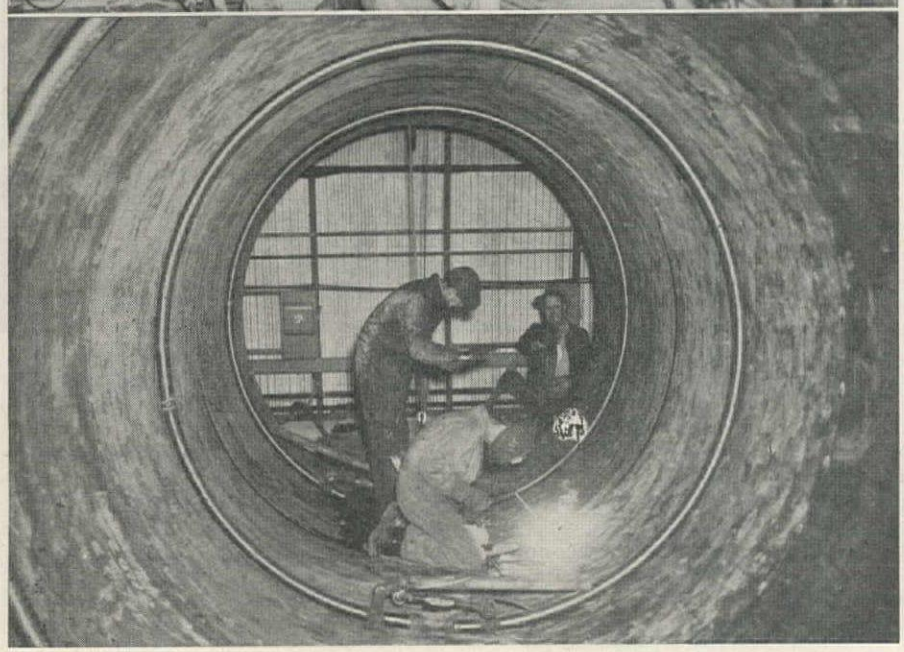
Thin shell pipe

The steel pipe design adopted is not a pressure line except for two syphons along its course. It is provided with air-vent pipes of 24-in. diameter at intervals of 500 ft. over its entire length and is to operate at various capacities which will produce flow conditions from ½ full to completely full and at maximum capacity there will be a nominal head in the vent pipes in the upper portion of the line. The plate size is 3/16 in. over the entire length including the two syphon sections, one of which carries a head of approximately 40 ft. at its lowest point. The grade is one foot per thousand feet.

The design incorporates the economy of a thin shell conduit supported in ring girders at intervals of from 24 ft. to 48 ft. spans in accordance with terrain conditions. The ring girders, made of 4-in. structural Tee sections are, in turn, supported at the horizontal diameter by two short legs and base plates which rest on footings or on trestle bents as the case may be. Except for specifically located anchored supports, the pipe line is free to move on the footings to accommodate expansion and contraction due to temperature changes. The moments and stresses in the ring girders







are calculated from formulae developed from the theorem of least work. The economy is effected through the optimum positioning of ring girder and supporting legs to bring about the greatest balance between the moments imposed on the system by the water load and those counter-imposed by the reactions or supports.

"Blitz" construction schedule

Due to the unprecedented demand for electric energy, the operating schedule for power generation is extremely close and hence this plant could only be spared from the system for 91 days during the "spring run-off" season when reservoirs at other generating stations could be maintained at relatively high levels. All possible preparations were made for the "blitz" construction to facilitate operations and make certain of scheduled completion. The field sections were, for the most part, 24 ft. long, made up of three 8-ft. sections butt-welded together in the shop with one ring girder in place. For weeks before the scheduled "switch-off," as many as possible of these sections were hauled to or near their grade positions on specially constructed trucks and trailers over sometimes tortuous access roads built for the project.

In order to eliminate delay and impedence of pipe line laying by concrete work and curing time, a special steel pedestal was designed for prefabrication and distribution. These pedestals had feet with sufficient bearing area to support the empty pipe adequately. As laying of the pipe line progressed, these pedestals could be concreted in with relative ease without interference with assembly crews. The resulting concrete pillow block forms a foundation adequate for supporting the loaded pipe line.

The plant was scheduled to be taken out of service and construction operations to begin on the $720,000 project March 7, 1948. The first operation was the removal and disposal of the existing timber flume, and the trimming and rehabilitation of the grade to accommodate the new pipe line. Each and every shop section was stenciled with its own piece-mark number and had a specific and precise position in the line. Laying, fitting and final welding of line was started in several locations along the grade with independent crews and equipment to facilitate simultaneous erection of large portions of the flowline and eventual joining of the portions into the completed project.

The pipe was shop treated on the inside with bitulithic enamel to a thickness of approximately 3/32 in., and with zinc chromate primer on the outside. After erection the outside was finished with aluminum paint.

FABRICATING 102-in. steel pipe for Olmsted flowline in the shop set up by Olson Manufacturing Co. near the project: Top, rolling flat sheets into 8-ft. long sections; Center, 24-ft. section ready for welding stiffener ring at the end; Bottom, welding three 8-ft. sections into one 24 ft. long. Note temporary interior stiffener rings.

There were, of course, numerous problems and contingencies confronting the determined enterprisers, but the most stubborn resistance encountered were the forces of nature under the command of "General" Weather. The first half of the limited period was dogged with frequent snows, winds, rains and mud which made operations with heavy mobile equipment extremely difficult. However, with May came more accommodating weather. Additional shifts were employed and operations were extended "around the clock" and at 3:00 A. M., June 6, the headgates were opened and water sped through its new course to the generating units; just 91 days after the artery had been cut, and exactly on schedule.

Special features

Three unusual and ingenious engineering features mark this project for distinction. They are: (1) the steel footing pedestals, (2) flexible expansion joints and (3) a double syphoning spillway. The first of these, the steel pedestals, have already been mentioned but a brief discussion of their technical features and function is in order. The required soil bearing area for the loaded pipe necessitates a concrete pillow of rather wide proportions. Such a foundation must either be deep enough for proper stress distribution or must be structurally reinforced. The former is cumbersome, the latter complex, and both are costly. The design and employment of the pyramidal four-legged flat top steel pedestal was the solution to several problems. First, it provided quick and adequate support for the empty pipe in the construction stages; second, it provided load distribution to the concrete pillow, minimizing the reinforcement required; third, it permitted the concrete work to be carried on apart and independently from pipe erection without mutual interference; and fourth, it provided an excellent table or surface for temperature movement of the pipe with respect to the bases.

The flexible expansion joints were developed as a solution to a somewhat rare problem. The course of the pipe line crossed a mud slide area where the ground was not stable and where many times the whole area has moved or slid distances ranging from inches to feet. There was no practical possibility of avoiding this area. Hence, the development of the flexible joint permitted the construction of a flowline across this area which literally floats and may move within considerable limits with the land. The joints are spaced every 48 ft. across this area, with a ring girder support 4 ft. each side of each joint. The joint itself consists of a 6-in. gap in the steel pipe bridges by a rubber tube of the same diameter as that of the pipe. The tube is ⅜ in. thick and 18 in. long. The 6-in. laps are clamped to the pipe with steel cinch bands. A small angle-iron stiffening flange is welded to the pipe just beyond each end of the rubber tube. These flanges support a free steel sleeve which covers the entire expansion joint. The sleeve is also made of 3/16-in. sheet and to a diameter allowing about ½ in. radial clearance over the flanges. Thus the steel sleeve supports the rubber tube in much the same manner as an automobile tire casing supports the inner tube. The free sleeve with the large radial clearances permits a wide range of movement between the pipe sections in any direction.

PIPE SECTIONS being placed on pyramidal supports by mobile crane. About 14,400 ft. of the pipe was laid under the Morrison-Knudsen Co. contract in 91 days. Below, MAJ. HAROLD BOEHMER, construction engineer on the project, who wrote article.

Overflow spillway

A spillway is required at the lower end of the pipe line where the course tunnels through the rock cliffs before entering the pressure box at the head of the penstocks. When generating load is suddenly dropped off, the flow must be diverted before the pressure box can overflow. To accomplish this, a spillway is provided at the tunnel entrance portal. A transition section brings the flow from round pipe to the open "U" shaped spillway structure. To spill directly over the side of the "U" with a weir crest of allowable height would require a long crest and an expensive structure besides a wide spill race.

By providing two syphon hoods and

conduits outside the open "U" section and over the sides so that their entrance openings are horizontal and at the elevation of the maximum operating water level, any rise in level above this elevation will spill into the syphon throats and start syphoning action. The two throats combine into a single discharge spout. The size and head are designed to pass the maximum capacity of the flowline. When the water level in the line drops below this elevation, the syphon entrance is exposed and the action ceases. Thus a concentrated spill of full capacity is effected which requires only a narrow spill race. The spill stream is also directed out horizontally which keeps the foundations and supports dry. When not in action the syphon system is dry and hence free of freezing problems.

Arizona Power Shortage Cut by New Plant Output

COMPLETION of a $3,000,000 expansion at the Central Arizona Light and Power Company's steam generating plant west of Phoenix marks the first step in the utility's $10,000,000 expansion program. Operation of the new unit means the end of agricultural power rationing and a general easing of the Central Arizona shortage. Effects of the new generator will be felt over almost the entire length of Arizona since the company's power network extends from Tucson to Flagstaff in northern Arizona and to the Colorado River on the west border.

The steam plant was considerably expanded in order to accommodate the new steam turbine unit, manufactured and installed by the General Electric Co. Five bays were added to the existing 12-bay steam plant structure and a gas and oil fired boiler was installed to furnish steam under 900-lb. pressure to the turbo-generator which operates at 3,600 r.p.m. Total generating capacity of the plant is now 74,000 kw.

Steam used to run the turbines is condensed and reused. A cooling tower for water used in the 31-ft. high condenser towers is 193 ft. long and 32 ft. wide. It is capable of cooling 28,000 gal. per min. of water. It requires 85,000 gal. per min. of water to operate the plant's four turbines.

Additional features of the current expansion program will be completed within the next two years. A 15,000-kw. generator and 60,000-kw. unit are now being manufactured and will be installed before 1950.

Change in Cheyenne Compact

A TENTATIVE REVISION of the proposed Cheyenne River Compact between Wyoming and South Dakota has been completed at a meeting of compact commissioners from both states meeting recently at Cheyenne, Wyo. The revision, suggested by Wyoming State Engineer L. C. Bishop, allocates waters of the Cheyenne River and its tributaries with 25 per cent going to Wyoming and 75 per cent to South Dakota.

San Diego to Vote on Bonds For Water System Expansion

GENERAL IMPROVEMENT of the water distribution system within San Diego is needed very much along with completion of certain works for which bonds were voted in 1945 and replacement of one of the main transmission lines serving San Diego from the Otay System, according to Water Department officials of the city. A $6,000,000 bond issue is proposed and will be voted upon by the people at the November general election.

Improvements proposed are:

La Jolla, Pacific Beach and Kearney Mesa

$2,300,000 for pipelines, reservoir and pumping plant. The Pacific Beach area has grown about 900% since the beginning of the war and it, as well as La Jolla, often has many areas out of water during peak use periods. A 36- and 30-in. pipeline will extend from the easterly city limits in Mission Valley across Kearney Mesa and Rose Canyon to a terminal reservoir on the south slope of Mt. Soledad. It will be the new supply main for nearly all of San Diego north of the San Diego River. Branch lines of 12 and 18 in. will supply Pacific Beach and Morena Blvd. Another branch line on Friars Road along the North side of San Diego River will supply a rapidly developing area in Mission Valley and reinforce the supply into the Morena Blvd. pipe lines. The first line to be constructed will be on Electric Ave., between Pacific Beach and La Jolla. This must be completed before the summer of 1949 if a serious water shortage in La Jolla is to be avoided. The pressure area on Mt. Soledad in La Jolla is to be divided into two areas by construction of an additional reservoir and pumping plant.

Completion of Alvarado Filtration Plant

This plant contemplated as a part of the 1945 bond issue can not be completed without additional funds due to increasing costs since the 1945 election. The total cost of this plant is now estimated at $3,000,000, of which $1,000,000 is already spent or under contract. There remains $300,000 in the 1945 bond issue and it is proposed that $1,750,000 will be made available from the new bond issue. Included in the treatment plant construction is a 12-in. line to carry the waste brine solution through Chollas Valley, discharging into Chollas Slough near the Bay.

The Alvarado Filtration Plant is located above the level of Murray Reservoir for the reason that this higher elevation will enable gravity deliveries of water into the city from El Capitan and San Vicente Reservoirs when passed directly through the plant. Murray Reservoir will be operated as a supplementary storage near the city and as a receiver for wash water from the filters, resulting in conservation of water. At times that Murray water is needed for use in the city, it will be pumped from the reservoir into the treatment plant by a pumping plant proposed as a part of this bond issue.

University Heights Regulating Reservoir

The north basin at this reservoir is too small and in bad condition. It is to be enlarged and a concrete roof constructed upon which a playground or tennis court could be located. The south basin is in bad structural condition and must be rebuilt completely, similar to the north basin, but during the following winter. The two reservoirs will provide much needed additional storage at the principal point of water distribution within the city. Cost is estimated at $500,000.

Bonita pipe line and miscellaneous lines

Repair and maintenance costs on the present Bonita line have been as much as $15,000 per year. This old steel line is a part of the transmission system bringing Otay water into the city and its replacement is essential at this time, the estimated cost being $450,000. Numerous 12- and 16-in. mains scattered throughout the city are also proposed, transmitting greater quantities of water into many areas where present mains will be interconnected. This will result in greater interchange of water from one area to another and especially between sources; the gridding will also permit balancing between areas in case of emergency.

The work all comes under the supervision and direction of Gerald E. Arnold, Director of Water Department, City of San Diego. Plans and specifications are being prepared for most of the work and it is proposed to start actual construction soon after the first of the year.

Columbia River Bridge Site Sought Near Kennewick, Wn.

SURVEYS have begun to determine the best possible site for a new bridge across the Columbia River about a mile upstream from the present river bridge near Kennewick, Wash. The proposed bridge will be an integral part of the Washington State Highway Department's plan to build a new four-lane highway from a point west from the Richland intersection to Kennewick following higher ground than the present highway.

It is also planned to build a new bridge over the Yakima River south of Richland about ¾ mi. upstream from the present bridge. This would provide a major traffic outlet south of Richland. Roads in the area are carrying a steadily increasing load due to developments at Richland and Hanford Works by the Atomic Energy Commission.

Dikes Will Protect Coachella Canal

DRAGLINE with a 4-cu. yd. bucket loads a bottom dump Euclid wagon working along the base of the San Bernardino Mountains where cuts were up to 150 ft. The dragline-wagon team was used for completing the upper 10 ft. of the dike.

Continuous system of dikes along high side of Coachella Canal in Southern California will protect it from flash floods, dissipating water through wasteways at strategic locations—Asphalt mats protect slopes in narrow flood channels

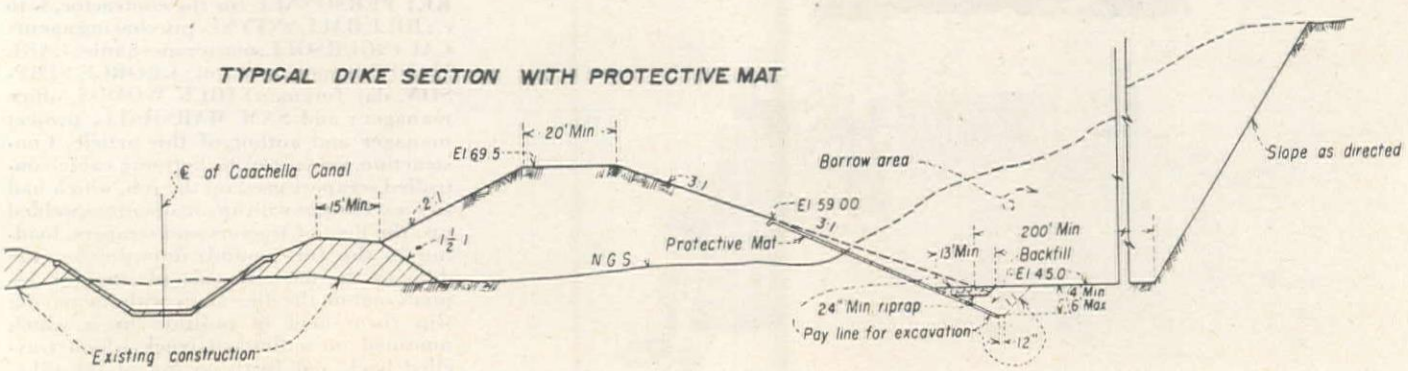
By S. A. MARSHALL
Project Manager
Marshall, Haas & Royce
Indio, Calif.

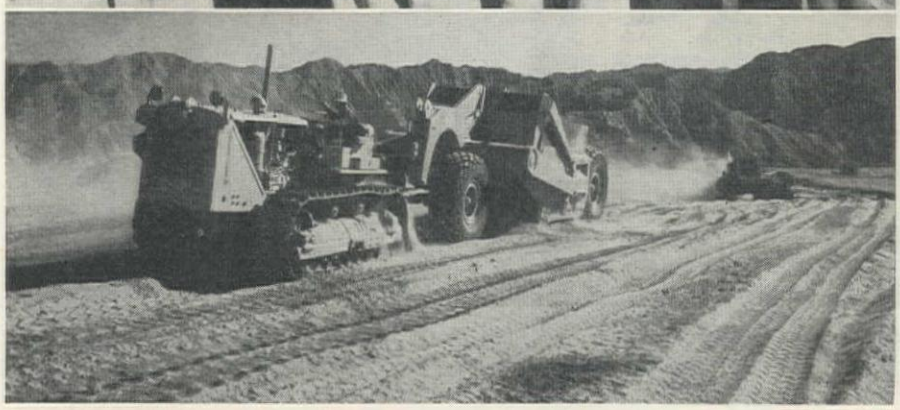
UPON COMPLETION of the Coachella Canal in southern California during the current year, the life-giving water of the Colorado River will be brought to the Coachella Valley. The Coachella Canal, a branch of the All-American Canal system, was authorized by the Congress under the Boulder Canyon Project Act approved Dec. 21, 1928.

The All-American Canal was commenced in 1934 and substantially completed in 1940. It begins at Imperial Dam on the Colorado River some 18 mi. northeast of Yuma, Ariz., and extends westward closely parallel to the Mexican Border for 80 mi., furnishing irrigation water to the rich Imperial Valley. The Coachella main canal takes off from the All-American at a point some 20 mi. west of Yuma. It follows a northwesterly direction across the desert lands lying to the east of the Imperial Valley, extends along the eastern side of the Salton Sea and the Coachella Valley until it approaches Indio in the center of the valley. Curving around the north central portion of the valley, it turns back along the west side of the valley. Upon completion, the canal will total 123 mi. in length. Construction work on the Coachella Canal was discussed in *Western Construction News* for Dec., 1946.

Since this Coachella Main Canal closely parallels the San Bernardino Range of mountains to the east, the engineers of the Bureau of Reclamation realized early that some protection would be needed to protect this vital flow of irrigation water from the flash floods caused by local thunder storms

TYPICAL DIKE SECTION WITH PROTECTIVE MAT





in the mountains, during which large streams of flood water would hit broadside to the canal and would undoubtedly cause severe damage to the canal as well as deprive the farmers of the valley of their irrigation supply.

Flood protection for canal

A continuous system of dikes running closely parallel to and between the canal and the mountains was evolved by the Bureau of Reclamation engineers in order to eliminate the necessity for the construction of numerous wash channels across potentially arable land. These dikes will impound the flood waters in a large ponding area, from which they will then be gradually dissipated through three wasteways at strategic locations, carrying the water under the main canal and through concrete lined channels down to the Salton Sea.

In several locations where the flood channel above the dike is less than 200 ft. in width a 6-in. asphalt mat is being placed on the slope of the dike to protect the dike from excessive erosion from the current in the flood channel. O. R. Sawley of Palm Springs, and Gunner Corporation of Pasadena, installed a Madsen hot plant for this purpose and the asphalt was placed with an Ekenstam Canal Paver. The paving slip form was pulled along the 2½-to-1 slope by a tractor using a 4-part line attached to the Power Control Unit, and held to its position on the slope by a winch mounted on a low bed truck which travelled back and forth on the top of the dike. Considerable interest was attached to this operation inasmuch as these asphalt mats were more or less experimental, the Bureau of Reclamation having heretofore favored concrete for this type of construction.

This dike construction was started during World War II, when J. F. Shea Co. constructed the first section of dike near Mecca. In Dec., 1947, contracts were let for 9,000,000 cu. yd. of earthwork dike construction to complete this flood protection phase of the project. Eight miles of the dike, involving 4,000,000 cu. yd. of earthwork was let to Marshall, Haas & Royce of San Mateo, Calif., and the remaining ten miles, involving 5,000,000 cu. yd., was let to Fisher & Crowe of Los Angeles.

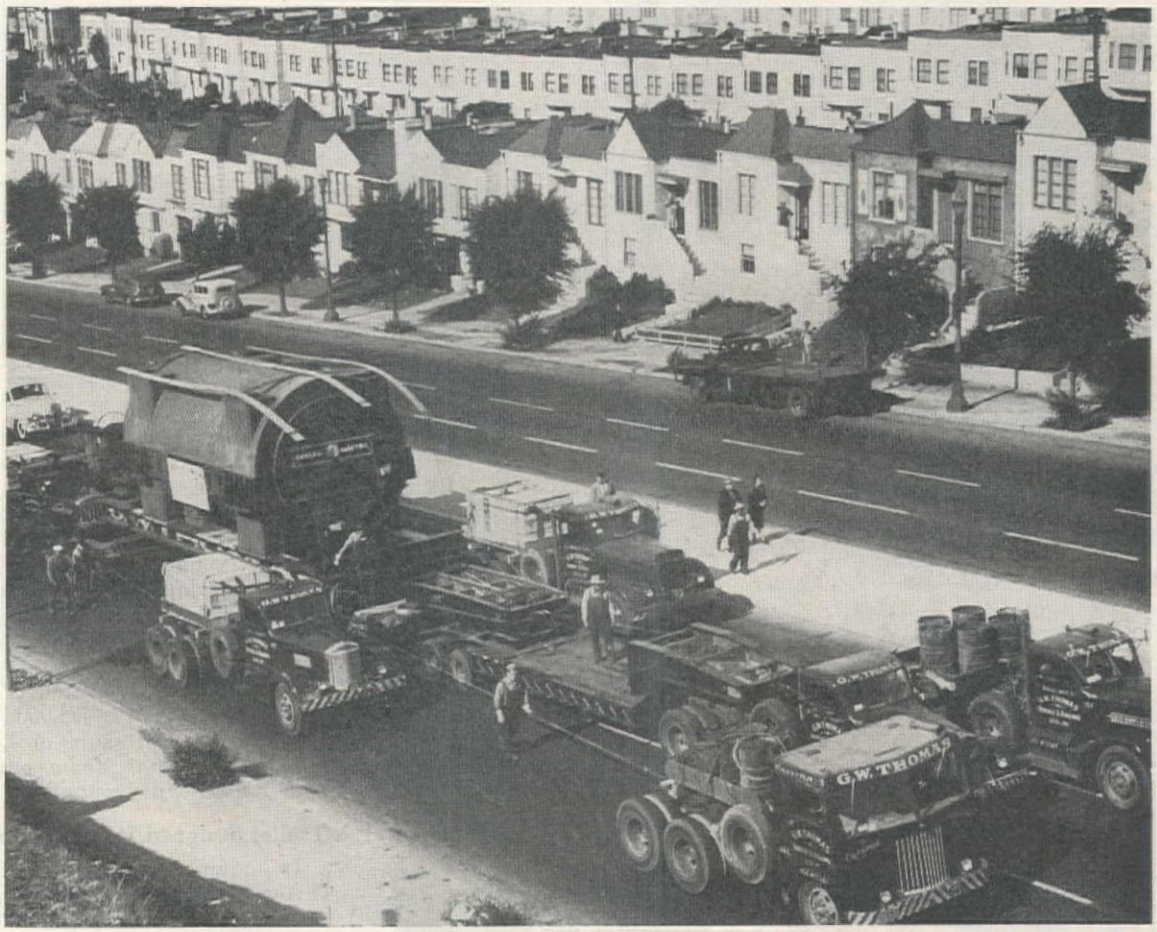
Excavation methods

Of particular interest was the work along the base of the San Bernardino Mountains where through cuts as deep

(Continued on page 99)

KEY PERSONNEL for the contractor, l. to r.: BILL BALLANTYNE, purchasing agent; CAL INGERSOLL, master mechanic; CARL MAUER, superintendent; GEORGE SIMPSON, day foreman; DICK WOODS, office manager; and SAM MARSHALL, project manager and author of this article. Construction views, top to bottom: cable-controlled scrapers used on the job, which had side extensions with apron openings welded up; the fleet of tractors and scrapers, loading in the foreground, dumping on the dike in the background; placing the asphalt mat on the dike slope with the paving slip form held in position by a winch mounted on a flat-bed truck which travelled back and forth on top of the dike.

Haul Heavy Power Equipment



MOVING at a top speed of 2 m.p.h., the 178-ton armature proceeds uphill on Bayshore Highway south of San Francisco using three traffic lanes. The specially-built truck with 74 wheels was powered by seven tractors, five pulling and two pushing.

Armature weighing 178 tons moved through San Francisco streets for P. G. & E. project using specially-built 74-tired truck powered by three tractors — In Los Angeles, special rig of two semi-trailers functioning as an articulated full trailer transports 100-ton transformers for Dept. of Water and Power

IN RECENT weeks, hauling of heavy electric power equipment has become a matter of importance both in San Francisco and Los Angeles.

Engineers of the Los Angeles Department of Water and Power find that, in order for its electric power service to be maintained without interruption, it is necessary to transport huge transformers from one station to another located throughout the metropolitan area. Some of the transformers weigh approximately 100 tons. The problem of how to haul them safely and quickly had to be solved or the sub-station system of power distribution would lack complete efficiency.

Steam generator

At about the same time, one of the heaviest and largest single railroad freight shipments on record was brought to San Francisco for a Pacific Gas & Electric Co. project. It weighs approximately 356,000 lb., or 178 tons, and is 24 ft. long by 12½ ft. in diameter.

It was shipped across the country on one of only three railroad flat cars capable of carrying such a load. This car has eight axles and sixteen wheels, instead of the customary four axles and eight wheels. The overall weight of the car and the shipment is 460,000 lb. (230 tons) and the total height is 17 ft.

The shipment was moved through San Francisco streets on a specially-built truck with 74 rubber-tired wheels and powered by three tractors, one pulling and two pushing. The truck weighs 110,000 lb. (55 tons), making the total weight of truck and cargo 466,000 lb. (230 tons).

This record shipment is the armature or stator of one of two huge, new General Electric turbo-generators for the P. G. & E.'s Station "P" steam-operated electric power plant at Hunters Point in San Francisco. Station "P" is being enlarged and its capacity increased from 62,000 hp. to 360,000 hp., at a cost of $23,700,000.

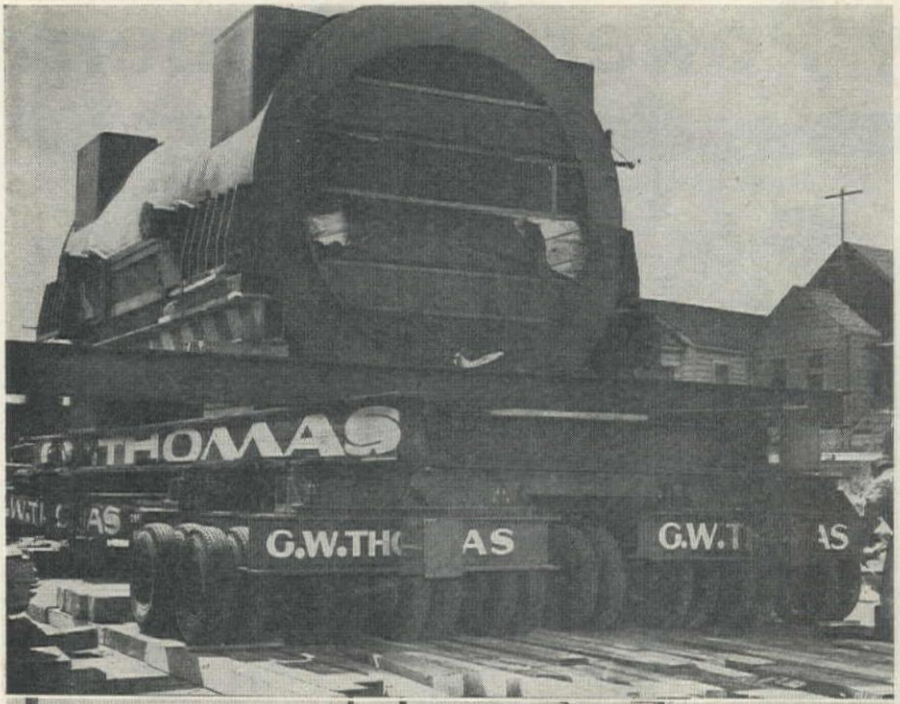
The capacity increase will be achieved by two new 149,000-hp. turbo-generators manufactured by the General Electric Co. at its Schenectady, N. Y. plant. The first unit is scheduled to go into operation in November and the second in January, 1949.

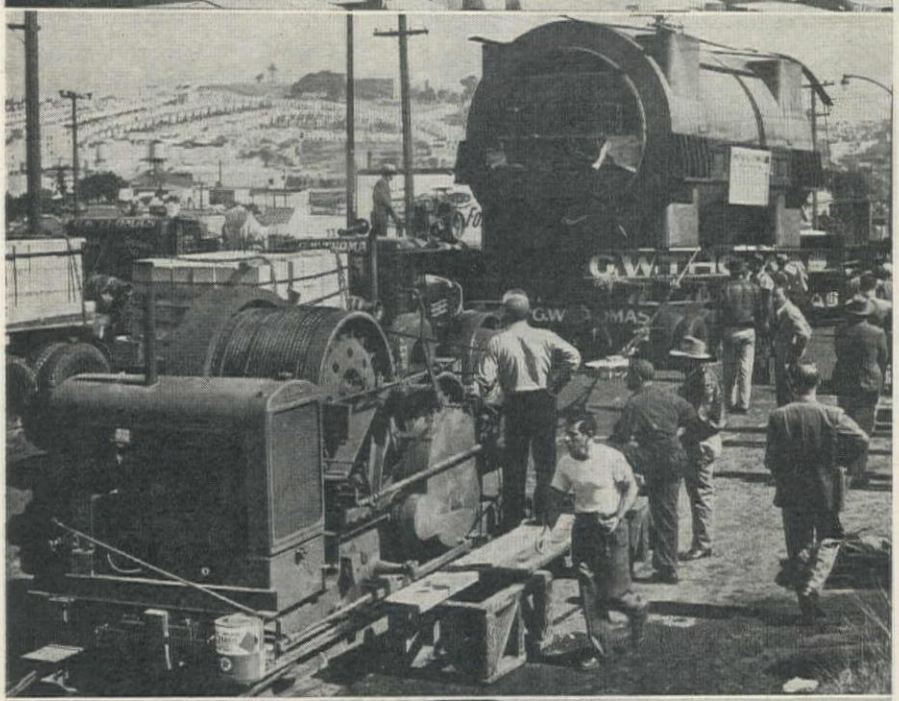
The armature was shipped July 26 from Schenectady to Streator, Ill., via the New York Central, over a route planned to avoid tunnels and bridges for which it was too large or too heavy.

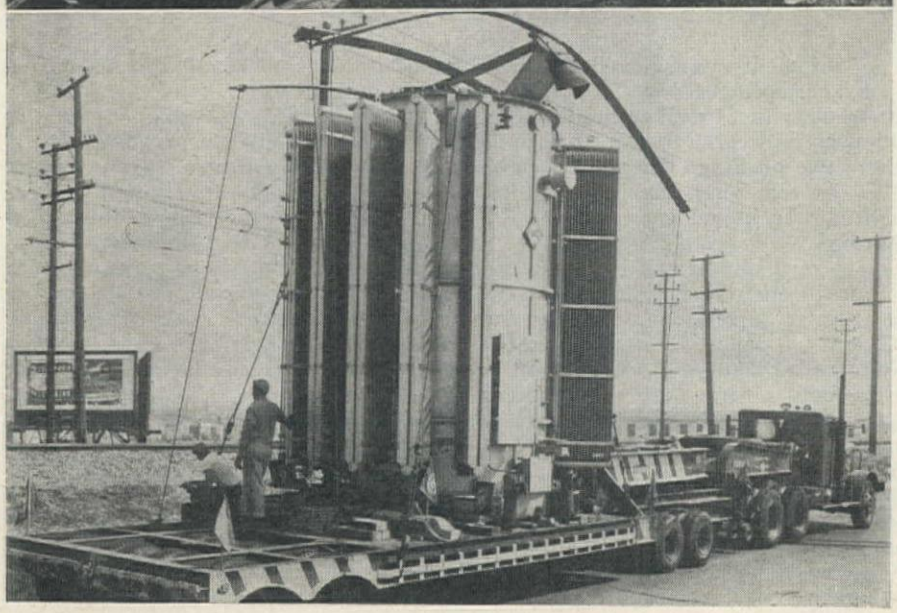
From Streator to Oakland the shipment was handled by the Santa Fe, with many special provisions for its protection. The armature car was the only loaded car in the train, the others being empty refrigerator cars en route back to California fruit-shipping centers. The train operated on a schedule specially arranged to assure speed and safety.

Rail detour to San Francisco

At Oakland the armature was turned over to the Southern Pacific for delivery to San Francisco. From Oakland it







traveled via Elmhurst, Newark and the Dumbarton Bridge to Redwood City Junction, and thence to San Bruno. There, because the huge load would not quite clear the four tunnels between San Bruno and the San Francisco terminal, the car was routed over what is now called the San Bruno Branch, but was part of the main Peninsula Line into San Francisco prior to 1907 when the tunnels were completed. By the use of the San Bruno Branch, the Southern Pacific delivered the armature at San Jose and Sagamore Sts., San Francisco.

Largest generators

The new turbo-generators for Station "P" will be two of the three largest of their type in the United States, there being one other in a recently-built plant in New Jersey. Each will be 62 ft. long and will operate at 3,600 r.p.m.

The turbines are of the tandem compound type. Steam coming from the boilers at high pressure operates the first end and then goes directly to operate the second end, both on one shaft.

To provide steam to operate the turbo-generators there are four huge boilers, two per generator. Each boiler is 105 ft. tall, 60 ft. long and 28½ ft. wide. The boilers will operate at 960 deg. F. and each will deliver 475,000 lb. of steam per hour at a pressure of 1,380 lb. per sq. in. The total steam output of all four boilers will be 1,900,000 lb. per hr.

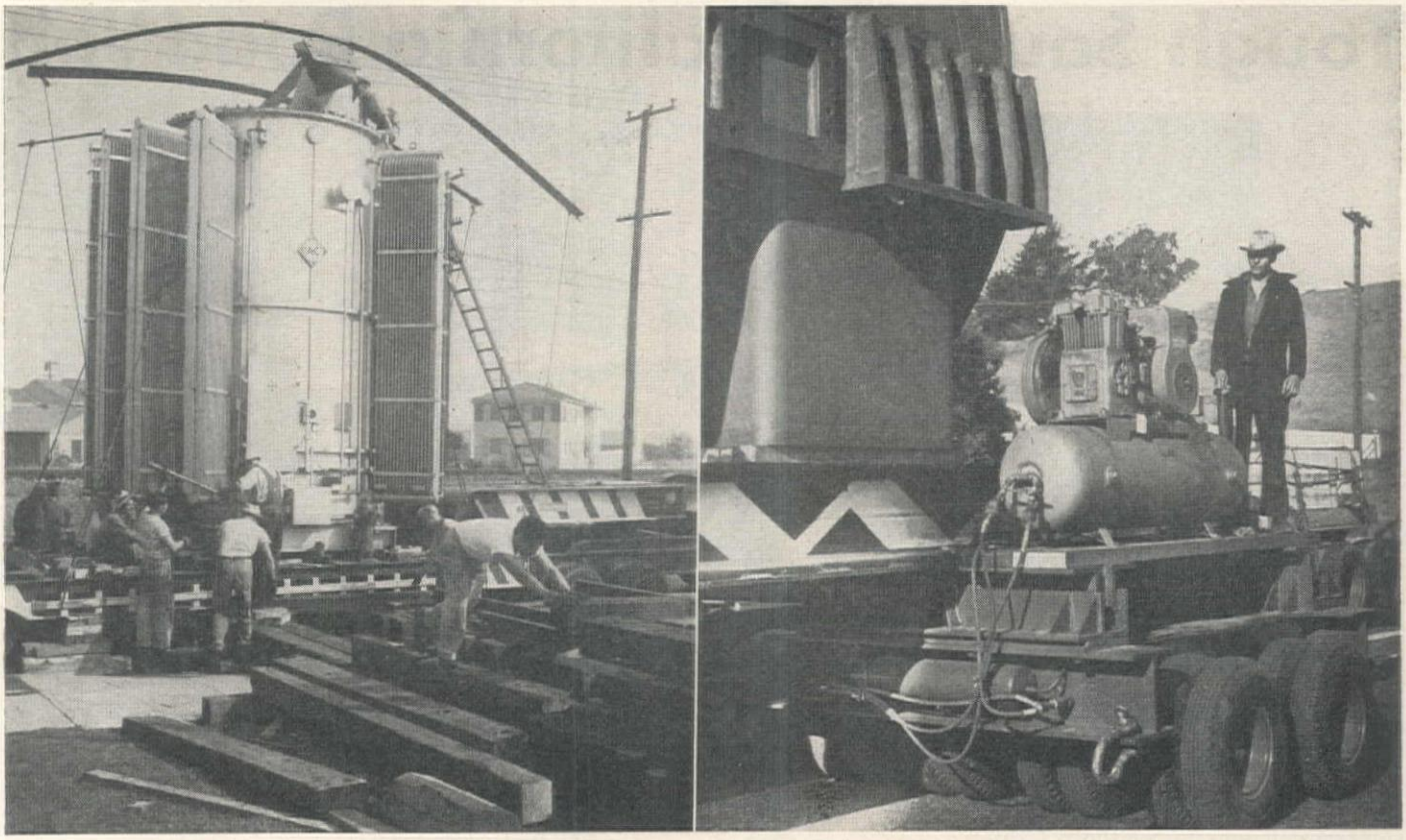
Trailer designed for generator haul

In moving the 100-ton transformers through Los Angeles streets, engineers decided that no practical transport method, other than by truck-trailer, could be considered. But, was there a trailer or could one be built that would meet all of the requirements? Not alone must the vehicle's weight-carrying ability be adequate. The trailer must be low to facilitate loading and unloading and permit clearance of overhead wires. It also would have to be high enough so it would not "bottom" the long span between wheels when negotiating gutters and similar street depressions. Distribution of the weight over the axles, maneuverability on turns and various other important factors had a bearing on all calculations.

Transportation engineers of the Department of Water and Power held numerous conferences with design and construction engineers of the Fruehauf Trailer Co. Finally, a satisfactory design was agreed upon and the Fruehauf Company was authorized to proceed with the construction of the trailer.

Necessity required that the trailer consist of two units—one a "jeep" of gooseneck construction, with the forward end supported on the rear axles of the tractor and the rear end supporting

FIRST of two 178-ton armatures bound for San Francisco is shown on its special mounting, top. Center, a winch at the top of a hill enroute kept the load from slipping during downhill movement. Bottom, the 100-ton transformer loaded on the "jeep" trailer. Two semis acted as articulated full trailer. Wood fenders protect top.



TEMPORARY "railroad," built to transport 100-ton transformers between power stations and trailer at Los Angeles, is being dismantled at left. At right, operator is working special compressor provided to operate air brakes on the back 32 wheels of the trailer used to transport P. G. & E's armature at San Francisco.

the forward end of the principal load-carrying trailer. The latter also is the gooseneck type. In reality, each unit is a semi-trailer as some part of its weight and that of its load rests upon and is carried by another vehicle. In combination the two semi-trailers function as an articulated full trailer.

Whereas the "jeep" is not designed with a load carrying capacity except in conjunction with its counterpart, the main trailer can be coupled direct to the tractor and haul a 60-ton load. As a single "semi," the department uses this unit to haul turbine wheels weighing 40 tons to the Boulder power station, more than 300 mi. from Los Angeles. These are referred to as "toy" loads.

A transformer weighing 100 tons stands 25 ft. high and with cooling fins attached measures 18 ft. wide. It contains 5,300 gal. of oil. It is equipped with wheels and for the purpose of transfer from a supporting foundation to the Fruehauf trailer or for removal from the trailer to the foundation rails are laid. Power for the pull is derived from a winch mounted on the truck.

Surety Company Takes Over Clearing Contract at Hungry Horse Dam Site

DELAYED clearing operations at the Hungry Horse damsite on the Flathead River near Devil's Elbow, Mont., have resulted in termination before completion of the contract held by the R & S Construction Co. The contract for clearing 1,335 ac. at and near the damsite was awarded to the firm in May, 1947, for $408,320 with 840 days allowed for completion. The year immediately following proved to be the wettest in history for the area, and with more than half of the completion time expired, only about 30 per cent of the contract was completed.

Seaboard Surety, bonding company, will take over the clearing contract. H. W. Jones, Minneapolis, Minn., their representative, will be in charge. J. J. Reese and E. C. Sever, the R & S partners, will probably be associated with Seaboard in some capacity. The same crews will be kept on the job and more men will be hired in the attempt to meet the contract deadline.

Another clearing contract for an additional 7,210 ac. is starting this fall in the reservoir area. Low bidders for this job were Wixon & Crowe and J. H. Trisdale, Redding, Calif., on a bid of $1,733,-880.

A satisfactory source has been found for the 3,500,000 cu. yd. of sand and gravel to build the concrete dam. The gravel will be obtained from near the junction of the Flathead River and its south fork just off Highway No. 2, 4½ mi. from the damsite. General-Shea-Morrison, Hungry Horse prime contractors, have for several months had this acreage under option. A gravel washing and screening plant is being designed for placement just below the damsite.

A contract to supply 12 mi. of conveyor belt for transporting sand and gravel to the damsite has been awarded to United States Rubber Co. Two sections of belting, each one mile in length, will be used for the main conveyor lines. The majority of the belting will be 30 in. wide. Installation of the conveyor system is expected to be completed by the summer of 1949.

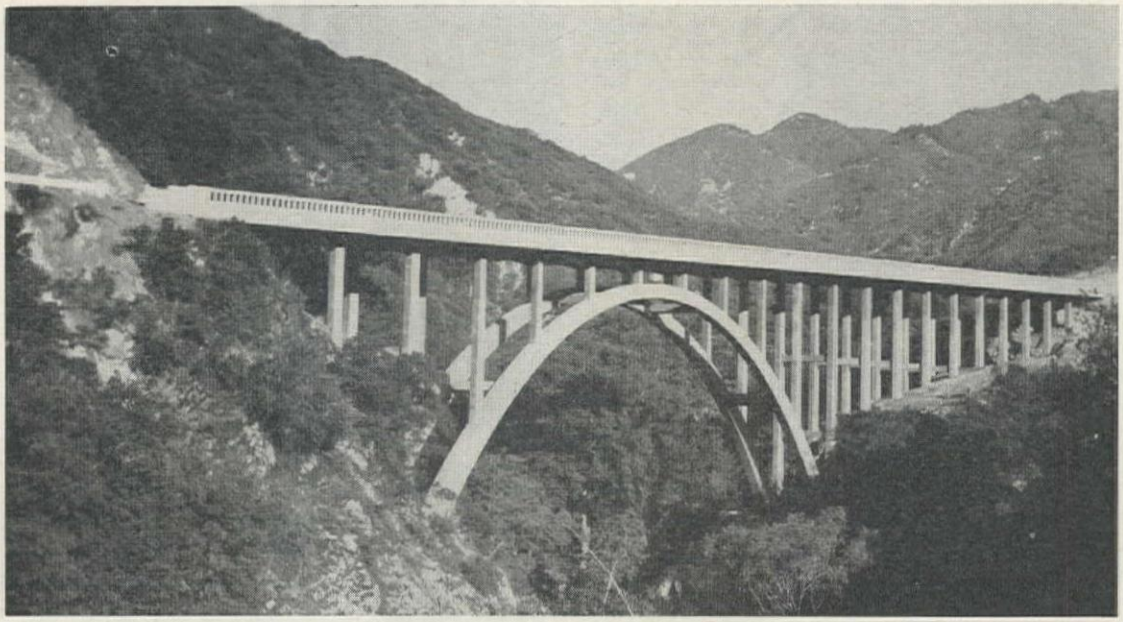
The multiple-purpose Hungry Horse Dam, world's fourth largest concrete dam, will be 2,115 ft. long, 520 ft. high, and will have a reservoir capacity of 3,500,000 ac. ft. The grand total of about 12,000 freight loads of cement will be used in its construction.

Title to Public Lands Available for Airports

LANDS in the public domain have been made available for development of public airports by the Interior Department of the U. S. Government. The new regulations enable the Department's Bureau of Land Management to transfer outright title of public land desired for airstrip purposes to states, counties and municipalities, with ownership reverting to the Federal Government when the land is no longer used for the purpose.

The Airport Leasing Act of 1928 allowed the Interior Department to rent public land to communities. The new regulations should stimulate aviation in the Western area, since applications are on file from nearly every Western state for the lease of public land for such purposes.

Tough Southern California Road Job



ARCH BRIDGE over City Creek, 430 ft. long and 130 ft. above the stream, blends well with the mountain locale.

New two-lane City Creek Road from San Bernardino to Rim of the World Drive, being rebuilt over 15-mi. length, has many huge fills with roadbed cut from rocky hillside and uses several interesting types of erosion protection

By S. C. GUNTER
Redlands, Calif.

ONE OF THE TOUGHEST construction jobs in Southern California is the new two-lane City Creek road, now being built by the California Division of Highways in the Southland mountain playground, the San Bernardino range. Unofficial estimates place the entire cost of the fifteen mile road near the four million dollar mark.

Connecting, as it will, the east end of Highland Ave., near San Bernardino, with the Rim of the World Drive, the new road will be a boon to motorists who at present are jamming the Waterman Canyon Road, the only main artery leading to both Big Bear Lake and Lake Arrowhead. As a more direct route to Big Bear, the new road will shorten driving time from the valley floor to this resort by half an hour. At present on peak traffic periods during week ends more than two thousand cars an hour pass over the two-lane Waterman Canyon route. This is three times the maximum number allowable for safety. By siphoning off the traffic bound for Big Bear from the Waterman Canyon route, City Creek road will aid materially in relieving this congestion.

During the past ten years many have advocated rebuilding the old City Creek road. A lumber company originally built it in 1891 and operated it as a toll road. Later it became a part of the county's road system. There have been many improvements since the original layout. Even so, those who have traveled over it in recent years remember it well because of the narrow road, heavy grades (15 to 20 per cent) and countless hairpin curves which have caused many people to become just as "seasick" as if they were aboard ship during a storm at sea. Permanent connections have been made with parts of the old road that are still intact. These will be maintained so as to be available in the event of forest fires.

Contracted in sections

The first leg of the new road (3.233 mi.) was completed in April, 1948. The Denni Investment Co. of Wilmington, Calif., had the $740,000 contract for this part of the road. Work is nearly finished on the second section. Westbrook & Pope of Sacramento was awarded the contract for this section, their bid being $744,000. Fisher & Crow of Los Angeles has been awarded the contract on the third leg of the road, with a bid of $703,000. The rest of the proposed road will be divided into one or two sections and bids will be called for in the near future.

Already completed, at the end of the first section, is an arch type reinforced concrete bridge spanning the west fork of City Creek. Towering 130 ft. above the stream, the bridge is 430 ft. long. Because the ends of the bridge meet solid rock on each side of the canyon, no approach spans are needed. As seen from the opposite side of the canyon, the symmetry of the bridge against the mountain backdrop forms an extremely interesting picture. Another bridge, of steel "I" beam design will be erected over the east fork of the stream. Most of the excavation is through granite rock that is extremely tough stuff to work with. It is badly broken up by fissures in all directions, which complicate blasting. Powder cannot be used to the best advantage because it is impossible to know which way the rock will crack.

The first leg of the roadway itself involves an increase in elevation of 785 ft. in only 3.233 mi., and yet at no point does the grade exceed seven per cent. The minimum radius of curvature is 250 ft. for a 120-ft. stretch. The design is for 40 m.p.h. with passing sight distance provided at frequent intervals. The first mile is planned for a safe speed of 50 m.p.h. This provides transition from the fast Highland Avenue to the more difficult alignment higher up the mountain. As the road leaves the valley it is built up 55 ft. above the level of the orange groves which flank it on either side.

The road is 26 ft. in width. It is paved with plantmix bituminous surfacing with 150-200 penetration paving asphalt three inches thick. This was laid with a Barber-Greene spreading machine and rolled with a three axle tandem roller. The shoulders are paved with oiled gravel.

Because the roadbed is cut out of the rocky hillside, there are many fills, the deepest one being 130 ft. high. It required 100,000 cu. yd. of material for this one fill.

Slope protection

Several types of erosion protection are being used. One of the most interesting is one which utilizes brush mats to minimize erosion.

It was necessary to change the alignment of the creek in two instances. In

these places selected rock slope protection was laid at the toe of the fill in order to keep the water in the stream from washing out the embankment. This was made by placing a layer of boulders several feet deep. The rocks, available in quantity, were placed individually by a Lima ¾-cu. yd. shovel.

With an improvised machine made of pipe, angle iron and a winch, brush was crushed into mats 25 ft. long, 5 ft. wide and 6 in. thick.

On each side of these mats there is placed a layer of 2 in. square mesh 14-gauge galvanized wire fabric, and the wire and brush are held together by 16-gauge galvanized wire ties. The mats are laid horizontally on the fill and are held in place by stakes driven through the wire. Originally the mats were laid in layers 2½ ft. apart with rocks and dirt between them. Because this required so much brush, the spacing of the mats was later changed to 10 ft. apart for the first 50 ft. of the fill and 15 ft. apart thereafter. On the early part of the job the mats were placed so that 6 in. of the mat extended beyond the fill, which gave a terraced appearance to the slope. Because of the difficulty of compacting the dirt, it was later found advisable to cover the mats completely.

In all, 25,000 lin. ft. of brush mats were used. Although these brush mats are highly successful, they will not be used on the other parts of the road. The chief objection is the immense quantity of brush that is needed to make them. Cutting the brush denudes the hillsides, and that in itself will permit considerable erosion.

Other protective devices

On the slopes of the fills, six tons of straw to the acre were spread and rolled into the ground. The straw was previously used for bedding the horses at the Santa Anita Race Track. These slopes were then seeded with a mixture of barley (50%), rye (45%), alfalfa (3%) and mustard (2%)—200 lbs. to the acre. This will grow after the first rain and reduce erosion. Baccharis Viminea, a hardy indigenous shrub, has been planted on the fills and will provide permanent protection from slope erosion.

PART CIRCLE down drains, above, consisting of half sections of pipe laid on the surface, are adequate to carry runoff and will not fill up with debris. Improvised machine at left below was used to crush brush into mats, center, which were placed on slopes above the roadbed as erosion protection, right. Old City Creek Road is visible at top of this view.

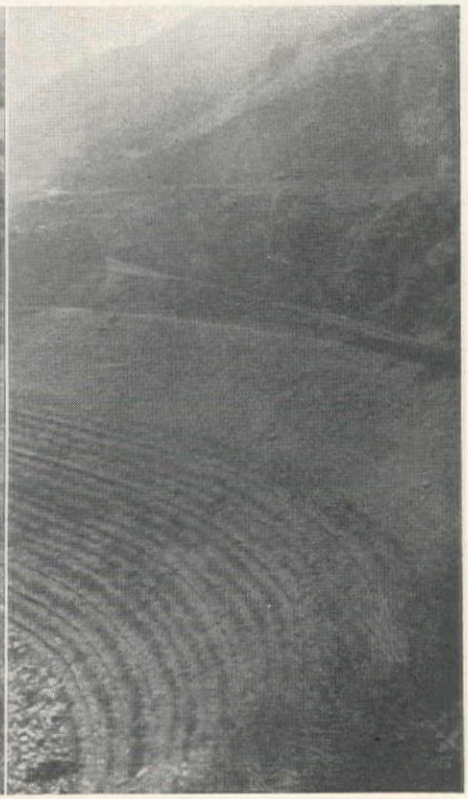
The rocks and dirt from the cuts, the deepest of which is 130 ft., were used for the fills. It was moved by Caterpillar scrapers (W. D. 10's) which are self-loading, have a capacity of 10 cu. yd., are rubber tired and have a maximum road speed of 40 m.p.h. Le Tourneau carry-alls and Koehring dumpsters of 6-cu. yd. capacity were also used to good advantage.

Galvanized metal bin-type retaining walls have been constructed in several places. These walls consist of a series of rectangular cells composed of metal units. The maximum height of these walls is 30 ft. The backfill is free of rocks (none larger than 6 in. at the greatest dimension) and progresses simultaneously with the erection of the vertical wall courses. This material is well tamped.

Drainage structures

Large amounts of concrete have been used in building reinforced retaining walls, box culverts, drop inlets, one underpass and the bridge. One of the chief problems is that of drainage. The drainage areas are steep and, when the water rushes down the hills, it carries brush and other coarse debris with it. The inlets of the culverts are kept high and the floors have enough gradient to pass the stream burdens without any deposition. Just so there won't be trouble during unusual storms, debris cribs are installed at the inlets of the pipe culverts which are located in draws. Most of the pipes will be corrugated metal except for reinforced concrete pipe where irrigation channels cross the road.

At one place where the City Creek Water Company's pipe line crosses the road, an underground reinforced con-



crete pipe carries the water. Here it was necessary to install a syphon with a 5-ft. drop.

Water lines of the Bear Valley Mutual Water Co. and the North Fork Water Co. also pass under the road in four places.

Surface ditches above the cuts and at the bottom of the fills have been constructed to assist in drainage and to minimize the danger of slides.

Drain pipes have slopes that range from five to 100 per cent. The slope on the cross drains varies from fifty to eighty per cent.

In some places part circle down drains are going in. These consist of half sections of pipe laid on the surface. Since they are open, there will be no danger of their becoming stopped up with debris that is carried down with the water. The fall is so great that they will be adequate to carry the runoff.

Southern Californians are anxiously awaiting the completion of the entire project. This is a limited access freeway, which eliminates the growth of unsightly roadside stands that would mar the scenic value of the route and create traffic hazards through loss of driver vision.

The work on this project is under the supervision of E. Q. Sullivan, District Engineer, California Division of Highways, District VIII, with offices in San Bernardino. Wayne H. Crawford is Resident Engineer, California Division of Highways, and John H. Horn is the California State Bridge Department representative. Tom McDaniel was in charge of construction for the Denni Investment Company.

Bond Issues and REA Loans Indicate Coming Construction for the West

FORECASTING construction work in the West in the near future are recently approved loans from the Rural Electrification Administration and bond issues passed by vote of the people in various areas or through appropriate action of governmental bodies. By states the loans and bond issues concluded in recent weeks are as follows:

California

The Los Angeles Department of Water & Power, through its commissioners, issued bonds totaling $19,000,000, of which $10,000,000 will be for construction in the water department and $9,000,000 in the electrical department; the Los Angeles County Board of Supervisors has provided $738,400 for building projects at Hancock Park and other parks in the county; the city of Ontario will receive bids Nov. 1 on a sewage treatment plant estimated to cost $750,000; the Elk Grove Sanitary District has approved bonds in the amount of $175,000; the city of Hayward has approved bonds in the amount of $160,000 for sewer lines; the Willits Union High School District has approved bonds for school additions amounting to $125,000 and the Willits Elementary School District, $250,000; the Redwood School District, Del Norte Co., approved bonds amounting to $43,878; and Plumas Co. approved high school bonds in the amount of $946,000.

Colorado

Kit Carson Electric Assn., Burlington, has received an REA loan of $3,575,000 for acquisition and rehabilitation of a 1,472-kw. generating plant and 128 mi. of distribution line from the Inland Utilities Co., and also for construction of a new generating plant with four 875-kw. generators, 90 mi. of transmission line and 1,025 mi. of distribution line; Southeast Colorado Power Assn., La Junta, has an REA loan of $197,000 for rehabilitation of headquarters facilities, a radio system, and 5 mi. of new line.

Idaho

Fall River Rural Electric Co-op., Ashton, was given an REA loan of $350,000 for headquarters facilities, system improvements and 53 mi. of new line.

Kansas

Norton-Decatur Co-op. Electric Co., Norton, was granted an REA loan of $1,100,000 for 700 mi. of distribution line, 10 mi. of tie line and system improvements.

Montana

Permanente Cement Co., Oakland, Calif., has announced plans for construction of a cement plant near Helena to cost approximately $6,000,000.

Nebraska

Southwest Electric Membership Co-op., Palisade, has an REA loan of $432,000 for acquisition and rehabilitation of a generating unit and 26 mi. of existing line, also for construction of 17 mi. of transmission line, 105 mi. of distribution line and other system improvements; Goodall Electric Mfg. Co., Ogallala, is contemplating the construction of a $4,000,000 strawboard plant at Ogallala.

North Dakota

Capital Electric Co-op., Bismarck, has been loaned REA funds in the amount of $610,000 for 394 mi. of distribution line.

Oregon

Eastern Oregon Electric Co-op., Inc., Pendleton, received an REA loan of $100,000 to complete previously approved construction.

South Dakota

FEM Electric Association, Ipswitch, has an REA loan of $920,000 to build 584 mi. of distribution line and to complete previously approved construction.

Texas

Green Belt Co. Electric Co-op., Wellington, has an REA loan of $450,000 for 249 mi. of distribution line, 39 mi. of tie line, a radio communication system and system improvements; Medina Electric Co-op., Hondo, an REA loan of $765,000 for 584 mi. of distribution line, a radio communication system and system improvements; Hunt-Collin Electric Co-op., Greenville, an REA loan of $90,000 for 50 mi. of distribution line and 16 mi. of tie line; Karnes Electric Co-op., Karnes City, an REA loan of $450,000 for 218 mi. of distribution line, 100 mi. of tie line and system improvements; Taylor Electric Co-op., Inc., Merkel, an REA loan of $460,000 for a 600-kva. substation, 16 mi. of multi-phase line, a radio communication system and 314 mi. of distribution line; Kaufman Co. Electric Co-op., Kaufman, an REA loan of $150,000 for 60 mi. of distribution line and headquarters facilities; Bailey Co. Electric Co-op. Assn., Muleshoe, an REA loan of $430,000 for 215 mi. of distribution line, 48 mi. of tie line and headquarters facilities; North Plains Electric Co-op., Inc., Perryton, an REA loan of $582,000 for 395 mi. of distribution line and system improvements; and Rita Blanca Electric Co-op., Dalhart, an REA loan of $275,000 for 177 mi. of distribution line.

Washington

Kennewick City Council has authorized issuance of sewer revenue bonds in the amount of $380,000 for sewers and a treatment plant.

Underground Garage Is Planned in Los Angeles

CONSTRUCTION of a $5,000,000 underground garage at Pershing Square in downtown Los Angeles, Calif., has won tentative approval from the Los Angeles City Council. The Council directed that an ordinance be drawn giving the Recreation and Parks Commission the right to advertise for bids to build and operate the underground garage and recommending that a 50-yr. lease be given the builder and operator. Under the tentative terms of the lease, the builder will have to pay the City a rental plus a percentage of profits and return the garage to the City at the end of the 50 years.

The Pershing Square garage has been under proposal intermittently since 1931. Preliminary plans call for four underground levels with space to accommodate 2,300 cars at one time. The garage would be about 50 per cent larger than San Francisco's Union Square underground parking station. The proposed lease also provides that the park be restored after the garage is built.

Mahlon E. Arnett, president of the Downtown Parking Association of Los Angeles stated that, if this non-profit organization was awarded the contract, it would operate the parking station only until its investment was returned and would then return it to the city. It is estimated that the garage will be constructed within two years after the project receives final approval.

CONSTRUCTION DESIGN CHART

C... Unit Stress in Compression Steel

By JAMES R. GRIFFITH
Dean of Engineering
University of Portland
Portland, Oregon

THE ACCOMPANYING chart represents some sort of a record, being the 100th chart of the series. I am not sure whether the readers should receive a commendation for having endured that many charts, or that I should be rewarded for hanging on this long. In terms of actual personal labor it represents about 1,200 man-hours of work, 150 man-days, or 30 man-weeks of 40 hr. The fact that my eyes are not what they used to be stands to reason!

Regardless of the occasion, this chart is nothing spectacular. It is similar to that presented in the March, 1940, issue for a maximum allowable stress in the tensile reinforcement of $f_s = 18{,}000$ p.s.i. and an ultimate strength of concrete of $f'_c = 2{,}000$ p.s.i.

This chart, however, is based on $f_s = 20{,}000$ p.s.i., and $f'_c = 2{,}000$ p.s.i. The maximum allowable stress in the concrete, under the conventional code, would be

$$f_c = 0.45\, f'_c = 0.45 \times 2{,}000 = 900 \text{ p.s.i.}$$

Under conditions of balanced reinforcing, the maximum stress in both the concrete and the reinforcing would be at their respective maximum allowable values. The location of the neutral axis would then be determined by the expression

$$kd = 0.403\, d$$

The determination of the stress in the compression reinforcement is then a matter of direct proportion under the usual assumption that the stress intensity is a straight line variation. The chart solves this geometrical problem by a single straight line intersecting all scales.

The reader is referred to the former chart if he has any doubt as to the application of the information obtained. The solution line drawn on the original chart was for

$$d = 18 \text{ in.}$$
$$d' = 2 \text{ in.}$$

It was found that for an allowable compressive stress of $f_c = 900$ p.s.i. and tensile stress in the reinforcing of $f_s = 18{,}000$ p.s.i., the unit stress in the compression reinforcement was

$$f'_s = 10{,}050 \text{ p.s.i.}$$

A solution line has been drawn on the accompanying chart for the same conditions assumed above, thereby obtaining a stress in the compression reinforcement of

$$f'_s = 9{,}800 \text{ p.s.i.}$$

Numerically, the problem would be solved by the following steps:

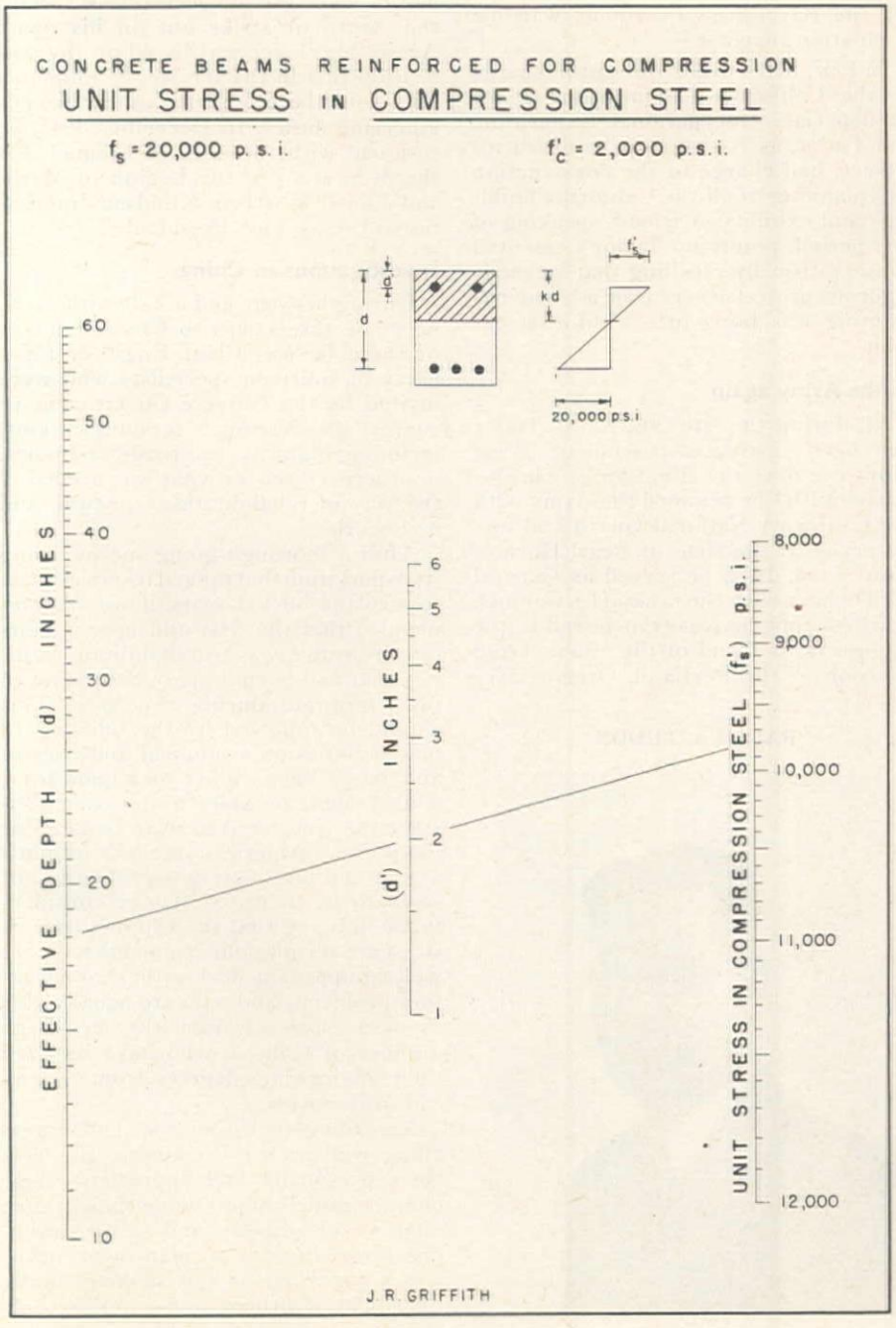
$$\frac{f's}{f_s} = \frac{kd - d'}{d - kd}$$

$$\frac{f's}{20{,}000} = \frac{(0.403 \times 18) - 2.0}{18 - 7.25}$$

$$f'_s = 9{,}770 \text{ p.s.i.}$$

The former chart had provisions for two values of f_c, one being for positive bending moments and one for negative moments. The conventional code has been changed since then with both values being the same under the present writing. Thus, as will be noted, the accompanying chart has been prepared for but one value of f_c.

The reader's attention is called to the fact that the basic assumption in the analysis of reinforced concrete beams wherein a plane surface at any section before deflection is assumed to remain a plane surface after deflection, is not true. In other words, the stress distribution in a section is not a straight line variation. Likewise the assumption that the ratio $\frac{E_s}{E_c} = n$ is a constant, is far from being true. The modulus of elasticity of concrete is not a constant, as anyone will agree who has made physical tests of such materials in the laboratory. When engineers quibble about the relative accuracy of their various methods of determining bending moments, it is an indication that they have lost sight of the basic assumptions involved. Period reading of ENGINEERING FAILURES by Godfrey, should be a must for all structural engineers. While many may question his methods, his thoughts are good for the soul. "To know one's ignorance is the best part of knowledge."



Portrait of a Bridge Planner

Ralph A. Tudor, with a varied background of meritorious Army and civilian service, is now Chief Engineer of the San Francisco Bay Toll Crossings Division of the California Department of Public Works—He and his corps are faced with the difficult task of recommending which type, how and where to build an additional crossing

By BETTY THOMPSON
San Francisco, Calif.

BACK in 1930, work got under way on the long-discussed and much-disputed San Francisco Bay Bridge. The first engineer to be assigned permanently to the Bay span office in San Francisco, was Ralph A. Tudor, a graduate of West Point and Cornell, then recently resigned from the U. S. Army. Today, eighteen years and one world war later, history repeats itself. Another Bay crossing is under contemplation, and serving as Chief Engineer for the Bay Toll Crossing Division is none other than Ralph A. Tudor, recently returned to civilian life again, after his wartime service with the Army Engineers.

By the end of this year, Mr. Tudor expects to turn over to the California Director of Public Works, the recommendation of his Division. Working with him are seventy-seven men—traffic experts, engineers, financial advisors and designers—whose findings will have much to do with determining whether the next Bay crossing will be the parallel span advocated in 1947 by the California Department of Public Works, or the southern crossing favored by the Army and Navy Board of 1946, or both.

No engineering in the Army

The man who must correlate and interpret these investigations was born in 1902, in Colorado Springs, Colo. His boyhood was spent in Oregon, where—after several summers of vacation construction work—he decided to become an engineer. Selecting the most direct route to his chosen career, he took—and passed the entrance examinations for West Point, from which he was graduated in 1923, number eighteen in his class, and then went on to Cornell for his degree in Civil Engineering.

The next five years he spent as an Army lieutenant, but not, as he had dreamed, building highways and bridges. Instead, his assignments ranged from duty as Staff Officer to managing a Post Exchange. Being an engineer first and an Army man second, Tudor finally, with reluctance, determined to leave the service.

This was in 1929. His first civilian job was under C. H. Purcell, then California State Highway Engineer and now Director of Public Works, who assigned him to work on the Bay Bridge as soon as it became a definite project. It was here that he met his present partner, Clarence A. Seage, as well as several of his associates in the new Bay Toll Division. They still talk about such unforgettable moments as the time bids came in for the West Bay foundations—bids that were just a million dollars lower than had been anticipated.

When the Bridge was completed, in 1936, Tudor was selected to set up the first operation, including the traffic handling system. His comment upon the present unhappy traffic situation, is that the span reached its capacity far sooner than had been anticipated—a result of several unpredictable conditions, including the Bay Area's enormous wartime population increase.

In 1937, Mr. Purcell was put in charge of the California Commission of the Golden Gate International Exposition, and Tudor, as Assistant Administrative Officer, had charge of the construction and planning of all the California buildings and exhibits. A friend, speaking of this period, points up Tudor's essential conservatism by recalling that he made vigorous protests every time a "modern" painting was hung in a California exhibit.

In the Army again

All during the late '30s, Ralph Tudor had been casting a pessimistic West Point eye over the situation in Europe. Early in 1941 he rejoined the Army with the California National Guard and was in service at the time of Pearl Harbor. Until June, 1942, he served as General Staff Officer with the rank of Lt. Colonel, at which time he was transferred to the Engineers, as Chief of the Engineering Division of the Portland, Oregon, Engineer District. In 1943, he was appointed to the important job of District Engineer. During the War, he was in charge of civil works amounting to more than $280,000,000 and of military works totaling in excess of $150,000,000. He supervised the completion of Bonneville Dam and the plans of MacNary Dam, both across the Columbia River.

RALPH A. TUDOR

Although under constant pressure, he showed an untiring willingness and ability to cooperate with such interdependent groups as the Chamber of Commerce, the War Manpower Board, "and even," as one man commented admiringly, "with Henry Kaiser, who was doing all right **without** any cooperation!" His absolute honesty, and his loyalty to both superiors and associates, were considered outstanding.

When the War ended, Tudor again had to make the old decision—stay with the Army, or strike out on his own? Again, his choice was based on the realization that in the service, he undoubtedly would be assigned to other than engineering duties. In December, 1945, he resigned with the rank of Colonel and the decoration of the Legion of Merit, and joined Morrison-Knudsen International Co. as Vice-President.

Investigations in China

During his year and a half with M-K, he made three trips to China. On one of these he was Chief Engineer for a party of fourteen specialists who were invited by the Chinese Government to survey the National communications, including highways, railroads, and ports, in order to discover what was needed in the way of rehabilitation, renewal, and new works.

After a thorough-going survey, using transportation that ranged from rickshaw to airplane bucket seats, it was recommended that the first and most important objective was to rehabilitate facilities that had been destroyed or allowed to deteriorate during the War. This should be followed by the building of new facilities on a nominal and reasonable basis. Then, in her own good time, China might be able to approach construction on the American scale. For the present, American methods of quick action and big overnight profits do not seem to be indicated. Tudor considers it encouraging that the Chinese universities are turning out engineers who are well-equipped to deal with reconstruction problems, and who are equally able to work efficiently with the very large number of Chinese who have received their engineering degrees from American universities.

According to associates, Tudor gets along well with the Chinese. He likes them personally and appreciates their characteristic humor, while they in turn approve his dignity and self-restraint, regarding him as a man who never "loses face." He is soft-spoken, totally uncritical of others, and—at least out-

wardly—never has been known to lose his temper. With his graying hair and erect carriage, he fits the traditional picture of a diplomat.

His handling of difficult situations proves that this diplomatic aspect is more than skin deep. For example, at one time he was faced with the problem of a department where the general morale was shattered by four or five employees who refused to work and unfortunately could not be fired. After surveying the scene, Tudor decided that ordinary disciplinary measures would be useless, so he quietly gave each goldbricker an office to himself, complete with desk, chair—and nothing to do. Departmental morale jumped a hundred per cent overnight.

During his period with Morrison-Knudsen, Tudor's love of family life came into conflict with the occupational handicap of the engineer—the necessity for frequent and prolonged absences from home. If Tudor has a hobby, it is his family. Aside from a liking for the legitimate theater, and an interest in color photography, his chief relaxations are horseback riding with his twelve year old daughter, Jean, and enjoying the company of friends in his Palo Alto home. Yet he now found himself away from home at least eighty per cent of the time. For this reason, in May of 1947, he submitted his resignation to M-K, and entered into partnership with his old friend, Clarence A. Seage. At present, Seage and Tudor are, among other things, acting as advisors on the power development of Oregon's Columbia River Basin.

Head of bridge studies

In January, 1948, the Department of Public Works selected Ralph Tudor to head the Division charged with investigating and building additional Bay crossings. They were fortunate in their choice. Not only does Mr. Tudor have previous valuable experience in bridging the Bay, but his Army background guarantees that full attention will be paid to such matters as the vital question of military security.

He is determined that emotion is to play no part in the recommendation of the Division. He is not wedded either by orders or personal conviction to findings put forth by previous surveys. So far as is humanly possible, guesswork and theorizing are being eliminated, and every possible factor is being weighed and double-checked, before the final recommendation is made.

Tudor and his corps of experts are faced with a staggering variety of problems. They must, for instance, consider the convenience of the five o'clock commuter—while at the same time pondering the possibilities of resistance to atomic bombs. Incidentally, it is perhaps not generally known that the California Toll Bridge Authority has authorized the simultaneous construction of both the parallel and southern crossings, provided that financing is available. If both cannot be financed at the same time, a choice must be made of the construction of one crossing to precede the other.

Needless to say, with rival crossings under consideration, the Division is fully prepared to have its recommendation greeted with cries of anguish from adherents of the side not chosen, if financing problems make such a choice necessary. Although Mr. Tudor is not answering questions at the present time, the anticipated year-end report will be accompanied by a mass of facts, figures and other data which it is expected will be sufficient to answer any reasonable challenge.

It is reassuring to note that all who are acquainted with Mr. Tudor—and the men surrounding him—are convinced that his findings will be completely objective, dispassionate and impartial. Whatever the Division's recommendation relative to bridges, it will be one upon which the public may safely rely, if they wish that type of bay crossing.

Coachella Canal . . . . . Continued from page 90

TYPICAL VIEW of dike construction shows the tractors and cable-controlled scrapers of 14 and 18-cu. yd. struck capacity loading in a through cut. In the desert, sand was deposited in 8-in. layers with only compaction being by the weight of heavy equipment rolling over it. Section of dike in background is parallel to main canal.

as 150 ft. were made through compacted clay, shale and sandstone. This work was accomplished by Marshall, Haas & Royce without the use of blasting powder by using LeTourneau rippers throughout the section. The material was then moved by tractors and scrapers, building the lower section of the dike to within about 10 ft. of top elevation, and topping out the dike with bottom dump Euclid wagons, loaded by a Bucyrus-Erie dragline with a 4-cu. yd. dragline bucket.

On other sections of the dike the topping out was done by using LaPlant-Choate 14-cu. yd. motor scrapers. After leaving the mountain section most of the material handled was desert sand and the contractors used a Shur-Rane sprinkling system to moisten the material and to keep down the dust. Each plot was sprinkled for a period of 24 hr., which produced a penetration of 10 to 12 ft., ample depth for the necessary borrow channel. It was found that after sprinkling, the material could be loaded in scrapers in about one-half the distance and that larger loads were secured. The dikes were built by depositing the material in 8-in. layers, without compaction, except the weight of heavy equipment rolling over it.

This work is being carried on under the direction of the Coachella office of the Bureau of Reclamation, C. S. Hale, construction engineer; Paul A. Oliver, assistant construction engineer, and R. A. McNeil, resident engineer.

Contractor's forces for Marshall, Haas & Royce are Sam Marshall, project manager; Carl Mauer, superintendent; George Simpson, day foreman; R. W. Hitchman, night foreman; C. H. Ingersoll, master mechanic; Wm. Ballantyne, purchasing agent, and Dick Woods, office manager.

CALIFORNIA DAM PERMIT IS ASKED—The Oakdale and South San Joaquin Irrigation Districts have asked the Federal Power Commission for authority to construct and operate a $8,840,000 hydroelectric project on the middle fork of the Stanislaus River near Tuolumne. Main features of the project would be a dam 275 ft. high and 1,150 ft. wide, a water conduit and powerhouse.

Ways to Keep Tire Costs Down

SPECIAL PUMP now available will enable tires on compressors, drills and other contractors' equipment which is not used for load carrying to be filled with liquid instead of air thus eliminating the need for constant checking and inflation.

A well-planned, properly executed and closely followed up program of tire care will produce large savings and eliminate operating problems

By FRANK W. FOX
Off-the-Road Tire Sales
Goodyear Tire & Rubber Co.
Akron, Ohio

WITH PNEUMATIC TIRES as standard equipment on nearly every wheel of construction machines these days, the master mechanic on each job must have a well planned, properly executed and closely followed-up program of tire care.

A visitor at the recent Chicago Road Show could not help but be impressed by the tires in evidence at that mammoth collection of all kinds of modern construction equipment—at the variety of machines on rubber, from the small compressors, drills, etc. to the largest earthmovers and, in addition, on dozers, shovels and rollers.

Another new trend which will make more and better construction tire service important is the development of larger models with correspondingly larger and more costly tire sizes. Ten years ago, 18.00-24 was the largest size of tire in use on earthmoving vehicles whereas today, 21.00-29, 24.00-29 and 27.00-33 tires are furnished on the latest models of a dozen machinery manufacturers.

To the contractor who has about $10,000 tied up in the tires on one Earthmover, the subject of tire care is going to be important enough that his equipment superintendent will have to "bone up" on how to get the most service out of the tires, how to avoid "flats" which will cut daily job progress and what to do in the case of tire injuries. While whole books have been written (and are available from tire manufacturers) to cover the three points just mentioned, it is our purpose in this article to state briefly the more important elements in a program of off-the-road service.

Selection of size and type

As tire purchasing precedes tire use, the first chance to keep tire costs down comes at the time tire requisitions are made out—in other words, **proper tire selection.**

For many of the wheels in every fleet, there are several choices of tires that can be made. The major tire lines offer in each size, variations in tread type and ply rating so that the proper choice depends on the job conditions.

Of course, the vehicle builders select as original equipment tires, those best for normal or average conditions, but when replacement tires are needed, the choice between "mud" type, "rock" type

or "dirt" type in the big sizes and between "highway" type, "traction" type or a "double purpose" type in the smaller sizes should be made only after the job to be done has been carefully studied so that the best fit of the tire to its work is assured.

After **proper selection,** the factors which must be given attention to keep tire cost down are **load, inflation, roads, vehicle operation, tire repairing** and **tire storage.**

Tire loads

The tire "boss" should always know the maximum recommended carrying capacity of the tires on his equipment and govern his loads accordingly.

To make sure that loads are "right," the weights on individual tires should be checked. This can be done right on the job with load scales or weighing jacks.

Tire load and inflation tables have been prepared by the Tire & Rim Association after consideration of the experience of the entire industry and following these recommendations gives the best chance of long tire life.

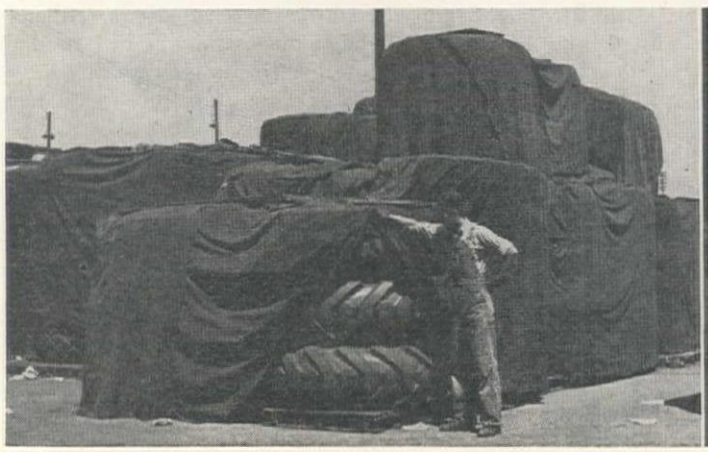
When overloads are frequent, the tire flexes too severely, the cord plies are subjected to severe internal strains and heat and early failure is probable. When loads are extra heavy, the possibilities of using larger or oversize tires or tires of the same size but with extra ply rating, able to hold higher pressure and thus maintain their normal shape under heavier loads, should be explored.

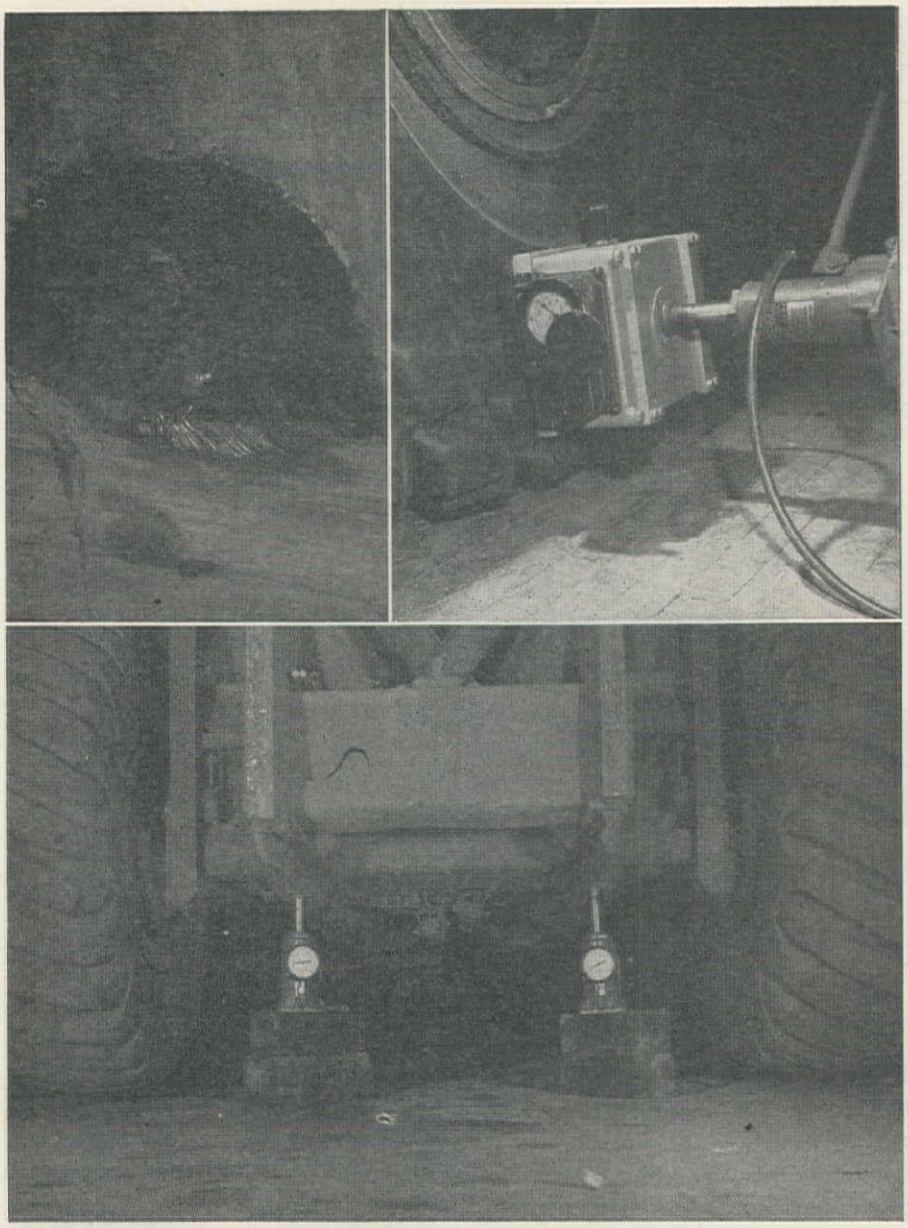
If such changes are impossible, then normal tire costs can be secured only by reducing loads.

Tire inflation

Next, let's consider inflation—it's the air that carries the load and the right pressure, provides adequate cushioning and enables the tire to absorb shocks.

PROPER SELECTION of tire types for each job will cut costs. Left to right: "Mud" type where maximum traction is obtained by widely-spaced, diagonal bars not connected at center; "rock" type tires, obtained by extra-heavy separate but closely-spaced lugs, extending across ground contact surface and well up on tire sidewalls; "dirt" type of wide rounded shape with uniform non-skid design of large diamond shaped blocks. PROPER STORAGE for tires outdoors, bottom left, requires heavy tarpaulin or building paper covering to protect from light and weather, and for tires left on wheels of vehicles between jobs, right, blocking up to take weight off tires or regular inflation to recommended pressure.





TREAD CUTS into rubber only can be cleaned out and skived as shown at top left and will not become enlarged, requiring no further attention. Cuts extending to surface of cord body should be repaired and vulcanized by special equipment, top right, which can be used without removing inflated tires from vehicle. Weighing jacks of up to 30-ton capacity, bottom, are useful in getting actual axle loads on heavy vehicles.

Under-inflation permits extra flexing and the same troubles as overloading. Over-inflation puts extra strain on the cords and when projecting rocks or surface irregularities are hit, the shocks are concentrated on small areas, resulting in bruises, more severe cutting and blowouts.

One method of reducing inflation problems is to use "Solution 100" in tires on the stationary machines such as compressors, drills and the like. This means the substitution for air of water or, where freezing temperatures are encountered, a calcium chloride solution in those tires for which the machine weight is the only load.

After the initial filling, no further attention is required unless a puncture is received. Equipment for this liquid filling of tires is owned by tire dealers throughout the country. But, there is no substitute for regular inflation with air and careful checks with accurate gauges for the tires on load carrying vehicles.

If the pressure loss between regular checks is more than 10%, valve cap and valve core seals should be examined. If the valve is not defective, the tire and tube should be dismounted, the leak found and repaired. Putting off changing the "leakers" does not save time, but may mean a "flat" during working hours and an additional loss in tire life.

Roads

Road and hauling surfaces on construction jobs vary widely so tire life and costs will also vary. But, the maintenance of the best possible conditions on each job will pay real dividends.

Regular road inspection, removal of loose rocks and repair of bad spots will keep tire damage at a minimum. Clearing the loading area around shovels will eliminate tire cutting and snagging—will reduce tire repair costs. Good hauling conditions will speed up the movement of materials on the job, will make it possible to use more of the speed of which the modern construction equipment is capable, with resulting lower costs and earlier job completion.

Vehicle operation

Under the head of "vehicle operation," measures can be taken to keep tire expense down in many ways. Drivers should slow down for rough going, should avoid spillage on haul roads and should "take it easy" when bad rock or sharp material must be run over as on the dump or when loading under a shovel. Drive wheels of pneumatic-tired power units for self-loading scrapers should not be allowed to spin as this cuts up the tire treads, quickly wears down the non-skid design and reduces tread traction and tire usefulness.

Pusher tractors should be available to help in loading, but bulldozer blades must be kept away from contact with rear tires of the earthmover or severe and generally unrepairable cuts will result. The pusher should get directly behind the vehicle it is helping and contact should always be with the pusher block, not with a corner of the frame where a sudden slip will mean a damaged tire.

Machines should be checked frequently to make sure that there are no bent parts or objects like rocks or roots wedged between the body and the tires, gouging and cutting into the rubber and cord. Likewise, leaking grease and oil should be watched for and scraped off before the rubber is damaged.

Rims which are bent fail to give proper support to tire beads. Beads include steel wire and when this is broken or separated from the surrounding layers of cord material, repairs are impossible, so it will save tires if bent rims are taken out of service quickly and either straightened or discarded.

When tire changes are being made, any rims which have been in service should have all rust and dirt removed by vigorous use of a wire brush. Then a light coat of zinc chromate or red lead should be applied and allowed to dry before another tire is mounted.

Tire repairs

No matter how efficiently a fleet in construction work is operated with respect to loads, inflation, road and vehicle care, tires are bound to be injured and, in many cases, successful repairs can be made which will extend tire life for service valued at many times the repair cost.

Sometimes the only cost will be a few minutes time to clean out a bad cut which is entirely in the tread rubber, but which if neglected will become enlarged,

eat into the cord body and cause serious damage. Such cuts if skived out so that stones can't be held will require no further treatment and will never have any material effect on the tire's life.

If cuts are large enough to extend through the tread to the cord body so that moisture can get into the outer layers of cord, a vulcanized repair should be made as quickly as possible. This is possible right on the job and with the tire on the rim by recently developed methods, provided electric current is available for the necessary equipment.

When tires are cut through or so badly damaged that less than ¾ of the layers of cords are uninjured, then the proper procedure is removal from service. Unless the injury is too large, complete repairs with inside body reinforcement and vulcanization are needed to join the new and old materials and to close up the gash in the outer surface.

Removal of large tires from the rims is a big job and one that must be done right to avoid damage to tire beads, tube or rim parts. Good tools, careful work and frequent consultation of the manuals furnished with the vehicles will help.

Tire storage

Good tire storage means protection against too much light or dampness, it means a clean dry place away from contact with hot steam pipes, oil or grease. If outdoor storage is necessary, tires should be covered with "tarps" or heavy builders paper and before mounting tires should be checked to see that they are completely clean and dry inside.

When vehicles are laid up between jobs, they should either be jacked up to take weight off the tires or provision should be made for regular inflation. Flat tires may get kinks that never come out and might affect tire life.

In conclusion, we repeat that the problems of tire care for the owner of a fleet of modern construction machinery are many and important. Tire bills are bound to be high and large savings are possible with proper buying practices, careful checking of operations involving tire use and good supervision of all tire details.

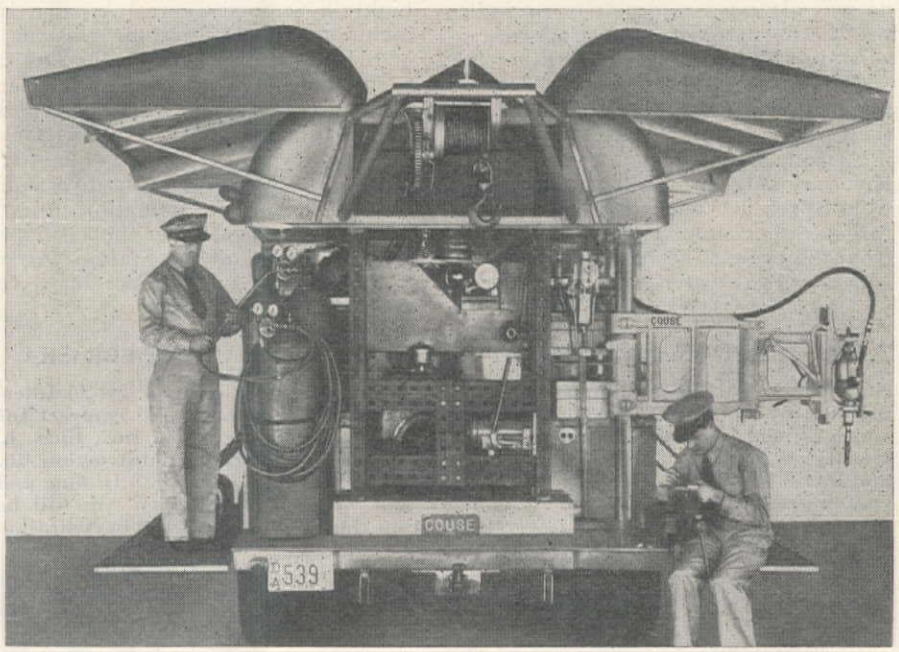
On every job, one man should be a tire "specialist" to be a good contact with the tire company representatives who visit the job and he should study the manuals and other data which are available on the subjects of tires and tire care. With the knowledge of what to do about tires to keep costs down and with the authority to have it done, such a tire boss can save many times his salary.

Maintenance Shop Rides to the Job

A MOBILE and self-contained factory is virtually what a new shop unit manufactured by Couse Manufacturing Co. of Newark, N. J., amounts to. It is capable of building new machinery out of scrap material, as well as going to the spot to make many types of repairs to operating equipment.

The operational layout of the Couse "M" Shop is as completely thought out and organized for efficient production as that of any modern American factory.

The precision work is done inside, off the ground. It is received on the right catwalk, is prepared by the assistant machinist who then passes it on to the lathe operator for turning, boring, grinding or milling, as may be required. When the machine work is finished, the part is passed across to the fitter and assembler who have their work bench opposite the lathe. The finished job is then placed on the left catwalk, ready to be picked up by the mechanic who originally left it for processing. This orderly flow of machine work through the precision department keeps four men busy without interference and the work proceeds with much the same dispatch as it would on a conveyor belt.



Heavier work

The heavy work is handled separately and on an entirely different system which is equally efficient in its adaption to the nature of the work. The center point for large work is the heavy steel workplate forming the rear of the shop body. The work area, being at ground level, is unlimited and fans out from the steel bench. There is no interference with the precision work, which flows across the shop. The large radial arm drill press, 60-ton hydraulic arbor press and 1-h.p. electric grinder are all located to service this rear area. The portable forge and anvil are set up nearby. Arc and oxy-acetylene welding are carried on in this area and a 3-ton crane is available for positioning work.

The Couse shop develops its own electric power and also 50 cu. ft. per min. of compressed air for the pneumatic tools and for tire inflation. Storage batteries can be charged on a large volume basis and up to 32 volts.

In order to make the operation of the shop most economical on "permanent" locations where commercial power lines are available, the electrical system is designed to permit the entire shop to be operated directly from the city service and the gasoline engine is then used only when moving to a new location or for emergencies. The savings in fuel and engine wear are very great.

The machining facilities are sufficiently large to handle 90% of the work encountered in practical maintenance, even of large aggregates such as earth-moving equipment and locomotives. It is usually the smaller parts of such complex mechanisms that break, wear out or otherwise render the whole inoperative.

The mobile shop costs about $33,000. At the present time, virtually the entire production of the factory is being shipped abroad, but as production becomes available, domestic and especially Western contractors, may find them useful in their operations.

NEWS OF WESTERN CONSTRUCTION

OCTOBER, 1948

Approval of Central Arizona Project Now Up to Congress

THE DEPARTMENT of the Interior's project planning report on the Central Arizona Project has been formally sent to Congress by Secretary of the Interior Krug. He stated that the report in no way attempts to decide or prejudice the California-Arizona water controversy on the Lower Colorado River.

The report finds the giant project economically feasible and recommends that the Congress authorize its construction if Arizona's claims upon the Colorado River are substantiated to a degree that would provide sufficient assured water for its operation. Estimated benefits from the project, designed to meet Arizona's critical water shortage and ease the Southwestern power shortage, would exceed the estimated $738,408,000 cost by 50 to 60 per cent.

The project plan calls for increased water supplies acutely needed in the highly developed Central Arizona area, including Phoenix, and for construction of Bridge Canyon Dam on the Colorado to produce hydroelectric power sorely needed by both California and Arizona.

"The showing in the report of the availability of a substantial quantity of Colorado River water for diversion to Central Arizona for irrigation and other purposes is based upon the assumption that the claims of the State of Arizona to this water are valid," Secretary Krug's transmittal letter to Congress stated.

"It should be noted, however, as the Regional Director and the Commissioner of Reclamation have pointed out, that the State of California has challenged the validity of Arizona's claim," the letter continued. "If the contentions of the State of Arizona are correct, there is an ample water supply for this project. If the contentions of California are correct, there will be no dependable water supply available from the Colorado River for this diversion."

Under the plan for the project, water would be diverted from the Colorado River at Lake Havasu, back of Parker Dam. The water would flow through the proposed 241-mi. Granite Reef Aqueduct to the Phoenix area. The water that would be made available would assure an adequate supply for 640,000 ac. of lands already developed. This would relieve the threat of economic stagnation growing out of the acute shortage of water to sustain a highly developed agricultural and industrial area. No development of new irrigation is contemplated.

The project plan also provides for exchange of waters between the Salt River and Colorado River to permit additional diversions in the Gila River basin above Granite Reef. Municipal water supplies for the City of Tucson would be assured. The ability of the United States to meet its obligations under the treaty with Mexico for delivery of water to that country would not be adversely affected under the project plan.

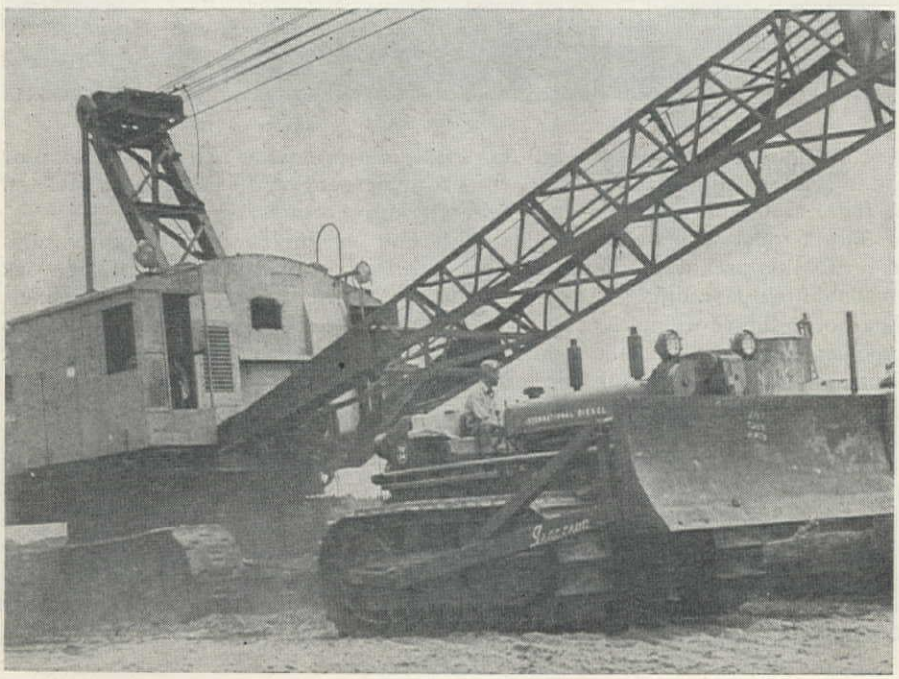
An additional 770,100 kw. of hydroelectric generating capacity would become available through construction of Bridge Canyon Dam and power plant as a feature of the project. This power is urgently needed to meet growing domestic, agricultural and industrial requirements.

In addition to the Granite Reef Aqueduct and Bridge Canyon Dam and power plant, the proposed construction involved includes pumping plants, aqueducts, related dams, irrigation and drainage systems, power plants, transmission lines and other incidental works.

About $658,000,000 of the estimated cost, based on today's prices, can probably be repaid by power, irrigation and municipal water users, and $80,312,000 would be charged to flood control, the

CONSTRUCTION BEGINNING AT HARLAN COUNTY DAM IN NEBRASKA

NEWLY ASSEMBLED Bucyrus-Erie crane is towed into position by a TD-24 International tractor on the Harlan County Dam project, the $19,432,386 contract for which is held by Guy F. Atkinson Co., Bressi-Bevanda Constructors, Inc., Chas. L. Harney, W. E. Kier Construction Co., A. Teichert & Son, Trepte Construction Co., and David G. Gordon. The dam will be an earthfill, 106 ft. high, 11,828 ft. long and containing 13,000,000 cu. yd. of embankment. Over 16,000,000 cu. yd. will be excavated. It is a Corps of Engineers project on the Republican River in Nebraska.



preservation and propagation of fish and wildlife, silt control, recreation and salinity control under the report's recommendations. Detailed studies show that an adequate margin of project revenues will exist to meet operation and maintenance expenses.

McNary Dam Generator Bids Due Mid-October

BIDS for the design and manufacture of the first four generators to be installed at the McNary Dam powerhouse near Umatilla, Ore., will be received by the Portland District, Corps of Engineers, until Oct. 15, Col. O. E. Walsh, Portland District Engineer, has announced. Specifications call for the design, testing, delivery and installation of the four 73,684 kva. AC generators and appurtenances. The first generator is to be installed and ready for final tests by Nov., 1953, and the fourth by Jan., 1955. By that time, turbines should be in place and McNary Dam will be ready to deliver its initial power.

A $5,031,567 contract has been awarded to the S. Morgan Smith Co., York, Pa., for the design and manufacture of the four 111,300-h.p. hydraulic turbines. Eventually, the installation of 14 generator-turbine units is planned in the powerhouse, providing an installed power capacity of 980,000 kw., nearly twice that of Bonneville.

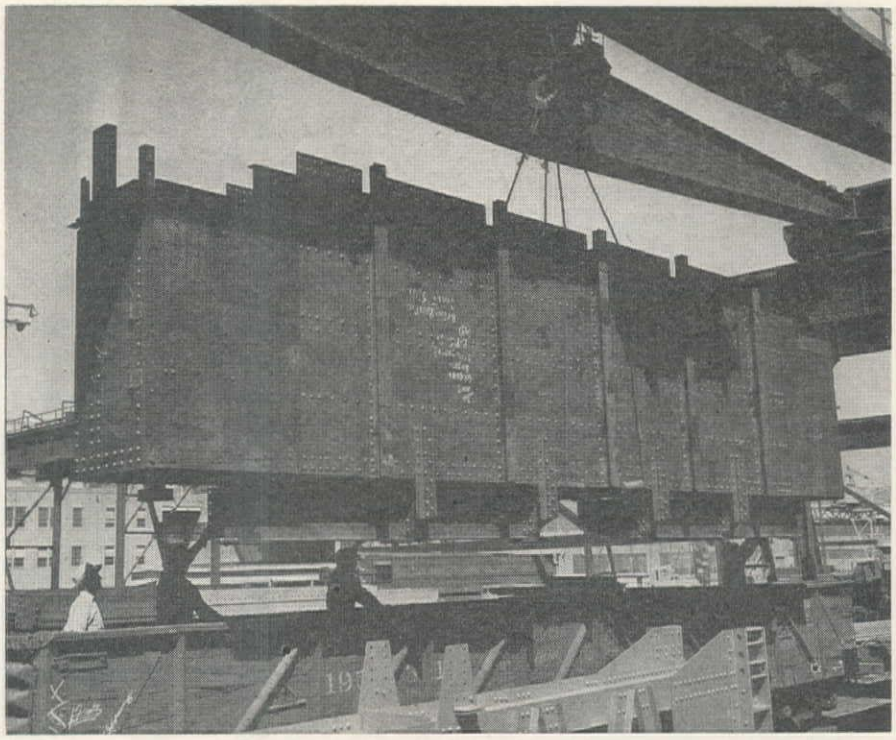
The McNary powerhouse will be located on the Oregon shore of the Columbia River about 2½ mi. upstream from Umatilla. A spur from the Union Pacific railroad will enter the powerhouse for delivering machinery under the cranes.

Approval of Huge Bond Issue Asked at Seattle

VOTERS AT SEATTLE, Wash., will be asked to approve bond issues totalling $14,500,000 to $15,000,000 at the November 2 election. Bond issues which now appear to be definitely scheduled for the ballot are: Seattle School District, $7,000,000 for building program; Port of Seattle, $1,750,000 for general improvements; King County Bridges, $3,000,000; and King County Hospital, $2,750,000.

The total has been reduced several million dollars by decision of the King County Commissioners to eliminate road improvements from the bond issue, which will be limited now to bridges, and by decision of Port of Seattle commissioners to defer its comprehensive new dock program. A plan to ask from $1,000,000 to $1,500,000 for a juvenile detention home is also under consideration.

The Seattle Port Commission previously had been discussing a $5,000,000 issue, which would have included a new finger dock, first step in the comprehensive program estimated to cost $20,000,000 or more, but property valuations were termed too high.



MASSIVE SECTION PART OF ALTERATION TO TACOMA NARROWS BRIDGE

FABRICATED steel section is shown being readied at Bethlehem Pacific Coast Steel Corporation's Alameda, Calif., plant for shipment to the Northwest where it will be erected as an alteration to existing Tower 3 on the new Tacoma Narrows Bridge. The new strut, 40 ft. long, 12 ft. high and weighing 18 tons, will permit the roadway to be raised 6 ft. higher than the original and widened from 20 to 46½ ft.

Work on Second Mokelumne Aqueduct Approaches Finish With New Contract

THE SECOND Mokelumne aqueduct, 81 mi. in length, which is being constructed by East Bay Municipal Utility District to bring an additional supply of water to the East Bay area of California, nears the final phase of its construction with the award of the contract for the installation of the pipe across the peat lands in the San Joaquin Delta.

This contract, awarded to Ben C. Gerwick of San Francisco, with a low bid of $982,117, calls for the installation of over 10 mi. of 68-in. diameter welded steel pipe, one-half inch thick, with a one-half inch cement mortar lining and an outside coating of aluminum paint. The fabrication and lining of the pipe was awarded in another contract.

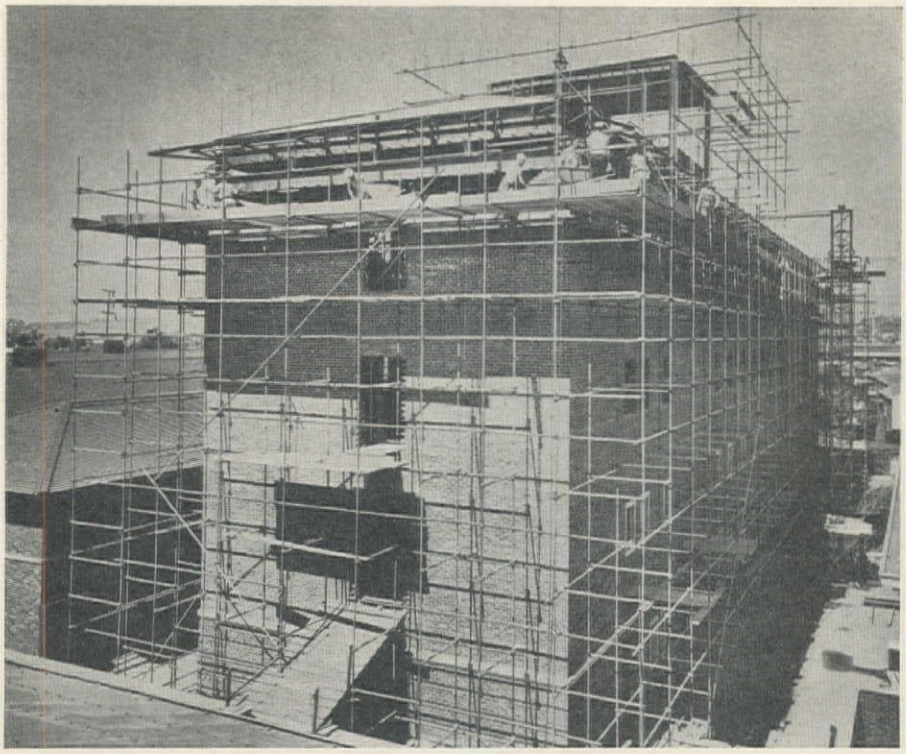
The Gerwick contract also calls for the installation of the supports for the pipe consisting of 856 cradles supported by structural steel bents, with ball and socket joints at both top and bottom of the legs of the bent. This type of support, located at 60-ft. intervals, is a new and unique method which will permit free movement of the pipe as the temperature changes. The work also involves the pouring of concrete pedestals on the concrete piles which are now being driven by Gerwick under another contract. The completion date set for the installation is March, 1949. Over 53 mi. of line have been completed to date and all other work is proceeding on schedule.

The District is already using completed portions of the new line, and has increased the quantity of water being delivered to the East Bay area from Pardee Reservoir by almost eight million gallons daily to aid in meeting peak consumption demands.

Masonite Builds Access Road

TO PROVIDE access to its redwood timber reserve in the western part of Mendocino Co., Calif., Masonite Corp. has awarded a contract for construction of a 37-mi. private truck road to Utah Construction Co. of San Francisco. E. T. F. Wohlenberg, Masonite's general manager at Ukiah, Calif., said the work is to be started immediately.

The two-lane road will extend from the plant to be built by the company north of Ukiah up Ackerman creek and thence to a connection on the west with the Fort Bragg highway near the junction of the Navarro River and its north fork. It will be used for the transportation of timber and cord wood, the latter being the principal raw material used by Masonite in the manufacture of hardboard. Owners of other timber land to be tapped by the new road will use it on a toll basis to truck out saw logs.



CALIFORNIA BUILDING SURROUNDED BY SCAFFOLDING DURING ERECTION

IN THE ERECTION of a 5-story brick commercial building at 1000 S. Fremont St., Alhambra, Calif., C. F. Braun & Co., contractors, set up a system of tubular scaffolding on all sides. The scaffolding is called Tubelox, furnished by Patent Scaffolding Co., Inc., Los Angeles and San Francisco. Only tubes and couplers are required.

Bid Calls by U.S.B.R. Expected Soon For Major Dam and Irrigation Works

PROJECTS UPON WHICH invitations to bid will be issued by the Bureau of Reclamation at an early date include the Cedar Bluff dam, an earthfill structure 134 ft. high and 12,500 ft. long, on the Smoky Hill River about 14 mi. south of Ogallah, Kans. More than 8,000,000 cu. yd. of earthfill embankment will be required. Invitations are to be issued Oct. 15.

About Oct. 25 bids will be invited on 15 mi. of the Delta-Mendota Canal of the Central Valley Project near Patterson, Calif. About 5,000,000 cu. yd. of excavation will be included along with concrete lining and structures.

During the next two months the Bureau expects to invite bids on the following projects. Dams: North Dam, an earthfill, about 2 mi. southwest of Coulee Dam, Wash.; Superior-Courtland diversion dam, a 300 ft. long concrete gravity overflow structure on the Republican River near Guide Rock, Neb.; and earthwork and structures for an equalizing reservoir, near Ogden, Utah. Canals: 18 mi. of the Wellton-Mohawk canal, about 20 mi. east of Yuma, Ariz.; earthwork and structures for 16 mi. of the Courtland canal, near Superior, Neb.; the last 15 mi. of the Hudson canal, about 15 mi. northeast of Tucumcari, New Mex.; earthwork and structures on 14 mi. of the West canal near Ephrata, Wash., and 1.5 mi. of feeder canal near Coulee dam, Wash.; about 12.5 mi. of the Superior canal near Superior, Neb., and 6.5 mi. of the Cambridge canal near Oxford, Neb.; 8 mi. of canal and laterals near Savage, Mont.; and enlargement of 4 mi. of the Fire Mountain canal from 70 cfs. to 200 cfs., near Somerset, Colo.

Electric installations: Substations of 15,000-kva. capacity at Williston, N. Dak., and Blythe, Calif.; stringing conductors on 55 mi. of 230-kv. transmission line from Davis Dam to Hoover Dam, and a similar project on 75 mi. of 230-kv. transmission line from Davis Dam to Parker Dam; 4.3 mi. of 12.5-kv. wood pole transmission line near Savage, Mont.; and a substation of 500-kva. capacity on the Yellowstone River, near Savage, Mont.

Miscellaneous work: Relocation of 7.2 mi. of railroad spur above Keswick reservoir, near Redding, Calif.; 1.5 mi. of access road at Keyhole Dam, 18 mi. northeast of Moorcroft, Wyo.; a filter plant and reservoir for domestic and irrigation water near Lewiston, Ida.; 3 pumping plants on the Gila Project east of Yuma, Ariz.; installation of a Venturi meter in a 75-in. pipeline in Ogden Canyon, near Ogden, Utah; channel improvements on the Lost River in Langell Valley near Klamath Falls, Ore.; processing of concrete aggregates on the Boulder Canyon Project in Nevada; and construction of 15 permanent houses at Boulder City, Nev.

OBITUARIES . . .

Ivor Kriken, 63, construction superintendent for the Drake Puget Sound Co., Seattle, Wash., died recently in Seattle after being flown from Attu, Alaska. He had been construction superintendent for the Drake company since 1939 and participated in the building of the hydroelectric dam at Chelan and the Copper River & Northwestern Railroad in Alaska.

* * *

Ralph Charles Darby, 64, Civil Engineer with the Great Northern Railway at Seattle, Wash., died Sept. 12.

* * *

William B. Wroth, 58, irrigation engineer employed for the past two years with the U. S. Bureau of Reclamation at Sacramento, Calif., died Sept. 13 in Sacramento. He was a graduate of Cornell University and all his life engaged in engineering work in the West and Southwest. He formerly worked with the War Relocation Center and the Soil Conservation Service in Colorado and New Mexico.

* * *

W. H. Powell, Chief Engineer for the Greater Vancouver Water Board, died recently at his home in Vancouver, B. C. Reputed as one of the top ranking waterworks engineers in Canada, he joined the Vancouver water authority in 1928.

* * *

John P. McElroy, 55, President of the Engineers Club of Fresno, Calif., during 1947, died recently.

* * *

Arthur A. Soderman, 57, Southern California general contractor, died Aug. 31, at his home in Los Angeles where he was bedridden for the past two years. During the war, he supervised the construction of Camp Callan at San Diego, Calif., the Basic Magnesium plant at Las Vegas, Nev., and underground oil and gas pipe lines for the Federal Government.

* * *

Ezra John Colvin, 73, building contractor at Colfax, Wash., died Sept. 8 in Spokane of a heart ailment.

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Sidney A. Riches, 86, retired construction engineer died Aug. 27 at Riverside, Calif.

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Robert P. Keane, District Manager for the Montana State Highway Department at Butte, died Sept. 19.

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Benjamin R. Kennerly, Sr., 71, building contractor at Los Angeles, Calif., died Sept 16.

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Sidney F. Bamberger, 36, structural engineer of San Francisco, died suddenly on Sept. 18. He was a partner in the architect-engineer firm of Bamberger & Reid.

CONSTRUCTION BRIEFS

Arizona

WILLIAMS AIRPORT NEAR FINISH — Completion in the near future of a 3¼-mi. paved access road, a 5,000-ft. cinder and tufa-surfaced runway, and completion of paving, lighting and fencing facilities will give Williams the most modern airport in Northern Arizona. Charles Lindbergh advised the airport site in 1928, and time has proved his wisdom.

California

GROUND BROKE FOR FOLSOM DAM — A blast of explosives Oct. 2 started things moving at the Folsom Dam site on the American River 3 mi. above the town of Folsom. Army Engineers are building the dam, which will have a maximum height of 280 ft. and will be a rolled earthfill with impervious core and reinforced concrete spillway.

SAN DIEGO WATER NEED DEBATED—G. E. Arnold, San Diego City Water Director, and Fred A. Heilborn, County Water Authority Chairman, disagree on whether a second barrel should be constructed connecting the city's water system to the Colorado River Aqueduct. Arnold contends that, of the 60,000 ac. ft. to which the city is entitled, only 50,000 is being used. Heilborn points out that nobody knows whether the region will get enough rain to fill the reservoirs to supplement supply from the Aqueduct.

CARBON CANYON DAM WILL BE BUILT—The war-delayed, $3,000,000 development of Carbon Canyon Dam near Fullerton has been revived. The water conservation and flood control project will be built "as soon as possible" by U. S. Army Engineers.

CACHUMA DAM NEEDS FINANCING — The multi-million dollar Cachuma Dam and distribution system in Santa Barbara County cannot be financed until the California Legislature passes a new enabling act, according to a conference of attorneys. An amendment to the County Water Agency Act will be sought at the next session of the legislature to give Santa Barbara and adjoining water districts the right to make a contract with the Federal Government, which already has appropriated $1,000,000 for the project.

Idaho

INITIAL WORK AT LUCKY PEAK DAM — Army Corps of Engineers announce that work will begin next March on the $20,000,000 Lucky Peak Dam on the Boise River 9 mi. southeast of Boise, Ida. The dam is to be an earthfill structure with a crest length of 1,730 ft. and height of 318 ft.

Montana

MILLION-DOLLAR STATE OFFICE BUILDING—Construction began last month on the new state office building opposite the Montana Capitol in Helena. Bids totalling $922,985 have been approved, with Dudley Construction Co., Great Falls, holding the general contract.

New Mexico

WATER USERS BLAST RECLAMATION BUREAU—Carlsbad Irrigation District water users have leveled charges of inefficient maintenance and failure to account for expenditures at the Reclamation Bureau. They instructed their directors at a mass meeting to confer with Interior Secretary Krug when he visits the state about mid-October.

Oregon

BRIDGE SURVEY SET—A $25,000 survey to determine whether a toll bridge should be built across the Columbia River at The Dalles has been authorized, and is expected to be completed by next April. The bridge would connect Washington's Evergreen Highway with the Old Oregon Trail Highway.

KLAMATH RECLAMATION OFFICE CLOSES—The Klamath District of the U. S. Bureau of Reclamation's Region II will be abolished as a result of Congressional limitation on personnel budgets. The Klamath District includes 7 Northern California and Southern Oregon counties. About 30 regular employees will be cut off the rolls. E. L. Stephens will remain as superintendent of the Klamath Project.

South Dakota

OAHE DAM CONSTRUCTION BEGINS—South Dakota's largest construction job began Sept. 17 with ground-breaking ceremonies at the Oahe damsite, 6 mi. northwest of Pierre. The $221,000,000 dam will provide flood control, irrigation, navigation, power and recreation. It is one of the system of multiple-purpose dam and reservoir projects included in the Pick-Sloan Plan for Missouri River development.

Utah

FLOOD CONTROL FOR SPANISH FORK RIVER — Landowners in the Spanish Fork area are pushing a flood control project covering 14 mi. of the river from the mouth of Spanish Fork Canyon to Utah Lake. A special committee headed by Harold Creer will seek funds from the next Congress for the project. The committee will ask for appropriations to straighten and widen the 13-mi. stretch of river.

Washington

RENAME POTHOLES DAM — Secretary of the Interior Krug was at Moses Lake Sept. 28 to officially rename Potholes Dam in honor of James O'Sullivan, veteran fighter for the Columbia Basin Project. The new namesake of the nation's fourth longest dam is now administrative assistant to the Washington State Columbia Basin Commission.

Wyoming

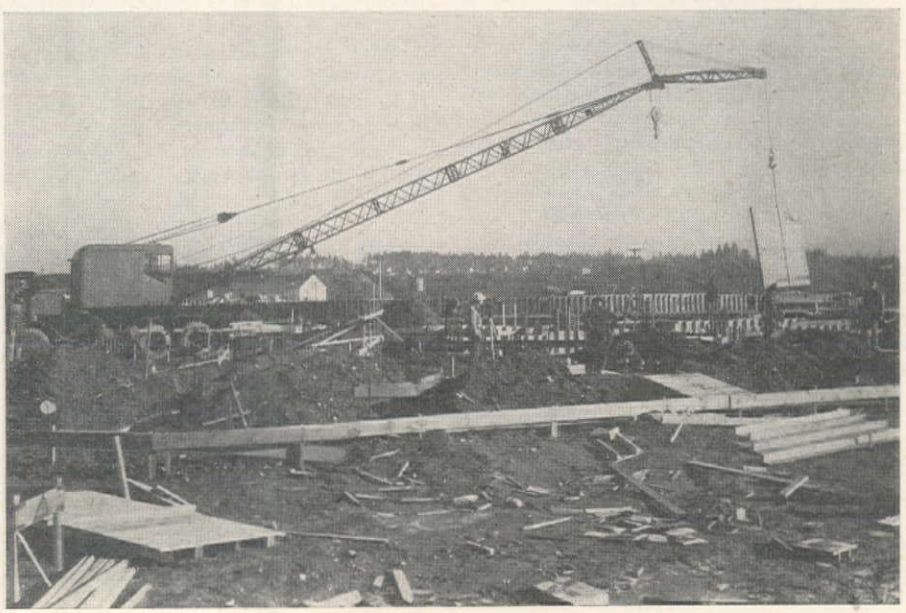
KORTES DAM TRANSFORMERS ARRIVE—All three of the main transformers for the Kortes Dam power plant have arrived. The transformers weigh 147,000 lb. each, and present a sizeable transportation problem in moving them across the bridge 20 mi. south of Casper and another small bridge near Alcova. Installation is scheduled for December, 1949.

Datelined Washington, D. C.

ALASKA HIGHWAY IN GOOD SHAPE—Assistant Secretary of the

MOBILE CRANE STRETCHES OUT PLACING FORMS FOR AIRCRAFT BUILDING

PLACING concrete forms for the Administration Building of the new Seattle-Tacoma Bow Lake Airport, approximately half way between the two cities is a 20-ton Lorain Moto-Crane. The machine is using an 80-ft. boom, 65-ft. standard, with a 15-ft. tip extension, in an almost horizontal position. Lease & Leigland are the contractors.



Interior William E. Warne, who recently drove over the Alcan Highway to Fairbanks, Alaska, says that the highway is in pretty good shape except for the southern approach in Canada. He predicts that the famous war-built route will eventually channel a tourist trade of more than $80,000,000 yearly into Alaska.

FUNDS SOUGHT FOR DAVIS DAM—Urgent demands for enough funds to put the Davis Dam project back on schedule will be made when hearings begin before the Budget Bureau on Bureau of Reclamation requests for 1949-1950 appropriations. The coming fiscal year has been set up as the year of heaviest spending on the Davis Dam development, because it is necessary during that period to prepare for the dam's use in controlling deliveries of water to Mexico, required under treaty for the fall of 1950.

The Editor's Mail...Arizona Spokesman Refuted in Colorado River Dispute

Dear Sir:

As an attorney who has for some years had a part in the Colorado River water dispute between Arizona and California, I cannot pass, without comment and correction, some of the assertions made by R. Gail Baker, of Arizona, in the Pro and Con discussion in the July issue of *Western Construction News.*

He makes a rather unfair insinuation in his statement that California makes a negative contribution to the Colorado River and therefore has little or no claim to its water. Mr. Baker must know, first, that the Colorado River Compact of 1922, which Arizona has now ratified, authorizes the use of Lower Basin water in California; second, that under the law of appropriation which is the law of the Western states, it is utterly immaterial whether the area which is to use water is in the watershed of the stream, or contributes water or not; and third, that the construction of the great Hoover Dam and the salvaging of the river's flood waters was only made possible by California agencies, public and private, which signed contracts guaranteeing full repayment of the cost of the dam. No Arizona organization or community was willing to shoulder that obligation. Without the contribution made by the California contracts there would be no conserved flood waters for either of the states to contend for.

Mr. Baker quotes Article III of the Compact, to support the current Arizona claim that it apportions 8,500,000 ac. ft. of water to the lower basin. Actually, paragraph III (a) definitely and specifically apportions "in perpetuity" 7,500,000 ac. ft. of water annually. Paragraph III (b), dealing with an additional 1,000,000 ac. ft. of "right to increase" does not say that this water is "apportioned," or "in perpetuity."

Let's look at the record. In 1930 Arizona brought suit in the United States Supreme Court to enjoin the building of Hoover Dam on the claim that the Boulder Canyon Project Act was unconstitutional. In that case the Arizona Attorney General told the Supreme Court that: "Such apportionment is limited to 7,500,000 ac. ft. per annum by Article III (a). The Colorado brief contends that paragraph (b) of Article III operates to increase this apportionment to 8,500,000 for the Lower Basin. This, we submit, is not the case. If it had been intended to apportion the larger amount, the Compact could easily have said so. The difference in language between paragraphs (a) and (b) is plain, and the difference in meaning is clear. Paragraph (b) does not apportion in perpetuity, as does paragraph (a) any beneficial use of water. It is very careful not to do this." Arizona's Attorney General so asserted to the highest court of the land, because it served Arizona's purpose at that time. California's position, which has never changed, was thus agreed to by Arizona in 1930.

Mr. Baker says that Arizona's total use of Gila River water is 1,200,000 ac. ft., plus the salvage of 500,000 ac. ft., which he says doesn't count. He insists that Arizona's claims have remained the same throughout the years. Let's look at the record again. In the Arizona injunction case of 1930 Arizona's formal complaint filed with the Court, says: "Of the appropriated water so diverted below Lee Ferry, 3,500,000 ac. ft. are annually diverted, used and consumed in Arizona. **Of the appropriated water so diverted, used and consumed in Arizona, 2,900,000 ac. ft. are diverted from the Gila River and its tributaries."** The words are Arizona's—the emphasis mine.

In the same paragraph is the statement: "To 'appropriate' water means to take and divert a specified quantity thereof and put it to beneficial use in accordance with the laws of the State where such water is found." But Mr. Baker says the half million acre feet of salvaged water in his own computation doesn't count because it is "salvaged" and would not have reached the Colorado River under virgin conditions. The brief of the Attorney General of Arizona in this case says: "2,900,000 ac. ft. had been appropriated (prior to June 25, 1929) from the Gila River."

The Supreme Court, in a second suit commenced by Arizona in 1933, rejected Arizona's claims that the 1,000,000 ac. ft. of III (b) water was designated for Arizona's exclusive use and said the clear intent of the Compact was that the water belonged "to the States of the Lower Basin, and not specifically to Arizona alone."

In a third suit, in 1935, a new Attorney General of Arizona told the Supreme Court that "the average annual virgin flow of the Gila River into the Phoenix, Arizona area is 2,359,000 ac. ft. Irrigation development has reduced the escape of such flow to approximately 644,000 ac. ft. annually and has reduced the annual average discharge of the Gila into the Colorado River near Yuma to about 350,000 ac. ft." Here, it appears, the Gila uses are about 2,000,000 ac. ft. But in paragraph VII the Arizona Attorney General says that "Of the virgin flow of the Gila in the Phoenix area, 2,885,000 ac. ft. per year have been used and appropriated in Arizona."

This is the public record that all may see and read. These are quotations from claims and briefs filed with the United States Supreme Court by Arizona's attorneys. Arizona, whose claims Mr. Baker says "have remained the same through the years," has set its annual use of Gila River water at anywhere from one million to almost three million ac. ft., according to the purpose of the moment.

On the other hand, California's views, for the last twenty years, have not been "expanding" or "increasing" as Mr. Baker says, but have been uniformly consistent. They are just what Arizona insisted on in 1930.

Mr. Baker closes his statement with the words, "California is planning toward an ultimate diversion of near 6,000,000 ac. ft." If Mr. Baker is referring to the aggregate quantity granted California by federal contracts made in the early 30's, on the basis of which this State has invested or committed $549,000,000, he is correct. Here is what Arizona's Attorney General said about "California's Maximum Legal Rights" in the Arizona Complaint in the Supreme Court case of 1935:

"Therefore the maximum quantity of Colorado River water which California may legally divert and consumptively use is:

"Of water apportioned by par. (a), Art. III, Compact	4,400,000
"One-half waters unapportioned	1,085,500
"California's maximum legal rights	5,485,500"

In paragraph XIX, the Arizona Complaint lists the California contracts aggregating 5,362,000 ac. ft., and "alleges that the total of the waters for the storage and delivery of which it was so contracted is substantially the entire amount which may legally be diverted from said river and consumptively used in the State of California * * * ."

These are statements not by California, but by Arizona.

Arizona refuses to negotiate or arbitrate. There is no other way to end the unfortunate dispute except a decision of the Supreme Court. Such a decision means a settlement based upon law and equity, in the American tradition of government under law. This decision California seeks, but Arizona opposes. Could this be because Arizona believes that such a legal and equitable settlement will inevitably uphold the California position?

Very truly yours,
ARVIN B. SHAW, Jr.
Assistant Attorney General
of California.

PERSONALLY SPEAKING

Edward L. Pine of Reno, Nev., has been named Secretary-Manager of the Nevada Chapter of the Associated General Contractors of America, Inc., to succeed **Charles L. Hill,** who died Aug. 27. Pine is a graduate engineer of the University of Nevada, with considerable construction experience. During World War II, he attained the rank of Major in the Army Corps of Engineers and was in charge of airport construction in the United States and South America. Since 1946, he has been employed in the Reno area on airport and pipeline construction and the design of a sewerage system for Washoe County, Nev.

* * *

Robert E. Fellows, Acting Chief of the Alaskan Section of the U. S. Department of Interior's Geological Survey, has announced plans for establishment of the Section's headquarters in San Francisco. The headquarters is opening during October under the direction of **George O. Gates.** Only a few of the technical staff will be transferred this fall from the field offices already in operation at Fairbanks and Juneau, Alaska, but the major portion will be operating out of San Francisco within two years. **Kenneth J. Kadow** is Director of the newly-established Alaska field staff located at Juneau. Kadow is supervising coordination of the Interior Department's varied Alaska programs.

* * *

Lewis A. Young, former acting director of the Kansas State Division of Sanitation, has been engaged at a $6,000 per year salary as director of the Colorado State Sanitation Division. He replaces **James A. King,** acting division head, who becomes director of general sanitation. Young, who took a master's degree in sanitary engineering from Harvard, is a member of the American Society of Civil Engineers. His appointment is an important step in the campaign for adequate control of stream pollution in Colorado.

* * *

F. W. Crocker, former chief engineer of the Pacific Bridge Co., San Francisco, is now at the Hungry Horse damsite in Montana to design cableways and a gravel screening plant. Crocker, who will work with General-Shea-Morrison's chief engineer, **R. W. Jones,** designed the cableways at Boulder and Bonneville Dams, the gravel and concrete plants at Grand Coulee, and the piers and anchorages for the Golden Gate Bridge at San Francisco.

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Harold N. Corbin, for the past two years administrative assistant to the city manager at Oakland, Calif., is the new city manager of Porterville, Calif. He succeeds **Harold Coulthurst,** resigned.

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Frank Giuliano has been appointed as city engineer of Walnut Creek, Calif.

* * *

Thomas S. Neilson, president of the Berkeley Steel Construction Co., Inc., Berkeley, Calif., has been appointed director of the East Bay Municipal Utility District to succeed **A. B. Robertson.** Neilson, who is president of the Berkeley Chamber of Commerce, will serve on the Board with President **K. L. Hamman** and directors **Roscoe D. Jones, A. C. Carrington** and **William D. McNevin.** He will have an important part in administration affairs of the publicly owned water system, as well as working out details of the sewage disposal project for the District.

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F. W. Welch, Assistant Professor of Civil Engineering at Washington State College in Pullman, has retired after more than 28 years of teaching surveying. He will remain in Pullman and will devote his time to private engineering work. Welch is responsible for organization of the W.S.C. summer survey camp near Naches, Wash.

* * *

Daniel L. Evans has taken office as County Road Engineer for King County, Wash. Evans was a member of the County engineering staff from 1920 to 1934, serving as principal County Engineer during the latter part of that period. From 1940 to 1944, he was a member of the Seattle District, Corps of Engineers staff, serving as Chief of Alaska Operations Division in Seattle and as Chief Construction Engineer for the Spokane area.

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Randle B. Alexander has assumed new duties as Bridge Engineer of the Texas State Highway Department at Austin. He is a veteran of 25 years' service with the department, his latest assignment being construction engineer on the Houston-Galveston Expressway. He succeeds **James P. Exum,** who resigned to accept a position with Howard, Needles, Tammen and Bergendoff, New York consulting engineers.

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D. L. Chaudoin is now Assistant County Engineer of Pima County, Arizona, with headquarters at Tucson.

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Miles Drake has been named city engineer of Auburn, Wash., to succeed **Earl G. Forbes,** resigned. Drake is a licensed civil engineer and land surveyor.

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George F. McCormack, Senior Civil Engineer for the Sacramento Division of the Southern Pacific Railroad, retired from active service on Sept. 30. He had been active in construction work for the SP division since 1914. He was in charge of double-tracking the line from Rocklin to Colfax and through the Sierras from Blue Canyon to Truckee, and directed construction of all the river levees used by the company.

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Col. Craig Smyser, District Engineer for the Army Corps of Engineers at Denver, Colo., has been named to a six-man permanent planning board which will oversee the development of Denver's municipal facilities.

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Kenneth B. Aldrich and **Willard Johnson,** formerly with the Arizona Power Authority in Phoenix, have gone into consulting engineering work in Pasco, Wash., under the name of Aldrich & Johnson. They are specializing in the design, development, management and economic reports on electric utility systems, and are presently engaged in work for the Benton and Franklin County Public Utility Districts in Washington.

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Merle Fischer, formerly with the Bridge Department of the California Division of Highways at Sacramento, Calif., is now District Maintenance Engineer for the Division at Bishop, Calif. **Jake Dekema,** formerly with the Bridge Department in Los Angeles, Calif., is now District Construction Engineer at Bishop.

* * *

William K. Billow, former engineer at Bonneville, Ore., has been appointed as superintendent of operations for the Clark County Public Utilities District with headquarters at Vancouver, Wash. He succeeds **Hugh Whisler.** Billow has 26 years of experience in the electric utility business.

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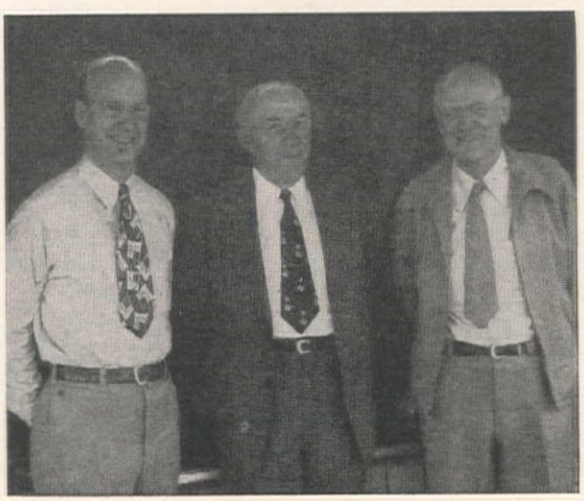
M. J. Shelton is the new General Manager and Chief Engineer of the La Mesa, Lemon Grove and Spring Valley Irrigation District with headquarters at La Mesa, Calif. He succeeds the late **Chet Harritt.**

* * *

L. Ralph Peltier is the manager of a firm which provides certified building inspectors for the construction fraternity in the City

1949 OFFICERS ELECTED BY THE ASSOCIATION OF WESTERN STATE ENGINEERS AT FLAGSTAFF.

AT THE CONCLUSION of the 1948 Convention of the Association of Western State Engineers held recently at Flagstaff, Ariz., J. J. WALSH, State Engineer of North Dakota, was elected president for the next year, and JOHN H. BLISS, of New Mexico, vice-president. Shown in the photo are, l. to r.: Bliss, Walsh, and O. C. WILLIAMS, of Arizona, retiring president, who was elected a director.



and County of Los Angeles and suburban cities of the area. The firm operates from 651 West 62nd St. in Los Angeles.

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The Public Roads Administration of the Federal Works Agency announces that its district office at Juneau, Alaska, has been raised to the status of a division office. **Hugh A. Stoddart,** formerly highway engineer in the district office at Portland, Ore., will be in charge as division engineer. He will supervise highway work in national forests in cooperation with other Federal agencies in Alaska.

* * *

Two Wyoming State water commissioners have been named for Park Co., Wyo. **Leo Althoff** of Badger Basin has been named commissioner in Division 3, District 10, to succeed **Lester Brown,** resigned. **E. E. Newton** of Cody is the new commissioner of Division 3, District 9, succeeding **W. E. Hogan.**

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Appointed to the faculty of the University of Nevada at Reno is **Charles E. Breese** as an instructor of civil engineering.

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Graig G. Leland of Santa Ana, Calif., is the new city engineer of Laguna Beach, Calif., succeeding **Douglas McKenzie,** resigned. Leland will also serve as street superintendent.

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Two additions have been made to the staff of the civil engineering department at Washington State College, Pullman, Wash. **Eugene P. Richey,** with a B.S. degree in civil engineering from the University of Alaska in 1941 and an M.S. degree from the California Institute of Technology in 1948, and **A. Bert Caseman,** with a B.S. degree in civil engineering from Utah State Agricultural College in 1947, are teaching this fall.

* * *

Bill Richards, former city manager of Phoenix, Ariz., has been appointed to serve as the first city manager of Merced, Calif., a position paying $7,500 per year.

COL. WILLIAM WHIPPLE, executive officer of the North Pacific Division, Corps of Engineers, Portland, Ore., since May, 1947, has been appointed District Engineer of the new Walla Walla, Wash. District, which will include McNary Dam.

SUPERVISING THE JOBS

Construction crews on Pacific Gas and Electric Company's mammoth Feather River hydroelectric project in Butte County, Calif., have swelled to over 1,000 men. The overall project, costing $61,800,000, includes two powerhouses, Cresta and Rock Creek; two diversion dams, 10½ mi. of 26-ft. tunnel, transmission lines and other facilities. **Gunnar Nygard** is supervising construction of the Cresta Powerhouse for contractor, Morrison-Knudsen, Inc. **Robert E. Martin** is the job engineer for M-K and **Chester M. Poor** is assistant engineer. **Floyd H. Bible** is carpenter foreman, **Kenneth E. Johnston** is concrete foreman, and **Lester E. Bishop** is labor foreman. **Ora E. Salyer** is reinforcing steel foreman, **Harold S. Carringer** is the job office manager, and **Oliver Oswald** is paymaster.

T. E. Connolly, Inc., San Francisco, is driving the Cresta Tunnel, with tunnel superintendents being **Harry Greshuk, Ted Slaight,** and **Fred Brunkskoll. Earl T. Walsh** is the project manager for the Connolly firm. **Thomas N. Beall** is the job office manager and timekeepers are **Barney Keating, C. B. Cook** and **C. Bagshaw.**

A. L. Simpson is general superintendent for Arundel Corp., and L. E. Dixon Co., San Gabriel, Calif., contractors for the central 24,000 ft. of the Rock Creek tunnel. Tunnel superintendents for the joint venture firm are **Clyde Green** and **Leo Pfliger. William Reynolds** is the master mechanic and **William Hughes** is chief electrician. **Ray Lamb** is the job office manager and **H. J. King** is purchasing agent.

Morrison-Knudsen Co., Inc., Boise, Ida., also have the contract for construction of the diversion dams, intakes, roads and the upper 4,000 ft. of the Rock Creek tunnel. **John Reed** is the project manager for the dam work, and **John Armitage** is the general superintendent. **C. C. McDaniels** is the rigging foreman, **Nels Seagram** is electric foreman and **Ira Bashaw** is master mechanic. **Charlie Silva** is carpenter foreman. **Ed White** is foreman at the rock plant and **S. T. Brown** is foreman at the batch plant. **Jim Dunn** is the night superintendent and **Ed Eaton,** assistant. **Chet Whittiken** is superintending construction of the Cresta Dam. Other foremen on the dam construction are: **John Skene,** iron work; **Lee Lowry,** electrical; **Mike Bibby,** welding; **Chet Wing,** drill and blasting, and **Mike Ryan,** warehouse. **Hank Ellis** is assistant master mechanic and **John Atkins** is the warehouse superintendent. **Al Huntingto** is the tunnel superintendent for M-K an **P. M. Lee** is tunnel walker. **Cliff Greshar** is the labor foreman. **Louis Wheeler** i project engineer and **John Erdle** is offic engineer. **Jean Hargraves** is the office man ager and **William Dolbeer** is the pay master. **R. E. Peck** is the camp manager.

The Walsh Construction Co., San Fran cisco, has contracted for the lower 6,719 f of Rock Creek Tunnel, penstock tunnel an powerhouse excavation. **Eugene C. Tuft** is superintendent for the powerhouse wor and **Frank Brown** is carpenter superin tendent. **Les Bean** is carpenter foreman **George Blehm,** concrete foreman and **For Ferris** and **William Van Patten** are genera foremen. **R. W. McAvoy** is the maste mechanic, **Roy Fredericks** is the job engi neer and **J. J. Kennedy** is the job offic manager. **E. H. Hatch** is general superin tendent for the tunnel work and **L. E Huntington** is the job superintendent Walkers are **John Hectu, Wayne Wilmot** and **H. Fossum.** Shifters are **Jack Robert son, Steve Wilmoth** and **G. F. Landus. Bo Halles** is master mechanic, **S. A. Pickett** i carpenter foreman, and **Mike Doyle** is th job office manager. **Don Jacobs** is the proj ect engineer. **Ralph Sterns** is the carpente shop foreman and **W. Allie Huntington** i powderman.

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M. G. "Mitch" Bennich is the genera superintendent for P. & J. Artukovich, Inc Los Angeles, on construction of the Secon Mokelumne Aqueduct for the East Ba Municipal Utility District, Oakland, Calif under a $1,095,429 contract. **Bill Olsen** i carpenter foreman on the job, **Fran Newell** is welder foreman, and **F. L Murphy** is assistant welder foreman. **Te Lowrie** is heavy duty mechanic and **Home Darst** is rigger foreman. **Johnny Grbaua** is engineer on the job, and **L. H. Rusk** i in charge of the plaster work. **J. E. Phi lippe** is the job office manager. Residen engineer for the E.B.M.U.D. is **L. Rouza** and **Bill Dunn** is assistant engineer. **J. Os borne** is senior inspector for the Distric and **D. Crumm** is inspector. **W. Wilson** i inspector for the excavation work.

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Marty Sheeran is superintendent for E C. Nickels, contractor for construction o the Campbell St. Reservoir in Glendale Calif. For the Calowell Construction Co Long Beach, Calif., subcontractors for th excavation work, **Bill Gonyo** is the genera superintendent and **Clarence Vore** is jo superintendent. Foremen for Calowell ar **George Miller** and **Dave Kendrick,** an **George Green** is the office manage Chief inspector on the job for the City o Glendale is **E. W. Johnson** with **Chet Car mean** as his assistant. Engineers for th city are **Bill Kelly** and **Arnold Jagow.**

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George Waters is the project manage for S.U.H.B. Co., joint venture contractor for construction of the Delta-Mendota In take Canal and Tracy pumping and dis charge lines near Tracy, Calif., a $5,800,00 job. The venture of four firms is sponsore by Stolte, Inc., and maintains offices i Oakland, Calif. Excavation superintenden is **Bill Mathews,** and **John Smith** and **Jac Corbett** are excavation foremen. **Ver Barker** is master mechanic and mechani foremen are **Pat** and **Ernie Potburg, Rus sell Ball,** and **Hartley Bordine** with **Jo Mathews** as partsman. **Bill Giddings** is de signer on the job, **Luke Weicksel** is chief o party and **Marvin Williams** is surveyo **Bill House** is the field carpenter superin tendent, and carpenter foremen are **Charli**

Ballard and **John Becker. Vic McFarland** is labor foreman and **Warren L. Movers** is the job office manager. **Vince Mork** is in charge of the warehouse. There are two shifts for the excavation and piledriving work. **Buck Fink** is the piledriver superintendent and piledriver foremen are **John Balma, Robert Molzan, Christian Burgstahler, Louis Kemmerling** and **Thomas Woodhall.** Equipment foremen are **Don Harnish, Jess Burch, Al Crum, Jack Corbartt, John Smith** and **Stubby Walker.** Bureau of Reclamation personnel on the job are **Roscoe Granger,** job engineer, **George Imrie,** resident engineer at Tracy, and **B. P. Ballport** and **O. G. Boden,** construction engineers at the Antioch offices.

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John H. Becich is the superintendent for Bechtel Corp., Los Angeles, Calif., on construction of the Revere Copper and Brass Co. Building in Los Angeles. **Harry M. Koons** is assistant superintendent and engineer on the job, and **Merle Charleston** is the job engineer. **Curly Mann** is carpenter foreman, **Ted Sandoval** is labor foreman, **Bill Cole** is millwright foreman, and **George L. Weaver** is rigger foreman. **Lyn McFadden** is surveyor, **Walter Hahn** is electrical engineer, **Wesley A. Irvin** is electrical foreman, and **Harold Morgan** is pipefitter foreman. **E. P. Cameron** is the field office manager and **R. O. Padgett** is the field purchasing agent.

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George J. Popovich is the superintendent for Basich Bros. Construction Co. and Basich Bros., San Gabriel, Calif., on the construction of a reinforced concrete bridge on the Highline Canal about 7 mi. east of Holtville, Calif., under a $105,665 contract. **R. H. Hapgood** is the job office manager. Popovich is also supervising 8.3 mi. of surfacing work near Blythe, Calif., for the Basich firms. **Homer Thompson** is the job office manager on this project, which is under a $215,850 contract.

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L. G. Creager is the project manager for Creager Bros. Constr. Co., Fort Pierre, S. D., on construction of a bridge in Meade County, S. D. **James Fluhorty** is foreman on the job. **J. W. Creager** is the project manager for the company on grading and traveling work in Harding, S. D. **Romie Rousseau** is supervising this work.

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Lloyd Vineyard is superintendent for Brezina Construction Co. on construction of prefabricated houses at Keyhole Dam in Wyoming for the Bureau of Reclamation. **Robert W. Brezina** is the project manager and **Frank Goehring** is resident engineer for the U.S.B.R. For similar work at Bixby Dam in South Dakota, the same supervisory personnel for the contractor exists with **H. M. Crowell** being resident engineer for the U.S.B.R.

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Milo Lubanko is the job superintendent for Basich Bros. Construction Co., San Gabriel, Calif., on the construction of 10.5 mi. of road surfacing near Banning, Calif. **L. Ray Cahoon** is purchasing agent for the project, which is under a $162,450 contract.

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J. K. McMullen is the superintendent for Peter Kiewit Sons' Co., Omaha, Neb., on improvement of the Los Angeles River channel in California. **Robert H. Shanley** is assistant superintendent and **Brinton E. Turner** is the job engineer. Foremen are **Freddy Welch,** excavating; **T. Smith,** grading, and **William "Tiny" Madison,** labor. **Wally St. Jacques** is mechanical superintendent and **Glen Kelley** is master mechanic. **M. H. Liddil** is office manager and **E. L. Martich** is timekeeper. **Carl Verner** is resident engineer for the State Bridge Department and **H. E. Belford** is resident engineer for the State of California.

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O. H. "Whit" Whitney is the job superintendent for R. E. Hazard Contracting Co., Inc., San Diego, Calif., on construction of the Gibbs Airport for the City of San Diego. Subcontractors for the excavation work, C. G. Willis & Sons, Inc., Los Angeles, Calif., have **Bert Lee** as job superintendent and **J. D. Morrison** and **M. F. Doran** as foremen. **Charles Chase** is their master mechanic. **Jack Tuelley** is the superintendent for J. S. Barrett Co., Newport Beach, Calif., subcontractors for utilities work.

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E. Erickson is supervising construction of the new Foreman & Clark Building in San Diego, Calif., for contractor, the Trepte Construction Co., San Diego.

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Charles Anderson is superintendent for Johnson Western Co., San Pedro, Calif., on construction of a bridge across the Sacramento River at Rio Vista, Calif. Pile foremen are **J. McLeod** and **F. H. Robertson,** and **Herbert Mertz** is the job office manager. Chief operating engineer on the job is **O. Scobee. R. N. Brink** is resident engineer and **P. Bowen** is the assistant resident engineer.

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A. A. Linn is the general foreman for R. O. Ferguson Co., Turlock, Calif., on the erection of a power line from Shasta Dam to Cottonwood, Calif. Foremen on the job are **D. L. Marshall, H. E. Edgar, E. D. Moe, B. R. Crane, E. P. Celeya** and **J. A. Jenkins.**

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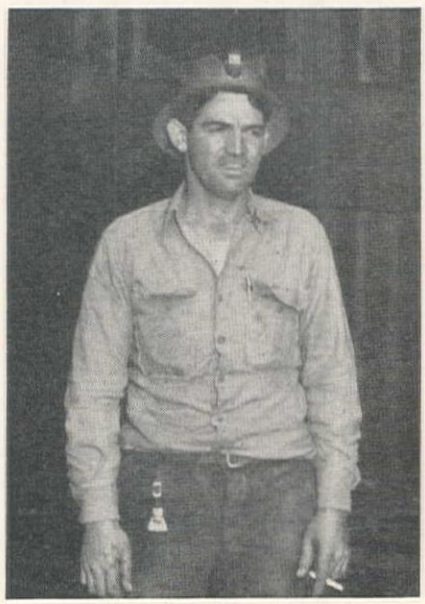
R. C. Blasongame is the general superintendent for Tunnel Constructors, Denver, Colo., on the construction of 5 tunnels for the Colorado-Big Thompson Project near Loveland, Colo. Blasongame has recently returned from France and Switzerland where he instructed personnel in the use and application of American equipment and new methods for driving tunnels.

R. C. BLASONGAME



Tom Redman is the dirt superintendent for the Nilson-Smith Construction Co., Great Falls, Mont., on the construction of 10 mi. of grading and surfacing and two bridges on the Dillon-Twin Bridges Road in Beaverhead County, Mont. **Jim Jones** is foreman on the job, **Norman Moe** is gravel superintendent and **John Paul** is pipe foreman. The job is under a $344,360 contract.

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Claude Wylie is supervising the surfacing of 5 mi. of road near Los Alamos, N. M., for Wylie Bros., Albuquerque, N. M., contractors for the $246,943 job. **S. Daniels** is grade foreman, **Bailey Nelson** is the structures superintendent, and **Floyd Heer** is the job office manager.

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Roy Hill is superintendent for Peter Kiewit Sons' Co., Arcadia, Calif., on the construction of 4.9 mi. of grading and surfacing in Orange County, Calif., under a $648,936 contract. **Brad Lockwood** is the job engineer, **Burl Grounds** and **Toots Powell** are dirt foremen, and **O. K. Hoeppner** is the office manager.

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Doyle Matthews is the superintendent for Matthews Bros., Idaho contractors who have subcontracted for grading and surfacing work near Preston, Idaho, from the H. A. Gardner Co., Blackfoot, Idaho. **Richard Simonds** is resident engineer for the Idaho Bureau of Highways.

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W. T. Grayson is acting as superintendent for his own general contracting firm on construction of water and sewerage facilities in Pocatello, Idaho. **William E. McDermott** is foreman for the work.

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Tip O'Neil is the superintendent for McGlothlin, Inc., and Riordan-Anderson Co. on construction of the airport and administration building at Shelby, Mont. The job is under a $324,000 contract.

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Roy Schultz is the general superintendent for Miller and Strong, Eugene, Ore., contractors for the construction of levees 4 mi. from Toledo, Ore., on Yakima Bay. **Niel Miller** is foreman on the job. **H. W. Key** is resident inspector for the Corps of Engineers, Portland District.

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Douglas McEvers is superintendent for the California Construction Co., Los Angeles, Calif., on construction of a theatre building for Robert L. Lippert Theatres, on Ventura Blvd. in Los Angeles.

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Changes in the personnel of McNeil Construction Co., Los Angeles, Calif., on their Millirons Department Store job in the Westchester District of Los Angeles being built under the supervision of **Carl D. Edwards,** include **Howard Marks** and **Jim Evans,** carpenter foremen.

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L. J. Ellsworth is supervising construction of a quonset warehouse and assembly room and a garage in Blackfoot, Idaho, for the L. J. Ellsworth Construction Co. **Ross Ellsworth** is the foreman for all of the work of the firm.

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A. M. Harsh is superintendent for Fredcrickson & Watson Construction Co., Oak-

land, Calif., on the construction of 7.8 mi. of grading and surfacing between Camp Lowe and Bailey Hill in Siskiyou County, Calif., under a $651,030 contract. **L. E. Christman** is tractor foreman and **John Naur** is shovel foreman. Other foremen are **Johnny Heckert,** concrete work, **"Pete" Pace,** fine grading work, and **Curley Walker,** labor. Master mechanic on the job is **Bill Halloway** and **Joe Burnside** is assistant mechanic. **George Perry** is the job office manager.

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G. "Guy" C. Jack is supervising construction of the Aeronautical Science Building on Harbor Drive, San Diego, Calif., for contractor, Vistenahl, Inc., La Jolla, Calif.

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A. A. Bainter, formerly active as a heavy construction contractor for many years on highway construction in Mississippi, Illinois and Nebraska, now has offices at Long Beach, Calif., as the Bainter Construction Co. He is presently engaged in the widening of Cherry Ave. in North Long Beach.

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A. J. Golden is superintendent for the M. H. Golden Construction Co., San Diego, Calif., on construction of the sewage treatment plant for the City of San Diego. Assistant superintendent is **Cuvier Greene. Jack Golden** is the carpenter foreman and **Jack Shacklin** is timekeeper.

* * *

W. H. James is supervising construction of the sewage treatment plant at Chula Vista, Calif., for contractor, James W. Huntley, Los Angeles. **Homer Smith** is carpenter foreman and **Art Coffman** is foreman on the $170,000 job.

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Fred McDowell is superintendent for the Del E. Webb Construction Co., Phoenix, Ariz., on construction of the half-million dollar Medical Center Corporation in Phoenix. The building will cover nearly a block.

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Charles McInroe is the general superintendent for the Rogers Construction Co., Portland, Ore., on surfacing and grading work near Klamath Falls, Ore. **H. W. McInroe** is the project manager and **Lloyd Babler** is in charge for Babler Bros., subcontractors for oiling work. **Joe Toole** is resident engineer for the Oregon State Highway Department.

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Col. F. Betz is the superintendent for the Colonel F. Betz Construction Co., Sausalito, Calif., on the erection of a bridge on the Pacific Coast Highway at Pismo Beach, Calif. **Frank Muren** is the assistant superintendent, **C. A. McOsker** is the bridge construction foreman, and **C. W. Dowdey** is the layout foreman. **Ted Lundquist** is the office manager.

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M. P. Brotherton, formerly superintendent of construction for the Bishop Steel Construction Co. in Phoenix, Ariz., is now heavy duty mechanic with A. Teichert & Son, Sacramento, Calif., on the construction of a flood control levee at Ventura, Calif.

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H. L. Salter, for several years a key man with Phillip Hughes, contractor in Los Angeles, Calif., is superintending construction of a warehouse building on Stanford Ave. in Los Angeles.

UNIT BID SUMMARY

Bridge and Grade Separation . . .

Washington—King County—State—Bridges and Fill

State Construction Co., Seattle, Wash., at $151,750, have been awarded the contract by the Department of Highways, Olympia, for 0.8 mi. grade, surface, and the construction of four reinforced concrete slab bridges on the King County Road. Unit bids were received from the following:

(1) State Construction Company $151,750
(2) C. B. Croy 158,068
(3) M. P. Butler 158,835
(4) Port Construction Company $166,438
(5) General Construction Company 174,409
(6) S. S. Mullen, Inc. 174,441

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, clearing and grubbing	$1,300	$3,000	$3,000	$2,000	$1,000	$500
1,110 cu. yd. com. excav., incl. haul of 600 ft.	1.50	.80	.49	1.00	1.00	1.00
40 cu. yd. com. tr. excav., incl. haul of 600 ft.	2.00	2.00	2.50	2.50	3.00	5.00
38,900 cu. yd. borrow in pl., incl. haul of 600 ft.	.50	.57	.47	.60	.60	.50
7,500 cu. yd. sta's. overhaul on above materials	.04	.03	.02	.03	.03	.02
959 M. cu. yd. sta's. overhaul on above materials	6.00	.15	6.00	5.00	8.00	8.00
24 cu. yd. structure excavation	8.00	5.00	2.50	5.00	6.00	5.00
36.2 sta's. (100 ft.) finishing roadway	15.00	18.00	20.00	18.00	15.00	15.00
850 cu. yd. cr. stone surf. top crse. in pl.	3.25	3.50	4.50	4.00	4.00	2.75
1,750 cu. yd. cr. stone surf. base crse. in pl.	3.25	3.50	4.50	4.00	4.00	2.75
50 M-gals. water	3.00	5.00	4.00	4.00	5.00	3.00
20 cu. yd. hand placed riprap	15.00	10.00	7.50	20.00	20.00	25.00
740 cu. yd. loose riprap Class A in pl.	6.00	6.25	5.25	4.75	5.50	3.00
288 only tbr. spot posts in pl.	2.50	2.50	2.50	5.00	1.50	3.50
940 lin. ft. bm. gd. rl. ty. No. 1 () or No. 3 () des. No. 5 comp. in pl.	2.75	3.25	3.00	3.50	3.00	2.75
1,280 lin. ft. asph. conc. gutter in pl.	1.25	1.20	.50	2.00	1.00	1.50
42 lin. ft. asph. conc. spillway in pl.	2.00	1.50	2.00	7.00	1.50	2.00
19.1 cu. yd. conc. Class A in pl.	55.00	70.00	53.00	80.00	70.00	74.50
3,332 lbs. steel reinf. bars in pl.	.10	.12	.11	.11	.12	.10
Lump sum, remov. exist. trestle & app. trestle	8,450	10,000	8,500	11,000	18,000	11,245
BRIDGES						
846 cu. yd. conc., Class A in pl.	47.00	55.00	56.00	52.00	.56	65.00
191,100 lbs. steel reinf. bars in pl.	.095	.10	.10	.09	.09	.10
3,200 lbs. structural carbon steel in pl.	.35	.65	.33	.50	.30	.50
5,262 lin. ft. furn. precast conc. piling at site	3.85	3.00	3.50	3.75	4.00	4.00
172 only, driving precast conc. piles in pl.	36.50	50.00	26.50	50.00	40.00	50.00
1,780 lin. ft. bm. gd. rl. Ty. No. 1 () or No. 3 () sp. des. comp. in pl.	3.50	2.75	4.20	3.50	3.00	3.50
5 only, furn. and driving precast conc. test piles in pl.	500.00	500.00	430.00	350.00	400.00	900.00

California—Alameda County—State—Structures

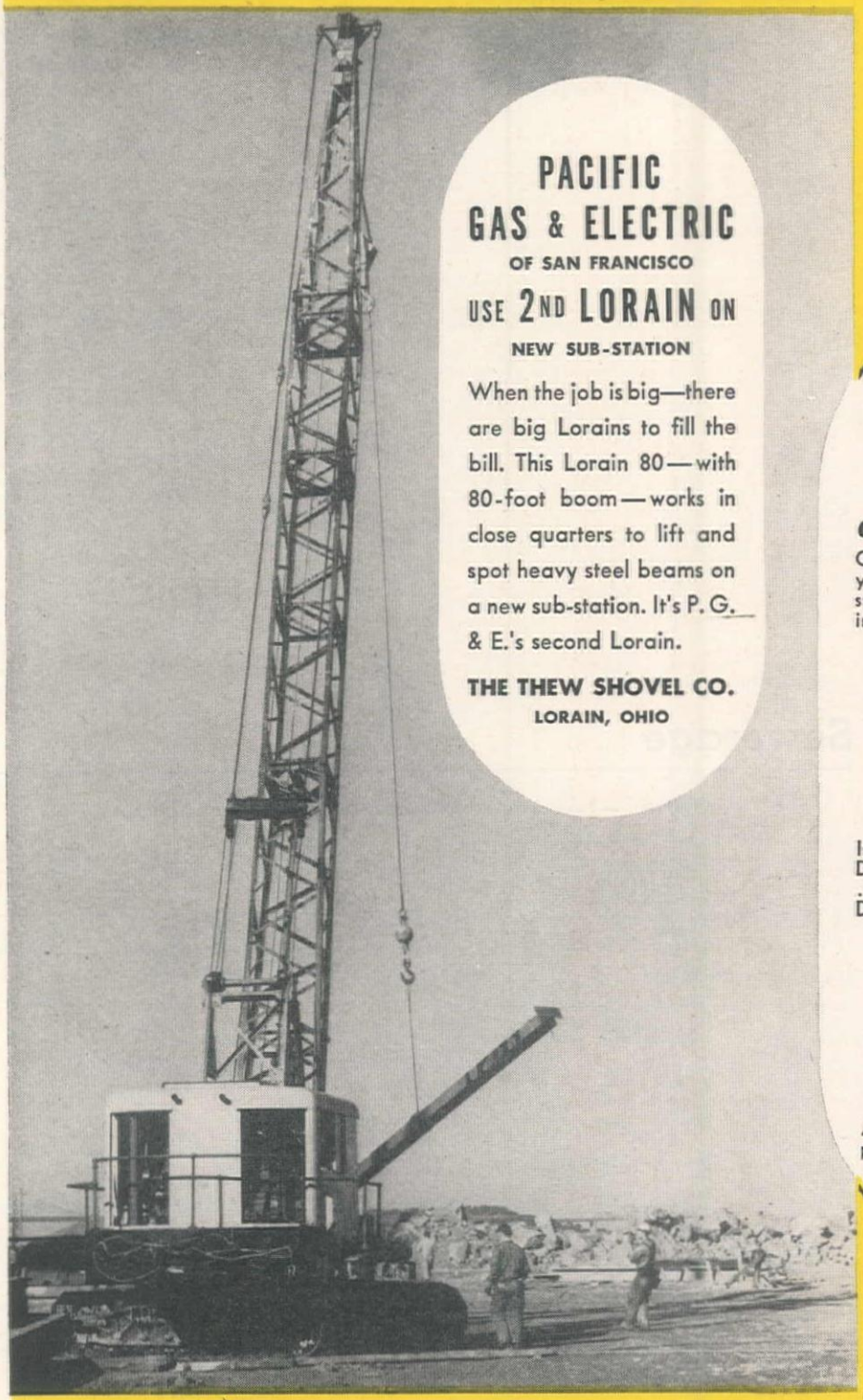
Johnson, Drake & Piper, Inc., Oakland, Calif., have been awarded a contract of $1,487,715 by the California Division of Highways, Sacramento, for highway improvements on the East Shore Freeway and the 42nd Ave. interchange, which involves construction of two railroad underpasses, a portion of a railroad overhead, two highway undercrossings and overcrossings, and about 0.7 mi. of roadway to be graded and surfaced. All above work is in Oakland, Calif. Unit bids were received from the following:

(1) Johnson, Drake and Piper, Inc.....$1,487,715
(2) Fredrickson & Watson Construction Co., and M & K Corporation..... 1,554,001
(3) MacDonald, Young & Nelson, Inc. J. H. Pomeroy & Company, Inc..... 1,672,728
(4) Bates & Rogers Construction Corp. $1,727,020
(5) Stolte Incorporated Duncanson Harrelson Company..... 1,735,741
(6) Lee J. Immel 1,739,669
(7) A. Soda & Son; Ransome Company 1,813,830

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
3,330 cu. yd. remov. conc.	3.00	1.75	2.00	2.70	4.00	3.00	3.85
Lump sum, clearing grubbing	$5,000	$17,150	$5,000	$3,400	$21,000	$8,000	$5,000
176,000 cu. yd. roadway excav.	.79	.73	.85	.78	.72	.80	1.05
1,600 cu. yd. ditch and channel excav.	1.20	1.55	1.00	1.85	1.00	2.00	2.00
15,000 cu. yd. structure excav.	2.41	2.70	4.00	4.65	3.00	3.00	4.52
9,575 cu. yd. struct. excav. (major structs.)	4.00	2.70	3.70	5.30	6.00	5.00	7.00
11,525 cu. yd. struct. backfill (major structs.)	1.08	3.40	2.00	2.90	5.00	2.50	2.00
33,000 sq. yd. comp. orig. ground	.0475	.07	.05	.065	.08	.08	.05
20,000 cu. yd. local borrow	1.17	.94	1.50	.88	.60	1.00	1.90
600,000 sta. yd. overhaul	.01	.01	.007	.0055	.012	.01	.01
8,214 tons filter material	3.13	2.69	4.00	4.70	3.00	4.00	4.00
6,500 sq. yd. preparatory landscape treatment	.36	.22	.20	.195	.10	.15	1.10
15,000 prep. slopes (slope erosion protection)	.12	.09	.10	.21	.10	.15	.50
3,000 cu. yd. imported top soil	3.00	2.40	3.00	3.10	3.00	3.00	3.85
Lump sum, dev. wat. sup. & furn. wat. equip.	$5,000	$5,000	$2,500	$2,600	$3,000	$5,000	$2,500
5,000 M. gal. applying water	1.09	1.50	1.50	2.60	1.80	1.75	2.00
50 sta. finishing rdwy.	24.00	50.00	25.00	31.20	60.00	50.00	50.00
5,800 tons crusher run base	2.74	2.75	4.00	4.90	3.00	3.40	2.90
25,000 sq. yd. mix. & comp. (cem. tr. subgrd.)	.30	.40	.30	.40	.75	.35	.52
1,200 bbl. Portland cem. (cem. tr. subgrade)	4.05	4.68	4.50	4.05	4.00	4.00	4.00
11 tons liq. asphalt, SC-1 (pr. ct.)	44.80	48.00	50.00	52.00	40.00	35.00	35.00
25 tons asphaltic emul. (pt. bdr. & cur. sl.)	45.00	48.00	50.00	52.00	40.00	36.00	48.00
5,200 tons pl.-mix. surfacing	7.50	8.00	7.00	7.90	7.00	6.80	6.40
300 lin. ft. pl.-mix. raised bars	2.00	1.50	2.00	1.80	2.00	1.00	2.75
5,400 cu. yd. Class "B" P.C.C. (pavement)	13.44	15.00	15.00	21.65	17.00	16.00	16.00
4,300 ea. pavement tie bolt assemblies	.50	.53	.50	.73	.60	1.00	.50
7,297 cu. yd. Class "A" P.C.C. (structures)	40.00	42.00	47.00	46.40	50.40	56.00	43.00
1,063 lin. ft. rubber waterstops	1.84	2.00	2.00	1.86	3.00	2.00	4.00
2,328,500 lbs. furnishing structural steel	.09	.095	.115	.0928	.11	.11	.105
2,328,500 lbs. erecting structural steel	.0275	.03	.022	.035	.028	.02	.025
35,000 lbs. miscl. iron and steel	.37	.30	.30	.45	.30	.50	.30
1,599 lin. ft. steel railing	7.39	8.00	8.00	6.90	7.00	8.00	8.00
19,525 lin. ft. furnishing conc. piling	2.90	2.80	3.00	3.00	3.00	3.25	3.00
921 ea. driving conc. piles	37.80	46.70	40.00	39.00	40.00	35.00	43.00
1,585 sq. yd. membrane waterproofing	1.79	1.70	2.00	1.60	2.00	5.00	2.00
1,585 sq. yd. protective covering	.45	.90	1.00	1.55	2.00	5.00	2.15
80 cu. yd. broken conc. riprap	7.32	16.75	20.00	2.50	12.00	40.00	10.00
2,100 cu. yd. Cl. "B" P.C.C. (curb, gutters, and sidewalks)	35.55	32.00	30.00	39.00	32.00	35.00	32.50
29 ea. survey monuments	30.00	27.50	15.00	21.00	30.00	25.00	35.00
1,000 lin. ft. laminated guard railing	2.40	2.80	4.00	3.15	3.00	3.00	2.50
350 lin. ft. remov. & reconstr. guard railing	2.00	2.80	3.00	3.30	2.00	2.30	2.50
2,600 lin. ft. metal plate guard railing	2.67	3.00	4.00	2.65	3.00	3.00	3.50
22 ea. guide posts & monument markers	6.00	7.00	5.00	5.50	6.00	5.00	5.00
7,360 lin. ft. chain link fence	1.00	1.10	1.10	.97	1.00	1.00	1.50
10 ea. walk gates	50.40	53.00	50.00	47.00	60.00	50.00	50.00

(Continued on next page)

AGAIN IT'S LORAIN IN CALIFORNIA



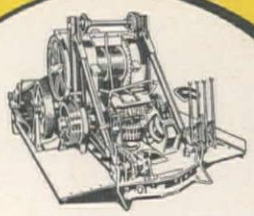
PACIFIC GAS & ELECTRIC
OF SAN FRANCISCO

USE 2ND LORAIN ON
NEW SUB-STATION

When the job is big—there are big Lorains to fill the bill. This Lorain 80—with 80-foot boom—works in close quarters to lift and spot heavy steel beams on a new sub-station. It's P. G. & E.'s second Lorain.

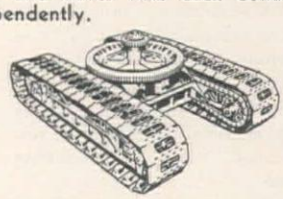
THE THEW SHOVEL CO.
LORAIN, OHIO

BIG YARDAGE FEATURES *in the* LORAIN-820 SERIES



Center Drive Turntable

Concentrates power where and when you need it . . . Simultaneous hoist, swing and travel with each controlled independently.



2-Speed Crawler

Independent Crawler Travel . . . Chain Driven . . . 2 speeds in both directions . . . 4 way Tread and Travel Lock . . . Drop-forged Treads.

Booms For Every Job

All-welded, all-steel Shovel Boom with positive independent Chain Crowd. Interchangeable Crane, Dragline, Clamshell and Hoe Booms also available.

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WORTHAM MACHINERY CO. ..... *Cheyenne, Wyo. and Billings, Mont. Branches: Sheridan, Greybull, Casper and Rock Springs, Wyo.*

3 ea. drive gates	100.00	100.00	100.00	88.00	100.00	100.00	100.00
76 lin. ft. 12-in. R.C.P. (std. str.)	9.45	3.40	3.00	3.65	1.95	1.50	3.95
460 lin. ft. 12-in. R.C.P. (3000-D)	3.25	2.90	4.00	4.15	2.10	1.50	4.52
4,500 lin. ft. 15-in. R.C.P. (std. str.)	3.26	2.74	4.50	4.70	2.60	3.20	5.05
300 lin. ft. 15-in. R.C.P. (2800-D)	3.67	3.83	5.00	5.40	2.75	3.60	5.85
3,600 lin. ft. 18-in. R.C.P. (std. str.)	3.85	3.61	5.50	5.95	3.25	3.60	6.50
420 lin. ft. 21-in. R.C.P. (std. str.)	4.62	4.40	6.50	6.65	4.00	4.60	7.25
500 lin. ft. 24-in. R.C.P. (std. str.)	6.12	5.45	8.00	8.30	5.00	5.00	9.00
1,150 lin. ft. 30-in. R.C.P. (std. str.)	7.62	6.73	9.00	9.80	6.50	6.40	10.65
205 lin. ft. 6-in. C.M.P. (16 ga.)	1.00	1.65	2.00	1.65	1.10	1.40	1.75
60 lin. ft. 8-in. C.M.P. (16 ga.)	1.36	2.45	2.50	2.10	1.75	2.00	2.30
76 lin. ft. 36-in. C.M.P. (10 ga.)	24.37	32.40	65.00	67.50	30.00	35.00	74.00
242 lin. ft. 6-in. P.M.P. (16 ga.)	1.09	2.00	1.50	1.30	1.35	1.50	1.50
5,800 lin. ft. 8-in. P.M.P. (16 ga.)	1.50	1.70	2.00	1.90	1.90	2.20	2.00
50 lin. ft. 4-in. cast iron pipe	1.43	4.30	3.00	3.15	1.65	3.00	3.40
130 lin. ft. 8-in. cast iron pipe	3.93	11.36	5.00	4.70	4.30	5.00	5.05
2,900 lin. ft. 8-in. vitrified clay pipe	1.79	2.00	2.50	2.30	1.45	1.00	2.50
320 lin. ft. 10-in. vitrified clay pipe	2.08	2.40	3.00	2.75	2.10	2.00	2.95
11 ea. adjusting manholes to grade	20.79	66.00	60.00	57.20	36.00	30.00	62.00
1 ea. adjusting lamphole to grade	20.70	66.00	40.00	36.40	24.00	12.00	40.00
9 ea. salvaging frames and covers	12.32	17.00	40.00	36.40	10.00	12.00	40.00
95 lin. ft. new manholes	35.78	30.00	20.00	21.00	27.50	25.00	24.00
2 ea. new lampholes	178.92	72.00	40.00	42.00	36.00	50.00	45.00
12 ea. new manhole frames and covers	58.46	57.00	70.00	68.00	50.00	50.00	75.00
2 ea. resetting manhole frames and covers	18.09	25.00	30.00	26.00	12.00	30.00	30.00
2 ea. resetting lamphole frames and covers	18.09	25.00	20.00	21.00	10.00	12.00	24.00
90 ea. red reflectors	1.48	2.00	3.00	5.50	4.00	1.00	10.00
40 lin. ft. 1¼-in. galvanized steel pipe	.56	1.07	.90	.75	1.20	1.60	4.00
210 lin. ft. 1½-in. galvanized steel pipe	.62	1.13	1.00	.80	1.30	1.70	4.00
650 lin. ft. 2-in. galvanized steel pipe	.71	1.32	1.20	.90	1.40	1.80	4.00
325 lin. ft. 2½-in. galvanized steel pipe	.95	1.67	1.50	1.30	1.80	2.00	5.00
40 lin. ft. 3-in. galvanized steel pipe	1.20	2.63	2.00	1.50	2.10	2.20	6.00
85 lin. ft. 4-in. galvanized steel pipe	1.75	3.47	2.50	2.05	3.00	3.00	8.00
917,000 lb. furn. bar reinf. steel	.065	.06	.08	.07	.07	.06	.08
917,000 lb. placing bar reinf. steel	.015	.027	.0156	.0175	.02	.02	.02
Lump sum, R.R. falsework (Sather underpass)	$12,000	$18,000	$7,500	$4,050	$30,000	$30,000	$32,920
Lump sum, R.R. falsework (Melrose underpass)	$7,500	$5,000	$2,500	$4,665	$15,000	$10,000	$21,626
Lump sum, moving section house	$1,176	$1,100	750.00	$1,300	$1,000	$4,000	$1,850
Lump sum, drainage pumping equipment	$11,178	$10,000	$10,000	$10,400	$10,000	$10,000	$8,800
Lump sum, pumphouse electrical equipment	$1,842	$2,000	$1,800	$1,710	$1,800	$1,700	$1,945
Lump sum, traffic signal system	$13,681	$13,600	$14,000	$12,700	$13,000	$12,000	$14,215
49 ea. Type "A" electroliers	550.00	560.00	550.00	510.00	550.00	500.00	550.00
5 ea. Type "A_1" electroliers	825.44	840.00	750.00	766.00	800.00	700.00	700.00
2 ea. Type "A_2" electroliers	$1,000	$1,030	$1,000	937.00	$1,000	900.00	800.00
1 ea. Type "A_3" electrolier	550.00	540.00	550.00	495.00	520.00	500.00	600.00
8 ea. Type "A_4" electroliers	407.12	415.00	400.00	378.00	320.00	400.00	400.00
1 ea. Type "A_5" electrolier	600.00	600.00	600.00	537.00	560.00	600.00	600.00
11 ea. Type "A_6" electroliers	550.00	555.00	550.00	511.00	520.00	500.00	550.00
Lump sum, misc. lighting fixtures	$4,000	$4,304	$4,000	$3,624	$3,500	$4,000	$4,085

Sewerage . . .

California—Los Angeles County—City—Storm Drains

Steve P. Rados, Los Angeles, Calif., have been awarded the contract at $527,004 by the City of Long Beach, Calif., for the construction of the North Boundary Flood Control, Artesia Street Trunk Line. A total of 100 working days are required for completion of the project. The follwing submitted unit bids:

(A) Steve P. Rados $527,004
(B) G. E. Kerns 543,161
(C) Artukovich Brothers 584,238
(D) Charles T. Brown and Paul Vukich Construction Company 600,485
(E) Burch & Bebek 620,456
(F) P & J Artukovich $632,868
(G) McDonald & Kruse and Green-Mears Construction Company 638,308
(H) Nick Tomovich and Michael Izzi 644,270
(I) V C K Construction Company 761,985

(1) 1671 lin. ft. 96-in. reinf. concr. pipe 1250 D-Load
(2) 1548.80 lin. ft. 96-in. reinf. concr. pipe 1000 D-Load
(3) 1884.73 lin. ft. 90-in. reinf. concr. pipe 1000 D-Load
(4) 102.10 lin. ft. 84-in. reinf. concr. pipe 1100 D-Load
(5) 50.37 lin. ft. 63-in. reinf. concr. pipe 1500 D-Load
(6) 48 lin. ft. 48-in. reinf. concr. pipe 4000 D-Load
(7) 1329.62 lin. ft. 48-in. reinf. concr. pipe 1750 D-Load
(8) 276 lin. ft. 45-in. reinf. concr. pipe 1750 D-Load
(9) 362 lin. ft. 42-in. reinf. concr. pipe 1750 D-Load
(10) 32 lin. ft. 42-in. reinf. concr. pipe 1250 D-Load
(11) 622 lin. ft. 39-in. reinf. concr. pipe 1750 D-Load
(12) 136.50 lin. ft. 36-in. reinf. concr. pipe 1750 D-Load
(13) 697 lin. ft. 30-in. reinf. concr. pipe 1750 D-Load
(14) 674 lin. ft. 24-in. reinf. concr. pipe 1500 D-Load
(15) 180 lin. ft. 21-in. cement concr. pipe extra strength
(16) 740 lin. ft. 18-in. cement concr. pipe extra strength
(17) 1041 lin. ft. 15-in. cement concr. pipe extra strength
(18) 1 special drop manhole and junction chamber at Line Ave.
(19) 1 special junction chamber at Orange Ave.
(20) 1 special junction chamber at Cherry Ave.
(21) 16 standard manhole Type G
(22) 2 standard manhole Type H
(23) 2 special manhole Type H
(24) 2 standard catch basin connection chamber for 96-in. RCP
(25) 1 standard catch basin connection chamber for 90-in. RCP
(26) 43 standard catch basin No. A-1
(27) 7 standard catch basin No. A-2
(28) 1 standard catch basin No. H-1
(29) 2 standard catch basin No. G-D
(30) 18 standard local depression No. B-1
(31) 4 standard local depression No. B-2
(32) 11 standard local depression No. C-1
(33) 2 standard local depression No. C-6
(34) 9 standard local depression No. C-7
(35) 4 standard local depression No. B-17
(36) 4 standard local depression No. B-17.1
(37) 1 standard local depression No. D-1
(38) 1 standard inverted siphon for 6-in. VCP—16-ft. long
(39) 1 standard inverted siphon for 10-in. VCP—24-ft. long
(40) 1 standard inverted siphon for 10-in. VCP—32-ft. long
(41) 28 lin. ft. 10-in. cast iron pipe sewer replacement
(42) 32 lin. ft. 8-in. cast iron pipe sewer replacement
(43) 16 lin. ft. 6-in. cast iron pipe sewer replacement
(44) 28 lin. ft. 6-in. vit. clay pipe house connection
(45) 12 lin. ft. 6-in. cast iron pipe house connection
(46) 8 lin. ft. Type C concr. backfill for 12-in. VCP
(47) 20 lin. ft. Type C concr. backfill for 48-in. RCP
(48) 10 lin. ft. Type A concr. backfill for 6-in. pipe
(49) 10 lin. ft. Type A concr. backfill for 8-in. pipe
(50) 10 lin. ft. Type A concr. backfill for 10-in. pipe
(51) 10 lin. ft. Type A concr. backfill for 12-in. pipe
(52) 10 lin. ft. Type A concr. backfill for 15-in. pipe
(53) 10 lin. ft. Type A concr. backfill for 18-in. pipe
(54) 10 lin. ft. Type A concr. backfill for 21-in. pipe
(55) 5,000 tons rock mattress
(56) 241 cu. yd. concr. removal
(57) 9700 sq. ft. 4-in. plant mix surf.
(58) 137 sq. ft. 8-in. asph. conc. pave.
(59) 113 sq. ft. 8-in. Portland cement concr. pave.
(60) 7 remove and dispose of palm trees
(61) lump sum, remodel water main interferences
(62) lump sum, removal gas main interferences
(63) 1,400 M gals. water used for sprinkling

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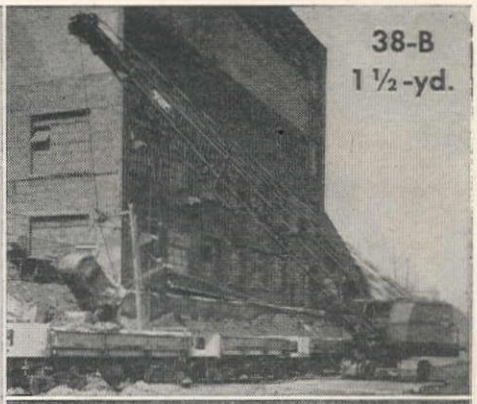

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That's right, mister! It's the combination of light weight and great strength, the effective distribution of weight, the remarkable balance of operating functions, the smooth responsive control that together make Bucyrus-Erie ⅜ to 2½ yard excavators tops in speed and output.

And what they have in speed, they match in durability. Operators find it easy to maintain a fast steady pace shift after shift with minimum maintenance. There is no need to spend valuable hours making delicate adjustments, for on Bucyrus-Eries the necessary adjustments are few in number, are easy to make, and stay put. Machinery is simple, parts are few and large, every inch of shaft length is used.

When you buy a Bucyrus-Erie, you buy a fast, durable excavator that's easily converted to various front ends, too. It's not just a shovel for which other attachments are available; it's an all-round machine whose design makes it equally effective with any front end.

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Shovels • Dragshovels • Draglines • Clamshells • Cranes • ⅜ to 2½-yd.

		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
(1)	.....	68.50	80.00	80.00	81.52	84.00	74.00	81.00	76.00	87.43
(2)	.....	66.50	70.00	70.00	79.93	78.00	68.00	78.75	74.00	80.98
(3)	.....	61.65	60.00	68.00	70.57	68.00	64.00	70.00	68.00	78.18
(4)	.....	61.50	52.50	65.00	63.06	60.00	60.00	65.50	59.00	73.73
(5)	.....	58.15	47.00	50.00	55.22	40.00	50.00	57.50	51.00	67.83
(6)	.....	54.20	70.00	70.00	50.00	35.00	45.00	36.75	68.00	45.61
(7)	.....	29.10	20.35	30.00	22.79	30.00	40.00	32.50	37.00	42.71
(8)	.....	26.15	19.20	28.00	21.42	30.00	39.00	31.00	37.00	40.61
(9)	.....	24.25	15.00	26.00	19.80	20.00	38.00	31.00	36.00	33.01
(10)	.....	21.10	14.50	25.00	19.24	20.00	37.00	31.00	36.00	31.96
(11)	.....	19.00	15.00	23.00	18.63	18.00	34.00	31.00	34.00	31.11
(12)	.....	18.00	12.60	20.00	17.40	15.00	28.00	26.50	34.00	29.16
(13)	.....	14.60	10.60	20.00	15.47	12.00	25.00	25.50	30.00	25.16
(14)	.....	13.00	8.65	15.00	13.59	10.00	23.00	24.00	28.00	21.66
(15)	.....	11.00	7.50	10.00	12.46	9.00	18.00	8.70	20.00	18.31
(16)	.....	9.75	6.60	10.00	10.30	9.00	17.00	7.80	17.00	16.11
(17)	.....	7.85	5.75	8.00	9.48	7.00	16.00	7.00	15.00	14.06
(18)	.....	$2,790	$4,500	$3,500	$4,256	$3,015	$3,100	$4,450	$1,676	$4,200
(19)	.....	$1,400	$2,500	$1,200	$2,669	$1,728	$1,850	$2,925	$1,666	$2,500
(20)	.....	$1,785	$2,500	$2,000	$2,165	$1,780	$3,520	$3,600	$2,243	$2,600
(21)	.....	500.00	$1,000	400.00	729.00	450.00	475.00	440.00	555.00	750.00
(22)	.....	850.00	$2,000	500.00	$1,617	625.00	$1,350	$1,325	$1,505	$1,350
(23)	.....	900.00	$2,000	500.00	$1,890	700.00	$1,600	$1,700	$1,517	$1,500
(24)	.....	750.00	$1,000	400.00	$1,469	525.00	$1,350	$1,300	$1,096	$1,400
(25)	.....	700.00	$1,000	400.00	$1,347	500.00	$1,220	$1,200	$1,092	$1,500
(26)	.....	185.00	200.00	175.00	166.00	220.00	225.00	230.00	159.00	406.00
(27)	.....	285.00	300.00	200.00	308.00	260.00	425.00	600.00	294.00	544.00
(28)	.....	290.00	300.00	300.00	270.00	250.00	300.00	510.00	227.00	452.00
(29)	.....	265.00	400.00	300.00	250.00	225.00	375.00	440.00	256.00	481.00
(30)	.....	95.00	60.00	50.00	75.40	45.00	70.00	40.00	64.00	200.00
(31)	.....	70.00	70.00	55.00	93.60	55.00	90.00	64.00	64.00	75.00
(32)	.....	50.00	30.00	20.00	48.00	30.00	40.00	42.00	32.00	80.00
(33)	.....	60.00	60.00	60.00	41.60	40.00	75.00	64.00	64.00	85.00
(34)	.....	65.00	60.00	60.00	28.80	45.00	85.00	84.00	96.00	95.00
(35)	.....	85.00	70.00	70.00	81.60	60.00	85.00	84.00	96.00	100.00
(36)	.....	110.00	90.00	80.00	102.60	65.00	115.00	84.00	96.00	105.00
(37)	.....	60.00	100.00	60.00	41.60	45.00	100.00	42.00	64.00	77.00
(38)	.....	720.00	800.00	500.00	764.00	$5,800	$2,500	$1,680	$2,020	$1,500
(39)	.....	950.00	900.00	500.00	876.00	$7,800	$3,500	$2,100	$2,320	$2,500
(40)	.....	825.00	$1,000	500.00	928.00	$9,800	$4,500	$2,850	$2,420	$3,000
(41)	.....	15.00	10.00	10.00	13.36	25.00	15.00	14.00	10.00	12.00
(42)	.....	14.00	10.00	10.00	12.54	20.00	14.00	14.00	10.00	10.00
(43)	.....	10.00	8.00	10.00	11.69	20.00	11.00	14.00	10.00	8.00
(44)	.....	7.50	5.00	5.00	8.00	20.00	5.00	14.00	5.00	6.00
(45)	.....	9.00	10.00	10.00	11.69	20.00	6.00	14.00	7.00	8.00
(46)	.....	5.30	5.00	2.50	10.00	5.00	1.50	5.50	3.00	10.00
(47)	.....	7.00	20.00	11.00	25.00	10.00	6.00	11.25	10.00	25.00
(48)	.....	3.15	5.00	1.00	7.00	5.00	1.00	4.25	3.00	3.00
(49)	.....	3.75	5.00	1.25	9.00	5.00	1.25	4.25	3.00	4.00
(50)	.....	4.60	5.00	1.35	11.00	5.00	1.50	5.50	3.00	6.00
(51)	.....	5.30	5.00	1.60	14.00	6.00	1.50	7.20	3.00	7.00
(52)	.....	6.50	7.00	2.00	16.00	7.00	2.00	8.50	3.00	8.00
(53)	.....	8.00	8.00	2.50	18.00	10.00	2.50	10.00	3.00	10.00
(54)	.....	9.35	9.00	2.90	20.00	10.00	3.00	11.00	3.00	12.00
(55)	.....	2.75	4.00	3.00	4.45	6.00	5.00	3.50	4.00	5.00
(56)	.....	3.25	6.00	8.00	9.00	20.00	5.00	28.00	7.00	20.00
(57)	.....	.25	.20	.40	.25	.55	.35	.30	.28	.40
(58)	.....	.65	1.00	1.00	.76	.60	.50	.50	.50	2.00
(59)	.....	1.35	1.00	1.00	1.05	.75	1.00	.85	.50	2.00
(60)	.....	33.50	50.00	50.00	125.00	100.00	100.00	75.00	75.00	300.00
(61)	.....	$7,270	$7,270	$7,270	$7,270	$7,270	$7,270	$7,270	$7,270	$7,270
(62)	.....	$8,575	$8,575	$8,575	$8,575	$8,575	$8,575	$8,575	$8,575	$8,575
(63)	.....	2.40	4.00	11.50	2.50	4.00	1.00	2.25	4.00	30.00

Highway and Street . . .

California—San Luis Obispo County—State—Grade, Surf. and Bridge

Frederickson & Kasler, Sacramento, were awarded the $1,055,958 contract, by the Division of Highways, Sacramento, for 5 mi. grading, surfacing, and the construction of a reinforced concrete girder bridge across San Luis Obispo Creek, between Pismo Beach and Miles Station. The following submitted Unit Bids:

(1) Frederickson & Kasler $1,055,989
(2) Griffith Co. 1,219,315
(3) Granite Construction Co. $1,268,853

		(1)	(2)	(3)
265	sta. clearing and grubbing	22.00	18.00	26.00
600	cu. yd. remov. conc.	4.00	4.00	5.00
430,000	cu. yd. roadway excav.	.445	.44	.57
8,500	cu. yd. struct. excav.	2.80	3.50	2.75
4,000	cu. yd. ditch and channel excav.	1.85	2.00	1.85
122,500	tons imported borrow	.78	.77	.90
25,000	cu. yd. imported top soil	1.15	2.00	1.85
3,750,000	sta. yd. overhaul	.005	.005	.005
21,000	lin. ft. vertical holes (sand drains)	1.08	1.55	1.00
13,000	tons sand fill matl.	.78	.75	1.40
65,000	sq. yd. compact. orig. ground	.05	.04	.05
124,000	sq. yd. prep. slopes (slope erosion protection)	.065	.08	.06
2,000	lb. seed (slope erosion protection)	.23	.20	.20
198,000	ea. ice plant cuttings	.035	.04	.03
Lump sum,	dev. water supply and furn. wat. equip.	$12,600	$16,000	$12,500
16,700	M. gal. applying water	1.00	1.50	1.75
265	sta. finishing roadway	20.00	10.00	11.00
48,000	tons crusher run base	2.36	2.60	3.00
365	tons liq. asphalt, SC-2 (pr. ct. and pen. tr.)	21.00	25.00	24.00
140	tons asph. emuls. (pt. bdr. and sl. cts.)	33.00	30.00	31.50
1,250	tons screenings (sl. ct.)	6.00	5.50	7.50
1,580	tons paving asphalt (P.M.S., Type A)	21.00	22.00	22.00
28,500	tons min. aggr. (P.M.S., Type A)	3.00	4.20	4.00
450	tons liq. asphalt SC-5 or 6 (P.M.S., Type B)	21.00	22.00	22.00
8,000	tons mtn. aggr. (P.M.S., Type B)	3.00	4.20	4.00
81,000	sq. ft. placing P.M.S. (gutters, ditches and slope drains)	.10	.17	.10
17,600	lin. ft. placing P.M.S. (dikes)	.24	.40	.15
450	lin. ft. raised bars	1.00	1.50	1.30
1,700	cu. yd. Class "A" P.C.C. (structs.)	55.00	75.00	66.00
385	cu. yd. Class "A" P.C.C. (footing blocks)	55.00	33.00	60.00
436,000	lb. furn. bar reinf. steel	.07	.08	.09
436,000	lb. placing bar reinf. steels	.02	.03	.025
1,144	lin. ft. conc. railing	8.00	7.00	3.50
10,980	lin. ft. furn. untreated Douglas fir piling	.82	.90	.90
1,900	lin. ft. furn. treated Douglas fir piling	1.72	1.60	1.60

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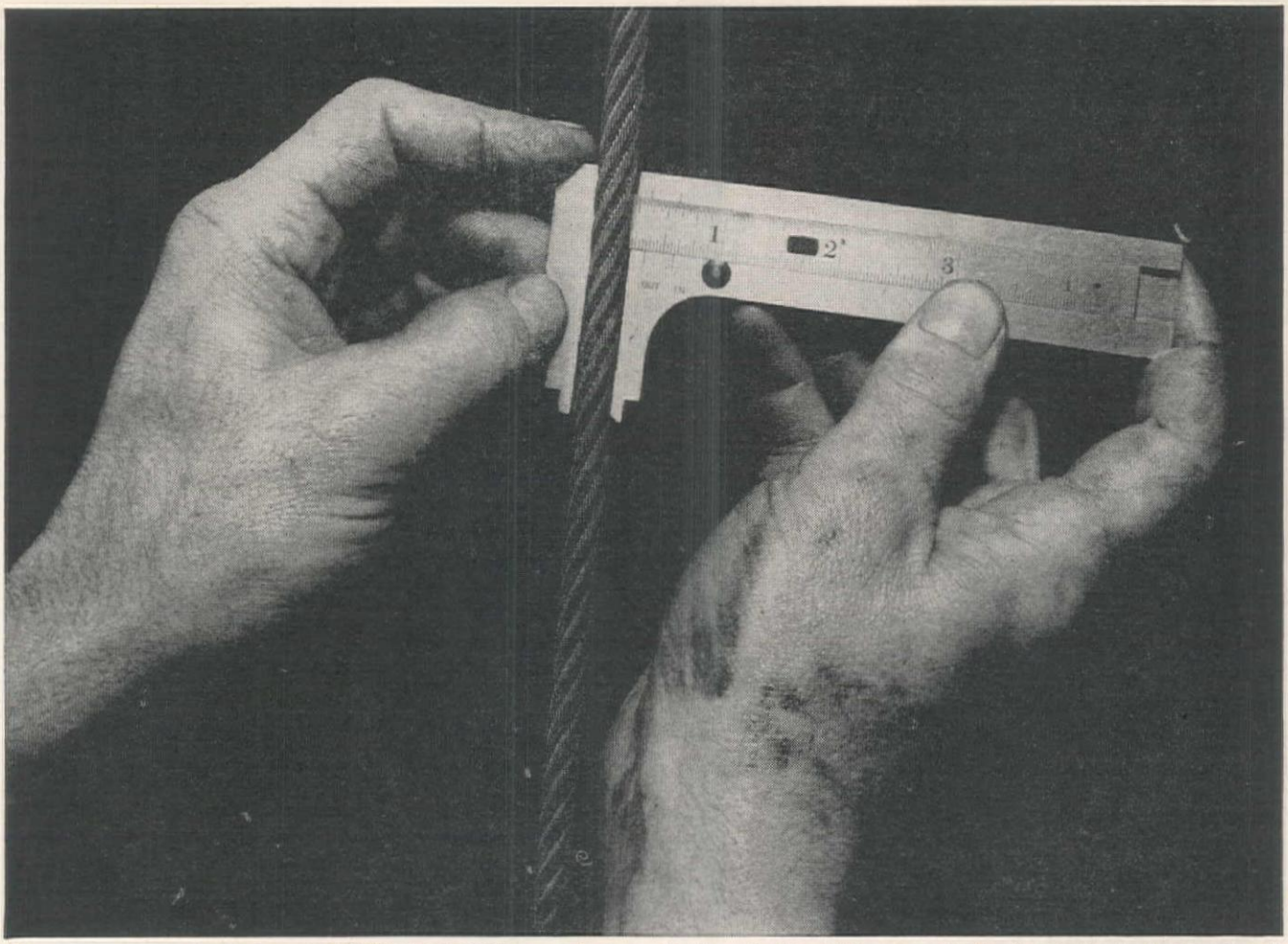

Micrometer exactness goes into TIGER BRAND manufacture all along the line. Tolerances in the finished rope, in the strands and in the wires themselves, are checked and checked again with the constant care that means more wear for users.

How Columbia's precision tests give wire rope longer life

Tough TIGER BRAND gets many tests, from ore to completed rope... tensile tests, torsion tests, fatigue tests. The precision test, shown above, makes sure that each wire and strand is doing its job in TIGER BRAND. For hard-working American TIGER BRAND wire rope is a tribute to teamwork.

When you put Excellay Preformed TIGER BRAND to your own use-tests, you'll immediately like its handling ease, the way it rides smoothly in sheave grooves. You'll notice at once how it resists kinking... how it gets right on the job with shorter break-in time. And when TIGER BRAND has been at work for a while you'll see how you really save... for TIGER BRAND likes its work. Those high-tensile U·S·S steel wires and strands just don't want to quit.

Get in touch with your nearest dealer. Find out for yourself why... the big demand is for Tiger Brand.

COLUMBIA STEEL COMPANY, *San Francisco*
Los Angeles · Portland · Seattle · Salt Lake City

A Columbia Service Tip. It is not good practice to have more than one layer of rope on a drum. If this can't be avoided, the layers should not crosswind but should wind regularly in the grooves formed between successive turns of the preceding layer.

USS **U·S·S TIGER BRAND Wire Rope**

UNITED STATES STEEL

308	ea. driving timber piles	48.00	30.00	50.00
16,400	lb. misc. steel	.365	.30	.28
700	cu. yd. sacked conc. riprap	20.00	40.00	25.00
550	cu. yd. Class "A" P.C.C. (curbs)	45.00	47.00	44.50
73	ea. r. of w. monuments	6.00	6.00	6.00
19	ea. monuments	10.00	6.00	14.00
7,200	lin. ft. metal plate guard railing	2.70	3.00	2.75
200	ea. culv. markers and guide posts	4.00	5.00	4.80
45	ea. access opening markers	7.50	15.00	14.00
4.5	mi. new property fence	825.00	$1,300	$1,000
12	ea. drive gates	53.00	70.00	45.00
550	lin. ft. chain link fence	1.50	1.00	1.50
102	ea. red reflectors	2.00	1.50	4.00
750	lin. ft. 18-in. C.M.P. (16 ga.)	2.80	3.00	3.30
1,860	lin. ft. 24-in. C.M.P. (14 ga.)	4.25	4.50	4.80
720	lin. ft. 30-in. C.M.P. (14 ga.)	5.35	6.00	6.30
1,210	lin. ft. 36-in. C.M.P. (12 ga.)	7.90	8.70	9.30
35	ea. spillway assemblies	26.00	35.00	50.00
1,080	lin. ft. 8-in. C.M.P. downdrains (16 ga.)	1.70	1.50	1.85
35	ea. pipe anchors	16.50	15.00	14.00
240	lin. ft. salv. exist. pipe culvs.	1.60	1.20	1.40
66	lin. ft. relay. salvgd. C.M.P.s	1.30	1.00	1.50
3	ea. salv. spillway assemblies	14.00	15.00	14.00
400	ea. conc. barrier posts	5.50	7.00	8.00
	METAL CRIBBING			
364	ea. 16-in. x 9.5-ft. metal stringers (16 ga.)	13.00	20.00	20.00
127	ea. 19½-in. x 5.2-ft. metal spacers (16 ga.)	5.35	7.00	8.00
31	ea. 15¼-in. x 5.2-ft. metal bottom spacers (16 ga.)	4.50	6.00	7.00
30	ea. 3⅜-in. x 9.5-ft. metal stringer stiffeners (8 ga.)	5.00	6.00	7.00
512	lin. ft. 8¾-in. metal columns (8 ga.)	2.30	3.00	3.00
31	ea. 6⅛-in. x 8-9/16-in. metal column caps (12 ga.)	.85	1.00	1.00
62	ea. 16-in. x 16-in. metal base plates (1 ga.)	3.90	6.00	5.50

Nevada—Elko County—State—Grade & Surf.

Gibbons & Reed Co., Salt Lake City, Utah, submitted the low bid of $296,601, which was rejected by the Department of Highways, Carson City, Nev., for about 4 mi. of grading, drainage structures, surfacing and other work on Route 1, from a point 4 mi. west of the Nevada-Utah State Line to the Nevada-Utah State Line (Wendover). The following submitted unit bids:

(1) Gibbons & Reed Company.....$296,601 (2) W. W. Clyde & Company.....$324,337

		(1)	(2)
	Force account, special detours	$1,000	$1,000
1,634	cu. yd. Type 1 gravel base (1½-in. size) (detours)	.60	.75
52	ton liquid asphalt, Type SC-2 or SC-3 (roadmix) (detours)	33.50	37.50
.49	mi. roadmix (detours)	$1,300	$1,000
	Lump sum, signs	$1,200	$1,000
700	lin. ft. remove guard rail	1.60	.60
	Lump sum, move sign	$1,000	$1,000
152,389	cu. yd. roadway excavation	.98	1.17
304	cu. yd. drainage excavation	2.00	1.50
22	sta. V-type ditches	3.20	12.00
3,500	cu. yd. borrow	.42	.40
451,104	yd. sta. overhaul	.01	.02
18,009	yd. mi. overhaul	.16	.15
428	cu. yd. structure excavation	2.15	2.00
1,091	cu. yd. backfill	2.35	2.00
7,000	M. gal. water	1.50	1.75
	Lump sum, furnish water equipment	500.00	$1,000
191	hr. power roller	5.50	7.00
8,815	ft. hr. tamping roller	.85	.75
17,937	ton Type 1 gravel base	.42	.55
26,881	ton gravel surface	.92	.70
174	ton liquid asph., Type MC-1 (prime)	35.00	40.00
928	ton liquid asph., Type SC-2 or SC-3 (roadmix)	33.50	37.50
3.72	mi. roadmix	$1,100	$1,500
15,112	sq. yd. roadmix intersections and channelization	.18	.12
33	cu. yd. Class A concrete	85.00	60.00
570	lb. reinforcing steel	.16	.14
204	lin. ft. 18-in. corrugated metal pipe	4.30	3.40
1,186	lin. ft. 24-in. corrugated metal pipe	6.10	5.10
184	lin. ft. 30-in. corrugated metal pipe	7.50	6.40
336	lin. ft. 36-in. corrugated metal pipe	11.50	9.80
128	lin. ft. 43-in. x 27-in. corrugated metal arch pipe	12.50	10.20
6	cu. yd. grouted hand-laid riprap	23.00	25.00
52	cu. yd. Class A concrete curb	120.00	50.00
900	lin. ft. beam type metal guard rail	3.00	2.50
48	ea. culvert markers	12.00	6.00
37	ea. guide posts	12.00	5.00
39	ea. right-of-way markers	16.00	10.00
5,200	sq. yd. paved ditches	.42	.50

Montana—Flathead County—State—Surface and Oil

Union Construction Co., Great Falls, Mont., have been awarded a $294,846 contract by the State Highway Commission, Helena, for about 7.3 mi. surface and oil on the Kalispell south section of the Kalispell-Pablo Road in Flathead County. The following submitted unit bids:

(1) Union Construction Company $294,846
(2) S. Birch & Sons Construction Co..... 308,488
(3) F. & S. Contracting Company.....$311,164

		(1)	(2)	(3)
134,467	cu. yd. uncl. excavation and borrow	.35	.36	.32
1,152	cu. yd. culvert excavation	2.00	2.00	2.50
395,760	sta. yd. overhaul	.015	.02	.02
28,506	ton Type A top ¾-in. gravel	1.25	1.35	1.32
29,995	ton base coarse surface gravel, C-2	1.15	1.15	.93
40,703	cu. yd. select borrow base course	1.05	1.05	1.00
28,538	cu. yd. select sand base	1.00	1.05	1.63
149,508	gal. appl. RCS-2 cutbk. asph.	.16	.20	.17
7.321	mile processing	1,000.00	1,200.00	1,200.00
3,305	sq. yd. processing	.40	.50	.60
4,750	M. gal. water embk. and surface	2.50	2.25	2.50
100	unit roll. surf. course (st. tir.)	10.00	8.00	7.00
920	unit roll. surface course (pn. tir.)	8.00	8.00	6.00
680	unit rolling embankment	8.00	8.00	7.00
950	lin. ft. 15-in. corrugated metal pipe culvert	3.00	3.50	3.75
566	lin. ft. 18-in. corrugated metal pipe culvert	4.00	5.00	4.50
362	lin. ft. 24-in. corrugated metal pipe culvert	7.00	6.50	5.50
28	lin. ft. 30-in. corrugated metal pipe culvert	8.00	8.00	7.25
74	lin. ft. 36-in. corrugated metal pipe culvert	10.00	11.00	9.00
78	lin. ft. 48-in. corrugated metal pipe culvert	14.00	15.00	13.00
120	lin. ft. 90-in. sec. pl. p. culvert, 10 gauge	50.00	55.00	50.00
86	lin. ft. 108-in. sec. pl. p. culvert, 8 gauge	70.00	65.00	60.00

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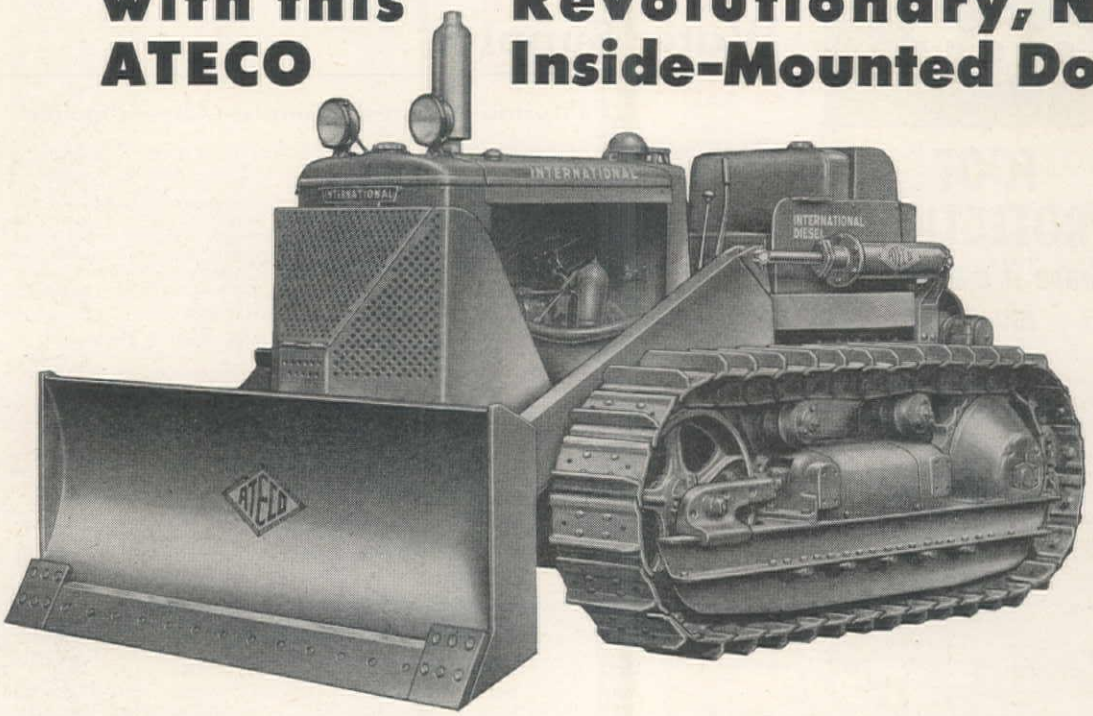
Cut Clearing and Yardage Costs

with this ATECO Revolutionary, New Inside-Mounted Dozer



Note the clean appearance of the new ATECO inside-mounted Dozer on International TD14W (74" gauge). No over-the-track brackets or overhead "A" frames to catch brush or cut off operator's view.

Mounts completely free of tracks... Has fast, high lift...

No permit required for highway transport.

Put this new, heavy-duty ATECO Inside-Mounted Dozer up against any other Dozer now on the market. Compare it for looks—note freedom from subframes, excessive pipes and hose. Compare its performance on clearing, excavating, earthmoving. Study its operating advantages.

FAST, HIGH LIFT. Bowl raises 1 foot per second. Bowl lifts to 48" above ground level. Bowl drops to 12" below ground level.

HIGHWAY TRANSPORT. Overall width of tractor with Dozer is 7' 11¾". No special permit needed for trucking over highways.

ADJUSTABLE BOWL. ATECO patented, shock-resisting bowl, 36" high, has accurate leveling adjustment.

CHOICE OF BLADES. Available with either straight Bulldozer blade or narrow angling blade.

EASY ON TRACTOR, LESS MAINTENANCE

The new ATECO Inside-Mounted Dozer mounts rigidly to transmission case; tracks oscillate independently of Dozer. It's a snug-fitting mounting that eliminates Dozer stresses from track and engine frames and thus reduces wear on track rails, wheels and sprockets. You save money on track parts and repairs.

The new ATECO Dozer is a honey for clearing trees and brush. You get extra leverage from its 48-inch high lift. Here Dozer is being operated by front-mounted pump, leaving rear of tractor free for cable control unit, winch or hoist. Can also be operated from rear pump.

Try this new, inside-mounted Dozer NOW. See your International distributor or call us direct TODAY.

ATECO

AMERICAN TRACTOR EQUIPMENT CORPORATION

9131 SAN LEANDRO BLVD.
OAKLAND 3, CALIFORNIA

CABLE ADDRESS: ATECO, OAKLAND
TELEPHONE SWeetwood 8-2466

Mack Wooldridge
PRESIDENT

DARREL WOOLDRIDGE
Vice President

BULLDOZERS • ROADBUILDERS • SCRAPERS
TAMPERS • RIPPERS • FARM IMPLEMENTS
FRONT LOADERS

SUBSOILERS • VALVES • HYDRAULIC MOTORS
CYLINDERS • OIL HOSE AND FITTINGS
TRACTOR CRANES • PUMPS

1,038 lin. ft. relay pipe culverts	2.00	2.00	2.00
265 cu. yd. gravel backfill	3.00	3.00	4.00
2 each R.R. crossing signs	200.00	150.00	100.00
2 each R.R. adv. warning signs	100.00	200.00	100.00
2 each concrete project markers	25.00	20.00	25.00
39 each concrete station markers	10.00	6.00	10.00
88 each concrete R/W monuments	7.00	8.00	8.00
Lump sum rem. exist. tim. str. and main. tr. all	$2,000	$1,000	$8,000
1,100 ton Type A stkp. grv. ½-in. gr	2.50	2.00	3.00
1,789 ton stkp. st. chps. gr. B	5.00	5.00	5.00

Water Supply . . .

California—Alameda County—City—Pipeline

Manuel Smith, Oakland, Calif. (Sched. A) $327,065; McGuire & Hester, Oakland (Sched. B) $380,972, (Sched. E) $414,277, (combination Sched. B & E) $795,249; R. A. Wattson Co., North Hollywood (Sched. C) $363,713, (Sched. F) $380,522, (combination Sched. C & F ($744,235, and R. Goold & Son, Stockton, (Sched. D) $396,261 (combination Sched. A & D) $746,782, submitted low bids to the City of Hayward, Calif., for the installation of 13 mi. of 24-in. diam. steel pipe divided into Section 1 and 2, with three schedules under Section 1 as follows: (1) asphalt-dipped and felt wrapped pipe, (B) cement lines and felt wrapped pipe, (C) cement-lined and cement coated pipe; and three schedules under Section 2 exactly as in Section 1. Work extends from the Hetch Hetchy Pipeline from the City of Hayward's water system, along Niles Rd., to San Francisco's Aqueduct nr. Mission San Jose, California. The following submitted unit bids:

SECTION 1, SCHEDULE A

(A) Manuel Smith $327,065
(B) R. Goold & Son 358,064
(C) E. T. Haas Co. 360,280
(D) McGuire & Hester $373,580
(E) Underground Construction Co. 399,625
(F) Pacific Pipeline & Engineers Ltd. 418,291

(1) furnish and install 32,760 l.f. 24-in. No. 3 gauge welded steel asphalt-dipped and felt wrapped pipe.
(2) furnish and install 44 l.f. 36-in. corrug. metal pipe by jacking under highway.
(3) furnish and install 100 l.f. 36-in. corrug. metal pipe by jacking under Western Pacific railroad.
(4) furnish and install 78 l.f. 36-in. ditto.
(5) furnish and install 140 l.f. 36-in. ditto under Southern Pacific railroad.
(6) 120 c.y. Class C concrete in trench.
(7) 5 each, Class C, concrete anchors at pipe bends
(8) make two 24-in. pipe connections to existing fittings provided by City of San Francisco at intersection of Hetch Hetchy and Nile Highway.
(9) connect 24-in. pipe to existing flange fitting at Irvington Portal of Hetch Hetchy tunnel.
(10) furnish and install eight 24-in. gate valves.
(11) furnish and install 1 each 12-in. gate valve.
(12) furnish and install 6 each ½-in. pressure air vents.
(13) furnish and install 1 each 2-in. combination air and vaccum valves.
(14) furnish and install 5 each 24-in. No. 3 gauge welded steel 30 degree to 60 degree elbows.
(15) furnish and install 14 welded steel manholes and covers.

	(A)	(B)	(C)	(D)	(E)	(F)
(1)	8.90	9.84	10.00	10.00	11.00	11.35
(2)	40.00	41.69	30.00	55.00	35.00	55.00
(3)	50.00	41.69	30.00	55.00	35.00	55.00
(4)	45.00	41.69	30.00	55.00	50.00	55.00
(5)	50.00	41.69	30.00	55.00	40.00	55.00
(6)	20.00	19.55	30.00	30.00	30.00	19.00
(7)	20.00	19.55	50.00	78.00	20.00	30.00

	(A)	(B)	(C)	(D)	(E)	(F)
(8)	150.00	51.75	500.00	600.00	275.00	210.00
(9)	100.00	135.41	500.00	500.00	425.00	400.00
(10)	932.00	$1,479	$1,500	$1,740	$1,500	$1,800
(11)	225.00	$1,209	450.00	$1,080	400.00	560.00
(12)	300.00	264.33	90.00	300.00	550.00	630.00
(13)	300.00	267.92	130.00	300.00	500.00	640.00
(14)	100.00	143.09	150.00	150.00	250.00	135.00
(15)	350.00	178.94	200.00	210.00	200.00	250.00

SECTION 1, SCHEDULE B

(A) McGuire & Hester $380,972
(B) R. Goold & Son 396,721
(C) Underground Construction Co. $419,591
(D) Pacific Pipeline & Engineers, Ltd. 433,319

(1) furnish and install 32,760 l.f. 25-in. No. 7 gauge welded steel cement-lined and felt wrapped pipe.
(2) furnish and install 44 l.f. 36-in. corrug. metal pipe by jacking under highway.
(3) furnish and install 100 l.f. 36-in. corrug. metal pipe by jacking under Western Pacific Railroad.
(4) furnish and install 78 l.f. 36-in. ditto.
(5) furnish and install 140 l.f. 36-in. ditto under Southern Pacific Railroad.
(6) 120 c.y. Class C concrete in trench.
(7) 5 each, Class C, concrete anchors at pipe bends.
(8) make two 25-in. pipe connection to existing fittings provided by City of San Francisco at intersection of Hetch Hetchy and Nile Hwy.
(9) connect 25-in. pipe to existing flange fitting at Irvington Portal of Hetch Hetchy tunnel.
(10) furnish and install eight 24-in. gate valve.
(11) furnish and install 1 each 12-in. gate valve.
(12) furnish and install 6 each ½-in. pressure air vents.
(13) furnish and install 1 each 2-in. combination air and vacuum valves.
(14) furnish and install 5 each 24-in. No. 3 gauge welded steel 30 degree to 60 degree elbows.
(15) furnish and install 13 welded steel manholes and covers.

	(A)	(B)	(C)	(D)
(1)	10.20	11.02	11.60	11.75
(2)	55.00	41.69	35.00	57.00
(3)	55.00	41.69	35.00	57.00
(4)	55.00	41.69	50.00	57.00
(5)	55.00	41.69	40.00	57.00
(6)	30.00	19.55	38.00	20.00
(7)	78.00	19.55	20.00	30.00
(8)	600.00	61.75	275.00	215.00

	(A)	(B)	(C)	(D)
(9)	300.00	135.41	425.00	435.00
(10)	$1,740	$1,479	$1,500	$1,850
(11)	$1,080	$1,209	400.00	585.00
(12)	300.00	264.33	550.00	640.00
(13)	300.00	267.92	500.00	655.00
(14)	240.00	143.09	250.00	210.00
(15)	240.00	178.94	150.00	260.00

SECTION 1, SCHEDULE C

(A) R. A. Wattson $363,713
(B) R. Goold & Son 365,901
(C) McGuire & Hester 368,168
(E) E. T. Haas Company $393,540
(F) Underground Construction Co. 404,986
(G) Pacific Pipeline & Engineers Ltd. 440,000

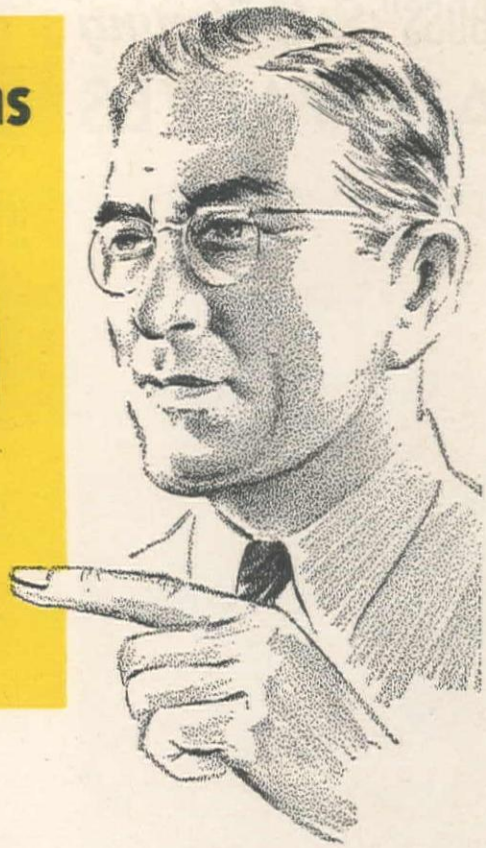
(1) furnish and install 32,760 l.f. 25-in. No. 10 gauge welded steel cement-lined and cement-coated pipe.
(2) furnish and install 44 l.f. 36-in. corrug. metal pipe by jacking under highway.
(3) furnish and install 100 l.f. 36-in. corrug. metal pipe by jacking under Western Pacific railroad.
(4) furnish and install 78 l.f. 36-in. ditto.
(5) furnish and install 140 l.f. 36-in. ditto under Southern Pacific Railroad.
(6) 120 c.y. Class C concrete in trench.
(7) 5 each, Class C, concrete anchors at pipe bends.
(8) make two 25-in. pipe connections to existing fittings provided by City of San Francisco at intersection of Hetch Hetchy and Niles Hwy.
(9) connect 25-in. pipe to existing flang fitting at Irvington Portal of Hetch Hetchy tunnel.
(10) furnish and install eight 24-in. gate valves.
(11) furnish and install 1 each 12-in. gate valve.
(12) furnish and install 6 each ½-in. pressure air vents.
(13) furnish and install 1 each 2-in. combination air and vacuum valves.
(14) furnish and install 5 each 24-in. No. 3 gauge welded steel 30 degree to 60 degree elbows.
(15) furnish and install 13 welded steel manholes and covers.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
(1)	10.05	10.07	9.80	10.25	11.00	11.10	12.00
(2)	40.00	41.65	55.00	40.00	30.00	35.00	55.00
(3)	40.00	41.65	55.00	60.00	30.00	35.00	55.00
(4)	40.00	41.65	55.00	45.00	30.00	50.00	55.00

(Continued on next page)

Shell scientists answer questions about the extra values in

SHELL X-100 MOTOR OIL



Q. *How is this motor oil different?*

A. *It is different in make-up . . . and purpose.*

Q. *Different in make-up?*

A. ***Shell X-100 Motor Oil starts*** with a particularly high-grade base oil. To this, special fortifying agents are added, several of them newly developed by Shell research. These are "X" safety factors that protect oil against chemical change . . . keep oil clean . . . minimize rust, engine wear and oil consumption.

Q. *What about the difference in "purpose"?*

A. ***Shell X-100 Motor Oil is specifically designed for extreme conditions.*** The "X" safety factors, in fact, exceed the demands of the hardest kind of sustained, high-speed driving.

Q. *When should Shell X-100 Motor Oil be used?*

A. ***Check the kind of service you put your passenger cars and light trucks to.*** Shell X-100 Motor Oil may seem more than you need for ordinary driving — but the extra margin of safety is mighty good to have at any and all times.

Q. *Is it for all gasoline-powered equipment?*

A. *Yes* — and Shell X-100 Motor Oil is at all Shell stations and depots. Or ask your local Shell representative.

ARE YOU ABSOLUTELY SURE YOU ARE GETTING ALL THAT'S NEW IN LUBRICATION?
Your Shell Lubrication Engineer can make a complete study and analysis of your plant and machines . . . give you engineering counsel, advice on new lubricants and their application . . . help you set up schedules and controls for each and every machine. For that kind of service—call in your Shell Lubrication Engineer

SHELL

(5)	40.00	41.65	55.00	50.00	30.00	40.00	55.00
(6)	20.00	19.55	30.00	20.00	30.00	38.00	19.00
(7)	100.00	61.75	600.00	150.00	500.00	350.00	210.00
(9)	100.00	135.41	300.00	100.00	500.00	500.00	335.00
(10)	$1,500	$1,479	$1,440	732.00	$1,500	$1,500	$1,800
(11)	650.00	$1,173	$1,080	225.00	450.00	400.00	565.00
(12)	200.00	278.30	300.00	300.00	90.00	550.00	620.00
(13)	250.00	272.30	30.00	300.00	130.00	500.00	630.00
(14)	200.00	193.91	300.00	100.00	250.00	300.00	235.00
(15)	155.00	178.94	240.00	350.00	200.00	250.00	260.00

SECTION 2, SCHEDULE D

(A) R. Goold & Son.....$396,261
(B) McGuire & Hester 412,662
(C) E. T. Haas Co. 432,108
(F) Underground Construction Co.....$440,617
(G) Pacific Pipeline & Engineers Ltd..... 465,386

(1) furnish and install 31,700 l.f. 24-in. No. 3 gauge welded steel asphalt-dipped and felt wrapped pipe.
(2) furnish and install 2,770 l.f. 18-in. No. 3 ditto.
(3) furnish and install 3,310 l.f. 16-in. No. 3 ditto.
(4) 58 l.f. 36-in. gauge corrug. metal pipe by jacking.
(5) 14 each, Class C, concrete anchors in trench at pipe bends.
(6) furnish and install two 16-in. reservoir connections and controls.
(7) furnish and install 4 each 24-in. gate valves.
(8) furnish and install 4 each 18-in. gate valves.
(9) furnish and install 1 each 8-in. blow-off.
(10) furnish and install 6 each ½-in. pressure air vents.
(11) furnish and install 1 each 2-in. combination air and vacuum valves.
(12) furnish and install 1 each 24-in. x 18-in. x 16-in. No. 3 gauge welded steel tee.
(13) furnish and install two each 24-in. No. 3 gauge zero degree to 30 degree welded steel elbows.
(14) furnish and install 3 each 24-in. No. 3 gauge zero to 30 degree elbow.
(16) furnish and install two 18-in. No. 3 gauge 30 to 60 degree elbows.
(17) furnish and install three 18-in. No. 3 gauge 90 degree elbow.
(18) furnish and install three 16-in. No. 3 gauge zero to 30 degree elbows.
(19) one each 16-in. No 3 gauge 30 degree to 60 degree elbow.
(20) furnish and install 14 welded steel manholes and covers.

	(A)	(B)	(C)	(D)	(E)
(1)	9.95	10.20	11.50	11.15	11.40
(2)	9.35	10.25	10.00	10.15	11.40
(3)	9.15	9.60	10.00	9.65	10.40
(4)	41.80	55.00	30.00	40.00	55.00
(5)	19.55	78.00	50.00	20.00	19.50
(6)	$3,703	$4,800	$4,000	$4,400	$3,800
(7)	$1,479	$1,740	$1,500	$1,500	$1,840
(8)	864.96	900.00	800.00	800.00	310.00
(9)	467.94	420.00	180.00	150.00	210.00
(10)	264.33	300.00	90.00	550.00	630.00

	(A)	(B)	(C)	(D)	(E)
(11)	268.68	300.00	130.00	500.00	640.00
(12)	273.06	270.00	200.00	200.00	254.00
(13)	93.86	96.00	158.00	145.00	100.00
(14)	198.08	210.00	150.00	225.00	180.00
(15)	75.19	85.00	100.00	100.00	81.00
(16)	111.39	120.00	100.00	140.00	100.00
(17)	157.85	145.00	100.00	190.00	124.00
(18)	69.60	90.00	90.00	95.00	75.00
(19)	111.87	120.00	90.00	135.00	97.00
(20)	178.94	210.00	200.00	200.00	280.00

SECTION 2, SCHEDULE E

(A) McGuire & Hester.....$414,277
(B) R. Goold & Son..... 427,244
(C) Underground Construction Co.....$469,756
(D) Pacific Pipeline & Engineers Ltd..... 475,995

(1) furnish and install 31,700 l.f. 25-in. No. 7 gauge welded steel cement-lined and felt wrapped pipe.
(2) furnish and install 2,770 l.f. 18-in. No. 7 ditto.
(3) furnish and install 3,310 l.f. 16-in. No. 7 ditto.
(4) 58 l.f. 36-in. No. 7 gauge corrug. metal pipe by jacking.
(5) 14 each, Class C, concrete anchors in trench at pipe bends.
(6) furnish and install two 16-in. reservoir connections and controls.
(8) furnish and install 4 each 24-in. gate valves.
(8) furnish and in stall 4 each 28-in. gate valves.
(9) furnish and install 1 each 8-in. blow-off.
(10) furnish and install 6 each ½-in. pressure air vents.
(11) furnish and install 1 each 2-in. combination air and vacuum valves.
(12) furnish and install 1 each 24-in. x 18-in. x 16-in. No. 7 gauge welded steel tee.
(13) furnish and install two each 24-in. No. 7 gauge zero degree to 30 degree welded steel elbows.
(14) furnish and install 3 each 24-in. No. 7 gauge 90 degree elbows.
(15) furnish and install one 18-in. No. 7 gauge zero to 30 degree elbow.
(16) furnish and install two 18-in. No. 7 gauge 30 to 60 degree elbows.
(17) furnish and install three 16-in. No. 7 gauge zero to 30 degree elbows.
(18) furnish and install three 16-in. No. 7 gauge zero to 30 degree elbows.
(19) one each 16-in. No. 7 gauge 30 degree to 60 degree elbow.
(20) furnish and install 14 welded steel manholes and covers.

	(A)	(B)	(C)	(D)
(1)	10.20	11.04	11.75	11.85
(2)	10.40	10.41	10.65	12.00
(3)	9.70	9.50	10.15	11.00
(4)	55.00	42.90	40.00	57.00
(5)	78.00	19.55	20.00	20.00
(6)	$4,800	$3,703	$4,400	$3,900
(7)	$1,740	$1,479	$1,500	$1,880
(8)	90.00	761.30	800.00	320.00
(9)	420.00	467.94	150.00	214.00
(10)	300.00	264.33	550.00	645.00

	(A)	(B)	(C)	(D)
(11)	300.00	258.58	500.00	655.00
(12)	330.00	338.20	200.00	336.00
(13)	180.00	107.92	145.00	154.00
(14)	300.00	214.68	225.00	280.00
(15)	150.00	80.22	100.00	132.00
(16)	180.00	127.52	140.00	187.00
(17)	210.00	172.50	190.00	234.00
(18)	120.00	102.78	95.00	127.00
(19)	150.00	154.18	135.00	170.00
(20)	210.00	190.44	200.00	280.00

SECTION 2, SCHEDULE F

(A) R. A. Wattson Company.....$380,552
(B) R. Goold & Son 395,011
(C) McGuire & Hester 406,557
(D) Underground Construction Co.....$445,287
(E) E. T. Haas 472,020
(F) Pacific Pipeline & Engineers Ltd.....477,551

(1) furnish and install 31,700 l.f. 25-in. No. 10 gauge welded steel cement-lined and cement coated pipe.
(2) furnish and install 2,770 l.f. 18-in. No. 10 gauge ditto.
(3) furnish and install 3,310 l.f. 16-in. No. 10 gauge ditto.
(4) 58 l.f. 36-in. No. 10 gauge corrug. metal pipe by jacking.
(5) 14 each, Class C, concrete anchors in trench at pipe bends.
(6) furnish and install two 16-in. reservoir connections and controls.
(7) furnish and install 4 each 24-in. gate valves.
(8) furnish and install 4 each 18-in. gate valves.
(9) furnish and install 1 each 8-in. blow-off.
(10) furnish and install 6 each ½-in. pressure air vents.
(11) furnish and install 1 each 2-in. combination air and vacuum valves.
(12) furnish and install 1 each 24-in. x 18-in. x 16-in. No. 10 gauge welded steel tee.
(13) furnish and install two each 24-in. No. 10 gauge zero degree to 30 degree welded steel elbows.
(14) furnish and install 3 each 24-in. No. 10 gauge 90 degree elbows.
(15) furnish and install one 18-in. No. 10 gauge zero to 30 degree elbow.
(16) furnish and install two 18-in. No. 10 30 to 60 degree elbows.
(17) furnish and install one 18-in. No. 10 gauge 90 degree elbow.
(18) furnish and install three 16-in. No. 10 gauge zero to 30 degree elbows.
(19) one each 16-in. No. 10 gauge 30 degree to 60 degree elbow.
(20) furnish and install 14 welded steel manholes and covers.

	(A)	(B)	(C)	(D)	(E)	(F)
(1)	10.05	10.15	9.95	11.20	12.00	12.00
(2)	6.80	9.71	10.15	10.40	11.00	11.00
(3)	6.10	9.05	9.50	9.90	11.00	10.60
(4)	40.00	41.80	55.00	40.00	30.00	55.00

	(A)	(B)	(C)	(D)	(E)	(F)
(5)	10.00	19.55	78.00	20.00	50.00	19.50
(6)	$3,500	$3,703	$4,800	$4,400	$4,000	$3,720
(7)	$1,500	$1,479	$1,740	$1,500	$1,500	$1,810
(8)	750.00	864.56	900.00	800.00	800.00	320.00

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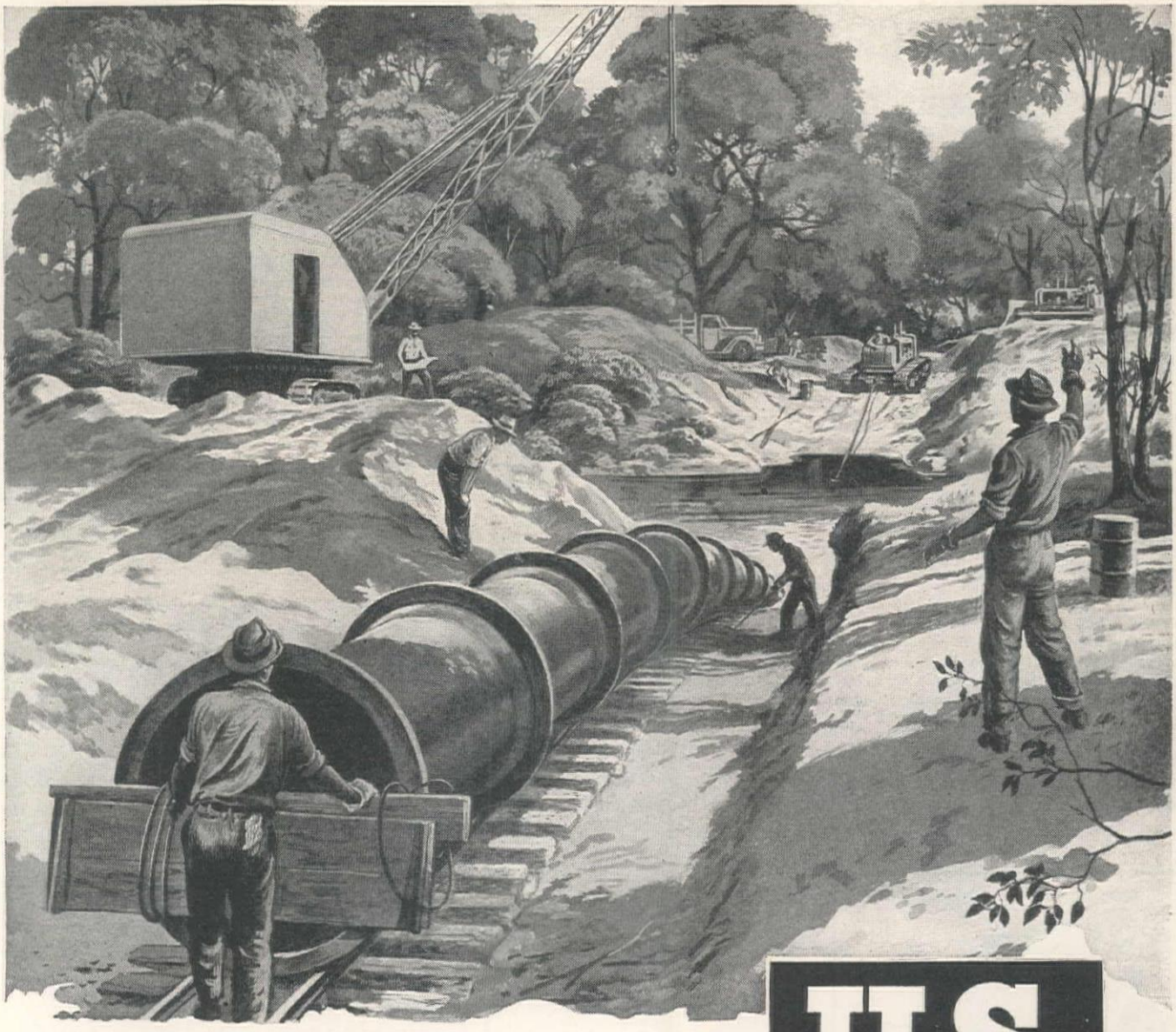

Painted for U. S. Pipe & Foundry Co. by Paul Laune

U.S. cast iron PIPE

FOR WATER, GAS, SEWERAGE AND INDUSTRIAL SERVICE

In the files of our Engineering Service Department that go back nearly half a century, are records of the solutions to unusual problems in pipe design and installation, such as the flexible joint stream crossing illustrated above. If you have such a problem we may be able to tell how a similar problem was previously solved. Our wide design and manufacturing experience with special fittings to meet unusual requirements, where standard material cannot be used, may also be found of value to you. **United States Pipe and Foundry Co., General Offices: Burlington, New Jersey. Plants and Sales Offices Throughout U. S. A.**

(9)....	$4,250	408.63	420.00	150.00	180.00	206.00
(10)....	200.00	278.30	300.00	550.00	90.00	620.00
(11)....	250.00	258.80	300.00	500.00	130.00	630.00
(12)....	375.00	353.05	480.00	450.00	500.00	445.00
(13)....	150.00	150.60	240.00	220.00	300.00	212.00
(14)....	250.00	235.75	360.00	300.00	400.00	320.00

(15)....	135.00	117.30	240.00	160.00	200.00	198.00
(16)....	145.00	144.90	270.00	180.00	200.00	200.00
(17)....	200.00	192.04	360.00	230.00	300.00	258.00
(18)....	110.00	92.00	180.00	110.00	150.00	143.00
(19)....	135.00	124.20	240.00	150.00	200.00	160.00
(20)....	165.00	178.94	240.00	250.00	200.00	260.00

Power . . .

Arizona—Mohave County—Bur. of Recl.—Towers and Trans. Line

Wonderly Construction Co., Long Beach, Calif., at $590,839 (Sched. I); Stolte, Inc., Oakland, Calif., Arizona Sand & Rock Co., Phoenix, Ariz.; United Concrete Pipe Corp., Baldwin Park, Calif., Ralph A. Bell, Baldwin Park, Calif., at $1,333,460 (Sched. II); Seabrook-Elliott-Eisenman, Chula Vista, Calif., at $803,790 (Sched. III), submitted the low bids to the Bureau of Reclamation, Parker Dam, Calif., for construction of foundations and steel towers for Davis Dam-Hoover Dam, Davis Dam-Prescott, and Prescott-Phoenix 230-kv. transmission lines situated in the western part of the state of Arizona. Completion time for Schedule No. 1 is 210 days; Schedule No. 2 is 500 days, and Schedule No. 3 is 345 days. Unit bids were submitted as follows:

	Sched. I	Sched. II	Sched. III
(A) Wonderly Construction Company (null and void if awarded contract on either Sched. II or Sched. III)	$590,839	$1,411,703	$845,232
(B) Stolte, Inc., Arizona Sand & Rock Company, United Concrete Pipe Corp., Ralph A. Bell (without Sched. I, will not accept Sched. II and III)	615,566	1,333,460	845,660
(C) Peterson Engineering Co., Underground Construction Co. (will accept one schedule only)	638,919	1,636,007	1,173,156
(D) Seabrook-Elliott-Eisenman (will accept one schedule only)	666,656	1,541,985	803,790
(E) Abbett Electric Co	706,000	572,240	979,460
(F) Harvill-Byrd Electric Co.	726,700	.....	1,106,392
(G) Reynolds Electrical & Engineering Co.	785,948	1,855,850	1,098,094
(H) Donovan, Inc.	900,222	1,600,974	1,091,666

SCHEDULE I

Davis Dam-Hoover Dam 230-kilovolt transmission line.

(1) lump sum, clearing land and right-of-way
(2) 100 cu. yd. excav., common, for tower sites
(3) 50 cu. yd. excav., rock, for tower sites
(4) 1,900 cu. yd. excav., common, hand, for tower footings
(5) 700 cu. yd. excav., common, auger, for tower footings
(6) 1,100 cu. yd. excav., rock, for tower footings
(7) 3,000 lin. ft. drilling holes for anchor bars and grouting bars in place
(8) 2,240 barrels, furn. and handling cement
(9) 350,000 lbs., furn. and placing reinforcement bars
(10) 1,100 cu. yd. placing concrete in formed tower footings
(11) 800 cu. yd. placing concrete in unformed tower footings
(12) 1,136 stubs, placing steel stubs for tower footings
(13) 4,438,000 lbs., erecting steel towers

SCHEDULE II

Davis Dam-Prescott 230-kilovolt transmission line.

(14) lump sum, clearing land and right-of-way
(15) 150 cu. yd. excav., common, for tower sites
(16) 100 cu. yd. excav., rock, for tower sites
(17) 4,200 cu. yd. excav., common, hand, for tower footings
(18) 1,400 cu. yd. excav., common, auger, for tower footings
(19) 2,500 cu. yd. excav., rock, for tower footings
(20) 6,700 lin. ft., drilling holes for anchor bars and grouting bars in place
(21) 5,000 barrels, furnishing and handling cement
(22) 780,000 lbs., furnishing and placing reinf. bars
(23) 2,500 cu. yd., placing concrete in formed tower footings
(24) 1,900 cu. yd., placing concrete in unformed tower footings
(25) 2,254 stubs, placing steel stubs for tower footings
(26) 9,685,000 lbs., erecting steel towers

SCHEDULE III

Prescott-Phoenix 230-kilovolt transmission line.

(27) lump sum, clearing land and right-of-way
(28) 100 cu. yd. excav., common, for tower sites
(29) 50 cu. yd. excav., rock, for tower sites
(30) 2,600 cu. yd. excav., common, hand, for tower footings
(31) 900 cu. yd. excav., common, auger, for tower footings
(32) 1,600 cu. yd. excav., rock, for tower footings
(33) 4,100 lin. ft., drilling holes for anchor bars and grouting bars in place
(34) 3,100 barrels, furnishing and handling cement
(35) 480,000 lbs., furnishing and placing reinf. bars
(36) 1,600 cu. yd., placing concrete in formed tower footings
(37) 1,200 cu. yd. placing concrete in unformed tower footings
(38) 1,616 stubs, placing steel stubs for tower footings
(39) 5,980,000 lbs., erecting steel towers

SCHEDULE I

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
(1)	$9,565	$102,500	$5,000	$69,380	$112,000	$75,000	$8,335	$100,000
(2)	4.53	10.00	9.23	10.00	10.00	12.00	4.65	8.00
(3)	12.60	20.00	23.99	20.00	30.00	35.00	36.10	23.00
(4)	13.20	15.00	19.12	12.00	11.00	25.00	20.03	12.00
(5)	24.55	15.00	21.35	24.00	10.00	25.00	18.63	16.00
(6)	24.40	26.00	50.58	20.00	51.00	40.00	29.02	30.00
(7)	1.74	3.00	3.65	2.50	5.00	2.00	1.89	7.00
(8)	11.22	9.00	9.91	8.50	9.00	8.00	11.72	7.50
(9)	.2025	.20	.24	.17	.17	.21	.28	.20
(10)	87.70	70.00	93.25	60.00	72.00	75.00	108.72	150.00
(11)	52.00	45.00	79.20	55.00	70.00	75.00	66.50	100.00
(12)	11.10	20.00	17.52	55.00	10.00	10.00	42.15	5.00
(13)	.0584	.047	.05	.062	.06	.065	.077	.084

SCHEDULE II

(14)	190,085	184,000	143,850	300,000	249,600	.....	68,653	105,000
(15)	3.50	10.00	9.23	10.00	10.00	.....	4.65	6.00
(16)	9.48	20.00	24.00	20.00	30.00	.....	30.82	13.00
(17)	12.00	15.00	19.12	11.00	11.00	.....	21.60	8.00
(18)	21.00	15.00	21.35	22.00	10.00	.....	18.43	12.00
(19)	23.00	26.00	50.58	16.00	51.00	.....	29.58	20.00
(20)	1.38	3.00	3.65	2.50	5.00	.....	1.89	4.00
(21)	10.35	9.00	9.91	9.00	9.00	.....	12.15	7.50
(22)	.195	.20	.24	.15	.17	.....	.28	.155
(23)	79.55	70.00	93.25	55.00	72.00	.....	105.05	111.00
(24)	45.75	45.00	79.20	50.00	70.00	.....	61.80	57.00
(25)	11.50	20.00	17.52	55.00	10.00	.....	42.61	3.50
(26)	.0573	.048	.0581	.059	.06	.....	.084	.084

SCHEDULE III

(27)	40,752	128,000	151,200	30,000	153,600	90,000	37,203	103,000
(28)	4.00	10.00	9.23	10.00	10.00	12.00	4.65	6.00
(29)	11.90	20.00	23.99	20.00	30.00	36.00	36.10	17.50
(30)	12.50	15.00	19.12	10.00	11.00	26.00	20.03	9.00
(31)	22.85	15.00	21.35	20.00	10.00	26.00	18.63	12.00
(32)	23.60	26.00	50.58	20.00	51.00	40.00	29.02	20.00
(33)	1.60	3.00	3.65	2.00	5.00	3.00	1.89	5.25
(34)	10.55	9.00	9.91	8.50	9.00	9.00	12.33	7.50
(35)	.198	.20	.24	.15	.17	.23	.28	.155
(36)	85.30	70.00	93.25	40.00	72.00	75.00	88.90	111.00
(37)	49.50	45.00	79.20	35.00	70.00	75.00	46.44	57.00
(38)	10.95	20.00	17.52	40.00	10.00	12.00	42.49	3.50
(39)	.061	.048	.073	.07	.06	.08	.083	.092

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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 $75,000 are not listed. Space is not available to list more than a small proportion of the proposed projects. For your convenience, all items are prepared in an identical manner to provide the following information: County of job location (capital letters); name and address of contractor (bold face); bid price; brief description of work; awarding agency; and approximate date of award. More detailed information may be secured concerning employment conditions, wage rates, etc., by writing directly to the contractor. When available, the names of the supervisory personnel will be published in the "Supervising the Jobs" columns.

CONTRACTS AWARDED

Large Western Projects . . .

Peter Kiewit Sons' Co., Omaha, Neb., and **Morrison-Knudsen Co., Inc.,** Boise, Ida., have been awarded contract of $13,622,066 by the District Corps of Engineers, Ft. Lincoln, Bismarck, No. Dakota, for the excavation and main embankment, Stage II, of Garrison Dam and Reservoir in Riverdale, North Dakota. The site of this work is to be on the Missouri River about 75 mi. NW. of Bismarck, No. Dak.; 60 mi. S. of Minot, No. Dak., and 13 mi. W. of U. S. Highway 83, at a point about midway between Coleharbor and Underwood, No. Dakota. This project is to be completed not later than December 31, 1950.

American Pipe and Construction Co., South Gate, Calif., have been awarded a $1,489,447 contract by the Bureau of Reclamation, Denver, Colo., for the construction of earthwork, pipe lines and structures from Sta. 337/50 to Sta. 939/79, sub-laterals and wasteway, Unit 5, Coachella Valley Distribution System, All-American Canal System, Boulder Canyon Project, Arizona-California-Nevada. The work is situated from about 8 to 19 mi. south of Coachella, Calif., and will require 400 calendar days for completion.

Lease & Leigland, Seattle, Wash., was the low bidder and have been awarded a $4,400,000 contract by the District Corps of Engineers, Ft. Peck, Montana, for the construction of a 100-bed Veterans Hospital in Miles City, Montana. General work includes construction of various buildings, site improvements, paving, surfacing, sewage collection system, water, electric and heating systems.

Stone and Webster Engineering Corporation, San Francisco, Calif., were awarded a $50,000,000 contract by the Pacific Gas & Electric Co., San Francisco, for the construction of a 402,000 hp., 300,000 kw. steam operated electric generating plant at Moss Landing, Calif.

Griffith Co., Los Angeles, Calif., submitted a bid of $1,370,538 and have been awarded the contract by the California Division of Highways, Sacramento, for 0.9 mi. of grading, paving, and the construction of grade separation structures on the Santa Ana Parkway between La Verne Avenue and Eastland Avenue in Los Angeles.

MacDonald, Young and Nelson, San Francisco, Calif., at $30,000,000 were the low bidder and received a contract from Stoneson Brothers, San Francisco, for the const. of four 10-story reinf. conc. apartment bldgs; ten 3-story wood frame apartment bldgs., and from 17 to 52 other apartment bldgs., theater, shopping center, medical bldg. and commercial section. This is to be known as the Stonestown Community Project and is located on 19th Ave. north of Park Merced in San Francisco.

Morrison-Knudsen Co., Inc., Boise, Idaho, have been awarded a $1,589,220 contract by the Bureau of Reclamation, Denver, Colo., for the construction of earthwork and structures from Sta. 00 plus 00 to Sta. 20 plus 00, Muddy Ridge Canal, laterals, sublaterals and wasteways on the Riverton Project about 20 mi. northeast of Riverton, Wyoming.

L. H. Hoffman, Portland, Ore., has submitted the low bid of $6,000,000 and received a contract from the National Biscuit Company, Seattle, Wash., for the construction of a biscuit plant 995 ft. in length, with a total area of 390,000 sq. ft. This new plant will be constructed on a 25 acre site in Seattle, Wash., and will serve the entire Pacific Northwest area.

Bethlehem Pacific Coast Steel Corp., Los Angeles, Calif., received a $2,452,780 contract from the Water and Power Department, Los Angeles, for furnishing 1300 single and double steel transmission line towers for the Owens River Gorge power lines.

Monson Brothers, San Francisco, Calif., at $2,111,856 (basic bid plus Alt. 1) were low and have been awarded the contract by the City and County of San Francisco, for the construction of the Youth Guidance Center on a 16-acre site at Portola and Woodside Drives in San Francisco.

Wixon & Crowe, and **J. H. Trisdale,** Redding, Calif., were recently awarded a $1,733,880 contract by the Bureau of Reclamation, Hungry Horse, Mont., for clearing a portion of the reservoir site on the Hungry Horse Project, near Kalispell, Mont.

Mead & Mount Construction Co., Denver, Colo., has been awarded a $1,120,000 contract by the Post Printing & Publishing Co., Denver, for the construction of a superstructure printing plant in Denver.

Franks Dredging Co., San Francisco, Calif., and **Guy F. Atkinson Co.,** Portland, Ore., have been awarded the contract at $938,204 by the District Corps of Engineers, Portland, for the construction of a reserve fleet mooring basin between Tongue Point Navy piers and the mouth of the John Day River in Cathlamet Bay near Astoria, Ore.

Zoss Construction Co., Los Angeles, Calif., have submitted a bid of $2,164,192 and have been awarded the contract by the City of Los Angeles, for the construction of the Lincoln Heights jail addition in Los Angeles.

Ben C. Gerwick, Inc., San Francisco, Calif., were awarded a $982,117 contract by the East Bay Municipal Utility District, Oakland, for the erection of structural steel supports, 67-in. pipe line and install appurtenances of pipe line for about 10 mi. of Unit C, 2nd Mokelumne Aqueduct in Contra Costa and San Joaquin Counties, Calif.

MacDonald, Young and Nelson, San Francisco, Calif., have been awarded a $1,000,000 contract by the Jackson Furniture Co., Oakland, for the const. of a 6 or 8-story addition to their furniture store building in Oakland, Calif.

Del E. Webb Construction Co., West Los Angeles, Calif., at $8,132,706, have been awarded the contract by the Veterans Administration, Washington, D. C., for the construction of a Veterans Hospital in Denver, Colo. The building, in general, will have concrete foundations, brick faced, stone trim walls, concrete floors, etc.

Baruch Corporation, Los Angeles, Calif., at $1,589,000 submitted the low bid and have been awarded the contract by the Board of Education, Los Angeles, for the construction of the Harbor Area Junior College in Wilmington, Calif.

Frank C. Sheldon, Gardena, Calif., has been awarded a $875,000 contract by Milton Kaufman, Inc., Gardena, for the construction of 109 dwellings in Norwalk, Calif.

Larsen & Larsen, San Francisco, Calif., were awarded a $1,000,000 contract by the Imperial Diesel Engine Co., Oakland, for the construction of a tank and batch house in Hayward, Calif.

Ross B. Hammond Co., Portland, Ore., were recently awarded a $1,371,793 contract by the University of Oregon, Eugene, for the construction of a reinforced concrete building to be known as the Erb Memorial on the University of Oregon campus in Eugene.

Haas and Rothschild, San Francisco, Calif., have been awarded a $2,757,811 contract by the State of California, Sacramento, for the construction of a reinforced concrete one-story building which includes five female ward buildings, 2 male ward buildings and 1 tuberculosis hospital building at the Sonoma State Home in Eldridge, Calif.

Christiansen Brothers, Salt Lake City, Utah, were awarded the $1,500,000 contract by Brigham Young University, Provo, for the construction of a 4-story reinforced concrete building on the campus at Provo.

Highway and Street . . .

Arizona

NAVAJO CO.—**Vinnell Co., Inc.,** 1145 Westminster Ave., Alhambra, Calif.—$433,127 for grade, drain over new alignment and place selected matl., about 5¾ mi. NE. of Holbrook—by State Highway Department, Phoenix. 9-17

PINAL CO.—**Orr & Orr Construction Co.,** 302 W. Monte Vista Rd., Phoenix—$202,860 for about 1.8 mi. grade, drain, surf., etc. on the Florence-Superior Hwy.—by State Highway Department, Phoenix. 9-17

California

ALAMEDA CO.—**Heafey-Moore Co.,** 344 High St., Oakland—$471,516 for 1.4 mi. of six-lane divided hwy. from 14th Ave. to Fruitvale in Oakland—by City of Oakland. 9-8

ALAMEDA CO.—**Lee J. Immel,** Box 175, San Pablo—$188,206 for 0.7 mi. grade, surf., and lighting syst. at the San Francisco-Oakland Bay Bridge Toll Plaza—by Division of Highways, Sacramento. 9-3

KERN CO.—**Oilfields Trucking Co.,** and **Phoenix Construction**

Co., Box 906, Bakersfield—$134,983 for 11.5 mi. grade and surf. betw. Mojave and San Bernardino Co. line—by Division of Highways, Sacramento. 9-3

LASSEN CO.—**Harms Brothers** and **M. W. Brown,** 5261 Stockton Blvd., Sacramento—$319,904 for about 3 mi. hwy. improvement betw. Susanville and Alturas—by Public Roads Administration, San Francisco. 9-1

LOS ANGELES CO.—**Peter Kiewit Sons' Co.,** 345 Kieways Ave., Arcadia—$658,977 for 3.2 mi. grade, surf., and const. 3 bridges betw. 1.6 mi. E. and 1.6 mi. W. of Malibu Jct. — by Division of Highways, Sacramento. 9-1

LOS ANGELES CO.—**Griffith Co.,** 1060 South Broadway, Los Angeles—$1,370,538 for 0.9 mi. grade, pave, and const. grade separation structures on the Santa Ana Parkway betw. La Verne Ave. and Eastland Ave., Los Angeles—by Division of Highways, Sacramento. 9-17

LOS ANGELES CO.—**Sully-Miller Construction Co.,** 1500 W. 7th St., Long Beach —$78,580 for const. and reconst. conc. sidewalks, curbs, and driveway aprons on 14 streets in San Antonio Hgts., Long Beach —by City of Long Beach. 9-17

LOS ANGELES CO.—**Sully-Miller Construction Co.,** 1500 W. 7th St., Long Beach —$177,826 for improvements on Santa Ana Ave., other streets, alleys, etc., in Newport Beach—by City Council, Newport Beach. 9-17

MERCED CO.—**Guy F. Atkinson Co.,** Box 593, South San Francisco—$573,642 for 5.7 mi. grade, pave, and surf. betw. Atwater and Livingstone—by Division of Highways, Sacramento. 9-10

MERCED CO.—**Elmer J. Warner,** 1103 Sycamore, Stockton—$118,833 for 2.7 mi. grade and surf. betw. Gustine and San Joaquin Riv.—by Division of Highways, Sacramento. 9-3

SAN BERNARDINO CO.—**George Herz & Co.,** Base Line and Lytle Creek, San Bernardino—$189,261 for 1.8 mi. widen and surf. in San Bernardino County and City—by Division of Highways, Sacramento. 9-3

SAN DIEGO CO.—**E. C. Young & Co.,** 608 Knott St., Bakersfield—$173,844 for 1.5 mi. grade, and surf. betw. Julian and Santa Isabel—by Division of Highways, Sacramento. 9-10

SAN JOAQUIN CO.—**Karl C. Harmeling,** 1710 Mt. Diablo Ave., Stockton—$102,146 for hwy. improvement on the Tracy Rd. in Drexler Trct. and Union Island and extending from St. Rt. 4 about 8½ mi. from Stockton southerly acr. Drexler Tract, Middle Riv. and Union Island a distance of about 4 mi. to intersection with Howard Rd.—by County Clerk, Stockton. 9-16

TRINITY CO—**Mercer-Fraser Co.,** 2nd and Commercial Sts., Eureka—$289,412 for 8.8 mi. highway improvement in Trinity Natl. For.—by Public Roads Administration, San Francisco. 9-1

YUBA CO.—**Westbrook & Pope,** 2331 Fair Oaks Blvd., Sacramento—$392,634 for 5.5 mi. of hwy. improvement on the Nevada City-Downieville Hwy., Tahoe National Forest—by Public Roads Administration, San Francisco. 9-17

Colorado

HUERFANO CO.—**Dominic Leone Construction Co.,** 818 Oak St., Trinidad — $151,077 for about 5 mi. grade, structs., and surf. betw. Walsenburg and Gardner—by State Highway Department, Denver. 9-17

MONTEZUMA CO. — **Ed Lively Construction Co.,** Dolores—$75,552 for 2.2 mi. grade, drain, surf., and structs. betw. Dolores and Rico—by State Highway Department, Denver. 9-10

PROWERS CO. — **Blanchard Brothers,** 412 Tramway Bldg., Denver—$143,700 for 16 mi. surf. and oil process betw. Springfield and Lamar—by State Highway Department, Denver. 9-1

ROUTT CO.—**Peter Kiewit Sons' Co.,** Box 4149, S. Denver Sta., Denver—$568,228 for 9.1 mi. grade, structs., and surf., betw. Steamboat Sprgs. and Crain — by State Highway Department, Denver. 9-17

Idaho

BONNEVILLE CO. — **Burns Construction Co.,** 150 11th St., Idaho Falls—$188,576 for about 4 mi. roadbed, drain. structs., and surf. betw. Idaho Falls and Beeches Corner —by Bureau of Highways, Boise. 9-24

ELMORE CO.—**H. A. Gardner Co.,** 685 Northwest Main St., Blackfoot—$120,442 for 5.2 mi. bitum. surf., drain structs., and const. roadbed on Hwy. 22 betw. Mountain Home and Tollgate—by Bureau of Highways, Boise. 9-14

KOOTENAI CO.—**R. A. Heintz Construction Co.,** 8101 N. E. Union Ave., Portland, Ore.—$134,030 for 5.5 mi. roadbed, drain structs., and asph. surf. of the Trent Rd., and 6.2 mi. of the Spirit Lake Hwy.—by Bureau of Highways, Boise. 9-14

LATAH CO.—**Triangle Construction Co.,** Box 2617, Boise—$198,748 for 3.4 mi. roadbed, drain. structs., and surf. betw. Joel and Troy—by Bureau of Highways, Boise. 9-24

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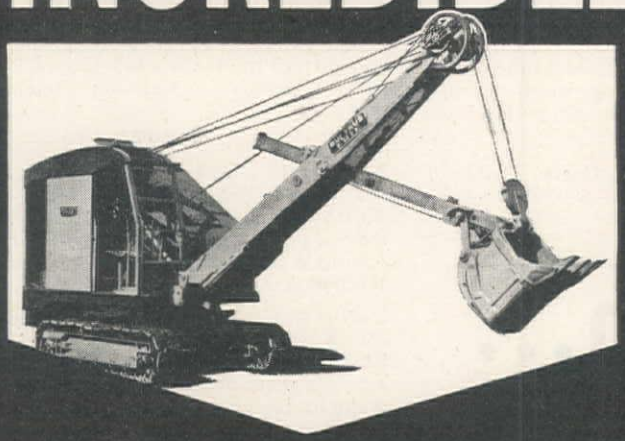

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TWIN FALLS CO. — **Tom McCorkle Construction Co.**, 3001 Idaho St., Boise—$103,245 for street improvements in Buhl—by City Council, Buhl. 9-21

Kansas

PHILLIPS CO.—**Brown Brothers Construction Co.**, Manhattan—$130,868 for 8.8 mi. of grading—by State Highway Commission, Topeka. 9-1

Montana

BROADWATER CO.—**Glen Geery, Inc.**, 439 Connell Ave., Missoula—$90,192 for work on the Radersburg-Toston Rd.—by State Highway Commission, Helena. 9-18

DEER LODGE CO.—**F & S Construction Co.**, Box 4, Butte—$147,955 for repairs on the Anaconda-Warm Springs Rd.—by State Highway Commission, Helena. 9-18

HILL CO.—**McLaughlin, Inc.**, 327 Ford Bldg., Great Falls — $238,380 (recommended) for gravel surf. and drain on a stretch of the Havre-Simpson-Canadian Line Rd.—by State Highway Commission, Helena. 9-18

MUSSELSHELL CO. — **Riedesel Construction Co.**, 2325 9th Ave. N., Billings—$105,693 (recommended) for grade, drain, surf. and const. conc. bridge on the Roundup W. and S. road — by State Highway Commission, Helena. 9-18

RAVALLI CO.—**Glen Geery, Inc.**, 439 Connell Ave., Missoula—$90,973 (recommended) for grade, drain, surf., and oil on the Hamilton-Stevensville Rd.—by State Highway Commission, Helena. 9-18

ROSEBUD & MUSSELSHELL COS.—**Taggart Construction Co.**, Box 560, Cody, Wyo.—$102,325 for work on the Roundup-Forsyth Rd.—by State Highway Commission, Helena. 9-18

WHEATLAND AND FERGUS COS.—**Stanley H. Arkwright, Inc.**, 208 Securities Bldg., Billings—$246,885 for grade, drain and surf. of the Harlowton-Moore Rd.—by State Highway Commission, Helena. 9-18

Nevada

ELKO CO.—**Gibbons & Reed Co.**, 259 W. 3rd South St., Salt Lake City, Utah—$279,970 for about 4 mi. of hwy. improvement from a point 4 mi. W. to Nev.-Utah State Line (Wendover) — by Department of Highways, Carson City. 9-13

LINCOLN CO. — **Gibbons & Reed Co.**, 259 W. 3rd South, Salt Lake City, Utah—$258,102 for 10.4 mi. of hwy. from Panaca Jct. to a point about 10 mi. E.—by Department of Highways, Carson City. 9-24

Oregon

BAKER CO.—**D. F. McKenzie**, 1465 Mission St., Salem—$191,178 for grade and oil mat surf. on the Miles Bridge-Baker sec. of the Medical Sprgs. Hwy.—by State Highway Commission, Salem. 9-16

BENTON CO.—**J. C. Compton Co.**, Box 86, McMinnville—$109,135 for oil and surf. the Smallwood Crk.-Benton Co. line sec. of the Alsea Hwy. — by State Highway Commission, Salem. 9-17

CURRY CO.—**Snook Brothers**, Salem — $83,056 for grade and pave the Gold Beach sec. of the Oregon Coast Hwy.—by State Highway Commission, Salem. 9-16

GRANT CO.—**Rogers Construction Co.**, 11760 N.E. Glisan, Portland — $227,409 (recommended) for grade and surf. for the John Day Riv.-Squally Hook sec. of the Columbia Riv. Hwy.—by State Highway Commission, Salem. 9-17

LAKE CO.—**D. F. McKenzie**, 1465 Mission St., Salem—$89,033 for oiling on the Fremont Jct.-Drake Crk. sec. of the Warner secondary hwy.—by State Highway Commission, Salem. 9-16

Utah

DAVIS CO. — **Strong Company**, Springville—$238,595 for 5.8 mi. grade and drain rdwy. betw. Bountiful and Farmington—by State Road Commission, Salt Lake City. 9-18

MORGAN AND SUMMIT COS. — **W. W. Clyde and Co.**, Springfield—$117,941 for about 6 mi. bitum. surf. betw. Morgan-Summit County Line and Henefer — by State Road Commission, Salt Lake City. 9-1

SAN JUAN CO.—**W. W. Clyde and Co.**, Springville—$120,593 for 9.8 mi. of surf. from Monticello to Devil's Canyon — by State Road Commission, Salt Lake City. 9-1

TOOELE CO.—**Gibbons & Reed Co.**, 259 W. 3rd South St., Salt Lake City—$284,079 for road-building which will extend from the Nev.-Utah line at Wendover to a point 4 mi. W.—by State Road Commission, Salt Lake City. 9-13

UTAH CO. — **Strong Co.**, Springville — $356,957 for about 7 mi., 3-in. surf. betw. Provo and Pleasant Grove—by State Road Commission, Salt Lake City. 9-18

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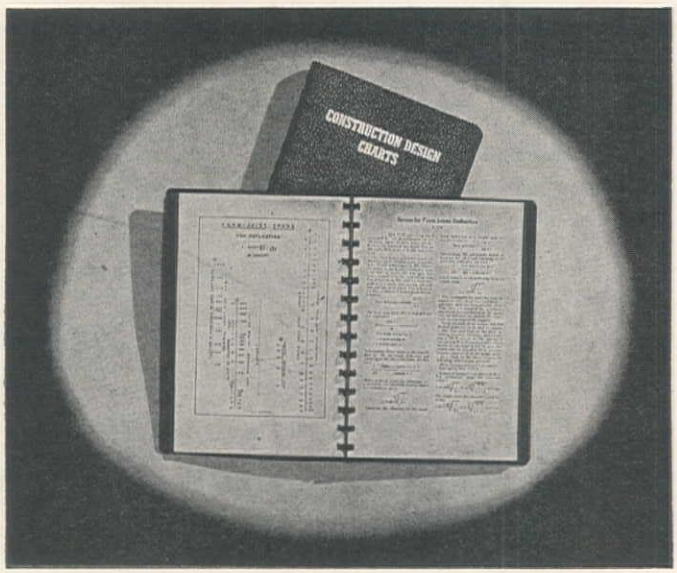

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City..... State.....

Position..... Company.....

Water Supply . . .

California

ALAMEDA CO. — **R. A. Wattson Co.,** 5528 Vineland Ave., North Hollywood—$702,000 for installation of 13 mi. of 24-in. diam. steel pipe (Sch. C & E) on the Hetch Hetchy Pipeline from Hayward along Niles Rd., to the San Francisco Aqueduct nr. Mission San Jose—by City Council, Hayward. 9-13

ALAMEDA AND CONTRA COSTA COS.—**E. T. Haas Co.,** Box 411, San Mateo—$80,896 for installing water mains in Alameda and Contra Costa Cos.—by East Bay Municipal Utilities District, Oakland. 9-13

CONTRA COSTA AND SAN JOAQUIN COS.—**Ben C. Gerwick, Inc.,** 112 Market St., San Francisco—$982,117 for conc. foundations, anchors, and pipe line on Unit C, 2nd Mokelumne Aqueduct—by East Bay Municipal Utility District, Oakland. 9-13

SAN DIEGO CO.—**M. H. Golden Construction Co.,** 3485 Noel St., San Diego—$260,375 for installing roof and lining at the Alvarado Regulating Reservoir and Murray Reservoir in San Diego—by City Council, San Diego. 9-21

Idaho

NEZ PERCE CO.—**S. M. Gilbert & Co.,** 7100 E. Marginal Way, Seattle, Wash.—$157,351 (Sch. I) and **E. F. Pugsley,** 805 E. Northlake, Seattle, Wash.—$116,809 (Sch. II) for const. of irrigation and domestic water pipe dist. syst. on the Lewiston Orchards Proj., from 2 to 10 mi. S. and E. of Lewiston—by Bureau of Reclamation Lewiston. 9-23

Oregon

JOSEPHINE CO.—**Henshaw Brothers,** Portland—$108,592 for const. of a conc. reservoir in Grants Pass—by City Council, Grants Pass. 9-11

Washington

KITTITAS CO. — **Malaspina & Napoli,** Seattle—$87,672 for pipe installation for the rehabilitation of the municipal water system in Ellensburg—by City Council, Ellensburg. 9-17

Waterway . . .

California

LOS ANGELES CO.—**Shannahan Bros.,** 6193 Maywood Ave., Huntington Park — $127,928 for repairs to Rainbow Pier in Long Beach — by City Council, Long Beach. 9-20

Idaho

BOUNDARY CO.—**Gerald Miller,** Box 191, Wasco, Ore.—$167,831 (1st phase) for restoration of flood control works, Kootenai Riv. and tributaries in the vic. of Bonners Ferry—by Corps of Engineers, Seattle, Wash. 9-3

BOUNDARY CO. — **Gerald Miller,** Box 191, Wasco, Ore.—$166,627 (3rd phase) for restoring flood control works on the Kootenai Riv.—by Corps of Engineers, Seattle, Wash. 9-10

BOUNDARY CO.—**Roy L. Bair & Co.,** W. 1220 Ide Ave., Spokane, Wash.—$269,442 (2nd phase) for restoration of flood control works on the Kootenai Riv. nr. Bonners Ferry—by Corps of Engineers, Seattle. 9-4

Oregon

CLATSOP CO. — **Franks Dredging Co.,** 260 California St., San Francisco, Calif., and **Guy F. Atkinson Co.,** Cascade Bldg., Portland—$938,204 for const. of a reserve fleet mooring basin betw. Tongue Point Navy piers and mouth of John Day Riv. in Cathlamet Bay nr. Astoria—by Corps of Engineers, Portland. 9-3

MULTNOMAH CO.—**General Construction Co.,** 4850 N. W. Front, Portland — $145,260 for repairing sub-structure on the slip side of Pier 5, Municipal Terminal No. 4, Portland—by Commission of Public Docks, Portland. 9-1

Washington

YAKIMA CO.—**J. A. Terteling & Sons, Inc.,** P. O. Box 1428, Boise, Idaho—$116,194 for restoration of flood control facil. on the Yakima Riv.—by Corps of Engineers, Seattle. 9-15

Dam . . .

North Dakota

McLEAN AND MERCER COS.—**Peter Kiewit Sons' Co.,** 1024 Omaha Natl. Bank Bldg., Omaha, Neb., and **Morrison-Knudsen Co.,** 319 Broadway. Boise, Idaho—$13,622,066 for the const. of the right abutment

for Garrison Dam located about 75 mi. N. of Bismarck—by Corps of Engineers, Ft. Lincoln, Bismarck. 9-28

Airport . . .

California

SAN MATEO CO.—**Morrison-Knudsen Co., Inc.,** 1 Montgomery St., San Francisco, and 810 Title Guarantee Bldg., Los Angeles—$3,994,844 for const. of airport runways, etc. at the San Francisco Municipal Airport—by City and County of San Francisco. 9-3

Idaho

LATAH CO. — **McAtee & Heath,** Box 2188, Spokane, Wash.—$216,668 for resurf. runway, enlarge parking apron, and install drainage controls on the west end at the Pullman-Moscow Airport, Moscow — by Civil Aeronautics Administration, Seattle, Wash. 9-8

Utah

SALT LAKE CO.—**W. W. Clyde,** Springville—$206,775 for runway improvements and parking lot at the Salt Lake Municipal Airport—by City Commission, Salt Lake City. 9-1

Sewerage . . .

California

LOS ANGELES CO.—**Steve P. Rados,** 2975 San Fernando Rd., Los Angeles—$527,004 for const. of the North Boundary Flood Control, Artesia St. Trunk Line in Long Beach — by City Council, Long Beach. 9-3

LOS ANGELES CO.—**Robert Vlacich,** 2901 Worthen Ave., Los Angeles—$75,959 for grade, pave, const. rock and oil roadway, install sewers and other improvements on Woodley Ave., Los Angeles—by Board of Public Works, Los Angeles. 9-10

LOS ANGELES CO. — **M. F. Kemper Construction Co.,** 3701 Overland Ave., Los Angeles—$794,689 for a piping system for the Hyperion Activated Sludge Plant, El Segundo—by Board of Public Works, Los Angeles. 9-13

LOS ANGELES CO. — **Bosko Construction Co.,** 3844 Whiteside Dr., Los Angeles—$145,893 for const. of California Ave. extension trunk sewer in Lynwood—by City Council, Lynwood. 9-1

LOS ANGELES CO.—**Charles T. Brown,** Box 311, San Fernando, and **Paul Vukich Construction Co.,** 6465 Northside Dr., Los Angeles—$194,334 for const. of the Sta. Monica Blvd. and Carmelita Ave. branches of the Santa Monica storm drain, Beverly Hills—by City Council, Beverly Hills. 9-17

MARIN CO.—**A. J. Peters & Son,** 534 Stockton Ave., San Jose — $135,772 for const. about 38,000 lin. ft. of sewers from Sleepy Hollow to San Anselmo—by Sanitary District, San Anselmo. 9-17

MENDOCINO CO. — **Nick J. Chutuk Construction Co.,** 13313 Sherman Way, No. Hollywood—$94,465 for furnish. and install sewage collection lines, manholes and appurt. in Ukiah—by City Council, Ukiah. 9-17

RIVERSIDE CO.—**R. A. Erwin,** Box 244,

Colton—$225,922 for const. of the Arlington Outfall Sewer betw. Colorado and Jackson Sts., and a sewage disposal plant in Riverside—by City Council, Riverside. 9-17

SAN DIEGO CO.—**L. B. Butterfield,** 2035 Main St., San Diego—$107,000 for installation of sanitary sewers, water mains and paving in Furlow Hgts. Unit No. 1, San Diego—by City of San Diego.

Washington

KING CO.—**State Construction Co.,** 1750 19th Ave. So., Seattle—$847,593 for const. the trunk and latl. sewer systs. in the 40th Ave. N. E. area, Seattle—by Board of Public Works, Seattle. 9-17

Bridge & Grade . . .

California

LOS ANGELES CO. — **Oberg Brothers Construction Co.,** Inglewood—$193,230 for const. a reinf. conc. box girder overcrossing on Hollywood Parkway at Spring St., Los Angeles—by Division of Highways, Sacramento. 9-3

LOS ANGELES CO. — **Spencer Webb Co.,** Box 921, Inglewood — $954,483 for const. a reinf. conc. girder underpass and reinf. conc. overcrossing on Hollywood Parkway at Melrose Ave. and at Vermont Ave., Los Angeles—by Division of Highways, Sacramento. 9-8

LOS ANGELES CO. — **Wonderly Construction Co.,** 2649 Live Ave., Long Beach —$507,350 for diversion and control of water furnish and drive piles, erect superstruct. and remove exist. struct. of the Firestone Blvd. Bridge and adj. channel in Southgate —by Corps of Engineers, Los Angeles. 9-1

LOS ANGELES CO. — **Fred D. Chadwick,** 4335 Brewster Ave., Lynwood—$76,260 for the const. of the Vineland Ave. Bridge and appr. over the Los Angeles Riv. in the No. Hollywood District—by Board of Supervisors, Los Angeles. 9-3

SAN BERNARDINO CO. — **Matich Brothers** and **E. L. Yeager,** Box 87, Riverside—$401,951 for 1.6 mi. grade, surf. and const. two reinf. conc. bridges betw. East Base Line Ave. and Orange St. about 3 mi. N. of Redlands—by Division of Highways, Sacramento. 9-27

SANTA BARBARA CO.—**Baker & Pollock,** 29 N. Olive St., Ventura—$132,594 for 1.1 mi. grade, surf. and const. 4 reinf. conc. bridges betw. Sheffield Dr. and San Ysidro Rd.—by Division of Highways, Sacramento. 9-17

Montana

BROADWATER AND GALLATIN COS.—**W. P. Roscoe,** Billings—$431,903 (recommended) for const. of two conc. and steel bridges on the Toston-Bozeman Hwy. —by State Highway Commission, Helena. 9-18

CASCADE CO. — **Dalakow - Underseth Engineering & Construction Co.,** Box 823, Helena—$83,926 for const. of a steel and conc. bridge over the Dearborn Riv. on the Rogers Pass-Simms Hwy.—by State Highway Commission, Helena. 9-18

POWELL CO.—**McKinnon-Decker Co.,** 1520 Hauser Blvd., Helena — $335,806 (recommended) for grade, drain, surf., oil, and const. of an overpass over the N. P. RR. at Garrison—by State Highway Commission, Helena. 9-18

Oregon

DOUGLAS CO.—**Lockyear and White, Inc.,** 4136 40th St., S.W., Seattle, Wash.—$120,317 for const. the Steamboat Crk. bridge on the North Umpqua Hwy. E. of Roseburg—by Public Roads Administration, Portland. 9-2

Washington

OKANOGAN CO.—**Terpining & Sons,** Ferndale—$109,297 for const. a bridge over Libby Crk. and extend bridge over Methow Riv. on Hwy. 16—by Department of Highways, Olympia. 9-3

Power . . .

California

LOS ANGELES CO.—**J. M. Mathes,** 6881 Ira Ave., Bell Gardens—$82,668 for installation of an electrolier street lighting system in the Palms district, Los Angeles—by Board of Public Works, Los Angeles. 9-24

LOS ANGELES CO.—**Bethlehem Pacific Coast Steel Corporation,** 11100 S. Central, Los Angeles—$2,452,780 for furnish. 1300 single and double steel trans. line towers for Owens Riv. Gorge power lines — by Water and Power Department, Los Angeles. 9-17

SAN FRANCISCO CO.—**Severin Elec-**

tric Co., 249 Natoma St., San Francisco—$220,000 for overhead wiring W. of Franklin St. in San Francisco — by City and County of San Francisco. 9-23

Nebraska

VALLEY CO.—**A. B. Reither Construction Co.,** 602 Denham Bldg., Denver, Colo. —$104,194 for the construction (labor only) of 359.64 mi. of trans. line—by Loup Valley Rural Electric Membership Assn., Neb. 9-20

Oregon

LANE CO.—**Minnis and Schilling,** Eugene —$239,589 for const. of a powerhouse sec. of the Walterville Hydroelectric Plant, Eugene—by City of Eugene. 9-17

LINN AND MARION COS. — **R. W. Byers,** Box 67, Redding, Calif.—$302,000 for const. of trans. lines for supplying power for the Detroit Dam const. and community workers at the dam—by Bonneville Power Administration, Portland. 9-4

Washington

BENTON CO.—**Menzel & Kimball,** Hotel Lorenz, Redding, Calif. — $114,651 for about 192 mi. of distribution lines in Prosser and vicinity—by Inland Engineering Co., Ritzville. 9-28

MASON AND JEFFERSON COS. — **McPhail Engineering Corp.,** Tacoma — $477,915 (Sch. 5 and 6), and **F. E. Wilder,** Box 516, Olympia—$117,440 (Sch. 4), for about 39.9 mi. of trans. line, clearing and misc. work from Shelton to Fairmount—by Bonneville Power Administration, Portland, Ore. 9-28

Irrigation . . .

California

RIVERSIDE CO.—**American Pipe and Construction Co.,** 4635 Firestone Blvd., South Gate—$1,489,447 for const. of earthwork, pipe lines and structs. from Sta. 337/50 to Sta. 939/79, sub-latls. and wasteway, Unit 5, Coachella Valley Dist. Syst., All-American Canal Syst., Boulder Canyon Proj. The work is located about 8 to 19 mi. S. of Coachella—by Bureau of Reclamation, Denver, Colo. 9-17

Idaho

CANYON CO. — **Vernon Brothers Co.,** Box 1787, Boise—$105,254 for const. of earthwork and structs., Sand Hollow wasteway (East Branch) and Willow Crk. wasteway, Payette Div., Boise Proj., in the vic. of Caldwell—by Bureau of Reclamation, Denver. 9-17

Oregon

KLAMATH CO.—**George R. Stacy,** Tulelake, Calif.—$549,145 for earthwork and structs. on the Tule Lake Div., Modoc Unit, about 6 mi. S. of Klamath Falls—by Bureau of Reclamation, Klamath Falls. 9-17

Utah

SALT LAKE CO.—**Provo Foundry and Machine Co.,** 400 E. 9th St., Provo—$346,-937 (Sch. II) for const. of pipeline and structs. on the Salt Lake Aqueduct, Aqueduct Div., from 3 to 16 mi. SE. of Salt Lake City—by Bureau of Reclamation, Provo. 9-23

Wyoming

FREMONT CO. — **Morrison-Knudsen Co., Inc.,** 319 Broadway, Boise, Idaho —

$1,589,220 for const. of earthwork and structs., Sta. 00 plus 00 to Sta. 20 plus 00, Muddy Ridge Canal, laterals, sublaterals and wasteways on the Riverton Proj. about 20 mi. NE. of Riverton—by Bureau of Reclamation, Denver, Colo. 9-17

Miscellaneous . . .

California

ALAMEDA CO.—**Lee J. Immel,** Box 175, San Pablo—$188,206 for grading, surfacing and lighting system at the toll plaza, San Francisco-Oakland Bay Bridge—by Division of Highways, Sacramento. 9-1

YOLO CO.—**Associated Electrical & Mechanical Co.,** 223 Clara St., San Francisco—$379,973 for utility connections on various bldgs. at the University of California, Davis—by University of California, Berkeley. 9-7

Montana

FLATHEAD CO.—**Wixson & Crowe Co.,** and **J. H. Trisdale,** Box 799, Redding, Calif.—$1,733,880 for clearing a portion of the reservoir site on the Hungry Horse Project nr. Kalispell—by Bureau of Reclamation, Hungry Horse Government Camp. 9-23

Oregon

LANE CO.—**Strong & MacDonald, Inc.,** 4045 Ruston Way, Tacoma, Wash., and **Miller & Strong,** Eugene — $220,790 for const. of a section of the Southern Pacific Co.'s Cascade line relocation at Lookout Point dam reservoir—by Corps of Engineers, Portland. 9-1

Building . . .

Arizona

COCHISE CO. — **Womack Construction Co.,** 1712 S. Central Ave., Phoenix—$340,821 for const. of 50 dwellings at the Galena Townsite, Bisbee—by Phelps Dodge Corporation, Bisbee. 9-3

MARICOPA CO.—**Del E. Webb Construction Co.,** 5101 W. San Fernando Rd., Los Angeles—$458,900 for const. of a medical center bldg. in Phoenix—by Medical Center Corporation, Phoenix. 9-3

California

ALAMEDA CO. — **Barrett & Hilp,** 918 Harrison St., San Francisco—$637,982 for const. hospital addtn. to Peralta Hospital in Oakland—by Peralta Hospital, Oakland. 9-8

ALAMEDA CO. — **MacDonald, Young and Nelson,** 351 California St., San Francisco—$1,000,000 for const. of a 6- or 8-story addtn. to a furniture store bldg. on the SW. corner 20th and Broadway Sts., Oakland—by Jackson Furniture Co., Oakland. 9-1

ALAMEDA CO.—**Larsen & Larsen,** 629 Bryant St., San Francisco—$1,000,000 for const. a tank and batch house in Hayward—by Atlas Imperial Diesel Engine Co., Oakland. 9-13

ALAMEDA CO.—**John E. Branagh,** 105 Sheridan Ave., Piedmont — $462,777 for const. the Burkhalter School in Oakland—by Board of Education, Oakland. 9-2

ALAMEDA CO. — **Louis C. Dunn Co.,** 799 Monadnock Bldg., San Francisco — $736,193 for const. a 3-story reinf. conc. laboratories bldg. on the University of California campus, Berkeley—by University of California, Berkeley. 9-7

BUTTE CO.—**B. and R. Construction Co.,** 110 Market St., San Francisco—$382,467 for const. of a boiler plant, maintenance shops, and training school bldgs. at Chico State College, Chico — by State of California, Sacramento. 9-23

CONTRA COSTA CO.—**Parker, Steffens and Pearce,** 135 So. Park St., San Francisco—$517,850 for const. of a public library in Richmond—by City of Richmond. 9-10

HUMBOLDT CO. — **Robert McCarthy Co.,** 1050 Kirkham St., San Francisco — $412,000 for const. of the St. Bernard's Elementary School in Eureka—by Roman Catholic Archbishop, Sacramento. 9-28

KERN CO. — **Ashby & Opperman,** 211 Quincy St., Bakersfield — $373,000 for const. an elementary school in Bakersfield—by Board of Education, Bakersfield. 9-8

KERN CO.—**Trewhitt-Shields & Fisher,** 926 Parallel, Fresno—$632,800 for const. a high school science bldg. in Taft — by School District, Taft. 9-22

LOS ANGELES CO. — **Structon,** 4201 Sunset Blvd., Los Angeles—$239,000 for const. of addtns. to the Franklin School, Santa Monica—by School District, Santa Monica. 9-1

LOS ANGELES CO.—**Zoss Construction Co.,** 1037 N. Cole Ave., Los Angeles — $2,164,192 for const. of the Lincoln Hgts. jail addtn., in Los Angeles—by City of Los Angeles. 9-3

LOS ANGELES CO.—**Baruch Corporation,** 5655 Wilshire Blvd., Los Angeles—$1,589,000 for const. of the Harbor Area Junior College in Wilmington — by Board of Education, Los Angeles. 9-3

LOS ANGELES CO. — **MacDonald, Young and Nelson,** 351 California St., San Francisco—$450,000 for const. a store bldg. in Santa Monica—by J. C. Penney Co., Los Angeles. 9-1

LOS ANGELES CO.—**Frank C. Sheldon,** 2918 W. Compton Blvd., Gardena—$875,000 for const. of 109 dwellings in Norwalk —by Milton Kauffman, Inc., Gardena. 9-1

LOS ANGELES CO. — **Pacific Iron & Steel Co.,** 11633 S. Alameda St., Los Angeles—$427,617 for const. of a warehouse bldg. in El Segundo—by North American Aviation, El Segundo. 9-3

LOS ANGELES CO.—**Vinnell Co.,** Building Division, 108 W. 6th St., Los Angeles —$388,315 for const. of a superstructure for the Diesel shop at S. P. Co.'s Taylor Yard, Los Angeles—by Southern Pacific Co., San Francisco. 9-24

LOS ANGELES CO.—**Connas Construction Co., Inc.,** 590 S. San Vicente Blvd., Los Angeles—$400,000 for const. of 70 dwellings in the Van Nuys district—by self. 9-24

MADERA CO.—**Graham & Jensen,** 1634 M St., Merced—$239,152 (subject to approval of State Finance Board) for const. an elementary school in Chowchilla—by School District, Chowchilla. 9-8

MARIN CO.—**Johnson, Drake & Piper,** 1736 Franklin St., Oakland—$415,000 for const. of a telephone bldg. addtn. in San Rafael—by Pacific Telephone and Telegraph Company, San Francisco. 9-22

MENDOCINO CO.—**Litchfield Construction Co.,** 721 Francisco Blvd., San Rafael—$222,337 for const. of school bldg. in Mendocino—by School District, Mendocino. 9-23

MONTEREY CO.—**Stone and Webster Engineering Corporation,** Russ Bldg., San Francisco—$50,000,000 for const. of an electric generating plant at Moss Landing —by Pacific Gas & Electric Co., San Francisco. 9-21

SACRAMENTO CO. — **Campbell Construction Co.,** 800 "R" St., Sacramento — $559,000 for const. of an office and distributing plant in Sacramento—by Zellerbach Paper Co., Sacramento. 9-10

SAN DIEGO CO. — **Riha Construction Co.,** 4859 El Cajon Blvd., San Diego—$139,075 for const. of school bldgs. in Lakeside—by School District, Lakeside. 9-10

SAN DIEGO CO. — **Dell Thurber, Jr.,** 3168 Midway Dr., San Diego—$185,460 for alterations to the Navy Mess bldg. at the Fleet Sonar School, San Diego—by 11th Naval District, San Diego. 9-17

SAN DIEGO CO.—**R. J. Daum Construction Co.,** 6803 West Blvd., Inglewood — $403,772 for const. of an arts, crafts, and library addtn. on the State College campus, San Diego—by Division of Architecture, Sacramento. 9-1

SAN FRANCISCO CO. — **MacDonald, Young and Nelson,** 351 California St., San Francisco—$30,000,000 for const. of the Stonestown Community Project on 19th Ave., north of Park Merced in San Francisco—by Stoneson Brothers, San Francisco. 9-15

SAN FRANCISCO CO.—**Monson Brothers,** 475 6th St., San Francisco—$2,111,856 (basic bid plus Alt. 1) for const. of the Youth Guidance Center on a 16 acre site

at Portola and Woodside Drives, San Francisco—by City and County of San Francisco. 9-2

SAN LUIS OBISPO CO.—**George W. Giles,** 1038 Riverside, Paso Robles—$464,900 for const. of a reinf. conc. memorial hospital in Paso Robles—by War Memorial District, Paso Robles. 9-13

SAN MATEO CO.—**MacDonald, Young and Nelson,** 351 California St., San Francisco—$240,000 for const. of a Lucky Store bldg. in Burlingame—by St. Francis Investment Co., San Francisco. 9-1

SAN MATEO CO.—**Joseph Bettancourt,** 1015 San Mateo Ave., San Bruno—$134,535 for const. police station and jail in South San Francisco—by City of South San Francisco. 9-10

SANTA CLARA CO.—**Carl N. Swenson Co.,** Box 558, San Jose—$178,395 for const. a parochial school in San Jose—by Roman Catholic Archbishop, San Francisco. 9-10

SOLANO CO.—**J. A. Bryant,** 1815 Capitol St., Vallejo—$200,000 for const. of a bowling center in Vallejo—by Directors of Bowling Center Corp., Vallejo. 9-2

SONOMA CO. — **Haas and Rothschild,** 274 Brannan St., San Francisco—$2,278,000 for const. of a tubercular hospital at the Sonoma State Home in Eldridge—by State of California, Sacramento. 9-27

TULARE CO.—**R. Pedersen & Son,** 446 Clark St., Fresno—$627,000 for const. a 140-bed tuberculosis hospital infirmary bldg. in Springville — by Tulare-Kings Counties Joint Tuberculosis Committee, Visalia. 9-8

VENTURA CO.—**C J B Construction Co.,** 551 So. "B" St., Oxnard—$128,888 for alterations to the Camarillo State Hospital, Camarillo — by Division of Architecture, Sacramento. 9-1

Colorado

DENVER CO.—**Del E. Webb Construction Co.,** 5101 San Fernando Rd. West, Los Angeles—$8,132,706 for const. of a Veterans Hospital at Denver — by Veterans Administration, Washington, D. C. 9-17

DENVER CO. — **Mead & Mount Construction Co.,** Denver Natl. Bank Bldg., Denver—$1,120,000 for const. of a superstructure printing plant in Denver — by Post Printing & Publishing Co., Denver. 9-13

Idaho

CANYON CO.—**Intermountain Builders,** Box 506, Caldwell—$558,377 for const. of a reinf. conc. 75-bed hospital in Caldwell—by Memorial Hospital, Caldwell. 9-16

Montana

CUSTER CO. — **Lease & Leigland,** Vance Bldg., Seattle, Wash.—$4,400,000 for const. of a 100-bed Veterans Hospital in Miles City—by Corps of Engineers, Ft. Peck. 9-24

GALLATIN CO.—**The Haggerty-Messmer Co.,** Bozeman—$275,000 for const. of a library on the Montana State College campus in Bozeman—by Montana State College, Bozeman. 9-3

New Mexico

SANTA FE CO.—**L. D. Leftwich,** Box 559, Lubbock, Texas — $561,753 for the modification of the Western Housing Area, Los Alamos—by Atomic Energy Commission, Los Alamos. 9-1

Oregon

LANE CO.—**Ross B. Hammond Co.,** 1241 N. Williams Ave., Portland—$1,371,793 for const. of the Erb Memorial Bldg. on the University of Oregon campus, Eugene—by University of Oregon, Eugene. 9-21

UMATILLA CO. — **McCormack Construction Co.,** Pendleton — $207,131 for const. of an addtn. to the nurses home at the Eastern Oregon State Hospital, Pendleton—by Eastern Oregon State Hospital, Pendleton. 9-16

Utah

UTAH CO. — **Christiansen Brothers,** 209 W. 13th South, Salt Lake City—$1,500,000 for the const. of a reinf. conc. 4-story science bldg. on the Brigham Young University campus, Provo — by Brigham Young University, Provo. 9-24

Washington

KING CO.—**L. H. Hoffman,** 715 S. W. Columbia St., Portland, Ore.—$6,000,000 for const. a new biscuit plant in Seattle—by National Biscuit Company, Seattle. 9-19

SNOHOMISH CO.—**Three Rivers Plywood and Timber Co.,** Darrington—$500,000 for const. a plywood mill in Darrington—by self. 9-1

THURSTON CO.—**Strand & Sons,** 3939 University Way, Seattle — $225,000 for const. of a modern clinic bldg. in Olympia—by Memorial Hospital, Olympia. 9-2

Wyoming

LARAMIE CO.—**Dutcher and Co.,** Cheyenne—$410,539 for const. of the Wyoming Home and Hospital for the Aged — by Board of Charities and Reform, Cheyenne.

TRADE WINDS

News of Men Who Sell to the Construction West

CALIFORNIA

More than 50 manufacturers of Diesel engines, engine parts and accessories, and instructors in mechanical engineering, held a 2-day educational conference in San Francisco's Bay Area on Aug. 16 and 17. The conference was held under the sponsorship of the DIESEL ENGINE MANUFACTURERS ASSOCIATION, Chicago, Ill., and was arranged as part of DEMA's 5-year educational project, the aim of which is to help the nation's mechanical engineering schools turn out better trained Diesel engineers. The speaking program consisted largely of talks by representatives of the Diesel Industry, and inspection tours of three industrial laboratories were features of the two days' session. Group sessions were held on Diesel fuels and service problems.

☆ ☆ ☆

The appointment of **E. P. Camous** as Traffic Manager of W. P. FULLER & CO., San Francisco, has been announced by President **A. H. Brawner.** He succeeds **N. B. Wagner,** who retired recently after completing 50 years of service with the paint, glass and wallpaper firm.

☆ ☆ ☆

CONTINENTAL SALES & SERVICE CO., Los Angeles, Calif., have been appointed as distributor of engines and service parts for the WISCONSIN MOTORS CORP., Milwaukee, Wis. The new distributor replaces the Essick Manufacturing Co. of Los Angeles as distributor in the Southern California territory. Wisconsin engines are used extensively for powering farm machinery, construction equipment, mining, railway and highway maintenance equipment and many branches of industrial service.

☆ ☆ ☆

A. Kolstad, of KOLSTAD ENGINEERING & SALES CO., Long Beach, Calif., has been appointed sales representative for THOMAS C. WILSON, INC., manufacturers of tube cleaning equipment.

☆ ☆ ☆

THE UNITED STATES PIPE & FOUNDRY CO., Burlington, N. J., has purchased a 35-acre tract of land located in the San Francisco Bay Area at Richmond, Calif., for the purpose of erecting a plant for the production of Cast Iron Pressure Pipe made by the centrifugal process. This product is widely used by all municipally and privately owned water works systems throughout the United States and foreign countries. The plant will serve plants primarily located in California as well as in other Pacific Coast states.

☆ ☆ ☆

Glyn O. White of LaCanada, Calif., has been appointed district representative for the La PLANT-CHOATE MANUFACTURING CO., INC., of Cedar Rapids, Iowa. His territory will cover the southwestern states including California, Nevada, Utah, Arizona and New Mexico. Prior to joining LaPlant-Choate, White was district representative for the Wooldridge Manufacturing Co., and he has more than 16 years of experience in the construction industry.

☆ ☆ ☆

Harry H. Smedley has been named by GAR WOOD INDUSTRIES, INC., FINDLAY DIVISION, Findlay, Ohio, as Service Representative for the Western Region. He will work out of the firm's San Francisco office. Prior to this appointment, Smedley was employed by the Industrial Equipment Co. as Field Service Representative.

☆ ☆ ☆

Benjamin F. Fairless, President of UNITED STATES STEEL CORP., New York City, has announced that purchase of the assets of CONSOLIDATED WESTERN STEEL CORP. by a new United States Steel subsidiary of the same name has been closed. **Alden G. Roach,** former president of the firm, will remain as President of the new subsidiary. No change in the present basis of operations is contemplated.

☆ ☆ ☆

Two changes in personnel of HERCULES POWDER COMPANY's Explosive Department offices in Los Angeles, Calif., and Salt Lake City, Utah, have been announced. **Lawrence W. Early,** who has been resident manager of the Los Angeles office since it was established as a sub-office early this year, has been transferred to the company's Salt Lake City office. **Robert W. Crabtree** will succeed Early as resident manager of the Los Angeles office. For the past seven years, Crabtree has been a sales-service representative in the San Francisco office.

☆ ☆ ☆

Construction of an office building for the Valley Division of the UNION OIL COMPANY OF CALIFORNIA, Los Angeles, in Bakersfield, Calif., has commenced with completion scheduled for early in 1949. When completed, the new building will provide office space for members of the production, geological, geophysical, land, sales and purchasing departments. In addition, space will be provided for a paleontological laboratory.

☆ ☆ ☆

J. H. Anthony, formerly engaged in the electrical contracting business in Los Angeles, Calif., has moved to 4760 Valley Blvd. in that city and is engaged in the sale of all electrical facilities of the Torrance Aluminum Plant, which he has purchased from the government. **C. M. Leflang** is business manager for the venture.

☆ ☆ ☆

TIMBER STRUCTURES, INC., has announced the moving of its Pacific Southwest office from San Francisco to 2111 Frederick St. in Oakland, Calif. According to **Theodore C. Combs,** Resident Manager, office floor space has been more than doubled as necessitated by increased business.

☆ ☆ ☆

PACIFIC NORTHWEST

INLAND MACHINERY CO. of La Grande, Ore., has been appointed by the CATERPILLAR TRACTOR CO., Peoria, Ill., as distributor for "Caterpillar" products in five eastern counties of Oregon. The new distributorship is headed by **Robert R. Carey** as President, **J. Donald Steinbeck** and **C. E. Millering** as Vice-Presidents, and **W. Ned Jones** as Secretary-Treasurer. The organization will serve the counties of Baker, Union, Wallowa, Grant and Harney in Oregon, territory formerly served by BUNTING TRACTOR CO., which retains as its territory 19 counties of Idaho and Malheur County, Ore.

☆ ☆ ☆

Melvin A. Staben has been appointed District Manager for all industrial business conducted by the OLIVER CORPORA-

TION in the states of Oregon, Washington, Idaho and Montana. Staben is well known in the Northwest. He has long been active in the logging, contracting and industrial fields in that territory.

☆ ☆ ☆

A link was added to the chain of WHITE MOTOR CO. dealers in the Pacific Northwest recently with the opening of the new building of TACOMA WHITE TRUCKS, INC., representatives of the company in Tacoma, Wash. Under the presidency of **Frank Buchanan,** the new company is supplied with every modern facility to represent White products in Tacoma. The recently opened building is of latest design and construction, incorporating hydraulic hoists, engine test analyzers, boring bars and all modern repair equipment. In attend-

ance at the opening ceremonies were **Wilson D. Patterson,** Pacific Coast Regional Manager for the White Motor Co., and **D. H. Wilson,** White's Wholesale manager for the Northwest.

☆ ☆ ☆

R. K. Gottshall, formerly Director of Sales of the Explosives Department of ATLAS POWDER CO., Wilmington, Del., has been appointed Assistant General Manager of the department. **W. E. Collins, Jr.,** former manager of the Seattle, Wash., Sales District, succeeds Gottshall as Director of Sales. **George W. Thompson,** special representative for the New York Sales District, has been transferred to Seattle as Manager of that District Sales Office.

☆ ☆ ☆

THE FEENAUGHTY MACHINERY & EQUIPMENT CO. of Oregon and Washington was honored recently by the FOUR WHEEL AUTO DRIVE CO., Clintonville, Wis., at a banquet celebrating the completion of 26 years of Sales and Service Dealership. **Don Feenaughty,** President of the dealership, and **M. B. Mack,** Vice President and Sales Manager, came to Clintonville to accept a plaque presented to the Feenaughty organization by **Walter A. Olen,** FWD President.

☆ ☆ ☆

INTERMOUNTAIN

R. F. Dierking of Des Moines, Iowa, has been appointed Manager of the West Central offices of the PORTLAND CEMENT ASSOCIATION, Chicago, Ill. Dierking succeeds **R. W. Winters,** who resigned. His headquarters will be Kansas City, Mo., from where he will direct Association field work in Colorado, Kansas, Missouri, Nebraska, Oklahoma and Wyoming.

☆ ☆ ☆

A series of personnel changes naming new branch and regional managers for MINNEAPOLIS-HONEYWELL REGULATOR CO., New York City, and its industrial division, BROWN INSTRUMENT CO., have been announced. Among these are the appointment of **Edwin A. Thompson,** formerly manager of the Peoria, Ill., branch, as regional manager for the mountain region which includes Colorado, Utah, and parts of Idaho, Nebraska, Wyoming and Nevada. He succeeds **George D. Maves,** who has been named manager of the Boston, Mass., branch.

☆ ☆ ☆

AMONG THE MANUFACTURERS

John S. Conway, formerly Export Sales Manager for the KOEHRING CO. of Milwaukee, Wis., has been appointed General Sales Manager according to a recent announcement by the company. In his new post, Conway succeeds **J. F. Robbins,** who will become President and General Manager of the CAPITOL EQUIPMENT CO., Koehring distributor in Harrisburg, Pa. At the same time, Koehring named **John E. Chadwick** as Assistant Sales Manager and **R. E. Stewart** as Export Sales Manager.

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The consolidation of the movement of both personnel and equipment into its new 19-acre plant site at Indianapolis, Ind., has been completed by PEERLESS PUMP DIVISION of the FOOD MACHINERY CORP. Peerless' new plant is the former Fall Creek Ordnance works and was acquired from the War Assets Administration late in 1946 with a bid of $861,000. Works manager of the new plant is **H. J. McKenzie** and assistant works manager is **C. N. Adams.** The plant has been well equipped to produce units of the complete line of Peerless pumps, vertical, horizontal, centrifugal and domestic water systems. A complete and rounded complement of the most modern machinery and tools has been

brought together to build up one of the most accurate and finest industrial machine shops anywhere.

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Due to the demands of an expanding national market, McCook, Ill., has been chosen as the site of a new, modern plant for TURCO PRODUCTS, INC., manufacturers of specialized industrial cleaning compounds. The new plant is a necessary addition to Turco's present manufacturing facilities at Chicago, Los Angeles and Houston. The McCook location is available to various sources of raw materials and its central location for distribution of finished compounds makes possible more rapid service and equalization of freight charges to Mid-West and Eastern markets.

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The BARRETT DIVISION, ALLIED CHEMICAL & DYE CORP., New York City, announces the appointment of **B. C. Cowart** as Manager of the Protective Coatings Sales. He succeeds **G. B. McComb,** resigned.

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A. C. Monteith, engineering executive of the WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Pa., has been elected vice-president in charge of engineering and research. He succeeds **Marvin W. Smith,** whose election as executive vice-president of Baldwin Locomotive Works was announced.

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C. M. Gegenheimer has been named District Manager in charge of the Chicago office of MARION POWER SHOVEL CO. of Marion, Ohio. He succeeds **David E. Rizor,** who has been transferred to the company's home office. Rizor was appointed as assistant to **John P. Courtright,** Vice President in charge of Sales for the company.

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Two appointments have been announced recently to the Board of Regional Sales Supervisors of EUTECTIC WELDING ALLOYS CORP., New York City. **William R. Bajari,** new member of the Board, is Eutectic Regional Sales Supervisor in the Western Region of the United States, responsible for the group of 160 Eutectic Field Engineers active in that area. **Robert H. Groman** now assumes full responsibility as Eutectic Regional Sales Supervisor in the West Central area.

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Robert M. "Bob" Vilsack has joined the Sales Department of TAYLOR FORGE & PIPE WORKS, Chicago, Ill. The company, with main plant at Chicago, also operates extensive properties at Fontana, Calif. Vilsack was recently associated with the M. W. Kellogg Co. of New York in engineering and sales work.

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FINDLAY DIVISION OF GAR WOOD INDUSTRIES, INC., Findlay, Ohio, has announced the appointment of **John D. Blood** as Division Service Manager. **George S. Ames** has been named by the firm as Special Representative of the Service Department. Ames will be on call to assist pipeline contractors on service and parts problems.

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THE OSGOOD CO., of Marion, Ohio, announces the appointment of **Fred L. White,** former Chief Engineer of the company, to the position of Development and Consulting Engineer. In his new capacity, White will divide his full time between the

home office and the field, making surveys leading to continued improvements in the present line of modern Osgood excavating and material handling equipment, and the designing of equipment related to special applications. Appointed to succeed White as Chief Engineer is **John E. Callouette**, formerly Design Engineer of Clark Brothers Corp., Olean, N. Y.

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David A. Werblin has been appointed as Sales Engineer for the Northeastern territory of GRIFFIN WELLPOINT CORP., New York City, manufacturers of wellpoint systems, pumps, generating sets and auxiliary sets. Werblin, an M.I.T. graduate, was formerly associated with Parsons, Klapp, Brinckerhoff and Douglas, New York City consulting engineers, as a Construction Engineer.

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Neil C. Hurley, 78, chairman of the board of INDEPENDENT PNEUMATIC TOOL CO. of Aurora, Ill., died Aug. 2 of a heart attack at his home in River Forest, Ill. Hurley had been active in the company for the past 21 years, directing its expansion first as its president, and then, since 1944, as board chairman.

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Harry H. Barber, Chairman of the Board of BARBER-GREENE CO., Aurora, Ill., manufacturers of bituminous road building equipment and material handling machinery, died Sept. 6. He had been in failing health for several years. Barber, one of the pioneer designers of modern construction equipment, retired as president of the Barber-Greene Co. on Sept. 25, 1945, to become Chairman of the Board. He was 70

HARRY H. BARBER

years old. In 1940 he was presented the Pioneer Award by the National Association of Manufacturers in recognition of his many patents for new machines and methods for material handling, ditch digging and road construction. Harry Barber's influence as an ethical and original designer has been a stimulus to many young men in the construction and industrial fields and his designs and the highways constructed with his machines will remain as a monument to him.

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PETTIBONE - MULLIKEN CORP., Chicago, Ill., has purchased the assets and business of UNIVERSAL ENGINEERING CORP. of Cedar Rapids, Iowa. Universal is one of the largest and oldest manufacturers in the United States of crushing machinery and allied equipment for rock and gravel plants. This acquisition marks another step in Pettibone's program to better diversify its products and markets.

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W. M. Watkins has been appointed as District Manager for the Indianapolis, Ind., branch of MACK TRUCKS, INC., New York City. Prior to assuming his new duties, Watkins was Wholesale Manager for Mack's Dallas, Texas, branch. Net sales for Mack Trucks, Inc., and subsidiary companies for the first six months of 1948 amounted to $62,659,862 and net profit totalled $2,449,917, representing $1.64 per share.

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Formation of a new department of the MINNEAPOLIS-HONEYWELL REGULATOR CO., New York City, to supervise the advertising, merchandising and sales promotion activities of the company has been announced by **C. B. Sweatt,** executive vice-president. **John R. Bergan** has been appointed head of the new department as merchandising manager. Other changes include the promotion of **Chandler Murphy** as advertising manager and **John A. Young** as sales promotion manager. **Ray R. West**

has been named manager of sales of the company's products for industrial applications. West's appointment, said BROWN INSTRUMENT CO. officials, is in line with current Honeywell sales expansion and new products development for control of temperature, humidity and pressure in industrial and specialized fields.

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Dr. Lewis Warrington Chubb, director emeritus of the Research Laboratories of WESTINGHOUSE ELECTRIC CORP., Pittsburgh, Pa., has retired after 43 years of scientific research with Westinghouse,

leaving behind him a record of outstanding contributions in nearly every field of science and engineering. The veteran scientist, who served as director of the Laboratories from 1930 until assuming his honorary emeritus post last March, was awarded more than 150 patents covering inventions in radio, electronics, jet propulsion, telephony, electrical equipment, radar and many other fields. He has received nearly every major engineering and scientific honor.

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Kenneth E. Sabine, Cleveland advertising man since 1937, has joined the staff of the BYERS MACHINERY CO., Ravenna, Ohio, as Assistant Sales Manager in charge of advertising and sales promotion. Sabine has been assistant advertising manager for Jack & Heintz Precision Industries, Inc., Cleveland, since his discharge from the Army Air Force in 1945.

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M. B. Garber, Assistant Sales Manager and Export Manager of THE THEW SHOVEL CO., Lorain, Ohio, since 1937, has been appointed General Sales Manager. He succeeds the late **Don G. Savage,** who died on July 25. Garber immediately announced the appointment of **Q. J. Winsor** and **J. T. Cushing** as Assistant General Sales Managers for the power crane and shovel firm. Winsor previously held the position of Assistant to the General Sales Manager and District Sales Manager for the East-Central territory while Cushing has been District Sales Manager for the West Coast, with offices in San Francisco.

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John H. Bailor of the GENERAL ELECTRIC CO. has become resident sales engineer in Reno, Nev. Bailor was formerly with General Electric's sales and engineering divisions in San Francisco. Due to increasing utility and industrial activities in the Reno area, the company has set up a resident Apparatus Department agent.

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A number of changes of personnel have been announced in the Engineering Division of the FOUR WHEEL AUTO DRIVE CO., Clintonville, Wis. **Donald B. Olen,** formerly Chairman of the Manufacturing Committee, has been named Director of the Engineering Division, and **H. B. Dodge,** former Director, has been elevated to Technical Advisor to the Management for the company. **G. D. Simonds,** formerly Manager of Design Engineering, has been named Chief Engineer in Charge of Design of Standard FWD models. A series of major changes have also been made in the reorganization of the FWD Sales Division. Many sales supervisors and salesmen are being assigned to specialized markets. **A. E. Johnson,** formerly Assistant Field Sales Manager, has been named Supervisor of Government Sales. **Stanley Wick,** formerly Manager of the Order Department, has been named Assistant Director of Sales in charge of all office domestic sales activity, and **Jack Kelly,** formerly Assistant Field Sales Director, has been appointed Assistant Director of Sales in charge of administration of FWD's field organization. **John Battes,** who for the past three years has been FWD Sales Supervisor in Northern California and Idaho, has been named Acting Manager of FWD's Western Sales Zone. He fills the vacancy of **Paul Schmidt,** who will shortly be named to an important position in FWD's sales organization. **Howard Collard,** formerly Sales Supervisor in Oregon and Washington, has been named Acting Zone Manager in the Southwestern States.

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Frank J. Smith is the newly appointed Advertising and Sales Manager of the PHILLIP CAREY MFG. CO., Cincinnati, Ohio. He succeeds **Harold D. Bates,** who was recently promoted to General Merchandise Manager. Smith joined the Carey company early in 1948 after several years in the sales and advertising departments of Owens-Corning Fiberglas Corp.

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.

Diesel Engine

Manufacturer: Cummins Engine Co., Inc., Columbus, Ind.

Equipment: New engine developing 165 h.p. at 1800 r.p.m.

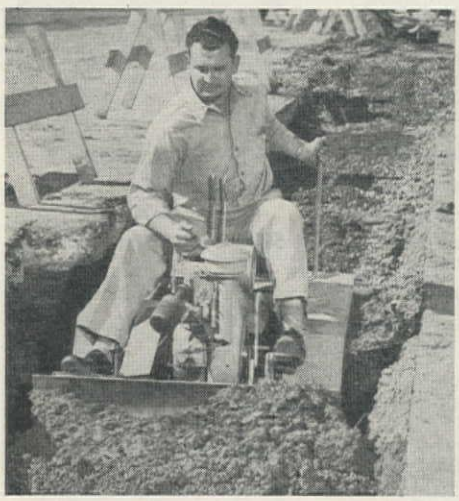
Features claimed: The new Cummins Diesel, designated the HR-600 model, continues the company's trend toward "more power per pound." The engine, with a piston displacement of 743 cu. in., has a four-stroke cycle and has the exclusive Cummins Fuel System. It is available in an automotive model, three industrial models and a marine model. Model HRBI-600 is the basic industrial model, Model HRI-600 is equipped with instrument panel and trunnion support base, and Model HRP-600 is an enclosed power unit with structural steel base, clutch power take-off, radiator, fan, engine hood and fuel tank. Field conversion to HR-600 from H-600 can be made by Cummins dealers. Steps involved include boring the present block and installing HR-600 pistons and liners and the optional installation of the new increased-flow lubricating system and continuous groove bearings.

Small Track-Type Tractor

Manufacturer: Earl H. Pence & Co., Inc., Berkeley, Calif.

Equipment: Tractor 38 in. wide and equipped with bulldozer.

Features claimed: Because of its narrow width and low overall height of 41 in., the Agricat can work between forms and in



many places where low headroom restricts larger tractors. It weighs only 1,170 lb., so is easily transported. The Agricat is powered by a 6 h.p. Wisconsin engine, has two forward speeds and one reverse. The tracks are 6 in. wide and have a ground contact of 318 sq. in. Length overall, including Dozer, is 6 ft., and ground clearance is 12 in.

Hydraulic Coupling

Manufacturer: Hudlen Hydraulic Co., El Monte, Calif.

Equipment: Automatic coupling designed for use with tractor hydraulic lifts and other earth moving types of equipment.

Features claimed: The new coupling utilizes the accepted hydraulic principle of providing tapered plug valves to control any amount of line pressure. Simplicity of the general design of the coupling obviates any use of tools to couple or uncouple the hose lines. These operations are practically instantaneous. No oil is lost during this function. In event of hitch-pin failure, it is physically impossible to snap the hose lines in two, as a 3-lb. pull on the lines automatically closes the tapered plug valves and causes the coupling segments to disconnect. Machined from steel, none of the coupling parts is subject to inherent failure.

Concrete Vibrator Shaft

Manufacturer: Wyzenbeek & Staff, Inc., Chicago, Ill.

Equipment: Completely new type of shaft with embedded spring.

Features claimed: The new shaft has the reinforcing spring of the flexible shaft "locked in" by solidly embedding it in a

heavy layer of oil-resistant moulded rubber. This embedding of the spring provides a heavily reinforced shaft which is perfectly smooth on the outside. This new protection is claimed to prevent breakage of casing, insuring longer shaft life and at the same time leaving no external springs to catch on forms or reinforcing bars. The inner-liner of the shaft is impregnated with graphite, and there is virtually no loss of power through friction.

Transporter for Spreader Boxes

Manufacturer: The Highway Special Equipment Co., Hilliards, Ohio.

Equipment: Unit to hoist and carry spreader boxes on the highway.

Features claimed: Nine to twelve boxes can be trailed at full speed behind any light

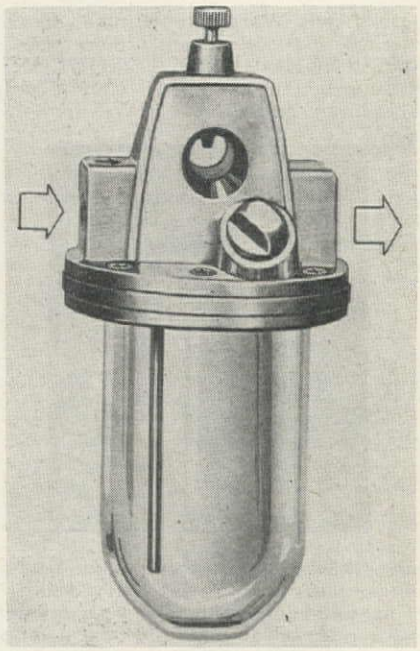
pick-up truck with the unit. The serious traffic hazard of transporting boxes crosswise of the road is eliminated as well as the dangerous work of loading heavy spreaders on trucks. Only one man is needed to place the Transporter over a spreader box. Then, using the worm gear crank, he easily hoists the box on two lifting hooks and further secures it with a chain sling, tightened by turnbuckle.

Automatic Air Line Lubricator

Manufacturer: Hannifin Corp., Chicago, Ill.

Equipment: Lubricator which meters oil into the air stream in compressed air lines.

Features claimed: The lubricator meters the oil into the air as a fine mist, which is



beneficial in reducing friction and heat and also greatly prolongs the life of air powered equipment. The unit consists essentially of a body to which pipe connections are made and a bowl containing a supply of oil. The rate of flow of oil is visible from both sides and can be accurately controlled by a needle valve. Operation of the lubricator is simple and foolproof, never requiring any attention other than to fill the bowl with approximately ½ pint of oil. Oil is automatically injected only when air is flowing.

Trenching Machine

Manufacturer: Koehring Co., Milwaukee, Wis.

Equipment: Ladder-type trencher with a digging range of 5 to 7½ in. in width and up to 4 ft. in depth.

Features claimed: The small, utility-size Trenchmobile, known as the Model 80, is a compact excavator equipped with a wide range of operating and trenching speeds to make it a versatile unit in almost any type of excavation within its range of digging widths and depths. It is rubber tire mounted and self propelled although it can be towed behind a truck or pickup or loaded onto a truck and trailer without difficulty. The machine should fill a definite need in the operating schedules of public utilities and gas companies.

Mobile Crane

Manufacturer: R. G. LeTourneau, Inc., Longview, Texas.

Equipment: 7-ton Tournacrane model.

Features claimed: The new model Touracrane has a three-way positive electric control for pin-point spotting, lifting and placing the load. The crane will lift its rated capacity without the use of outriggers or counterweights, and then carry the load safely either on smooth surfaces or across rough terrain. Large pneumatic tires on the vehicle cushion the load. The unit, using

only a 20-ft. area, can reverse its direction and move away with the load in one continuous forward movement. The forward wheels are not only steerable but also tractive. The Tournamatic differential allows the wheel having the greatest traction to have the most power.

Portable Pipe Bender

Manufacturer: Electric Cord Co., New York City.

Equipment: Lightweight hydraulic bender.

Features claimed: The new, portable tool forms smooth, uniform pipe bending operations right on the job. Weight has been kept down to a minimum without a loss of strength, with the combined weight of jack and frame being 83 lb. A removable hydraulic jack simplifies the service problem and can be used for many other useful purposes. The 30-in. steel frame is electrically welded and heavily reinforced. The unit comes complete with ¾ up to 2½-in. dies.

Roofer's Hoist

Manufacturer: American Hoist & Derrick Co., St. Paul, Minn.

Equipment: Unit for smaller hoisting jobs.

Features claimed: Known as the Model 500, the unit develops a 500-lb. single line pull at 200 ft. per min. The hoist is gasoline powered by a 4.2 h.p. single cylinder air-cooled engine. Weighing only 410 lb. and equipped with pressed steel wheels and wheelbarrow type handles, the unit is highly portable and can be easily and readily moved from one spot to another by only one man.

Dragline Bucket

Manufacturer: Berner Engineering Co., Santa Clara, Calif.

Equipment: Bucket which requires no time to drag to hoisting position.

Features claimed: This archless bucket is arranged so that the control chains pass

behind the pivot point imposing a rearward rotation upon the linkage assembly which is limited by a stop and thus locks the linkage for a proper, positive and predetermined carrying position of the bucket. With the center of gravity farther to the rear, the proper digging-in position is maintained. Elimination of the arch in the design eliminates any chain and rope contact which causes wear and necessitates repair on conventional buckets. Design of the Short-Cycle bucket eliminates all special links, rings and clevises that have always been a source of trouble and expense.

Cable Controlled Scraper

Manufacturer: Gar Wood Industries, Wayne, Mich.

Equipment: Four-wheeled scraper for use with a single tractor of 55 or greater horsepower.

Features claimed: Capacity of the Gar Wood Model 508 Scraper is 7.6 cu. yd. heaped or 6 cu. yd. struck. It takes a deep cut down to 12 in. below the tires. Simple straight line cable reeving saves wear on the cable and facilitates replacements. The pivoted type bowl results in less friction of dirt. The over-all width of 8 ft., 10 in. permits working in narrow cuts with good capacity. High bowl clearance permits tractor to traverse soft footing. Low center of gravity and three point suspension of scraper on its wheels reduces twisting strains to a minimum.

Centrifugal Pumping Unit

Manufacturer: Hale Fire Pump Co., Conshocken, Pa.

Equipment: Self-powered pump meeting the need for a portable, general purpose unit.

Features claimed: The single centrifugal pump is bolted directly to a 7.7 h.p., 4-cycle air-cooled Briggs & Stratton gasoline engine. The resulting unit is compact, dependable and quick starting, with no troublesome flexible couplings and no possibility of misalignment. Capacity of the pump is 60 U. S. Gal. per min. at 90 lb. pressure.

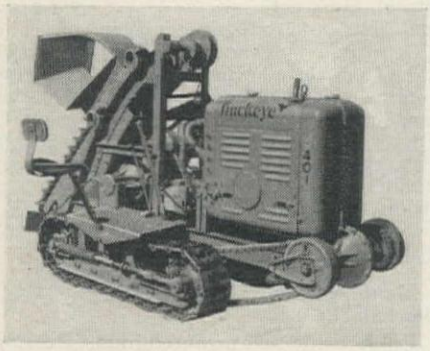
The pump is available either with hand carrying frame, a barrow type carriage with pneumatic tires, or for stationary mounting. It is ideal as an auxiliary for pumping into a booster tank or direct into suction from any source of liquid which a main pumping unit cannot reach.

Small Ditcher

Manufacturer: Gar Wood Industries, Inc., Findlay, Ohio.

Equipment: Pony ditcher to excavate trenches as narrow as 6 in. wide.

Features claimed: One of the smallest excavating machines ever built, the new



Buckeye 401 Pony Ditcher weighs only 6,590 lb., digs to a 4-ft. depth, and uses digging buckets either 6 or 8-in. wide. Maximum length is 13 ft., 9 in., and its width is 4 ft., 4 in. Its compactness enables it to squeeze through areaways and to traverse lawns and walks without damaging them. Digging speeds range from 2.19 to 14.7 ft. per min. The excavator boom is all-welded steel box type and is raised and lowered by means of a self-locking worm hoist, powered directly from the engine transmission. Spoil is discharged to both sides of the ditch. Crawlers, driven from forward by a heavy truck-type differential, are nonclogging and have cast alloy steel treads. The left side crawler is adjustable vertically so that the machine can maintain an even keel for digging a vertical ditch.

Material Crusher

Manufacturer: Dixie Machinery Mfg. Co., St. Louis, Mo.

Equipment: Improved Hammermill line, designed for either primary or secondary crushing.

Features claimed: Outstanding feature of the improved "36 Series" Dixie Hammermill is a longer, continuously moving breaker plate that guards against the passage of oversized materials between the breaker plate and the front cage bar. As an extra precaution against restricting flow of material, added space has been provided between the cage bars and the back of the mill. Other important changes in the new line include all-steel construction, flange-type end discs of cast steel to protect hammer bolts and nuts from wear at ends, and a heavy flywheel to exert a stabilizing action to offset the effect of momentary overload occasioned by the inclusion in the feed of unusually large pieces of raw material. Easy access to hammers for periodic examination is afforded by a conveniently located clean-out and inspection door.

Small Hauling Truck

Manufacturer: Techtmann Industries, Milwaukee, Wis.

Equipment: Truck with upper and lower hooks for convenient hauling of boxes.

Features claimed: The double-hook feature enables the hook-arm to bite into totally enclosed wood boxes or cases or into open boxes, while the upper hook takes hold of handles on metal tote boxes,

etc. Easy manipulation of the hook-arm is made possible by the convenient hand grip on the arm itself. When the load is hooked, the operator merely pulls backward and the load slides easily onto the balanced tilting carrier plate. Bulky boxes can be "tumbled" onto the carrier plate. The powerful leverage principle employed reduces the operator's effort to a minimum.

Rubber Pipe Joints

Manufacturer: Hamilton-Kent Manufacturing Co., Kent, Ohio.

Equipment: Rubber joint that is cast into the pipe by the manufacturer.

Features claimed: When the Type B Tylox joint is cast into the pipe, it is set into a form which makes it perfectly round and of the proper size to receive the spigot. The casting material is then poured and functions not only to hold the gasket in the pipe properly, but also fills in any spaces or ir-

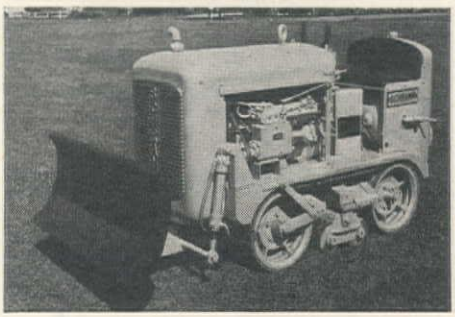
regularities which were present in the bell of the pipe when it was made. In fact, the bell can be shaped like an egg because the casting material automatically compensates for it. The basic necessity for this type of joint rose from the fact that the spigot end of bell and spigot pipe is normally concentric and uniform in diameter, but the bell is inclined to warp and sag so that the inside of the bell on most finished pipe is neither round nor uniform in diameter.

Hydraulic Backfill Blade

Manufacturer: Schramm Inc., West Chester, Pa.

Equipment: Hydraulically operated blade with a crawler type compressor.

Features claimed: The blade is operated by hydraulic pressure, supplied by a hydraulic pump. The pump is a self-contained



unit with a pressure relief valve, hydraulic reservoir and pump in one housing. Two hydraulically operated cylinders, mounted on track guards, move the blade up and down, traveling 14 in. above ground level and 11 in. below ground level. The blade is useful for backfilling ditches when used in conjunction with a pneumatic backfill tamper and can also be used for light grading around new developments.

Electric Motor

Manufacturer: Louis Allis Co., Milwaukee, Wis.

Equipment: Foot mounted motor with entire base enclosed by the motor housing.

Features claimed: The motor is streamlined and free of cracks, recesses or depressions to prevent any collection of particles under the motor. Mounting bolt holes are located in accordance with NEMA standards permitting the motor to be completely interchangeable with motors now in use. Access to the mounting bolts is through the removable grille plates. The base design also permits the use of a built-in conduit box, eliminating the usual projecting box supplied on motors of conventional design. The new motor will be supplied with the Type C flange for pump applications and with all of the standard and special voltages, frequencies and electrical modifications that may be encountered.

Portable Compressor

Manufacturer: Ingersoll-Rand Co., Phillipsburg, N. J.

Equipment: Utility compressor for large contractors.

Features claimed: The unit is self-contained, completely air-cooled and driven by a gasoline engine. The two cylinder, single-stage compressor has a piston displacement of 37.5 cu. ft. per min. at 80 p.s.i. pressure. It is equipped with an automatic unloader which permits the compressor to operate at constant speed but compress air only when needed. The compressor and its gasoline-engine driver are mounted on an air receiver which forms an integral part of the running gear 6.00 x 16 pneumatic tires and a detachable ball-and-socket type trailer hitch make the Pac-Air easy to tow behind a truck or passenger vehicle.

Truck-Mounted Crane

Manufacturer: The Schield Bantam Co., Inc., Waverly, Ohio.

Equipment: ⅓-yd. unit with interchangeable booms and buckets which can be quickly converted from power shovel to dragline, trench hoe, clam, pile driver or crane.

Features claimed: The Bantam mounts on any 1½-ton truck or larger. All major assemblies are equipped with ball bearings, mechanical clutches are internal expanding drum type, split type laggings provide proper line speeds, hook roller design eliminates strain on the center pin, and the roomy cab is designed for operator comfort. An exclusive feature of the unit is the patented "mole's claw" which interchanges with the trench hoe bucket. According to the manufacturer, the "mole's paw" will work in sticky or mucky material where the conventional bucket does not operate satisfactorily.

Valve In-Head Engine

Manufacturer: LeRoi Co., Milwaukee, Wis.

Equipment: V-8 engine with horsepower rating up to 135.

Features claimed: The H-540 model, with speeds up to 1800 r.p.m., is compact and light in weight despite the horsepower range. It runs on gasoline, butane or natural gas, the fuel adaptability providing low consumption, lower operating costs and trouble-free performance. Features incorporated into the new engine are removable, wet-type cylinder sleeves; counterweighted

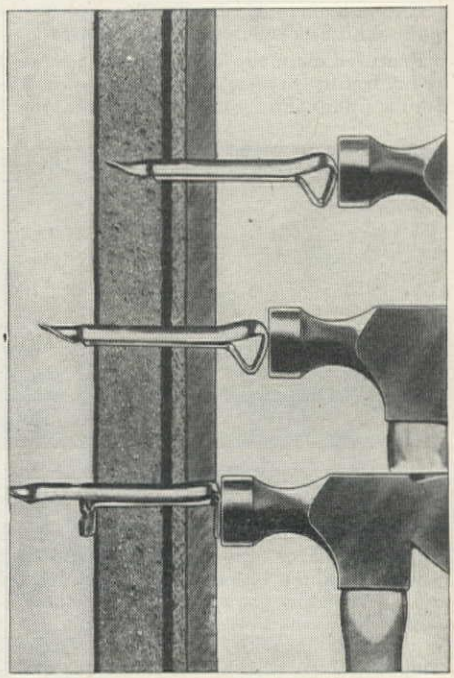
crankshaft; unit construction of crankcase and cylinder block; water-cooled manifolds; full-pressure lubrication; gear-driven water pump; cam-ground aluminum pistons and push button electric starting.

Wood Shingle Fastener

Manufacturer: Elastic Stop Nut Corporation of America, Union, N. J.

Equipment: ES nail, a simple means of locking wood shingles directly to gypsum.

Features claimed: The fastener has two legs, one-half enclosing the other, hinged near the end and forming a triangular loop



at the top. When it is driven into the material, the last blow of the hammer flattens the top, causing a locking action. ES nails can be driven at convenient points without locating studs. The 1¾-in. nails are of low carbon steel, zinc coated for attaching the shingles to gypsum sheathing by customary concealed method of shingle application.

Freely Turning Swivels

Manufacturer: General Machine & Welding Works, Pomona, Calif.

Equipment: Swivels to eliminate twist in wire rope.

Features claimed: The Miller Whip Line Special, with a weight of 32 lb., is weighty enough to return a whip line to the ground when using a long boom. Even under a 77,000-lb. load, this swivel can be turned by merely grasping it with the thumb and forefinger. Constructed of two female ends, the swivel is bicketed to the end of the boom and provides a free non-twisting working line. The patented design of the swivels makes possible the use of the entire bearing surface of three ball races. The rolling surface is of the annular ball type for greater sheer and shock load and will swivel freely under maximum load.

Wire Rope Cutter

Manufacturer: Pell Cable Cutter Co., San Francisco, Calif.

Equipment: Cutter which can be operated in any position and weighs only 70 lb.

Features claimed: Of all-steel construction, Hydrashear is manually operated, entirely self-contained, and does not have to

be anchored when in use. It cuts wire rope in sizes up to 1½ in. through the application of hydraulic pressure. Its portability is valuable to any on-the-job operation where wire rope or cable is used.

Aluminum Surface Treatment

Manufacturer: Farrelloy Co., Philadelphia, Pa.

Equipment: Chemical which cleans the dirtiest aluminum and at the same time creates an absorptive crystal coat.

Features claimed: Alumatreet may be used for removing dirt and oxide and re-

storing castings or other alloys of aluminum. It protects the treated surface so that if paint is scratched it will not permit creeping of the corrosion under the adjacent paint. It gives a ductile, non-metallic coating that does not flake even on light gauge aluminum which is readily damaged by bending or denting. The chemical may be used with no surface preparation on bright metal and dries by physical action at normal temperature. Bottom of aluminum disk illustrated is before treatment, and top sector is after application of Alumatreet.

Clay Spade

Manufacturer: Le Roi Co., Milwaukee, Wis.

Equipment: Spade operated by compressed air.

Features claimed: The new Le Roi 31 spade, weighing only 18 lb., enables the operator to do more work with less effort. Also contributing to easy handling is the short 19-in. length. An exclusive built-in oiling system will prove of primary importance to users. Oil from a large reservoir in the handle is metered into the live air stream and carried to every working part. Cylinder, handle and steel retainer have been forged to form a tough, hard-working tool.

Flat Belt Conveyor

Manufacturer: George Haiss Mfg. Co., Inc., New York City.

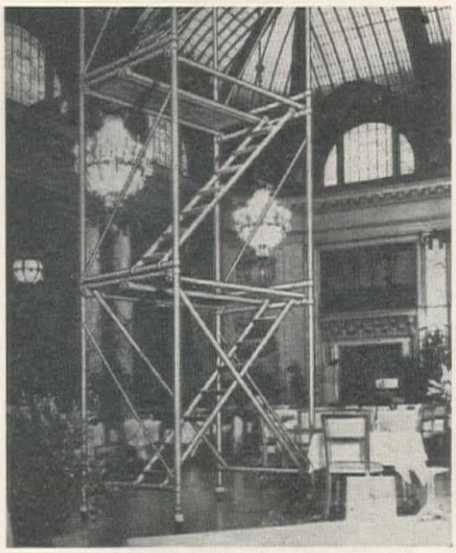
Equipment: Conveyor with capacities of 70 to 100 tons per hour.

Features claimed: Design of the new model includes rubber pulley lagging, easily replaceable without removal of pulley; cam adjusted feed end pulley, and a scraper plate tip which adjusts to pulley position for accurate alignment. Uses of Model 481 include movement of coal and coke from pile to truck; radial storage installation, and unloading hopper bottom cars. The conveyor is furnished in belt widths of 14 and 18 in., in lengths ranging from 20 to 40 ft., and it is driven by either air or water cooled engine or electric motor with protective housing.

Lightweight Scaffolding

Manufacturer: Up-Right Scaffolds, Berkeley, Calif.

Equipment: Mobile scaffolds with legs adjustable for desired working level.



Features claimed: Up-Right Scaffolds are made of a light weight aluminum alloy and a 7-ft. single section unit requires one man just one minute to erect. The scaffolds

are available in any number of section units. The simple lock-in feature eliminates all wing nuts, bolts and loose parts and requires no wrenches. Each section folds flat. Foundation area of 4½ by 6 ft. is standard. A safety-tread stairway permits the user to mount the scaffold entirely within the structure.

Portable Air Compressor

Manufacturer: American Brake Shoe Co., New York City.

Equipment: Portable compressors readily adjustable for different pressures.

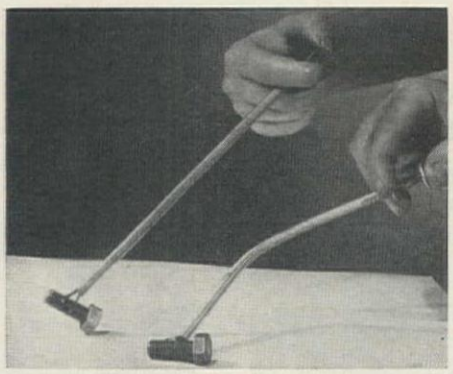
Features claimed: The two compressor models are particularly adaptable for low pressure, high volume work. Both models produce 100 per cent oil-free air. Special designing eliminates all contact or contamination of the air with lubricating oil. Model 17-C delivers 4.4 cu. ft. per min. free air at 40 lb. pressure. The entire mechanism is encased in welded steel frames for greater stability. The model has twin air cleaners quickly accessible by loosening only two cover screws. Model 8-C delivers 2.2 cu. ft. per min. at 25 lb. pressure. This model has no cylinders, pistons or rings to wear out.

Specialty Tool

Manufacturer: Emco Enterprises, Inc., Chicago, Ill.

Equipment: Tool for hard-to-reach parts and places.

Features claimed: Especially invented for tricky service jobs, the Flex-O-Pic can be used in almost any spot where hands



or other tools cannot get, reaching to parts that are dangerously inaccessible. The shaft is flexible cable and is enclosed in a flexible housing with expanding and retracting fingers which enable it to reach in and grab a tight hold on anything, with enough flexibility to work around corners or S-turns. The tool is precision made, acid proof, cadmium plated and can be taken apart to be cleaned.

Paint Spray Gun

Manufacturer: American Brake Shoe Co., New York City.

Equipment: Gun which distributes paint by a more uniform flow of air and paint.

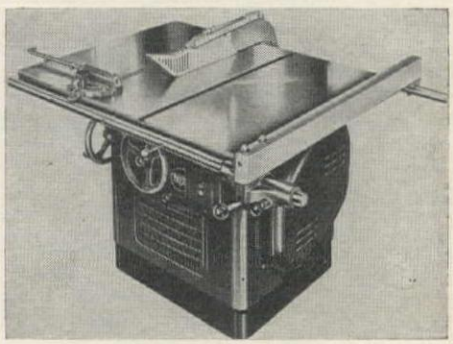
Features claimed: Detrimental effects from air pressure drop and eddy currents have been eliminated by designing ample air passages in the gun body, and by providing for precision, uniform flow and size of air streams from both wing jets and center orifice. The result is shallower valleys between finer microscopic paint globules and more uniform distribution. The entire head of the gun can be quickly removed as a unit by merely removing a locking screw and lock nut. Only one fluid needle is required for all paint spraying. The fluid needle assembly can be removed in one piece in a few seconds for cleaning. A highly accurate control of spray width is provided by the angle of the needle.

Tilting Arbor Saw

Manufacturer: Delta Manufacturing Division, Rockwell Manufacturing Co., Milwaukee, Wis.

Equipment: Saw with 12-in. blade and capable of tilting a full 45 deg.

Features claimed: The saw can be used for aluminum, carbon and like materials virtually impossible to handle with an ordi-



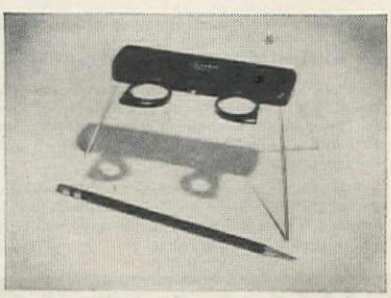
nary saw. It can cut 4⅛-in. stock on a square cut and can split a 4-ft. panel into two 24-in. parallel sections. It can also do straight ripping, cut-off work, miter cutting, rabbeting, grooving, tongue and groove work, dadoing, sticking, shaping and many other tasks. Used with a 3 or 5-h.p. motor, the saw can be set for speeds of 1800, 2400, 2600 r.p.m., or more. Work is supported in front of the saw blade by a table space of 16 in.

Folding Pocket Stereoscope

Manufacturer: Fairchild Camera & Instrument Corp., Jamaica, N. Y.

Equipment: Stereoscope for users of vertical aerial photographs.

Features claimed: The three legs and two lenses of the instrument may be folded into recesses of the die-cast body to make an instrument smaller than an ordinary eyeglass case. When set up, the F-271 is 4 in. above the photographic prints. The tripod arrangement of the legs assures stability, and the design permits ready ar-



rangement of both the instrument and photos. The two meniscus lenses of 4½-in. focal length and 2½ power magnification are accurately ground to provide clear, sharply defined images.

Metal Shear

Manufacturer: Universal Products Co., San Francisco, Calif.

Equipment: Tool to cut metal without damage to corrugations.

Features claimed: The portable unit cuts

corrugated metal, metal lath, sheet metal and corrugated asbestos simply and quickly. In making the cut, the shear removes a narrow ribbon, ⅜ in. in width. This allows the metal or material being cut to be moved through the shears rapidly without binding or twisting. This shear produces a clean-cut end which eliminates the necessity of an exceedingly large overlap. The unit, weighing 15 lb., can be easily moved about the job and from job to job.

Mechanized Hand Truck

Manufacturer: Melooz Manufacturing Co., Los Angeles, Calif.

Equipment: Three-wheel hand truck with revolutionary telescoping support.

Features claimed: The telescoping support adjusts and locks instantly to the correct balance position for any type and

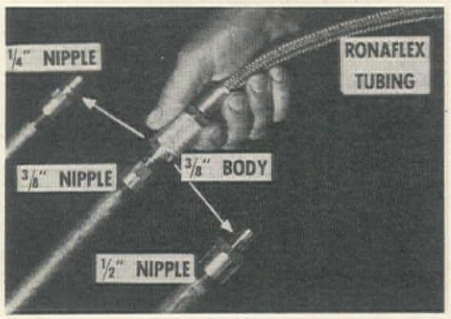
weight of load, even with the load on the truck. The Tri-Truck is ruggedly built of hard wood and steel. It balances and supports the load so that even inexperienced men can do efficient hand trucking work. The Tri-Truck keeps the load balanced, even on rough, wet or slippery surfaces or if it strikes a floor obstruction. It stands 56 in. high.

Flexible Tube Coupling

Manufacturer: Ronaflex Tubing Co., Inc., Philadelphia, Pa.

Equipment: Tubing with snap-on, interchangeable couplings.

Features claimed: Increased convenience for the user of flexible tubing is possible with the new design development. As



illustrated, the ⅜-in. Ronaflex coupling body fits ¼, ⅜ and ½-in. nipples. The degree of interchangeability varies with the type of coupling and with the size. The 1½ and 2-in. regular coupling bodies, for example, are interchangeable with nipples of the two sizes. Thus, a limited number of the Ronaflex assemblies will fit a wide variety of nipple sizes.

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.

UNITIZED ALL PURPOSE PLANTS — **The Iowa Manufacturing Co.,** Cedar Rapids, Iowa, has just published a new 20-page bulletin on Cedarapids portable Unitized crushing, screening and washing plants. Detailed description and specifications are presented on the four basic units which make up Unitized Plants—Primary Crushing, Scalping, Secondary Crushing and Wet or Dry Screening Units, as well as descriptions of typical combinations of these plants and the types of finished products they will produce.

HISTORICAL DEVELOPMENT OF POWER TRANSMISSION—**The Twin Disc Clutch Co.,** Racine, Wis., have just issued a 39-page booklet which coincides with their 30th Anniversary, and traces the historical development of power transmission in general. Scenes from three decades ago and evolution to the present time are featured. Pages in this booklet contain numerous drawings and photographs, many showing equipment manufactured by users of Twin Disc Clutches and Hydraulic Drives.

JAEGER MACHINES — **The Jaeger Machine Co.,** Columbus, Ohio, have three catalogs off the press which effectively describe their trailer mixers (Catalog M-8), Hi-Dump Speed Merchants (Catalog TM-8), and the Jaeger "Air Plus Compressor" (Catalog JC-8). Graphs, illustrations, and photos of the above mentioned equipment tend to make these catalogs interesting to both Contractors and Operators.

PICK-UP WELDER—**Couse Manufacturing Co., Inc.,** Newark, N. J., have released a 4-page bulletin describing their new pick-up welder for speedy repairing. In it are described some of the outstanding features and photographs on the cover show that it has all of the conveniences to make the Pick-Up Welder a complete shop on wheels.

TWO CYCLE DIESEL — **Allis-Chalmers, Tractor Div.,** Milwaukee, Wis., are releasing a bulletin of 27-page length describing functions of the 2-cycle Diesel engine, which is a smaller size than those engines used in streamliners, but which have already started to change accepted ideas of tractor performance and economy. Advantages of this engine are numerous. There is smoothness of operation, more strength and power with lighter weight, extreme flexibility, simplicity of construction and operation, quick and easy starting, and also a big advantage in altitude work. All in all, this bulletin is a success story of the 2-cycle, smaller size, Diesel engine.

DIESELS AT WORK—**The Caterpillar Tractor Co.,** Peoria, Ill., have issued numerous booklets recently. The Power for Crushing and Screening Plants (Form 11467), which describes various sizes of Diesel engines that are used for crushing plant operations; The Caterpillar Diesel D4 Tractor (Form 10750), which brings the design and manufacturing points of this tractor before the users eyes; Caterpillar Diesel Engines and the Work They Do (Form 11463), which depicts the line of Caterpillar Diesel industrial engines, marine engines and electric sets operating in their varied capacities on jobs throughout the world; Motor Grader Profits That Await the Contractor (Form 11316), aimed at showing the contractor the extreme versatility of the Caterpillar Diesel Motor Graders; Public Utilities and the Caterpillar Diesel Power That Serves Them (Form 11624), features as the main topic, the ever increasing efficiency for the public utility operator; Turning Blueprints Into Highways, (Form 11157), is released for the interest of all highway engineers and constructors. There are 16 pages of illustrations showing Diesel powered equipment operating in all phases of road construction throughout the world, and Caterpillar Diesel Go to Town (Form 11313), stresses the importance and uses of Diesel power in the city, town and village, and also heralds

the application possibilities of Diesel power units. This booklet tends to show how Diesel powered equipment will make your community a better, safer, cleaner place in which to live.

BATCH PLANT — **The Johnson Co.**, Champaign, Ill., subsidiary of the Koehring Co., Milwaukee, Wis., has recently published a new and colorful 24-page catalog which tends to serve the road builder's batching problem with greater flexibility and efficiency. This catalog is titled "Roadbuilders Portable Batching Plants."

HOISTS—**Superior-Lidgerwood-Mundy Corp.**, Superior, Wis., have released a 19-page catalog which features hoisting machinery of every make, model and size. It has photos, technical data, parts and other essential material available, for all wishing to possess further knowledge on hoisting machinery.

WIRE ROPE SLINGS—**Union Wire Rope Corp.**, Kansas City, Mo., have recently issued a bulletin in regards to their newest 9-part ultra-flexible wire rope sling. There is a detailed description and photographs of their Tuffy slings being used in various operations. There are also charts of safe working loads for angular pulling and angles at which the Tuffy slings operate more efficiently.

CONCRETE BY VIBRATION METHODS—**The Vibro-Plus Corp.**, New York City, N. Y., has published a booklet "High Quality Concrete by Vibration Methods," which contains 47 pages and valuable information concering the latest methods employed in the vibration of concrete, the vibration principle, and many test results obtained in the vibration of concrete. It is completely illustrated with many pictures of modern concrete structures, and a large number of charts and tables which make this booklet understandable, even to the layman.

CALCULATOR—A new decimal-fraction calculator has been developed by the **Wendt-Sonis Co.**, Hannibal, Mo. This calculator is designed for use in adding and subtracting fractions, and converting fractions to decimals or vice versa. Calculators may be obtained by writing the Wendt-Sonis Company, Hannibal, Mo.

PORTABLE GASOLINE HAMMER —**The Barco Manufacturing Co.**, Chicago, Ill., announces in their new bulletin, the production of a new gasoline pavement breaker and rock drill, Model H-6B. Featured in this manual is the development, operating expense, and capabilities of this new and what is believed to be fastest and most powereful gasoline hammer perfected up to this time.

ARC WELDING ELECTRODES — **Wilson Welder and Metals Co., Inc.**, New York City, have announced a new, 40-page electrode catalog which contains 50 photographs and diagrams, an electrode selector chart and complete details on all the electrodes in the extensive Wilson line. Typical data supplied are general description, application, welding procedure, mechanical properties, and specifications.

WELDERS' GUIDE—**Hobart Brothers Co.**, Troy, Ohio, presents a vest pocket welders' guide which is filled with useful information on welding. Among other things, it gives the characteristics of various welding arcs, four essentials of proper welding procedures, type of joints, typical positions, chart of standard steel shapes, photographs of good and bad welds, causes of common welding troubles and what to do about them, welding symbols, and easy-to-use table of "How to Find" formulas.

PORTABLE POWER TOOLS—**Mall Tool Co.**, Chicago, Ill., is publishing a new catalog illustrating and describing the complete line of Mall Portable Power Tools. The catalog is designed to serve as a handy reference for tool users, their dealers, and their dealers' salesman. The many illustrations followed by full construction and performance specifications enable the reader to determine instantly the capacity and types of jobs for which the tool is best suited. Due to a number of ingenious interchangeable attachments also listed in the catalog, many of these tools can be quickly converted to other tools and their usefulness greatly expanded.

BUCKET LOADERS—**N. P. Nelson Iron Works, Inc.**, Clifton, N. J., have announced a bulletin, K5-B, which describes a new bucket loader with a shorter base dimension to improve maneuverability and elevator and discharge mechanisms engineered for alongside truck loading and minimum headroom requirements. The new model is equipped with renewable steel-toothed feeder blades that loosen the material and assure full loading for every bucket on every trip. Rated capacity is 2 yds. per min., handling earth, sand, gravel, cinders, coal, etc.

NERVA - SEAL — **Rubber & Plastics Compound Co., Inc.**, New York, N. Y., announce in a 4-page bulletin the story of Nerva-Seal, a newly developed copolymer compound for improving the qualities of straight asphalt. Included in this bulletin are a brief description of the product, its physical and chemical advantages, the proc-

ess by which Nerva-Seal is blended with straight asphalt, and technical data. Other products discussed in similar bulletins are Nervastral Seal-Pruf and J. F. Sealpruf is a product for protection against the elements in building construction, general construction and industry, while, Nervastral J. F., is a thermoplastic hot poured type of rubbery joint filler, which has excellent resilient cohesive and adhesive for continuous sealing of contraction and expansion joints.

RESEARCH—**Stanford University Information Service,** Stanford, Calif., has released a brochure which illustrates the Stanford Research Institute's work and facilities. The 19-page booklet points out the realized need for industrial and applied research for the manufacturing and agricultural industries of the eleven Western States. Included is a description of the activities of Stanford Research Institute, the services it offers, and the basis on which it seeks to serve the interests and the industries of the Western States.

TRUSSED RAFTERS FOR HOUSING — **Timber Engineering Company,** Washington, D. C., have prepared an 8-page bulletin for architects, designers, contractors, builders and financial institutions, describing the economics, mechanics and other uses for clear span Teco Trussed Rafters. Clear-span trussed rafter construction alone can result in labor and lumber savings up to 30 per cent as compared with conventional roof and ceiling framing. Fabrication, assembly, erection and planning are described fully, with photographs, illustrations, and graphs.

PINE MILLS—**The Western Pine Association,** Portland, Ore., has released its Directory of Membership, which includes mills that manufacture Ponderosa, Idaho, and Sugar. This directory offers by states, the name of member and plant locations, addresses of their general offices, capacities by shifts, production by species, staple products handled and factory products and specialties.

HORIZONTAL MOTO-MIXERS & AGITATORS—A recent release of the **Chain Belt Company,** Milwaukee, Wis., is their Bulletin No. 48-9, which describes the new 1948 Horizontal Moto-Mixers and Agitators. The bulletin illustrates and explains the exclusive Rex Moto-Mixer features such as the chain drum drive, 3-point drum mount, Rex water nozzle, drum blading, leakproof charging door, truck engine drive, and Rex discharge spout. Job illustrations are shown and complete specifications for Rex Horizontal Moto-Mixers are given. They are made in 4½-yd. and 5½-yd. mixer sizes.

PORTABLE MATERIAL ELEVATOR—In a new 8-page catalog covering their Portable Material Elevator, the **American Hoist & Derrick Co.,** St. Paul, Minn., announces a new allowable height of 97-ft., with a platform lift of 90-ft. The elevator is self-erecting when used at the 47-ft. height or under. This new catalog contains many operating views as well as mechanical details of the New Portable Material Elevator.

HEAVY-DUTY MOTOR GRADER—**Galion Iron Works & Mfg. Co.,** Galion, Ohio, and its distributors, have a new 24-page catalog on Galion's new No. 116 Extra Heavy-Duty Motor Grader, which is now ready for distribution. The manufacturer emphasizes that standard equipment includes manual steering with hydraulic booster, same size tires front and rear, and an electric starter. This grader is claimed to offer the utmost in tractive effort, blade pressure, ease of handling and versatility of blading operations. Other outstanding features of design, construction, and operation are fully illustrated and described.

NEW FACTORY—**Joseph T. Ryerson & Son, Inc.,** Emeryville, Calif., have recently published a 12-page, illustrated booklet that gives a quick, picture-story of their new San Francisco Bay Area steel-service plant located in Emeryville, Calif. This booklet briefly traces the Company's history, touching on some of the more important developments in the steel-service business over the past century. Illustrations of the exterior and interior views of the plant, offices, cutting, shipping and stock scenes are featured. There is also given a short description of the principal products which Ryerson produces.

CONSTRUCTION PUMPS—**The Marlow Pump Co.,** Ridgewood, N. J., has just released a new 12-page, 2-color bulletin showing seventeen different series of self-priming centrifugal pumps and three series of diaphragm pumps especially designed for use in construction work. This bulletin contains performance tables, specifications and illustrations of detailed pictures of the pumps in each series. Marlow is said to manufacture the world's largest line of construction pumps and descriptions of these are included in the bulletin.

OPPORTUNITY SECTION

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