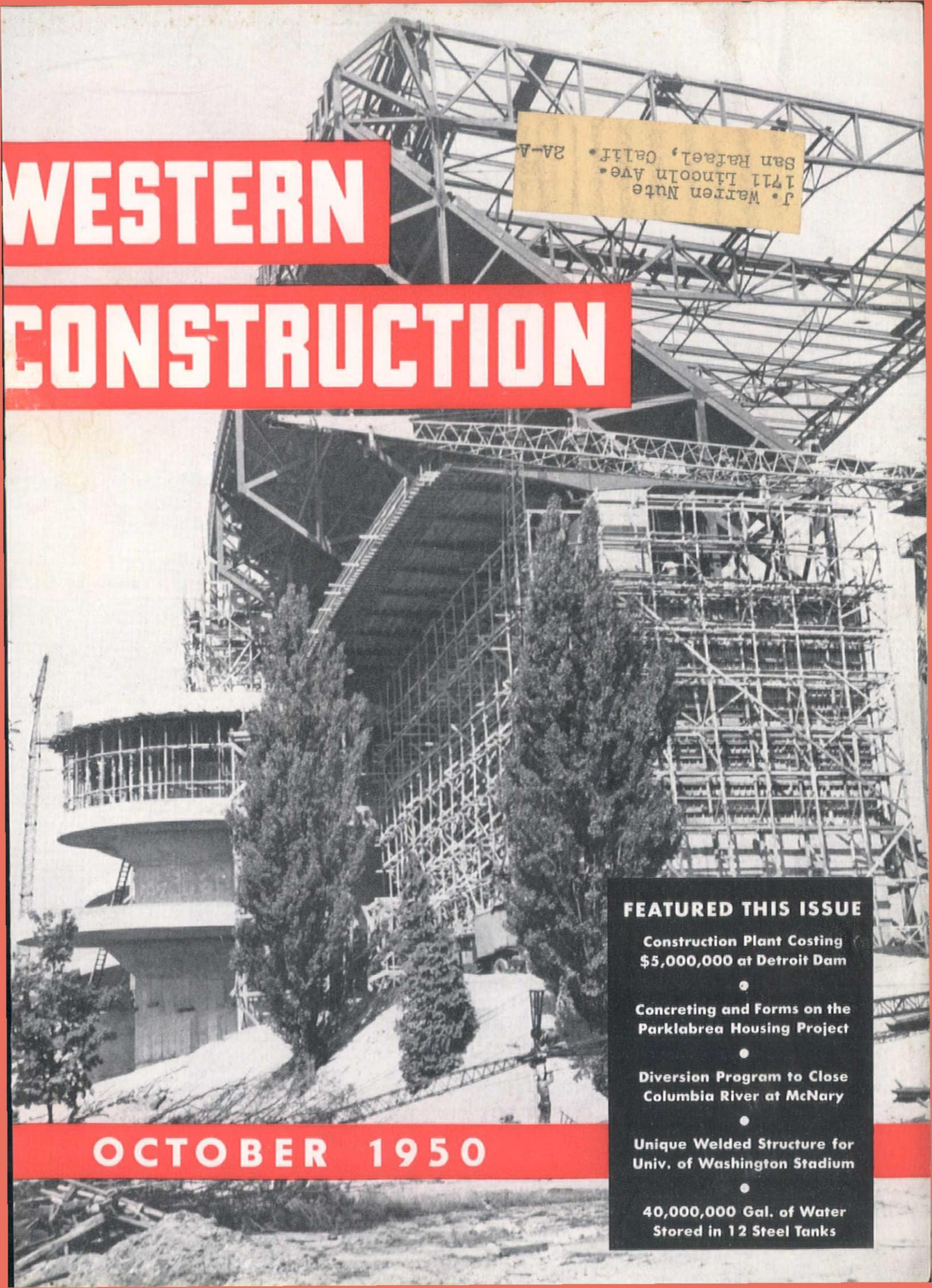


WESTERN CONSTRUCTION

FEATURED THIS ISSUE

Construction Plant Costing $5,000,000 at Detroit Dam

•

Concreting and Forms on the Parklabrea Housing Project

•

Diversion Program to Close Columbia River at McNary

•

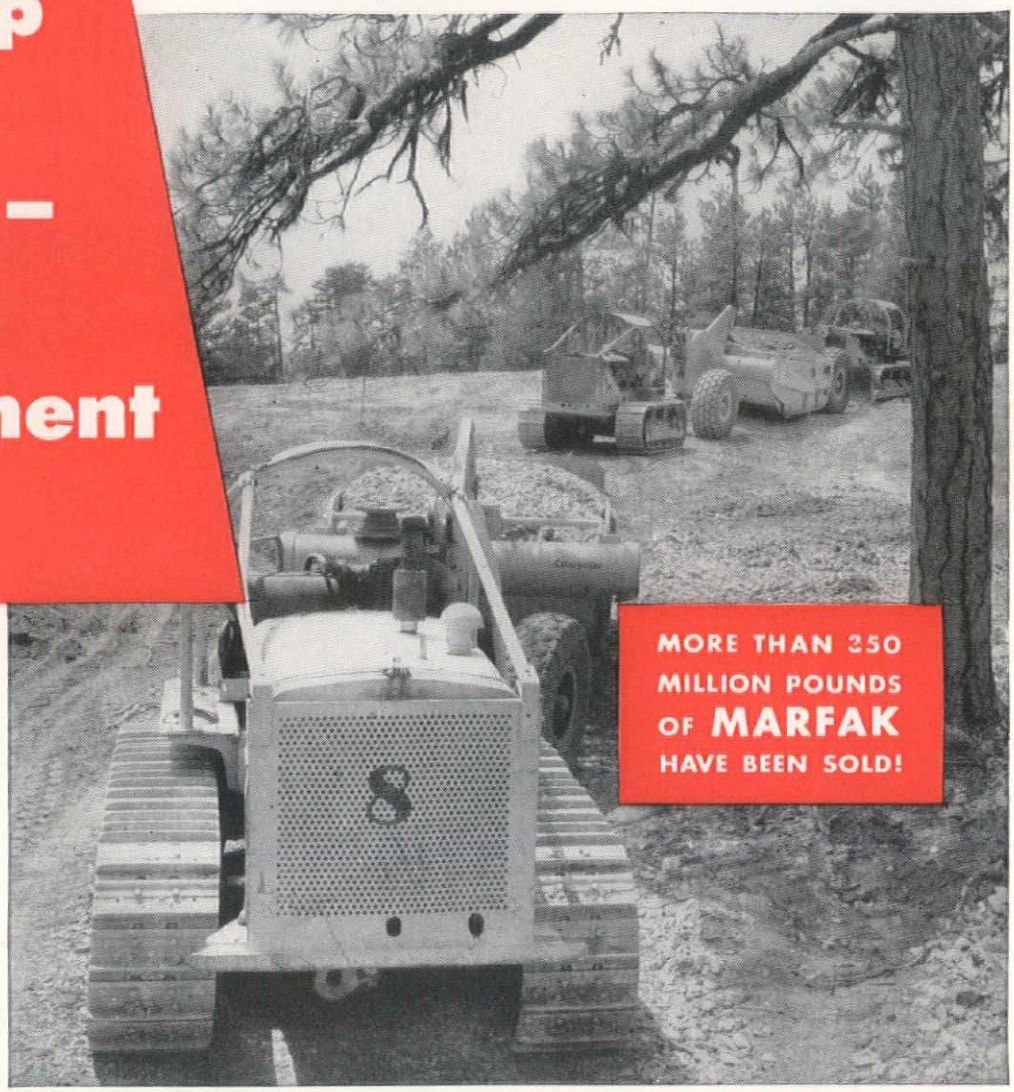
Unique Welded Structure for Univ. of Washington Stadium

•

40,000,000 Gal. of Water Stored in 12 Steel Tanks

OCTOBER 1950

To keep costs DOWN— keep equipment "UP"



use TEXACO MARFAK

Lubricate the chassis bearings on your tractors, trucks and other equipment with *Texaco Marfak.* You'll seal out dirt and moisture, seal in protection against wear and rust. And *how that protection lasts!* The roughest service won't pound or squeeze *Texaco Marfak* out of the bearings. Machines stay on the job and out of the repair shop. Your maintenance costs drop.

In wheel bearings, use *Texaco Marfak Heavy Duty* and get the same long-lasting protection — extra hundreds of miles of it. *Texaco Marfak Heavy Duty* stays *in* the bearings. That means it stays *off* the brakes. Greater safety, greater economy. No seasonal change necessary.

Still More Savings — Fuel consumption and engine maintenance costs come down when you lubricate heavy-duty gasoline and Diesel engines with *Texaco Ursa Oil X★★.* It cleans as it lubricates.

Maintenance costs for crawler track mechanisms are less when you use *Texaco Track Roll Lubricant.* Parts last longer because dirt and moisture are sealed out.

You can simplify your lubrication procedures and reduce costs all around by using Texaco Products. A Texaco Lubrication Engineer will gladly give you full details. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

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

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

There is no better guarantee than a REPEAT ORDER!

Where to go to get the real story on equipment that will mean profit on the job? Ask the user — the Northwest user — the Northwest repeat order buyer who can speak from experience.

Valley Construction Co. of Seattle, Wash., has proved Northwest advantages. They can tell you what it means to have Northwest features — what it means in high output and low-cost maintenance.

A repeat order from a satisfied customer is your guarantee of the kind of service you are looking for and eight repeat orders is a testimonial that can't be questioned.

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

Valley Construction Co.
Seattle, Washington
buys their ninth
NORTHWEST

local NORTHWEST sales agents

BUTTE, MONTANA
Hall-Perry Machinery Co.

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DENVER, COLORADO
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1234 Sixth Ave., South

WESTERN CONSTRUCTION

Volume 25 **OCTOBER 1950** Number 10

FEATURE ARTICLES

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The Construction and Civil Engineering Publication of the West

★

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★

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B.F.Goodrich

Hauling giant loads over blasted rock this B. F. Goodrich tire outlasts them all

IN ROAD contracting service in Tennessee, North Carolina and Virginia, the equipment pictured above is engaged in the tire-killing business of working its 32,000 pounds over the sharp rock of blasted terrain. Add a total load weight of 16 cubic yards of rock and earth, and it's easy to understand why bruises and blowouts make off-the-road tires a major cost item in such equipment.

Such was the story, at least, until B. G. Young & Sons of Johnson City, Tenn., owners of the fleet, turned to B. F. Goodrich *double nylon shock shield* tires to combat the high cost of tire mortality in such rugged service. Since then, costly road delays and work interruptions have been cut to a fraction of what they had formerly considered normal. The BFG Universal tires shown above, for example, have been in service for well over a year—*and not one has yet been removed from its wheel.* Mr. B. G. Young says, "The service we obtain from B. F. Goodrich tires with nylon shock shield is far and beyond anything we have ever experienced before."

Only B. F. Goodrich off-the-road tires have the *double nylon shock shield.* (It's patented.) Layers of nylon cord, built between the tread and body plies, shield the cord body by smoothly distributing shocks and strains. This plus factor of extra mileage and service hours in BFG tires is yours at no extra cost. Then, too, because there's a specially-designed deep tread for every need, you can look forward to good traction far beyond the time when ordinary tires must be changed over to service on free-rolling wheels.

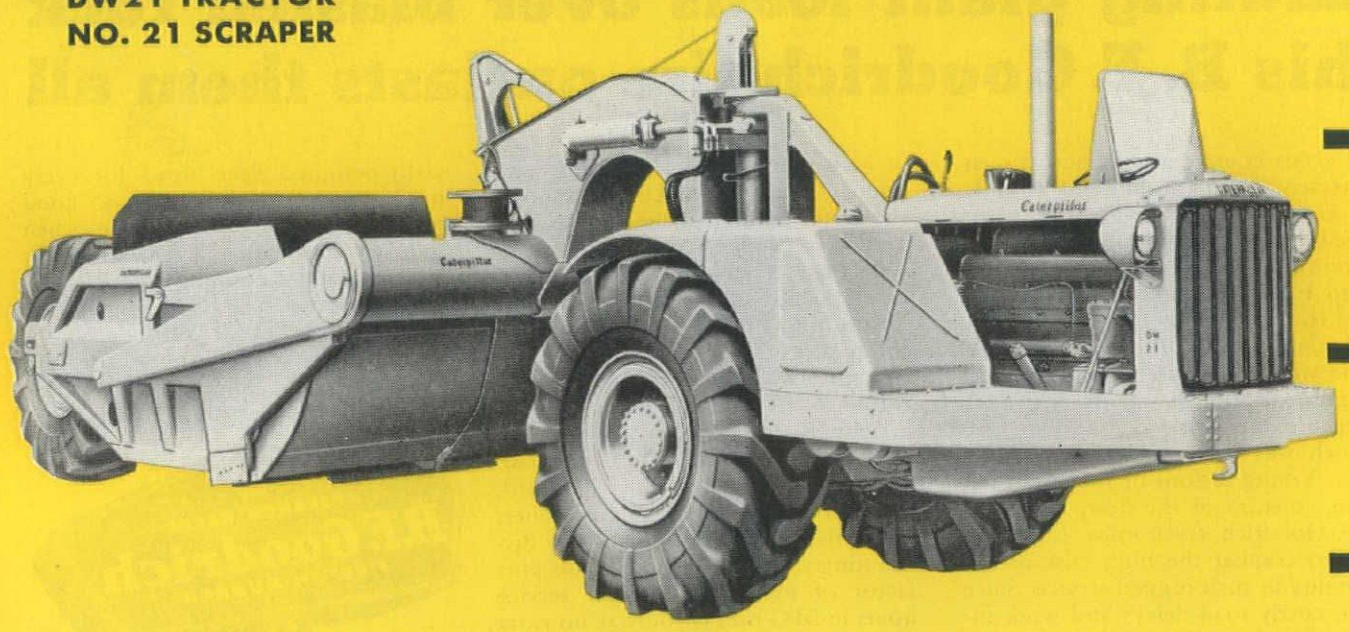
So see your B. F. Goodrich dealer. Specify BFG tires for your new equipment. Enjoy longer tire service and lower overhead offered you by *The B. F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

2 GREAT NEW ADDITIONS

DW20 TRACTOR
W20 WAGON

DW21 TRACTOR
NO. 21 SCRAPER



TO THE "CATERPILLAR" LINE

—TO BRING YOU STILL GREATER EARTHMOVING CAPACITY AND SPEED

Accompanying the Tractor features generalized (below, right) the Wagon member of this big-capacity unit offers:

17 cu. yds. capacity, struck; 25 cu. yds., heaped.

Travel speeds, through tractor's 5 gear ratios, ranging from 2.88 to 26.6 m.p.h.

Generous size hopper to provide good target for shovel or dragline loading.

Controlled dumping . . . openings can be varied without mechanical adjustment—permitting either dumping or windrowing.

Accurate hydraulically controlled dumping with positive mechanical lock on dump doors.

THE DW20 TRACTOR AND NO. 20 SCRAPER UNIT

The "Cat" No. 20 Scraper is available also for the DW20 Tractor. It has the same capacity and general specifications (except in type of gooseneck) as the No. 21 Scraper described below.

THE ENGINE: ***Both prime movers have the new 6-cylinder "Cat" Diesel Engine . . . 275 HP. peak capacity at 2,000 r.p.m. tested in accordance with A.S.M.E. Power Test Codes; 225 HP. at 1,900 r.p.m. available at the flywheel.***

Accompanying the Tractor features generalized (right), the 2-wheel DW21 offers:

Full 90° turn each way.

Travel speeds, through 5 gear ratios, ranging from 2.16 to 20 m.p.h.

Scraper capacity is 15 cu. yds., struck; 19½ cu. yds., heaped. (With available 12″ extensions, 18 cu. yds., struck; 22½ cu. yds., heaped.)

Bowl and apron are designed to promote "boiling" action of earth through center of load—for full-measure yardage and minimum loading time.

Large low-pressure tires for easy load flotation.

'Dozer-type ejection for positive "kicking out" of sticky material; dependable spring-action ejector return.

Open bowl design to permit visible loading under shovel or dragline.

Adjustable rear axle to permit level cuts and desired settings.

Double bottom of special alloy steel. Self-sharpening reversible cutting edge.

High apron lift, low center of gravity.

FOR high-speed hauling . . . for high production . . . "Caterpillar" offers two new earthmoving units — the 4-wheel DW20 and the 2-wheel DW21.

With a completely new 6-cylinder Diesel Engine producing 225 HP. available at the flywheel, the newcomers give users their choice of high-speed wheel-type prime movers.

The DW20, with top speed of 26.6 m.p.h., has 2 design matched trailed units . . . the "Cat" W20 Wagon (25 cu. yds. heaped capacity) and the "Cat" No. 20 Scraper (19½ cu. yds. heaped capacity).

The DW21, with top speed of 20 m.p.h., trails the "Cat" No. 21 Scraper (19½ cu. yds. heaped capacity).

And, as always, "Caterpillar" quality, dependability, durability and work capacity are built in . . . backed by the unparalleled parts and service facilities of the world-wide "Caterpillar" dealer organization.

For further information on these two new units, contact your dealer or write the factory.

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

TRANSMISSION

Constant-mesh transmission, and heavy-duty clutch. Special locking device that prevents gears from becoming disengaged.

BRAKES

Each large, heavy-duty brake is 22″ in diameter, 7″ wide. Compressed air energized brakes on both tractor and drawn member of unit. Handy control valves for applying both sets of brakes, and to right or left driving wheel.

STEERING

Hydraulic booster steering that follows the natural "feel of the road" hand guidance. Heavy steel stops for keeping gooseneck of drawn equipment from jackknifing.

OPERATOR COMFORT

Airfoam rubber cushion on bucket-type seat mounted on coil spring with hydraulic snubber. All controls within easy reach. Excellent visibility.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS

MOTOR GRADERS • EARTHMOVING EQUIPMENT

FIRST OFFICIAL TESTS PROVE....

MORE POWER

ADVERTISED

~~140~~

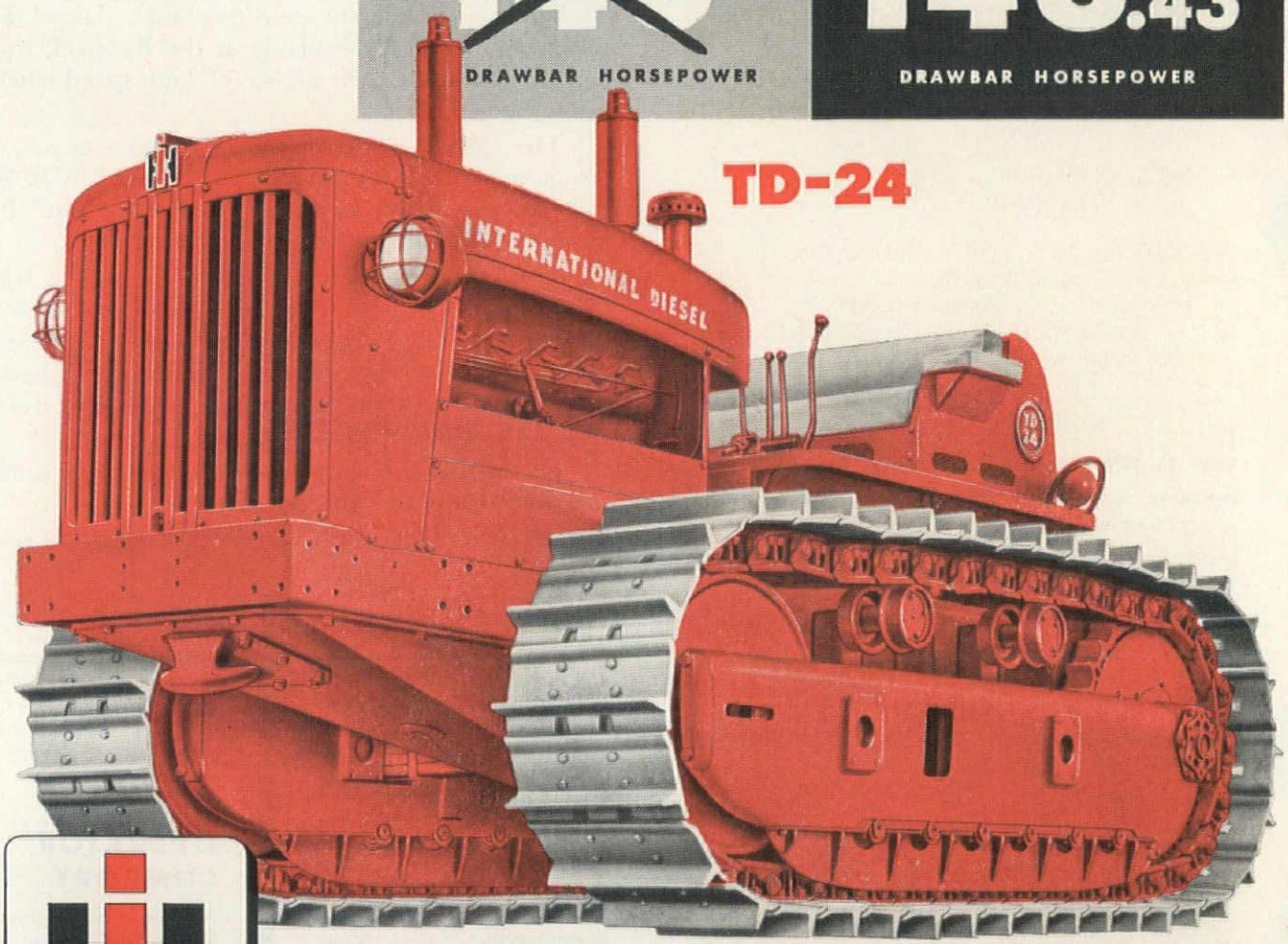
DRAWBAR HORSEPOWER

OFFICIAL TEST

148.43

DRAWBAR HORSEPOWER

TD-24

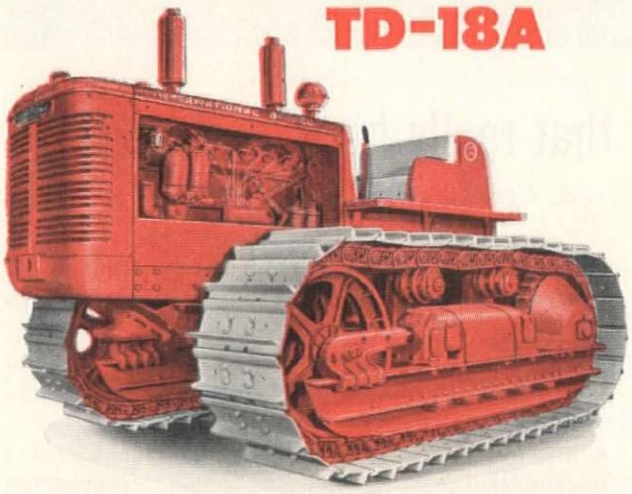


INTERNATIONAL HARVESTER

INTERNATIONAL

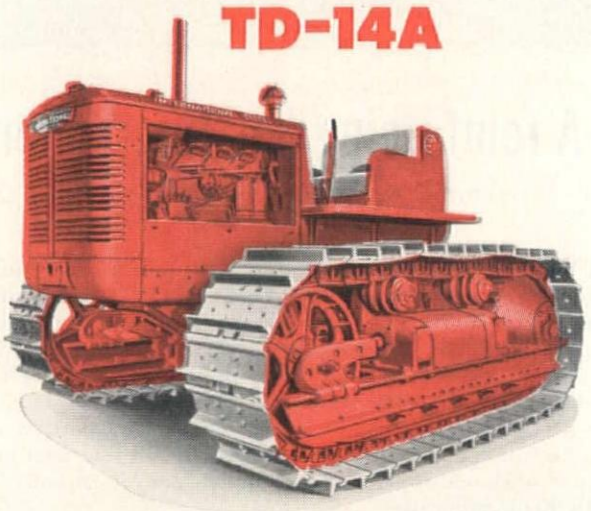
than we claimed!

ADVERTISED	OFFICIAL TEST
~~87~~	89.29
DRAWBAR HORSEPOWER	DRAWBAR HORSEPOWER



TD-18A

ADVERTISED	OFFICIAL TEST
~~60.5~~	65.90
DRAWBAR HORSEPOWER	DRAWBAR HORSEPOWER



TD-14A

INTERNATIONAL DIESEL CRAWLERS GIVE YOU A BONUS OF POWER

Official tests of the three latest models of International crawlers show how conservative International Harvester's advertised horsepower ratings have been.

A board of university engineers tested each of the tractors illustrated and found that it had substantially higher drawbar horsepower than we had claimed—as shown in the figures, above.

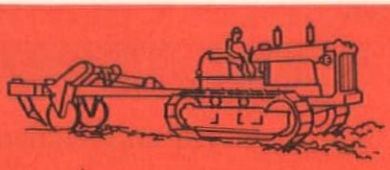
No wonder owners have found that International crawlers outwork every other tractor of similar size. No wonder the giant TD-24 has stolen the show on every big job it has tackled.

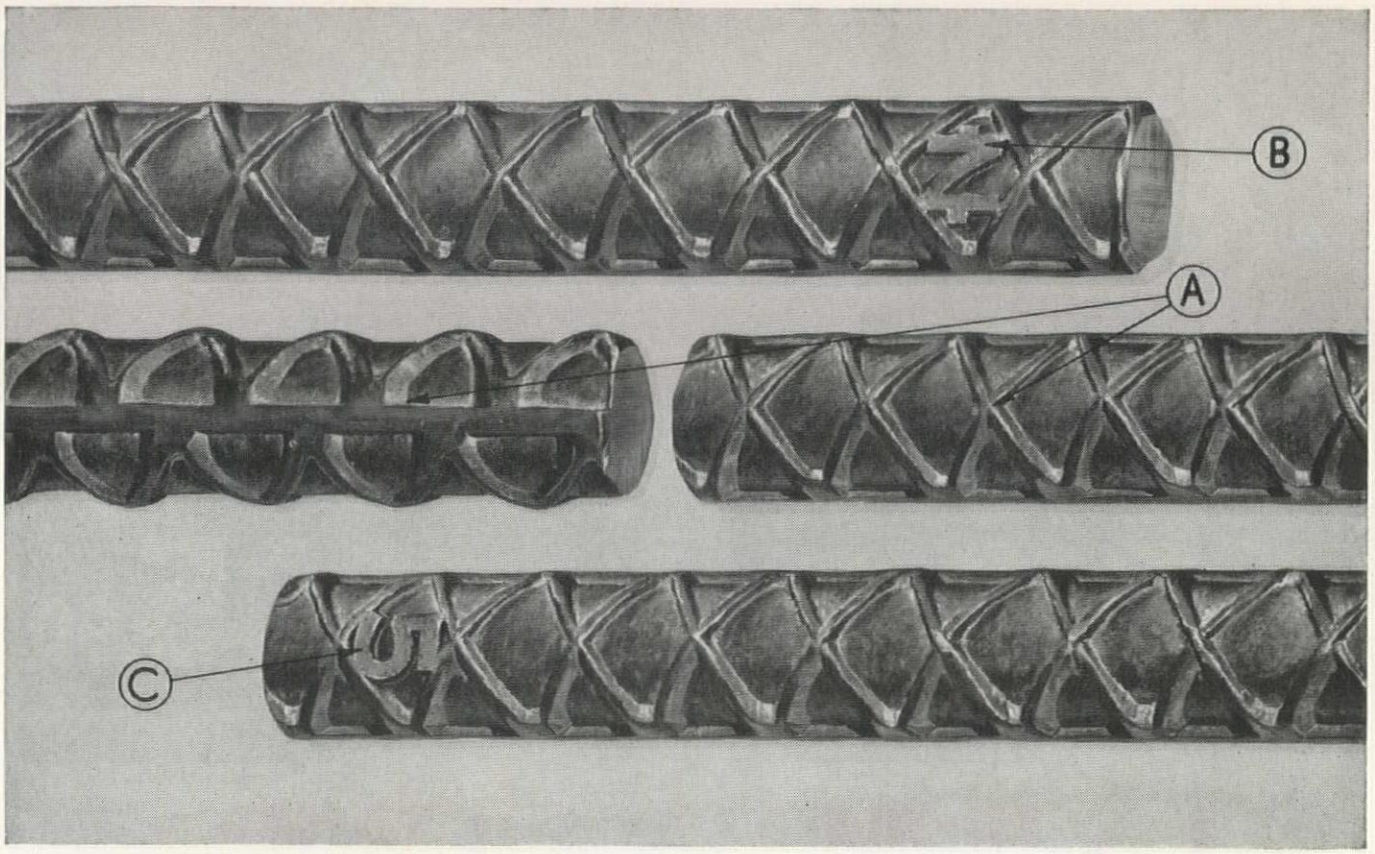
It is the policy of International to deliver more for the money than buyers expect. That's why you get a bonus—not only in horsepower but also in product quality—every time you buy International.

Ask your International Industrial Power Distributor, or write direct, for copies of the official test reports to aid you in your equipment planning.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

INDUSTRIAL POWER





A reinforcing bar from Columbia that really bites and holds

And it bears the quality mark of the Concrete Reinforcing Steel Institute

When U·S·S DI-LOK re-bar sinks its teeth into a concreting job, you know the grip is there to stay. For DI-LOK'S special deformation design reduces cracking to a minimum and provides for maximum tensile pull. Lowers construction costs, too...by reducing the length of splices and usually eliminating the need for hooks. Columbia's re-bar is made from U·S·S Steel—and its new-billet steel meets ASTM A-15-39 specification for quality. Its pattern meets ASTM A-305-49 specification for deformations. On your next job discover a new standard of construction efficiency . . . specify U·S·S DI-LOK Reinforcing Bar.

A. Deep, rugged diamond-lock deformation gives positive grip without slippage. Builds maximum bond between steel and concrete.

B. The quality mark of the Concrete Reinforcing Steel Institute shows bars are rolled from new-billet steel to meet ASTM A-15-39 specification.

C. Size numbers on each bar make office, shop and field measurement easy...without time-taking measurements and possibility of error.

U·S·S DI-LOK re-bars available in these sizes

BAR NO.	3	4	5	6	7	8	9	10	11
SIZE (Rounds)	3/8″	1/2″	5/8″	3/4″	7/8″	1″	1″	1-1/8″	1-1/4″
AREA (Sq. in.)	0.11	0.20	0.31	0.44	0.60	0.79	1.00	1.27	1.56
WEIGHT (Pounds per lineal ft.)	0.376	0.668	1.043	1.502	2.044	2.670	3.400	4.303	5.313

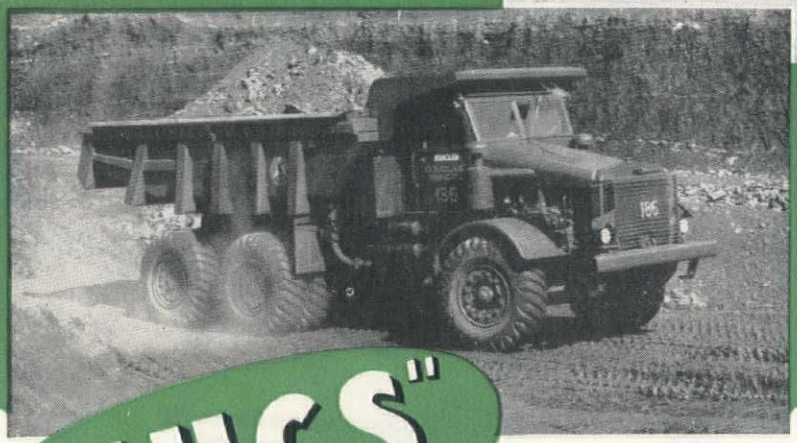
Specify U·S·S DI-LOK—the reinforcing bar that passes every test

U·S·S DI-LOK Reinforcing Bar

Columbia Steel Company • San Francisco • Los Angeles • Portland • Seattle • Salt Lake City

UNITED STATES STEEL

BY THE YARD..



OR BY THE TON..

"EUCS"

Haul More Loads at Less Cost!

Leading contractors and industrial users buy Euclids because they are job proved for high production at the lowest cost per ton or yard moved . . . and because "Eucs" are designed and built throughout for long, efficient service in open pit mines and quarries, heavy construction and industrial work.

There is a Euclid model to meet every requirement in off-the-highway work . . . and body designs for all types of materials. Their rugged strength and stamina have made "Eucs" the standard hauling equipment of many leading operators. The Euclid Loader is built to match the speed and efficiency of other Euclid earth moving equipment. It is designed for use with the Euclid Bottom-Dump and other large capacity hauling units, and provides fast, mobile loading of practically any material.

Euclid's world-wide distributor organization assures fast, efficient service to all owners. Write for complete information on the Euclid models best suited to your job requirements and plan now to move more loads per hour at more profit per load with "Eucs" on your future off-the-highway work.

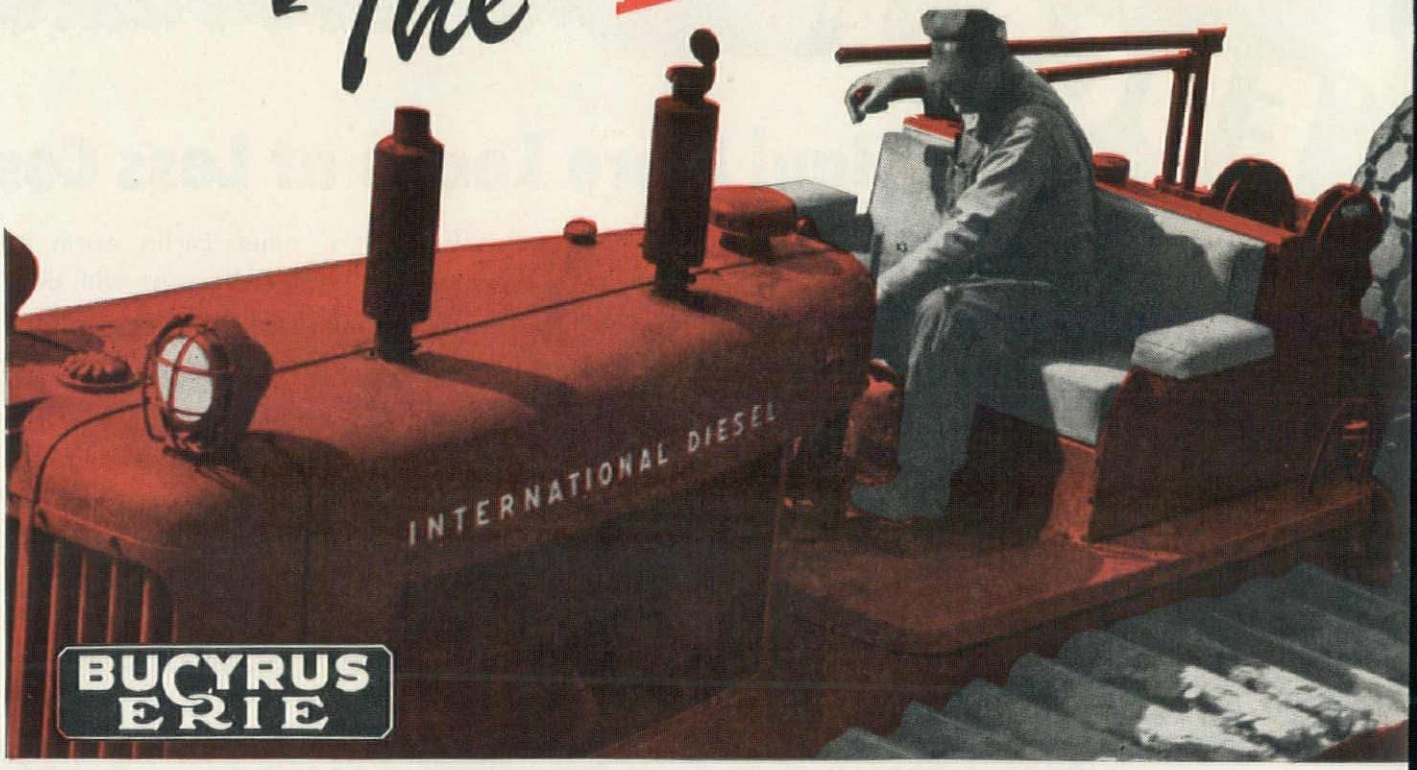
The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

CABLE ADDRESS: YUKLID CODE: BENTLEY

EUCLIDS *Move the Earth*

The Line Forms to the Right...

Why Operators The BIG RED



TALK to operators who have handled both the BIG RED combination and other dirt moving units. Ask these operators which they prefer and they'll point to the BIG RED hook-up of an International TD-24 tractor and Bucyrus-Erie B-170 or B-250 scraper.

They'll tell you *why*, too. This outstanding dirt moving team is bigger and easier to operate, does things no other combination can do. It comes up with a good day's work every time out, even in wet slippery weather. It averages more dirt per trip than any other crawler tractor-scraper outfit, makes one or two extra trips per hour. No other tractor is bigger, more

See Your INTERNATIONAL

Prefer Team

Matched for Championship Dirt Moving

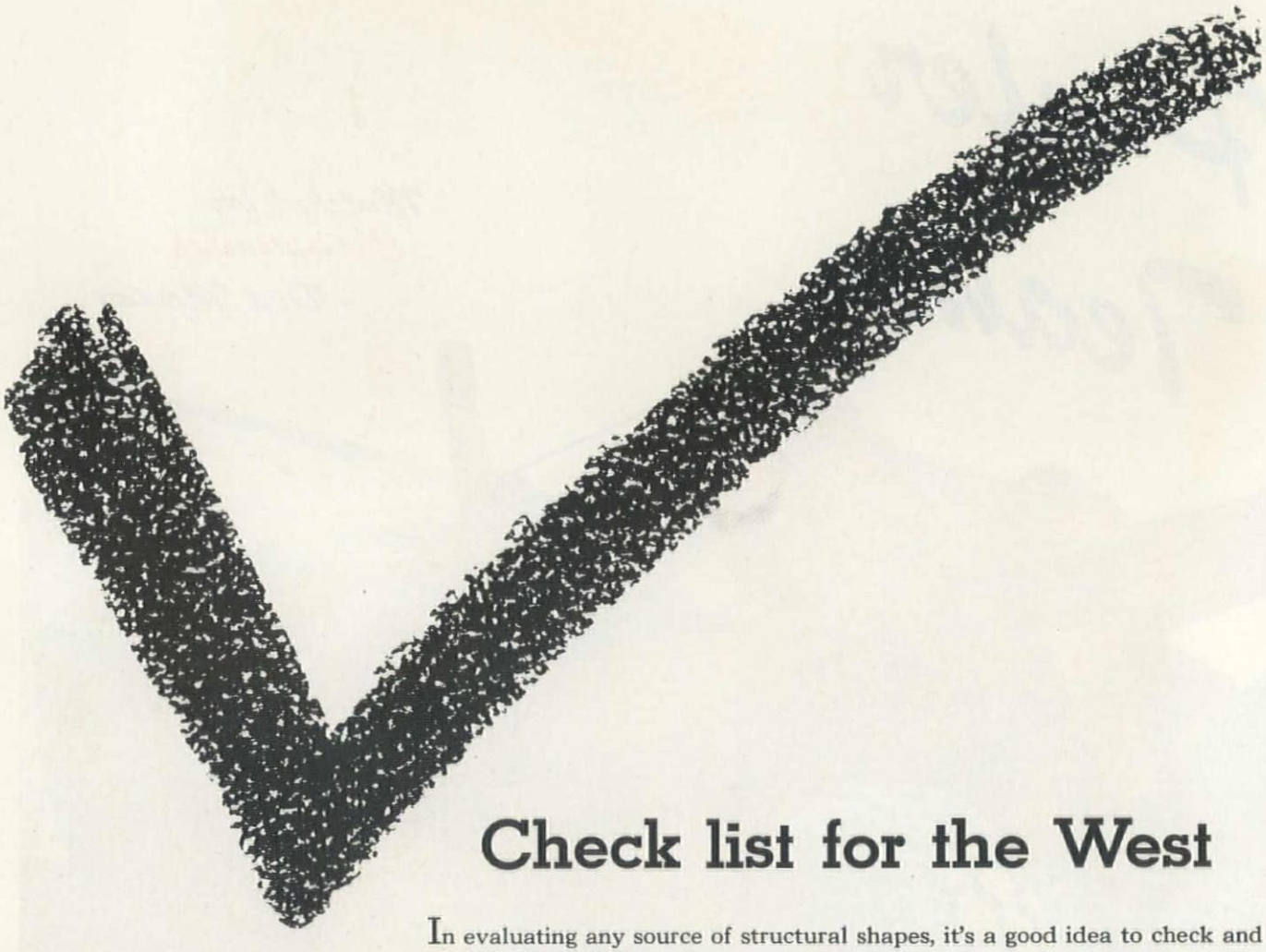
powerful, more flexible, or easier to handle. The scraper is perfectly matched to take full advantage of this great power. It handles easier, loads quicker, dumps faster and cleaner than other scrapers.

Your operators will "go for" the championship BIG RED team, too. Even more important, they'll use it to cut your dirt moving costs. Ask for complete information!

189T50C

BUCYRUS-ERIE COMPANY, South Milwaukee, Wis.

Industrial Tractor Distributor



Check list for the West

In evaluating any source of structural shapes, it's a good idea to check and see if it offers all these advantages:

- ✓ **Nearby location, to keep carrier delivery time to an absolute minimum . . . and to assure prompt, dependable engineering service.**
- ✓ **Modern production facilities.**
- ✓ **Rigid control of quality—from the mining of coal and iron ore to the production of finished shapes.**
- ✓ **A wide range of quality structural shapes.**

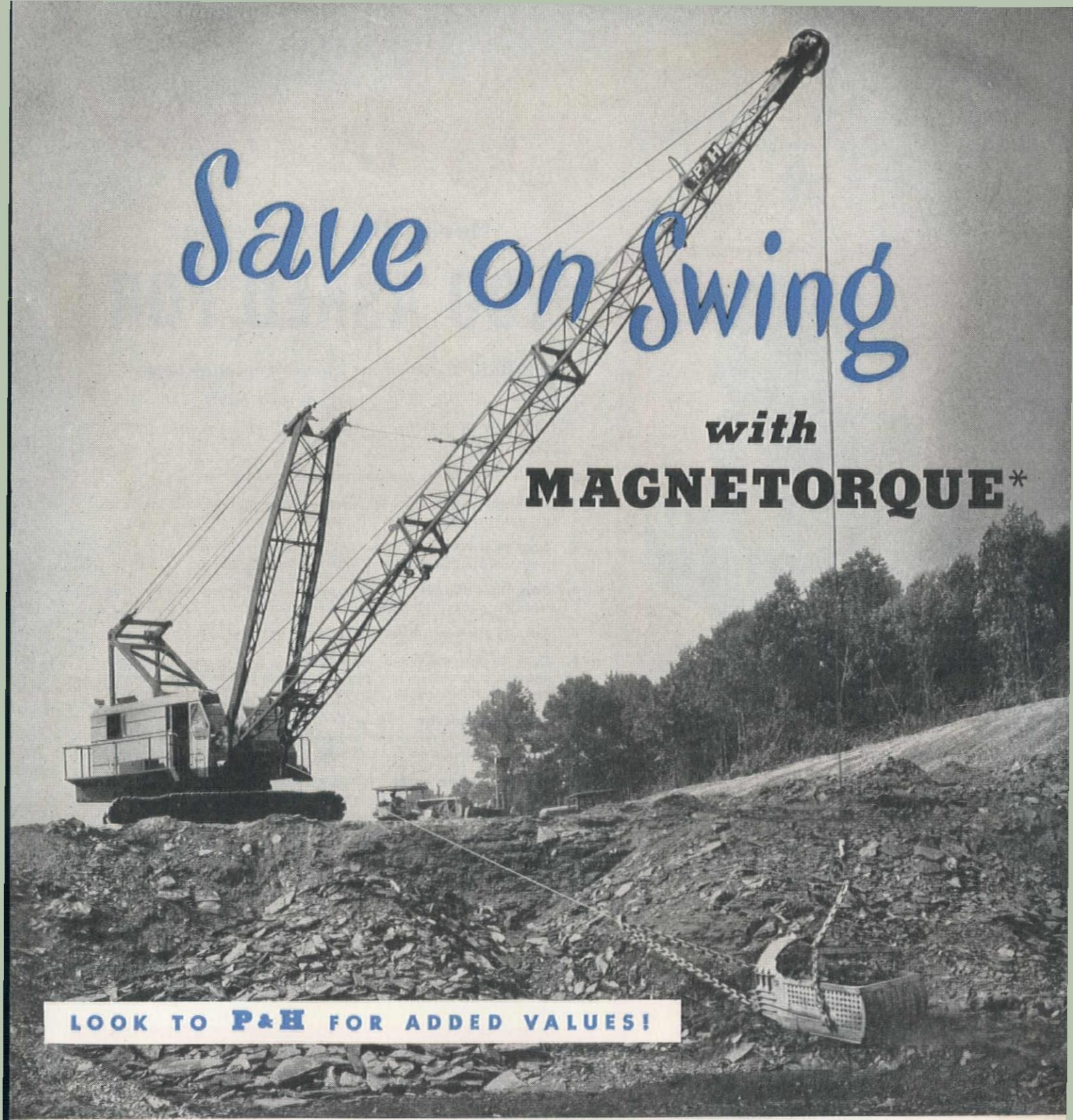
As a major source of structural shapes, Kaiser Steel rates a check on every count! Which is why experienced construction engineers have found this to be true:

It's good business to do business with

Kaiser Steel

built to serve the West

PROMPT, DEPENDABLE DELIVERY AT COMPETITIVE PRICES • plates • continuous weld pipe • electric weld pipe • hot rolled strip • hot rolled sheet • alloy bars carbon bars • structural shapes • cold rolled strip • cold rolled sheet • special bar sections • semi-finished steels • pig iron • coke oven by-products
For details and specifications, write: **KAISER STEEL CORPORATION, LOS ANGELES, OAKLAND, SEATTLE, PORTLAND, HOUSTON, TULSA, NEW YORK**



Faster digging cycle . . . up to 20 percent faster . . . is yours with the P&H Magnetorque* electric swing. Only Magnetorque can give you faster, smoother starts and stops that make this possible. It means greater production, lower cost, and more profits. You'll say it's the greatest advancement ever made on large draglines and shovels. You can say good-bye to swing friction troubles . . . once and for all. Power is transmitted electro-magnetically . . . there's no friction . . . there's no wear . . . and far less time-outs to rob production. The smooth operating Magnetorque lasts the life of the machine.

On all kinds of digging the Magnetorque can help you cut yardage costs. Magnetorque electric swing is standard on the P&H 1055 (3½ cu. yds.) and the new 955-A (2½ cu. yds.). Write today, for more information.

*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.

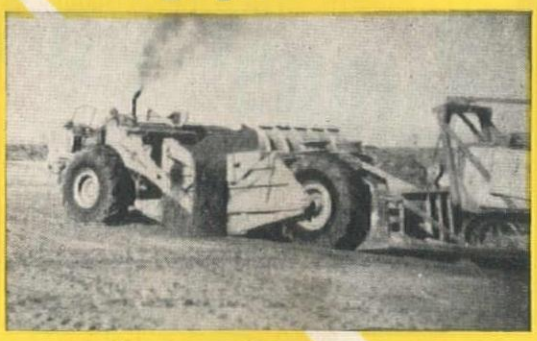
P&H EXCAVATORS
4490 W. National Avenue
Milwaukee 14, Wis.
HARNISCHFEGER CORPORATION

EXCAVATORS • OVERHEAD CRANES • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLERS AND TRUCK CRANES

LaPLANT CHOATE

. . . the sure sign of more and more profitable earthmoving jobs!

HERE'S the sure sign of the extra yardage production that gets the job done faster and at lower cost on more and more jobs. Watch LPC Motor Scrapers in action . . . talk to the men who own them. Then ask your LPC distributor to explain *all* the big-production, high-profit features. LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa—LaPlant-Choate Sales and Service, 1022 77th Ave., Oakland, Calif.

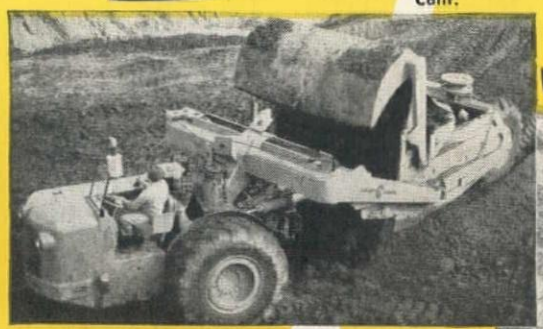


LAPLANT CHOATE One of the ways J. Robert Bazley uses Motor Scrapers for coal stripping at Mt. Carmel, Pa.

LAPLANT CHOATE Brown Construction Co. is piling up high yardage totals at Deming, New Mexico.

LAPLANT CHOATE Henry Doelger picks 4 Motor Scrapers to move 12 million yards of sand at Westlake, Calif.

LAPLANT CHOATE Two LPC Motor Scrapers are working for Bayer & Mingolla on the Route 2 by-pass, Leominster, Mass.



LAPLANT CHOATE Four LPC Motor Scrapers are speeding operations on the Benbrook Dam for List & Clark, Ft. Worth, Texas.

LAPLANT CHOATE For the Burlington Railroad relocation project at Chillicothe, Mo., Perry McGlone uses five Motor Scrapers.

LAPLANT CHOATE Patterson Construction Company has three units working on the Pennsylvania Turnpike at Steelton, Pa.

LaPLANT CHOATE

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COLUMBIA EQUIPMENT CO.
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PORTLAND, OREGON SEATTLE, WASHINGTON

again! SUCCESSFUL BIDDERS* CHOOSE HD-19's for Major Projects...

Now The New Jersey Turnpike

EVEN FLOW OF POWER means smooth, fast loading. Torque converter automatically synchronizes speeds of the HD-19's pulling and pushing — work as one! Starts and stops are made through throttle — no constant clutching, no sudden shocks to operator and equipment on pusher contacts.

SPEEDS BULLDOZING. Bigger loads are rolled faster . . . load, terrain and use of throttle govern forward speed — and there's no stalling of engine! High reverse gets HD-19 back for each pass quicker. No job is too tough to handle with its ground-gripping traction and heavy, correctly balanced weight.

Big Fleets of New Torque Every Grading Contractor

Some of the reasons big, rugged HD-19's are preferred—

HYDRAULIC TORQUE CONVERTER DRIVE eliminates most gear-shifting . . . keeps tractor working at higher average speeds . . . provides smooth, cushioned performance. Increases production, cuts maintenance costs.

EASIER, FASTER SERVICING through simple unit assembly. Major units can be removed and repaired or replaced without removing unrelated parts. Simpler construction throughout.

FOR GREATER PRODUCTION

FOR EASIER OPERATION

FOR SIMPLIFIED SERVICING

Converter Tractors . . . Some Over 20 Units . . . are used by on this Outstanding 118-Mile, 40,000,000 cu. yd. Job

SIMPLIFIED MAINTENANCE AND LUBRICATION. All adjustments unusually accessible. All fittings or lubrication points readily reached — none under tractor. Extended lubrication periods—1,000 hours on truck wheels, track idlers and support rollers.

FULL OPERATOR COMFORT. With gear-shifting practically eliminated and hydraulic fingertip steering, operator's job is much easier — fatigue is cut, output goes up. Many other operating advantages.

RUGGED, DEPENDABLE. 40,000 lb. of properly balanced weight . . . long, wide, sure-gripping tracks — a powerful, heavy tractor that really "bears down" . . . outperforms and outlasts under any operating conditions.

• • •

On any job . . . big or small . . . tough or easy . . . you will cut costs, increase profits with powerful HD-19 Hydraulic Torque Converter Tractors. "Seeing is Believing." Ask your Allis-Chalmers dealer for a demonstration.

see your ALLIS-CHALMERS dealer

ARIZONA: Phoenix—Neil B. McGinnis. **NORTHERN CALIFORNIA: Oakland and Eureka**—Buran Equipment Company; **Modesto**—J. M. Equipment Co.; **Fresno**—Peerless Tractor and Equipment, Food Machinery and Chemical Corp.; **Salinas and King City**—Livingston Bros. Tractor Co.; **No. Sacramento, Stockton, Redding**—Moore Equipment Company, Inc.; **Mountain View**—Redwine Tractor Co.; **Visalia**—Tulare County Tractor Co. **SOUTHERN CALIFORNIA: Bakersfield**—San Joaquin Tractor Co.; **Los Angeles, San Diego and Santa Barbara**—Shaw Sales & Service Company. **IDAHO: Idaho Falls and Boise**—Southern Idaho Equipment Company. **MONTANA: Missoula**—Mountain Tractor Company; **Sidney**—Northland Machinery Company; **Billings**—Seitz Machinery Company, Inc. **NEVADA: Elko**—C. W. Paul Hardware and Machinery; **Reno**—Moore Equipment Company, Inc. **OREGON: Eugene, Roseburg and North Bend**—Farm and Industrial Equipment Co.; **The Dalles**—Dielschneider Equip. Oreg. Ltd.; **La Grande**—Oregon Tractor Company; **Medford**—Tractor Sales and Service, Inc.; **Klamath Falls**—West Hitchcock Corp.; **Portland**—Wood Tractor Company. **UTAH: Salt Lake City**—Cate Equipment Co., Inc. **WASHINGTON: Seattle, Tacoma and Wenatchee**—A. H. Cox & Company; **Walla Walla**—Northern Harris; **Spokane**—American Machine Company. **WYOMING: Casper**—Studer Tractor & Equipment Co.

LOSS OF MY WEIGHT IN ENGINE WEAR —ABOUT TWO OUNCES— WILL RUIN YOUR ENGINE

Your engine weighs hundreds of pounds, but the loss of 2 ounces by wear — little more than the weight of the canary — will ruin it!

It's Acid Action - not friction - that causes most engine wear

Shell Research discovery counteracts Acid Action, prolongs engine life

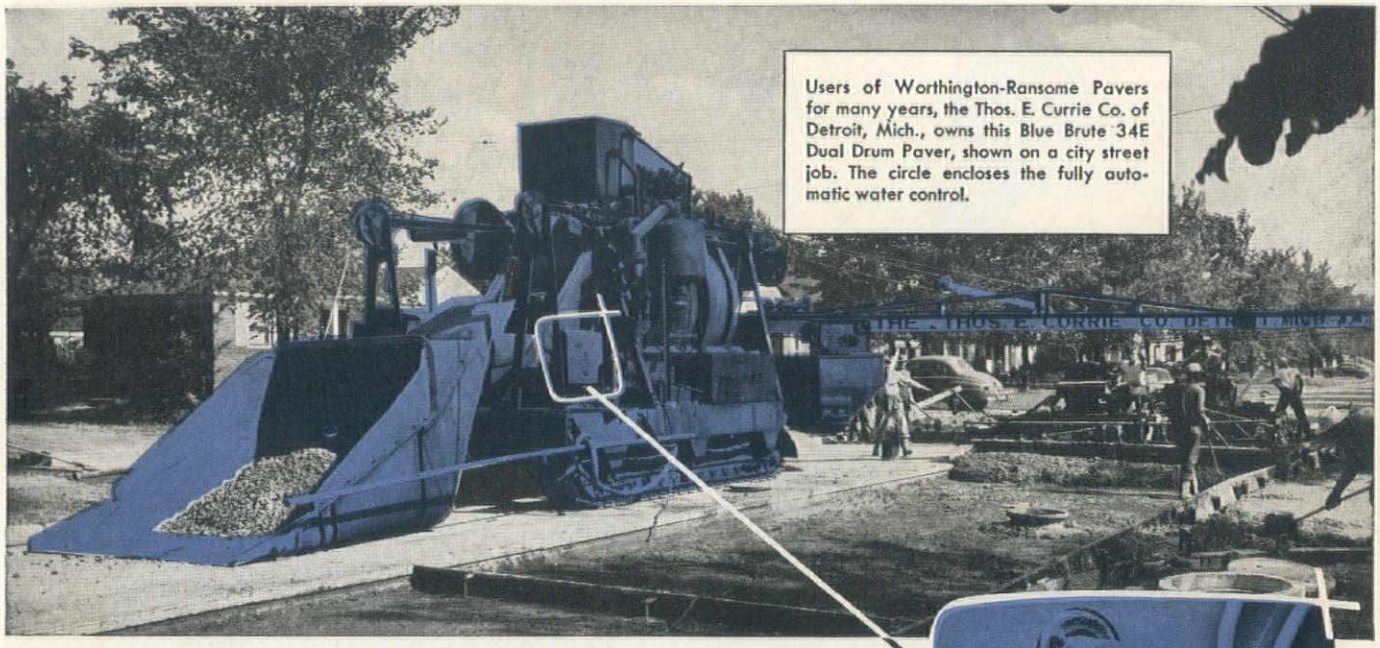
• Few realize it's corrosive Acid Action—not friction—that causes up to 90% of engine wear. In typical "on and off" operation, your engine never warms up to efficient operating temperature.

Combustion is incomplete. Partially burned fuel gases and moisture attack the metal surfaces *chemically*. Shell scientists worked 9 years developing a new, unique "X" safety factor to counteract this biting acid.

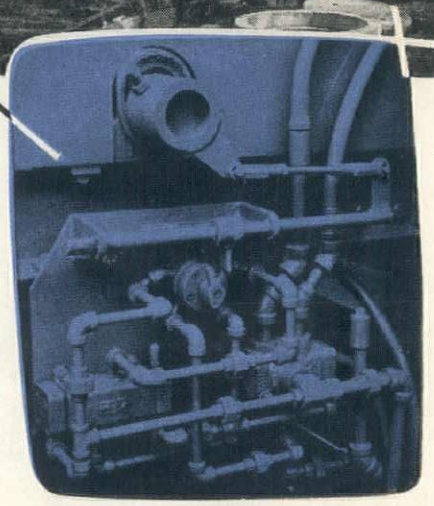
Now 2½ millon miles of road testing, plus millions of miles of use by motorists, have proved that Shell X-100 Motor Oil prolongs engine life. This oil, long famous for its protection at sustained high speed, now brings this additional safeguard for every mile you drive.

For passenger cars and light trucks

It's Incomparable!



Users of Worthington-Ransome Pavers for many years, the Thos. E. Currie Co. of Detroit, Mich., owns this Blue Brute 34E Dual Drum Paver, shown on a city street job. The circle encloses the fully automatic water control.



Precision mixing...for faster, lower cost paving...with WORTHINGTON *BLUE BRUTE* 100% Automatic Water Control

Standard equipment on Blue Brute 34E Dual Drum Pavers, the automatic, hydraulically controlled water system assures uniformly correct mixing. Designed to go into operation when the skip is approximately 4 feet off the ground, this device closes the water valves when the required amount of water is in the drum. An automatic water-cutoff delaying action, adjustable up to 12 seconds, eliminates holding up the skip until the proper quantity of water has been discharged.

BIG SAVINGS WITH THE "LIVE" BOOM-AND-BUCKET

This patented feature not only spreads as it swings, cutting down costly hand shovelling — it also does away with split batches. Just run out the bucket, carrying a full batch, to wherever needed. Then, with positive hydraulic control you can discharge just the required amount. Users report this highly mobile boom-and-bucket combination saves over $100 daily on difficult off-highway jobs, by eliminating an extra crane and up to 4 additional men — *and it's standard equipment only on Blue Brute Pavers!* Special attachments, easily and economically applied, make it possible to pour concrete up to twenty-five feet above ground level.

From charging to pouring you'll find you can do more with Worthington-Ransome Blue Brute Pavers — do it faster, do it for less cost. Get the complete facts proving *there's more worth in a Blue Brute*. Contact your nearby Worthington-Blue Brute Distributor, or write direct.

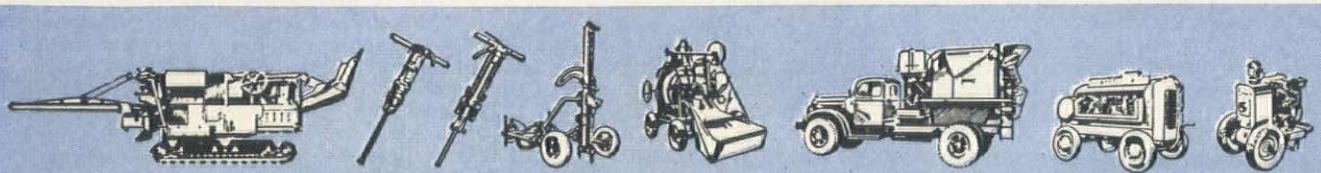
Worthington Pump and Machinery Corporation
Construction Equipment Department
Harrison, New Jersey

Distributors In All Principal Cities

WORTHINGTON

BUY BLUE BRUTES

RO.3



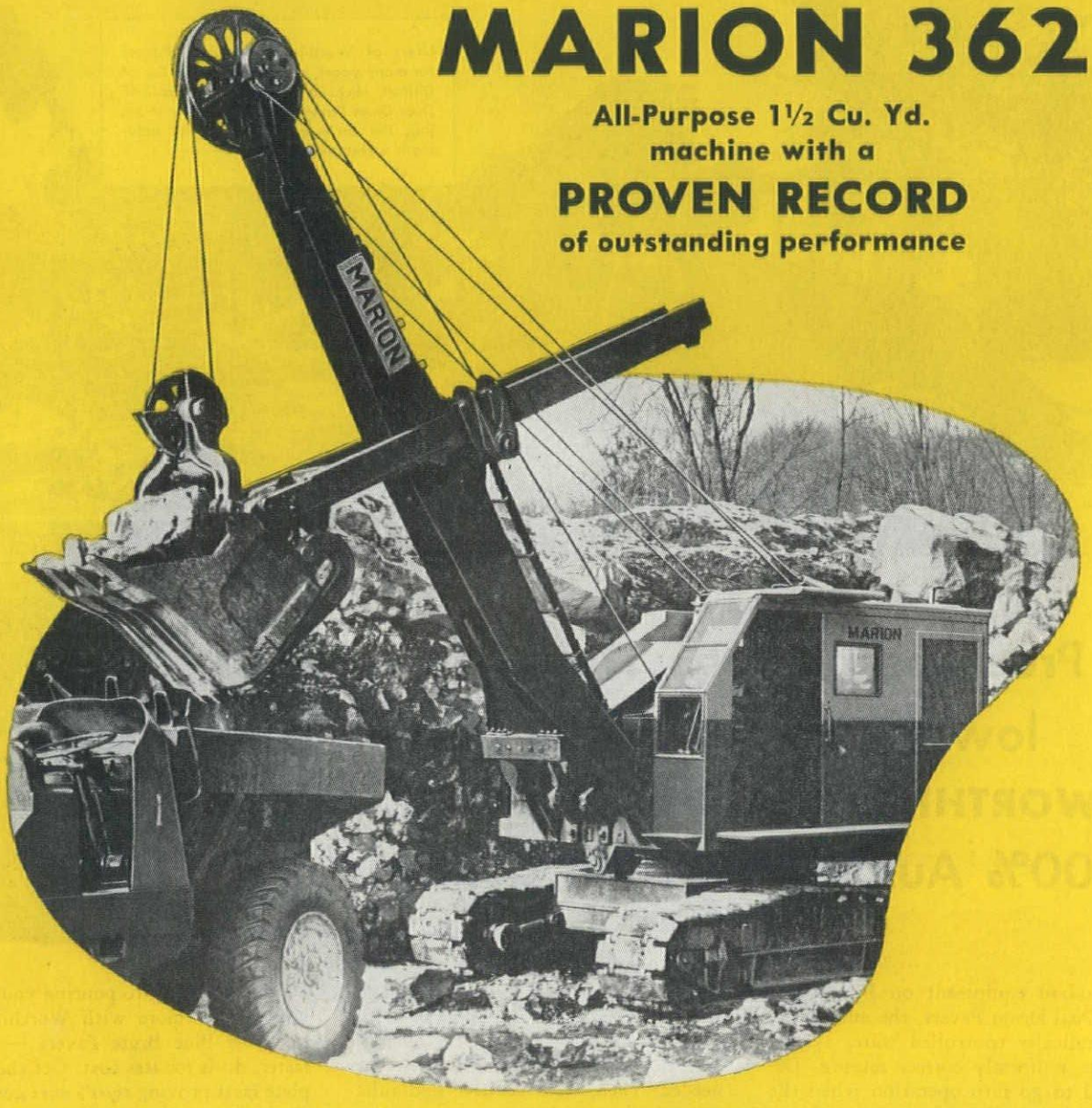
IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

MARION 362

All-Purpose 1½ Cu. Yd. machine with a

PROVEN RECORD

of outstanding performance



SOME MARION 362 FEATURES

VERSATILE — Easily convertible front end equipment for shovel, dragline, clamshell, crane, pull shovel, drop ball and grapple service. Conversions made quickly in field. No machinery changes except for drum laggings and sprockets.

SMOOTH CLUTCHES — Smooth, positive clutch action over the years, Swing, propel and crowd retract clutches never require adjustment; hoist and crowdout clutches have only one adjustment.

MARION AIR CONTROL—Compensating-type air control valves yield full machine power when 12 pounds of pressure is applied to control levers. No production lag because of operator fatigue. Air control eliminates levers, bell crank, toggles, pins, etc.

•

ANTI-FRICTION BEARINGS—16 ball or roller bearings cover all principal friction points, resulting in greater operating economy, machine efficiency and fewer replacements.

SIMPLE, HEAVY-DUTY DESIGN—Only two horizontal shafts on machinery deck. Only 16 gears aside from front end equipment. Gears heat treated. Shafting of alloy steel. Main frame all welded for life-long perfect alignment.

SEE YOUR MARION DISTRIBUTOR

MARION POWER SHOVEL COMPANY.....571 Howard Street, San Francisco 5, California
STAR MACHINERY COMPANY.....1741 First Avenue, South, Seattle, Washington
RAY CORSON MACHINERY COMPANY.....351 Kalamath Street, Denver 9, Colorado
M & F EQUIPMENT COMPANY.....2521 Isleta Highway, Albuquerque, New Mexico
MARION POWER SHOVEL COMPANY.....2505 N. E. 33rd Avenue, Portland, Oregon
BROWN-BEVIS EQUIPMENT COMPANY.....4900 Santa Fe Avenue, Los Angeles 11, California
C. H. GRANT COMPANY.....1401 Eastshore Highway, Berkeley 10, California
STAR MACHINERY COMPANY.....E. 415 Sprague Avenue, Spokane 8, Washington
STAR MACHINERY COMPANY.....701 Larson Building, Yakima, Washington
MARION POWER SHOVEL COMPANY.....114 W. Adams Street, Phoenix, Arizona
RASMUSSEN EQIUPMENT & SUPPLY COMPANY.....1960 South Second West, Salt Lake City, Utah

Make FORD power YOUR power

Ford

INDUSTRIAL ENGINES

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

Ford "254" POWER UNIT

Six Cylinder, 254 cu. in. displacement, Gross Dynamometer Brake Horsepower 94 @ 2400 RPM.

(Also available in open type power unit or engine assembly only)

...and be RIGHT 3 WAYS!

1. **RIGHT POWER** . . . you have five Ford power sizes to choose from . . . all engines and units are factory-tested . . . ready to install . . . complete and ready to run.
2. **RIGHT FEATURES** . . . every model reflects all the benefits of Ford's famed progressive engineering.
3. **RIGHT SERVICE** . . . as near as your nearest Ford Dealer, clear around the world.

FORD INDUSTRIAL ENGINES

are offered as complete power units or as individual units, either open or closed, both with a wide variety of special attachments. They are made in the following types and sizes:

120 CU. IN. 4 CYLINDER
226 CU. IN. 6 CYLINDER
254 CU. IN. 6 CYLINDER
239 CU. IN. V-TYPE 8 CYLINDER
337 CU. IN. V-TYPE 8 CYLINDER

Leading machinery and equipment builders—makers of agricultural machinery, road and construction equipment, lumber and sawmill machinery, oil field equipment and various other applications—are swinging to Ford Industrial Engines and Power Units more and more for their power sources.

They choose Ford first because they know Ford standards of engineering, design and production are notably high.

FORD POWER FOR STEADY PERFORMANCE. You can *depend* on Ford Industrial Engines and Power Units. Each engine and unit is thoroughly inspected and test run at the factory, before shipment. Ford Power Units are delivered to you complete and ready for use.

FORD POWER FOR SERVICE EVERYWHERE. Your equipment customers want prompt, economical service when they need it. Owners of equipment and machinery powered by Ford save time and money on service and parts replacement because Ford Service is available everywhere, helps cut "down-time."

FORD POWER FOR SMART APPEARANCE. Up-to-date products need up-to-date power that looks smart. Ford Industrial Engines and Power Units are smart looking, well designed and compact. Their appearance is Ford-engineered to harmonize with the best in modern machinery and equipment design.

Industrial Engine Department

FORD MOTOR COMPANY

Dearborn, Michigan

For Special Literature on Ford Industrial Engines and Power Units, Use This Coupon . . .

INDUSTRIAL ENGINE DEPT., FORD MOTOR COMPANY, DEARBORN, MICHIGAN

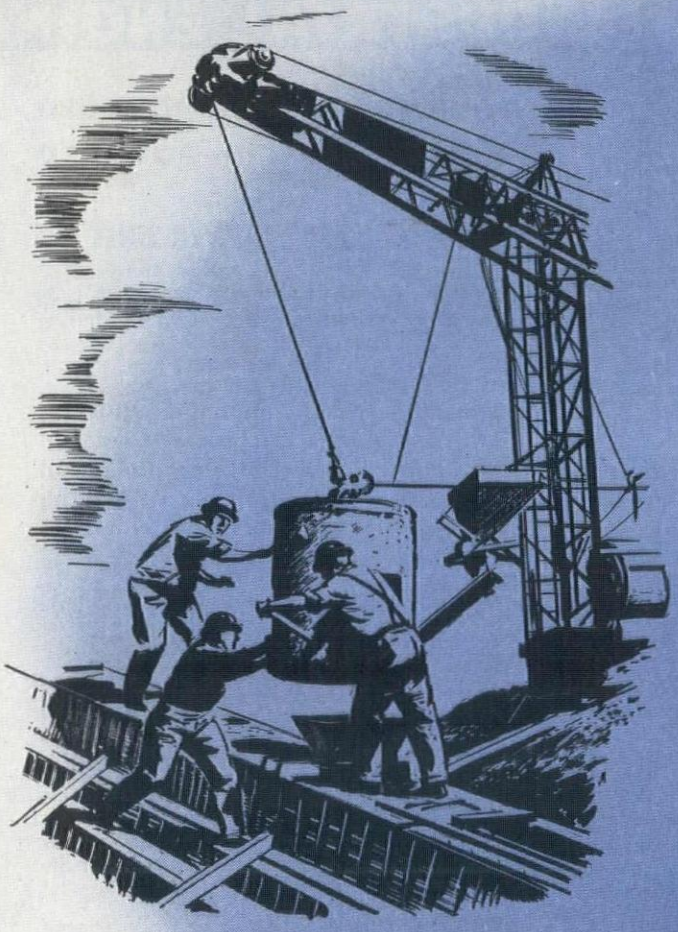
Please send me comprehensive literature about Ford Industrial Engines and Ford Power Units.

Name_____
(Please print)

Address_____

City_____ State_____ D

Today it's Roebling!



Roebling Preformed Lang Lay "Blue Center" Steel Wire Rope lasts longer; brings fewer shut-downs; cuts down replacement time; saves wire rope dollars.

Why men who watch costs specify Roebling Preformed

THE RECORDS PROVE IT... that Roebling Preformed "Blue Center" Wire Rope stays on the job longer and cuts your costs. This is partly because "Blue Center" steel—developed and made only by Roebling—has unsurpassed resistance to abrasion, shock and fatigue. In large measure, too, it is because of the painstaking care, special techniques and modern precision machines that guard and maintain Roebling quality leadership.

Preformed a big help, too. Wide experience in the field proves that Roebling *Preforming* brings still more operating economies. Preformed is easier and faster to handle and install. You can cut it without seizing. It winds better... is not apt to set or kink... minimizes vibration and whipping.

Today's best buy. Roebling makes wire rope of every construction, grade and size ... engineered for top efficiency on every type and make of rope-rigged equipment. Have your Roebling Field Man recommend the *right* rope for best, low-cost performance on each installation. John A. Roebling's Sons Company of California—San Francisco—Los Angeles—Seattle—Portland.

ROEBLING

A CENTURY OF CONFIDENCE

Atlanta, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Road ★ *Cincinnati*, 3253 Fredonia Ave. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 4801 Jackson St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. Twelfth St. ★ *Portland*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 Seventeenth St. ★ *Seattle*, 900 First Avenue S.

New! VICTOR CUTTING TORCH

with Stainless Steel Head and Tube Assembly

CTS-400 Series

Rugged stainless steel tip nut, head and tubes.

Uses all standard Victor cutting tips.

New high-capacity, cutting oxygen valve—operated over half million times without detection of wear.

New oxygen and fuel control valves with "O" ring pressure seals—no outmoded packing, no take-ups, no adjustments needed.

Test it *on your severest cutting job . . . see for yourself how fast it cuts, how cool it stays.*

Here's the torch you've been waiting for. Cuts longer and faster than other torches without overheating because mixer and mixer tube are made of high-heat resistant copper alloys—no danger of mixer failures from overheating. Mixer itself is Victor's famous spiral mixer, designed to prevent backfire and flashback.

The stainless steel head and tube assembly is a single unit and can be replaced without buying a complete torch. Comes with either 90° or 75° head. Standard length is 21″; 27″ or longer available on special order.

Call your Victor dealer NOW . . . ask him to demonstrate this new, stainless steel torch on your toughest cutting job.

VICTOR

Welding and Cutting Equipment Since 1910

Welding rods for all uses. Regulators for all gases up to 5000 psi. Machine and hand torches for welding, preheating, cutting, flame hardening and descaling. Portable flame cutting machines. Pneumatic filters and lubricators. Kinmont power positioners. Fluxes. Write today for free descriptive literature.

VICTOR EQUIPMENT COMPANY

3821 Santa Fe Ave.
LOS ANGELES 58

844 Folsom Street
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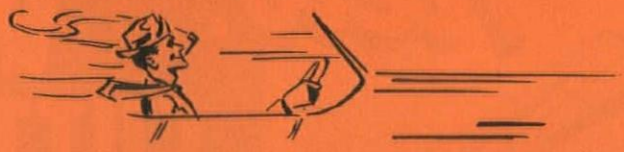
CHICAGO 7

There's a Branch or Distributor to serve you in Portland, Spokane, Seattle, Salt Lake City, Casper, Great Falls, Anchorage, Boise, Denver, Tucson, Phoenix, Albuquerque, Oakland, San Diego, Fresno, Ventura, Sacramento.



AND TRAVEL

UNIVERSAL "TRAVELER"

CRUSHING, SCREENING AND LOADING PLANTS

TS-TRAVELER—Screens finished pit run, crushes oversize. Blends and loads. Available in 916, 1016, 1020 or 1024 sizes with bronze or roller bearing jaw crushers.

CSE-TRAVELER—Closed circuit plant with bucket elevator return from crusher to screen. Produces specification material. Available in 916, 1016, 1020 or 1024 sizes with bronze or roller bearing jaw crushers.

CS-TRAVELER—Screens out finished pit run, crushes oversize. Mixes and loads. Available in 916, 1016, 1020 or 1024 sizes with bronze or roller bearing jaw crushers.

Enjoy rock bottom aggregate costs where production requirements are moderate. Here are three low priced units from the complete line of famous Universal crushing plants. You get advanced engineering design for top efficiency and economy. Simplicity of construction provides easy operation with minimum man-power. The sturdy Universal overhead eccentric jaw crusher with its double crushing action and force discharge of material gives you greater crushing capacity.

Designed for "crush-and-travel" operations, Universal TRAVELER plants are ideal for building access roads to backwoods locations, as well as logging and oil field operations. Also for secondary road construction and maintenance work.

GET FULL DETAILS . . . WRITE FOR BULLETINS

PRICES START AS LOW AS **$8632.00**

F.O.B. Factory—Complete with Power

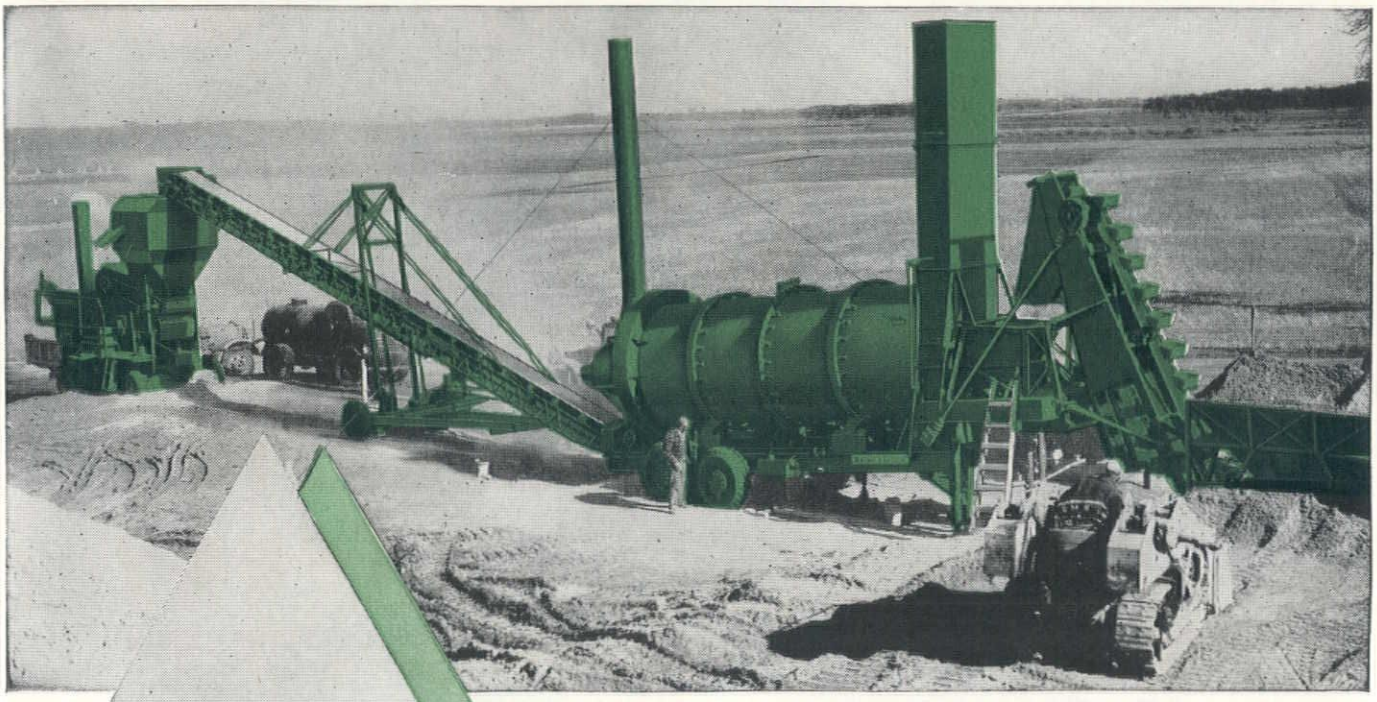
UNIVERSAL ENGINEERING CORP. division of PETTIBONE MULLIKEN CORP.

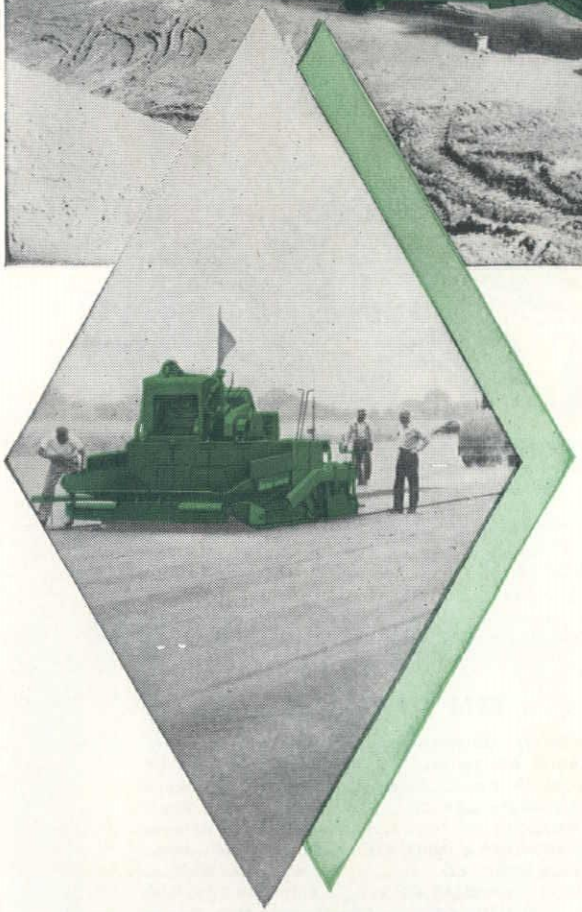
323 Eighth Street N. W., Cedar Rapids, Iowa
Phone 7105

4700 W. Division Street, Chicago 51, Illinois
Phone SPaulding 2-9300

Arizona Equipment Sales, Inc.....Phoenix, Arizona
Industrial Equipment Co.....Los Angeles 11, Calif.
Bay Cities Equipment, Inc.....Oakland 7, Calif.
Nevada Equipment Service, Inc.....Reno, Nevada
The Harry Cornelius Co., Albuquerque, New Mexico
J. K. Wheeler Machinery Co., Salt Lake City 1, Utah
Cheyenne Truck Equip. Co.....Cheyenne, Wyoming

Barber-Greene





The B-G Tamping-Leveling Finisher will lay any mix, hot or cold. Places a continuous ridge-free surface with each succeeding strip firmly compacted against the previous one.

High-Capacity
"Intermediate" Mixing with Portability

For Sale By:

BROWN-BEVIS EQUIPMENT CO.
Los Angeles 58, California

COLUMBIA EQUIPMENT CO.
Spokane, Washington; Seattle, Washington
Boise, Idaho; Portland 14, Oregon

WILSON EQUIPMENT & SUPPLY CO.
Cheyenne, Wyoming; Casper, Wyoming

CONTRACTORS' EQUIP. & SUPPLY CO.
Albuquerque, New Mexico

RAY CORSON MACHINERY CO.
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JENISON MACHINERY CO.
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WESTERN CONSTRUCTION EQUIPMENT CO.
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KIMBALL EQUIPMENT COMPANY
Salt Lake City 10, Utah

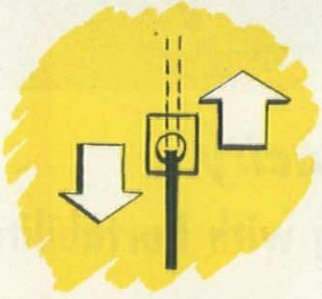
STATE TRACTOR & EQUIPMENT CO.
Phoenix, Arizona

THE RIGHT COMBINATION!

INDUSTRIAL WHEELERS

MM MINNEAPOLIS-MOLINE MODERN MACHINERY

VISIBILITY and SAFETY



CONVENIENT STRAIGHT-LINE SHIFTING

MM UTIL with shuttle gear lever instantly reverses movement in any of six forward or reverse speeds pre-selected by operator. Saves time! Reduces operator fatigue! Does more work every hour!

OPERATOR FULLY PROTECTED! He works in *safety zone* away from moving arms, out of the dirt—and is protected by rear bumper.

Good vision with operator safely away from all moving arms and spillage gives the *right* combination of VISIBILITY and SAFETY.

MM Industrial Wheelers offer the maximum in 'front end design' with heavy inset front wheels, H-section front axle, easy roller steering, and oversize tires for load capacities up to 10,000 pounds. Swinging drawbar or adjustable pintle hook is adaptable for all pull-behind equipment. Front, side and rear power take-offs provide direct drive for all hydraulically and mechanically operated equipment.

Roller steering permits quick, easy steering regardless of load . . . shuttle gear provides fast reversing for handling more loads per hour with less operator fatigue . . . an assortment of single or dual rear tire equipment in various treads is available to meet all requirements.

ATTACHMENTS: Mechanically or hydraulically operated front-end loaders • lifts • dozer blades • scarifiers • rear leveling blades • reversible or V-type snow plows • pull-behind scrapers • side-mounted or pull-behind mowers • rotary brooms • rear drum winch • all-weather enclosed cabs and many others.

MM DEALERS

LEE REDMAN EQUIPMENT CO.....Phoenix, Ariz.
EDWARD R. BACON CO.....San Francisco, Calif.
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REED HARDWARE & IMPLT. CO.....Idaho Falls, Idaho
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HAMILTON EQUIPMENT CO.....Salt Lake City, Utah
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MILLS IMPLT. CO.....Billings, Montana
TRACTOR & EQUIPMENT CO.....Miles City, Montana
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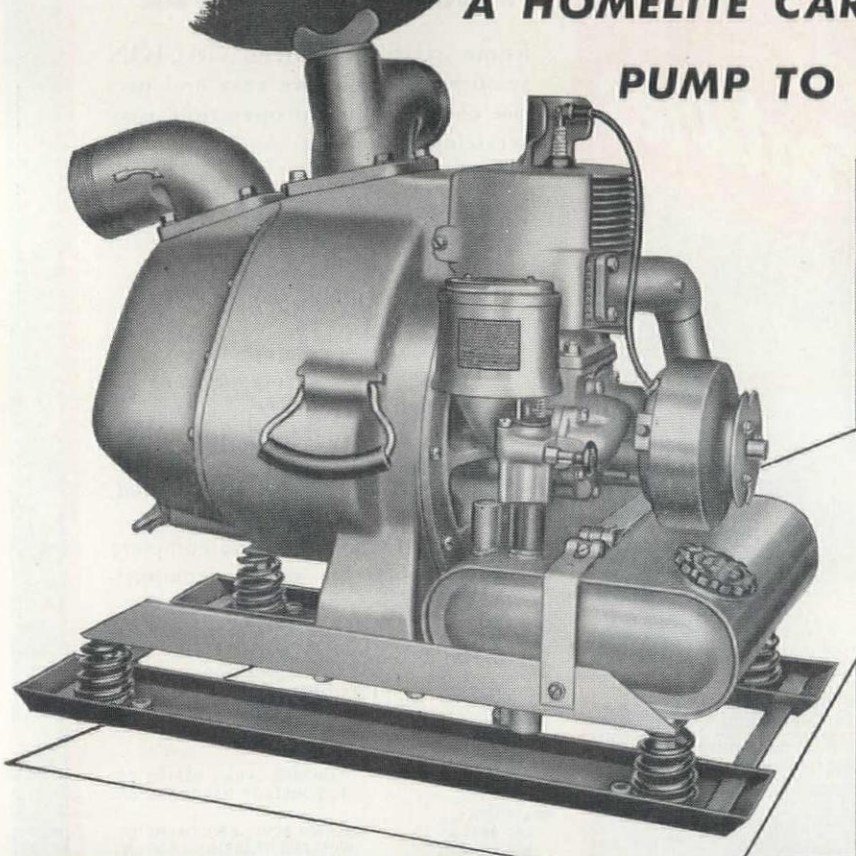
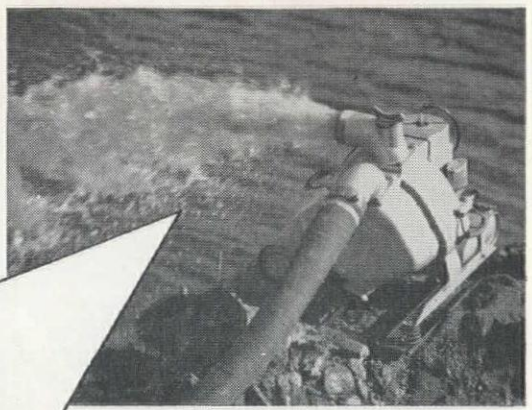
GARVEY TRUCK SERVICE.....Stockton, Calif.
CASEY-METCALF MACHY. CO., INC.....Los Angeles, Calif.

MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA

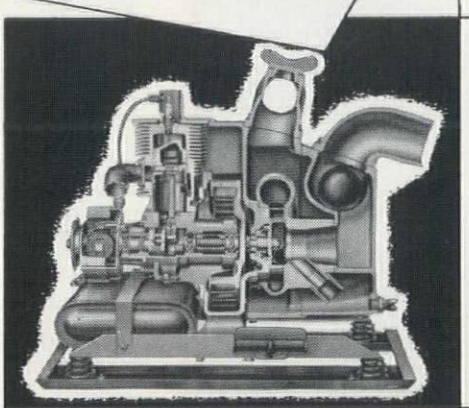
FOR 3 BIG REASONS

A HOMELITE CARRYABLE PUMP IS THE PUMP TO HAVE ON THE JOB





1. PERFORMANCE. Just add it all up . . . lightweight for easy handling, 15,000 gallons per hour, the fastest self-priming possible, a guaranteed 28 ft. suction lift, automatic seepage control, no trouble with clogging *even when handling mud and solids* . . . that's what you always get from a Homelite *carryable* gasoline-engine-driven pump that can be set up for operation easily and quickly *anywhere*.



2. DEPENDABILITY . . . continuous trouble-free performance . . . is the result of all the special features that Homelite engineers build into their pumps . . . replaceable abrasive-resistant wear plates, a simple five-part sealing device and impeller that require no grease, packing or attention and a non-clogging pump body directly attached with no bearings necessary, to the famous Homelite Gasoline Engine, the result of building over 275,000 gasoline-engine-driven units this past quarter century.

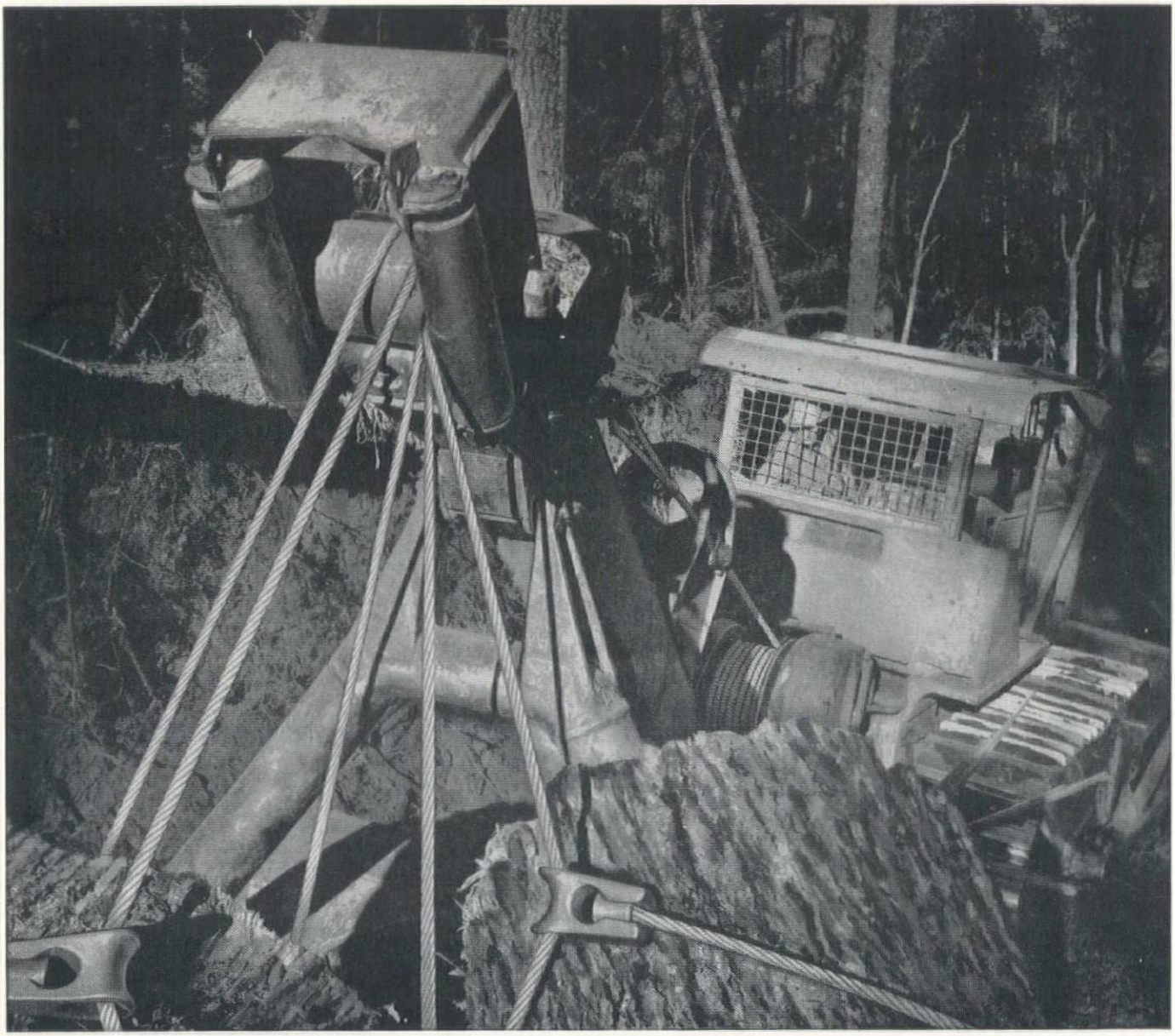
3. SERVICE. To keep Homelite pumps operating continuously, just as the day they were first delivered, a chain of exclusive Homelite service shops extend across the nation. These service stations are completely stocked and staffed by trained Homelite men who are ready to keep your Homelite pumps in top notch condition at all times.

STICK TO THE RULE OF THREE 1. Performance 2. Dependability 3. Service, and you'll always stick to a Homelite.

DEPENDABILITY · PERFORMANCE · SERVICE

Homelite Corporation

1310 RIVERDALE AVENUE, PORT CHESTER, NEW YORK



Tractor arch logging using Tiger Brand Wire Rope at Jensen Lumber Co., Willits, California.

Tiger Brand Wire Rope is manufactured from raw ore to finished product under the strict quality controls of United States Steel. To help you get all the stamina engineered into American Tiger Brand, the services of a Field Specialist are available without charge.

Contact your Tiger Brand distributor or write Columbia Steel Company, Room 1422, Russ Bldg., San Francisco 4.

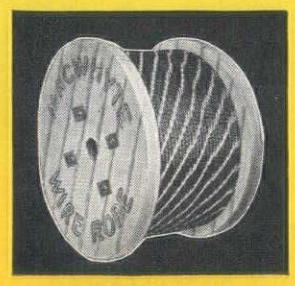
U·S·S TIGER BRAND Wire Rope

UNITED STATES STEEL

There's no guesswork

For the wire rope and slings best suited to your needs—

call MACWHYTE COMPANY

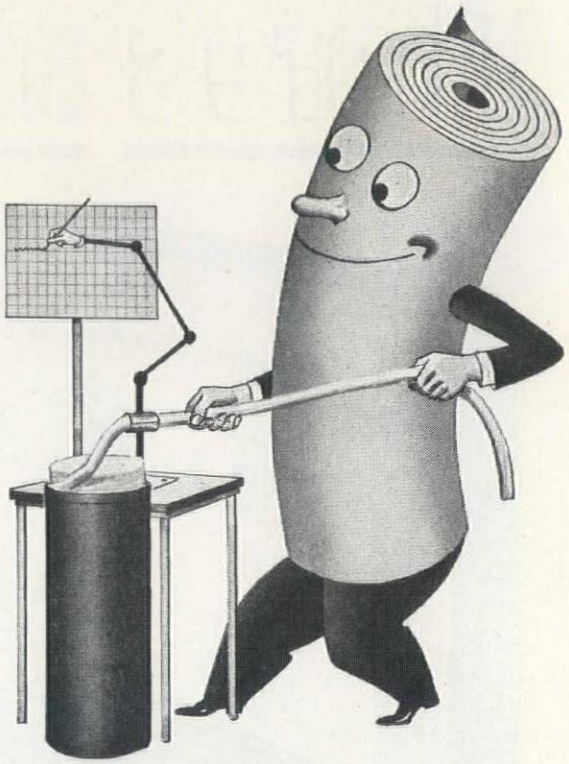


Portland 9, Ore.	Seattle 4, Wash.	San Francisco 7, Cal.	Los Angeles 21, Cal.
1603 NW 14th Ave.	87 Holgate Street	141 King Street	2035 Sacramento St.
Broadway 1661	Main 1715	Exbrook 2-4966	Trinity 8383

A copy of the Macwhyte general wire rope catalog, G15, is available to you on request to any Macwhyte Company office or authorized distributor.

902

CHECKING EVENNESS OF SLIVER WITH LINEAR REGULARITY TESTER. One of a series of laboratory controls throughout production to assure fabric uniformity in all Mt. Vernon-Woodberry products.



UNIFORMITY

Makes the Big Difference

In TARPAULINS

MT. VERNON — EXTRA

Gives You

Greater Fabric Uniformity

The greater uniformity of Mt. Vernon Extra Duck assures you the two most important qualities you want in tarps — top protection and top wear. You'll find your repair and replacement costs reduced considerably.

Mt. Vernon-Woodberry Mills

Branch Offices: Chicago • Atlanta • Baltimore • Boston • Los Angeles • Akron

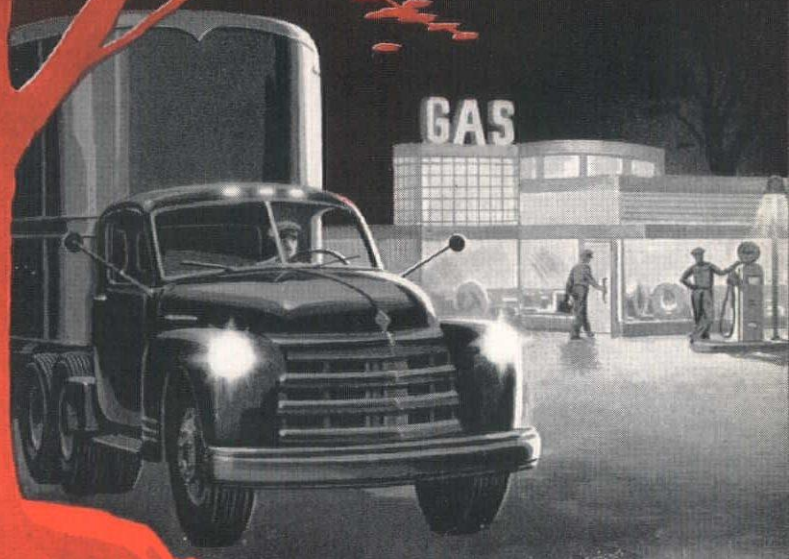
TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST. · NEW YORK

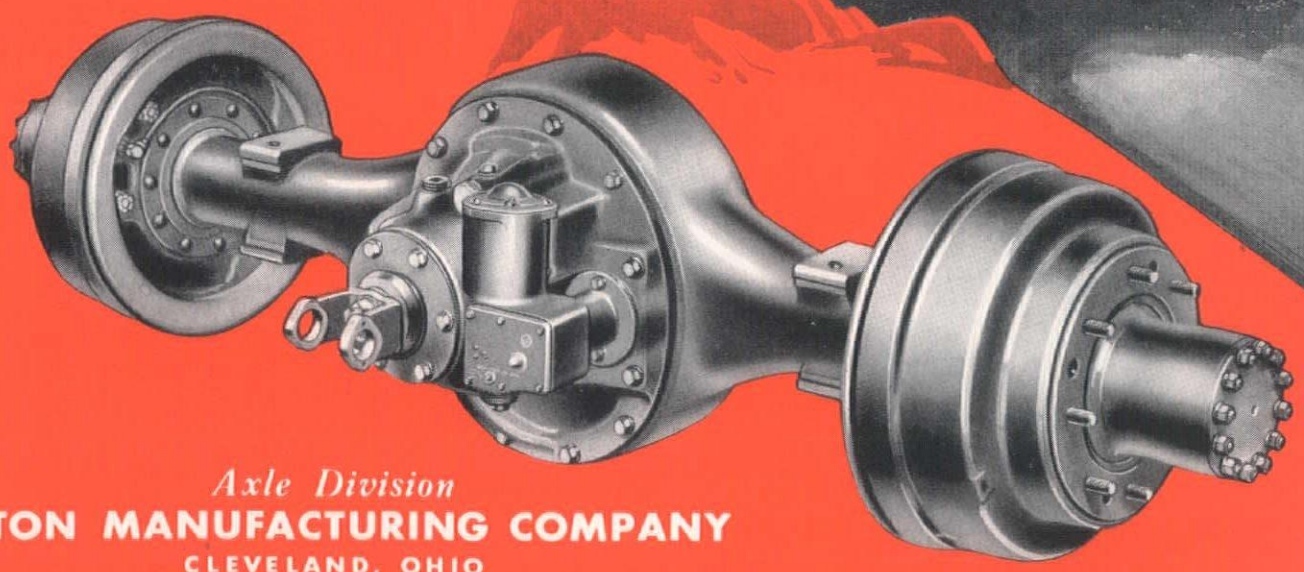
EATON

2-Speed Truck AXLES

Give More Pay-Load Miles at Lower Cost per Mile

Trucks equipped with Eaton 2-Speed Axles make fewer stops for gas and oil. That's because these Eaton Axles double the number of available gear ratios in any truck, thus permitting the use of the most efficient ratio for every driving condition. As a result, the engine operates at economical speeds—doesn't strain and struggle on hills or when starting under full load . . . runs effortlessly on the straight-away. This means, too, that stress and wear on engine and major power transmission parts is minimized. These operating and maintenance economies—plus the higher trade-in value of Eaton equipped trucks—enable Eaton 2-Speed Axles to more than pay for themselves on trucks of the 1½ ton class and larger. Ask your truck dealer to show you what this means to you.



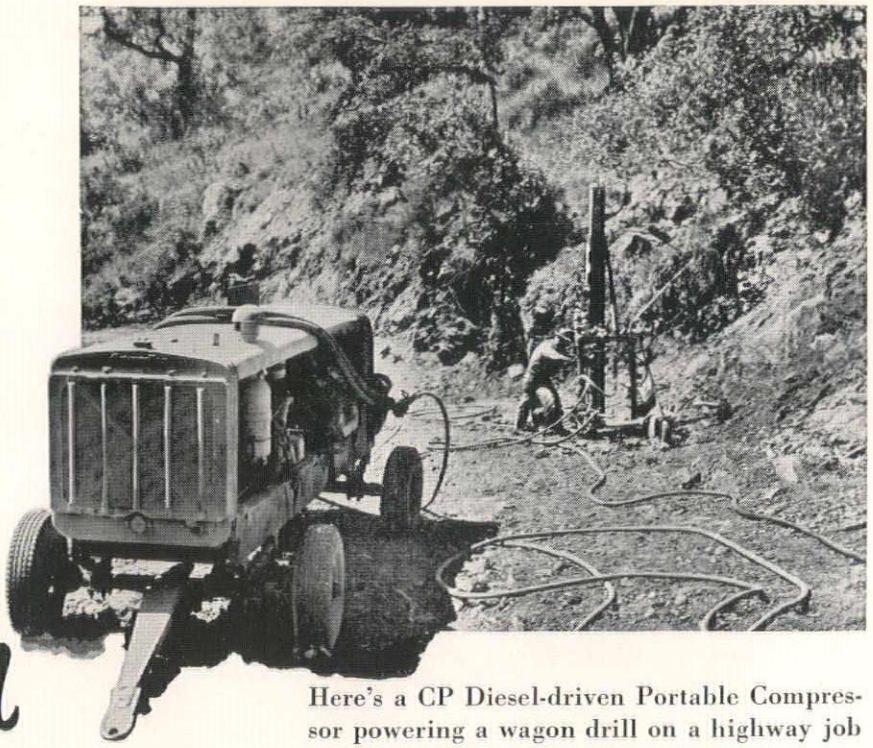


Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

EATON PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS



Cut Construction Schedules...

with CP equipment

Here's a CP Diesel-driven Portable Compressor powering a wagon drill on a highway job through California mountains.

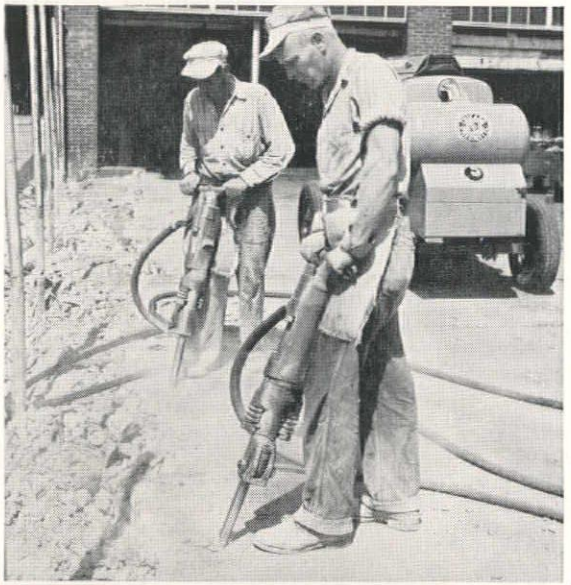
In any location where compressed air is needed, a CP Portable Compressor will provide an ample supply *economically*, because the gradual speed regulator adapts engine speed to air demands, holding fuel consumption to a minimum.

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.

Nuts to 1¼" bolt size are quickly run off—or on—with this heavy-duty CP-365 Air Impact Wrench. A big time-saver on construction jobs both for erection of structural members and maintenance of heavy equipment.

No job is too tough for these heavy-hitting CP-117 Demolition Tools, designed for breaking dense concrete and other extremely hard materials.

In the world's largest line of demolition equipment there is a CP tool for every type of demolition work. Five models range from the lightweight CP-111 (25 lb. class) to the heavy-duty CP-117 (80 lb. class).



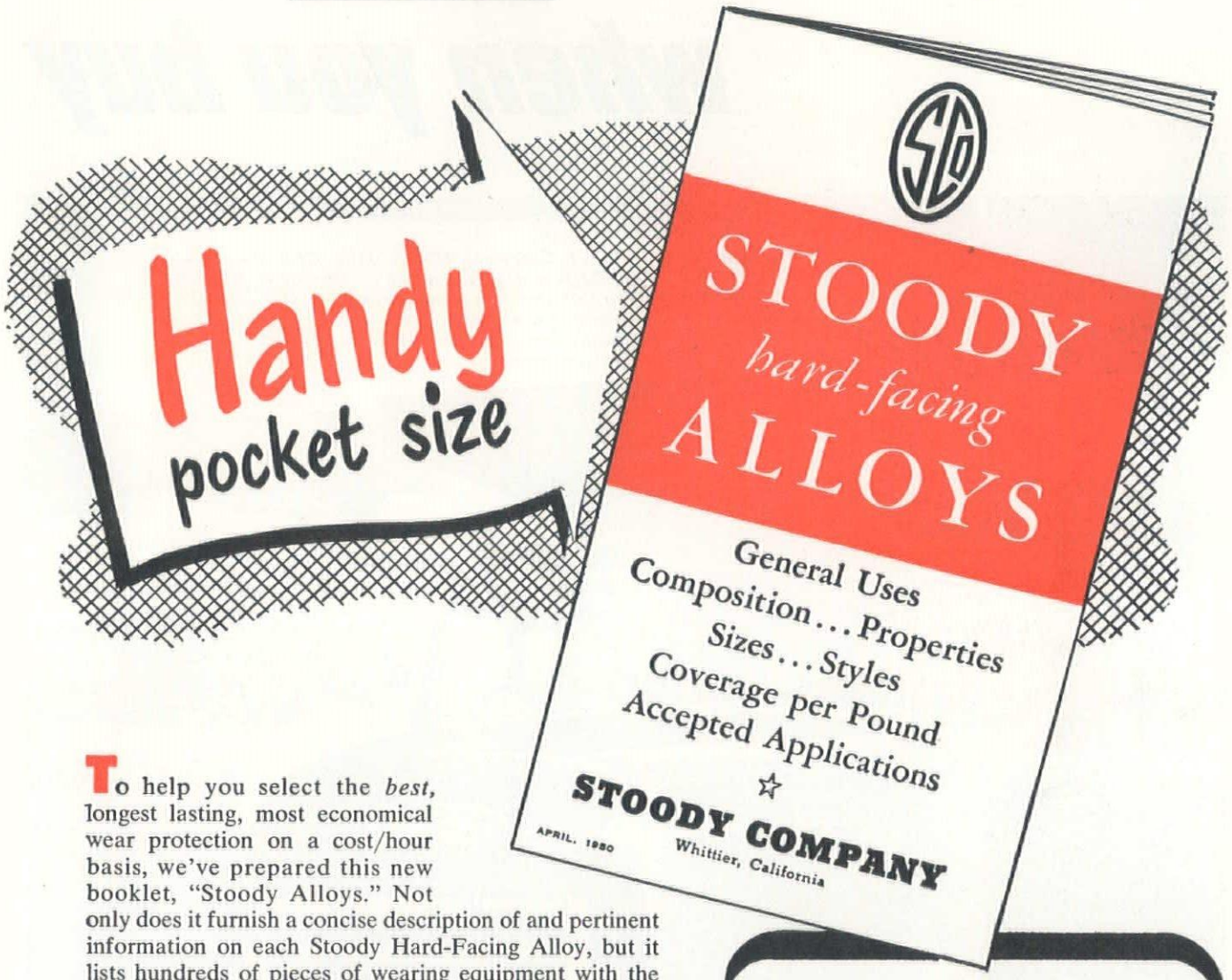
Write for full information on CP Contractors' Equipment.

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

How to make Stoody Hard-Facing WORK harder for you



To help you select the *best*, longest lasting, most economical wear protection on a cost/hour basis, we've prepared this new booklet, "Stoody Alloys." Not only does it furnish a concise description of and pertinent information on each Stoody Hard-Facing Alloy, but it lists hundreds of pieces of wearing equipment with the recommended alloy for maximum protection. By following the Stoody Alloys recommendation, you'll save many hours of trial and error, because all selections have been made only after many years of testing.

SEE YOUR DEALER or write for your copy today! Simply ask for the new issue of "Stoody Hard-Facing Alloys." For more complete data on any individual Stoody Alloy, detailed circulars are available.

STOODY COMPANY
11956 EAST SLAUSON AVENUE
WHITTIER, CALIFORNIA

You need your own personal copy of "Stoody Hard-Facing Alloys" if you now operate any equipment in these industries!

Construction
Lumber and Paper
Rock Products
Cement
Brick and Clay
Metal Mining
Coal Mining
Iron and Steel
Coke and Gas
Foundries
Power Plants
Petroleum
Railroads
Agriculture
Automotive

TIME TO
when you buy

Here is GMC Model 850, 35,000 lb. GVW powered with 200-H.P. gasoline engine with max. torque of 422 ft. lbs. at 1200 rpm. Built in wheelbases from 141 to 201 inches, this unit has air brakes as standard, and 5-speed Synchro-Mesh transmission. Your GMC dealer will be glad to supply full specifications.

LOOK AHEAD

heavy-duty trucks

Now more than ever dependability is extremely vital in heavy trucks and equipment. You want to *know* they will keep going—for years, if need be.

You get that kind of durability – through more years of use—in GMC's. It is this dependable operation, along with top performance at lowest transportation cost, that explains why more heavy truck users are buying GMC's now than ever before!

Built for Longer, Harder Work

These massive GMC's are designed and built to have added strength and long life in every part—especially important in the construction field. Check over the list of features that make every GMC outstanding for quality—unequaled by any other make.

Size and Power for Any Demand

There are husky giants for on- and off-the-road work, ranging up to 90,000 lbs. gross weight as a tractor, and 55,000 lbs. gross weight as a truck. You have a choice of tough, lusty valve-in-head gasoline engines, or the famed GM 2-cycle Diesels, with power up to 200 H.P. The right wheelbase and gear combination is available to handle your job.

And Easy on the Driver

Men would rather work GMC's, with the "cushion-mounted," all-welded, "Six-Footer" Cab that stays comfortable. Clash-proof transmission and recirculating ball-bearing steering gear make GMC's the easiest trucks to handle.

* * * *

If you want a REAL truck—that will see you through—check with your GMC dealer. He'll be glad to show you how fully GMC covers the hauling field.

GMC Truck & Coach Division of General Motors

GMC

GASOLINE & DIESEL TRUCKS

FROM ½ TO 20 TONS

GM

GENERAL MOTORS

Your key to greater hauling profits

Only GMC's Bring You All These Features

GMC Heavy-Duty Valve-in-Head Gasoline Engines. Built to deliver top power and to last longer. All GMC gas engines, from 96 to 200 H.P., have TOCCO-hardened crankshafts and Moraine airplane-type bearings, top efficiency lubrication, cooling, and carburetion systems.

GM 2-Cycle Diesel. Exclusive Power-on-Every-Downstroke Design increases power and smoothness with reduced weight and bulk. Unit Injectors eliminate high-pressure fuel lines, pumps, and manifolds.

SYNCHRO-MESH 5-Speed Transmissions, for clash-proof shifting.

Recirculating BALL-BEARING Steering reduces driver effort and fatigue.

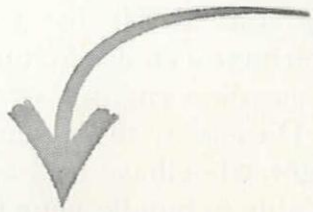
MASSIVE MODERN FRONT ENDS, with Frame-Mounted Bumper Stock Grilles. Radiator core is rubber-insulated, shielded in surrounding steel shell; fenders and grille separately removable.

ALL-WELDED, ONE-PIECE "SIX-FOOTER" CABS.

TRUCK-ENGINEERED FRAME—No Useless Dead Weight.

BARRETT* PROTECTIVE PRODUCTS
COVER EVERY PIPE-COATING NEED

1 **Pipeline Enamel**
2 **Millwrap Enamel**
3 **A.A. Enamel**
4 **Asbestos Felt**
5 **Materials for Special Uses**



BARRETT* MATERIALS FOR SPECIAL USES

BARRETT* CA-50 HEAVY-DUTY COLD APPLICATION COATING. Protects metal or concrete exposed to severely corrosive acid or alkali vapors in industrial plants . . . dam and flood control works . . . sewage disposal plants . . . wherever extra-heavy, durable protection is required.

BARRETT* ETERNIUM* PAINT. This high-quality coal-tar paint has been used successfully for many years to protect metal and woodwork in mines, chemical plants, or wherever corrosive conditions are severe.

BARRETT* 34 YB COLD APPLICATION COATING. Withstands corrosive conditions of waterfront and marine conditions, such as piers, ships, floating drydocks, and service vessels for off-shore oil and gas wells.

BARRETT* SERVICE CEMENT. The standard for many years for protecting field joints of welded pipe. This coal-tar "putty" is applied cold. No priming or torching of surface is required. Used with Barrett Pipeline Fabric.

BARRETT* PIPELINE FABRIC. This strong, durable, coal-tar saturated fabric is widely used as a reinforcing membrane or tape. Barrett Service Cement is used with it to protect field joints of pre-coated pipes.

BARRETT* INDUSTRIAL COATING. Provides corrosion control under the most punishing conditions of Industrial Plant corrosive exposures. For maximum resistance, this heavy-bodied liquid coal-tar paint is reinforced with inert minerals. Extreme cold does not affect it, and it also withstands dry heat of approximately 400° F.

✓ *Memo:* **FOR CORROSION ENGINEERS**

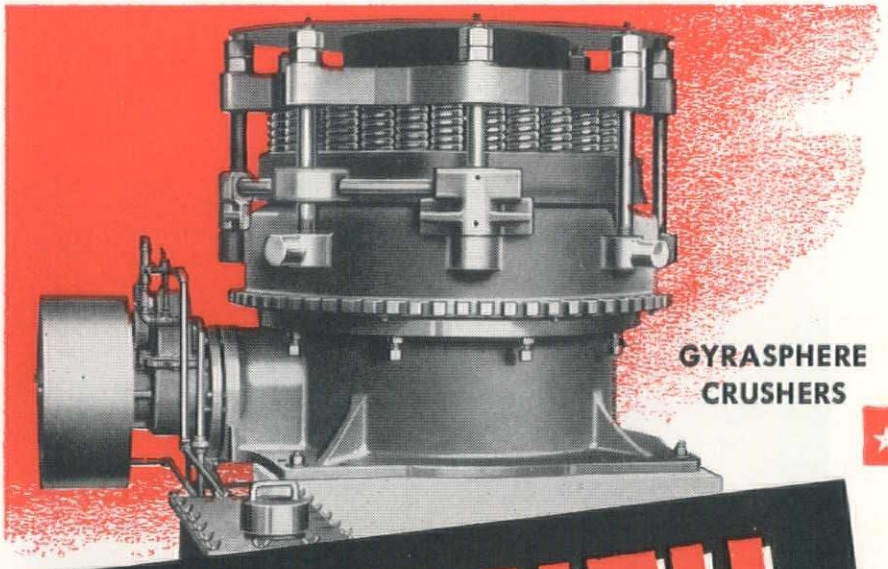
Attention to product quality, and knowledge of the service requirements of every product, explains why Barrett coal-tar coatings for special uses are so satisfactory and dependable.

The listing above covers only six of the many *Barrett Materials for Special Use.* The Barrett organization will be most happy to consult with you—without cost or obligation—on any special protective problems you may have. A satisfactory solution will almost certainly be found among Barrett's many, and moderately priced, specialized protective coatings.

Barrett*

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

*Reg. U. S. Pat. Off.



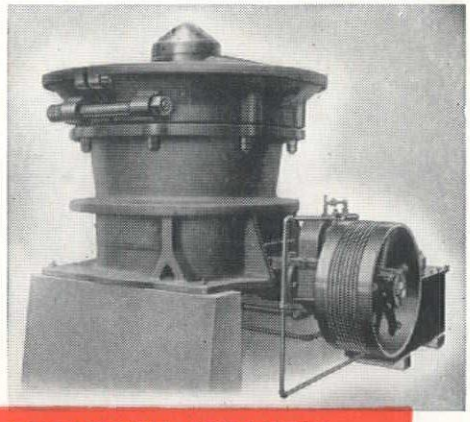
GYRASPHERE CRUSHERS

TELSMITH CRUSHERS

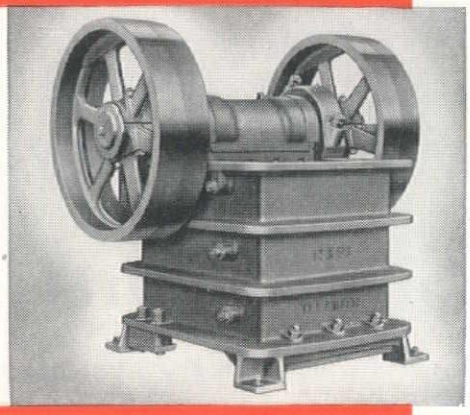
for

BETTER PRODUCT • BIGGER CAPACITY LOWER COST

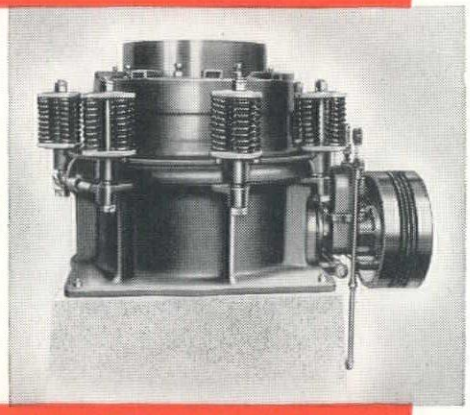
What do you want to crush? What size product do you want to make? Coarse . . . intermediate . . . fine . . . or a wide range of sizes? Telsmith Crushers can do it for you—most ***dependably***. You can be sure that Telsmiths will be right for your particular job ***always***. Because Telsmith builds crushers of ***all types***. And Telsmith Engineers have no reason whatever to be prejudiced for or against any one type of crusher. Consult Telsmith Engineers . . . get their unbiased recommendations for your plant. Find out how the latest features in modern crusher design give you top tonnage, exceptional product quality, low cost . . . get Crusher Guide No. 271, and Bulletin 274. C-7



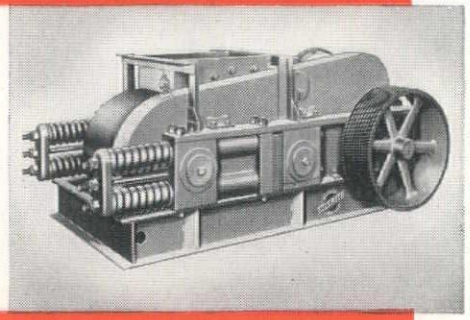
★ GYRATORY BREAKERS



★ JAW CRUSHERS



★ INTERCONE CRUSHERS



★ DOUBLE ROLL CRUSHERS

TELSMITH

PRIMARY CRUSHERS

Jaw Crushers: Sizes 10 x 16 in. to 30 x 42 in., 22 to 240 tons per hr. capacity.

Gyratory Breakers: Sizes 6-B to 25-B, 26 to 400 tons per hr.

SECONDARY CRUSHERS

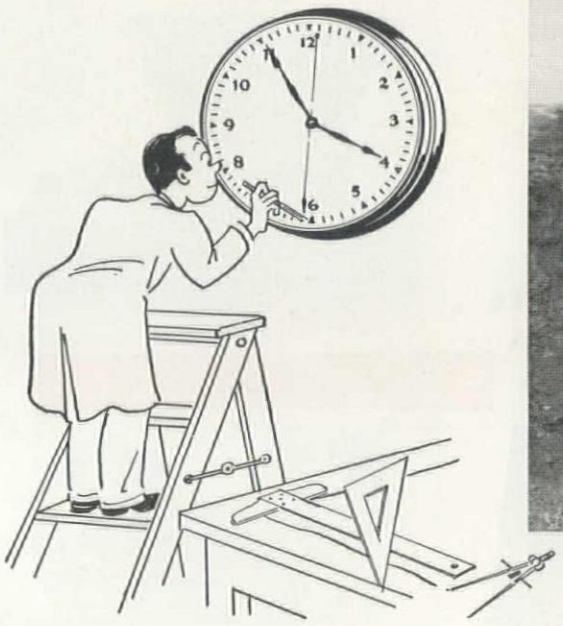
Gyrasphere: Sizes 24 to 48 in., 15 to 210 tons per hr. ***Intercone:*** Sizes 18 to 28 in., 26 to 68 tons per hr. ***Double Roll:*** Sizes 24 x 16 in. to 40 x 22 in., 75 to 132 tons per hr.

MINES ENGINEERING & EQUIPMENT CO.

369 Pine Street • SUtter 1-7224

SAN FRANCISCO 4, CALIFORNIA

Manufactured by SMITH ENGINEERING WORKS, MILWAUKEE 12, WISCONSIN



Split Half a Second into Sixteen Parts . . . *and you get a sensational improvement in blasting methods!*

Here's a picture that shows WHY the ROCKMASTER Blasting System pays off! Notice the rock in motion. And yet the explosive gases are held within the burden. No spectacular "spouts" of gas going to waste. Result: Greater explosives efficiency, better fragmentation, less vibration, greater safety.

In a ROCKMASTER blast, holes are electrically fired at controlled split-second intervals. The timing is in each electric blasting cap. The ROCKMASTER "16" series offers you a choice of sixteen millisecond delay detonators, all starting together, all firing at timed intervals in a little over half a second!

For rock, coal, ore—on the surface or underground

Your job may call for two, three or all sixteen ROCKMASTER detonators. We help you select them to fit your job. Drill pattern and explosives are based on what you want to accomplish. Many times, this means important savings in drilling and dynamite.

Write for your copy of the booklet on the ROCKMASTER "16" Blasting System. It includes diagrams for loading in quarrying, stripping, mining, construction.

Less Bark *More Bite*

ROCKMASTER "16" TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

Offices in Principal Cities

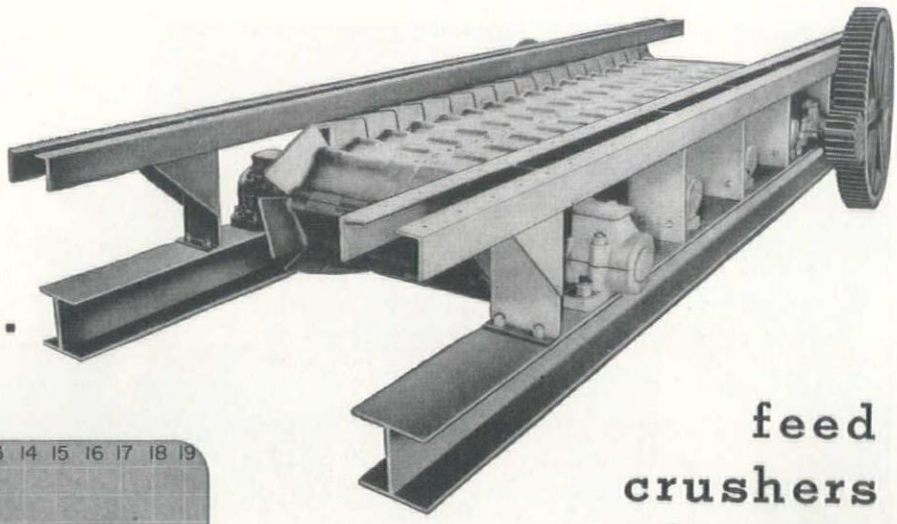
ATLAS EXPLOSIVES

"Everything for Blasting"

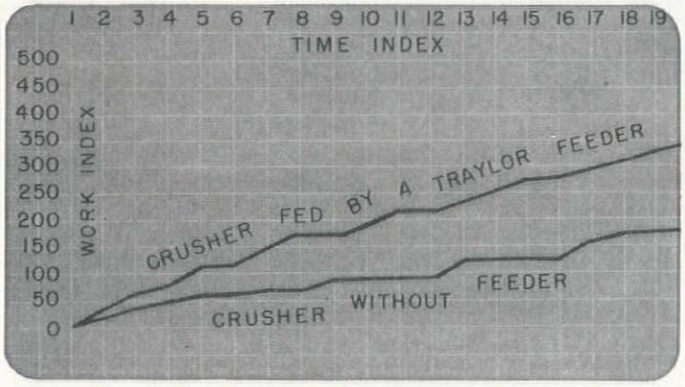
CHEMICALS ATLAS EXPLOSIVES

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

Double your aggregate Production...

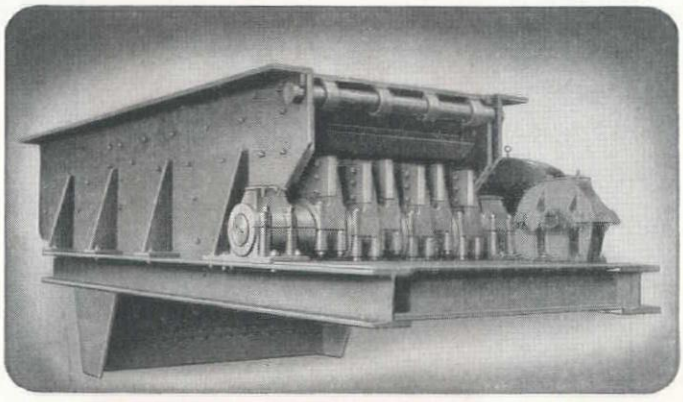


feed crushers evenly with TRAYLOR FEEDERS

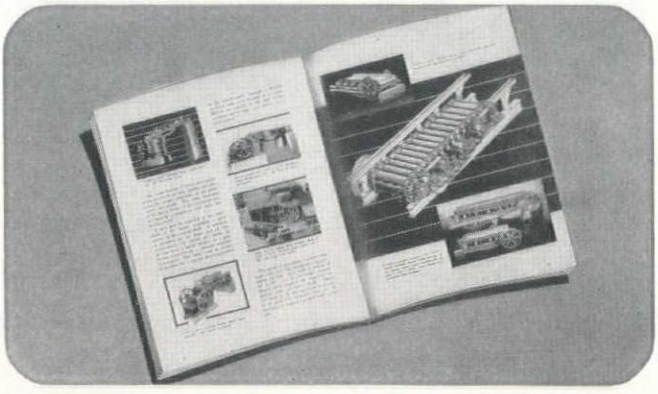


This chart clearly shows that a crusher evenly fed by a Traylor Feeder consistently produces more than twice as much as that same crusher without a feeder. That's because there are no peaks and valleys in the material supply.

Generally, any jaw or gyratory crusher is most efficient when working with a controlled feed of material. This is especially true in primary operations. Traylor all-steel Apron Feeders will increase crusher production by supplying a steady even flow of material at all times. Overlapping, heavy steel aprons and flanges maintain a solid surface . . . prevent material leakage. Widths from 30" to 84" in any practical length desired.



Traylor Grizzley Feeders have massive reciprocating bars of steel topped with renewable wear plates. These plates are suitably slotted to remove undersizes before they reach the crusher . . . all of the crusher production is used to reduce oversize. In sizes from 3' x 6' to 10' x 20'



FREE NEW FEEDER BOOKLET

Traylor builds a complete line of feeders for many purposes. Increase your profits by operating your crushers at their most efficient capacity. Write today for illustrated Bulletin 1114 which describes Traylor Feeders in detail.

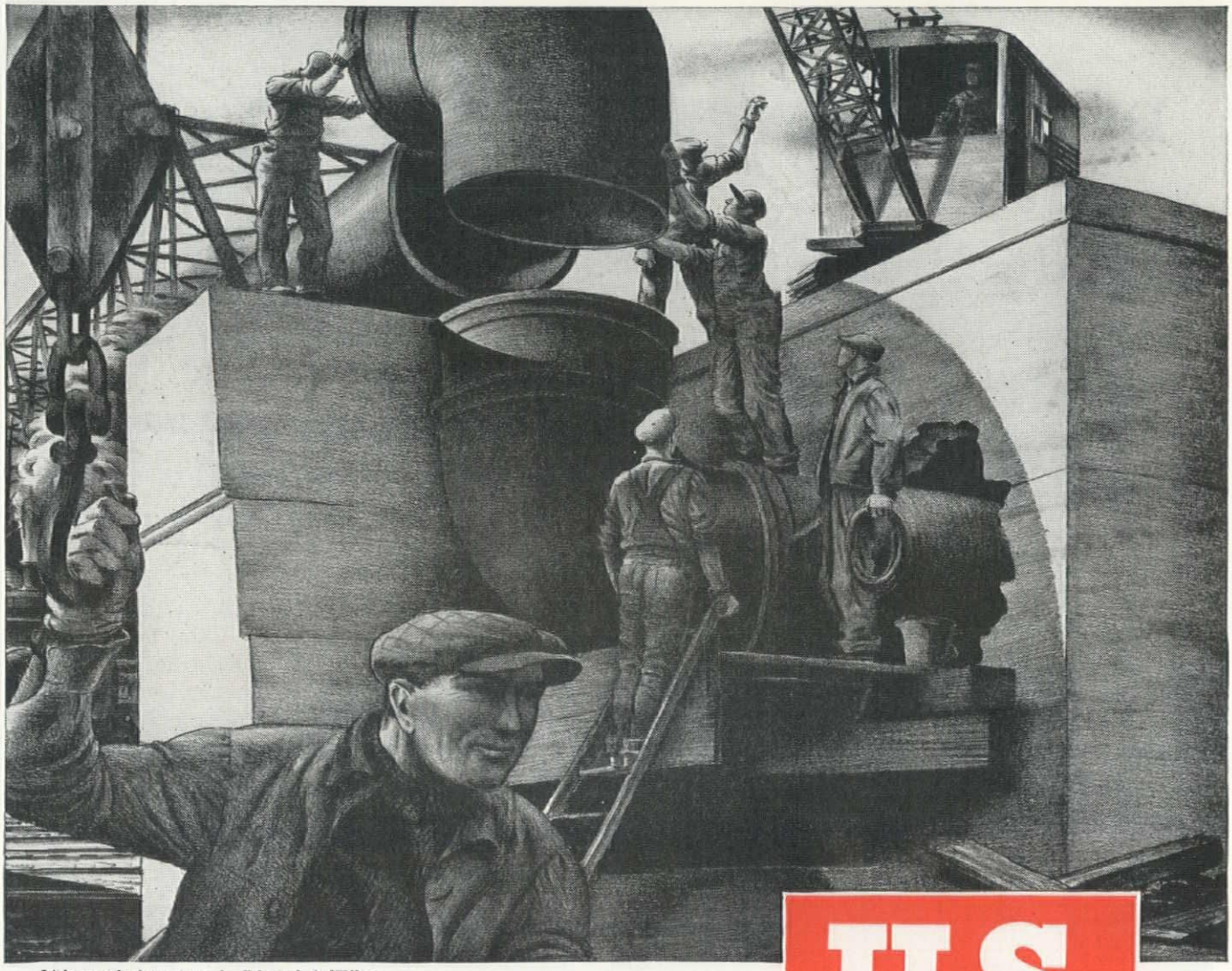
TRAYLOR ENGINEERING & MANUFACTURING CO.
391 Mill St., Allentown, Pa.

West Coast Branch: 919 Chester Williams Bldg., Los Angeles, California
Northwest Distr.: Balzer Machinery Company, 2136 South East 8th Ave., Portland, Oregon.

Traylor

Rotary Kilns, Coolers and Dryers
Grinding Mills • Crushing Rolls
Jaw, Reduction and Gyratory Crushers

A "TRAYLOR" LEADS TO GREATER PROFITS



Lithographed on stone by Edward A. Wilson

U.S. cast iron PIPE

FOR WATER, GAS, SEWERAGE AND INDUSTRIAL SERVICE

"Meet the customers' needs" has been our watchword for more than fifty years. Whether it's pipe seven feet, or a few inches, in diameter—or a complicated fitting—or a special casting—we have the equipment and the technical skills to meet almost any need for cast iron pressure pipe and fittings. Taking advantage of process developments and utilizing scientific methods to control quality, our plants are regularly manufacturing products that adequately meet our customers' exacting requirements. **United States Pipe and Foundry Co., General Offices: Burlington, N. J. Plants and Sales Offices Throughout U.S.A.**

NEW *Golden Anniversary* MACK TRUCKS

NOW! Money-Saving Mack Advantages...

Never Before Available in Popular-Size Trucks

No need now to settle for anything less than Mack stamina and economy in your lighter capacity trucks.

New *Golden Anniversary* "A" Series Mack Trucks now enable you to get the benefits of rugged Mack truck construction in every capacity down to 17,000 lbs. g.v.w.

Every inch and pound—from their sensational new Mack-built Magnadyne engines to their exclusive rubber Shock Insulated spring suspension—these new Macks are engineered in the same high quality Mack tradition as their famous forebears...built to handle their hauling jobs with all the enduring reliability and longer life which has marked Mack performance for half a century.

See these great new Macks at your nearest Mack branch or distributor. You'll find that for your lighter hauling jobs, they measure up in every respect to the standards you've grown to expect from dependable, long-wearing heavy-duty Macks.

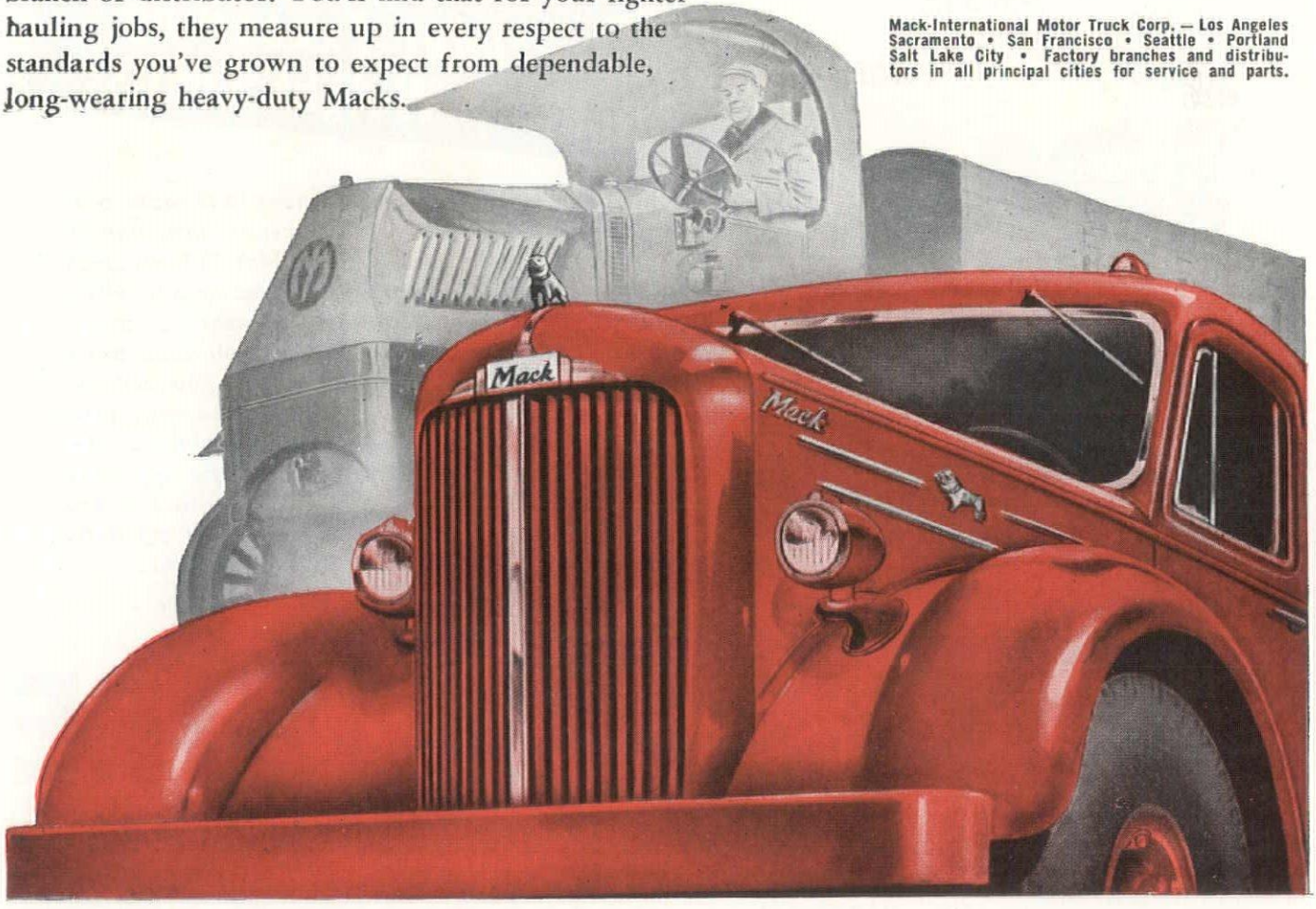
BE PROFIT-WISE

modernize with

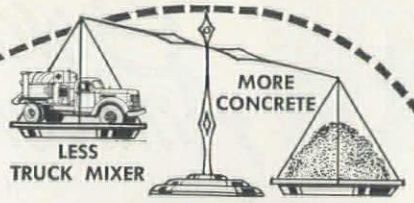
Mack TRUCKS

outlast them all

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



Now – with these New LOAD LIMIT SMITH-MOBILES, You Can Haul BIGGER PAYLOADS



. . . without Exceeding Highway Weight Limits!

Wouldn't you like to have your trucks haul *more concrete* and *less mixer* with a *lower capital investment?* You can do it with these new Smith-Mobile Load Limit Models. Deadweight is reduced to a minimum by eliminating parts and assemblies not necessary to mixer operation. This means you can haul full-rated truck mixer payloads and still meet highway load limitations. And you can do it without any compromise with quality, performance or sturdiness. Smith-Mobile is *the ONLY Load Limit truck mixer carrying the approved NRMCA rating plate.* Models are available in 2, 3, 4½ and 5½ yard sizes, with higher ratings for agitators. Get the complete story. Ask for Bulletin No. 247.

Your Smith-Mobile *LOAD LIMIT* Model can easily be converted to a Standard Smith-Mobile Truck Mixer or Agitator. A Standard Model can easily be converted to *LOAD LIMIT* Model.

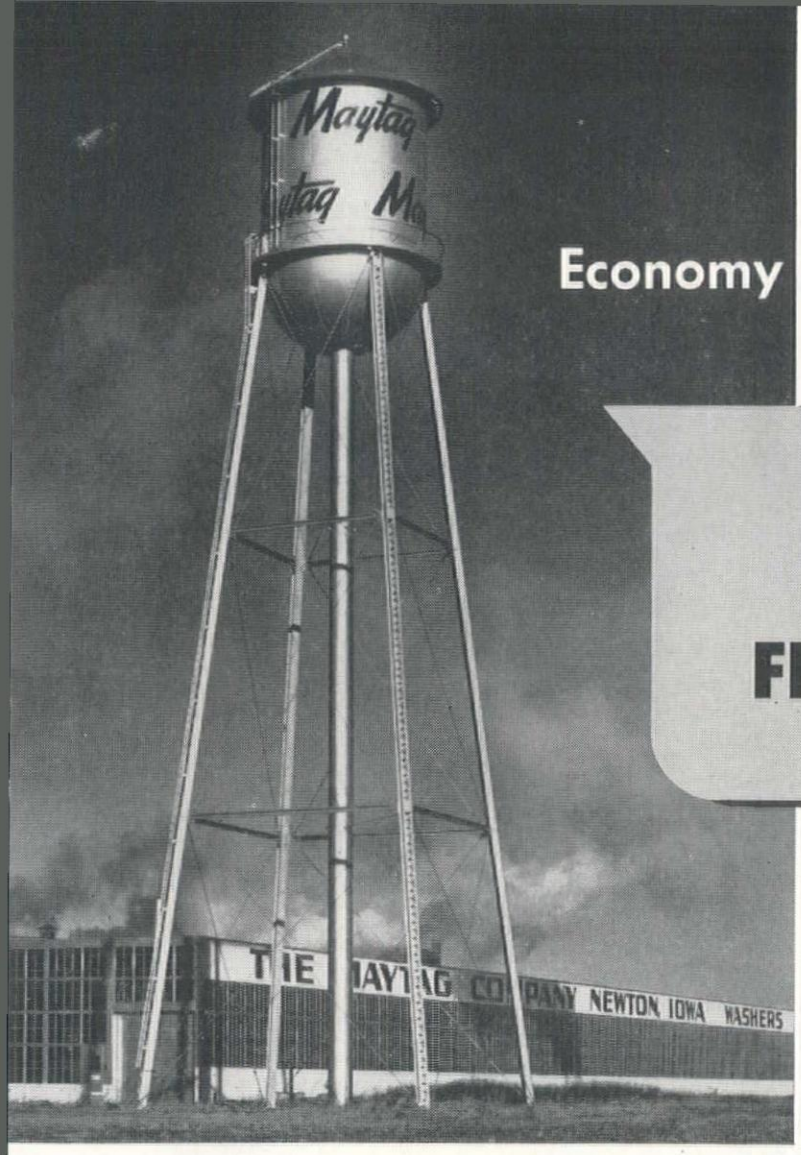
THE T. L. SMITH COMPANY
2871 N. 32nd St. • Milwaukee 10, Wisconsin, U. S. A.

SMITH MOBILE

Our 50th Anniversary – A HALF CENTURY OF PROGRESS BUILDING BETTER MIXERS!

1900 1950

Clyde Equipment Co., 1631 N.W. Thurman St., Portland 9, Ore.; **Clyde Equipment Co.**, 3410 First Ave. So., Seattle 4, Wash.; **Electric Steel Foundry Co.**, 2141 N.W. 25th Ave., Portland 10, Ore.; **Gunderson-Taylor Machinery Co.**, 970 Cherokee St., Denver 4, Colo.; **R. L. Harrison Co.**, 1801 North 4th St., Albuquerque, N. M.; **The Lang Co.**, 267 West First South, Salt Lake City 9, Utah; **McCoy Co.**, 6000 Colorado Blvd., Denver, Colo.; **McCoy Co.**, 518 North 3rd St., Sterling, Colo.; **Merrill-Brose Co.**, 11th and Howard Sts., San Francisco 3, Calif.; **Nevada Equip. Service, Inc.**, 1525 E. 4th St., Reno, Nev.; **Northland Machinery Co.**, 103 N. Richards Ave., Sidney 4, Mont.; **Pioneer Machinery Co.**, Gladstone and Lee Aves., Idaho Falls Idaho; **The Sawtooth Co.**, 715 Grove St., Boise, Idaho; **Shaw Sales and Service Co.**, 5100 Anaheim-Telegraph Rd., Los Angeles 22, Calif.; **Studer Tractor and Equipment Co.**, P. O. Box 779, Casper, Wyo.; **Westmont Tractor and Equip. Co.**, 150 E. Spruce St., Missoula, Mont.



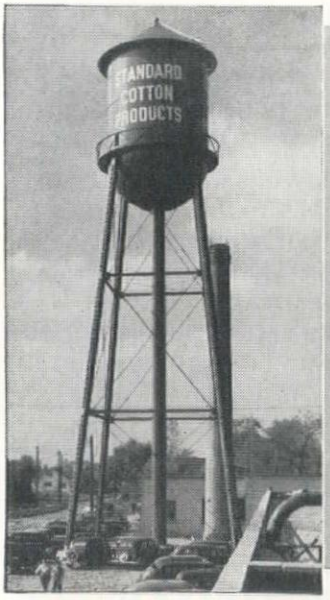
Economy in water supply

plus

Dependable FIRE PROTECTION

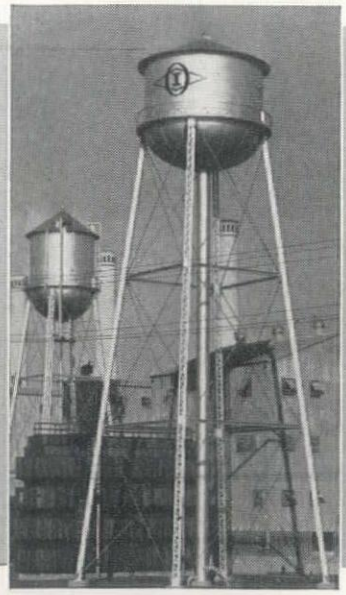
PITTSBURGH • DES MOINES

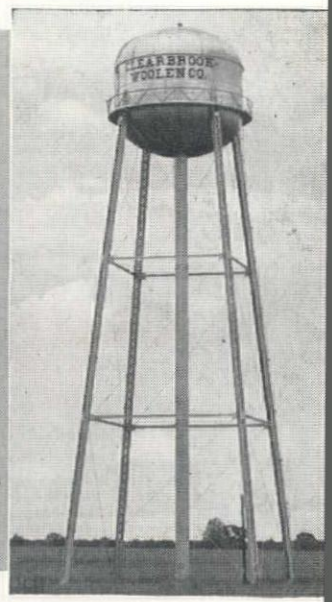
INDUSTRIAL *Elevated Steel Tanks*



Water for process use—for general plant needs—for ever-present sprinkler supply! You're *sure* of dependable water service and protection with storage in a Pittsburgh-Des Moines Tank—your satisfaction is guaranteed by the pioneer builder of elevated steel tanks since 1897. Let us quote on your requirements.

Write today for our complete Elevated Steel Tank Brochure





PITTSBURGH • DES MOINES STEEL CO.

Plants at PITTSBURGH, DES MOINES and SANTA CLARA

Sales Offices at:

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NEW YORK (7), . Room 919, 270 Broadway
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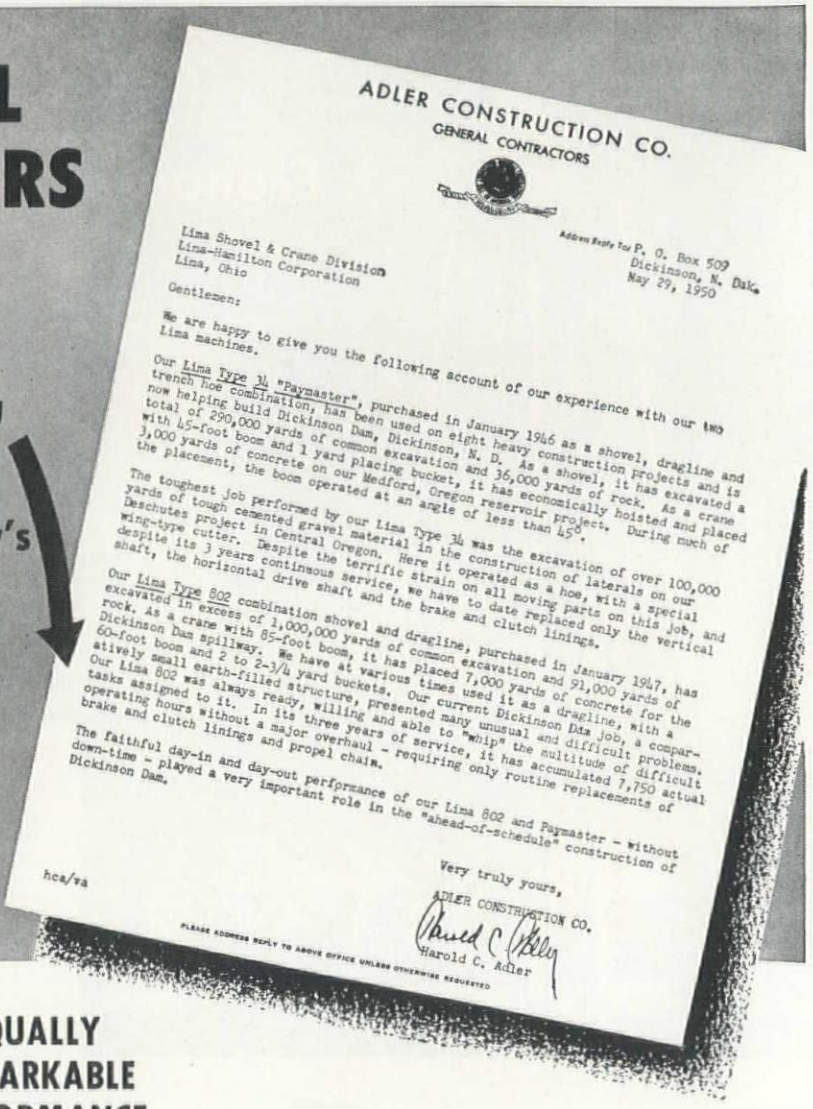
DES MOINES (8), ... 921 Tuttle Street
DALLAS (1), . . . 1225 Praetorian Building
SEATTLE . . . . . 928 Lane Street
SANTA CLARA, CAL. . . 627 Alviso Road

"7750 ACTUAL OPERATING HOURS WITHOUT A MAJOR OVERHAUL!"

That's Adler Construction Company's Experience with a

LIMA TYPE 802



ADLER CONSTRUCTION CO.
GENERAL CONTRACTORS

Address Reply to: P. O. Box 507
Dickinson, N. Dak.
May 29, 1950

Lima Shovel & Crane Division
Lima-Hamilton Corporation
Lima, Ohio

Gentlemen:

We are happy to give you the following account of our experience with our two Lima machines.

Our Lima Type 34 "Paymaster", purchased in January 1946 as a shovel, dragline and trench hoe combination, has been used on eight heavy construction projects and is now helping build Dickinson Dam, Dickinson, N. D. As a shovel, it has excavated a total of 290,000 yards of common excavation and 36,000 yards of rock. As a crane with 45-foot boom and 1 yard placing bucket, it has economically hoisted and placed 3,000 yards of concrete on our Medford, Oregon reservoir project. During much of the placement, the boom operated at an angle of less than 45°.

The toughest job performed by our Lima Type 34 was the excavation of over 100,000 yards of tough cemented gravel material in the construction of laterals on our Deschutes project in Central Oregon. Here it operated as a hoe, with a special wing-type cutter. Despite the terrific strain on all moving parts on this job, and despite its 3 years continuous service, we have to date replaced only the vertical shaft, the horizontal drive shaft and the brake and clutch linings.

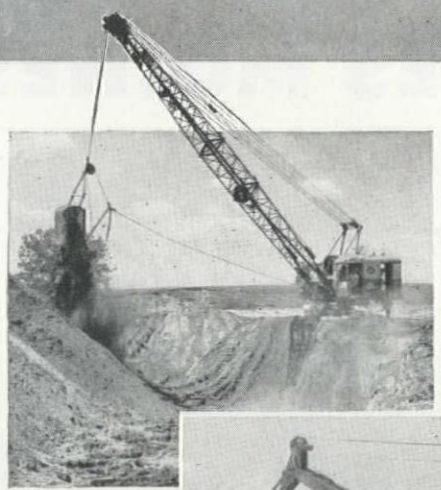
Our Lima Type 802 combination shovel and dragline, purchased in January 1947, has excavated in excess of 1,000,000 yards of common excavation and 91,000 yards of rock. As a crane with 85-foot boom, it has placed 7,000 yards of concrete for the Dickinson Dam spillway. We have at various times used it as a dragline, with a 60-foot boom and 2 to 2-3/4 yard buckets. Our current Dickinson Dam job, a comparatively small earth-filled structure, presented many unusual and difficult problems. Our Lima 802 was always ready, willing and able to "whip" the multitude of difficult tasks assigned to it. In its three years of service, it has accumulated 7,750 actual operating hours without a major overhaul - requiring only routine replacements of brake and clutch linings and propel chain.

The faithful day-in and day-out performance of our Lima 802 and Paymaster - without down-time - played a very important role in the "ahead-of-schedule" construction of Dickinson Dam.

hca/va

Very truly yours,
ADLER CONSTRUCTION CO.
Harold C. Adler

PLEASE ADDRESS REPLY TO ABOVE OFFICE UNLESS OTHERWISE REQUESTED



EQUALLY REMARKABLE PERFORMANCE IS REPORTED FOR A LIMA TYPE 34 PAYMASTER

This company's outstanding record in completing jobs ahead of schedule has been the subject of several feature articles appearing recently in construction magazines. In these articles, as well as in the accompanying letter, Adler gives his LIMA machines credit for playing a major role in these achievements.

Here is another case showing why it will pay you to consult a LIMA representative before you purchase your next shovel, crane or dragline. The LIMA line includes Shovels ¾ to 6 yards, Cranes to 110 tons and Draglines variable. Truck-mounted cranes in 20 and 35 ton capacities.

LIMA EQUIPMENT SOLD AND SERVICED BY:

Our Seattle Office: 1932 First Avenue So., Seattle 4, Washington
Our San Francisco Office: 1232 Hearst Bldg., San Francisco 3, California

SALES AGENTS:

Acme Iron Works, Culebra Ave. at Expressway, N.W., San Antonio, Texas
Cascade Industrial Supply, 515 Market St., Klamath Falls, Oregon
Contractors' Equipment & Supply Co., P. O. Box 456, Albuquerue, New Mexico
Feenaughty Machinery Co., 112 S.E. Belmont St., Portland 14, Oregon
Feenaughty Machinery Co., 600 Front St., Boise, Idaho
Foulger Equipment Co., Inc., 1361 South Second Street West, Salt Lake City 8, Utah
Garfield and Company, 1232 Hearst Bldg., San Francisco 3, Calif.
Jameson Engineering Sales, 573 Dexter Horton Bldg., Seattle, Wash.
McCoy Co., 3201 Brighton Blvd., Denver 5, Colorado
Modern Machinery Co., Inc., 4412 Trent Ave., Spokane 2, Washington
Smith Booth Usher Co., 2001 Santa Fe Ave., Los Angeles 54, Calif.
Tulsa Equipment Co., Inc.,
418 East 2nd St., Tulsa 3, Oklahoma

Lima Shovel and Crane Division

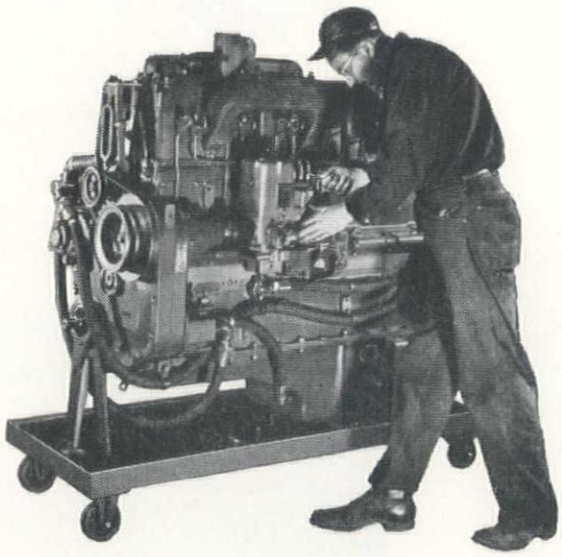
LIMA, OHIO

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

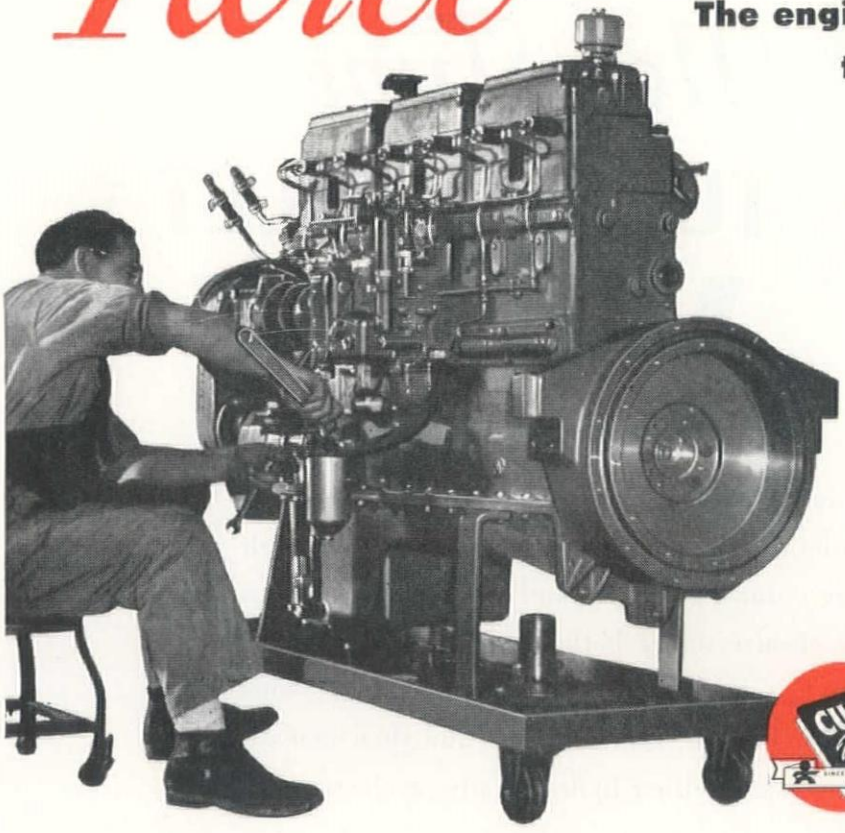
LIMA HAMILTON CORPORATION

Cummins® Custom-built Diesels

Built not once but Twice



The engine that's built better to give power at lower cost



Why is a lightweight, high-speed Cummins Diesel the best buy in economical, dependable power? *Because every* part of *every* engine is made under strictest quality control methods. Each engine also is actually built *twice*. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected—after that it is re-assembled and tested *again*.

Perfection in engine craftsmanship . . . Cummins exclusive fuel system . . . an unexcelled service and parts organization . . . mean that rugged, dependable Cummins Diesels make more profits for power users.

There's a model for your power needs. Contact your Cummins dealer. He has more facts to show you about making more profits with

Diesel power by CUMMINS

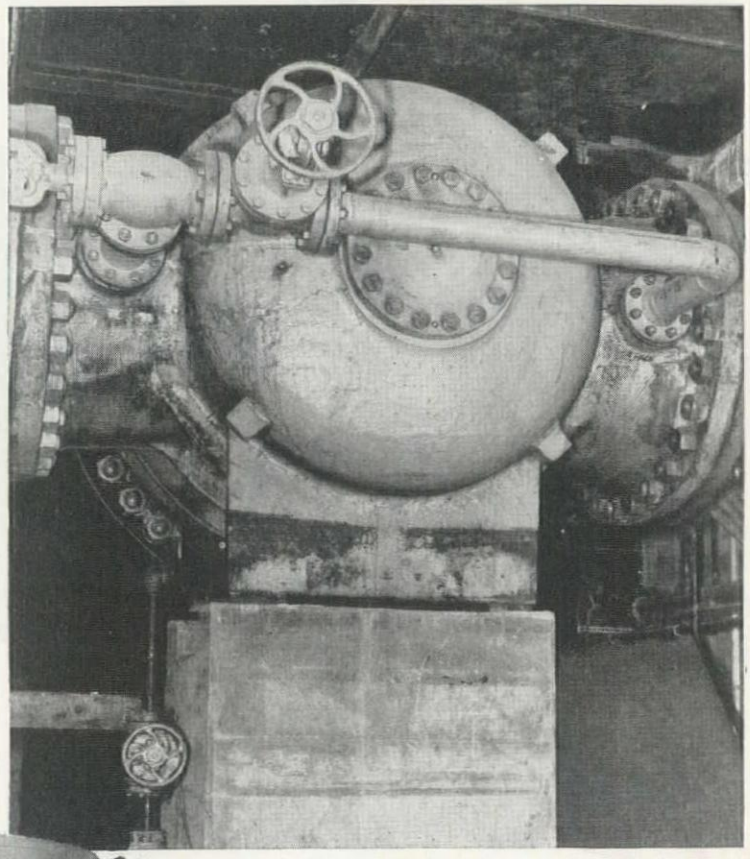
CUMMINS Dependable DIESEL

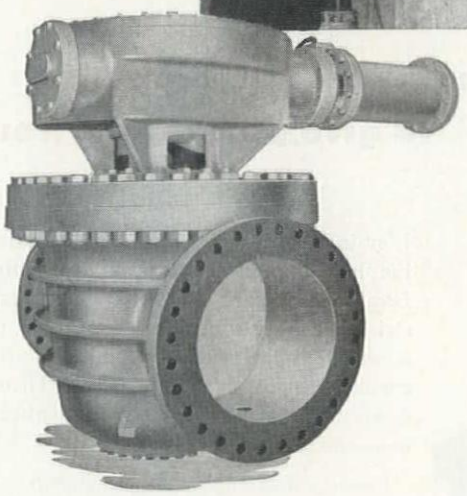
TRADEMARK REG. U.S. PAT. OFF.

CUMMINS ENGINE COMPANY, INC. · COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
Columbus, Indiana, U.S.A. · Cable: Cumdiex

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks · off-highway trucks · buses · tractors · earth-movers · shovels · cranes · industrial locomotives · air compressors logging yarders and loaders · drilling rigs · centrifugal pumps generator sets and power units · work boats and pleasure craft.





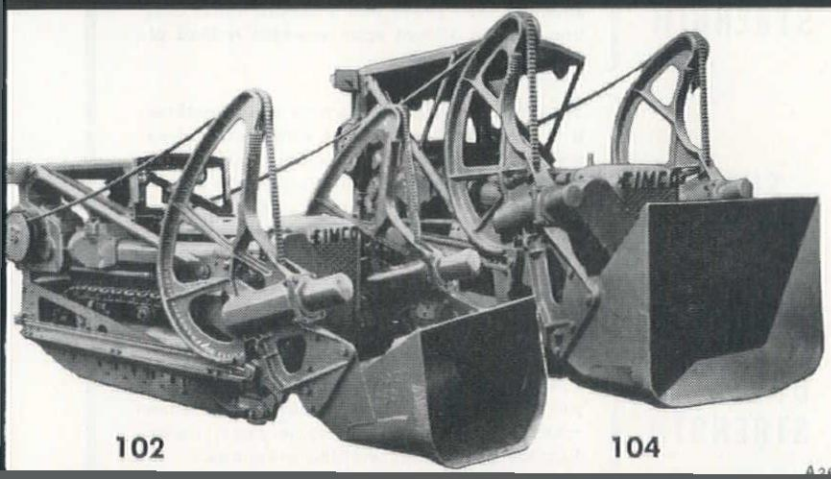
New Type TURBINE INLET VALVE

Striving for greater achievement, we have applied the Smith Rotovalve to hydro-turbine inlet service. The full circular opening through its body and conical plug reduces head loss and penstock turbulence to a minimum. Positive closure under both normal and emergency conditions is achieved by a mechanical operating mechanism which lifts the plug axially from its seat, rotates it 90° and then reseats. The mechanism may be actuated either hydraulically or electrically.

S. MORGAN SMITH Co.
YORK, PENNA. U.S.A.

Rock Loading

10–15 Second Cycle



102 104

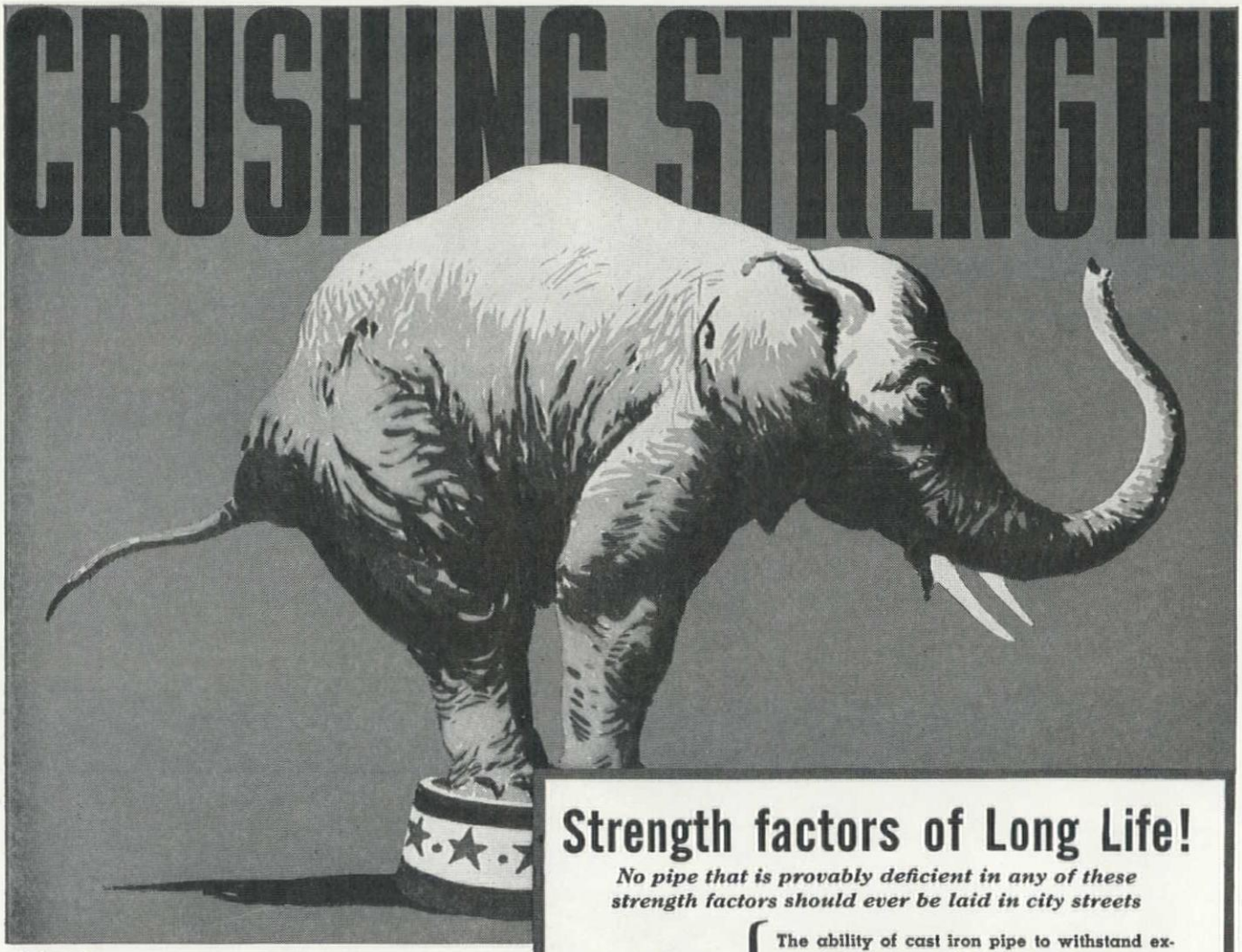
The 104 Eimco RockerShovel above is loading limestone into 8 ton mine cars. The capacity of the 104 is equal to their 2 yard power shovel and the 104 is used for such auxiliary jobs as moving track, bulldozing, etc.

Continuous high speed loading into trucks is possible when sufficient haulage equipment is available. The 104 bucket cycle of 10 to 15 seconds makes it possible to load 250 to 300 tons per hour. Speed, power and versatility of the Eimco 104 will lower maintenance costs as well as initial investment — with no sacrifice in tonnage. Write for more information.

EIMCO

A266

CRUSHING STRENGTH



Without crushing strength—or, for that matter—without all of the strength factors listed opposite—no pipe laid 100 years ago in *city streets* would be in service today. But, in spite of the evolution of traffic from horse-drawn vehicles to heavy trucks and buses—and today's vast complexity of subway and underground utility services—cast iron gas and water mains, laid over a century ago, are serving in the streets of more than 30 cities in the United States and Canada. Such service records prove that cast iron pipe combines all the strength factors of long life with ample margins of safety. No pipe that is provably deficient in any of these strength factors should ever be laid in city streets. Cast Iron Pipe Research Association, Thos. F. Wolfe, Engineer, 122 So. Michigan Ave., Chicago 3.

CAST IRON

Strength factors of Long Life!

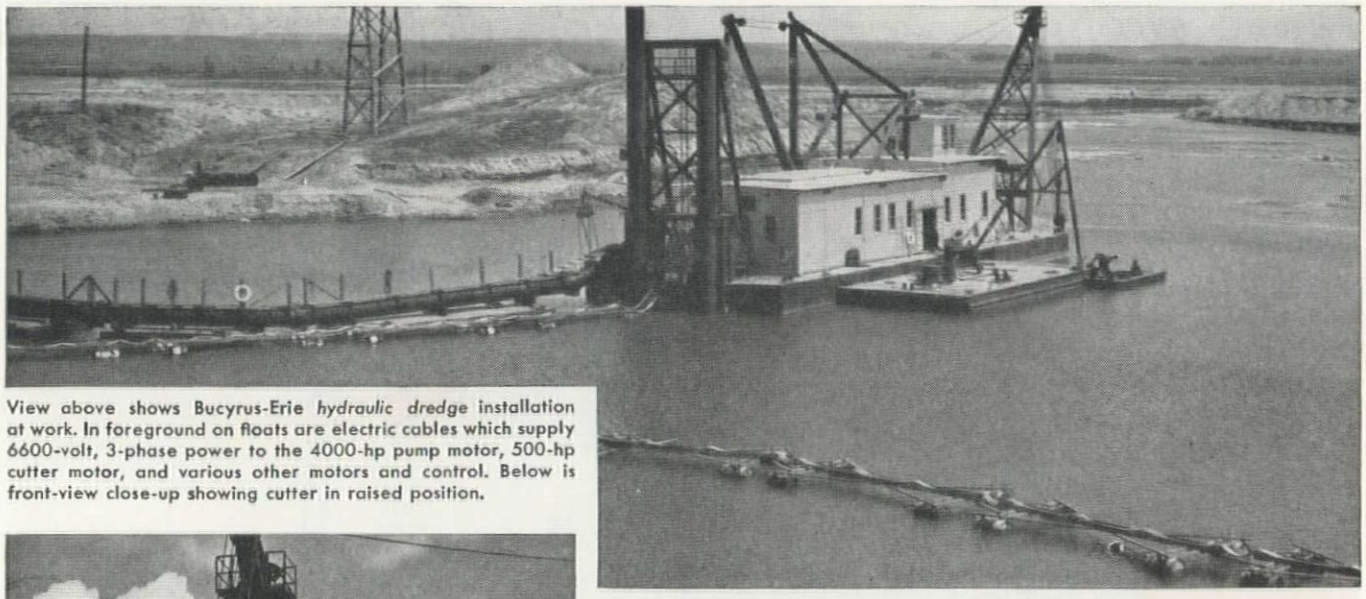
No pipe that is provably deficient in any of these strength factors should ever be laid in city streets

CRUSHING STRENGTH — The ability of cast iron pipe to withstand external loads imposed by heavy fill and unusual traffic loads is proved by the Ring Compression Test. Standard 6-inch cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

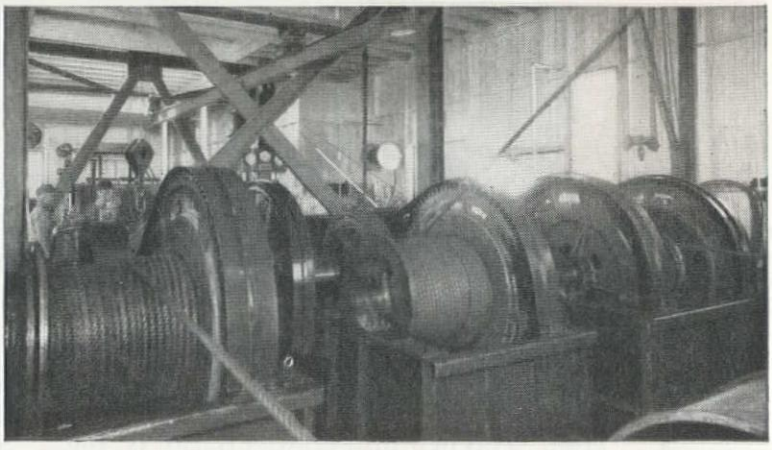
BEAM STRENGTH — When cast iron pipe is subjected to beam stress caused by soil settlement, or disturbance of soil by other utilities, or resting on an obstruction, tests prove that standard 6-inch cast iron pipe in 10-foot span sustains a load of 15,000 lbs.

SHOCK STRENGTH — The toughness of cast iron pipe which enables it to withstand impact and traffic shocks, as well as the hazards in handling, is demonstrated by the Impact Test. While under hydrostatic pressure and the heavy blows from a 50 pound hammer, standard 6-inch cast iron pipe does not crack until the hammer is dropped 6 times *on the same spot* from progressively increased heights of 6 inches.

BURSTING STRENGTH — In full length bursting tests standard 6-inch cast iron pipe withstands more than 2500 lbs. per square inch internal hydrostatic pressure, which proves ample ability to resist water-hammer or unusual working pressures.



View above shows Bucyrus-Erie *hydraulic dredge* installation at work. In foreground on floats are electric cables which supply 6600-volt, 3-phase power to the 4000-hp pump motor, 500-hp cutter motor, and various other motors and control. Below is front-view close-up showing cutter in raised position.



Inside, these hoist cable drums are driven by G-E motors. After ten years of rough duty, this fully electrified dredge continues to give top performance for its owners.

Vacuum-cleaning RIVERS . . . *Electrically*

This electrically driven hydraulic dredge is a pretty rugged looking "vacuum cleaner." But biting-into and sucking-up river bottoms is a rugged job—though it does require accurate control. That's why Bucyrus-Erie uses *electric drives* in most dredge installations.

Electrified construction equipment is being used more and more to handle difficult jobs—jobs that require smooth, completely dependable operation. With G-E power distribution systems supplying the voltage and G-E motors and control driving your equipment, you are assured of all the benefits of electrification plus G-E engineering assistance in application, installation, and service—wherever the job may be. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

WESTERN PLANTS OR SERVICE SHOPS: Anaheim, Denver, Los Angeles, Oakland, Ontario, Portland, Richland, Salt Lake City, San Diego, San Francisco, San Jose, Seattle. WESTERN SALES OFFICES: Bakersfield, Butte, Denver, Eugene, Fresno, Los Angeles, Medford, Oakland, Pasco, Phoenix, Portland, Riverside, Sacramento, Salt Lake City, San Francisco, San Diego, San Jose ,Seattle, Spokane, Stockton ,Tacoma.

Ask him Today!

Whether you buy or build construction equipment, your G-E representative can show you how to do a better job—at lower cost—by complete electrification. Write him now, and he'll call on you at your convenience.

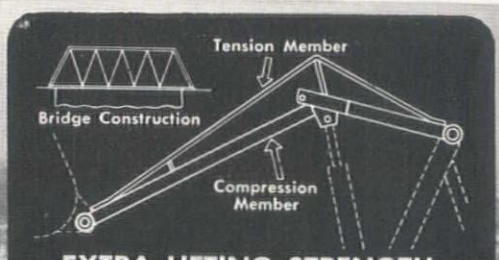
Electrified Construction
BETTER PRODUCT
LOWER COST

GENERAL ELECTRIC

664-11

Operators Agree...

there's NO WINTER LAYOFF for a LULL Shoveloader



EXTRA LIFTING STRENGTH

Lull Shoveloaders are equipped with lifting arms of rugged bridge-like construction. They are designed to give maximum lifting strength without bulkiness and to eliminate twisting or swaying even under maximum loads.

SNOW IS NO PROBLEM . . . for a LULL SHOVELOADER

You'll find Shoveloaders working on city streets, at airports, in the country, and around industrial plants, pushing . . . piling . . . plowing . . . or loading snow with their usual cost cutting efficiency.

Lull Shoveloaders are designed with more weight to the rear of tractor for easier handling and greater traction . . . both mighty important factors in winter operation. Power down crowd instantly controlled by operator permits a quick break through of hardest packed, heavy wet or even deep crusted snow. Ideal for clearing the way for heavy traffic or other operations. These are but a few of many reasons more and more experienced operators agree . . . there's NO WINTER LAYOFF for Lull Shoveloaders.

LONG FORWARD REACH permits Lull Shoveloader to fully load truck bodies from the rear, using only one lane of traffic and eliminating extra time consuming maneuvering.

EIGHT VALUE-PACKED MODELS

Eight models with a wide variety of interchangeable attachments make Lull Shoveloaders the most versatile equipment you can own.

Get LULL SHOVELOADER FACTS today. MAIL THIS COUPON NOW!

LULL Manufacturing Company
3612 East 44th Street, Minneapolis 6, Minn.

LULL Manufacturing Company
3612 East 44th Street Minneapolis 6, Minn.

Designers and Builders of
The Largest Line of Allied Equipment
for Industrial Wheel Type Tractors

Please send illustrated literature on:
LULL SHOVELOADER
AND ATTACHMENTS

Name..... Title.....

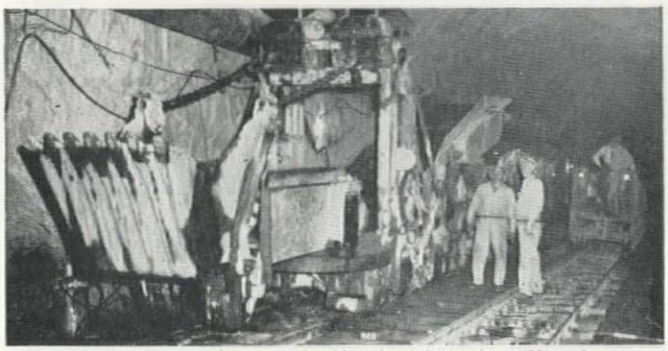
Company .....

Address .....

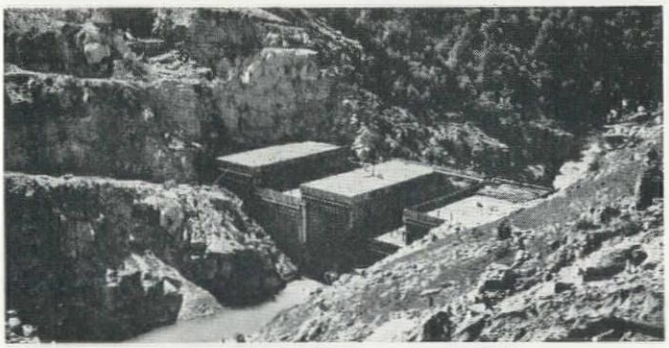
City..... State.....

SHOVELOADERS ● UNIVERSAL LOADERS ● FLUID-DRIVEN SWEEPERS ● LULLDOZERS ● SHOULDER MAINTAINERS

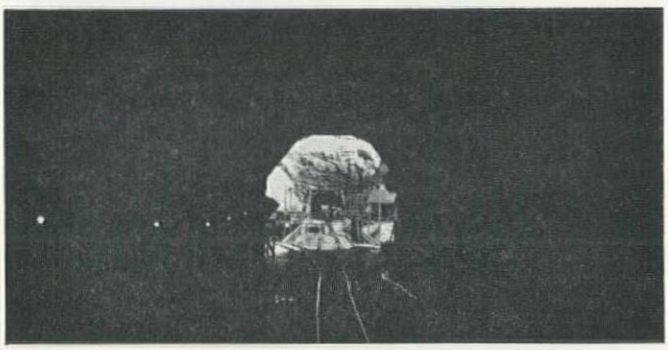
Southern California Edison Breaking Own World's Record With General Petroleum Products



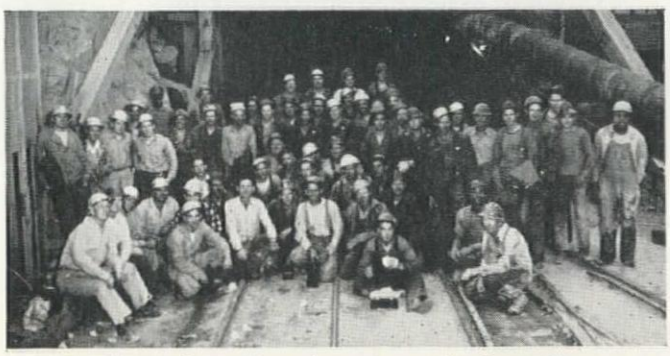
Huge scooper in tunnel of Bechtel-Morrison-Knudsen project at Big Creek Dam for Southern California Edison Company.



View of Big Creek Dam at Auburry, California.



Mouth of Big Creek Dam Tunnel.



Crew of tunnel workers at mouth of tunnel.

New construction records are being set at Southern California Edison's #4 Plant on the San Joaquin River. The two world-wide contracting firms of Morrison-Knudsen and the Bechtel Corporation combine the know-how of their capable organizations in this $19,000,000.00 project consisting of a power house, a 245 foot dam utilizing 250,000 cubic yards of concrete, and a two-mile horseshoe type of tunnel 10,500 feet long and 24 feet in diameter.

Construction started on July 1st, 1949 and a two-year completion schedule was established. Within ten months the halfway mark had been reached and it is now apparent that the plant will be in operation at least 6 months ahead of schedule. Already a world's record has been set in the building of the dam, breaking a previous Southern California Edison record and present indications are that other records will be set upon completion of the project.

Credit for the feat goes to careful planning, an expert professional crew, and to the operation and maintenance of the 115 major pieces of motorized equipment on the job. The entire project is fueled and lubricated with General Petroleum products and the outstanding record of equipment performance is a testimonial to the quality of these products and the all inclusive service provided by General Petroleum lubrication engineers.

Take Advantage of this G. P. Service

The G. P. Lube-Engineer is an expert trained to save you money through proper lubrication. The preventive-maintenance program he will put into effect for your equipment will result in longer machinery life, simplified lubrication methods, less buying and stocking problems.

GENERAL PETROLEUM CORPORATION
—using nature's gift to better mankind

Mobilgas

Left to Right: H. L. Leventon, Project Manager, Big Creek Dam; L. C. Wicks, Master Mechanic; D. G. Tait, General Petroleum Representative.

Here's Where SPEED PAYS OFF!

YOU CAN MOVE BIG LOADS FASTER on Firestone TIRES

SPEED on the job means profit on the job. You know how much more money you make when you move big loads fast — without profit-killing down-time.

You pile up yardage faster and cut the down-time with Firestone Tires on your equipment. Because their treads are so designed to provide greater productive efficiency and the cord body so engineered to stand up under big loads and high speed operations, Firestone Tires take the roughest punishment and still keep your payloads moving.

The records of off-the-highway operators the country over prove this, and you can prove it too by giving Firestone Tires a trial on your equipment. Let your Firestone Dealer or Store give you all the facts and show you how Firestone Tires will cut your expenses and step up your profits.

Listen to the Voice of Firestone on radio or television every Monday evening over NBC

GROUND GRIP • EARTH MOVER • ALL TRACTION • ROCK GRIP

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES SPECIFY FIRESTONE OFF-THE-HIGHWAY TIRES

NEW International 6-wheel Trucks

give you balanced *Heavy-Duty Engineering*

America's most popular heavy-duty trucks now come to you in new 6-wheel models, ranging in GVW from 22,000 to 45,000 pounds.

The International models in this complete new line are all outstanding products of balanced heavy-duty engineering. This means that every model is carefully balanced for lower operating costs, for longer truck life, for better all-round operation.

You get the proved heavy-duty engineered value that has kept International first in heavy-duty truck sales for 18 straight years. You get traditional stamina plus new operating economy, new comfort, new ease of handling.

You can see proof of heavy-duty engineered stamina in the new frame, new bogie, and new spring-and-saddle assembly. You can see proof of operating economy in the combustion chamber design of the new Super Blue Diamond and Super Red Diamond power plants. You can see proof of super-comfort and super-visibility in the new Comfo-Vision Cab—"roomiest cab on the road"... proof of steering ease in new Super-steering.

And that's not all. You can see proof of the advanced nature of this new balanced engineering throughout every 6-wheel model. One typical example is the new third differential. This new differential takes the place of the power divider, eliminates need for an extra propeller shaft, and makes practical shorter 6-wheel units.

Get the complete story about these new 6-wheel versions of America's most popular heavy-duty trucks. Find out why they mean more money in YOUR pocket. See your nearest International Truck Dealer or Branch.

International Harvester Builds
McCormick Farm Equipment and Farmall Tractors
Motor Trucks . . . Industrial Power
Refrigerators and Freezers

ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO

There will be no *THIN SPOTS* in an Adnun Laid Road!

The gauging will always check accurately on an Adnun job!

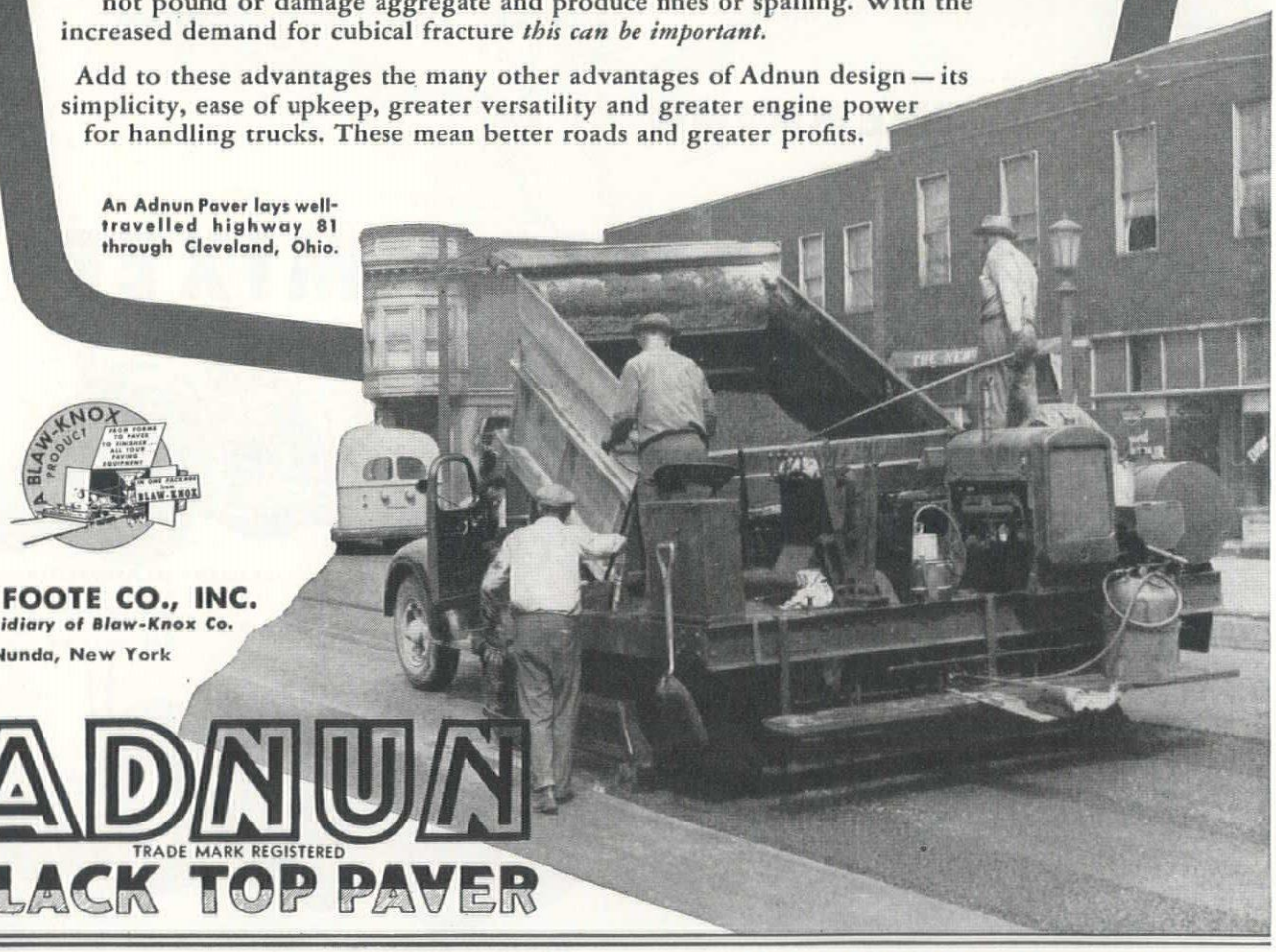
COURSE thickness remains uniform in an Adnun laid road regardless of base course irregularities — *there will be no thin spots* where road breakdown can begin.

The correction of any error is instantaneous at a touch of the hand wheel and action is positive and mechanical and is not dependent on the sometimes doubtful action of hydraulic mechanism, nor does the screed have to wait 'til it has climbed to a new position to make the correction.

The action of the screed is a slow, even, slicing action. There is no tearing of the surface due to jerky steering or grade roughness. Slow-speed screed action does not pound or damage aggregate and produce fines or spalling. With the increased demand for cubical fracture *this can be important.*

Add to these advantages the many other advantages of Adnun design — its simplicity, ease of upkeep, greater versatility and greater engine power for handling trucks. These mean better roads and greater profits.

An Adnun Paver lays well-travelled highway 81 through Cleveland, Ohio.



THE FOOTE CO., INC.
Subsidiary of Blaw-Knox Co.
Nunda, New York

ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER

WESTERN MACHINERY COMPANY
Phoenix, Arizona

C. H. GRANT COMPANY
San Francisco, California

LEROI-RIX MACHINERY COMPANY
Los Angeles, California

LIVELY EQUIPMENT COMPANY
Albuquerque, New Mexico

CONTRACTORS EQUIPMENT COMPANY
Portland, Oregon

COLORADO BUILDERS' SUPPLY CO.
Denver, Colorado

LANG COMPANY, INC.
Salt Lake City, Utah

AIR-MACK EQUIPMENT CO.
Seattle, Washington

WESTERN EQUIPMENT COMPANY
Spokane, Washington; Boise, Idaho Falls, Idaho

RECORD-BREAKING DEMAND FOR THE NEW SEAMAN MIXER

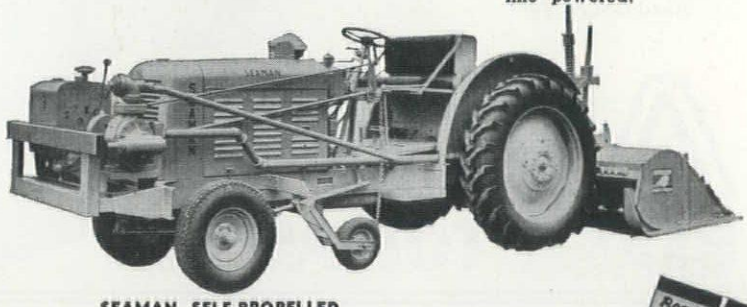
TO CUT ROAD BUILDING COSTS . . . IMPROVE MIXING QUALITY . . . INCREASE HOURLY PRODUCTION . . .

Since the announcement of the NEW 1950 SEAMAN MIXERS, the demand is probably greater than has ever before existed for any road mixing equipment.

Contractors, highway engineers, states, counties and municipalities have found in the NEW SEAMAN Self-Propelled MIXER and the NEW SEAMAN Self-Propelled TRAV-L-PLANT such great versatility in forward mixing speeds that they match every condition and every material with top efficiency in performance. Greater output . . . greater mixing depths, and an unsurpassed quality of mix.

Then there's also the NEW Motorized SEAMAN Pull-Type Mixer (not illustrated) in which mixing rotor speeds are controlled by a selective speed transmission to compensate for variances in material and in the forward speeds of the towing tractors . . . Write for the two Bulletins describing the NEW SEAMAN models. It will be well worth your while!

SEAMAN SELF-PROPELLED MIXER
7 forward mixing speeds, road gear and reverse.
7 ft. mixing width. Diesel or gasoline powered.



SEAMAN SELF-PROPELLED TRAV-L-PLANT
All Self-Propelled advantages plus spray bar, pump, pump tachometer and tachometer wheel. 7 ft. mixing width. Diesel or gasoline.

SEAMAN MOTORS, Inc.
297 N. 25TH STREET
MILWAUKEE 3, WIS.

Send for these two NEW SEAMAN BULLETINS — describing the Self-Propelled MIXER, the Self-Propelled TRAV-L-PLANT, and the Motorized Pull-Type MIXER. Both just off the press.

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT RPM Tractor Roller Lubricant

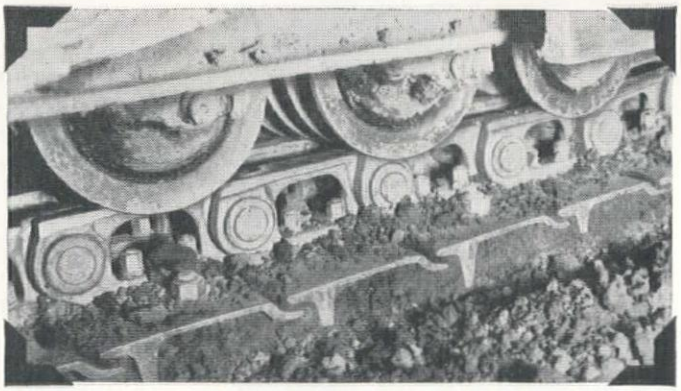
UNIT Track bearings — International TD-6 Bulldozer

CONDITIONS Continual shock loads working on pavement

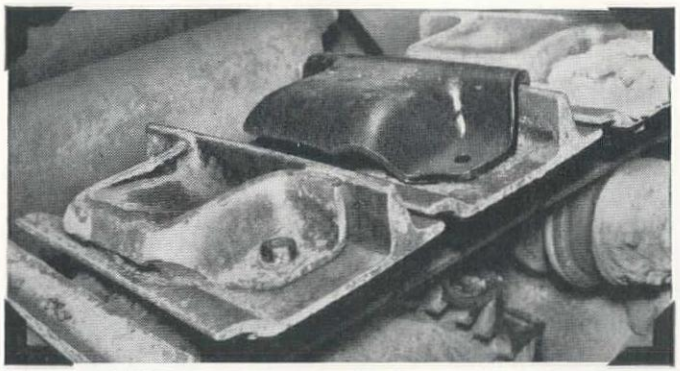
PERIOD 2 years

FIRM Barrett + Hilp, San Francisco

Track-roller bearings last twice as long as expected!



CONTINUALLY POUNDED BY SHOCK LOADS from working on pavement, track-roller bearings greased with RPM Tractor Roller Lubricant have been in service on this tractor for 3325 hours. They are still in good condition despite the fact that they have already doubled their normal life-span. The unit has had many different operators in the two years it has worked. All work has been bulldozing back-fill of trenches on streets or moving from job to job on other pavement. Under these conditions, Vernon Dresser, Head Mechanic on the job for Barrett & Hilp, expected, at the most, 1500 hours service from the bearings.



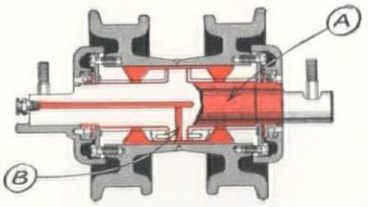
WORN STREET PAD on the track. In use only 18 months, its excessive wear indicates the tough street service the tracks have had. Note the new pad, right, placed alongside for comparison. The tractor has worked in a variety of climates, including one job in a series of dust storms in summer temperatures over 100° in the shade.

REMARKS: There are three grades of RPM Tractor Roller Lubricant—Light, Medium, and Heavy to meet all operating conditions in International and Caterpillar track-roller bearings. For Allis-Chalmers, RPM Tractor Roller Lubricant—A.C. Type is recommended.

RPM

TRADEMARK "RPM" REG. U.S. PAT. OFF.

How RPM Tractor Roller Lubricant resists wear in the toughest service



It flows evenly to all bearing surfaces; lubricates and retards rust formation.

A. Contains chemical anti-wear agent—maintains tough lubricating film.

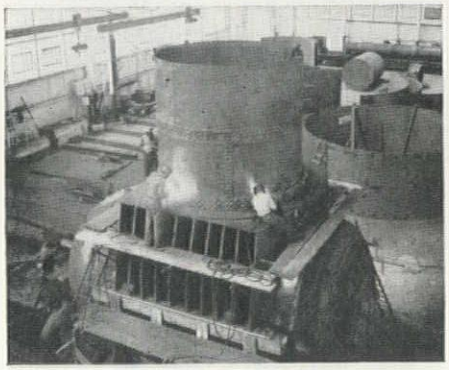
B. Has improved stringiness compound—sticks on surfaces, resists leakage, helps keep protective grease seal outside bearings.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

SURGE Tanks at Fort Peck

. . . at the world's largest earthfill dam

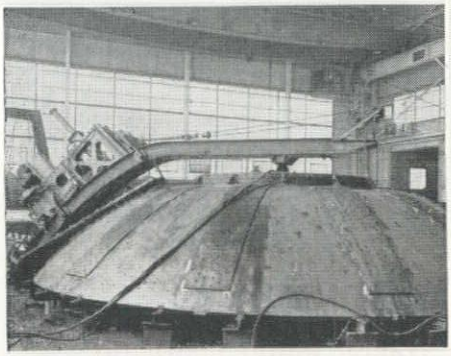


1. Each of the three surge tanks has a riser pipe which is connected to the penstock by a specially-reinforced saddle flange. The view above shows this flange being welded to the riser pipe.

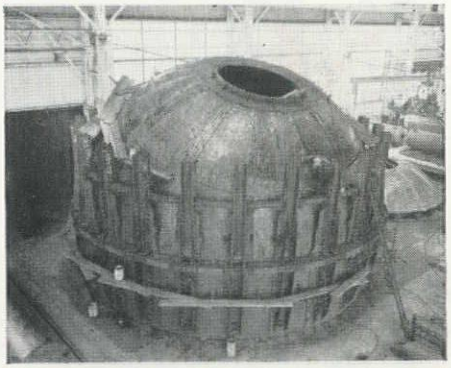
There are three 40-ft. diam. by 150-ft. high Horton surge tanks at the Fort Peck project in Montana. Two of the surge tanks are in service and the third is connected to a penstock that is blanked off at present. The two surge tanks that are in service prevent hydraulic instability in the penstocks resulting from sudden changes in load on the turbines.

Some of the story behind the building of surge tanks for this strenuous service is brought to light in the accompanying illustrations. The rest—design, erection and testing—is a record of cooperation with U. S. Engineers. Significantly, model and field test studies proved that the basic design and fabricating methods were sound.

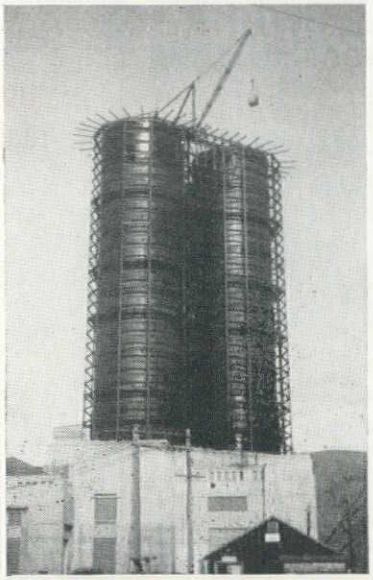
The surge tank installation at Fort Peck is a testimonial of our ability to build steel plate structures for engineering projects. We also furnished a steel tunnel liner, three penstocks, a wye branch, and three large-diameter riser pipes connecting the penstocks to the surge tanks. The same skills and facilities that we used for this project are available to help you. On your next job, write our nearest office for details and cost estimates.



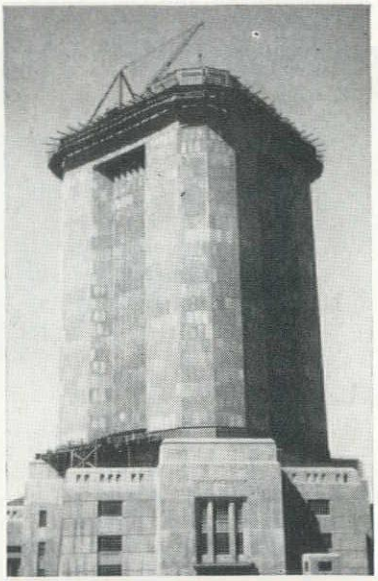
2. A special machine designed and built by CB&I is used to ream rivet holes in the surge tank bottom plates.



3. The bottom of one of the surge tanks is shown fitted up in the shop to check accuracy of fabrication before shipping.



4. The 40-ft. diam. by 150-ft. high "giants" were erected adjacent to the Fort Peck power house.



5. View showing the enclosure around the Fort Peck surge tanks nearing completion.

WESTERN CONSTRUCTION

October 1950 Vol. 25, No. 10

Volume, Scarcity and Controls

WITHIN the last month nothing has developed to indicate any marked change in the current impact of the semi-war effort on the construction industry. This force includes such factors as a violent jump in the price of lumber highlighting the slow rise for most other materials, the definite threat of shortages in materials and equipment, the equally growing shadow of controls and regulations, and the shortage of man-power. However, the volume of work here in the West continues at an increasing rate over a year ago, even though the accent on types of work has begun to shift.

At the recent meeting of the governing boards of the Associated General Contractors these factors were the subject of a careful survey. As to materials, steel was mentioned as causing more concern than any other construction requirement, though cement and lumber were high on the list, and the latter was rated as providing the highest rise in price. Contractors also noted that equipment was developing shortages, especially in the heavy-duty units, and that prices were creeping up. The labor situation was pronounced tight with special emphasis on the skill classification. Wage rates were described as either on the rise, or awaiting pressure as soon as existing contracts expire. Thus the factors of immediate concern to construction are moving in accord with the pattern established by the National mobilization of military and industrial forces.

As to volume of work, the picture will remain bright, although changing. More of some types of work and definitely less of others was generally predicted, and is proving correct. Rehabilitation of military establishments represents an added volume of work, and plans are being rushed by private utilities and the Government to further any and all projects which relate to production of power. Congress passed the federal-aid highway program measure which tends to set the pattern for a continuation of highway work in accord with long established procedure. Municipal work continues to be a question mark on the construction program, except as population trends and concentrations demonstrate needs which can be met only by special concessions.

Controls and regulations can be expected to increase in number and severity. At least as long as the Nation moves toward a war-time footing the construction industry will feel more and more restrictions.

In all, the pattern for the coming months appears to indicate an increasing volume of work, which will be made difficult by growing scarcities in men, materials and equipment, and will be regulated by an expanding system of governmental controls and regulations.

"Mixing" No Longer Applies

GRADUALLY the engineering specifications for mass concrete have added to the equipment and control instruments required on the job until the contractor's operations have developed into "manufacturing." Today, a modern concreting plant represents precision of design and operation which would make it quite adequate for accurate handling units of pounds rather than dealing in thousands of tons. Years ago, one of the earliest refinements was the designer's demand for close control of the water-cement ratio, which placed emphasis on batching and weighing equipment. Next, the matter of modified cement composition added another refinement, although this related mostly to mill production of the vital ingredient, rather than to mixing operations.

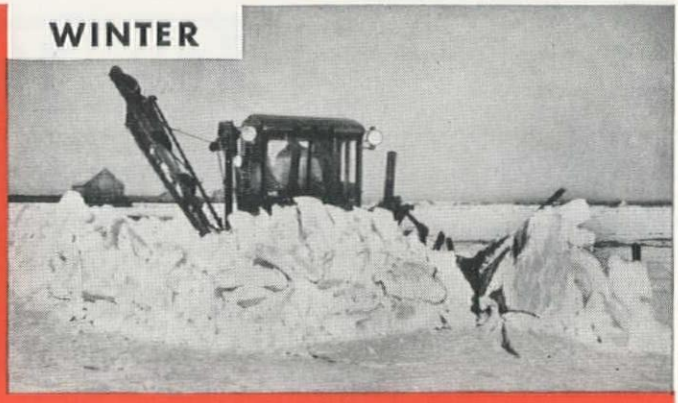
Then, the matter of quality of aggregate and its exact grading received the technicians' attention, with the result that contractors now take apart the raw product of nature, and recombine the parts to secure the required uniformity and maximum density. Lastly, there is the matter of temperature for the product which goes into the forms, or the subsequent extraction of the heat produced by hydration. Today, this requirement has reached its ultimate, in the West, at the plant built to produce "cold concrete" for Detroit Dam. This plant, reviewed in this issue, contains all of these elements and can be considered a model for meeting the stipulations of the designer in producing mass concrete of modern quality. Certainly, operations which begin at a quarry and end with a sixteen-ton bucket load of exactly proportioned and correctly cooled product are far removed from old-time contracting.

Measuring thousands of tons of materials with exact control of size, moisture, and temperature has placed mass concrete work on a level with metallurgy and petroleum in matters of production techniques and controls. "Mixing concrete" is hardly the logical term to apply to this precise manufacturing process.

How Far Will Science Go?

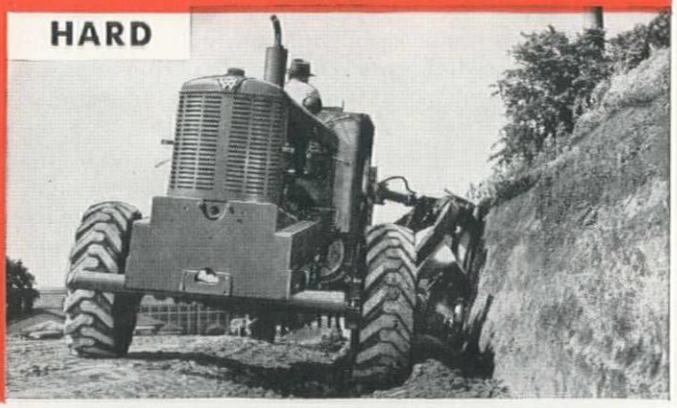
OF ALL the engineering instruments, the ordinary plumb-bob has always seemed the most likely to remain its own simple self. The weighted brass bob on the end of the string under the transit was the essence of fundamental mensuration. Today, the electronic plumb-bob has arrived to add the magic of science to this engineering tool. True, the new device is designed to be used in measuring the wandering of hollow piling after driving, but it does mark an encroachment on a faithful instrument which seemed so adequate and accurate swinging gently under the influence of gravity. Although gravity probably rules the electronic recording of the new device, the reading of a calibrated scale will not provide the engineer with the satisfaction obtained by seeing the plumb-bob centered over the tack in the stake.

····88-H····99-H····MASTER 99····



More Work Per Day

More Work Days Per Year



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WYOMING—WILSON EQUIPMENT & SUPPLY COMPANY.....*Cheyenne*

Plant Layout at Detroit Dam

DEEP hexagonal cribs hold aggregates transferred by suspended conveyor from primary crushing plant on far side of canyon.

Contractor spends $5,000,000 for construction plant located in steep canyon—Precooling operations important feature of concreting for Corps of Engineers project in Central Oregon

REPRESENTING the work of 15 months and an expense of about $5,000,000, the construction plant for Detroit Dam has been completed, and pours will be made at an increasing rate until the 1,450,000-cu. yd. mass concrete gravity structure is completed. Multiple-purpose Detroit Dam is the major feature of the $70,000,000 Detroit Project, part of the Willamette Basin flood control development by the Portland District, Corps of Engineers. Work began March 28, 1949, under a $28,230,509 contract to Consolidated Builders, Inc., Mill City, Ore., a corporation sponsored by Kaiser Industries, Inc. The first bucket of concrete was poured August 5, 1950. (*Western Construction*, September, 1950, front cover.)

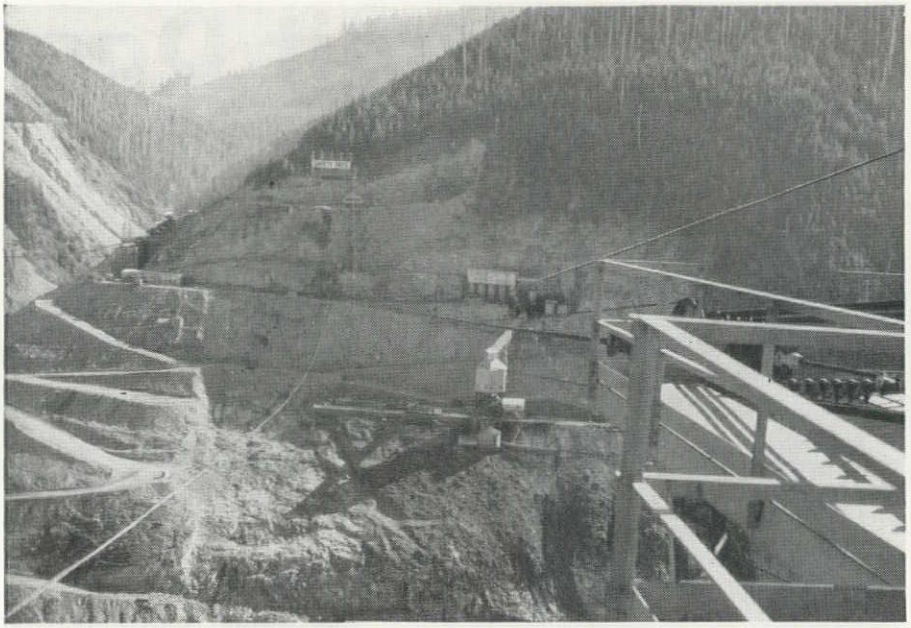
Detroit Dam is on the North Santiam River, about 50 mi. east of Salem, Ore., and will develop 100,000 kw. from two generating units. The first power will be on the line in January, 1953. The other major structure in the Detroit Project is Big Cliff Dam, 3 mi. downstream from Detroit Dam. Big Cliff will be advertised for bids in August, 1951 (tentative) and will represent about one-quarter the size and cost of Detroit. It will function primarily for reregulation of the river in the lower valley, and will develop 18,000 kw. of power.

The most difficult problem solved by the contractor thus far has been the cramped quarters and steep slopes at the damsite, where virtually the entire plant area has been taken from heavy cuts and fills in earth and solid rock on the left side of the canyon. The entire plant was designed to produce 6,000 cu. yd. of concrete per day (250 cy/hr). Among its outstanding features are: (1) the largest deep-frame jaw crusher in the world, (2) a 600-ft. long conveyor suspended high above a secondary canyon, and (3) a system of access roads of better quality than that afforded by many of the Nation's counties. Balancing the unusually tough conditions in the terrain that faced the contractor, favorable conditions at the site include direct cement transfer from box cars on an existing track, through an air system to the mixer, and a moderate concrete production line of about 2,700 ft. from primary crusher to peddling tracks.

Principals of Consolidated Builders, Inc.

Kaiser Industries, Inc., Oakland, Calif., Sponsor.
General Construction Co., Seattle.
Walsh Construction Co., New York.
Utah Construction Co., San Francisco.
Bates & Rogers Construction Co., Chicago.
Pacific Bridge Co., San Francisco.
The Shea Co., Los Angeles.

Most of the decisions facing the contractor during design of the plant arose not so much from "**Why** should we put it there?" as from "**How** can we put it there?" The quarry site of about 10 ac. on the 1:1 and 2:1 side slopes of Cumley Creek ridge, was selected by the Corps of Engineers. The mixing plant and peddling tracks are fixed, according to good design procedure, at a point as close as practical to the center of gravity of the mass concrete. Laid out between these two sites, on the rugged, rocky slopes of Cumley Creek and the main canyon, must go the complete aggregate plant, refrigeration plant, cooling plant, mixing plant, concrete railroad, and trackway for the two head towers. The contractor's office, warehouse, and



ROCK excavation for plant site was 85,000 cu. yd., excluding haul roads. Refrigeration plant (long white building), at far left; cooling plant, right; batching plant and peddling tracks, below.

cement storage silos are located on the gentler slopes of the right canyon wall, downstream from the dam. The solution and key to the entire plant layout has been the successful construction of all in-between plant units into the side of the canyon, on cut or fill sections mostly of rock.

The quarry is of solid diorite rock, underlying a softer, unsuitable material which is wasted into the adjacent canyon. The diorite is shot in 75 100-ft. benches by "Coyote hole" method, loaded with a 5-cu. yd. electric Bucyrus-Erie 120-B shovel into 8-cu. yd. Euclid dump trucks, and hauled through a drop of 130 ft. to the 350-hp. primary crusher. The quarry, 2,000 ft. upstream from the main structure, will be worked so that at the end of construction the shovel and primary crusher will operate at the same elevation.

The deep frame jaw crusher, a 66 x 84-in. Birdsboro Buchanan, is the largest of its type manufactured in the world, and handles incoming rock up to 5-ft. maximum dimension through a reduction to 12-in. minus material. A heavy curtain of anchor chain is suspended in front of the apron to lessen impact damage from the raw material. The jaw crusher discharges 650 ton per hr. onto two 5 x 12-ft. 6-in. scalping screens and a 30-in. gyratory crusher producing 6-in. minus rock. A ⅜-in. bottom screen and conveyor system carries dirt to a separate spoil pile.

A horizontal conveyor on steel spans supported on wood towers carries the crushed rock down the slope a distance of 350 ft., where it drops 114 ft. to a 9-ft. diam. recovery tunnel under a 40,000-ton surge pile. The surge pile is on a 1:1 slope, and rather than build retaining walls around the recovery tunnel, the contractor elected to waste the first material in order to bring the bottom of the live storage up to recovery tunnel elevation.

Cumley Creek canyon, a steep natural barrier, lies between the primary system and the only available site for the secondary screening plant. There were no alternatives but to cross the canyon by suspension, with a 600-ft., 36-in. conveyor on two 1¾-in. suspension cables.

The secondary screening plant was designed with a minimum of wasted space. It consists of nine bunkers in a row and, exclusive of sand circuits, measures 42 by 375 ft. in plan. Bunker storage, smaller in capacity and higher in cost than stockpiles, was made necessary by the lack of space. Conventional Allis-Chalmers 5 x 12, 5 x 14 single deck screens are located above the bunkers, and a recovery tunnel is located below. The secondary crushing plant adjacent to the screening plant consists of two 4¼ standard Symons Cone and one 5½ short head Symons Cone crushers, principally used to maintain balance in the upper sizes of coarse aggregates and produce feed for the sand plant. The bunkers, each with a capacity of 2,500 tons for coarse and 2,400 tons for fine aggregates, are made of 40-ft. diam. hexagonal ring fir timber cribbing, ranging from 6 x 16 at bottom to 6 x 10 at top.

The sand manufacturing part of the aggregate processing plant has a "man's job" to do. First, considering the specification with respect to gradation, fineness modulus, etc:

U. S. Std. Sq. Mesh Passing	Retained on	Min.	Percent by Weight Desired	Max.
..	4	0	0	5
4	8	5	10	15
8	16	10	15	20
16	30	20	25	30
30	50	20	25	30
50	100	12	19	22
100	200	1	4	5
200	Pan	1	2	3
			100	

Fineness Modulus 2.54

Fineness Modulus Limits 2.30 — 2.80

KEY SITE ELEVATIONS

2150	Top of quarry.
1970	Present shovel operations.
1840	Top of primary jaw crusher.
1700	End of horizontal surge pile conveyor.
1586	Intake of surge pile recovery tunnel.
1690	Conveyor head pulley at secondary screening house.
1580	Recovery conveyor from bunkers; roadway at dam crest.
1631	Cooling plant intake.
1575	Cooling plant discharge to mixer.
1540	Intake mixer.
1450	Peddling tracks.

NINE crib bins to hold sand and rock were made necessary by lack of space for stockpiling. Rock bins are fed by conventional screens, and recovery to cooling plant is through tunnel below.

Further: "The gradation of the fine aggregate (sand) at the aggregate plant shall be controlled so that when delivered to the mixer the fineness modulus of the fine aggregate does not vary from the average fineness modulus of the fine aggregate tested during the preceding 30-day period by more than 0.10."

The problem to solve in such a specication is that of controlling the amount of No. 8, (generally high in most manufactured sands) and bridging the gap between No. 30 and No. 100 (usually shy in most manufactured sands). In so doing an excess of minus-100 material is usually produced which usually is wasted.

Sand production

The Detroit plant will produce sand by the following method: The plant feed will be essentially ⅜ in. minus, most of which will be the product of the 3 Symons Cone crushers, the balance being "free fines" from the primary crushing and screening operation. The feed is introduced into the plant over a 5 x 10-single deck vibrating screen equipped with a ¼ in. top deck over which is a spray bar. The wet screened plus ¼ in. product goes directly via conveyor to an 8 x 12 Marcy peripheral discharge rod mill, the minus ¼ in. product via launder to a 5 ft. x 25 ft., 6 in.-Dorr rake classifier. The purpose of the classifier is to split this material into two sizes, plus 30 and minus 30. The plus 30 is combined with the plus 4 and constitutes rod mill feed, the minus 30 via launder is introduced into a 8 x 37 ft., 6 in., 19 ft. dia. Bowl Dorr classifier for final classification or removal of the excess—minus-200 material. Likewise the product of the rodmill goes directly by the same launder to the bowl classifier. The finished sand is introduced into the 4 sand storage bins via shuttle conveyor, four bins being necessary because of the 72-hr. free drainage time required by the specification.

The plant is designed to produce 125 tons per hr. of sand and the equipment now in use was selected on that basis, with the provision that auxiliary equipment in all probability would perforce be required to meet that production, but until more specific information was known as to the material, equipment behaviour, etc., no additional equipment would be procured.

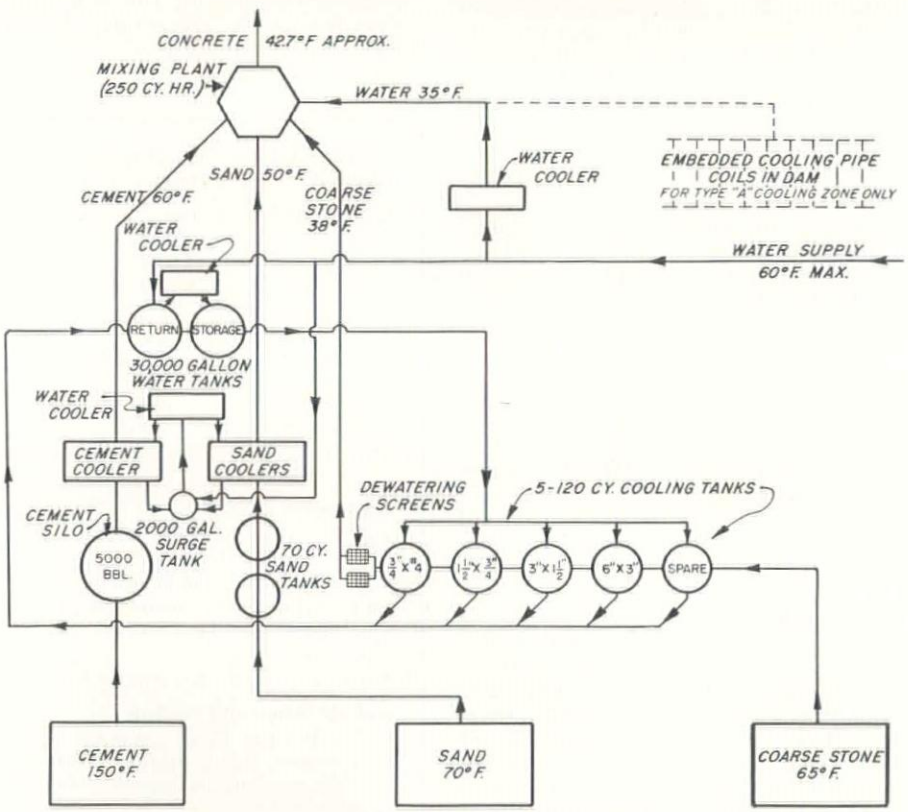
The problem of flexibility for the aggregate plant was solved simply and with finality. Each of the four coarse aggregate bunkers has a return circuit to the incoming line. The added cost of having recovery systems from each size is balanced somewhat by the elimination of additional screens or crushers to reapportion the grading. Another reason this type layout was chosen is that no additional area is needed for surge piles or screen towers.

Concrete

Detroit Dam concrete is interesting to Western engineers and contractors for three reasons: (1) It must be placed at a temperature between 40 and 50 deg. F., so that at the time of initial set it does not exceed 50 deg. F.; (2) Aggregates are being cooled in the first Western application of the "Inundation Method"; (3) The contractor's peak pouring schedule is tentatively set at 6,000 cu. yd. per 24 hr., one of the heaviest schedules in the country.

The concrete specifications are the first written by the Corps of Engineers, North Pacific Division, requiring this extreme cooling of the mix before placement. Specifications for Lookout Point Dam also require 50 deg. F. or less placement temperature, and the contractor has elected to use the refrigerated air blast system used at Harlan County Dam.

The aggregate, sand, and cement cooling plant to meet these strict specifications was designed on principles used successfully at Bull Shoals Dam, Arkansas. The coarse aggregates are inundated in refrigerated water, prior to mixing, in four tanks, one for each size. Each tank is primed with water to break the fall of rock, then filled to the brim with each aggregate size. Cold water (35 deg. F.) is then admitted from the bottom, and circulates up to an overflow. After a predetermined time, about 30 min. on a normal day's temperature, the water is shut off and the tank drained automatically. By this procedure the



COOLING PLANT SCHEMATIC PLAN

OPERATION SEQUENCE FOR COOLING GRADED COARSE STONE

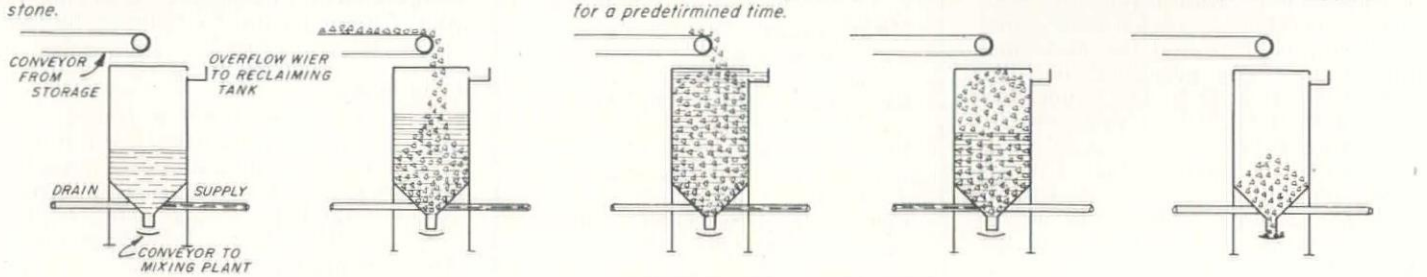
STEP I — *Fill tank approximately one-third full of water before introducing stone.*

STEP II — *Continue filling tank and introduce stone*

STEP III — *When tank is full of stone continue pumping and recirculating water for a predetirmined time.*

STEP IV — *Stop water circulation and drain tank.*

STEP V — *Open gate and load cooled stone on conveyor to mixing plant.*



coarse aggregate is cooled to 38 deg. F.

The specifications originally stated that if inundation were used, only the three (6-3), (3-1½), (1½-¾) sizes could receive this treatment. This was because it was feared that the smaller sizes would become saturated and upset the moisture control. The clause was rescinded, however, upon final approval of the cooling layout. The reason behind this move is that although the smaller size may actually be saturated, the total amount of moisture involved will be small in relation to the total. Since the saturation of the smaller size will be a constant amount, correction for this additional moisture can be made directly at the mixer. Each size aggregate passes over vibratory screens between the cooling plant and mixer to remove excess fines and moisture.

Sand and cement are cooled in a different manner, for obvious reasons. These two materials are placed in individual water-jacketed screw conveyors, in which water at 35 deg. F. is circulated in the heat exchangers. Sand is extruded at 50 deg. F., and cement is lowered from 150 to 60 deg. F. The end result is a mix placed in the neighborhood of 43 deg. F., with ample safety factor for the stringent specifications, and close to the mean annual temperature at the site. The air entrainment procedure used is conventional.

Cement for the project is shipped from the Permanente plant near Redwood City, Calif., in bulk tankers to Portland. From there it is shipped by rail to the damsite, where it is handled entirely by air until mixing. Two 5,000-bbl. silos receive incoming shipments at the railhead, and a pneumatic pump system carries the material through 8-in. welded pipe through a 400-ft. lift across the main canyon to a 5,000-bbl. silo at the mixer. The conveyor pipe is suspended by rings from steel cable, and was designed so that during construction the pipe could be pulled along the cable as each length was added.

The entire mass concrete plant was designed for a sustained output of 250 cu. yd. per hr. (6,000 cu. yd. per day). All concrete is poured in 5-ft. lifts on 32 monolithic blocks throughout the structure. However, the first 4 pours above the foundation are in 2½-ft. lifts, except where cooling pipe is required, in which case the lifts may be increased to 5 ft.

Blocks nearly 300 ft. long

An unusual item in the specifications is the lack of a limit on the length of each monolithic block. Whereas few pours are made in lengths longer than 100 ft. without contraction joints, the blocks at Detroit will be nearly 300 ft. long at the foundation level. There is a 5-day interval required between pours on succeeding lifts, and the maximum differential height permitted between adjacent blocks is 25 ft. The connection between blocks will be a conventional water stop, without keys or dowels. For block pours, the contractor plans to use Blaw-Knox steel forms, which will be raised for each lift. This will be one of the first uses of this type form in the West.

Circulatory cooling pipe is in two systems: "A" refrigerated at 38 deg. F.; and "B" river water not refrigerated. According to a recent change in plans, the "A" type of cooling includes all pipe placed in the toe block sections of blocks 15, 16, 17, 18 and 19 (approx. 25 ft. of the downstream section between el. 1166 and 1200) and between el. 1145 and 1190 in the blocks filling the deep slot. The "B" system of about 300,000 ft. of pipe is located above the "A" system in blocks 15 to 23 inclusive (downstream spillway toe).

Excavation

Diversion of the river was bid at $1,200,000, about 3% of the contract, and involved two cofferdams, and a 25-ft. horseshoe diversion tunnel 1,364 ft. long. On the upstream crib cofferdam a short section cut-off wall of sheet piling was driven about 20 ft. through gravel to bedrock. The downstream cofferdam is a combined rock and impervious zone type which abuts a concrete cut-off wall on the north side of the downstream tunnel portal. The tunnel was drilled in 15-ft. rounds with one jumbo alternating between the two headings. Work progressed at 20 ft. per day, and involved 28,200 cu. yd. of rock.

Specifications state that the diversion of the river shall in no way affect construction of the powerhouse, on the right abutment, and accordingly the tunnel was bored through the left abutment. Here the contractor encountered solid andesite rock, with several faults at the downstream end. For ease of construction at the downstream heading, the tunnel was realigned to escape the faulted area. In order to maintain water rights downstream, a 65-ft. head must be maintained on the main structure between plugging of the diversion tunnel and completion of the spillway. This will be handled by means of a short section of 5 x 5-ft. bypass tunnel and control gate to maintain flow when the stop logs are dropped at the upstream portal. During the last period of heavy river flow, the cofferdam spillway was slightly overtopped twice. The diversion tunnel and cofferdams were designed to pass approximately 13,000 cfs., this figure having been determined after careful analysis of the hydrographs, the over-all economy of design and the calculated risk involved.

Hand digging in slot

Excavation and foundation stripping, including over 70-ft. of vertical line drilling for the stilling basin walls, was virtually completed prior to the first pour of concrete. The most difficult problem involved in foundation stripping was exposure of a gravel-filled slot, about 60 ft. deep and 10 ft. wide at the bottom, which was filled with cemented material. This slot in its final excavation stage was dug with crowbars and hand shovels, and the material removed by cableway skips before the setting of 3rd stage grout pipes.

An innovation of the contractor for final foundation stripping is the use of a heavy monitor, much like those used in early Western placer mining. Operating under 185-psi. pressure, with a 2½-in. nozzle discharge, the monitor dislodges and removes with ease any one-man stone resting on bedrock.

Third-stage grouting is scheduled for 1952, when the abutments will have been completed. This is expected to be a conventional procedure, using a standard mortar at 150 psi.

Downstream from the stilling basin a 10-ft. heavy rock revetment is placed on the natural river gravels for a length of 250 ft. The upper 200 ft. consists of a concrete filled stone layer, using a minimum 200-lb. size rock. This rock, including boulders up to 6 cu. yd., was placed with shovels and trucks, and occasionally dragged with a chain or line. The concrete is placed on the initial 7-ft. lift with the largest Pumperete model made, with a hopper capacity built up by the contractor from 2 to 9 cu. yd.

Haul roads

One of the outstanding features of good construction practices on this job is the system of haul and access roads to accommodate the construction plant carved from 1:1 and 2:1 slopes in the canyon. All roads are built to a mini-

Concluded on page 106

Major Units of Equipment in the Detroit Dam Construction Plant

Quarry and Crushing

Ten wagon drills, Chicago Pneumatic Tool Co.
One 5-cu. yd. electric Bucyrus-Erie Shovel (120-B).
Ten 8-cu. yd. end dump Euclids.
One 66 x 84-in. Birdsboro Buchanan jaw crusher.
Two 6-in. Allis-Chalmers scalping screens.
One 30-in. Allis-Chalmers gyratory crusher.

Aggregate plant

Eight Allis-Chalmers single deck screens.
Three Symons cone crushers.
One Stephens-Adamson screen.
One Dorr rake classifier.
One Dorr bowl classifier.
One 8 x 12-ft. Marcy rod mill.

Refrigeration and cooling

Seven 100-ton Frick ammonia compressors; conventional shell and tube condensers, evaporators, and accessories.

Batching and mixing

One C. S. Johnson batcher plant (320 cu. yd. per hr.)
Four 4-cu. yd. Koehring tilting mixers.
Six 8-cu. yd. air-operated Blaw-Knox buckets.
Six locomotives on peddling track (from Coulee Dam).

Miscellaneous

Two 25-ton cableways, Construction Improvements, Ltd. "Travclift."
One Fluxo cement pump (250-300 bbl. per hr.).
Three 5,000-bbl. cement silos.
Blaw-Knox steel forms (mass concrete).
Five Chicago Pneumatic compressors (total 6,400 cfm.).

How to Get to a Damsite in a Canyon

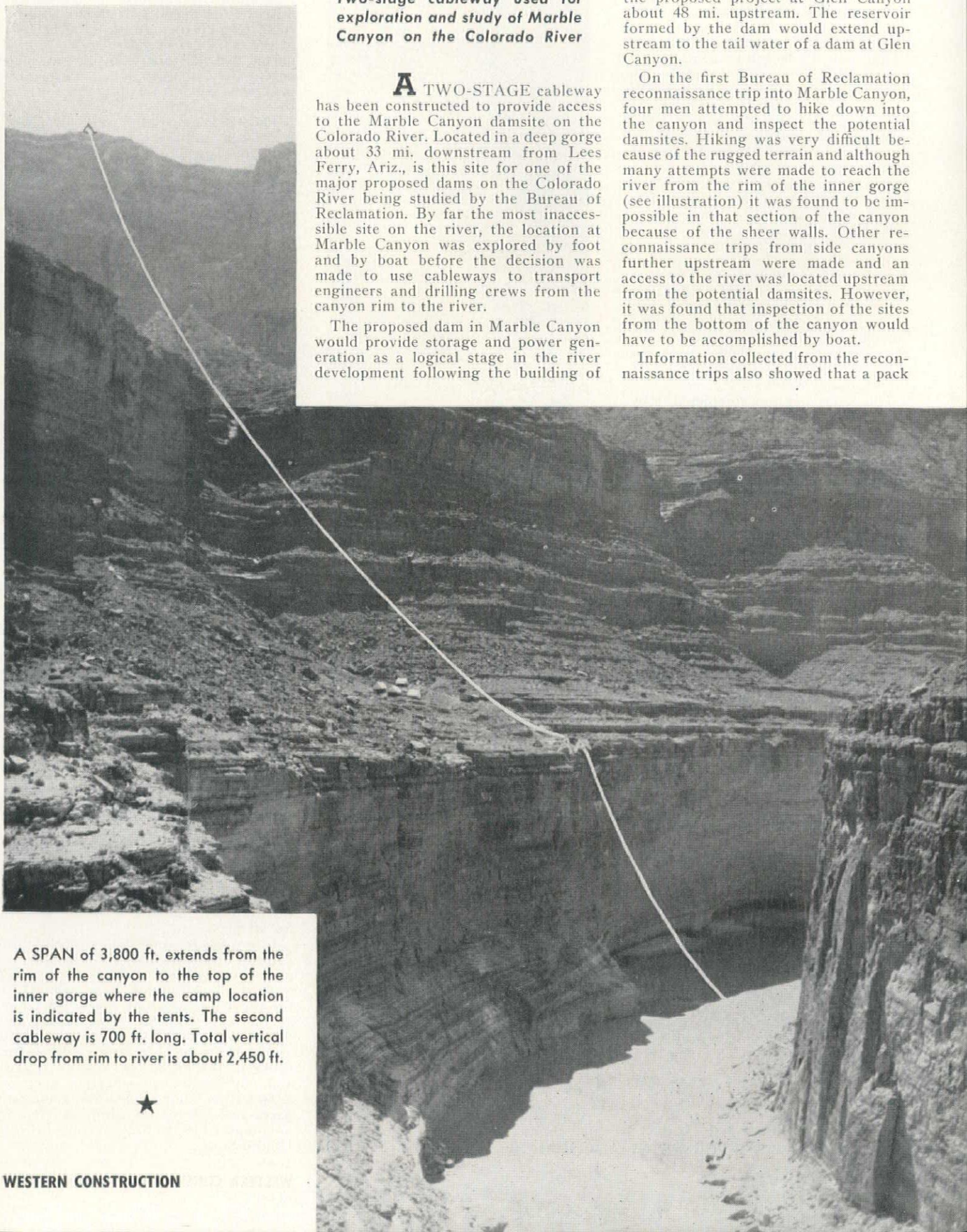
Two-stage cableway used for exploration and study of Marble Canyon on the Colorado River

A TWO-STAGE cableway has been constructed to provide access to the Marble Canyon damsite on the Colorado River. Located in a deep gorge about 33 mi. downstream from Lees Ferry, Ariz., is this site for one of the major proposed dams on the Colorado River being studied by the Bureau of Reclamation. By far the most inaccessible site on the river, the location at Marble Canyon was explored by foot and by boat before the decision was made to use cableways to transport engineers and drilling crews from the canyon rim to the river.

The proposed dam in Marble Canyon would provide storage and power generation as a logical stage in the river development following the building of the proposed project at Glen Canyon about 48 mi. upstream. The reservoir formed by the dam would extend upstream to the tail water of a dam at Glen Canyon.

On the first Bureau of Reclamation reconnaissance trip into Marble Canyon, four men attempted to hike down into the canyon and inspect the potential damsites. Hiking was very difficult because of the rugged terrain and although many attempts were made to reach the river from the rim of the inner gorge (see illustration) it was found to be impossible in that section of the canyon because of the sheer walls. Other reconnaissance trips from side canyons further upstream were made and an access to the river was located upstream from the potential damsites. However, it was found that inspection of the sites from the bottom of the canyon would have to be accomplished by boat.

Information collected from the reconnaissance trips also showed that a pack



A SPAN of 3,800 ft. extends from the rim of the canyon to the top of the inner gorge where the camp location is indicated by the tents. The second cableway is 700 ft. long. Total vertical drop from rim to river is about 2,450 ft.

★

trail could be constructed, but that such access would be difficult, expensive, and slow in transporting all equipment and supplies required for an investigation of the canyon and detail exploration of the most feasible site. Although the required equipment could be dismantled and transported in loads that a mule could carry, the many switchbacks in a trail would limit the length to 10 ft. for any material that a pack animal could handle. Such a plan would have necessitated the construction of a barge from timber of 10-ft. maximum lengths, which would result in a less satisfactory and possibly dangerous barge to use on the treacherous river.

Another possibility considered was to float a barge down the river from Lees Ferry and transport all other equipment and supplies by pack animals. Consideration of this plan required an inspection of the many bad rapids between Lees Ferry and the damsites. Two boats equipped with outboard motors were transported to Lees Ferry and were made to accompany the late Norman Neville on his annual expedition down the river as far as the damsites, because little knowledge was available of the rapids in that section.

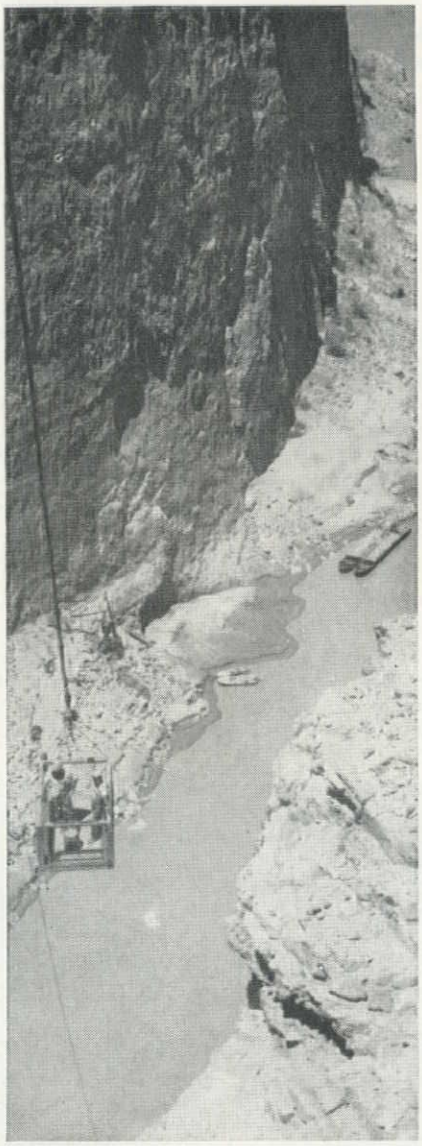
The 33-mi. trip was completed in two days and although no serious mishap occurred, a few times it appeared doubtful that the boats would make it through some of the bad rapids without capsizing. The Neville boats were of special design and construction for that type of river travel and were equipped with oars only. The Bureau boats were of lighter construction and were equipped with outboard motors so that they could travel against the current, except at large rapids which are impossible to traverse upstream.

The result of the trip foreclosed any further consideration of floating a barge down the river; however, with the two boats available in the canyon more detailed examinations and rough surveys of potential damsites were made. This information was utilized in preliminary studies for comparing the alternative sites and in the selection of the best possibility for initial exploration.

Camp at the rim

The reconnaissance trip also revealed that a temporary camp for the personnel working on investigations at the damsite would have to be located on the rim of the inner gorge. The few campsites available in the canyon were inaccessible by boat from the damsite because of bad rapids. This presented a problem of transporting workmen between camp and the bottom of the canyon at the damsite in addition to the problem of transporting men, equipment, and supplies from the high rim of the canyon to the inner rim.

The next means of access considered was cableways. Preliminary studies and estimates of costs involved under transportation by trail or cableway were made and the results showed the cableway method to be less costly and more satisfactory, provided that a safe cableway could be designed and installed at the estimated cost. An invitation was issued for bids on the design and manufacture of a cableway for the span between the outer and inner rims of the canyon. The low bid was submitted and award made to the Allison Steel Manufacturing Co., Phoenix, Ariz. Placing of the anchors, concrete footings, and installation of the cableway was accomplished by Government forces.



DESCENDING the lower cableway at a rate of 350 ft. per min. Note boats on the river. Live load capacity of the cableway is 2,000 lb.

Upper cableway

The upper cableway has a single span length of 3,800 ft. and a difference of 2,100 ft. in elevation between the upper and lower anchors. The track cable is 1⅜ in. in diameter and is the locked-coil type. A smooth type cable was requested to provide for proper operation of a safety brake which grips the cable. Should it become necessary to use the safety brake located on the carriage, a passenger may jerk a lever that shears a small copper pin which releases the spring-actuated brake shoes. The tension in the springs is pre-adjusted to apply the desired friction of the brake shoes on the cable. Another lever is used to spread the shoes and decrease the friction which would permit the carriage to move slowly downward, but should the lever be released the springs automatically apply the brake.

The inhaul cable is ⅝-in. improved plow steel. It is supported by one carrier near the upper end spaced with a ¼-in. cable festoon line, and for the balance of the distance the inhaul cable is supported by six rollers located at high points along the canyon profile to prevent the cable from dragging on the rock.

The live load capacity of the cableway is 2,000 lb. and the carriage is operated at an average speed of about 350 ft. per min. A surplus army portable type field telephone set is used for the communication from the lower landing to the hoist house located on the upper rim of the canyon.

Lower cableway

The lower cableway was purchased and installed to transport men and equipment from the camp at the inner rim to the bottom of the canyon. This second cableway has the same live load capacity as the upper one, but is smaller throughout because of the shorter span. The single span length is 700 ft. and the difference in elevation between the upper and lower anchors is 350 ft. The track cable is ⅞-in. diameter locked-coil type and the inhaul cable is ½ in.

This system of cableways for transporting personnel, equipment and supplies over the rugged terrain at Marble Canyon is proving to be both satisfactory and economical. It has greatly simplified a difficult access problem. With the cableways now available the Bureau of Reclamation plans to complete all investigations within the required refinement needed for the preparation of plans and specifications, thereby eliminating the requirement for any additional field investigations after the cableways have been removed and prior to any authorization of the potential development.

V. E. Larson is engineer for the Phoenix Area Planning Office of the Bureau of Reclamation.

HOURLY wage rates on Federal Aid highway projects, as announced by the Bureau of Public Roads, are higher in the Pacific Coast states than any other area in the nation, and considerably above the national average. Skilled labor rates in the Pacific Coast states average $2.28 an hour, as compared to $2.18 in the Mountain states and the U. S. average of $2.00.

Intermediate-grade labor receives an average hourly rate of $1.95 in the Pacific Coast states, which compares to $1.64 in the Mountain states, and $1.50 for the U. S. average. Unskilled labor averages $1.69 on the Pacific Coast compared to $1.37 in the Mountain states and $1.20 for the U. S. average. Rates for those in the executive, administrative, and supervisory classification average $2.66 for the Pacific Coast states, as compared to $2.10 for the Mountain states, as compared to the $1.92 average for the United States.

Concrete Formwork Totals 10,000,000 Contact Sq. Ft. on—

Record Parklabrea Housing Project

Forms designed for two pours per floor—Sequence of concreting operations planned for 12 days per floor to secure efficient use of 130 cu. yd. per hour batching plant

By
CHARLES A. McMAHON
Field Superintendent
Starrett Bros. & Eken,
General Contractors

ALL CONCRETE work is now completed on the Parklabrea Housing Project in Los Angeles and the interior finish work is progressing toward final completion. The $40,000,000 Metropolitan Life Insurance Company project is the largest architectural concrete construction job of its kind in the world. The eighteen 13-story (limit height) apartment buildings and seven large 2-story garages contain about 10,000,000 contact sq. ft. of form work and 250,000 cu. yd. of concrete.

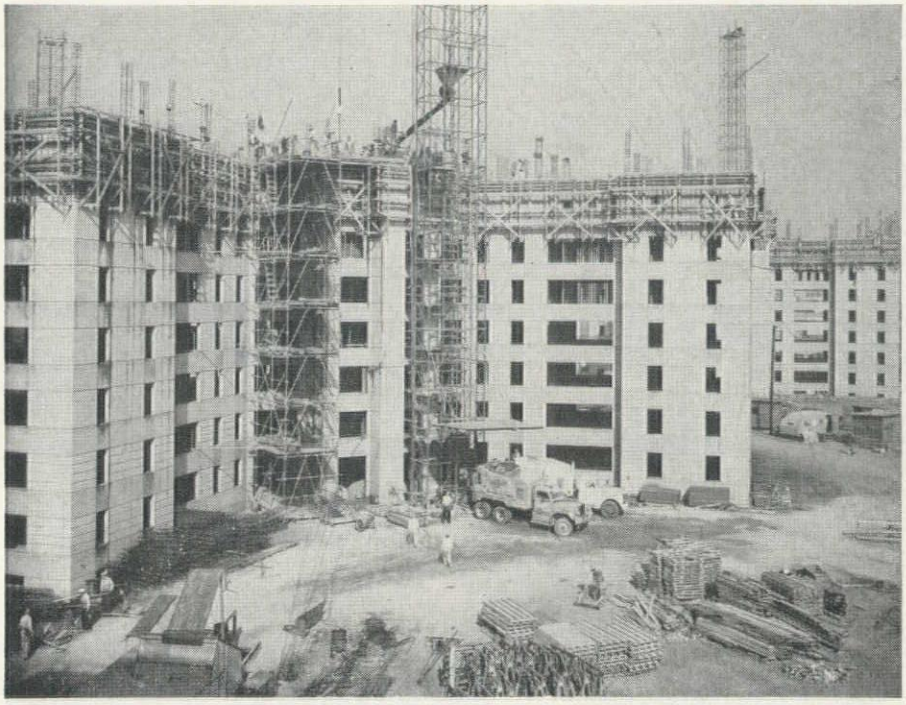
The project was conceived after the war when construction materials and manpower were available. The tower buildings, garages, and three blocks of 2-story units are arranged on a 90-ac. building site, which is a part of a 176-ac. tract located in the Miracle Mile district. Originally, all of this large tract was to be occupied by 2-story masonry apartment buildings, but the shortages created by the war prevented completion. The ever increasing land values in this Los Angeles area, and the desire for a greater financial return on this choice building site led to the decision of constructing the eighteen 13-story apartment buildings as part of Metropolitan's tremendous housing program.

A reinforced concrete structure finished with an architectural effect was selected as the type of construction for the tower buildings because of first cost, appearance, fire protection, and resistance to earthquake forces. The plate floor system, which is a flat slab system without column capitals or drop panels, was selected because it offered no obstructions in the apartment ceilings.

Calculation of stresses became very complex in this flat plate system because the square columns had to be irregularly spaced to allow clear areas in the apartment layout plan. The elongated "X" shape of the structure and the conditions of restraint brought about by the monolithic concrete placement plan further complicated the stress analysis by conventional methods. After considerable research, a new method of analysis by a lucite model was conceived. This method, which is known as the Presan (Photo - reflective - stress - analyzer), makes use of the fundamental principle of determining the distortion of a prototype and relating these results to the actual structure.

Briefly, it consists of reflecting a grid of lines on the mirrorized surface of the lucite model. The model is accurately photographed before and after being loaded by air pressure and the differences in the distortions are measured and interpreted in terms of bending moments. From this information the amount and the placement of the reinforcing bars and the size of structural parts required for the structure are determined. This method was found to be extremely accurate and met the complete approval of the Los Angeles Department of Building and Safety. All of the floor slabs are 7 in. thick and the exterior walls are 10 in. thick with pilasters to accommodate the exterior columns.

Raymond Concrete piles were selected for the foundations of the buildings, and each is supported on 603 step-taper, cast-in-place piles. Piles were driven in clus-



DURING concrete placing operations two transit-mix trucks unloaded concrete into a receiving hopper at the base of the double-section 190-ft. pipe hoisting tower. A two-way portable telephone system was used to control the delivery of the concrete to the upper floor. By using three complete floors of falsework, as shown, the concrete in the slab could reach its required strength before the shoring was needed on the third floor above to maintain the concrete placement schedule. Column steel is shown welded in place ready for the exterior forms to be raised the next working day after the concrete was placed.

ters to a minimum load bearing value of 35 tons each through adobe, sand and gravel. The average penetration was about 35 ft. Clusters were capped with blocks of reinforced concrete tied together with 12 x 12-in. reinforced concrete struts. The walls of the structure acted as beams spanning the distances between caps.

All of the columns were kept to a minimum size by butt-welding the vertical steel above each floor at a section of theoretical zero moment. This space-saving design was accomplished by accurately cutting the bars to obtain full bearing of the entire cross section, and then clamping the bars in proper position while the arc-welding operation was performed. All of the wall steel was lapped the required number of diameters at each floor. There are no contraction or expansion joints in the usual sense provided in these 13-story concrete buildings. Nevertheless, no cracking, checking or spalling has marred the unusually uniform smooth surface of the exterior walls.

Strip along pour-joint

A trapezoidal-shaped rustication strip with a large base of 2 in., a small base ½ in., and a thickness of ¾ in. was used at each of the horizontal joints, which terminated successive concrete placement operations. The size and shape of this member proved to be very satisfactory for several reasons. It resulted in a very pleasing architectural effect in the concrete exterior; it could be securely attached to the forms; and it did not fracture the sharp edges of the fresh concrete when the forms were stripped the next day. No evidence of movement or cracking has been detected along any of these horizontal construction joints. If fine shrinkage cracks have actually occurred along these horizontal planes, they have been most effectively concealed.

The distance from floor to floor is 9 ft., 0 in. with a clear distance of 8 ft., 4 in. in the apartments. The concrete for one complete story was placed in two operations as shown in the accompanying sketch. The spandrel beam and the floor slab was placed monolithically as one operation, then the forms were raised for the next story and the columns and the walls between the window openings were placed as the second operation. The construction joints were concealed by the trapezoidal-shaped rustication strip at the sill and head of the windows. The wall panels between windows are of such small dimensions that the lack of cracks is not surprising; however, each continuous spandrel band has a total length around the building of 850 ft. The lack of vertical cracks here may be attributed to the well distributed reinforcement of structural members, to good proportioning and water control, and to careful and uniform placement.

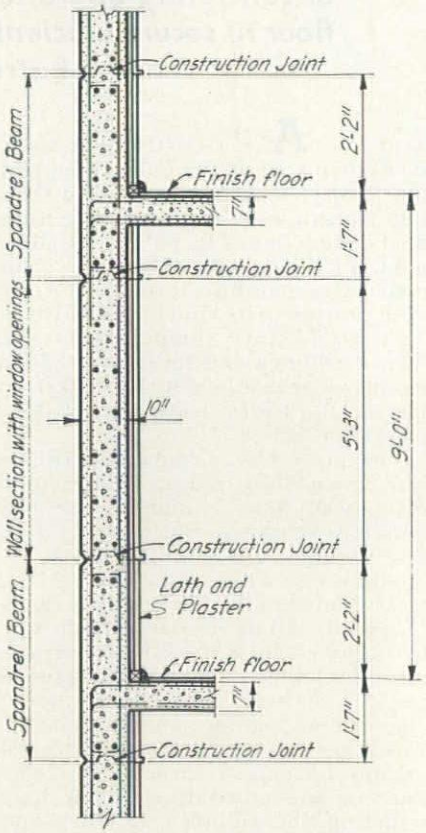
The rate of concrete placement, slump, temperature, construction live load, impact, and deflection were considered in determining the size and spacing of each member and part used to make the complete set of forms for the structure. Special attention was given to the construction of the exterior wall forms because all of these walls are of architectural concrete with the exception of the terra cotta front entrances. A 5/8-in. plastic-coated plywood, known as Plyglaze, was used for all exterior wall forms because it did not leave the grain effect in the concrete surface and because of its resistance to surface deterioration and ply separation. Forms were made in panels 8 ft. wide and long enough to place one complete story-height of concrete.

Tight joints prevent leakage

Horizontal joints were tightly joined together to prevent the leakage of the mortar paste when the concrete was vibrated in the forms. This was accomplished by ploughing out three interior plys of the five plys, inserting a ⅜ x 1-in. spline, and gluing all members together as the plywood was nailed to the studs. The 2 x 4-in. studding was placed 12 in. on center, and the maximum spacing of the double 2 x 4-in. wales was held to 26 in. on center. The bottom wale of this double member was supported in correct position at all times by wale brackets placed 4 ft. apart. The brackets, which were designed on the job, were made of ⅛ x 1½-in. strap iron and were fastened to the members by one ⅜ x 2-in. lag screw and one 8-penny common nail. The spacing of the ½-in. tie rods did not exceed 24 in. All of the panels were carefully fitted together, drilled for tie rods and numbered on a layout platform before they were sent to their designated building.

Exterior panels were erected at each building by the use of hand winches and were bolted together in wall sections with 5/8-in. machine bolts. The window opening forms were secured to the exterior forms prior to the reinforcing bar placement. These plywood bucks were designed and developed on the job site

POUR JOINTS indicate sequence of two lifts per floor: (1) spandrels and floor and (2) wall sections.



Materials and Equipment Used in the 18 Buildings of the Record Housing Project

18	75-hp. Electric Hoists	American Hoist & Derrick Co.
1	Gasoline Hoist	American Hoist & Derrick Co.
60	2-ton Handwinches	Beebe Bros.
2	500 Compressors	Chicago Pneumatic Tool Co.
5	210 Compressors	Chicago Pneumatic Tool Co.
20	Centrifugal Pumps	Gorman-Rupp Company
2	Double Gate Floor Hoppers	Garlinghouse Brothers
8	Receiving Hoppers	Garlinghouse Brothers
48	Concrete Buggies	Garlinghouse Brothers
6	Air Hammers	Chicago Pneumatic Tool Co.
21	Pneumatic Chippers	Chicago Pneumatic Tool Co.
39	Electric Saws	Skilsaw, Inc.
10	Electric Motors	Skilsaw, Inc.
1	Bench Grinder	Skilsaw, Inc.
9	Grinders	Skilsaw, Inc.
3	Sanders	Skilsaw, Inc.
8	Flexible Shaft Grinders	Mall Tool Company
18	Double Section Pipe Towers	Patent Scaffolding Co.
20,000	Wale Brackets	C. P. Concrete Equipment Co.
60	Concrete Screeds	C. P. Concrete Equipment Co.
760,000	sq. ft. 5/8" Plyglaze	St. Paul & Tacoma Lbr. Co.
2,000,000	sq. ft. A-A 5/8" Plywood	Hammond Lbr. Co.
14	Flat Bed Trucks	Chevrolet Div., GMC
5	Pickup Trucks	Chevrolet Div., GMC
3	40' x 80' Mill Bldgs.	Empire Steel Bldg. Co.
5	Lincoln Arc Welders	Lincoln Electric Co.
8,000	lin. ft. 3/4" Water Hose	United States Rubber Co.
8,000	lin. ft. 3/4" Water Hose	Goodall Rubber Co.
5,000	lin. ft. 1" Air Hose	United States Rubber Co.
72,000	sets Form Clamps	W. J. Burke & Co.
62	Rubber Tire Wheelbarrows	Jackson Mfg. Co.
4,000	lin. ft. 2½" Fire Hose	United States Rubber Co.
50	tons Flake Calcium Chloride	Hill Bros. Chemical Co.
2,500	sets 36" Column Clamps	Baker-Roos
7	7½ hp. Circular Saws (Table)	DeWalt Corp.
850	lin. ft. Suspended Scaffolding	Patent Scaffolding Co.
22	Concrete Vibrators	Viber Co.
4,000,000	bd. ft. Lumber	Hammond Lbr. Co., E. K. Wood and Sun Lbr. Co.
250	miles Scotch Masking Tape	Minnesota Mining & Mfg. Co.
30,000	Precast Concrete Blocks	Wailes-Bageman
40,000	gal. Waterproofing for Concrete	Pyramid Waterproofing Co.
100,000	lb. Plastiment Admixture	Sika Chemical Corp. (Super-Concrete Emulsions, Inc.)

and proved to be far superior to pressed metal bucks, as well as more economical. A wedged-shape wood reglet was nailed to these forms to receive the waterstop attached to the finished aluminum window sash. After the steel was inspected by a registered deputy inspector of the City of Los Angeles, the interior forms were set in place and the walls were aligned. Forms were held in correct alignment on the outside by the use of 4 x 6-in. strong-backs fastened to the wales of the exterior forms and on the inside by 2 x 4-in. braces anchored to the concrete floor.

Erection of falsework

Falsework for the 7-in. slab was erected after all the wall forms were in place. The shores were 4 x 4-in. posts set 4 ft. on center each way. Beams were 4 x 6 in. and 4 x 4 in. placed alternately on the lines of shores to support 2 x 4-in. joists. A continuous 2 x 4-in. header was placed on the 4 x 6's and the 7 ft., 10 in. joists were spaced 12 in. on center between the headers. This was done to support all of the edges of the 5/8-in plywood sheets used for the deck. Joints between the plywood sheets on the deck were fitted as tight as possible and the edges of the sheets were feather-wedged to produce a smooth surface. This procedure yielded good results and the concrete ceilings could be economically finished without plastering.

When all of the sleeves and inserts were in place on the deck, the slab steel was securely tied in place. Then the inside 27-in. spandrel beam forms were set. These forms were supported to the correct elevation by the use of precast concrete inverted truncated pyramid blocks placed on the deck forms. Wood spreaders were used to space all the wall forms during the erection period. These spreaders were removed during the cleaning and blowing operation prior to the placement of concrete. No spreaders, concrete blocks or reinforcing bar spacers were permitted to come in contact with the exterior face of the concrete walls.

A concrete placement schedule for the eighteen 13-story buildings was drafted as soon as all of the buildings were above the third-floor level. A batch plant with a capacity of 130 cu. yd. per hr. was erected on the job site. This plant was the most important factor in determining the progress of the project. By placing the walls and columns (142 cu. yd. each) on two buildings and the spandrel beams and slabs (416 cu. yd. each) on two other buildings, or a total of 1,116 cu. yd., the capacity of the batch plant could be reached with a minimum of overtime on the concrete and finishing crews. When the final schedule was approved by all subcontractors engaged in the construction of this mass-production, architectural concrete job, it required alertness, cooperation, and perfect timing by all concerned to make the buildings grow skyward according to plan.

The flow of the material from the source of supply to the final placement

Subcontractors Used . . .

Concrete Aggregates Co.

- 1 Automatic Noble Batch Plant.
- 8 Rex Transit Mix Trucks.
- 8 Jaeger Transit Mix Trucks.
- 1 Northwest Model 6 Clamshell.

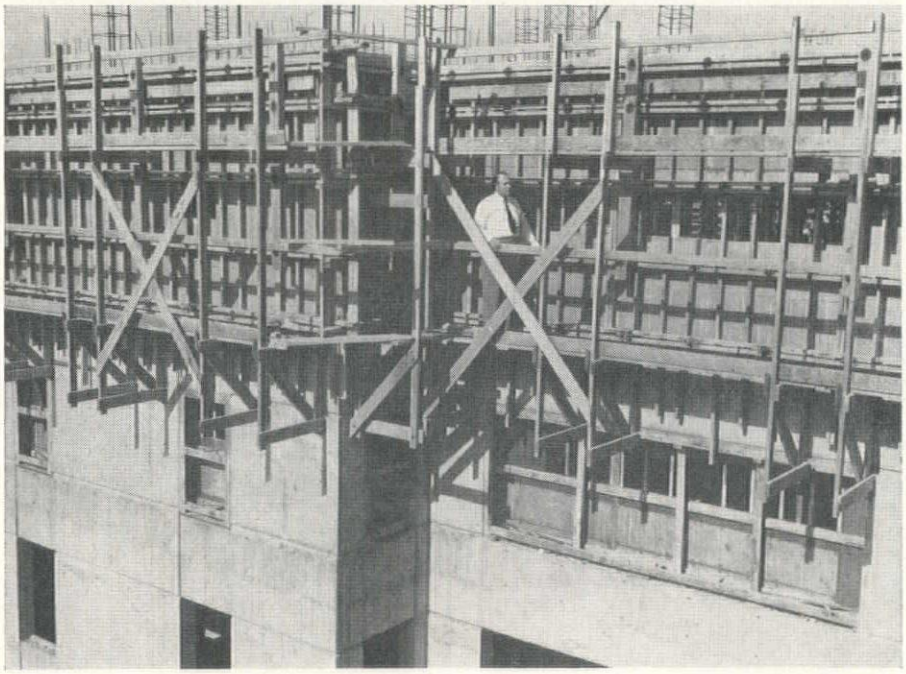
Spicer Co. (Excavating Contractor)

- 1 1½-cu. yd. Northwest Crane.
- 1 1-cu. yd. Skip Loader (Caterpillar).
- 1 D8 Caterpillar Bulldozer.
- 1 Caterpillar Road Patrol.
- 10 10-cu. yd. Dump Trucks (Ford and GMC).
- 1 International Pickup Truck.

Concrete Elevating Co.

- 3 30-ft. truck mounted steel towers for hoisting concrete.

EXTERIOR FORMS had 4 x 6-in. horizontal strongbacks, supporting 2 x 4 studs on 12-in. centers and 5-ply sheathing. Pour joints were concealed with strips at the sills and heads of windows.



was reliable and well coordinated. All of the aggregate and the cement was transported to the job batch plant by truck and trailer. The aggregate came from several sources located within a 50-mi. radius and the cement was furnished by three plants in Southern California.

Concrete placing schedule

The concrete placement operations regularly began at seven o'clock, with one of many transit-mix trucks dumping concrete into a hopper at the base of one of the 195-ft. double section pipe hoist-towers. A mix of 570 lb. of cement, 1,325 lb. of sand, 1,550 lb. of #3 rock, 270 lb. of #2 rock was carefully weighed, checked for moisture content and mixed with the proper amount of water to produce 1 cu. yd. of concrete with the designed strength of not less than 3,000 lb. per sq. in. at 28 days. All of the batches were mixed the required time and were sight-tested for workability before leaving the batch plant area. Pyramid waterproofing compound was used in all walls and slabs below grade and Plastiment admixture was used in all of the architectural concrete exterior walls. Continuous inspection was provided at the batch plant.

When the concrete was released into a 1¼-cu. yd. bucket in the hoisting tower at the building, it required a maximum of only 58 sec. for the 75-hp. electric hoist to deliver the load to one of two double hoppers at the floor being placed. The concrete was distributed to the forms by the use of two-wheel, rubber tired buggies pushed manually on a system of runways. Electric internal vibrators provided with 21-ft. flexible shafts and 2½-in. rubber-tipped vibrator heads were used to produce a dense concrete. A water jet was applied to the surface of the concrete in the walls before hardening, thereby cleaning the exposed reinforcing steel, removing the laitance, and exposing the clean sharp aggregate. This provided an excellent bond for the concrete to be placed above. Bonding was further improved by an initial grout layer, which was placed prior to the regular concrete. All of the floor slabs were screeded, floated, and troweled by cement finishers—no mechanical equipment was used in finishing the floors. Most of the floor area was floated to receive parquet oak flooring. The asphalt tile and linoleum areas were steel-troweled.

Stripping forms

The next working day following the placement of a floor slab the exterior wall forms were stripped and raised to form the next story. They were held to correct elevation by tightening the bottom of the forms against the concrete with ½-in. tie rods placed in the holes made when the rods were stripped. Loose material was removed from the exterior forms prior to the application of a thin film of light form oil to the surface. This was all of the maintenance work necessary to keep the Plyglaze panels in good condition throughout their thirteen uses.

The final concrete placement schedule provided for a story to be completely placed, raised, and stripped in twelve working days; however, the complete cycle was finished on some of the first nine buildings in six working days before the capacity of the batch plant, the limiting factor, was reached.

Later, cement finishers packed the tie rod holes, ground off the loose material, and sharpened the details and corners. This is all of the work necessary to prepare the exterior surfaces for paint.

The interior walls are given three coats of plaster. All bedrooms will have full tile bathrooms. Window sashes are of aluminum and a large picture window adorns each living room. Oak parquet flooring will be used in all bedrooms and living rooms. Enameled steel cabinets, double stainless steel sinks, plastic-top work areas, gas ranges and refrigerators will enhance each of the kitchens. Automatic elevators will deliver the tenants to their apartments in the tower buildings. Each tower building contains 153 apartments, and Parklabrea will have a total of 4,253 apartments when completed.

In addition to the apartment buildings, the project will have an administration building, a shopping center, a playground area, a maintenance building and seven large garages with a total storage capacity of 1,682 automobiles.

Personnel

The Metropolitan Life Insurance Company, the owner for whom the project is being built, will operate it after completion. Charles J. Chambers is the owner's superintendent on the project and is assisted by Mel Wadsworth.

Starrett Bros. and Eken, Inc., has the general contract and is represented by W. T. Griffiths and J. Henry Griffiths.

Leonard Schultze and Associates of New York are the architects, with Gordon B. Kaufmann and J. E. Stanton of Los Angeles as associate architects. Bowen, Rule and Bowen were the structural engineers and L. T. Evans was the foundation engineer. The mechanical and electrical drawings were prepared by Lester R. Kelly. Thomas D. Church is the landscape architect.

Scarcity of Materials and Labor Reported in Survey Made by AGC

INCREASED SHORTAGES of materials, machinery, and skilled workmen have developed during the past two months as the construction industry has hit the peak of operations at the site in the year of its greatest volume of activity in history.

As scarcities of building materials and machinery have developed, price increases have been general, with the sharpest rises for lumber. There has been pressure for increases of wage rates. There are expectations of a continued large volume of construction for the balance of the year.

These are highlights of a survey of conditions in the construction industry conducted by The Associated General Contractors of America for study at the mid-year meeting of its governing and advisory boards held at Chattanooga, Tenn., September 11-13.

The survey was conducted among the association's 112 local affiliated organizations and among its directors throughout the United States and Alaska, representing more than 5,600 of the nation's leading general contracting firms.

Replies to major points in the survey, which represent the opinions of hundreds of general contractors consulted by chapter and branch executives and by directors, follow:

Materials: 96% reported shortages. Four per cent reported no shortages. Of those reporting, 65% mentioned steel; 57% mentioned cement; and 36% mentioned lumber. The majority of replies stated that increasingly longer delivery dates were being given, or no delivery time would be promised. A few items of building materials were mentioned as impossible to secure. Where reasons were cited for shortages, the following were mentioned: strikes in producing industries, shortages of railroad cars for transportation, inability of the industry to produce sufficient quantities for the tremendous construction volume, and scarce buying.

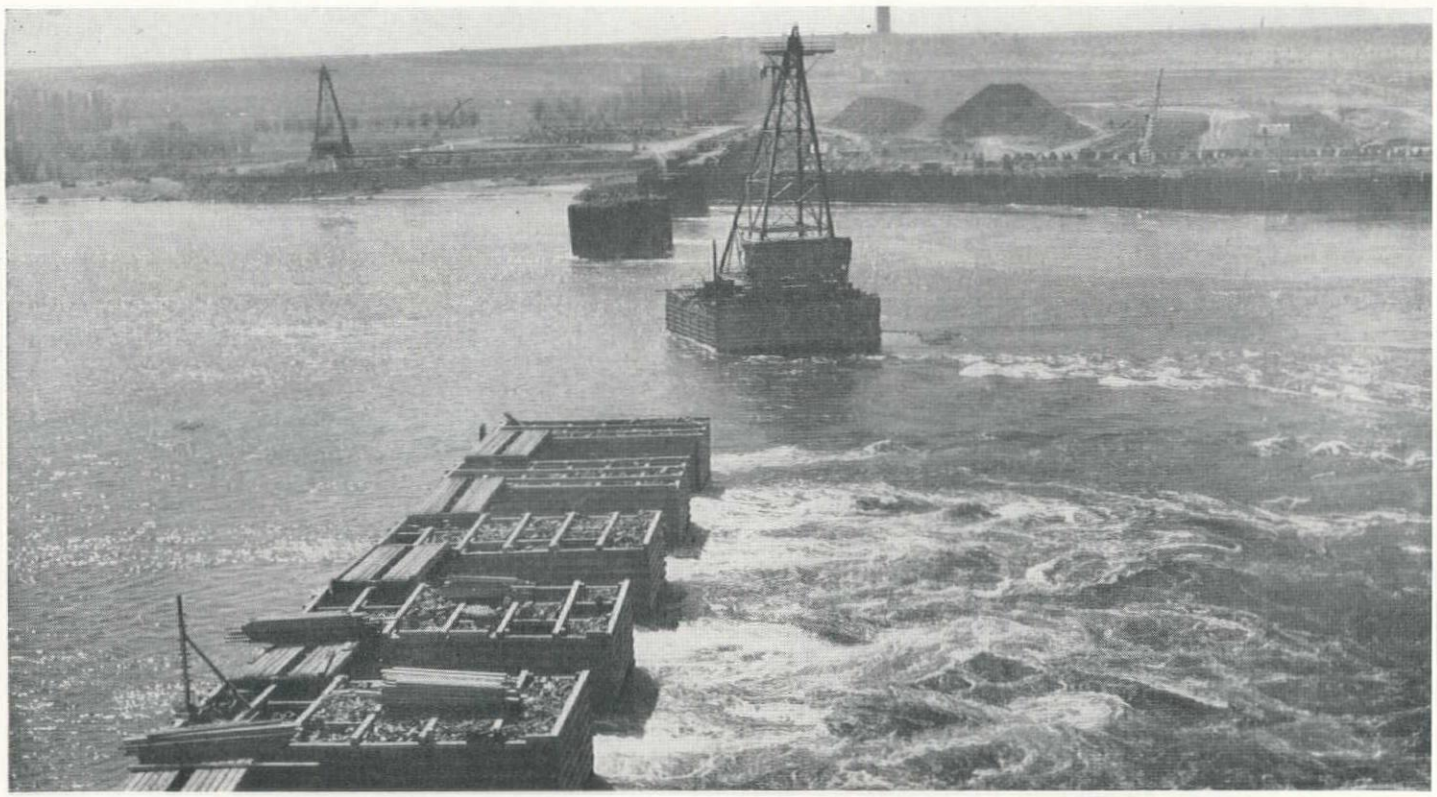
Materials prices: 90% reported materials price increases. 10% reported no increases. Largest increases were reported in lumber prices. Some reported it harder to secure firm prices. A few suggested that gray markets may be developing.

Equipment: 47% reported shortages. 53% reported no shortages. Shortages were reported principally for heavy duty machines. Some reported longer delivery dates. A few suggestions were made that there was scarce buying. As to equipment prices: 69% reported price increases, and 31% reported no increases.

Labor: 68% reported shortages of skilled workmen, and 32% reported no shortages. The replies on wage trends showed: 76% reported pressure for increases in wage rates, and 24% reported no increases in rates. Some with wage agreements in effect reported the expectation of demands for increases upon their expiration. Some suggested that efforts were being made to secure increases before controls were instituted.

Volume: 37% reported that more projects were coming on the market now, and 31% reported the volume of new work was about even with what it has been, while 28% reported a downward trend. Some reported that projects were being rushed into construction ahead of possible controls. Others reported projects were being held back because of possible future difficulties in securing materials if allocation programs were put into effect.

The stabilization of construction costs at approximately 10% below postwar peaks was the highlight of conditions shown by a survey which was conducted about one year ago.



Corps of Engineers Plan for a Major Battle in—

Diverting the Columbia at McNary

This month the attention of the entire construction industry will be fixed on the fight to close off a 70-ft. depth of channel in swift water

IN A FEAT that is attracting nation-wide construction attention, the Corps of Engineers at McNary Dam will effect closure of the civilized world's wildest river at the toughest location ever tackled. McNary Dam Contractors, Plymouth, Wash., holder of the $15,835,-540 Oregon Shore contract, beginning October 10 will build what amounts to a rock and earthfill dam 100 ft. high and 240 ft. long, constructing in 70 ft. of deep water and fighting river velocities up to 15 mph. Local contractors and engineers alike acknowledge this to be the most difficult river diversion attempted anywhere.

McNary Dam, about two-thirds of the distance down the Columbia River from Coulee Dam to Bonneville Dam, and 190 mi. east of Portland, is one of the main units for development of the Columbia River and its tributaries. Its estimated total cost is $270,000,000, and work, based on dollar volume accepted, including mechanical units, is 35% complete. The first contract was let in April, 1947, and first power on the line is scheduled for December, 1953.

Closure of the cofferdam at McNary will be spectacular because (1) the channel at its deepest point is 70 ft. below expected river elevation, (2) the expected river flow of 100,000 cfs. has a channel velocity of 10 ft. per sec., (3) this amounts to a million-dollar dam built in 60 days and (4) 12-ton concrete tetrahedrons, 3,000 of them, will be used in the first recorded application in construction.

The river

The maximum recorded flood in the last 70 years was a flow of almost 1,200,-000 cfs., which occurred in 1894. The disastrous flood of 1948 had a flow of 1,010,000 cfs. Flows in excess of 500,000 cfs. can be expected every year. Flash floods occur occasionally from December to February. All these facts limit the safe time for closure to between Sept. 15 and Dec. 1, because closure is practically impossible during flows in excess of 150,000 cfs. The river cannot be closed before the first week in October because of the heavy fall run of chinook salmon upstream. These conditions limit closure to the months of October and November.

PICTURED ABOVE—

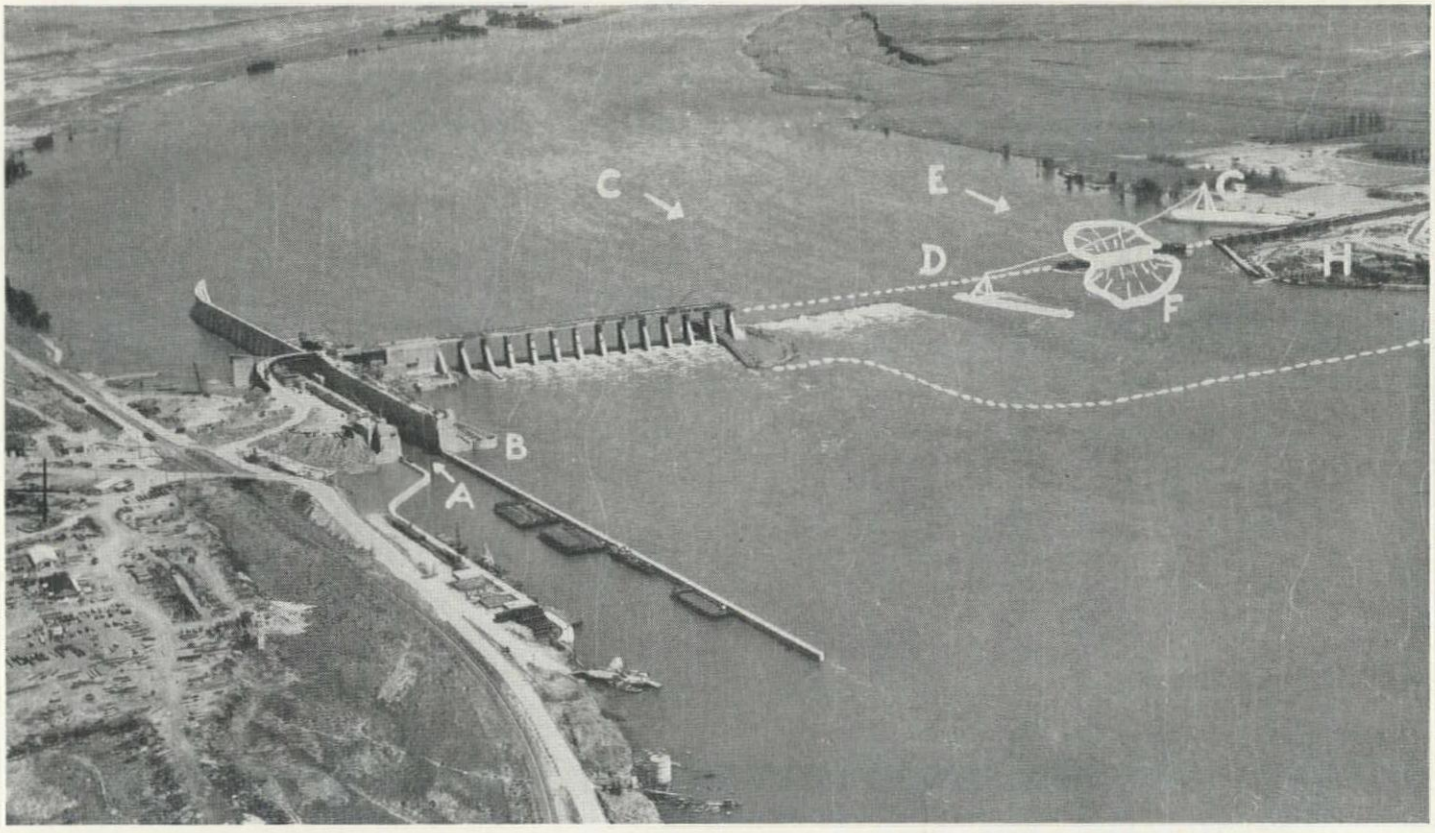
Near the Oregon shore in the background is a 70-ft. depth of swift water where final closure will be made. The two towers will support a cableway used to drop concrete tetrahedrons and rock for the first stage of the cofferdam.

Types of cofferdam construction used at McNary

1. Earth and rock dike.
2. One row of sheeting, with fill or bracing.
3. Steel sheet pile cells, circular or semicircular.
4. Rock dike, covered on water side with impervious earth.
5. Wood crib, filled.
6. Wood crib, rock filled and with stop logs between.

Conventional designs unsuitable

As plans were drawn for the main structure in 1947, it was evident to the designers that closure of the Columbia River at McNary would involve new techniques not previously used. Accordingly, diversion and closure were included in the contract for Oregon Shore work and unit bids taken. The general method of closure was specified; this was done because (1) the contractors needed certain facts upon which to base their bids (2) cofferdamming in this case is as much an engineering as a contracting problem, and the engineers must exercise control over operations as they proceed (3) closure and test pumping of the enclosure are chronologically the last items of the current contract, scheduled for completion in April, 1951, thus giving the contractor time to plan the entire operation. Contractors at the time



FEATURES of the general McNary Dam area, with identification of elements in the final closure program: A—Navigation lock on Washington shore built in the initial stage; B—Fish ladder; C—Main channel of the Columbia; D—Timber crib and cableway tower on Artesian Island; E—Oregon channel 240 ft. wide with 70-ft. maximum depth; F—Slopes of the finished cofferdam (see page 78 for design features); G—Cableway tower on Oregon shore; and H—Powerhouse excavation.

of bidding were given the option of submitting an alternate cofferdam design together with its bid; none was received, however.

The river at present flows through the deep closure gap, called the Oregon channel, and a 600-ft. wide opening through the 12 offshore spillway bays, already constructed to within 40 ft. of their final elevation. Between the two channels is Artesian Island, a low water island of gravel. (Artesian Island, suitable for either wood crib or steel sheet cell cofferdam designs, was scoured during the 1948 flood to 8 to 14 ft. below its previous elevation.)

Extensive design studies

Intensive design studies and model test studies were made of rock-filled timber crib cofferdams. The cribs were to be floated into position, sunk in place, filled with rock, and faced on the upstream side with straight web steel sheet piling. Preliminary design revealed that in the deep Oregon channel, this procedure required cribs 82 ft. square in plan and 90 ft. high. Placing such cribs in the 50-ft. depth of water (70 ft. in the center of the channel) with velocities from 10 to 20 ft. per sec., developed cable pulls of up to 1,500,000 lb. Because of hawser pulls, difficult anchorage problems, and design difficulties in providing crib strength to resist cable pulls, this design was abandoned as being too risky.

Steel sheet pile cellular cofferdams are suitable, and are being used, for the Washington channel and Artesian Island, and for the downstream cofferdam leg. Their use, however, in the deep section, where large diameter cells are required for stability, resulted in excessively high interlock stresses.* To effect closure by driving steel sheet piles in deep, fast water against the differential heads involved was not considered feasible.

The adopted design, which is now being carried out, consists of closing the 240-ft. gap by means of successive lifts of precast concrete tetrahedrons and large rock, sealed on the river side with an impervious fill. The most difficult problem in the field is to gain a foothold in the swift channel, so that fill materials will not be swept away in the current. To do this, concrete tetrahedrons will be dropped in the channel and spotted in such a manner that they sink and form a dike across the channel. They will be spotted initially so that the dike will have a 20-ft. crest and 2:1 slopes (indicated as Zone A on the accompanying cross-section). The crest will be 32 ft. above the deepest point of the channel. The second construction step will be to place the lift of Zone B rock, quarried to a minimum size of 1 ton, on the upstream side of the dike for a distance to make the combined crest width 150 ft.

For the second lift, tetrahedrons will be spotted and dropped so as to form another dike on the crest of the first. The downstream slope will be built up another 10 ft., and 1-ton plus rock dropped upstream to form a new crest about 120 ft. wide. Succeeding 10-ft. lifts of tetrahedrons and rock will be dropped until the last lift breaks the river surface. During construction, the river will have increased its elevation upstream of the fill by 18 ft. The resulting structure after placing tetrahedrons and large rock will be a pervious rock dike, passing about 1% of the total 100,000 cfs. expected flow, and having a 20-ft. crest breaking the river surface by only a few feet. At this point, the most difficult part of the diversion will have been accomplished, under the watchful eyes of some of the country's most outstanding engineers.

Once the dike has broken the surface, Zone III will be placed by the cableway. The material is excavated basalt rock from the powerhouse from 1 ton down to dust. Following this operation the cableway will place a 4-ft. thick blanket of spalls (6 in. minus to dust).

The cofferdam will be made impervious by the upstream dumping of a heavy fill of impervious earth, topped with a 2-ft. thick filter blanket, and a 3-ft. thick dumped stone revetment, all of which will be placed by cableway. At this point the cofferdam extends from a low at el. 198 to a crest at el. 270, and is diverting 100,000 cfs. through the 12 spillways bays offshore on the opposite channel. The contractor will next build a 30-ft. high timber crib on the crest of the cofferdam. This will increase the

*According to authorities cellular cofferdams of steel sheeting, both circular and semicircular, have been used for many years. The most serious cofferdam failures on the Mississippi River were of this type, and a similar design on the Madden Dam on the Chagres River, near the Panama Canal, was a disappointment. Most failures of this type are from the cells bursting because of the pressure of the earth fill, although the interlock joints have strengths of 12,000 to 16,000 lb. per lin. in. Interlocks can be broken by hard driving through obstructions such as boulders or riprap, and if one interlock fails, the cell fails. Another cause of failure may be from overturning. This happens before the cell is filled and may be caused by water currents.

height of the entire cofferdam to slightly over 100 ft., and give protection against overtopping at flows up to 386,000 cfs.

It is economically infeasible to construct the cofferdam to divert flows in excess of this amount. The cofferdam will be overtopped in 1951 and in 1952, but will be dry 9 or 10 months each year. The cost of cribbing for the closure dike alone is $100,000, and brings the cost of closure itself to almost $1,000,000. Although the closure structure itself is tantamount to a rock dam placed in the wet, 100 ft. high, in 60 days, the cost per lin. ft. is $4,000, an entirely reasonable figure for rock fill dams of this size, let alone nearly insurmountable field problems.

Only one revision thus far has been made in the original plans. The downstream lifts of tetrahedron dikes are to be given 20-ft. crest widths, as additional stability against overturning. The dikes originally came to sharp crests, during construction, at 2:1 slopes.

Early figuring

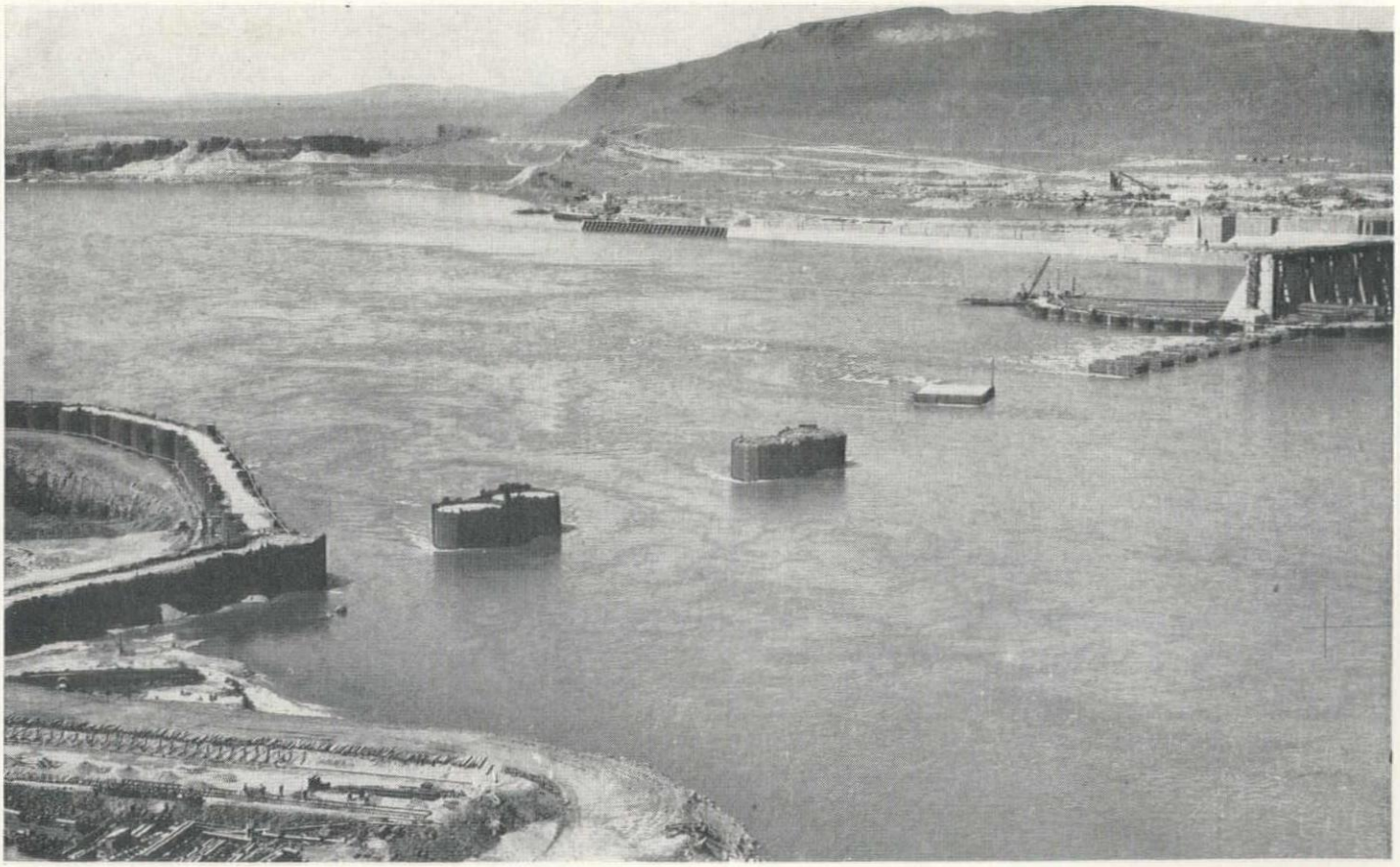
Precast concrete tetrahedrons are the key to successful economical closure of the nearly untameable spot of the Columbia. Their use in design came about from prototype tests conducted at the Passamaquoddy Station in Maine, near the world-famous Atlantic Ocean tidal basin in the Bay of Fundy. Here, the relationship of weight of quarry rock vs. velocity of water required for overturning was established by direct observation under the effect of 30-ft. high tides. These data, obtained in 1936, indicated the minimum size of rock to be stable under velocities expected at McNary.

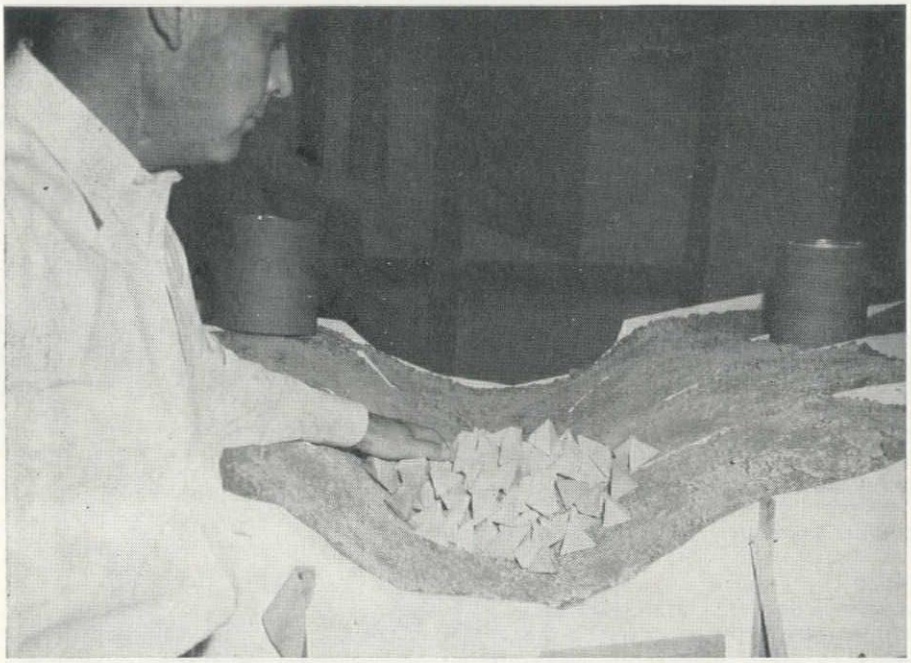
Model tests of McNary preliminary design methods were made for each 10-ft. lift, and for river flows from 75,000 to 250,000 cfs. The initial velocities at the beginning of closure were 12 ft. per sec., and the maximum velocities at the crest of the dike at any time during construction were 22 ft. per sec. In addition, when the pervious dike is being built lift by lift, very high velocities develop at the toe of the slope. This flow is in the nature of a submerged plunging jet, and its velocity reaches a maximum of from 35 to 40 ft. per sec. when the dike is about two-thirds of the way up. These two conditions, stability under normal channel velocity and downstream toe of slope stability in the presence of the plunging jet velocity, dictated a minimum size of 8-ton rock.

Since the cost of 8-ton (minimum) quarry rock delivered at McNary proved far too expensive, it was decided to use precast concrete blocks (4 sacks of cement per cu. yd.). The pyramidal shape of the tetrahedron was selected as having the best shape factor against overturning. Accordingly, contract was let on that basis and bids received on 4,500 8-ton tetrahedrons. During construction, the contractor offered to substitute 3,000 12-ton tetrahedrons at the same total cost. This proposal would help the contractor during rapid placing in mid-channel work, and was accepted by the Corps of Engineers. As a result, the material in the closure dike will be more stable than was indicated in the Passamaquoddy prototype tests, by an unknown amount, because (1) tetra-

DIRECTING engineering operations (above) usual order, Col. Orville E. Walsh, Division Engineer, North Pacific Division and Col. William H. Mills, Walla Walla District Engineer; (below) S. G. Neff, Resident Engineer.

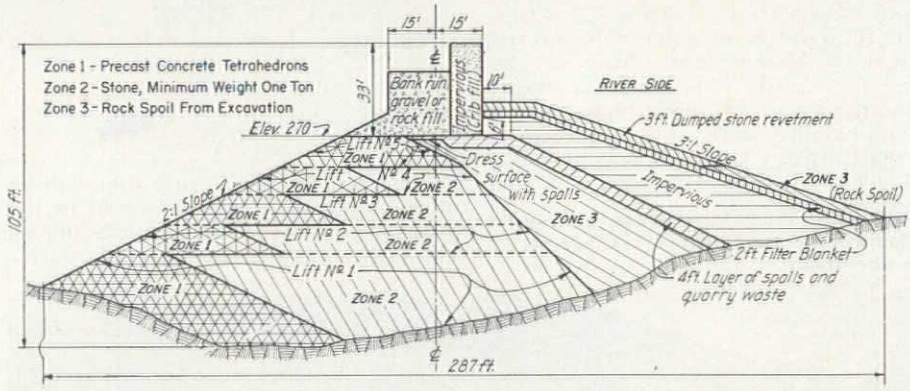
SCENE of the diversion struggle from the Oregon side. The deep channel lies between the two cellular structures. Tracks of near cableway tower are in lower left corner. Opposite tower had not yet been erected on square timber crib when this picture was taken.





MODEL of deep channel, with Otto R. Lunn, Coordinator on the McNary Dam project, indicating the tetrahedrons which will be the key to the start of the cofferdam.

CROSS SECTION of cofferdam showing location of the concrete tetrahedrons designed to hold against the current until the rocks of Zone 2 can be placed.



hedrons are used, rather than rock, and (2) the weight is 12 tons, rather than 8. The cost of the tetrahedrons is $540,000, in place. Each is 6 cu. yd., bid at $30 per cu. yd. in place. According to local reports, the only other recorded use of the tetrahedron shape has been for revetment work along the Mississippi River. These measured 18 in. on the edge.

Once closure of the upstream leg of the cofferdam has been completed, the major work will be done on the downstream leg. The downstream leg will consist of sandy silt and gravel-filled circular sheet pile cells, which can be placed here because of more shallow depths and insignificant velocities. The downstream leg will be built with its crest 26 ft. lower than the top of the upstream leg, because that is the differential head at the design flow of 386,000 cfs.

Differential Heads of Completed Cofferdam

Flow	Differential Head
100,000 cfs.	15 ft.
200,000 cfs.	21 ft.
300,000 cfs.	24 ft.
400,000 cfs.	27 ft. (overtopped)
500,000 cfs.	28 ft. (overtopped)

This major cofferdam will enclose an additional 47 ac. for spillway and powerhouse. Since this area will be inundated twice during the next three seasons, the Corps of Engineers has included pumping plant design in the plans and specifications for the next contract. Temporary fish ladders are built to operate during overflow.

Construction sidelights

One of the tricky maneuvers in the field, and one that may well experience change and development during operations, is the method of spotting the tetrahedrons for closure. The contractor at present has nearly completed work on a 3-in. main gut cableway, with 25-ton capacity and 1,400-ft. span. Both towers are movable, and have about 300-ft. travel limits. The tail tower travel is on rock filled timber cribbing placed on the low water Artesian Island. Present plans call for the placement of one tetrahedron every 4 minutes or better, on a 3-shift basis.

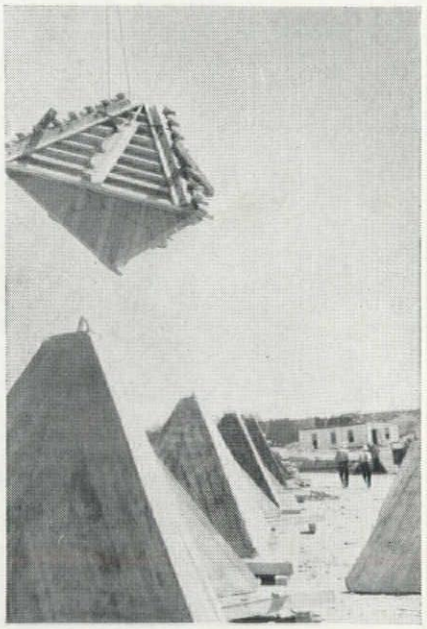
The contractor will load 12-ton tetrahedrons into a 15 x 15-ft. skip by means of a Tournacrane. The skip is rigged so it can be tipped and the tetrahedron will slide out at the open end. The maximum downstream drift has been calculated to occur when the fall through water is 55 ft., at which time the velocity is 12 ft. per sec. The maximum drift is 14 ft. It will decrease to 10 ft., as the depth gets less and the velocity increases, until at the top it becomes nil.

It is anticipated that the schedule of dropping points will be subject to change along the 240-ft. line. Present plans call for three to six spotting points upstream. Control of the growth of the dike will probably be made by making lead-line soundings over the work from the cableway skip and translating this information into revision of drop-schedule. It is planned to dump the 1-ton plus rock from the highline by means of a 15 x 15-ft. steel skip.

Although the difficult closure operation will be done over the deepest, fastest part of the river, the engineers believe that closure anywhere else would be just as tough an operation, and possibly be more risky than at the 240-ft. Oregon channel. Complete control of the facilities of Coulee Dam, over 300 mi. upstream, would temporarily lower the water at McNary only 1½ ft., not enough to be of real value, and it would interfere with power production at Grand Coulee.

In preparation for closure, the upstream leg of the cofferdam is being built out from the first step cofferdams near the shore. Already straddling the 240-ft. closure gap are cells 15 and 16, and 17 and 18. Before October 10, the 110-ft. gap between the Oregon Shore Junior cofferdam and cell 15 will be bridged with rock fill, then closed by cells 13 and 14. Work is now progressing with the driving of cells out from the Washington Shore first step cofferdam. Already built are eight rock filled 12 x 12-in. timber cribs, 30 x 60 ft. in plan, interspaced by 30 ft. These cribs cross the 20-ft. deep Washington channel. The 30-ft. gaps between cribs will be closed with 3-ft. diam. reinforced con-

STRIPPING form from one of the 3,000 twelve-ton concrete pyramids (tetrahedrons) which will be the first "stoppers" to be dropped.



crete stop logs. In the still water upstream from the cribs and stop logs, twin rows of 20-ft. diam. cells will be driven and filled, 16 in all, to cross the shallow channel. In the more quiet water over Artesian Island, the cofferdam will consist of 57 and 45-ft. diam. cells, filled with sandy silt and gravel and capped with 3 ft. of rock.

Previous construction

Powerhouse excavation work on the Oregon Shore contract is protected by the previously built "Junior Cofferdam." The Junior was built last year of sandy silt and gravel-filled circular sheet pile cells, 28 and 38 ft. diam., and under all river conditions sustained seepage of from 1 to 7 ac. ft. per 24 hr., even when excavation was at 100 ft. below water elevation. This gave indication of both tight foundation rock and cofferdam construction. An unusual coincidence in connection with this cofferdam is that it was designed to withstand a flow of 730,000 cfs. in the unpredictable river. This happened to be the exact maximum flow of the following season. At high water, the river was within inches of overtopping the Junior, and a stockpile of sandbags was on hand for last minute use if necessary.

Construction of the Junior was begun one season early, allowing work to begin one year earlier on the powerhouse, with a resulting speed up in time required for first power on the line. Without the Junior, powerhouse work could not begin until after the main closure.

Present closure work is being studied with interest for the additional reason that it may be considered as feasible for the deep, fast diversion of the Columbia at the proposed Dalles Dam. McNary Dam spillway is designed for a maximum flood of 2,200,000 cfs.

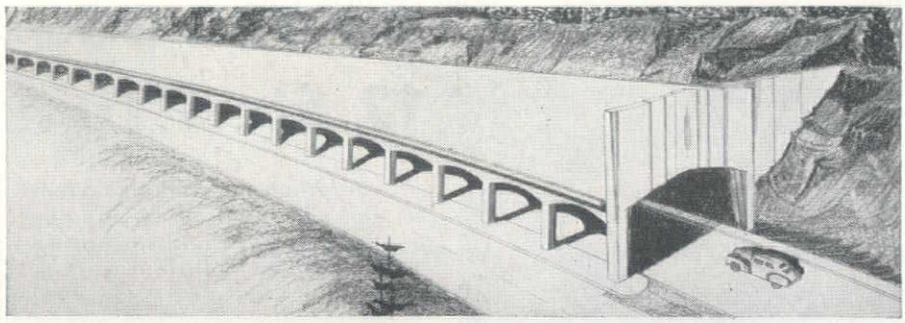
Of the total estimated cost of $270,000,000 for McNary Dam, about 47% will be spent east of the Mississippi River. About 45% will be spent in the Pacific Northwest, and 8% in the remainder of the West.

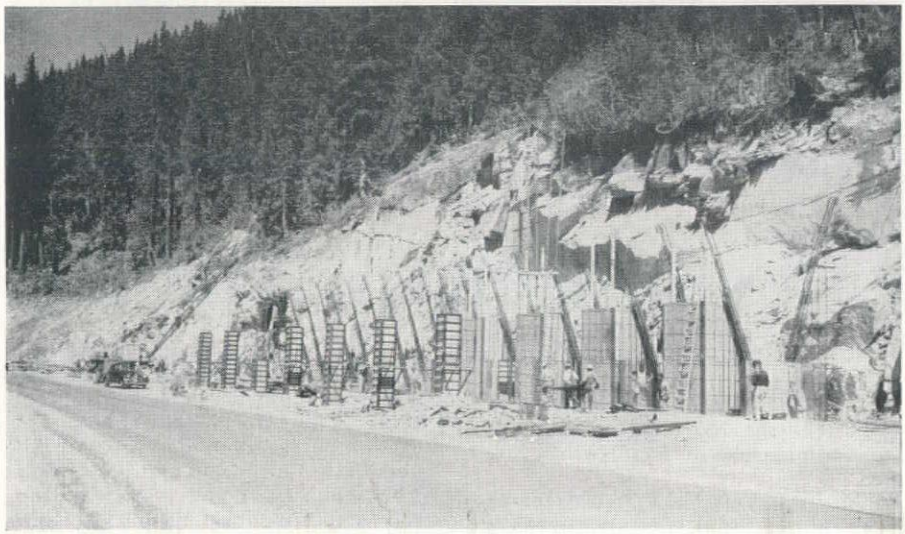
Personnel

Col. Orville E. Walsh is North Pacific Division Engineer, Corps of Engineers, and Col. William H. Mills is Walla Walla District Engineer. Otto R. Lunn is McNary Coordinator, and E. C. Franzen is Chief of the design branch. Sam G. Neff is Resident Engineer.

McNary Dam Contractors consists of Guy F. Atkinson Co., J. A. Jones Construction Co., and Ostrander Construction Co. John Morton is Project Manager, and Al Chausse is Project Engineer.

IN LINE WITH the establishment of voluntary priorities by other industries, members of the Cast Iron Pressure Pipe Institute have advised military authorities that they are immediately establishing their own priority system which will give preference to military requirements. Members of the industry have further advised the military that the supplier will require telegraphic or written statement from a responsible military official.





WINTER PROTECTION (top) for two lane highway (U. S. 10) with four lanes planned for heavy summer traffic. Forms being set (lower) for 2-ft. square concrete columns that will support precast roof units.

Precast Concrete Units for Snowsheds On Washington's Snoqualmie Pass

TO MAINTAIN Snoqualmie Pass as part of an all-year highway, the Washington State Department of Highways is building 1,800 ft. of reinforced concrete snowshed that is notable because of its heavy design, precast concrete roof beams, and economy of layout. The $1,015,620 contract was let March 25, 1950, to the C. V. Wilder & Gaasland Co., Inc., Bellingham, Wash., and work is scheduled for completion before the 1950 heavy winter snowfall. Snoqualmie Pass is located about 50 mi. east of Seattle on U. S. Hwy. 10, and is the lowest pass available to points east. The route is interregional and will eventually have four-lane traffic.

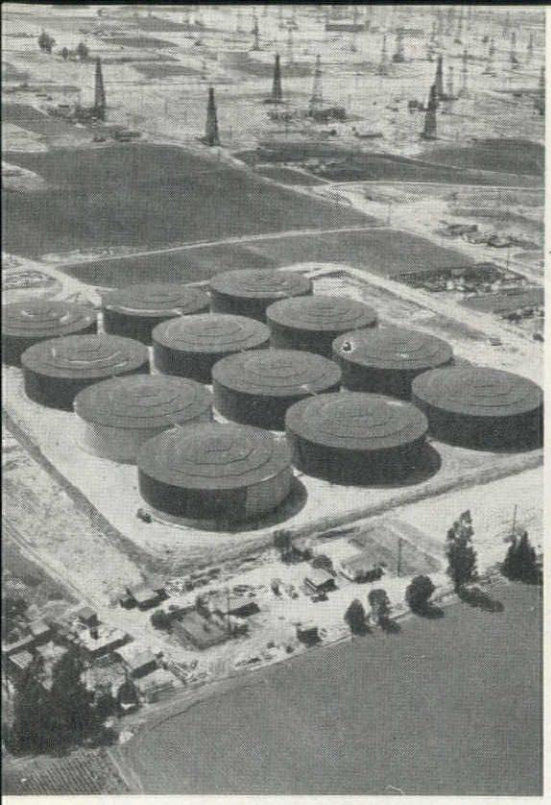
Several factors were considered in the snowshed design. To keep first cost to a minimum, the sheds are being built over two of four lanes to be paved. This can be done because peak winter traffic is far less than that of the rest of the year, and traffic can be channeled into one lane each way at the structure. The Lake Keechelus snowshed is 500 ft. long, and the other at Airplane Curve is 1,300 ft. long. To keep future maintenance at a minimum, both structures are built of reinforced concrete, with a series of 20-ft. open bays on the downhill side. Little drift is expected to enter the sheds through the open bays. To shorten construction time, the roof will consist of precast Tee beams with a 1 ft., 9 in. web and a 2 ft., 6 in. flange.

The snowsheds have a standard cross-section of a reinforced concrete footing 19 ft. wide and 4 ft. thick at its maximum. The uphill retaining wall is 28 ft., 3 in. high, with a constant thickness of 1 ft., 3 in. Retaining wall counterforts are 2 ft. thick, spaced on 10 ft., 2 in. centers. The open bays on the downhill side are supported on 2-ft. sq. columns. Concrete for columns, walls, and counterforts are poured with Universal Form Clamp steel and composition forms.

The precast roof beams are slightly less than 40 ft. long, placed on a 3:1 slope. A tapered hole in the stem at each beam end receives doweling from the retaining wall and arch support. The beams are grouted at the stems, and between beams the joint will be sealed with grout and penetration asphalt. Concrete for the precast beams totals 3,120 cu. yd., and structural concrete totals 9,800 cu. yd.

Included in the contract is 5,205 sq. yd. of 8-in. thick Portland Cement concrete pavement under the sheds.

William A. Bugge is Director of Highways, and George Stevens is Bridge Engineer. C. E. Chapman is Resident Engineer. For the contractor, E. V. Shields is General Superintendent, and Sam Lowry is Job Superintendent.



40,000,000-gal. Stored in 12 Steel Tanks at Long Beach

Addition to reservoir system of city required by population growth and increasing load on municipal system

By C. KENYON WELLS
Assistant General Manager and
Assistant Chief Engineer
Long Beach Water Department
Long Beach, California

MUNICIPAL WATER supply, one of the first facilities of a city to feel the pressure of population growth, is being improved by the city of Long Beach, Calif., under a $6,400,000 bond issue. The erection of twelve steel water storage tanks will mark another major step in the water expansion program, made necessary by spectacular postwar building and an ever-increasing load on the municipal water system. When completed, the new tank-farm reservoir will provide the city with 40 mg. additional storage which, when combined with the 20 mg. storage being planned under the same bond issue for the Alamitos Reservoir, will boost the total water storage to 100 mg., or storage for 3 days' average consumption.

The twelve tanks nearing completion on Dominguez Hill, just northwest of the city, are 132 ft. in diameter and 34 ft., 9 in. high. Under terms of a $1,134,930 contract, Chicago Bridge & Iron Co. has brought construction of these tanks to approximately 98% completion. The Board of Water Commissioners of the City of Long Beach has appropriately named this new reservoir system the J. Will Johnson Reservoir in honor of a past president and long-time member of that commission.

Five separate courses of steel shell plates are used in construction, with the thickness of the top course being ¼ in., and the thickness of the bottom course being ⅞ in. Intermediate shell plates are graduated by even decreases in thickness between the top and bottom plates. The tanks are covered with a wooden roof structure built up on steel girders supported by columns of 8-in. pipe. Roof sheathing is covered with asphaltic-type roofing material.

The 18-acre site of the J. Will Johnson Reservoir on Dominguez Hill was selected because it was the only elevated area available. The choice, however, proved ideal because with a minimum of excavation (not deeper than 6 ft. at any point) the reservoir floor was brought to 170-ft. elevation—the same elevation as the city's other reservoir on Alamitos Hill, built in 1932.

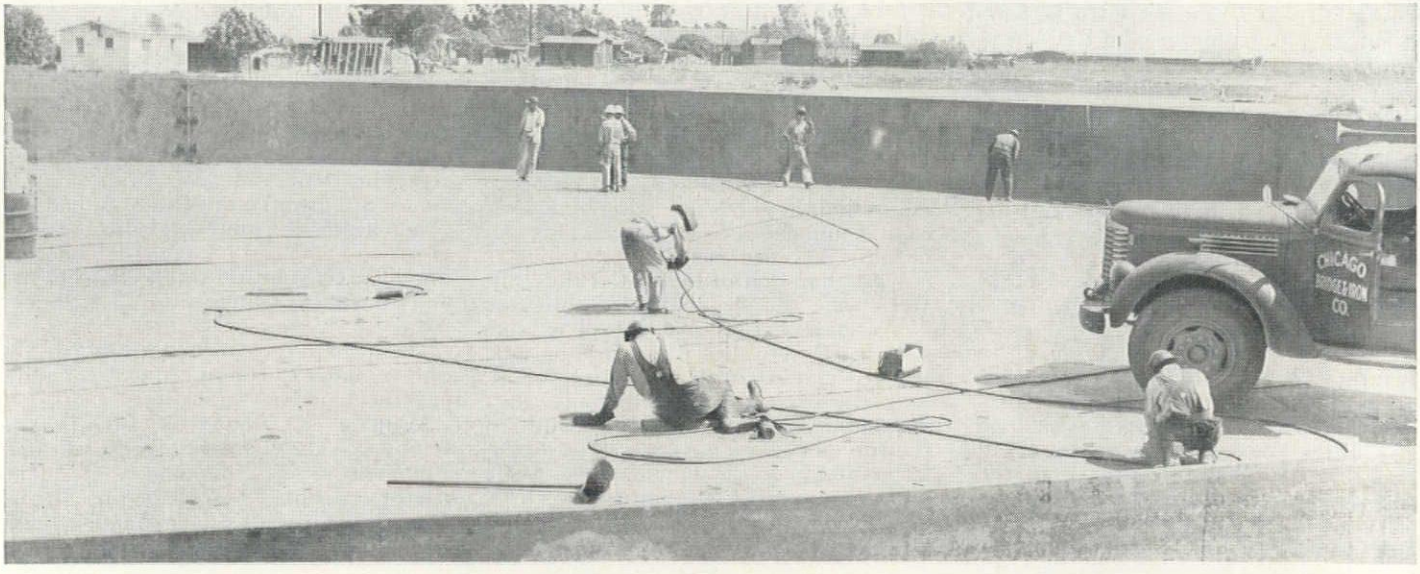
In all, the grading and development project called for excavating 64,170 cu. yd. of earth (55,330 cu. yd. were hauled away) and the removal of oil field operational building foundations. The removal of this deeply embedded concrete was accomplished with conventional wagon drill-and-blasting methods.

Local geological conditions warranted design of the steel tanks for earthquake resistance and ground subsidence. By designing a reservoir system comprised of individual tanks, earthquake risk is spread over more structures and, if ground settlement should develop, the tanks will settle as independent structures.

Tank reinforcement is obtained from twenty ⅞-in. diameter tie rods with turnbuckles attached, extending radially from the central column to reinforce the upper rim of the tank. This represents twice the number of tie rods used on the city's Alamitos Hill tanks erected in 1932. This safety factor is warranted in view of the fact that a tank in a nearby city, *not reinforced with tie rods,* failed during the 1933 earthquake—yet none of the Alamitos tanks were harmed. This proved the importance of tie rods in designing steel tanks for earthquake resistance.

Another precautionary measure taken was to drill twenty 24-in. diameter drain holes in the subgrade under each tank to a minimum depth of 20 ft., where a more porous formation exists (the geological makeup of Dominguez Hill includes a layer of clay over a more porous foundation). These twenty drain holes were filled with coarse grade sand so that they would readily accommodate any trapped water which might accumulate beneath the tank.

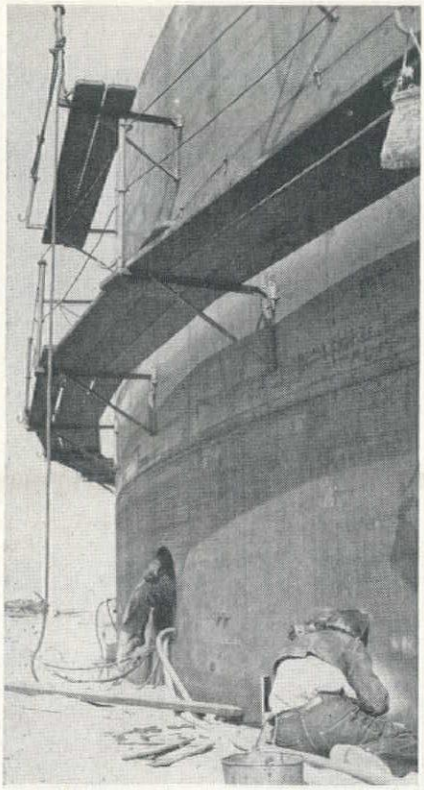
A sand mat foundation 1 ft. thick was placed over the clay subgrade. This mat is 1 ft. higher at the center than it is around the circumference. Approximately 630 cu. yd. of coarse sand were required for each mat foundation. Shaping of this sand mat foundation to the



WELDING the bottom of a 132 ft.-diameter tank, with the first of the five courses of shell-plates in position.

required spherical crown was accomplished with a tractor and scraper. This unit began spiralling from the center of the tank foundation at its minimum turning radius, skimming excess sand or depositing sand in accordance with grade requirements. The result achieved was highly satisfactory and extremely precise for such a large piece of equipment.

Construction of each tank began by laying rectangular and sketch plates on the sand mat foundation, then spacing, tacking and welding them. These plates were held together and correct spacing achieved by use of special "fitting-up" devices, used exclusively by Chicago Bridge and Iron Co. and its licensees. Next, the first course of shell plates was assembled, erected and their vertical seams welded. Shell plates were joined together by double-welded vertical and

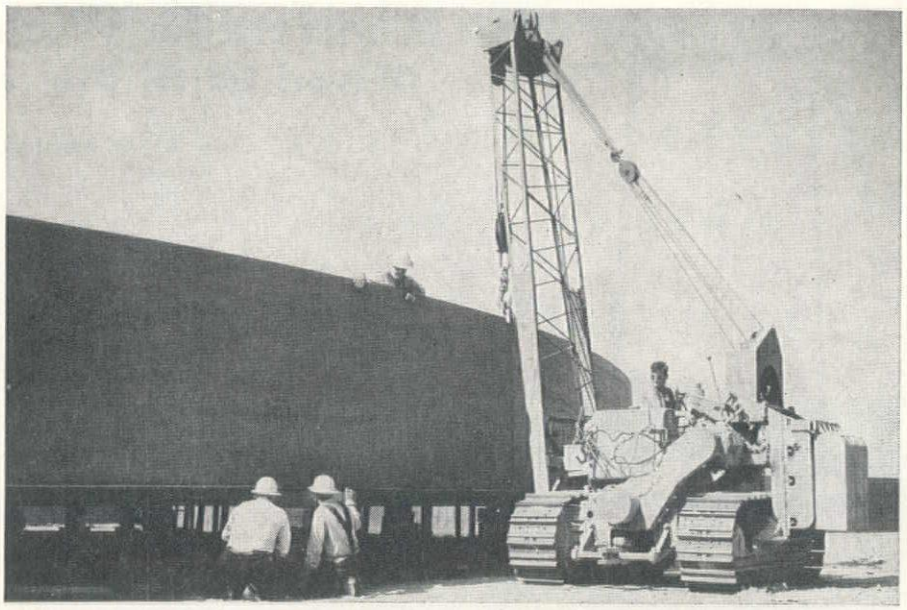


SCAFFOLDING for welders was hung on triangular brackets fastened to lugs welded to the shell plates.

horizontal butt joints. The ends of those shell plates greater than 5/16 in. thick at vertical joints were joined by a double-V butt joint with a minimum of 60 deg. included angle for both plates. The ends of those shell plates 5/16 in. or less were open square-butt joint welded both sides. The flush sides of shell plates are on the inside.

Raised to coat underside

A feature of this job was the requirement that the assembled first shell ring and bottom be jacked up on cribbing for completion of the bottom watertight seal weld and the application of coal-tar enamel. Normally, all welded steel tanks of this type are erected on the sand mat foundation and do not require being raised on cribbing. Such tanks, subsequently, have road oil pumped into the sand mat foundation as protection against bottom corrosion.



THE "TUB" (bottom and first shell course) was raised and supported on timber cribbing for applying coal-tar enamel to the underside. After lowering the foundation sand was impregnated with SC-6 road oil.

Long Beach Water Department officials, however, deemed it a wise investment to have these all-welded steel tanks raised on cribbing, much the same as for riveted construction, and to apply coal-tar enamel to the underside. In essence, this decision was based on satisfactory results obtained from undercoating the tanks on Alamitos Hill. Recent examination of these tanks (riveted construction) reveals the bottom coating to be still in excellent condition. The theory, then, was to continue with this satisfactory method which minimizes maintenance problems.

Bottom cleaned and sandblasted

Prior to applying coal-tar primer, the bottom surface of the tank was cleaned with a coal-tar solvent and then sandblasted. Bitumastic 70-B coal-tar priming solution was then applied at the rate of approximately 1 gal. to 280 sq. ft. of surface.

The primer was permitted to dry 24 hr., but not longer than 96 hr., before 70-B Bitumastic coal-tar enamel was applied. This coal-tar enamel was heated in kettles to a temperature of 450 deg. F., then poured into 2½-gal. electrically heated buckets and applied with Tampico-type daubers.

An electrical flaw detector, arranged to produce not less than 7,500 volts nor more than 10,000 volts at low amperage, was used to detect "holidays" in the enamel coating. This detector consists of a vibrator coil energized by a 6-volt battery and a fine steel wire brush electrode or current may be supplied to the fine steel wire brush electrode from a luminous sign transformer energized from a 110-volt, 60-cycle source of supply.

While this first shell ring and bottom, or tub, was supported on the cribbing, both 24-in. inlet and outlet 90-deg. elbows were welded in place. Coal-tar primer and enamel was then applied, particular attention being given to the application at the junction of the elbow with the bottom plate. Each elbow was then wrapped spirally, with 4-in. Tapecoat coal-tar material.

Tested for leaks

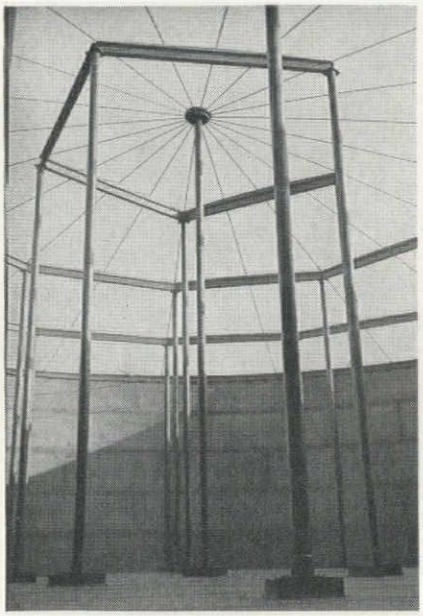
The tub was then subjected to a vacuum seam test for leakage. When this test was approved, the grade and crown of the sand mat was reestablished and cribbing removed in the center portion of the tank. The sand was then impregnated with SC-6 road oil at 350 deg. applied at the rate of 1½ gal. per sq. yd. from pressure spray nozzles.

Another ring of cribbing was then removed, the sand mat crown reshaped and more SC-6 road oil applied. This process of reestablishing the sand mat crown and removing cribbing was repeated until the tank was lowered onto the sand mat. Approximately 2,400 gal. of SC-6 road oil was used for each tank foundation.

Welding of additional shell plates was then accomplished, with the welders working from scaffolding supported by triangular brackets which in turn were supported by lugs welded to the shell plates.

Another test for leaks

After the steel columns and steel roof girders were in place, but before the timber rafters and roof sheathing were installed, the tank was filled with water and observed for leaks. After this leakage test was approved, the 2 x 10-in. Wolmanized Douglas Fir rafter system was installed and covered with 1 x 6-in. tongue and groove redwood sheathing. Redwood sheathing was employed because of its enduring qualities and because it has been used successfully for many years by the Department under similar conditions. The roof was then swept clean and all knotholes in the redwood sheathing were covered with 24-gauge galvanized sheet metal.



TWENTY-FOUR tie rods with turnbuckles extend radially from center column to upper rim.

Johns-Manville asphaltic roofing materials were then applied, with first a layer of 55-lb. asphalt-saturated felt and then two layers of 15-lb. asphalt-saturated asbestos felt. The bottom layer and the second layer were solidly and evenly mopped with asphalt at 350 deg., applied at the rate of 30 lb. per 100 sq. ft. The third or cap layer was treated in a similar manner, except that only 20 lb. of asphalt was used per 100 sq. ft.

Interior coated

After the tank roof was completed, the inside surfaces of shell plates and the topside of the bottom plates were sandblasted and coated with coal-tar enamel. The top of the bottom plates was coated to a thickness of ⅛-in.

Two spiral stairways were then constructed, one on the southeasterly tank and one on the northwesterly tank, with bridges erected between all tanks. The exterior surfaces of the tanks were then given two coats of red lead primer and a finish coat of aluminum paint.

Water for storage in these tanks will be supplied by the Metropolitan Water District of Southern California from its 54-in. distribution main in Victoria Street, through a 45-in. intake line presently under construction. The flow of water out of the tanks and into the City's distribution system will be through a 54-in. line, which is now also under construction.

Personnel

Plans and specifications for the J. Will Johnson Reservoir were prepared by the Engineering Division of the Long Beach Water Department. Brennan S. Thomas is General Manager and Chief Engineer.

The City was represented on the job by Robert W. Hunt Co. Dean Stephan is District Sales Manager, F. W. Schooley is Manager of the Pacific Coast Erection Division, and C. R. Mooney was the field foreman in charge of erection for the Chicago Bridge and Iron Company.

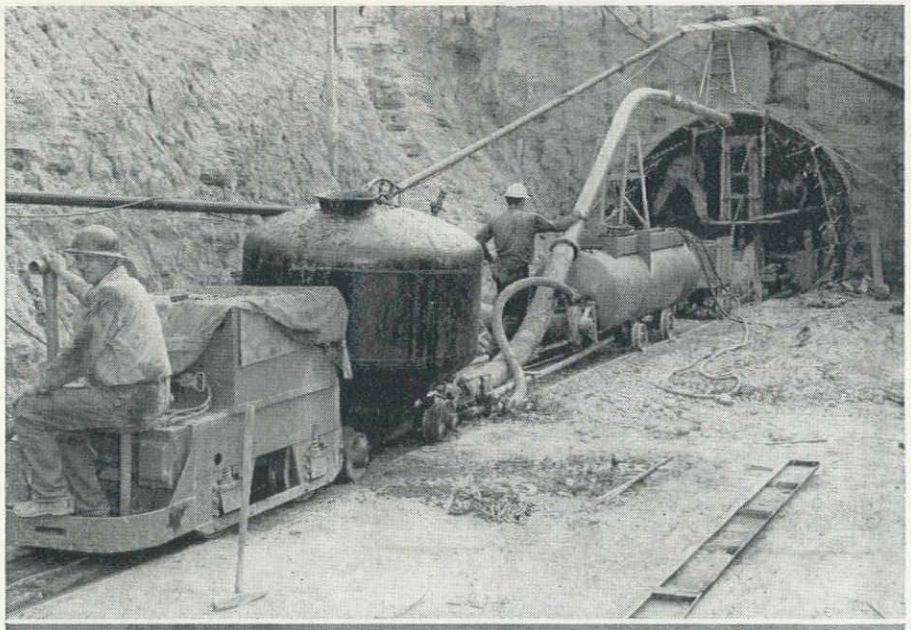
Concrete for Water Tunnel Lining Placed With Pneumatic Equipment

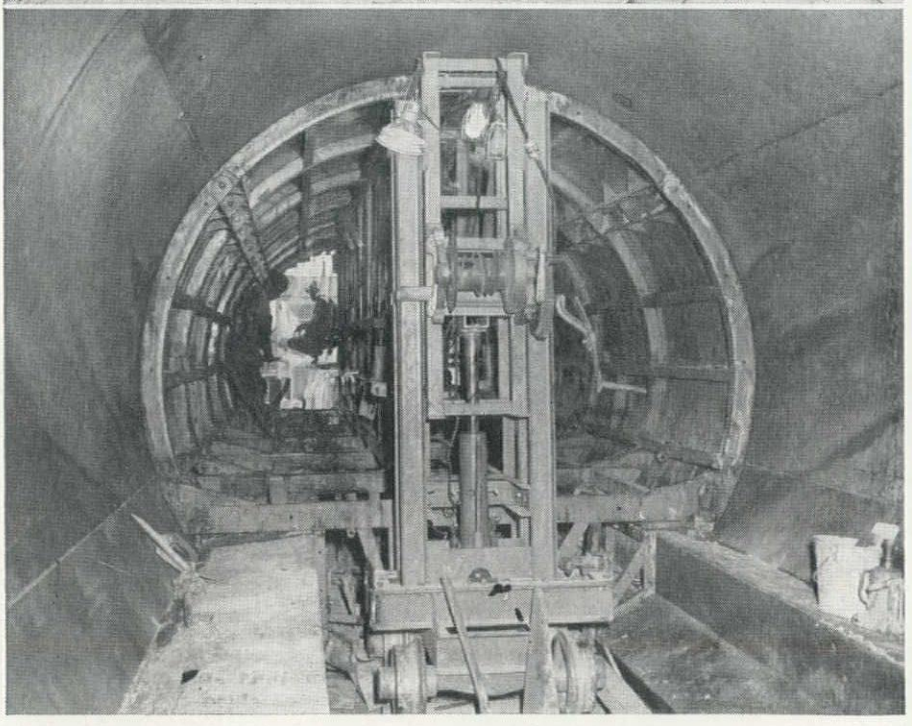
UNUSUAL methods and equipment have been used by Kemper Construction Co., Los Angeles, to place the concrete lining for a tunnel at the Baldwin Hills Reservoir of the Los Angeles Department of Water and Power. Shown at top below is one of two portals of the 400-ft. tunnel, which is part of the outlet works for the reservoir. The equipment shown is the Kemper Pneumatic Placer, including reserve air tank and a 30-ft. long concreting hose.

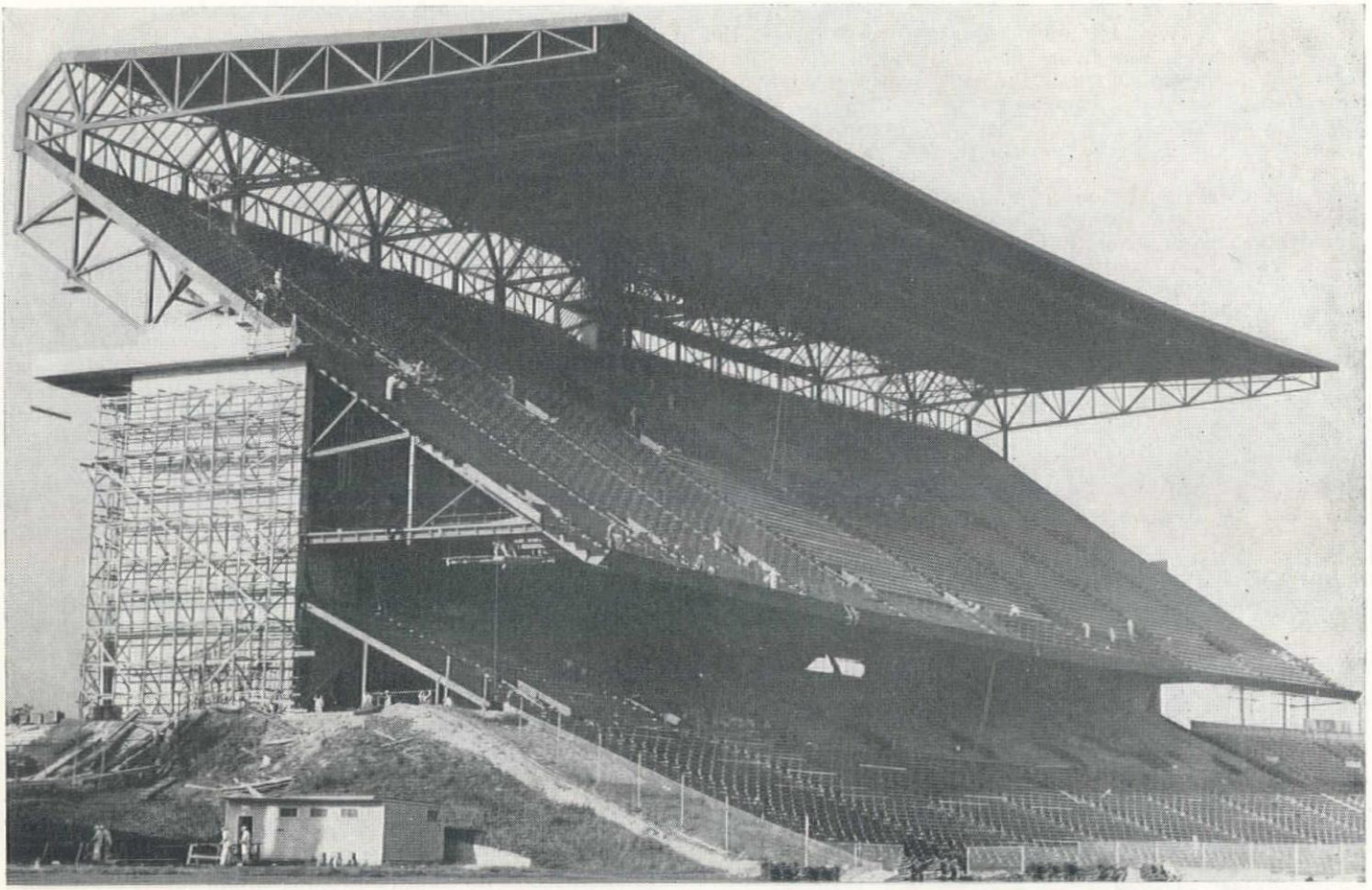
Operation of the special concrete placing equipment is similar to that used on the Grossmont Tunnel at San Diego (*Western Construction*, January 1948, pg. 65). Main advantage of the invention is the low velocity of discharge with very little segregation of aggregate.

Both bores of the twin tunnel will have 10-ft. finished diameter and will house 66-in. diameter intake and outlet steel pipes. The arch pour of concrete, first step in the concreting, is done first to avoid relocation of track. This pour is accomplished with a hydraulically actuated telescoping steel form, as shown. This form is collapsed on the main frame of the rail traveler. Length of the form, 30 ft., is limited by the volume of concrete per pour, as well as sharp bends in the tunnel. On a typical day, the crew strips, moves and sets forms until mid-afternoon and the pour of 45 cu. yd. is made before quitting time. Invert is poured last using hand screeds.

Bruce Kemper is superintendent for Kemper Construction Co.







Univ. of Washington Adds 15,000 Stadium Seats With—

All-Welded Cantilever Double Deck

Football crowds at Seattle dictate extension designed for maximum visibility and weather protection — Spiral concrete ramps involve special form problems — Welding was heavy and steel layout complicated

By HARLAN H. EDWARDS
Consulting Engineer
Seattle, Wash.

ON BOTH design and construction the new 15,000-seat addition to the University of Washington Stadium at Seattle is a most outstanding structure. The project has involved field operations featured by: (1) a tight time schedule, which started when the area was deep in mud, (2) forms for two silo-like circular concrete ramps on which all surfaces are curved, (3) high enclosing walls where 18 ft. pours of concrete were a minimum and (4) a cantilever steel frame on which welds of unprecedented size were the rule rather than the exception. The project was carried out by Strand & Sons, Seattle.

Due to the unusual character of the structure and to its construction at an outstanding university noted for its engineering excellence, extra precautions were taken to assure safety and stability under all conditions. To accomplish this the university authorized a review of the structural design by Shortridge Hardesty of the firm of Hardesty & Hanover, consulting engineers, New York City, and also ordered the checking of the welds by both the magnaflux and the gamma-ray processes. The design included a 2½-in. center expansion joint in the 416-ft. length of structure and bracing to resist a 70-mile wind and 0.1-gravity earthquake forces.

As with many similar institutions, enrollment and consequent attendance at athletic events had been skyrocketing at the U. of W. until sellouts at football games were becoming increasingly frequent and the need for more spectator space became evident. In setting up requirements of design, four conditions were specified in enlarging the stadium: (1) none of the 15,000 additional seats were to be back of posts, (2) maximum weather protection for spectators was to be provided, (3) a minimum of ground space was to be covered, and (4) a minimum number of supporting columns were to be used.

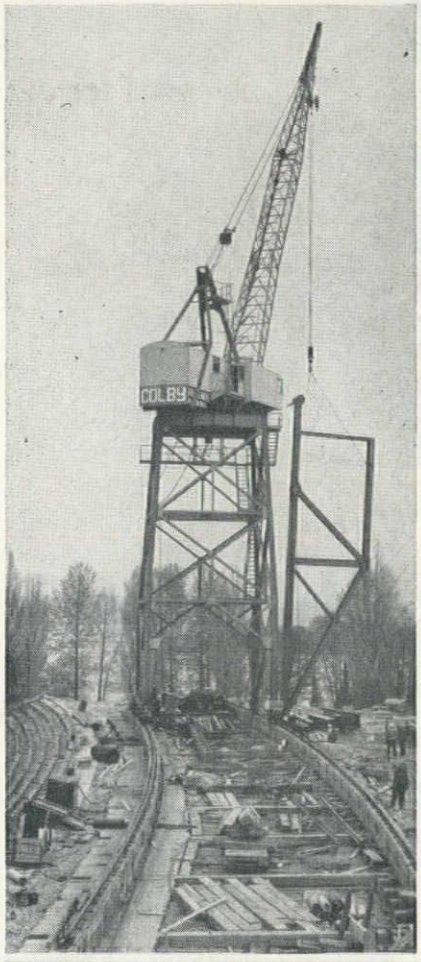
These conditions ruled out the usual type of stadium design having a large bowl-type ampitheater, and by reason of the massive sections required, the normal forms of reinforced concrete and steel construction were eliminated. All avenues of approach to the problem led back to the unique steel frame and cantilever roof design made possible through the use of the welded steel frame type of construction by Sigmund Ivarsson, consulting structural engineer for the architects George W. Stoddard & Associates, of Seattle. Not only were the design conditions met, but by welding: (1) the cumbersome gusset plates and rivets were eliminated, (2) it was possible to

THE COVER

WELDED design of unique structure results in saving 200 tons of steel and several weeks in construction time. Double deck occupies minimum ground space for the added capacity.

provide joints 33% stronger than American Welding Society recommendations, (3) the structure was given its sleek, streamlined appearance and at the same time about 200 tons of steel costing some $40,000 were saved, and (4) several weeks were cut from the construction time.

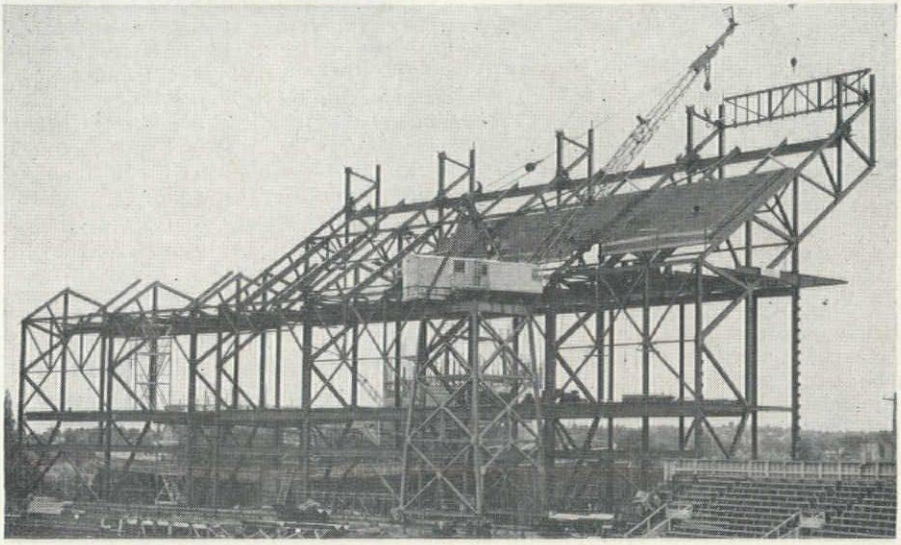
At first it was hoped that the approximately 416 x 150-ft. cantilevered roof would not need any hold-down ties or struts, but it was recognized that there were definite aerodynamic problems involved. Studies of models tested in a wind tunnel at the university showed that the roof without struts or hold-down ties would move slightly under pressure from unusually strong winds when loaded with snow. Although engineers agreed that such a movement would in no sense endanger the structure, it might have a bad psychological effect upon spectators and upon the gentlemen of the press located in quarters hung directly from the cantilevered canopy. Consequently ten 12 to 14-in. steel-pipe struts are being placed between the roof and the second deck of the addition to make the structure rigid.



With usable completion of the project scheduled for September 23, the date of the Kansas-Washington game, 26,000 of the 50,000 seats in the stadium will be in the double-decked stand on the southerly side of the field while another 10,000 are in the student section opposite. Of the 36,000 seats located between the goal posts, 20,000 are under roof, the topmost seats being 168 ft. from the playing field, at the height of a 14-story building. These high seats will be prized by many, for they give a perspective view of the field, from which plays can be much easier followed than from the usual location. Plans for future expansion include another 15,000-seat stand on the opposite side of the field, followed by lesser addition giving an ultimate capacity of 80,000 seats.

Press, and television representatives and visiting coaches are well provided for. Fifty-eight working press seats extending from mid-field to the 23-yard line are situated in a box hung from the cantilevered roof. Chairs are to be swiveled, set in two banks, one elevated behind the other. Insulated glass windows with louvered openings at the top for ventilation will afford protection in case of any strong winds from Lake Washington which is visible beyond the stadium. The quarters are equipped with elevator access from the ground—a feature which will be much appreciated by those who have packed a typewriter, cameras, and other equipment of qualified writers and photographers to the top of a high stadium. Radio and television booths, with special platforms for news-reel cameramen have been included on which no obstructing structural members exist within the field of vision. Visiting coaches will also be provided with plenty of working room for their scouting trips.

STEEL setting was carried out by crane traveling on curved track to follow line of stadium.



The site is partly on alluvium, originally being the shoreline of Union Bay of Lake Washington. Foundations were at first designed for concrete piles, the casting and curing of which would take time, but the subcontractor, Manson Construction and Engineering Co. found locally available a sufficient supply of H-section steel piles. Since these piles were to be driven to 40-ton bearing on the hardpan underlying the area, approximately 35% fewer piles were used. Under the conditions of mud existing at the site this saved approximately a month's time in driving. These piles were capped with steel plates welded on, and then encased in a concrete mat, which on some footings involved as much as 84 cu. yd. of concrete.

Concrete surface

Any construction man visiting the stadium will immediately comment upon the degree of perfection attained on the concrete work. Comparatively few rock pockets or rough spots appeared after stripping the forms, and these were immediately dug out and patched with a mortar containing a small amount of USG Redtop gauging plaster, for the purposes of making the color of the patch lighter to match the adjoining concrete, and to speed its rate of setting. Credit for this part of the job should go jointly to superintendent J. H. Wallstrom, labor foreman Stanley Simpson, and Frank Crooks, concrete technologist from the Pacific Testing Laboratories who was on the job practically full time. With the mix designed and set by the laboratory for 5-sack concrete with ½ oz. of Darex per sack (except where a fluid mix was required, for which 5½ sacks of cement were used) the concrete handled remarkably well. Its fatness, cohesiveness, workability and placeability at 4½-in. slump accounted for much of the successful placement. The 28-day average strength of better than 3,000 lb. for 5-sack concrete is particularly good for this area.

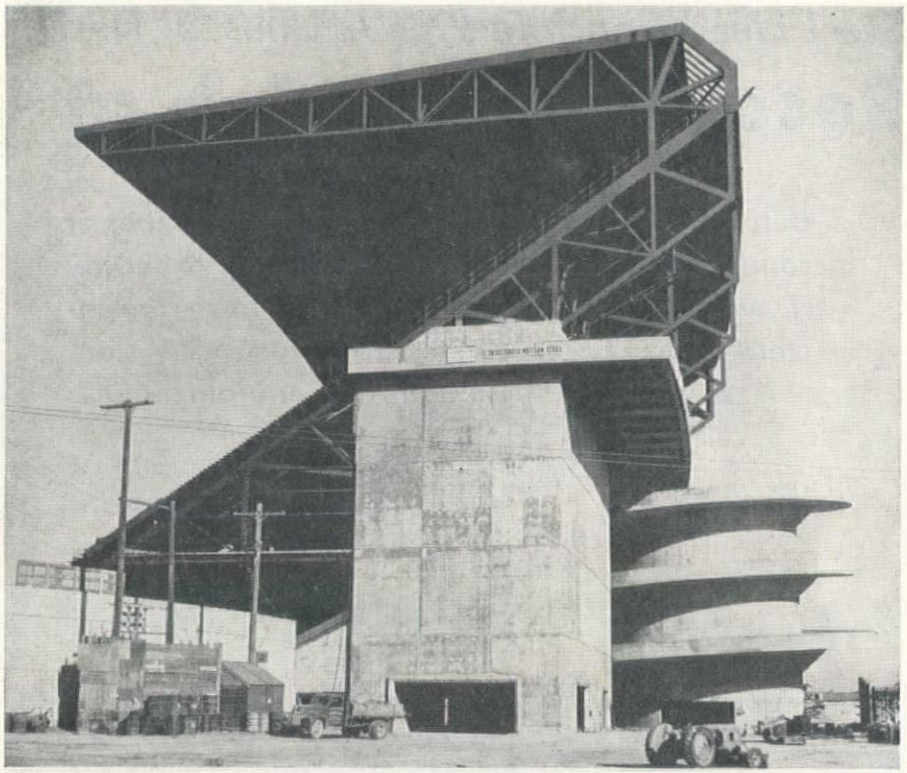
The outstanding features of the project are the spectacular twin-spiral cantilever concrete ramps which, like a pair of huge vertical spiral gears on a 56-ft. hollow shaft, provide an easy access to the lower and upper concourses at a 5.95% grade. A special construction problem resulted from the design of these ramps which provides for a curved lower face for this cantilevered spiral, due to the increased thickness of the slab toward the shaft. At the same time the top walking surface slopes 3 in. down to the outside. This not only gives quick rainwater drainage to the outside but it leaves the outer lower edge of the slab sufficiently low to carry the water into catch basins located at each turn.

All formed surfaces of this structure were curving, and this fact could have made form costs unusually high had it not been for the forming and bracing method developed by Superintendent Wallstrom. Shown in the accompanying illustration, the location of studs and walers for the outer form was based

upon the full 4-ft. width of plywood being used over shiplap. Vertical 2 x 4-in. studs were placed at 16-in. intervals around the barrel and the form was brought to the required curvature by the use of the proper sized and shaped wood wedges between the studs and the approximately 5-ft. walers which lapped and spiked together around the perimeter of the form. Special snap-ties were used, set radially, having take-up wedges at each end so that the front form could be brought to line separately from the back form.

The back or inside circular form was of shiplap set horizontally braced by double 2 x 4-in. studs set vertically at 23 in. centered on the radial snap ties. Takeup was provided by the wedge at the inside end of the tie. No walers or other bracing was used on the inside form, the stiffness being supplied by the outer construction and the radial assembly. The form for the curving and sloping connection between cantilever slab and barrel was fabricated similarly except that all facing was cut to maintain the radial method of forming and bracing. The form for the cantilever ramp slab was built, braced and supported as usual.

The ramps have been an advantage on the job for they are used by many crafts as a 16-ft. roadway for trucking miscellaneous tools and materials, excepting concrete, to the upper levels. Concrete was hoisted in the usual way by truck crane and bottom dump buckets and dropped into place down the high forms through elephant trunks.



SPIRAL RAMPS have 16-ft. walkway on 5.95% grade. The hollow central shaft of 56-ft. diameter introduced form problems caused by varying slab thickness and need for providing drainage.

Structural steel

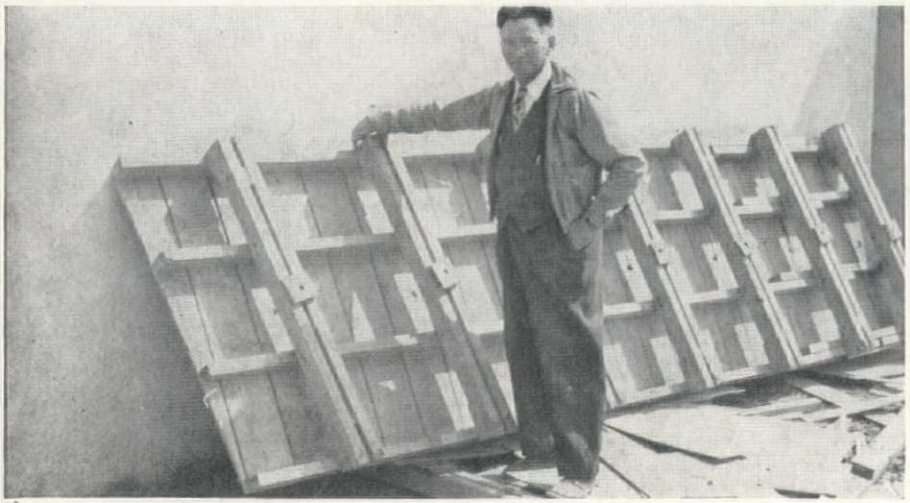
The structural steel subcontract work involved not only the heavy welding but also a difficult layout job due to the curve of the stadium. "Consolidated Western Steel Corp. did an outstanding job," declared Superintendent Wallstrom, "in spite of the unusual layout problems, the steel was unusually well fabricated and went into place accurately." Initial fabrication was at the Los Angeles plant, while shop assembly into larger units was done at the Seattle plant of Pacific Car and Foundry Co.

Credit for field erection is due O. J. "Smitty" Smith, field superintendent for Consolidated Western and a veteran in the erection and welding of large structures.

"Welding is an art which too many men fail to understand," commented Smitty. "As a result, it is necessary in the Pacific Northwest, where certified welders are not available, to 'qualify' the men coming to the job by rigorous tests, separating the careful craftsmen from those who 'just-work-at-it' unthinkingly.

"The basic principle involved in good welding practice is to avoid the locked-in stresses that may be built up if the heating and cooling of the metal occurs in the wrong sequence, by welding from a fixed point to a free point, with the welding operations always balanced symmetrically about the center point of each joint. Many men fail to take this to heart—to realize that on welds such as in structural members, it is necessary to balance the stresses caused by welding on one side of center by other stresses created by simultaneously welding at the same rate on the other side of center. It is on this type of work, too, that men must learn to work together, in pairs. If one stops for a smoke or for any other reason, the other must stop, too, and it is surprising how many men cannot learn to cooperate and coordinate their work with others." Smitty pointed with pride to the straight front edge of the cantilever canopy saying "that is the result of real craftsmanship, and came to within ⅛-in. of the calculated position."

WEDGES between the studs and the walers provided the means for securing curvature. J. H. Wallstrom, general superintendent for Strand and Sons, is pointing out the wedge system which he developed.



Personnel

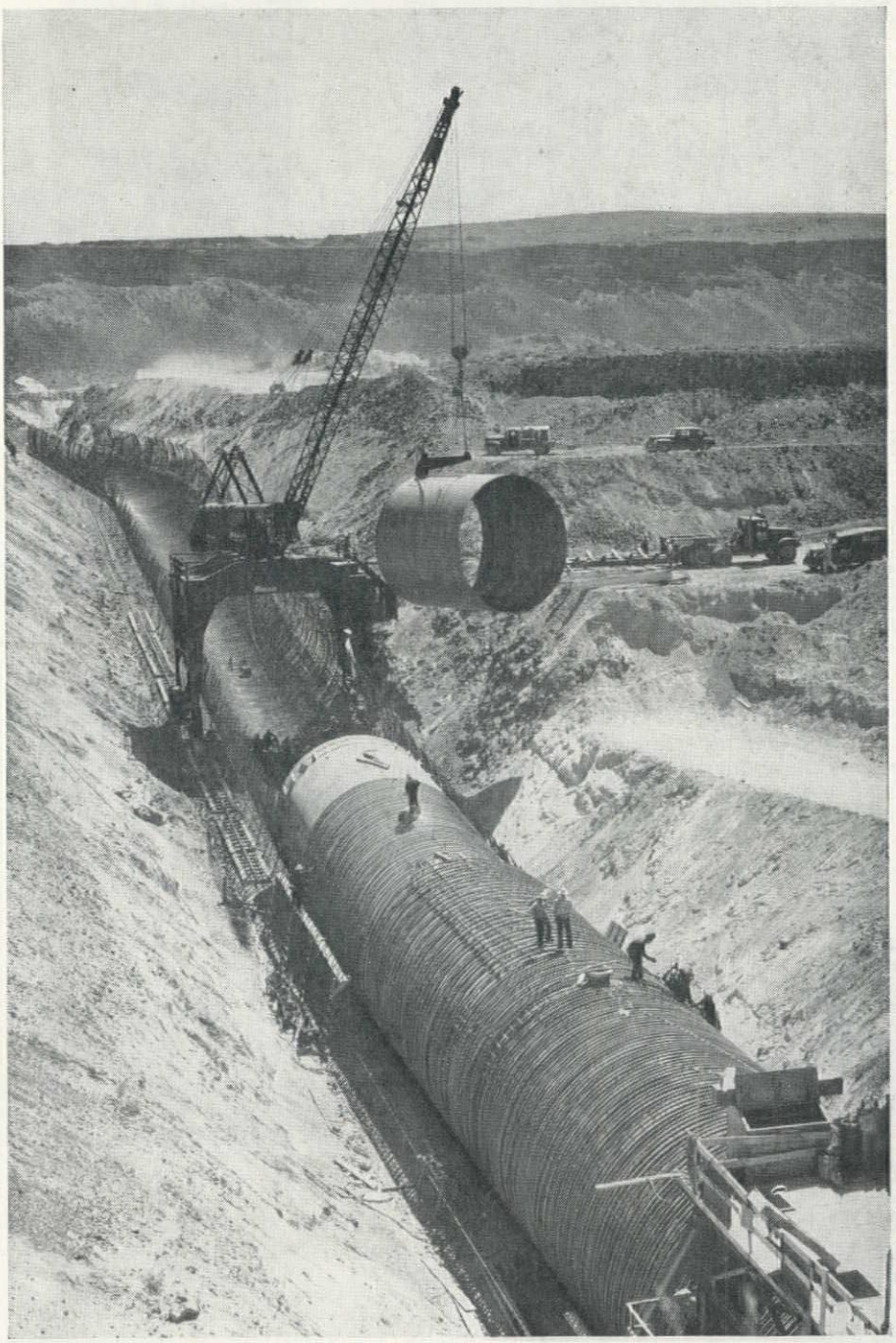
Design of the structure was prepared by George W. Stoddard & Associates, Seattle, represented by Francis E. Huggard and Arch N. Torbitt. Sigmund Ivarsson was structural engineer. Supervising architect for the University of Washington was John Paul Jones, represented on the job by A. O. Whipple. The University of Washington was represented by Charles C. May, superintendent of buildings and grounds, with Gilbert Schaller supervising the welding.

The contract was carried out by Strand and Sons, general contractors of Seattle. Elmer Strand was in charge of the project with J. H. Wallstrom, general superintendent. Consolidated Western Steel Corp. carried out the fabrication and erection of the structural steel, with O. J. Smith, general superintendent and Conrad Wilhelm, welding foreman. Manson Construction & Engineering Co. did the pile foundation.

Steel Lined Concrete Pipe Is Unusual Design Feature of—

Record Siphon Job at Grand Coulee

Detail studies of Soap Lake location and types of conduit result in selection of steel liner to secure: (1) water tight membrane, (2) inside form for concrete and (3) supplement to reinforcing — Construction features handling equipment



TRACK-MOUNTED revolving crane, with gantry straddling invert reinforcing, lifts liners from trailer and places them in position. When set the circumferential joints are machine welded by rigs operating on the stiffener ring tracks. Collapsible stiffener rings are placed when concrete is poured.

LONGER than the combined lengths of all siphons yet built by the Bureau of Reclamation in the Grand Coulee area, Soap Lake Siphon is nearing completion eight months ahead of schedule under contract by Winston-Utah, a joint venture firm composed of Utah Construction Co., San Francisco, and Winston Bros Co., Azusa, Calif. The Bureau opened bids Nov. 16, 1948, and a $7,614,000 contract was let to Winston-Utah for construction of the 12,880-ft. structure. Soap Lake Siphon is a major feature of the 88-mi. West Canal, which will carry irrigation water from Long Lake Dam and Main Canal on the north to laterals serving the area between O'Sullivan Dam and the Columbia River in the south. The first contract on the West Canal, $2,871,000, was let in June, 1946, to the Utah Construction Co. and Winston Bros. Co. The canal has a capacity of 5,100 cfs., and its section varies from 63 to 120 ft. in width at the water surface.

Soap Lake Siphon extends around the north end of Soap Lake, and is made necessary by a drop from el. 1320 to el. 1105 in the profile at the lake, and a rise back to el. 1301. The structure is notable for the problems it involved in location, alternate types of conduit and supports, unit stresses, final pipe design, welding, contraction joint studies, and cost studies of alternate designs. In the construction phase, the job is outstanding in the steel plate lining operations and the concrete work.

Alternate designs

The 215-ft. drop in the line of the canal across the lake suggested two alternatives: either an inverted siphon section or steel pipe supported at the canal grade. Cost estimates were prepared for steel pipe supported on concrete piers and piles driven into the lake bed, and for steel pipe placed on rock fill. Samples of the lake bed material indicated that little value could be placed on it for either frictional or lateral support for piles. In this case, lake deposits are interspersed with material classed between swamp, and firm silt and clay, and it was apparent that adequate bearing for piles could be obtained only in the gravel layer underlying this unsuitable material.

Further studies revealed that high

THIS REVIEW of the design and building of the Soap Lake Siphon is based on field information obtained during an editorial visit to the contractor's operations, supplemented by material covering preliminary investigations taken from a recent monograph prepared by Robert Sailer, Engineer, Canals Division, Branch of Design and Construction, U.S.B.R.—*Editor.*

concentrations, exceeding 37,000 ppm., of carbonates, sulphates, and chlorides in the lake water might have a serious effect on any concrete used in piling. Steel piling, it was believed, would suffer less damage than concrete in the lake water, but would come in contact with fresh water in the gravel stratum underlying the fine lake bed deposits. The difference in the concentration of solutions existing over a length of pile would be a source of heavy damage to the metal, and the only two means of solving the problem would be to use paint or an electric system cathodic protection. Paint was discarded both because it would become damaged during driving and because the lake water would remove it rapidly. Cathodic protection, successful on pipelines and steel sheet piling, was eventually discarded because no adequate estimate of either first cost or regular maintenance costs of such an unprecedented and large system of protection could be made. Also, uncertainty remained as to the effectiveness of this system for the interior piles of each large cluster required for a pier. For these reasons, piling could not be protected and plans for steel pipe supported at the high level were discarded.

No support in lake bed

The alternative plan, to place steel pipe on a rock fill across the lake, was discarded when tests of the fine lake bed material revealed that it had no measurable shear resistance. Under the heavy loads imposed by the rock fill, the saturated material in the bed was highly unstable.

Cost studies were made for steel pipe supported on concrete piers, but with the piers carried to the gravel stratum by open cofferdam construction, rather than supported on piles. This plan was abandoned because of high initial cost, and because once again there was the question of protecting concrete from the high concentrates contained in the lake water.

Bureau engineers, after rejecting plans for a crossing at the canal grade, then continued studies of a siphon pressure tunnel, and extensive investigations were made of the possibility of siphoning directly across the lake (shortest route possible). This plan showed promise, until borings in the lake bed failed to reach rock at a depth of 200 ft. below the water surface. At this depth the head on the siphon would have been over 400 ft., so the siphon pressure tunnel was discarded.

Routes around lake studied

Since the lake could not be crossed economically by siphon, routes around the north and south ends, considerably longer, were considered. A line passing around the north end of the lake was adopted as being the most economical. The line south of the lake might have been shorter, but more costly due to rights of way within the corporate limits of the town of Soap Lake.

Several different designs were considered for the pipe itself, once the line and grade had been established. Following conventional practice, preliminary designs were drawn for buried monolithic concrete pipe where the head was 100 ft. or less, and for steel pipe in the center of the siphon where the head was greater than 100 ft. However, estimates of the two types of conduit revealed that the cost of steel pipe for 100-ft. plus heads was nearly double the cost of concrete pipe for the same head. The high cost of steel in this instance led to studies of a new design, one which would retain much of the reduced cost of concrete but have the watertightness of steel. The new design, as is now under contract, is the result of this advanced study and consists of a steel-lined concrete pipe cast in place, for heads in excess of 100 ft.

Liner has three functions

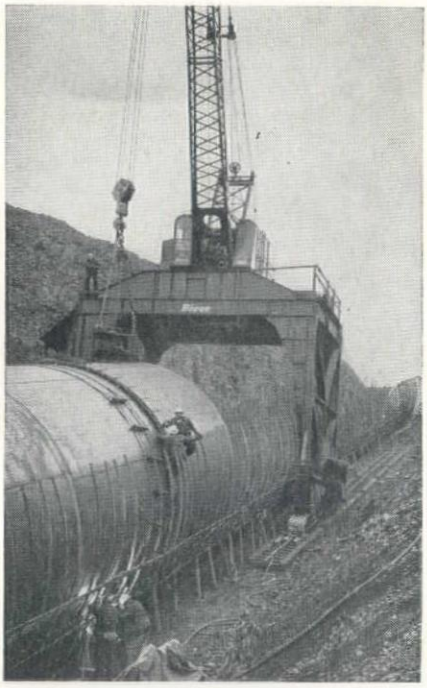
The steel liner on the inside of the pipe was designed with three purposes: (1) it serves as a water tight membrane, (2) it is used as an inside form for the concrete, (3) it is incorporated into the design of the steel reinforcement. As additional reinforcement, two layers of steel reinforcement are used in addition to the liner, one layer being placed directly against the steel plate. This design was assumed to be materially less costly than that for conventional steel pipe. However, because of possible construction difficulties of the new design in the unusually large size of pipe, an alternate bid was called for conventional design in plate steel pipe.

Having decided upon the route and general design of the siphon, plans and profiles were drawn in preparation for final design. It was decided to use monolithic reinforced concrete pipe of conventional design for the inlet and outlet legs of the siphon where the head is less than 100 ft. This pipe is 25 ft. I.D., has a 2-ft. thick wall, and is 1,910 ft. long at the inlet end. The outlet end is 2,413 ft. long, of identical design. In the central portion, where the heads are between 100 and 225 ft., bids were called on both the conventional plate steel pipe and the newly designed steel lined concrete pipe.

Anchors for steel pipe

At this section of the siphon, alternative plans and profiles differed little from each other. The line for steel pipe was changed slightly to take advantage of the existing rock outcrops, which are ideal for the concrete anchor blocks necessary for the short radius bends in the steel pipe. No anchor blocks were considered for the lined concrete pipe, which uses long radius curves. The profiles of both designs differed only slightly; the concrete pipe is somewhat lower because it is buried. At a highway crossing, underpassed by the steel lined concrete pipe, the head reaches a maximum of 225 ft., whereas the steel pipe would have been carried over the highway on steel bents for cost reasons.

When bids on Soap Lake Siphon were opened by the Bureau, the combination low bid on all schedules totaled $7,614,729, and favored construction of the newly designed steel-lined concrete pipe, as was anticipated. On the basis of this bid, plus the cost of cement and aggregate furnished by the Government, the cost of the high head, 8,264-ft. long, central portion of the siphon was estimated at $5,398,000. This was $2,363,000 below the cost figure for the alternate design of conventional steel pipe. In addition, it was estimated that maintenance savings—mostly painting—accruing over a 4-year period amount to $360,000, bringing the total saving to $2,723,000.



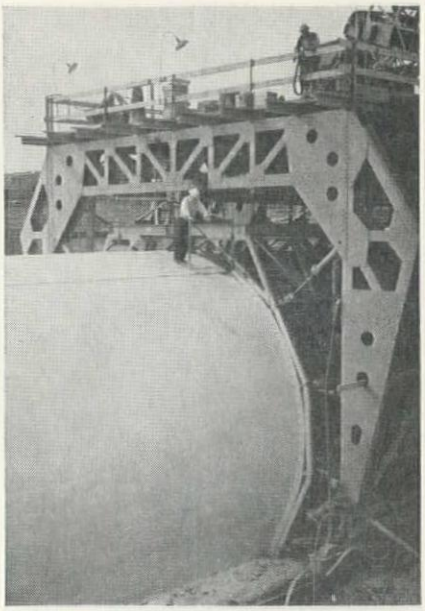
LINER sections are 20 ft. long and provided with a 2-in. lip on the bell end.

Single or double pipe

A cost study also was made to compare the cost of a single pipe with that of twin pipes designed for the same total capacity. The estimates showed that the two smaller pipes would cost about 25% more than a single pipe.

The initial section of the West Canal and siphon has a capacity of 5,100 cfs. Considering the hydraulic gradient, the low head concrete pipe siphon section must have an inside diameter slightly less than 23 ft. However, when preparing final designs it became apparent that the concrete forms being used on the Dry Coulee Siphon, also on the West Canal, might possibly be available. Because these forms are for 25 ft. I.D. concrete pipe, and because they are expensive (representing possibly $50,000), it appeared feasible to design concrete pipe on the Soap Lake Siphon to the same diameter, making possible the re-use of the expensive forms. Because of smaller head loss in the larger diameter concrete pipe, the steel lined high head section was made to a smaller diameter, 22 ft., 4 in., to take advantage of reduced head loss in the end sections. This resulted in a $100,000 saving in the reduced diameter high head section, in addition to any possible savings from re-use of the concrete pipe forms.

Sand, gravel, and rock fragments may fall into the canal from the slopes of cut sections, and be carried by the water finally to settle in the siphon. If allowed



OUTSIDE FORMS for concrete were handled by gantry and provided for a 40-ft. pour.

to enter the siphon, this material probably would collect at the low point and require periodic removal. Although this material probably would not damage the concrete pipe, its abrasive action would damage or completely destroy the steel lined sections. Maintenance costs would be so high that the added expense of constructing a gravel trap was justified. The size of the trap was determined arbitrarily, since no estimate of the amount of rock material to be expected was available. The trap as constructed consists of a section of open canal, 60 ft. long, with vertical baffle walls 4 ft. high to divide the bottom into five transverse compartments. The collected material will be removed between irrigation seasons. Armored seats are provided at the tops of each compartment for removable steel gratings, which will be installed at a future date, if necessary.

Contraction joint spacing

Contraction joints are spaced 400 to 500 ft. apart, and are designed so that they may be replaced from within the buried pipe. The spacing between joints was chosen between the influence to eliminate them entirely, because the buried pipe is at a reasonably constant temperature and the liner plate furnishes a continuous watertight membrane, and the questionable practice of building over 8,000 ft. of conduit without some type of expansion precaution. The steel liner contracted somewhat more than 1 in. between joints last winter. Manholes are 400 to 500 ft. apart, expressly to give access and ventilation during the coal-tar enamel coating of the steel liner. They are eliminated in the unlined concrete pipe section, where no coating is required. Blowoff structures are located at the low point, and at another point up the line and 32 ft. higher, so that the bulk of the drain water can be removed via the higher outlet and bypassed through a small channel 5,000 ft. long into Lake Lenore to the north. Although the low point outlet into Soap Lake will be used for the final drainage, the bulk of the water will not drain into and dilute the solids in Soap Lake. This design was made to accommodate local interests.

Steel liner for the high head section is ¼ in. thick, a dimension chosen because movable steel forms of this size and thickness had been satisfactory, and because rolling mill delivery of thinner sizes was uncertain at the time of design. In order to keep the liner to a true circle during erection and placing, the specifications called for adequate bracing from within on each completed section. This bracing remains in place until the concrete has reached about half its ultimate strength.

Sub-contractors

In the field, the American Pipe and Construction Co., Portland, Ore., holds the subcontract for fabrication of the liner; the Bigge Drayage Co., Oakland, is subcontractor on hauling to the site, and Humiston-Rosendahl, Los Angeles, has the subcontract for lowering each section on line and welding the circumferential joints. At the field shop, eight sheets of steel already stamped to size are machine welded and rolled to form a 20 ft. long liner section with a 2 in. lip on the bell end. Each liner is then carried to a round form and given the closing weld by machine. Shapeless under its own weight, each section is filled out with two sets of stiffener rings, and either stockpiled or hauled to the site for the next pour. The stiffener rings, equipped with tracks on the inside to handle construction equipment inside the siphon, are placed so that abutting lengthwise welds can be staggered.

Handling pipe

On the siphon line, a track-mounted whirley crane, with its gantry straddling invert reinforcing steel, lifts the pipe from the low bed trailer transport and places it in position. To do this (*Western Construction*, September, 1949, front cover) the crane is equipped with a "hairpin," which slips in the end of each section and supports it completely. The hairpin has two-point suspension from the cable block, one point of which is suspended by a coffing hoist so that each liner section can be angled home by hand. No pull-along is used. Setting the spigot end in each bell, with a lip of only 1 in. clearance, is a 15 to 20 min. process. Once the pipe is set, circumferential joints are manually welded from rigs traveling on "ferris wheels" on stiffener ring tracks. When the welds have been tested, the welding rigs and stiffener rings are removed, and heavier stiffener rings are inserted to support the weight

DESIGN FEATURES of the steel-lined concrete siphon indicating the reinforcing steel schedule. The ¼-in. steel thickness was selected because experience indicated it provided satisfactory stiffness for handling.

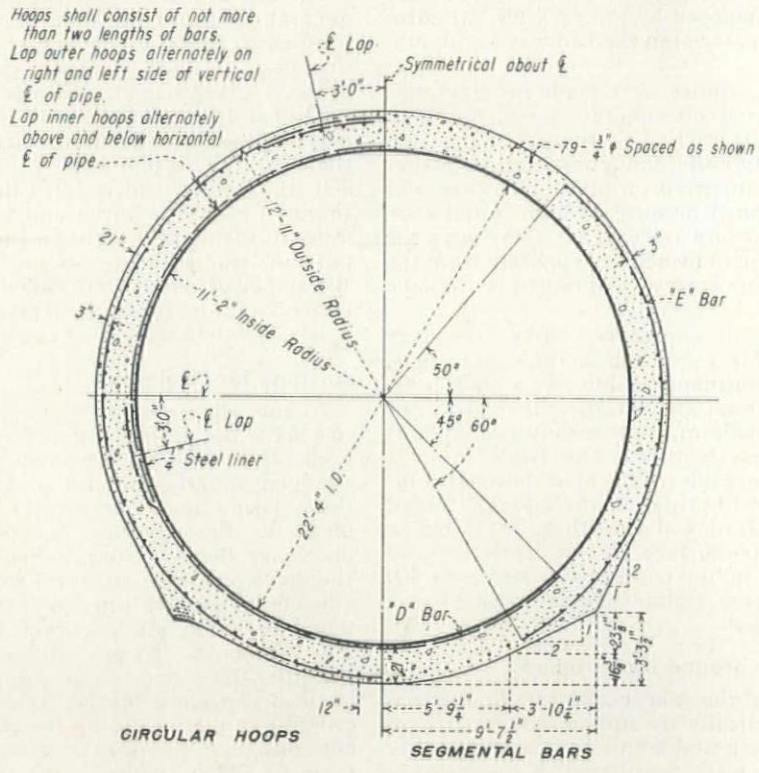
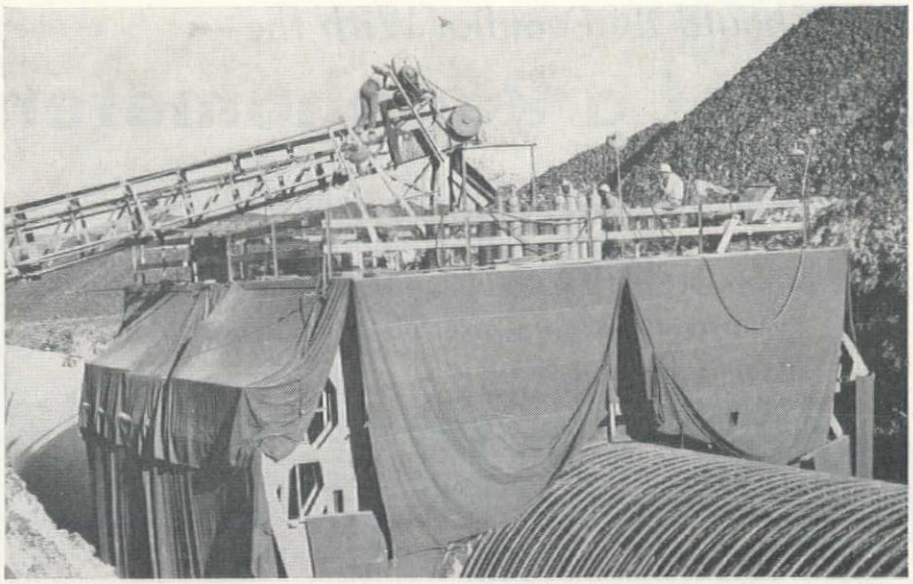


TABLE OF TRANSVERSE REINFORCEMENT

PIPE SYMBOL	INNER REINFORCEMENT		OUTER REINFORCEMENT		PIPE SYMBOL	INNER REINFORCEMENT		OUTER REINFORCEMENT	
	HOOP	SEGM. "D"	HOOP	SEGM. "E"		HOOP	SEGM. "D"	HOOP	SEGM. "E"
SCP 110	None	1/8" * @ 14 1/2"	1/8" @ 12 1/2"	1/4" @ 12 1/2"	SCP 180	1" * @ 11 1/2"	1" * @ 11 1/2"	2" @ 12 1/2"	1/8" @ 12 1/2"
SCP 120	5/16" ϕ @ 15"	1/8" * @ 15"	1/8" @ 12 1/2"	1/4" @ 12 1/2"	SCP 190	1/8" * @ 12 1/2"	1/8" * @ 12 1/2"	2" @ 11 1/2"	1/8" @ 11 1/2"
SCP 130	3/8" ϕ @ 15"	1/8" * @ 15"	1/8" @ 11 1/2"	1/4" @ 11 1/2"	SCP 200	1/8" * @ 11 1/2"	1" * @ 11 1/2"	2" @ 8 3/4"	None
SCP 140	1" ϕ @ 15 1/2"	1/4" * @ 15 1/2"	1/8" @ 10 3/4"	1/4" @ 10 1/2"	SCP 210	1/8" * @ 10"	1" * @ 10"	2" @ 8 1/2"	None
SCP 150	1" ϕ @ 14 1/2"	1/8" * @ 14 1/2"	1/8" @ 9 1/4"	1/4" @ 9 1/4"	SCP 220	1/4" * @ 11 1/2"	1" * @ 11 1/2"	2" @ 8 1/2"	None
SCP 160	1" ϕ @ 12 1/2"	1/8" * @ 12 1/2"	2" @ 14 1/2"	1/4" @ 14 1/2"	SCP 225A	1/4" * @ 10 1/2"	1" * @ 10 1/2"	2" @ 8"	None
SCP 170	1" * @ 13 1/2"	1/8" * @ 13 1/2"	2" @ 13 1/2"	1/4" @ 13 1/2"	SCP 225B	1/4" * @ 9 1/2"	1" * @ 9 1/2"	2" @ 7 1/4"	None

*Round bar equivalent in area to square bar shown.



CONCRETE MOVED from mixer on a conveyor was dumped into a hopper on top of the gantry and buggied to elephant trunks leading into the form. Each 200-yd. pour of 4-in. slump concrete required about 3 hours.

of the concrete. Three pairs of 6-ton and three pairs of 8-ton stiffener rings are used. They are collapsible, identical in diameter, and can be removed on their inside tracks. Average daily progress in this section is 40 lin. ft.

To accommodate the long radius curves of the siphon, the steel liner is trimmed at the field shop on the spigot end before it is rolled. Trimming is done only on the spigot end because of ease and less expense, and is allowable because each bend is limited to a minimum radius of 400 ft.

Concrete materials

Cement and aggregates are supplied by the Government, from installations already in service on other contracts in the area. Concrete is brought dry-batched to mixers at both the lined and unlined sections of siphon, where it is placed into the special forms made to the contractor's specifications by Consolidated Western Steel Corp. The forms used for the steel lined portion weigh about 120 tons, and straddle the siphon on the same tracks used by the whirley crane to place the steel liner. Two forms, each 20 ft. long, are used together and form 40 ft. of siphon per day. They consist of a heavy steel frame mounted on hydraulic jacks and wheel trucks, with polished steel plates curved to the outside dimension forming the concrete.

Filling the form

Four-inch slump concrete is carried from the mixer to the form on a conveyor, dumped in a hopper, and placed by buggies through elephant trunks to the various ports in the form. The mix is first poured down one side of the form to fill the invert section without voids. Next it is spotted by the buggies around the entire form and vibrated. In addition to hand vibrators, Viber units are attached to the stiffener rings inside the liner plate. These vibrate the liner, additional reinforcing steel next to the liner, and adjacent concrete. Concrete for the unlined section is poured with similar equipment, except that inside steel forms must be used. The daily progress on this section is 25 ft.

Each 200-cu. yd. pour begins at 8:00 a. m., and takes about 3 hr. The job record is 2 hr., 15 min. During the following 12 hr. the forms are stripped, and at midnight moved ahead on the line.

Inspection of the lined section during construction disclosed that when the liner is tapped, a hollow sound is given off at different spots. This has been observed in the past during construction of penstocks encased in mass concrete, however when the hollow sounding spots were explored, no voids could be found. In addition, grout could not be forced into these places. Nevertheless, some concern was felt over the condition of bond between the liner and concrete. As a result, a re-analysis of the pipe was made, assuming no bond at all, and in order to continue construction without delay the reinforcing next to the liner was made heavier to take into consideration the new stresses. To find the actual bond between liner and concrete, strain gages are being installed on the siphon. Measurements may give a clue as to what actually takes place.

Personnel

F. A. Banks is District Manager for the Bureau. H. A. Parker is Supervising Engineer, and F. S. Arnold is Construction Engineer. Harold M. Sheerer is Resident Engineer, and Vern Votaw is Field Engineer. George M. Mann is Project Engineer for Winston-Utah, F. G. Peterson is Construction Manager, and H. S. Thompson is General Superintendent. George Grindle is Superintendent for American Pipe and Construction Co., in charge of steel liner fabrication.

The Soap Lake Siphon was designed by Robert Sailer, Engineer, Canals Division, Branch of Design and Construction. He is the author of a recently released engineering monograph on the project, available for $.25 at the Bureau's project, available for $.25 from the Technical Editorial Office of the Bureau's Denver Headquarters.

New Building for Oregon Highway Dept.

THE OREGON State Highway Department will move into new quarters in 1951 upon completion of the State Highway Office Building in Salem. Work began Nov. 25, 1949, under a $1,599,000 contract to Sound Construction and Engineering Co., Seattle, (Peter Kiewit Sons' Co. subsidiary) and will be completed Feb. 28, 1951, despite a complete shutdown of 2 months during the last severe winter.

Because of the amount of light necessary for drafting and design compartments, the building is designed in a U-shape. Every room has outside light, except file and storage rooms. Largest single unit in the building is the 140 x 35-ft. design and drafting room on the 2nd floor, with outside windows on all sides.

Church-Newberry & Roehr is the architect. Haven Nutting is Clerk of the Works (resident engineer). Floyd Garrett is superintendent.

Highway and Street Engineers Should Be Familiar With the—

Design and Uses of a Roughometer

Since the public judges roads as either "rough or smooth," surface quality is important in public relations — City of Berkeley uses Roughometer extensively to plan improvement program

TAX PAYING motorists, usually unaware of the many items that go into good road construction and maintenance, are acutely aware of whether or not a road has a smooth, safe riding surface. Of course, weeds should be cut, drainage ditches kept open, shoulders kept at proper elevation, and bridge and steel work kept in good repair, but if these operations are done, and the road is rough, the motorist will say, "This is a bad road." If he has a smooth, safe riding surface, he will say, "This is a good road," regardless of neglected roadsides, bridges, culverts, and ditches. Road and street officials, then, should keep surfaces smooth and safe whether or not they can do anything else under conditions of limited funds and personnel.

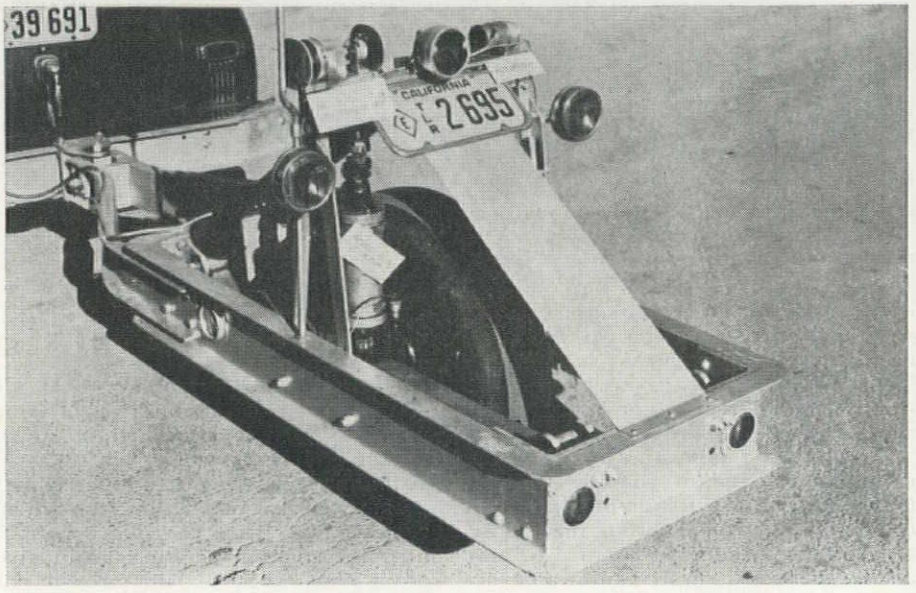
Useable standards

One of the first solutions to any roughness problem is to find out the degree of roughness. Instruments to measure road profiles have been developed since 25 years ago. Usually, these instruments were slow, tedious, and needed reference data. Although accurate, they were awkward, and results difficult to analyze and compare. Subsequent instruments were attached to the spring suspensions of automobiles, were called roughometers, and were an improvement because they measured the roughness of which the public is aware. Roughometers did not approach a standard, however, because readings varied with each automobile used, and spring suspensions vary widely. Roughometers measured vertical movement of the wheels, and later were equipped with integrators to give a summation of movement, usually expressed in inches per mile. Integrators were an improvement, yet two different cars with the same apparatus over the same road varied with speed, degree of roughness, and ratio to each other.

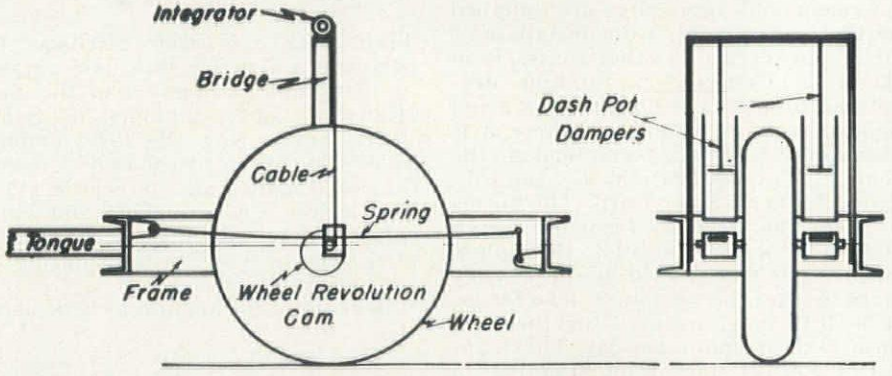
Pioneer apparatus

Pioneer roughness measurement has also been done by the California Division of Highways, which constructed a 16-wheel instrument called the Profilograph. This instrument recorded the actual profile of the pavement, as measured over the effective area of an automobile, and had the advantages of not being a part of an automobile, or needing specially ruled recording paper. It was quickly portable, and easily operated and observed. On the other hand, the 16 wheels were miniatures, about 5 in. in diam., and the instruments measured the actual profile of the surface rather than the profile obtained with a standard automobile tire and wheel.

The Bureau of Public Roads, before World War II, designed and built a single wheel semi-trailer, essentially as seen in the sketch, to bring road roughness measurement to an acceptable standard. The Bureau's roughometer had a wheel reaction of 580 lb., carried by a pair of frictionless leaf springs pivoted forward and shackled at the rear. For uniformity, it used a single leaf spring with ball bearing mountings. The frame was built of standard steel channels, attached to a Y tongue, so that the entire apparatus, acting as a pendulum, had its center of percussion on a vertical line through the axle. Subsequent refinements included two dash pot shock absorbers to dampen oscillation. Equipped with an electrical integrator, the instrument measured vertical travel of the trailer tire in inches per mile. The units of roughness were recorded with a magnetic counter mounted on the instrument board in the tow car. The roughometer was used extensively in the east and middle west, under the Bureau administration.



KEY to roughometer operation is vertical movement of semi-trailer wheel transmitted through cable to integrator. Recorder and electronic circuits are inside car. Relatively simple in theory, the apparatus has undergone extensive refinement to develop consistency in results.



During the past year, extensive roughness measurement research and field work has been conducted by the Institute of Transportation and Traffic Engineering, University of California, Berkeley. The roughness indicator, as used by the Institute, was built in 1941 under the direction of Prof. R. A. Moyer, for use at Iowa State College, from plans furnished by the Bureau of Public Roads. Shortly after Prof. Moyer came to the University of California in 1948, the Institute obtained the instrument, and made certain modifications and additions consisting mainly of an accurate

and reliable electronic oscillograph attachment and calibration equipment.

The roughness indicator, modified and with accessories, has been named the "Electronic Viagraph." In its design, particular attention has been given to the oscillograph unit, so that it is possible to determine from the road surface oscillograms the type of roughness encountered. Actual oscillograms, shown in the cut, reveal the appearance of imperfections, special conditions such as railroad track crossings, and the nature of asphalt surfaces. This roughness recorder section of the electronic viagraph has been highly refined, and can be operated on any standard Bureau of Public Roads roughness equipment. Batteries or power supply, electronic circuits, and the recorder units are located inside the automobile used to tow the viagraph, so that observations can be made continuously during a test run.

Artificial bumps

The accessory calibration device developed by the Institute consists of a motor, gear box, connecting rod, and slider arrangement. Its function is to produce artificial bumps of varying length and height, and at different speeds. The entire unit weighs 15 lb., and can be attached to any roughness indicator. Smaller postwar innovations include using a tire with a smooth tread, because normal treads pick up stones in the grooves of the tread pattern, adding to the roughness indications. In the first oscillograms taken of smooth surfaces, a ripple, resembling a sine wave, was noticed with a frequency corresponding exactly to one wheel revolution. After some investigation, it was found that the tire was .061-in. out-of-round, and since there are about 740 revolutions of the wheel per mile, this had a serious effect on the accuracy of the roughness as measured by the integrator. The solution was to place the tire in a special lathe where it was ground to within .001-in. of a true circle. The tire specified for the viagraph is a 6.00 x 16 smooth tread, maintained at 30 psi. inflation. Other viagraph modifications include changes in the electrical circuits, dash pot damping units, and integrator cable attached to the wheel axle.

A national standard for measuring roughness

Roughness measurements mean little without a standard. One of the ultimate objectives of the Institute is to establish not only a regional, but a national standard for measuring roughness. The electronic viagraph gives much promise of being the apparatus for this standard, because it is inexpensive to make and operate, in relation to the amount of public funds it can save, and the viagraph records only the kind of roughness that is transmitted through the automobile tire, as it affects riding quality. The roughness can be of any height up to about 3 in., with length limits of from nil to around 20 ft., as typified by sags on a bridge span between bents.

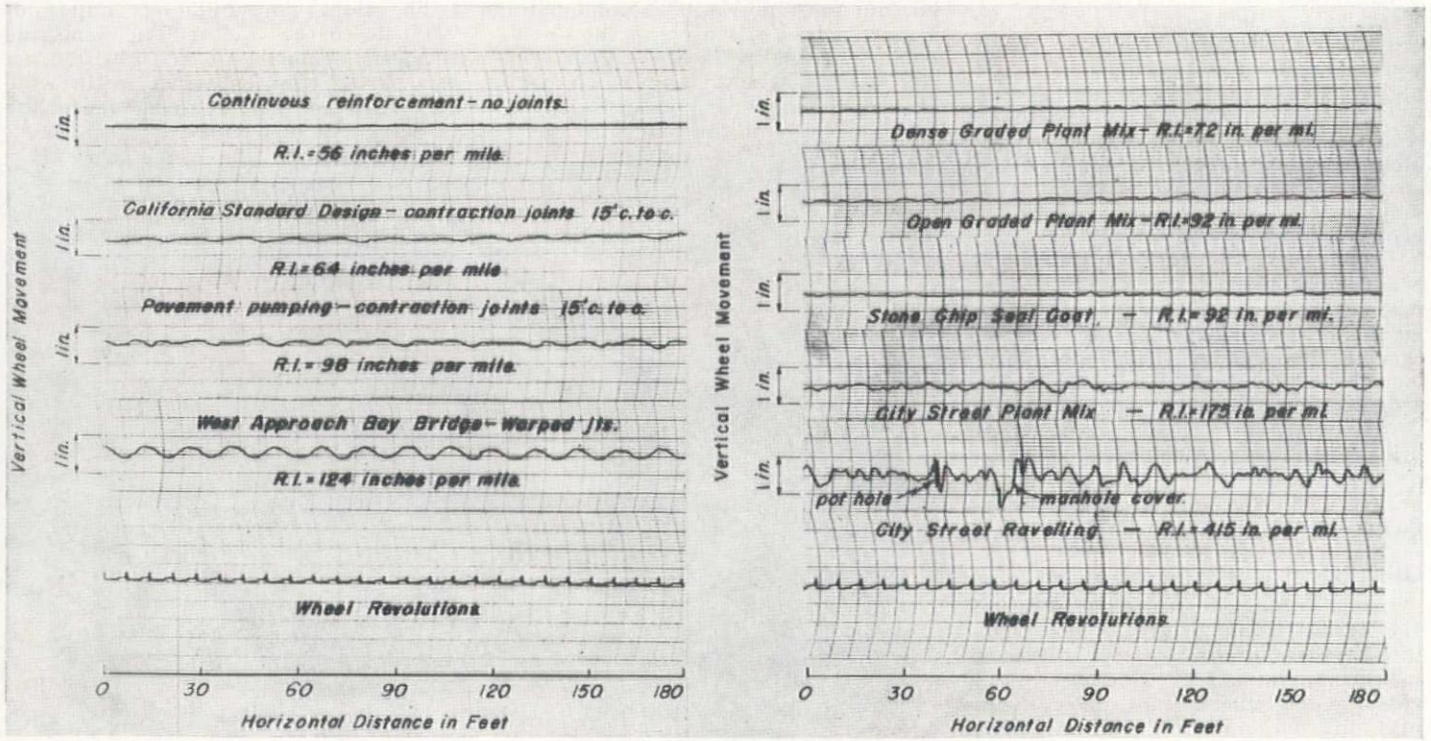
The primary usefulness of the electronic viagraph to street and road officials is its value in any program of determining a priority system of repair work. Traditionally, whenever any repair work is anticipated within corporate limits of a government, local interests immediately begin to put pressure on the officials to do the work first in their area. If it is possible to point to an accurate, numerical standard of repair needs, much of the "heat" put on the city hall can be deflected with facts. In this manner, a roughness standard can more than repay its initial cost, first as an aid in scheduling repair according to engineering thinking, and second by relieving the technical staff from a large amount of added public relations work.

One municipality recently to use the electronic viagraph in scheduling a street repair priority is Berkeley, Calif. With cooperation from the Institute, Berkeley developed one of the most factual street rating systems on record. The need for resurfacing was established by measuring the roughness with the viagraph, and by combining these data with traffic counts determined for the street in question. The result from these two sources has been named the "Surface Deficiency Index," and ranges from 0 to 100. According to this index rating, streets with a mark of zero do not need repair, and streets marked 100 are given top priority.

A key to the entire Berkeley program is in the method of combining roughness data with traffic counts to give the index. An estimate of work to be done and funds available was made, and tentative standards were made as follows:

Roughness, in./mi.	Riding qualities
Below 125	Excellent
125-200	Good
200-300	Fair
300-450	Rough
Above 450	Very rough

Almost 200 mi. of street was measured for roughness, with significant results indicating that less than 2 mi. of major streets were found to have roughness values exceeding 500 in./mi., and 86 mi. of secondary streets were rated at 300 in./mi. and more. From an examination of these results, it appeared reasonable to establish 450 in./mi. as an upper limiting value of roughness, above which any street would be repaired regardless of traffic count. It also seemed reasonable to establish 200 in./mi. as the lower limiting value, so that smoother surfaces, regardless of traffic, would be considered as satisfactory. Between these two



CHARACTER of roughness is shown recorded on oscillogram for different P.C.C. pavements (left), and different types of asphaltic surfaces tested.

roughness limits, the surface deficiency index was set from 0 to 100. In considering the effects of the traffic counts, a formula was used so that traffic had no effect at index 0 or 100, but had a maximum effect for an index at 50. For the average of roughness value of 325 in./mi., and the average traffic count of 300 vehicles per day for the city of Berkeley the index number is 50. With a drop in traffic to 50 vehicles per day, the index drops to 30; with a rise in traffic to 1,800, the index rises to 70, thereby giving the latter street a much higher priority. As the in./mi. roughness value approaches the upper or lower limits of 200 and 450, the effect of traffic gradually reduces to zero.

Priorities established

The results of this system have been highly satisfactory, according to reports from Richard Gallagher, Director of Public Works, Berkeley. Priorities for the streets were established first by listing all over 450 in./mi. in descending order of roughness. Between 450 and 200 in./mi., the streets were listed in descending order according to the deficiency index. For roughness values below 200, the streets were listed in descending order of roughness. This has resulted in a priority system for a program of resurfacing secondary streets as set up over a period of years, based on the two most important resurfacing factors, namely road roughness and traffic volume.

In addition to using the two major characteristics mentioned above, the city of Berkeley made special considerations in a small number of cases. These are:

1. Low priorities are given to streets needing abnormally high repairs prior to resurfacing. Where streets must have expensive repairs, and where they can be maintained in a serviceable condition for several additional years at a moderate cost, they have been given a lower index rating. This merely postpones by several years the resurfacing of streets requiring abnormally expensive repair work. The effect of this is to distribute high repair costs over two or three years.
2. It was deemed logical to postpone resurfacing work on any street scheduled to receive utilities conduits. Such streets are dropped from the improvement program until the utility work has been completed.
3. Older streets, smooth but with fine cracking which may cause extensive surface failure during the rainy season, are given high priorities for seal coats so that they can have the required preventive maintenance.
4. Slippery streets, a big contributor to the accident rate, are given higher priority than normal, so that over-sealed or bleeding over-rich asphalt mixes can be given appropriate corrective resurfacing treatment.

Other possible uses

In addition to using the viagraph as an aid in resurfacing priorities, the Institute has three other objectives at present for the apparatus. It is being used to (1) give a general check of all surface types in California, including a comparison between construction types and between California and other states, (2) determine the effect of differential slab temperatures, caused by the time of day and weather conditions, and (3) determine initial roughness values of new surfaces with periodic checks to see which surfaces have the greatest resistance to the destructive effects of traffic, weather, and age.

California highways checked

Over 600 mi. of California roads has been checked for roughness by the Institute in the last 12 months. These data have been taken, for the most part, on U. S. Hwy. 40, 50, 99, and 101, and in the cities of Berkeley and Los Angeles. Roughness values for badly disintegrated city streets have run over 500 in./mi., whereas three different highways of P.C.C. pavement have given consistent values in the low 40's, with the lowest recorded mile having a roughness of 38 in. This was on a new experimental section on U. S. Hwy. 40 near Fairfield, Calif., having continuous reinforcing and no expansion joints. The low value for asphalt surfaces has been 56 in./mi., with consistent values in the 60's being obtained for the smoothest sections. Records are not as complete, to date, for asphalt surfaces as for concrete. An effort is being made by the Institute to schedule roughness tests on many different types of asphalt pavement construction on the California State Highway system to determine the roughness characteristics of all the various types of construction, especially those involving seal coats.

Road roughness studies of the Institute are under the direction of Ralph A. Moyer, Research Engineer, and field tests are under the direction of John W. Shupe, Junior Research Engineer. The Berkeley priority rating system was designed with the advice of Richard Gallagher, Director of Public Works, Berkeley.

Rough Trimming Sides of Canal With New Tractor-Mounted Backsloper

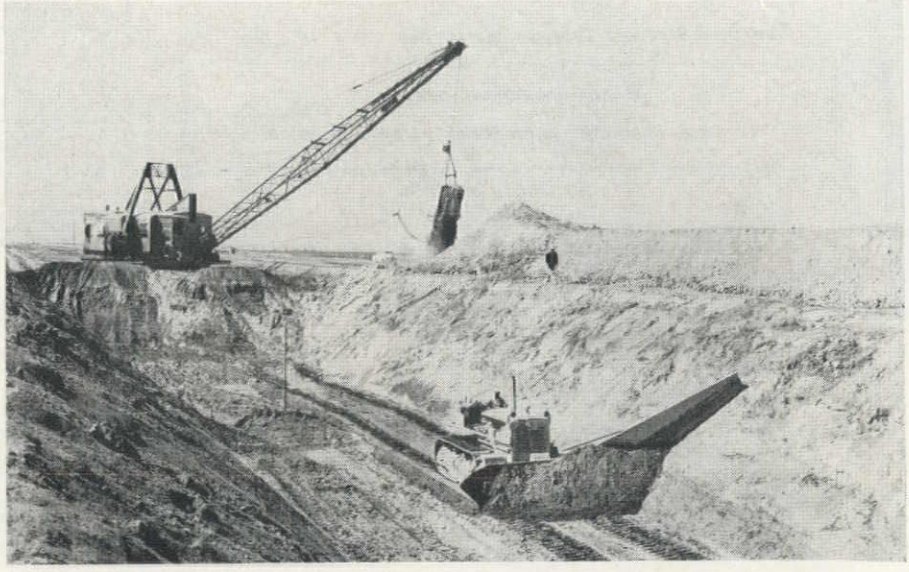
FOR FINISHING slopes on the Friant-Kern Canal project in California, a new type of backsloper is being used. Design calls for a 3½-in. concrete lining which requires final excavation to be accurate, if heavy overruns of concrete are to be avoided. Rough excavation is carried out by a 4-yd. dragline which excavates the section to within 2 ft. of final line.

Dragline excavation is closely followed by a motor grader and a tractor-bulldozer helping to bring the rough grade and slopes to a better finish. Where the slopes had been left with an unusually heavy cut the tractor acted in conjunction with the motor grader as a towing unit. Materials thus excavated were pushed up to the face to the dragline cut for removal. This combination has proved an expensive method of reducing the final work of the giant trimmer whose efficient operation with a cut to a fine tolerance is a foot or less.

Engineers from the Peterson Tractor & Equipment Co., of San Leandro, Calif., studied the problem and came up with a solution. The two machines previously used for slope finishing have been replaced with one backsloper and the operation is better handled.

The new backsloper consists of a standard Caterpillar bulldozer to which a long moldboard and cutting edge has been attached, making a continuous blade with that of the bulldozer. The sloper blade is curved similar to that of a motor grader for rolling material from the slope as it is cut. The tip is placed well in advance of the bulldozer blade to assist its shearing or cutting action. The blade is 16 ft. long on the slope and trims up a vertical distance of 10 ft.

The sloper and bulldozer unit adds 9,700 lb. to the tractor. The wing and tilting mechanism, on the right side, act as a partial counterbalance to the wing on the left, so the tractor has no feeling of being out of balance.



Breaking Up Shale With Heavy "Pick" To Speed Up Dragline Excavation

J. A. Terteling & Sons develops unique method for conduit work on Columbia Basin Project to aid bucket in penetrating hard layers

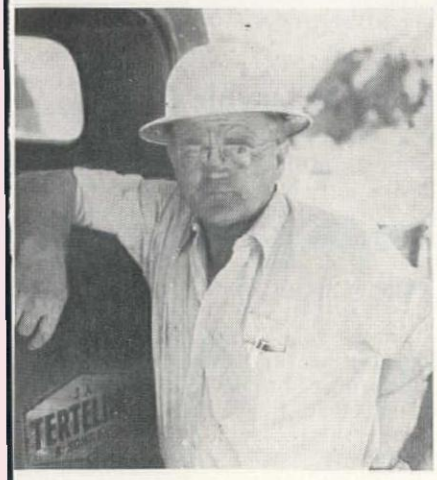
WESTERN INGENUITY has again come to the surface, this time on the J. A. Terteling and Sons, Inc., Boise, Idaho, contract for construction of North Coulee Dam and feeder canal where the superintendent was faced with a particular excavation condition.

On the cut-and-cover conduit section, the superintendent has devised a new pick to cope with tough excavating conditions on a section of the feeder canal line. At this point, layer after layer of shale was encountered, which slowed down dragline operations because the bucket would not bite into the material until it had been loosened.

To avoid extensive hand work with paving breakers, the superintendent is breaking the surface shale by dropping a 5,300-lb. pointed shaft from a crawler crane. The steel shaft is 20 ft. long and 10 in. in diam., and penetrates the shale with such force that the surface is well broken for the dragline. Both the crane, (Model 8 Northwest) and the dragline (Model 85 Linkbelt) operate side by side in advance of the conduit concrete crew. The pick is lifted up by a short loop of cable threaded through an eye welded on the top.

DROPPING the "pick" to loosen material for the dragline operating in the background.

GENE HILL, assistant superintendent on the job, who devised the new style of pick.



Larger model works

A 1,300-lb. shaft, 5 ft., 7 in. long and 8¾-in. in diam., was originally used, but this size did not provide sufficient breaking force. Sensing that he was on the right track and that a larger model would work, the superintendent then had the new pick made—turned to a point and fitted with an eye—from a length of steel shaft available from Bureau of Reclamation sources in the area.

The cut-and-cover section of the feeder canal is made necessary by possible slides in the hillside next to the job. This hill has moved about 9 in. during the course of the job, requiring almost immediate backfill over the twin-barrel, 25-ft. diam. concrete conduit. Twin barrels were used expressly to resist the unstable ground conditions prevalent. Concrete crews are pouring a 25-ft. length of the twin-barrel section every other day.

ACTION of the impact from dropping a pointed, 20-ft. length of 10-in. dia. shafting.

The contractor was awarded the $5,073,528 contract on April 21, 1949, and completion is scheduled for January, 1951. R. H. Ross is superintendent for the contractor, and E. C. "Gene" Hill is assistant superintendent who devised the new style pick. H. P. "Pat" O'Donnel is Resident Engineer for the Bureau of Reclamation.

Exploring Damsite for a Hydro Plant in Canada

DRILLING at the Nechako site in tests for the main dam of the big hydroelectric development of the Aluminum Company of Canada has been nearly completed, and according to preliminary reports, the results have been favorable.

Sufficient quantity of rock has been found near the surface to allow maximum use of site material for erection of a rock-filled dam 300 ft. high. Investigations have been carried out in British Columbia by the Aluminum Company of Canada (Alcan) for three summers and already some $500,000 has been spent in preliminary engineering surveys. The company proposes to spend $500,000,000 in the development of 1,500,000 hp., and this plant would increase the present world supply of aluminum by about 25%. If the project is built, the initial development would involve expenditure of some 50 to 200 million dollars, and completion of the development of 300,000 to 500,000 horsepower.

Continuous surveys will be made during the winter on transmission lines and other projects, and a crew will stay on the Nechako location to check weather conditions. Two short spans of transmission cable are being erected for the purpose of testing ice loading. These test transmission spans will be fabricated in Vancouver, B. C., and supported on aluminum towers. One span will be established for automatic recording, while the weather crew will make checks on the other span. The maximum elevation of the proposed line will be 5,800 ft. Materials to the crews are being flown in by helicopter.

Drillers are working at the Nanika River damsite at the west end of the area, and survey parties and drill teams are investigating possible low points along the reservoir rim. Several low spots on the north side of the reservoir would require closure by small dams, one of which might probably be used for the spillway.

Purpose of the Nanika dam is to divert Nanika Lake waters to Tahtsa Lake to provide enough water for the first phase of development. The main diversion would be from Tahtsa Lake by 10 mi. of tunnel through the mountains to the coast. The transmission line from the Kemano powersite, near sea level, is 48 mi. from Kitimat, closest area where space for a plant and townsite is available.

Construction Design Chart

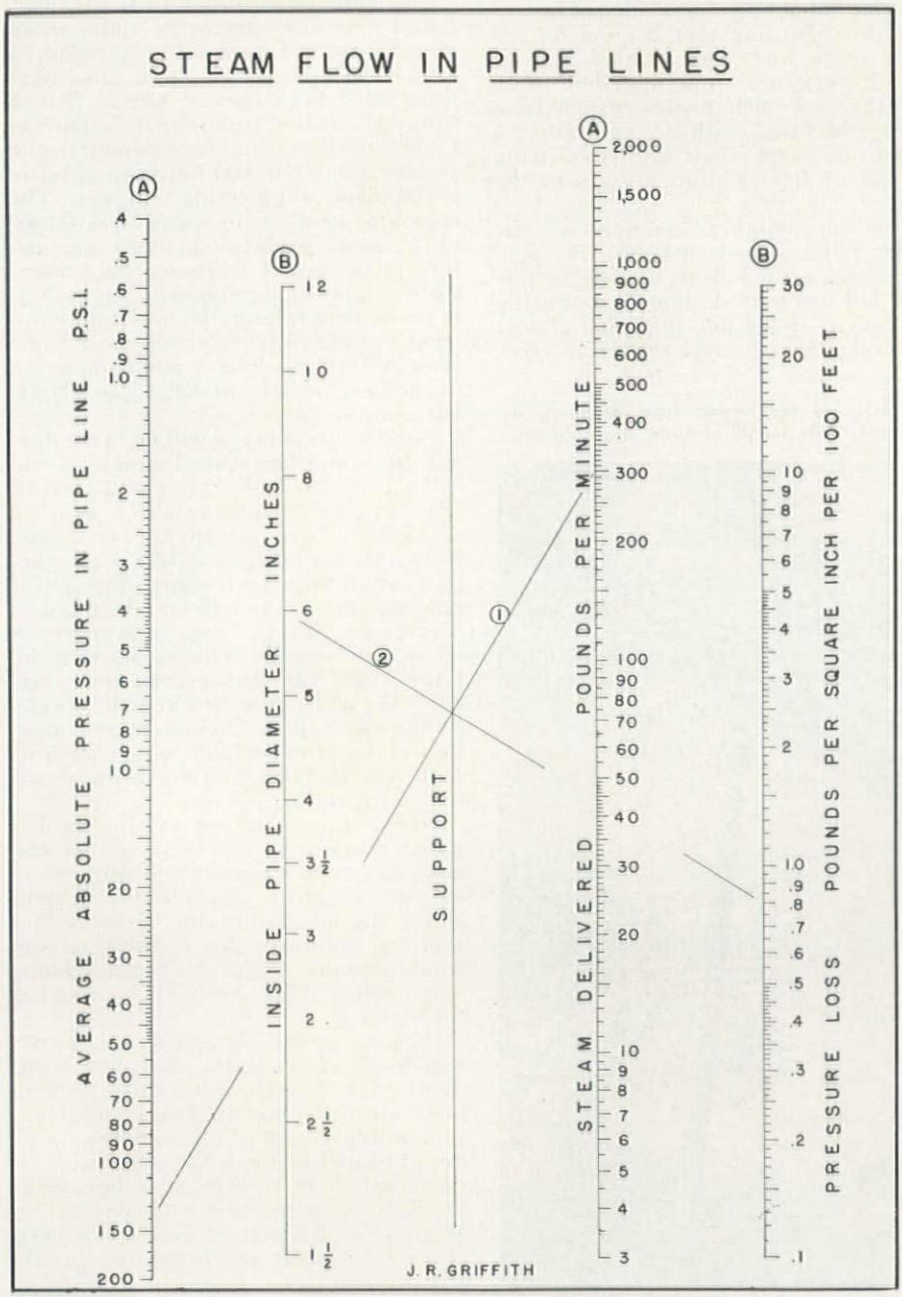
CXXIV . . . Steam Flow in Pipe Lines

By

JAMES R. GRIFFITH
Dean of Engineering
Portland, Ore.
University of Portland

THE PRESSURE loss resulting from the flow of steam in pipe lines is difficult to determine accurately. Judging by published literature on the subject, even the experts are not in agreement relative to the correct determination of such losses. On the other hand such losses must be approximated and the construction engineer is no exception when designing camps.

The Walworth Catalogue[1] has a Steam Flow Chart for solution of the Babcock formula. If the reader is interested in running down the source of this material, I would refer him to an article by Dean F. Foster[2] on the Flow of High Pressure Steam Through Pipes. In the discussion of the original paper, by H. H. Suplee, this identical chart and similar descriptive material will be found. In the article by Foster, reference is made to a chart by H. V. Carpenter "several years ago" in *Power*: I did not take the time to look up this chart by Carpenter but it apparently solved the problem for dry saturated steam without taking into account superheat temperatures. Incidentally, H. V. Carpenter was Dean of Engineering at Washington State College where I reported to my first teaching position in 1920.



Since the construction man will usually not be concerned with superheated steam, that factor has been omitted in the preparation of the accompanying chart. Only dry saturated steam is directly applicable although as indicated below the differences are not too serious where only rough approximations are sought. The accompanying chart requires, for any solution, two straight lines intersecting on the "SUPPORT." One line should be drawn between values on the (A) scales, and the other line between values on the (B) scales.

An illustrative problem is given in the Walworth catalogue,[1] as follows:

Steam delivered = 300 lb. per min.
Absolute pressure = 140 p.s.i.
Steam temperature = 600°F.
Pipe size = 6-in. standard

A pressure loss of 1.0 p.s.i. per 100 ft. of pipe is obtained by use of their chart.[1] Using the same data, but omitting the steam temperature, solution lines have been drawn on the accompanying chart for the above assumptions. A loss of pressure amounting to 0.8 p.s.i. per 100 ft. of pipe will be noted.

If the Walworth chart is used for the same data as above at 0° superheat temperature, a loss of 0.8 p.s.i. per 100 ft. of pipe will be obtained. In critical high pressure design jobs, the error thus obtained might be important. In such instances my recommendation would be to obtain expert advice.

In the original article by Foster,[2] another illustrative problem was given utilizing a different formula. The following conditions and results were given:

Average steam pressure in line = 40 p.s.i.
Superheat temperature = 150°F.
Amount of steam delivered = 1,700 lb. per min.
Pipe size = 10 in. standard
Loss of pressure computed = 2.08 p.s.i. per 100 ft. of pipe.

If the reader will draw solution lines on the accompanying chart for these conditions with the omission of the superheat temperature, he will obtain a loss of 1.7 p.s.i. per 100 ft. of pipe.

[1] Walworth Company, Inc. Catalogue No. 47, page 438.
[2] *Transactions A.S.M.E.*, Vol. 42, 1920, page 647.

Arizona Reservoir Empty

SAN CARLOS RESERVOIR behind Coolidge Dam in Arizona was expected to be dry in September, containing less than 5,000 ac. ft. of water the first of the month. The reservoir has a capacity of 1,285,000 ac. ft., but has never filled since the dam was constructed twenty years ago.

Estimates made early in the season indicated that the reservoir might be dry in August, but local summer rains added 15,000 ac. ft. A year before on the same date the reservoir held more than 160,000 ac. ft.

NEWS OF WESTERN CONSTRUCTION

OCTOBER 1950

Repairs to Be Resumed on Grand Coulee Dam Bucket

THE BID of $2,662,866 by Pacific Bridge Co., San Francisco, for repairs to the spillway bucket at Grand Coulee Dam has been accepted by the Bureau of Reclamation. Work will include repairs to the curved spillway bucket. The caisson is floated into position, then sunk inside the spillway bucket to create a working chamber 100 ft. long below water level, but under natural air pressure. The new contract will run for approximately three years. Pacific Bridge Co. completed one year of repair work on the bucket this spring under an earlier contract.

Repairs to the spillway were anticipated before the Grand Coulee Dam was built. Part of the injury was caused by sections of steel piling washing into the spillway from the cross-river cofferdams at the time the dam was built. At times, as high as four million horsepower of energy is dissipated downstream after the 320-ft. fall over the dam, and the swirling currents sometimes wash giant boulders into the bucket.

Design Studies Started for Richmond-San Rafael Bridge

PRELIMINARY investigations for the proposed bridge between Richmond and San Rafael, across San Francisco Bay, have been started by a traffic survey conducted by the Division of Bay Toll Crossings. This project was reviewed in *Western Construction*, May 15, 1950, p. 87. Engineering studies for this project were financed by the appropriation of $200,000 made by the California legislature.

Hearings have been conducted by the District Engineer of the Corps of Engineers, and the project has been actively supported by representatives from civic organizations as well as city and county officials. Questions relating to the clearances to be provided by the span will be answered by the state when submitting the report based on its preliminary design studies. The concensus indicated that the project was an urgent necessity for the industrial, commercial and residential development of the area.

Cost of the project was not indicated at the hearings except by reference to the original study by Earl and Wright, consulting engineers of San Francisco, which indicated a cost in excess of $30,000,000.

THE Associated Equipment Distributors membership in California, Nevada, Arizona and Hawaii, constituting the 11th Region, are holding a Fall meeting in Santa Barbara, October 26-27. This is an annual affair and will be attended not only by AED members and their wives, but also by a number of AGC officials as guests.

Registration for the meeting will be on October 26, followed by a business meeting. The following day will be a closed meeting of the AED in the morning, followed by golf in the afternoon.

Headquarters for the meeting will be at the Santa Barbara Biltmore.

Beal Shaw is Director of Region 11, Associated Equipment Distributors.

New Mex. Highway Planning Records Destroyed by Fire

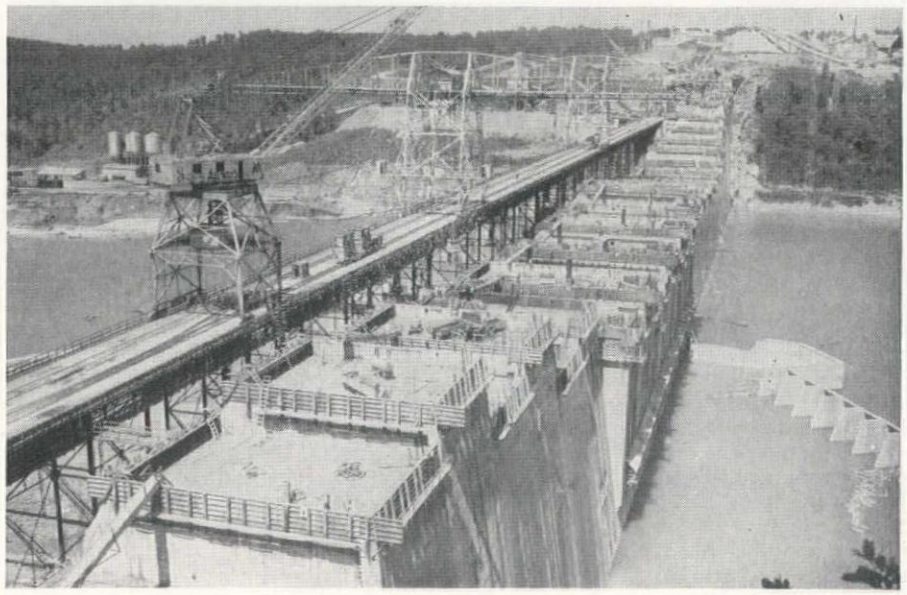
A DISASTROUS fire has destroyed many valuable records of the New Mexico State Highway Department. Offices occupied by the planning survey were destroyed when a fire burned out a downtown office building in Santa Fe. Records of the planning survey dating back to 1936 were lost. The loss represents the bulk of the records kept by the survey for more than ten years and will be most difficult to replace.

AN $11,000,000 hotel will be started within the next six months at Beverly Hills, Calif. Del E. Webb Construction Co. has been named contractor for the 8-story structure to be called the Beverly-Hilton hotel, to be operated by the Hilton Hotels Corp. Action of the City Council was necessary to permit construction of the hotel in a zone restricted to a 4-story limit.

HARVEY SLOCUM ANNOUNCES CHALLENGING RECORDS FROM BULL SHOALS

HARVEY SLOCUM reports that progress on the Bull Shoals Dam is setting some records for Western jobs to shoot at. Best 24 hours record for concreting has been established at 6,810 cu. yd. with 169,950 cu. yd. for the month of August. Concrete placed for a 10 months' period has been 1,632,000 cu. yd. This is the total yardage from the beginning of concrete placing to the end of August. These figures are considered to represent an all-time record for concrete placing on a project being constructed by the Corps of Engineers and are also believed to be a record for current similar projects. Further, this is believed to be an all-time record for concrete using 100% manufactured aggregate.

Bull Shoals Dam is a project being carried out for the Corps of Engineers by Ozark Dam Constructors. The project is located on the White River in north central Arkansas. It is a gravity-type dam 280 ft. high and is scheduled for completion in 1951.



Frank Banks — Builder of Grand Coulee Dam— Retires After 44 Years With Bureau of Reclamation

FRANK A. BANKS, builder of Grand Coulee Dam and other major Bureau of Reclamation structures along the Columbia River and its tributaries, retired September 29, according to an announcement by Secretary of the Interior Oscar L. Chapman.

Frank Banks concluded 44 years of active government service on that date, but he will remain with the Bureau of Reclamation in an advisory capacity, keeping available the knowledge he has accumulated in the construction of six major dams on five rivers of the Columbia River Basin. Mr. Banks is the oldest employee, in years of active service, in the Bureau of Reclamation.

"If anyone ever earned the privilege of retirement, it is Frank Banks," Commissioner Michael W. Straus of the Bureau of Reclamation said. "Grand Coulee and other Bureau of Reclamation dams in the Columbia Basin will be everlasting monuments to his genius. We are grateful indeed that his knowledge and experience will be available in the continuing program to develop the water resources of the Columbia Basin."

The Maine-born engineer is most widely known as the builder of Grand Coulee Dam, but his life work has been a water system—the Columbia River Basin.

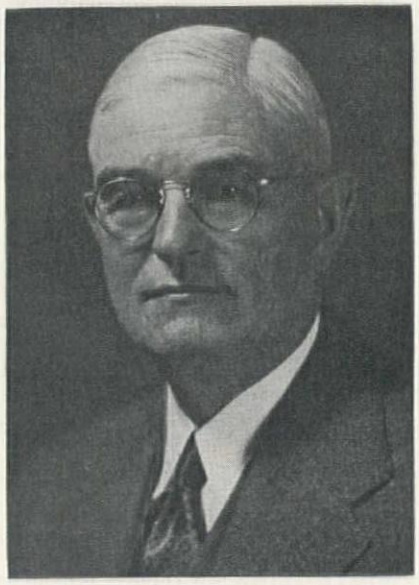
These are the six major dams and the five rivers on which Frank Banks has worked in his 44-year career:

Jackson Lake Dam, completed in 1917, on the Snake River, was the fourth largest reservoir in the United States and the fifth largest in the world. The dam is a concrete structure 70 ft. high, with a crest length of 4,920 ft., and a volume of 491,700 cu. yd. American Falls Dam, completed in 1927, on the Snake River, a job which required moving the entire town of American Falls, Idaho. This dam is 94 ft. high, with a crest length of 5,227 ft., and a volume of 313,600 cu. yd. Arrowrock Dam, on the Boise River of Idaho, once the highest dam in the world, and for which Banks designed preliminary plans about 1909, is about 350 ft. high, with a crest length of 1,150 ft., and a volume of 636,000 cu. yd. Owyhee Dam, on the Owyhee River of Oregon, greatest reclamation engineering achievement of the 1920's, is 417 ft. high, with a crest length of 833 ft., and a volume of 537,500 cu. yd.

Grand Coulee Dam, on the Columbia River in central Washington, is the greatest concrete structure in the world. The physical structure, completed in 1942, is 550 ft. high, the third highest in the country, with a crest length of 4,173 ft., and a volume of 10,585,000 cu. yd., the greatest of any structure on record in the world. The hydro-electric plant will rate a total of 1,974,000 kw., the largest in the world.

Mr. Banks has also supervised the construction to this point of the world's largest pumping plant with a lift of 280 ft. to irrigate a possible 1,000,000 acres in the Columbia Basin Project. In addition Banks supervised the construction of four other large, earthfill dams which form a part of the irrigation system for the Columbia Basin Project. These are the North and South Dams and the O'Sullivan and Long Lake Dams.

The record of his career is almost a history of reclamation in the Northwest, and the record of jobs he has held is a skeleton table of organization for the Bureau of Reclamation. He started as a rodman in Montana in 1906, when Reclamation as a national service was only four years old. He has investigated projects, reported projects, built projects, and managed projects after they were built. Banks has served since 1945 as



FRANK A. BANKS

District Manager, with the duty of supervising both the construction and administrative phases of the Columbia Basin Project.

Commissioner Straus said that Banks will continue as a member of the Columbia Basin Advisory Committee, and as representative of the United States on the Columbia River Engineering Committee of the International Boundary Committee. He also will continue to work out relationships of the Bureau of Reclamation with various state and other agencies on the Columbia Basin Project. He will continue to reside in the Coulee Dam area, in the shadow of his greatest dam.

On May 11, 1950, at the formal dedication of Grand Coulee Dam, President Truman presented to Banks the gold medal for Distinguished Service, highest honor of the United States Department of the Interior.

Banks also is a member of the Reclamation Hall of Fame, and an associate member of the American Society of Civil Engineers. He holds an honorary doctor of engineering degree from the University of Maine and an honorary doctor of laws degree from Washington State College.

Frank Banks was born in Saco, Maine, Dec. 4, 1883. He left a Yankee tradition of two centuries to head west, following his graduation from the University of Maine as a civil engineer.

Banks, informing Commissioner Straus of his intention to retire, wrote:

"After 44 years, I am in hopes of tapering off a little and doing some of the things that I have looked forward to doing in the past, but which for one reason or another could not be worked into the schedule.

"I shall always have a deep interest in the success of this project, and will greatly appreciate the opportunity of service as a consultant on an intermittent basis with respect to problems concerning which I may be helpful."

H. A. Parker Appointed to Head Columbia Basin Work

APPOINTMENT of H. A. Parker, long-time Bureau of Reclamation Construction Engineer, as Acting District Manager of the Columbia Basin Project, effective September 30, was announced by Regional Director H. T. Nelson. Parker will replace Frank A. Banks, present district manager, who retired on September 29. Now supervising engineer of the irrigation division, Parker has been in charge of construction and development from the Lower Equalizing Reservoir Dam near Coulee City southward to the end of the project.

Plans call for Parker to retain his office at Ephrata, since early next spring the staff of the district manager's office, now stationed at Coulee Dam, will be moved to Ephrata.

Parker has been an employee of the Bureau of Reclamation a total of over 40 years. Born and schooled in Maine, he went to work for the Bureau in 1909. His first job was on the Fort Peck Project in Montana as a rodman, but he transferred to the Milk River Project later in 1909, where he stayed for 13 years, progressing through various grades from rodman to engineer. In 1923 Parker moved to the Lower Yellowstone Project as superintendent and, when the irrigation districts took over in 1931, he left the Bureau to become project manager for those districts. A little over a year later he was offered the job of superintendent of the Shoshone Project in Wyoming, and in early 1933 returned to the Bureau in that capacity.

H. A. PARKER

In 1935 Parker moved from Shoshone to the Upper Snake River Project as construction engineer, and spent four years there, among other things building the Grassy Lake Dam in Wyoming, and the Island Park Dam and the Cross Cut Diversion Dam and Canal in eastern Idaho. From there he came to Ephrata in 1939 as Irrigation Engineer and, when the project went into construction in 1946, became Supervising Engineer.

Govt. Railroad to Grand Coulee Dam Dismantled After 15 Years of Service

THE colorful history of the government railroad between Odair and the Grand Coulee Dam closed August 31 when the Bureau of Reclamation opened bids to remove 30.7 mi. of track. Removal will clear the way for filling the 1,202,000-ac. ft. storage reservoir in the Grand Coulee. None of the removed track will be available for disposal under the contract.

The "sagebrush special" or "gopher chaser," as it was sometimes called, connected with the Washington Central branch of the Northern Pacific railroad at Odair, near Coulee City. Its construction was essential in delivering millions of tons of material used in the construction of Grand Coulee Dam.

The government line was 15 years old last July 19. Its colorful history started July 17, 1934, when David H. Ryan of San Diego was awarded a contract of $235,570 for its construction. On July 19, 1935, Gov. Clarence D. Martin piloted the first trainload through the Grand Coulee to the dam.

The railroad hauled more than 12,000,000 bbl. of cement, approximately 46,500 carloads, for the construction of the dam; 77,000,000 lb. of reinforcing steel; and 10,000,000 lb. of steel for the 18-ft. penstocks.

Among the toughest loads were the first transformers, which had to be shipped standing upright, and because of their height, the train was routed from the east coast by way of Florida to clear tunnels and other overhead obstructions enroute. Two General Electric flatcars, the only two of their kind in the world, carried the load. Their beds rode approximately 9 in. from the rails, and there were 16 wheels to each car to support a capacity load of 130 tons. In later years, transformers were developed that could be shipped in a horizontal position.

At the peak of construction, in the late thirties, two trainloads a day ran the 30-mi. route. The biggest train was 67 cars. The railroad was run from July 19, 1935, until Nov. 16, 1942, by contractors building the Grand Coulee Dam, first M.W.A.K. and later C.B.I. Since then, the government has been running the road.

Bechtel Offices to Consolidate At San Francisco Location

THE Bechtel organization has recently purchased buildings and property at 101 California Street, San Francisco, to place its engineering offices under one roof. With two connecting buildings at the new location, floor space of 47,000 sq. ft. is available. As soon as alterations are completed the engineering groups of Bechtel, which are now housed in three separate locations, will move to the new offices.

$5,000,000 L. A. Garage To Double as Bomb Shelter

CONTRACTS HAVE been awarded for the construction of a $5,000,000 garage under Pershing Square in Los Angeles. The contracts were awarded by the Recreation and Park Commission to an organization called City Park Garage, Inc., headed by Ford J. Twaits. Construction is scheduled to begin by November.

This plan for underground parking in the center of midtown Los Angeles has been under discussion for many years. Designation of the garage as a possible bomb shelter is expected to eliminate difficulty in obtaining materials.

Plans will be prepared by City Park Garage, Inc., and must be ratified by the City Council. Six months is allowed for preparation of these final plans.

Under terms of the lease the project must be completed by the end of 1952 and after fifty years the parking facility will revert to the city. The bid of City Park Garage, Inc., was the only valid offer received by the Commission after several calls had been made for bids. Specifications provide that the surface of the park must be restored to its existing condition after construction has been completed.

25-ft. Conduits Finished By J. A. Terteling & Sons

THE LARGEST CONDUITS ever built by the Bureau of Reclamation have received their last pour of concrete, and are complete except for completion of their inlet and outlet transitions. The conduits, of 25-ft. inside diameter, comprise a 2,200-ft. section of the Feeder Canal which will divert the first water from the Columbia River into the ancient channel of the Grand Coulee, next summer.

J. A. Terteling & Sons started work last fall on the 2,200-ft. section, less than one-fourth the length of the entire 1.8-mi. feeder canal, to assure an uninterrupted flow of water through a slide area. In the later stages, work was rushed on a three-shift, seven-day-a-week basis to complete the pipes before fall wet weather that might cause a slide in the area. The Bureau of Reclamation reports that the race has been won.

Throughout the job, excavation of the giant ditch more than 30-ft. deep in which the conduits were placed, was kept less than 100-ft. ahead of concreting.

The feeder canal, of which the conduit is one part, links the discharge pipes that will carry the water from the Grand Coulee pumping plant, and the equalizing reservoir in which the water will be stored. Other canals, siphons, and tunnels carry the water south to the Columbia Basin Project where the first 87,000 ac. will have water available in spring 1952.

Work on both the Feeder Canal and the North Dam is being performed by J. A. Terteling & Sons of Boise, Idaho, under a contract for about $5,000,000.

$200,000 B. C. Power Contract Awarded Vancouver Firm

CONTRACT has been placed by the B. C. Power Commission with Dawson Wade and Co. of Vancouver, B. C., for a start on the Clowhom Falls hydroelectric development at Sechelt, B. C. This is the first unit of the development and will produce 4,000 hp. The company's bid provides for a "target price" of $203,000 plus a 10% contractor's fee. If the cost exceeds that amount the fee percentage is lowered. A 20-mi. transmission line required for the project will be built by commission crews, it was announced.

Houston Votes $24,000,000 for City Water Supply Increase

HOUSTON citizens voted four-to-one to spend $24,000,000 for a 150-m.g.d. addition to the municipal water supply. The water will come from the San Jacinto River, and added to the present capacity of city water wells, will give the Texas city a water capacity of 280 m.g.d. The project was necessitated by Houston's expansion, especially during the past decade. The city now has a population of 593,000—a 54 per cent increase since 1940.

Specifically, the $24,000,000 in water bonds will provide for a $7,500,000 dam and $1,585,000 reservoir on San Jacinto River in northwest Harris county; a $4,500,000 filter plant, with an average capacity of 50 m.g.d.; a $375,000 pumping plant on San Jacinto River, plus $2,000,000 for the purchase of independent water systems as a result of the annexation of territory formerly served by water districts and private companies.

Bids for the projects are expected to be asked before the end of 1950, with work due to begin shortly after the first of 1951. The middle of 1952 is slated as the completion date.

Contractor to Finish Garrison Tunnel Driving by End of Year

DRIVING OF the eight tunnels at Garrison Dam on the Missouri River in North Dakota is scheduled for completion about the end of the year, according to officials of the S. A. Healy Co. Already five of the eight tunnels have been holed through and work is well advanced on the sixth. The entire job is scheduled for completion next May, which will be about two months ahead of the schedule that was revised because of the steel strike last year.

Columbia to Be Closed to Navigation for 60 Days

THE COLUMBIA River will be closed to navigation at McNary Dam for a period of about 60 days to permit the completion of the second-step cofferdam on the Oregon side, according to an order of Col. W. H. Mills, Walla Walla District Engineer, Corps of Engineers, announced recently. Plans for this work are reviewed in an article in this issue, page 75. It is expected that the river will be reopened to navigation on November 18 at which time the navigation lock on the Washington shore will be placed in operation.

Halting of navigation was requested by the contractors engaged in construction of the cofferdam because of a low hanging cable across the Oregon channel. The cable is being used to carry material to the upstream wing of the cofferdam which is nearing completion except for a 240-ft. gap. The work of closing this gap is scheduled to begin on October 10 after the fall run of salmon has passed the dam.

With the completion of the cofferdam the river level behind the dam will be raised about 20 ft., and the navigation lock will be placed in operation with a temporary upstream gate.

Concrete Placing Starts on 212-ft. Canyon Ferry Dam

CONCRETE placing has started on the Canyon Ferry Dam on the Missouri River. Montana's R. H. Fifield, chief engineer for the Montana State Water Conservation Board, officiated at the controls that tripped the first bucket of concrete. A total of 400,000 cu. yd. will be required to bring the dam to a crest height of 212 ft.

The pouring of concrete from the 8-yd. bucket handled and carried from the mixing plant 200 ft. up the canyon wall to the lowest excavation point by a cableway crossing the canyon about 275 ft. above bedrock, will continue on the initial block until the surface is covered. Block 13 is about 40 ft. wide and 160 ft. long and approximately 600 cubic yards of concrete will be required to cover bedrock to a more-or-less smooth surface.

"Canyon Ferry Dam is a key structure in the Missouri River Basin Project," Secretary Chapman said. "It will have a 50,000 kilowatt capacity power plant utilizing the flow of the Missouri River as well as providing major irrigation and flood control benefits. Ground was broken a year ago and first water storage is scheduled for the spring of 1953 and power production is planned by fall of that year." The 2,050,000 acre-ft. reservoir which will be created by the dam will extend 25 mi. upstream to near Townsend. The dam is about 17 mi. east of Helena.

Canyon Ferry Dam, which is being constructed by the Canyon Constructors of Los Angeles, California, on an $11,896,425 contract, is to be a concrete, gravity-type structure with a height of 212 ft. from foundation and 172 ft. from the normal stream bed. The crest length will be 1,000 ft.

BY AN OVERWHELMING majority the residents of Escondido voted to join the San Diego County Water Authority. By joining the San Diego Water Authority, Escondido will be able to supplement its local water supplies with a supply of Colorado River water delivered through the San Diego Aqueduct.

Escondido is now the 29th incorporated city within the Metropolitan Water District of Southern California.

Hungry Horse Grows 1 Ft. As 1,500 Work Labor Day

FIFTEEN HUNDRED workmen on the Bureau of Reclamation's big Hungry Horse dam in northwestern Montana celebrated Labor Day by pushing the world's fourth largest and third highest concrete dam upward a foot. Working in the heat of one of western Montana's hottest days, the construction crews kept the big 8-cu. yd. concrete buckets swinging out over the dam in a never-ending stream to set a new 24-hr. record pour of 6,618 cu. yd. The highest previous 24-hr. pour was 6,356 yards on August 29.

PERSONALLY SPEAKING

Corps of Engineers has appointed two engineers for its Seattle and San Francisco districts. **Lt. Col. John P. Buehler** is the new district engineer for the Seattle District, replacing **Col. Emerson C. Itschner,** ordered to overseas duty. Col. Buehler was formerly assistant to the North Pacific Division Engineer at

J. P. BUEHLER

K. M. MOORE

Portland, Ore. **Col. K. M. Moore** as San Francisco district engineer will direct construction and rehabilitation work at military posts in Utah, Nevada, and California. He was San Francisco district engineer in 1940, 1941, 1945, and 1946. Army engineer in Korea after the war, Col. Moore replaces **Col. Fremond S. Tandy,** who will command the engineer unit training center at Camp Carson, Colorado Springs, Colo.

Lt. Col. Alfred J. D'Arezzo has been appointed executive officer of the Seattle District, Corps of Engineers. D'Arezzo assumed the second top district position following the transfer of **Lt. Col. P. H. Symbol** to the research and development laboratory at Ft. Belvoir, Va.

* * *

Tom A. Clark of Ithaca, Neb., has been transferred from the Riverton Project in Central Wyoming to head the Weber Basin Area office in Utah. Clark becomes area engineer for the Bureau of Reclamation, in charge of all federal reclamation activities in the Ogden area, including continued investigations and preconstruction activities for the $70,000,000 Weber Basin Project. Others appointed to the Weber project are: **Ross D. Billings,** field engineer; **Francis M. Warnick,** project development engineer, and **Earl S. Jensen,** office engineer.

* * *

John C. Diehl, formerly with the Bureau of Reclamation on the Coachella Project, has been transferred to Friant, Calif., where he is chief of surveys for canal and lateral work.

* * *

Lt. Col. Robert N. Anderson has been named executive officer for the Walla Walla District, Corps of Engineers, replacing **Lt. Col. W. P. Leber,** who will take command of an engineer construction battalion at Fort Sill, Okla.

* * *

Stephen R. Andrus is named to the staff of the Service Bureau of the American Wood Preservers' Assn. western office at Portland, Ore. The bureau gives technical and promotional assistance to county engineers, consulting engineers, and the construction and structural industry in the eleven Western states.

* * *

R. W. Stuck, who recently resigned as chief engineer for the Atomic Energy Commission at Hanford, Wash., works, is accepting a position as project manager for an American engineering company with a large contract in Turkey. Before assuming his position with the AEC at Hanford in October, 1949, he served 15 years with the Corps of Engineers.

* * *

Vic Gretzinger, assistant to the Alpine County road commissioner for the last two years, recently resigned.

* * *

Charles Marshall, city engineer at Grants Pass, Ore., since Nov., 1948, has resigned to accept the post of director of public works at Petaluma, Calif. He

will be replaced at Grants Pass by **W. H. Baker,** building inspector.

* * *

G. Howard Robinson, Oakland insurance man, has been named to the Board of Directors of the East Bay Municipal Utility District replacing **Francis E. Boyd,** who recently resigned as president. **Louis J. Breuner** has been elected president.

* * *

Recent appointments within the California Division of Highways include: **Earl Withycombe,** formerly construction engineer with the department, to be assistant state highway engineer; and **Charles E. Waite,** engineer of design, to be assistant state highway engineer in charge of personnel and public relations. Withycombe succeeds **Ridgway M. Gillis,** who was appointed deputy state highway engineer. White succeeds **J. G. Standley,** retired.

* * *

D. B. FREEMAN

Col. Delbert B. Freeman is the first District Engineer of the recently created Fort Worth district office of the Corps of Engineers. At the present time he supervises a $175,000,000 civil construction program, including four dams in the Fort Worth-Dallas area: Benbrook, Grapevine, Lavon, and Garza-Little Elm. Col. Freeman also directs construction of the $42,000,000 Whitney Dam, the $22,500,000 Belton Dam, the $18,500,000 San Angelo Dam near San Angelo, Texas, and Dam "B" near Jasper in east Texas.

* * *

Lt. Col. James W. Sloat is now executive officer of the Portland District, Corps of Engineers, succeeding **Lt. Col. George A. Finley,** recently named Rock Island, Ill., district engineer.

* * *

Raymond J. Briggs & Associates, consulting engineers, announce the establishment of the first mechanical engineering department in Idaho at their office, 619 Grove St., Boise. **Robert M. Nelson** is chief of the new department.

* * *

A. L. B. Moser is now location engineer on construction of a canal system on the Oahe Project at Huron, S. Dak., for the Bureau of Reclamation. He was formerly with the bureau on the Riverton project, Wyo.

* * *

New state engineer of Utah is **Joseph M. Tracy** of Ogden, where he was city engineer from 1916 until 1926. Since 1943 Tracy has been a consulting engineer, primarily in civil engineering, in private practice.

* * *

Mathias W. Kennedy recently became field engineer for the Bureau of Recla-

mation in charge of construction on 17 mi. of Potholes East Canal near Othello, Wash. For the past two years he has been soils engineer on the construction of O'Sullivan Dam, Long Lake Dam, and North and South Coulee Dams on the Columbia Basin Project.

* * *

H. W. JORGENSEN

Homer W. Jorgensen, sanitary engineer, recently left his position as design engineer under A. M. Rawn, chief engineer and general manager of the Los Angeles County Sanitation Districts, to enter private practice in the field of sewage and industrial waste disposal. Jorgensen, secretary of the Los Angeles Section of the ASCE, has temporarily established an office in Modesto and soon will open an office in Fresno.

OBITUARIES . . .

Walter A. Hill, 84, former civil engineer for the Southern Pacific and Northern Pacific railroads, died recently at his home in Berkeley.

* * *

Frank Sawford, retired consulting mechanical and electrical engineer, died at Vancouver, B. C., recently at the age of 75. He was a former president of the Association of Professional Engineers of British Columbia, and a life member of ASME and AIEE.

* * *

Frank E. Martin, 70, contractor, died after a heart attack in Spokane recently. He supervised the building of several of Spokane's most beautiful downtown buildings.

* * *

D. William Yake, civil engineer for the city of Spokane for 40 years, died in a hospital there recently. Yake, 66, was a construction engineer for most of the railroad companies when they first began laying out their routes through the Big Bend country near Spokane.

* * *

John L. Krausa, 60, Los Angeles County highway inspector, died recently in Los Angeles.

* * *

Clifton Ray Hill, 72, engineer, of Pasadena, died Aug. 12. He was engineer for the Nevada Highway Department and designing engineer for the New York Central Railroad.

* * *

Clarence H. Thrams, 56, prominent Oakland general contractor, died Aug. 21. Thrams was president of the Oakland Builders Exchange in 1947 and 1948, and was president of the East Bay General Contractors Assn. for three years.

SUPERVISING THE JOBS

Wayne C. Wooten is project manager and **C. V. Thompson** is assistant project manager for Guy F. Atkinson Co., Portland, Ore., for logging, clearing, grubbing, roadway grading, channel changes, right-of-way fences, and construction of all drainage structures at Lookout Point Dam on the Middle Fork, Willamette River, Ore. Other key men on the $2,846,611 project are: **William Clough,** job engineer; **Harold Lundberg,** master mechanic; **Barney Lillie,** paymaster; **Carl Schmidt,** drill superintendent; **Dick Dawson,** excavation superintendent; **Joe Baker** and **Jim Forrest,** general foremen; **Pat Chadwell,** storekeeper; and **Roy Lamb,** carpenter superintendent.

Ivan Bukvic is job superintendent and **John E. Philippe** is office manager for constructing the $338,238 trunk sewers, Units No. 5 and 6 in Santa Clara County, Calif., for P. & J. Artukovich, Los Angeles.

L. Ralston is project manager and **O. Hovland** is superintendent for Mackley & Ralston, general contractors, on the $400,000 YMCA building at Minot, N. D.

On a $212,000 highway asphalt paving job near Sanders, Ariz., for Daley Construction Co., **Hugh Coper** is project manager, **Willis Smith** is superintendent, and **Bob Shill** is assistant superintendent.

R. M. Makemson is general superintendent and **George H. Willett** is assistant superintendent for Wallace & Wallace, contractors, on a road construction project between St. Johns and Sanders, Ariz., a $106,000 job.

Hal Spiess is superintendent and **George Roberts** is general foreman for L. C. Anderson Co., San Diego, constructing a $500,000 addition to Scripps Institute of Oceanography at La Jolla, Calif.

O. P. Pope is supervising a $196,183 highway construction job near Lobitos, San Mateo County, Calif., for Westbrook & Pope, Sacramento.

Charles H. Chamberlin is job superintendent for Guy F. Atkinson Co., Portland, Ore., on its $388,236 contract for constructing Soda Lake Dike, a causeway 47 ft. high and 1,700 ft. long, located southeast of O'Sullivan Dam in the Columbia Basin, Wash. Others working on the project are: **Ernie Ford,**

FOOTBALL FANS of the University of Washington will appreciate the work of this trio who built the addition to the stadium described on page 83. They are (left to right) Elmer Strand, in charge of the project, J. H. Wallstrom, general superintendent, and Mr. Strand, of Strand and Sons, general contractors of Seattle.

master mechanic; **John Selander,** paymaster; **Paul Harmon,** chief timekeeper; **Charles Roderick,** drill foreman; **Shorty Germain,** powder foreman; **Carl Stanford,** grout foreman; and **Troy Carter** and **Jack Orchard,** shovel foremen.

* * *

Jack Wilson is superintendent and **C. C. "Tony" Bryan** is assistant superintendent for Charles MacClosky Co. & Harms Bros., joint venturers on a $253,314 contract for constructing two grade separation structures to carry the proposed State Hwy. 6 freeway over U. S. Hwy. 99 in Yolo County, Calif., and constructing a portion of graded highway.

* * *

S. B. Wood is general superintendent for Clyde W. Wood & Sons, Inc., North Hollywood, on the firm's $420,316 contract for grading and paving 3.9 mi. of state highway east of The Willows, San Diego County, Calif. **R. E. Simmons** is office manager; **Bonnie Camron,** master mechanic; **Don Bridwell,** truck foreman; and **Harry Schutz,** grade foreman.

* * *

Lee Lowe is job superintendent for Tom McCorkle Construction Co., Boise, Ida., on a $180,710 asphaltic concrete pavement project in Grant County, Wash. **Don Tallman** is plant foreman and **Virgil Johns** is street foreman.

* * *

W. E. Burr is supervising construction of the $432,694 115-kv. transmission line from Sidney to Ogallala, Neb., for R. N. Campsey Construction Co., Denver, Colo.

* * *

H. M. Thomas is job superintendent for Allison & Haney, Contractors, Albuquerque, N. Mex., for grading, bituminous surfacing, and miscellaneous construction on 9.5 mi. of U. S. Hwy. 66 near San Jon, N. Mex.; a $537,491 project.

* * *

Supervising the $215,048 grading and paving project in Salem, Ore., for Warren Northwest, Inc., Portland, are: **W. W. Head,** job superintendent, and **E. N. Peterson,** concrete subcontractor.

* * *

Tom Collins is the general superintendent and **Nolan Ince** is the job superintendent for J. H. Welsh & Son Contracting Co., Phoenix, Ariz., on the firm's $240,000 contract for construction of sewer, water, and irrigation lines for 500 houses at Williams Field Air Force Base, Chandler, Ariz. **Pete Lallande** is in charge of project purchasing and **Fred Sutter** is job engineer.

* * *

Cy Ribisi is job superintendent for Frank B. Marks, Jr., contractor of New-

man, Calif., on the $367,478 highway widening and pavement resurfacing project between Palo Alto and Sunnyvale in Santa Clara County, Calif. **Lowell Jensen** is accountant on the project.

* * *

Robert F. Smith is job superintendent for Eaton & Smith, San Francisco, on the $340,711 track removal project on Lincoln Way between Arguello Blvd. and 48th Ave. in San Francisco. Other key men on the project are: **Loren Roller,** concrete foreman; **John Hanley,** subgrade foreman; **Earl Laurance,** sewer and drainage foreman; and **John O'Connor,** accountant.

* * *

E. S. "Sandy" Arnold is job superintendent for Craftsmen Construction Co., Santa Fe, N. Mex., on its $658,794 contract for constructing gas and water distribution facilities, road excavation, sewers, and pavement for Group 14, Los Alamos, N. Mex.

* * *

Ed Snitzler is job superintendent for Alex Robertson Co., Paramount, Calif., now building the $459,630 7-mi. water pipeline which will connect El Toro Marine Base, Calif., with the Metropolitan Water District System.

* * *

H. K. Mittry is project manager and **Whitey Gilbertson** is superintendent for Mittry Constructors, Inc., on the $6,717,660 Cachuma Dam on the Santa Ynez River in Santa Barbara County, Calif. **George Welton** is general foreman, **John S. Southworth** is engineer, and **Ken D. Morris** is office manager.

* * *

Ted Kesler is assistant to **John Erbele,** contractor, personally supervising construction of the $150,000 Beulah Memorial Hospital, Beulah, N. D.

* * *

Charles Williams is project manager and **P. B. Anderson** is general superintendent for O'Neil-Anderson Co., constructing the $165,000 Malta Hospital, Malta, Mont.

* * *

Boyd Robinson is project manager and **Everett "Tip" O'Neil** is general superintendent for McKinnon-Decker Co. & O'Neil Construction Co. for grading and surfacing a portion of state highway from Babb, Mont., to the Canadian border, a $360,000 contract.

* * *

Working for L. E. Dixon Co. of San Gabriel, Calif., on the construction of the $1,925,000 San Fernando High School at Los Angeles are: **Ray Otti,** job superintendent; **W. L. Squires,** project manager; and **George Dunham,** purchasing agent.

* * *

Everett "Tip" O'Neil is job superintendent for McKinnon-Decker Co., Helena, Mont., for grading, surfacing, and draining 10.5 mi. of the Babb-Piegan highway in Glacier County, Mont. **Fred**

Continued on page 107

Detroit Dam

. . . Continued from page 68

mum 24-ft. width, and have a 3-ft. drainage ditch in the cut sections. The maintenance for the 6-mi. system consists of a full shift each day with a water truck during dry periods and motor patrol.

Cableway coverage of the project is from two Construction Improvements, Ltd., cableways spanning the 1,950 ft. canyon with a 346-ft. travel limit. Both head and tail towers travel on straight runways, and are controlled from the head tower. Each has a capacity of 25 tons, and utilizes a 3¼-in. lock coil main cable. Their design is new, inasmuch as they can travel and hoist concurrently.

Night lights

The main night lighting system for the job consists of two light cables parallel to the cableways. Twin 1,500-watt units on 40-ft. centers can be reeled in from the suspension cable and serviced as needed.

The contractor at present has a crew of about 800 men, which is expected to reach 1,200-1,400 during the tight production schedule in 1951.

Personnel

Work at Detroit Dam is under the direction of Col. Donald S. Burns, District Engineer, Portland District. C. C. Davis is Resident Engineer, and S. R. Overholser is Assistant Resident Engineer.

PERSONALITIES AT DETROIT DAM

TOP row, l. to r., C. C. Davis, Resident Engineer, and Claude Beck, Chief of Operations, Corps of Engineers; R. R. Bates, Safety Supervisor for Consolidated Builders, Inc.

Below, C. B. I. personnel are Russ A. Hoffman, in car, General Superintendent; and Tex Allan, Structural Engineer.

Bottom, Eldon Lents, left, Office Manager; and Albert Bauer, General Manager of the contractors' corporation.

Claude Beck is Chief of Operations. Chief Inspectors include K. F. Ramsey, main dam construction, and W. L. Burgess, concrete control and placement.

Key personnel for Consolidated Builders, Inc., include Albert Bauer, General Manager; Russ A. Hoffman, General Superintendent; Harrison H. Roberts, Chief Engineer; Eldon Lents, Office Manager; and Ken Nielson, Purchasing Agent. Superintendents include B. W. Provost, dam construction; George Humphrey, rigging; Ray Steiner, batch and cooling plants; Ed Carpenter, aggregate production; Lee Pinkston, quarry; J. McNeely, carpentry; O. M. Mikkelsen, Master Mechanic; and Floyd Jones, electrical.

PRINCIPAL QUANTITIES

400,000 bbl. Portland cement, type IV or IVa.
800,000 bbl. Portland cement, type II or IIA.
1,450,000 cu. yd. mass concrete.
3,620,000 lb. reinforcing steel.
2,760,000 lb. fabricated steel penstocks.

Power Development to Start On Snake River in Idaho

A POWER development program estimated to cost $18,500,000 has been announced by the Idaho Power Co. for the Snake River. The proposed hydro-electric plant will generate 90,000 kw. and will be the largest of six plants constructed by the company since 1946. Present plans called for completion of the project in 1952.

The work will include an earth-filled dam with concrete spillways and a power house which will contain three 30,000 kw. generators. The site is about 7 mi. upstream from Grand View, Idaho.

Rapid increases in the use of power with a new contract to supply electricity to the phosphate industry in the Pocatello territory has prompted the plan to start the new project.

Supervising the Jobs

Continued from page 105

Stranberg is structure superintendent on the $358,649 job.

* * *

George C. Jones is supervising construction of the $400,000 rural electric power lines in Hill, Blaine, Chouteau, and Liberty Counties, Mont., for O'Neil Construction Co. & Lewis Construction Co.

* * *

Tom Haggerty is general superintendent for Haggerty-Messmer Co., Bozeman, Mont., now building a water line for the city of Havre, Mont.

* * *

Bert Sturney is supervising the $5,449,300 construction of a group of buildings at California Vocational Institution near Tracy, Calif., for Johnson, Drake & Piper, Inc., Oakland.

* * *

C. C. "Whitey" DeArmond is general superintendent for R. J. Daum Construction Co., Albuquerque, N. Mex., on the erection of Buildings A-17 and A-19 at Sandia Base, N. Mex., for the Atomic Energy Commission, a $6,100,000 contract. Assisting him are: **L. W. Cook,** general foreman, and **W. H. Browne,** chief engineer.

* * *

William R. Brown is job superintendent for Platt Rogers, Inc., Pueblo, Colo., on the $242,000 contract for grading and draining a portion of the Boulder-Idaho Springs highway in Boulder County, Colo. **J. P. Elliott** is general superintendent of heavy construction and **J. D. McTigue** is office manager.

* * *

George E. Briski and **George Shipp** are supervising construction on the $675,000 storm sewer for the city of Bismarck, N. D. The contract is held by Delver Construction Co. of Bismarck.

* * *

Lloyd Bailey is superintendent for Central Pre-Mix Concrete Co., Spokane, Wash., which has been awarded a contract for furnishing all concrete for the Atomic Energy Commission's reactor testing station near Arco, Idaho.

* * *

R. D. Golding is engineer and **R. W. Harris** construction superintendent for El Paso Natural Gas Co. on the portion of its $44,500,000 gas line being built from San Juan Basin to Gallup, N. Mex., to Ganado, Ariz.

* * *

Dan Morrison is project manager and **Ken Cornell** is job superintendent for Guy F. Atkinson Co., South San Francisco, for constructing a reinforced concrete slab bridge and box culvert and

6.5 mi. of grading and paving between Dutchman Creek and Lingard, Merced County; a $758,513 project. Morrison and Cornell are also supervising the grading and paving of 4.1 mi. north of Berenda, Madera County, a $428,657 contract held by Atkinson.

* * *

W. D. Boblet is supervising construction for Walter M. Harfst Co., Inc., Seattle, on a $500,000 three-story brick and cement office building at Ephrata, Wash., a Bureau of Reclamation project.

* * *

F. O. Neff is supervising a $100,000 bridge widening project at Umatilla, Ore., for Archie Averill, contractor.

* * *

John Parr is superintendent for Parr Construction Co., Culver City, Calif., on the construction of a natatorium and recreation center at Santa Monica College, Santa Monica.

* * *

Walter Maxwell is in charge of construction of two reinforced concrete bridges on the Harbor Freeway at Third St., in Los Angeles, a $319,776 contract held by Charles MacClosky Co., San Francisco. **Mel Kruse** is job superintendent for the project.

* * *

Roy Green is superintendent for Buttress & McClellan, Inc., Los Angeles, now constructing a store building for the Edison Co. at Oxnard, Calif.

* * *

Paul Arganbright is superintendent for C. J. B. Construction Co., Oxnard, on the construction of a $150,000 Safeway supermarket at Oxnard, Calif.

* * *

Dave Eskestrand is project manager for Eskestrand Bros. Construction Co. & O'Neil Construction Co., Havre, Mont., now building the $100,000 B.P.O.E. building at Wolf Point, Mont.

* * *

Roy Burns is project manager and **Max Neuwerth** is general superintendent for Neuwerth Bros. Construction Co. on the construction of a $55,000 water main for the city of Havre, Mont.

* * *

Glen Tirrell is superintendent for McLaughlin Construction Co., contractor for the $450,845 tunnel outlet protection works at the Fort Peck Dam project. **Sig Mahlam** is carpenter foreman and **Lou Pauey** is equipment foreman.

* * *

Lee E. Cox is superintendent for Guy F. Atkinson Co. on the Anaheim Street Bridge at Long Beach, California. The entire project will run about $1,000,000. **Howard Davis** is pile-driver foreman.

* * *

V. H. Montgomery is project manager and **Peter Shotrosky** is superintendent on the Winston Bros. Company's job of sinking a 750-ft. shaft at the PCA Mine, near Carlsbad, New Mexico. The work is being done for the Potash Company of America and involves the use of a freezing process to stabilize the material. The process has been used successfully in Europe but has never been used in this part of the country, according to reports.

* * *

Bill Nauman is project manager for the construction of a sewage disposal plant at Tucson, Ariz. The work is being done for the City of Tucson for an estimated cost of $1,500,000.

* * *

Charles Lukin is project manager and **Ken De Witt** is general superintendent for the Phoenix Tempe Stone Co. on a highway job near Topock, Ariz., for the State Highway Department. The project involves about 7 mi. of highway and the contract price is $333,483.

* * *

R. K. Payton is general superintendent for Payton Bros. and Brandt & Ford for improvements to the water supply system at Mineral Oaks, near Ojai, California, at a cost of $140,000.

* * *

Ray I. Quinn is running the job for Pioneer Constructors, who are carrying out paving work in Tucson, Ariz.

* * *

H. C. Longenbaugh is superintendent and **Earl West** is his assistant on the $366,000 canal job for the Bureau of Reclamation at Fort Sumner, N. Mex.

* * *

G. L. Odell of G. L. Odell Construction Co., is managing his own job for the Corps of Engineers at Conchas Dam, N. Mex. The work involves the building of revetment along the sides of the stilling basin, and the contract runs about $115,000. **Donald G. Odell** is general superintendent.

* * *

A. A. Larsen of Larsen Construction Co. is running a $305,000 state highway job near Sells, Ariz. The job involves grading, oiling and the construction of 9 concrete box culverts.

* * *

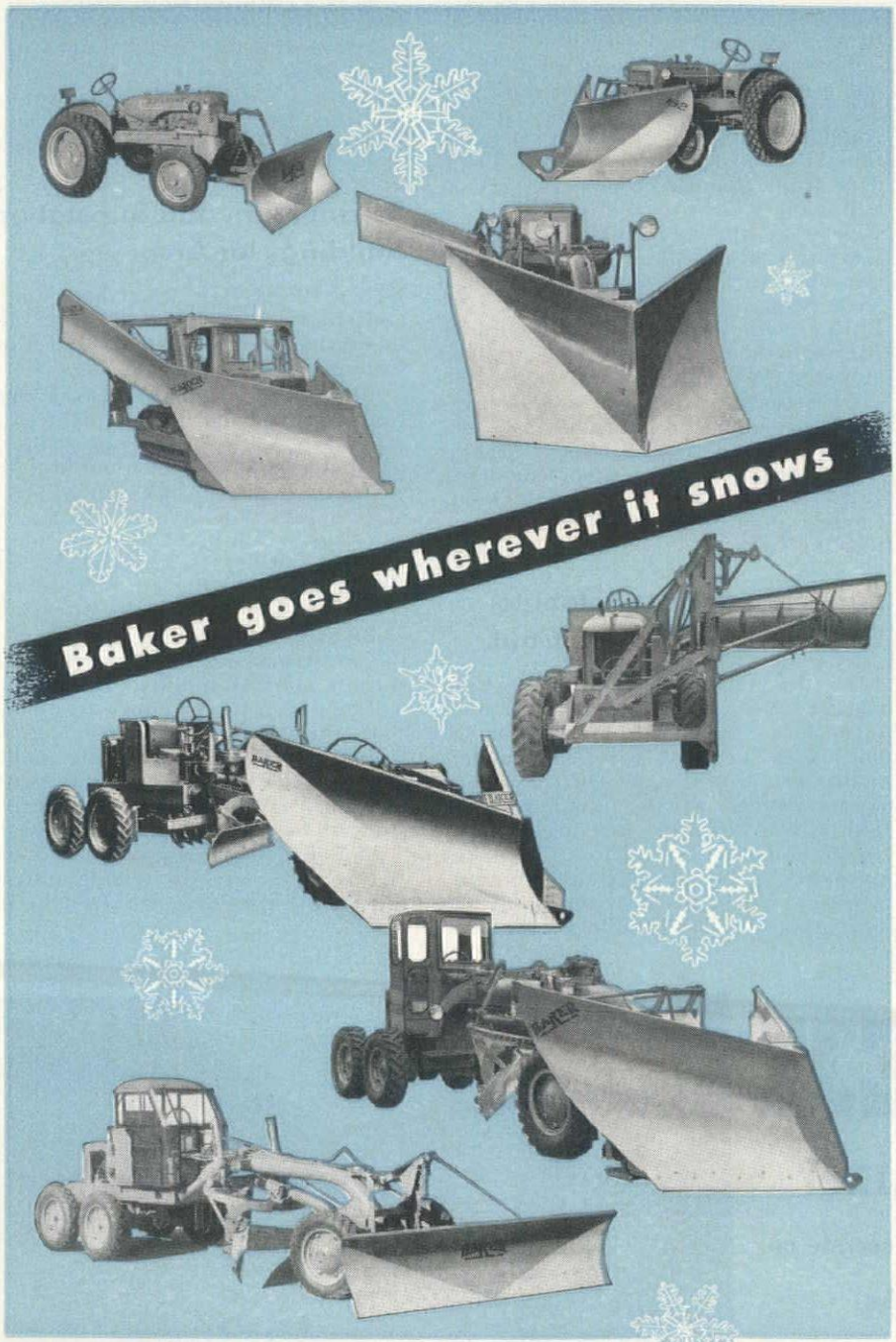
K. A. Ethridge is managing the job for Pioneer Constructors on a $242,000 highway job near Tucson for the state highway department. **T. E. Moore** is superintendent.

* * *

Andy Webster is superintendent for N. M. Ball Sons on a $750,000 highway job near Bakersfield, Calif. **Fay Lacy** is master mechanic on the work and **Jim San Sebastian** is engineer. The work is being carried out for the California Division of Highways.

* * *

G. L. Dutton is superintendent for San Xavier Rock & Sand Co. for the $65,000 contract of erecting a fence along the International Boundary near Nogales, Arizona. **Lane E. Day** is assistant. The job involves construction of a 2-ft. concrete curb under the entire length of fence, which is 13,350 ft. long. Posts are on 10-ft. centers and the fence is 11 ft. high.



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Tractor Sales & Service, Inc.
Medford, Oregon

Umatilla Tractor Company
Pendleton, Oregon

Wood Tractor Company
Portland, Oregon

•

Cate Equipment Company, Inc.
Salt Lake City, Utah

•

A. H. Cox & Company
Seattle, Washington
Wenatchee, Washington
Tacoma, Washington

Northern Harris
Walla Walla, Washington

Yukon Equipment, Inc.
Seattle, Washington

American Machine Co.
Spokane, Washington

•

Studer Tractor & Equipment Co.
Casper, Wyoming

Arizona Highway Dept. Wins Steel Bridge Award

THE ARIZONA State Highway Department has just won the Class II award in the contest sponsored by the American Institute of Steel Construction for the most beautiful steel bridges opened to traffic in the United States in 1949.

A jury of architects and engineers chose the winners from a field of 46. The contest has been conducted by the Institute since 1928.

The structure which won the Class II award (bridges with spans under 400 ft., costing over $500,000) is located on Pinto Creek, eleven miles east of Superior, Arizona.

The bridge was designed under the direction of R. A. Hoffman, Engineer of Bridges, Arizona State Highway Department. It was erected by Allison Steel Manufacturing Co. of Phoenix.

Standard Oil Finishes 566-mi. Salt Lake City-Pasco Pipe Line

COMPLETION of the $12,000,000, 566-mi. oil products pipe line from Salt Lake City to Pasco has been announced by Standard Oil Co. of California. The line was constructed and will be operated by Salt Lake Pipe Line Co., a Standard subsidiary. First leg of the line, from Salt Lake to a point near Boise, was completed in the fall of 1949, when winter weather halted further work. Balance of the line was completed this summer, with construction crews working between Pasco and Boise.

The 8-in. line has a capacity of 15,000 bbl. a day, with one pumping station at Salt Lake and another at Boise. Capacity could be boosted to 21,000 with installation of a third pumping station. Products from Standard's new refinery at Salt Lake will be carried in the line to eight take-off points along its route, serving a large part of the Intermountain and Northwest regions. Terminals have been installed at Ogden, Utah; Burley, Twin Falls, Boise and Fruitland, Idaho; Baker and Adams, Oregon, and at Pasco, Wash.

Construction of the new pipe line was by Morrison-Knudsen Company, Inc., Macco Corporation, Bechtel Corporation, Pacific Pipeline and Engineers, Ltd., Grafe-Callahan and Oklahoma Contracting Companies, and Smith Contracting Corp.

Excavating Contractors to Organize in Southern Calif.

THE Excavating and Grading Contractors Association has recently been formed in Southern California for the purpose of bringing together this particular group in the construction industry for a study of their mutual problems. This is said to be the first organization among smaller contractors interested primarily in excavating and grading work. The organizers of the group believe that these contractors have been caught between rising costs and low prices paid for this type of work.

The association has set up a permanent office. Secretary of the new organization is Nathan A. Osmore, and headquarters has been established at 1437 Westwood Boulevard, Los Angeles.

Steam Plant and Substation Buildings for Arco

BID-OPENINGS were held for two construction projects by the Idaho Operations Office, U. S. Atomic Energy Commission.

On September 28 bids were opened for the construction of a plant to generate process and heating steam. The plant will be housed in a building 110 by 66 ft., of steel and light-aggregate concrete blocks. The building will have, besides the steam plant, two air compressors, two air dryers, and a 600-kw. diesel electrical generating set. The generator set will be furnished by the Government.

On September 29 bids were opened for the construction of three electrical substation control houses. The buildings will be of reinforced concrete, one 30 by 50 ft., the other two 30 by 60 ft. The work will include heating, plumbing, and electrical service as well as conduits, manholes and grounding systems tying into adjacent outdoor electrical substations.

All construction work involved will be at the AEC's reactor testing station in the Twin Buttes area of the Snake River Plains.

Contracts . . .

A Summary of Bids and Awards For Major Projects in the West

Arizona

$358,982—**Arizona Sand & Rock Co.,** Box 596, Phoenix—Low bid for grading, draining, select material aggregate base, bituminous roadmix, and seal coat on 8 mi. of highway between Calabasas, Calif., and Tumacacori.

$526,885—**Ashton Building, Inc.,** Tucson—Low bid for constructing a central heating and refrigeration plant, including reinforced concrete tunnel extensions; by Regents of University of Arizona.

$1,700,000 approx.—**El Paso Natural Gas Co.,** Bassett Tower, El Paso, Tex.—Company constructing 175 mi. of natural gas lines in vicinity of Flagstaff.

$300,000—**Fisher Contracting Co.,** Box 4035, Phoenix—Contract for building a 2,160-ft. suspension bridge across the Gila River at Gillespie Dam to carry a 30-in. gas pipeline (now under construction) from Texas to San Francisco.

California

$3,337,728—**P. & J. Artukovich,** 13305 S. San Pedro St., Los Angeles (Schedule 3, Section A-2, $1,663,710) and **United Concrete Pipe Corp.,** Box 425, Baldwin Park (Schedule 2, $1,674,018)—Contracts for 14.4 mi. of pipeline construction in San Joaquin County; a Hetch Hetchy contract by City and County of San Francisco.

$1,799,708—**James I. Barnes Construction Co.,** 299 Kansas St., San Francisco—Contract for constructing Sir Francis Drake High School in San Anselmo, Marin County, to include eight one-story buildings of reinforced concrete and wood; by Tamalpais High School District.

$218,311—**Barrett & Hilp,** 918 Harrison St., San Francisco—Contract for constructing a sewage disposal plant, treatment works, and outfall sewers at Centerville, Alameda County; by Sanitary Board of Union Sanitary District.

$5,000,000 approx.—**Morrison-Knudsen Co., Inc.,** 411 W. Fifth St., Los Angeles—Contract with City Park Garages, Inc., for construction of three-story subterranean garage to double as bomb shelter beneath Pershing Square in Los Angeles; by City Council of Los Angeles.

$512,854—**W. J. Disteli,** 4814 West Jefferson Blvd., Los Angeles—Contract for constructing a reinforced concrete box girder bridge, grading and paving of road connections over Harbor Freeway at Fourth St., in Los Angeles County.

$385,880—**Gallagher & Burk, Inc.,** 344 High St., Oakland—Contract for street improvement on 14th Ave. and portions of intersecting streets between E. 14th and E. 30th Streets, Oakland; by City of Oakland.

$288,911—**John C. Gist,** 1020 46th St., Sacramento—Contract for construction of earthwork, foundations and superstructure, and dismantling and removing existing bridge on Sacramento River near Shasta Dam; by Bureau of Reclamation.

$577,278—**Charles L. Harney, Inc.,** 575 Berry St., San Francisco—Contract for constructing a drainage system and grading and paving at Oakland Airport; by Oakland Board of Port Commissioners.

$175,172—**Hess Construction Co., Inc.,** 2303 E. Artesia Blvd., Long Beach—Low bid for grading and surfacing 4.1 mi. with plantmix surfacing on imported base material, on Central Ave., between Foothill Blvd. and Phillips Blvd., San Bernardino County.

$222,961—**M. J. Lynch,** 2251 Revere Ave., San Francisco and **R. B. McNair,** 3745 Rhoda Ave., Oakland—Joint venture contract for construction of new interceptor sewer lines at Menlo Park, San Mateo County; by District Board of Menlo Park Sanitary District.

$9,000,000 approx.—**MacDonald, Young & Nelson** and **Morrison-Knudsen Co., Inc.,** 351 California St., San Francisco—Contract for constructing 980 houses at Fairfield-Suisun Airbase; by National Engineering Development Corp., New York.

$1,564,000—**Moore & Roberts,** 693 Mission St., San Francisco—Contract for construction of Franklin and Jefferson Schools, Berkeley; by the school board.

$1,088,526—**Pacific Coast Builders,** 2530 Eighteenth St., San Francisco—Contract for construction of physical education facilities, demonstration school and industrial arts buildings at Fresno State College, Fresno; by California Division of Architecture.

$168,473—**Leo F. Piazza Paving Co.,** 175 S. Montgomery St., San Jose—Low bid for construction of the San Jose Municipal Airport; by City of San Jose.

$4,000,000 approx.—**The William A. Simpson Construction Co.,** 816 W. Fifth St., Los Angeles 15—Contract for constructing a four-story department store in Los Angeles for J. W. Robinson Co.; by Beverly Hills Development Co.

$181,424—**Manuel Smith,** Rt. 1, Box 352, Winton—Low bid for construction of sewer collection lines, pumping station, treatment plant headworks, connecting sewer, and appurtenances at Carmel, Monterey County; by Carmel Sanitary District.

$213,262—**Stolte, Inc.,** and **Duncanson-Harrelson Co.,** 8451 San Leandro St., Oakland—Joint venture contract for constructing a pilot fish screen structure, appurtenant work, and a 13.8-kv. distribution line at Delta-Mendota Canal headworks, Central Valley Project; by Bureau of Reclamation.

$244,156—**A. Teichert & Son, Inc.,** 1846 37th St., Sacramento—Contract for construction of storm sewer for Tallac Village and Fruitridge Manor subdivisions, Sacramento; by Sacramento City Council.

Colorado

$1,294,312—**Gibbons & Reed,** 259 W. Third St., Salt Lake City, Utah—Low bid for construction of the 1.6-mi. Rattlesnake Tunnel, Estes Park-Foothills Power Aqueduct, Colorado-Big Thompson Project, located west of Loveland; by Bureau of Reclamation.

$700,000—**Mead & Mount Construction Co.,** Denver National Bank Bldg., Denver—Contract for constructing the new Edward L. Brown elementary school in Denver; by Denver Board of Education.

$500,000 approx.—**Utah Construction Co.,** 719 First Security Bank Bldg., Ogden, Utah—Contract for completion of driving on the Leadville drainage tunnel, above Arkansas River near Leadville; by U. S. Bureau of Mines.

Idaho

$227,000—**Chicago Bridge & Iron Co.,** Chicago, Ill.—Low bid for construction of two elevated storage tanks at reactor testing station near Arco; by Atomic Energy Commission.

$378,621—**C. B. Lauch Construction Co.,** Box 2559, Boise—Contract for remodeling three buildings and construction of four new structures at reactor testing station, Arco; by Atomic Energy Commission.

Montana

$415,915—**Lalonde Construction Co.,** Sidney—Low bid for 8.9 mi. of paving, curbing and gutters in Sidney; by Sidney City Council.

$213,873—**McLaughlin, Inc.,** 327 Ford Bldg., Great Falls—Contract for a 40-block paving and curbing project in Glasgow, providing for 3½-in coating of plantmix asphaltic concrete over a base course, together with roll-type curbing; by City of Glasgow.

$271,299—**Union Construction Co.,** Box 1261, Missoula—Low bid for grading and construction of bridges on 6.8 mi. of the Lewis & Clark highway between Lolo Hot Springs and Idaho state line; by Bureau of Public Roads.

$222,925—**W. D. Zavalas Co.,** Oroville, Calif.—Low bid for Schedules 2, 3, and 4, clearing 76.9 mi. of right-of-way for the Clark Fork section of the Spokane-Hot Springs 230-kv. transmission line; by Bonneville Power Administration.

Nebraska

$2,346,141—**Perry McGlone Construction Co.,** Grand Avenue Bank Bldg., Kansas City, Mo.—Low bid for earthwork and structures (excepting bridge superstructures) for the relocation of the Chicago, Burlington and Quincy Railroad at Trenton Dam, Frenchman-Cambridge Division, Missouri River Basin Project; by Bureau of Reclamation.

Nevada

$243,322—**Isbell Construction Co.,** Box 2351, Reno—Contract for resurfacing 7.6 mi. of streets in Reno and Sparks, Washoe County.

$473,122—**Silver State Construction Co.,** Fallon—Contract for constructing 28.9 mi. of state highway in White Pine and Elko Counties.

$336,159—**Silver State Construction Co.,** Fallon—Contract for construction of 12.9 mi. of state highway between Cliffside and 4 mi. west of Wendover in Elko County.

Oregon

$286,641—**Berke Bros.,** 7923 N.E. Halsey St., Portland—Low bid for constructing Oregon Forest Development Road Project on Zigzag-Lolo Pass road, Mt. Hood, Clackamas County; by Bureau of Public Roads.

$1,885,000—**Donald M. Drake Co.,** 904 Lewis Bldg., Portland—Low bid for construction of Lincoln High School building, a U-shaped structure of reinforced concrete construction with brick veneer in Portland.

$539,466—**Empire Construction Co.,** 4506 S.E. 39th St., Portland—Contract for constructing the S.W. Sunset Blvd. and S.W. Dorsch Road storm and sanitary sewer system in Portland; by City of Portland.

$404,378—**Carl M. Halvorson, Inc.,** 218 Builders Exchange Bldg., Portland—Contract for construction of a sewage treatment plant at Salem, to be the second largest in Oregon.

$177,350—**Tom Lillebo,** Reedsport—Contract for construction of reinforced concrete bridge on treated timber piling, and .5 mi. of grading and oil mat surfacing on the Bybee Bridge section of Table Rock Market Road, 8 mi. north of Medford in Jackson County.

$241,200—**Miller & Strong, Inc.,** 3871 Royal Road, Eugene—Low bid for constructing a stone breakwater for a small boat harbor in South Slough, Charleston; by Corps of Engineers.

$597,936—**C. J. Montag & Sons,** 7805 N.E. Halsey, Portland—Contract for seven reinforced concrete and steel structures, bridge remodeling, and 3 mi. of grading and paving on the Pacific West highway in Multnomah County.

$156,089—**M. L. & C. R. O'Neil,** Box 346, North Powder—Contract for grading, topping and structures on the North Powder River section of the Old Oregon Trail, Union and Baker Counties.

$274,110—**Parker-Schram Co.,** Builders Exchange Bldg., Portland—Contract for grading and oil mat surfacing of 1.1 mi. of Columbia River Highway in Hood River County.

$323,230—**R & R Construction Co.,** Tillamook—Low bid for clearing the right-of-way in the timber sales section of the Maupin-Detroit 230-kv. transmission line in Marion County; by Bonneville Power Administration.

$238,932—**Rogers Construction Co.,** 11760 N.E. Glisan, Portland—Contract for 15.8 mi. of grading, surfacing and oiling on a portion of state highway between Mill Gulch and Salisbury, Baker County.

$158,710 using asphalt and $158,684 using tar—**Warren Northwest, Inc.,** Box 5072, Portland—Low bid for grading and paving state highway between Pudding River and Silverton in Marion County.

Utah

$199,656—**W. W. Clyde & Co.,** Springville—Low bid for constructing 13.6 mi. of 2-in. roadmix bituminous surfaced road between Spring City and Wales, Sanpete County.

$374,316—**United Concrete Pipe Corp.,** Box 425, Baldwin Park—Contract for constructing water main extensions, Schedules 3L, M, and N, using concrete pipe, Salt Lake City; by Salt Lake City Corp.

$197,114—**L. A. Young Construction Co.,** Richfield—Contract for construction of a 2-in. roadmix bituminous surfaced road on the Boneta Approach between Upalco and Altamount, Duchesne County.

Washington

$344,000—**Curtis Gravel Co.,** Box 106, Spokane—Low bid for manufacturing, stockpiling, and placing crushed gravel and crushed rock along a 35-mi. section of the Spokane, Portland &

Seattle Railway relocation, connecting with McNary Dam reservoir.

$795,327—**J. C. Boespflug Construction Co.,** 1912 Fourth Ave., Seattle—Low bid for construction of the King County Youth Service Center; by King County Commissioners.

$260,000—**General Construction Co.,** Box 3244, Seattle—Contract for construction of fourth portion of the utility tunnel under the University of Washington campus, from Campus Parkway to 12th Ave., N.E., Seattle.

$1,167,370—**K. T. Henderson,** Longview—Low bid for constructing a junior high school at Longview.

$285,950—**Inland Asphalt Co.,** 10th & Havana Streets, Spokane—Contract for paving and curbing 8.6 mi. of streets and avenues in Spokane's northwestern section; by City Commissioners of Spokane.

$183,923—**Leo J. Lavin,** Coulee City—Contract for grading and paving 3.8 mi. of state highway between Twisp and Winthrop in Okanogan County.

$151,285—**C. E. Oneal,** Box 270, Ellensburg—Contract for grading and paving 5.4 mi. of state highway between Toppenish and Alfalfa in Yakima County.

$2,662,886—**Pacific Bridge Co.,** 333 Kearny St., San Francisco—Contract for river improvement and a spillway bucket repair job at Grand Coulee Dam; by Bureau of Reclamation.

$258,123—**Rushlight Automatic Sprinkler Co.,** 55 N.E. Farragut St., Portland, Ore.—Contract for constructing the new sewage treatment plant in Kelso; by Kelso City Council.

$1,118,226—**Henrik Valle Co., Inc.,** Box 4096, Interbay Station, Seattle—Contract for construction of the south addition to the student union building at the University of Washington; by Regents of Univ. of Wash.

$167,336—**Valley Construction Co.,** 7722 Rainier Ave., Seattle—Low bid for construction of the Unit 1-C outfall line in the Lake City Sewer District, involving construction of about 2,400 ft. of 72-in. heavy reinforced concrete pipe.

$278,371—**Western Asphalt Co.,** 309 W. 39th, Seattle—Contract for bituminous surface treatment and cement-treated base on 6.2 mi. of state highway between Purdy and Point Fosdick Road in Pierce County.

Wyoming

$157,540—**England & Roth,** Rapid City, S. Dak.—Contract for grading, draining, base course surfacing, timber bridges, culverts, and miscellaneous work on 5.9 mi. of the Hulett-Alladin road in Crook County.

$479,018—**Taggart Construction Co.,** Box 560, Cody—Low bid for street improvement in Cody.

$168,262—**J. H. & N. M. Monaghan & Assoc. Cos.,** Route 1, Derby, Colo.—Contract for erecting a culvert, a treated timber span bridge over Poison Creek and a span welded girder bridge over Wind River, and grading and paving on a 5-mi. portion of the Shoshoni-Riverton road in Fremont County.

Alaska

$481,370—**C. F. Lytle Co. & Green Construction Co.,** 312 Masonic Temple Bldg., Des Moines, Iowa—Contract for constructing a steel hangar at the international airport, Anchorage; by Civil Aeronautics Administration.

$459,695—**C. F. Lytle Co. & Green Construction Co.,** 312 Masonic Temple Bldg., Des Moines, Iowa—Low bid for grading 5.4 mi. of the Kenai River road in Chugach National Forest; by Bureau of Public Roads.

$327,668—**State Construction Co.,** 1245 Poplar Place, Seattle—Sole bid submitted for installation of sewers in western part of Fairbanks, involving installation of 12-in. to 24-in. trunk line and 8-in. and 10-in. laterals.

British Columbia

$1,500,000 est.—**Northern Construction Co., & J. W. Stewart, Ltd.,** 1304 Hornby St., Vancouver—Contract for constructing a sawmill and hogfuel storage plant at pulp and paper plant of Pacific Mills, Ltd.; building to be of structural steel and concrete with corrugated transite asbestos siding and roofing, at Ocean Falls.

Record Earnings Set on Delta-Mendota Project

THE DELTA District of the Bureau of Reclamation shattered all of its previous construction records in August when earnings totaling nearly $2,600,000 were rolled up under a score of major contracts for four key initial Central Valley Project features. Of this amount almost $2,100,000 represented unprecedented earth-moving and concrete-lining operations in a 30-day period on the Delta-Mendota Canal alone, while the remaining $500,000 was the combined accomplishment during the month on the Shasta-Tracy Transmission Lines, the Delta Cross Channel, and Tracy Pumping Plant and Switchyard.

Each month since last April construction progress in the Delta District has been climbing steadily to all-time-high records, with August attaining the high for the current fiscal year ending next July. This resulted from the virtual completion during August of two major Delta-Mendota Canal construction contracts for a combined 37 mi. on which an average of 90,000 cu. yd. of earth was moved and a half-mile of concrete lining placed each day during the month.

The Delta-Mendota Canal is now excavated and lined for an 89-mi. distance between Tracy Pumping Plant and a few miles southwest of Los Banos. Only 8 mi. of concrete lining remain to be placed to complete the 97-mi. concrete-lined portion. About one-third of the excavation for the 18-mi. earth-lined section northward from Mendota Pool has been completed.

Highlights of construction accomplishments on the other major CVP features under construction by the Delta District follow:

Delta Cross Channel—Excavation on the 3,400-ft. channel section between Walnut Grove and Snodgrass Slough reached 50% completion and excavation for the headworks and floodgate structure at Walnut Grove is getting well under way.

Tracy Pumping Plant and Switchyard—Stators were set for three of the six 22,500-hp. pump motors to drive the world's second largest irrigation pumps. Winding, insulating, and testing of remaining motor units is in progress. Construction of the control building, concrete placing, installing of conduit, and control cable tunnels and mechanical installations for the switchyard are in progress.

Riprap Ferried Across Columbia River by M-K

NEAR THE SITE where the historic Seaton Ferry once plied across the Columbia River, a new ferry service has been inaugurated by Morrison-Knudsen Co., Inc., of Seattle for the job of transporting approximately 350,000 tons of armor rock and riprap across the Columbia to protect the riverbanks below the dam.

The barge carries one, and sometimes two, Euclid trucks across the 600-ft. width of the Columbia at this point, with a "payload" sometimes estimated as high as 120,000 lb. of rock. The barge runs from a 2-in. high-line cable. Two other tow lines, one at either end of the barge, are used primarily for maneuvering, and the swift, deep current of the Columbia does most of the propelling.

The trucks receive their load of rock from one of two shovels at the down-river quarry, weigh out, then make their way down a temporary curved roadway to load on the barge for the trip to the left bank. Crossings average approximately two minutes of time, and round trips have been completed in eight minutes. The contractors estimate a crossing every 18 minutes, 26 trips to the shift, and 7,000 trips for the season. The work will be completed next spring.

Because of the heavy flow of the Columbia and the swift current, the crossings can be made only in the winter low-water season. From early morning till late in the evening, the trucks make their crossings. Armor and riprap rock are still being placed on the quarry side of the river, near the dam and downstream, to continue the program which started early this spring.

Approximately 4,000,000 hp. of energy is dissipated downstream by water which falls approximately 320 ft. at Grand Coulee Dam. The rock is needed to protect the banks against the severe wash of the resulting currents.

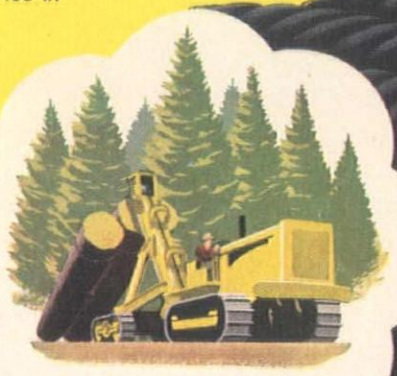
WICKWIRE ROPE

A PRODUCT OF CF&I

Ask any user . . . you'll find them everywhere

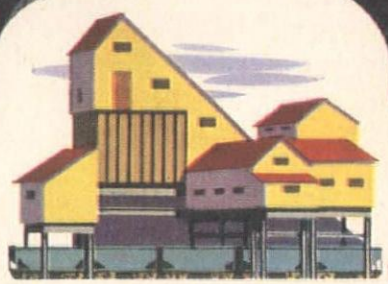
In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISSCOLAY® Preformed. It lasts longer — is easier to cut, splice and install. It's kink-resistant and safer to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant — Palmer, Mass.

IN THE EAST—Wickwire Spencer Steel Div. of C. F. &I.
500 Fifth Ave., New York 18, N. Y.
IN THE ROCKIES—The Colorado Fuel and Iron Corp.
Continental Oil Bldg., Denver, Colo.
ON THE WEST COAST—The California Wire Cloth Corp.
1080—19th Ave., Oakland 6, Cal.

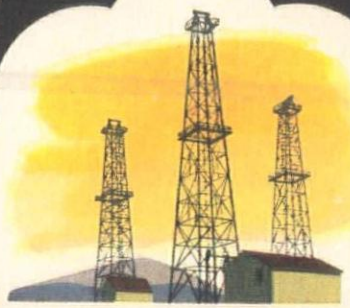


LOGGING

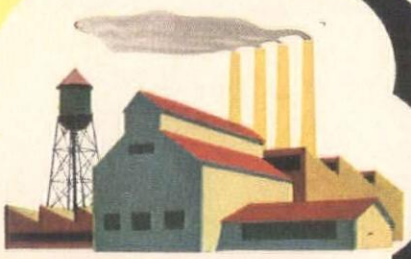
TRANSPORTATION



MINING



PETROLEUM

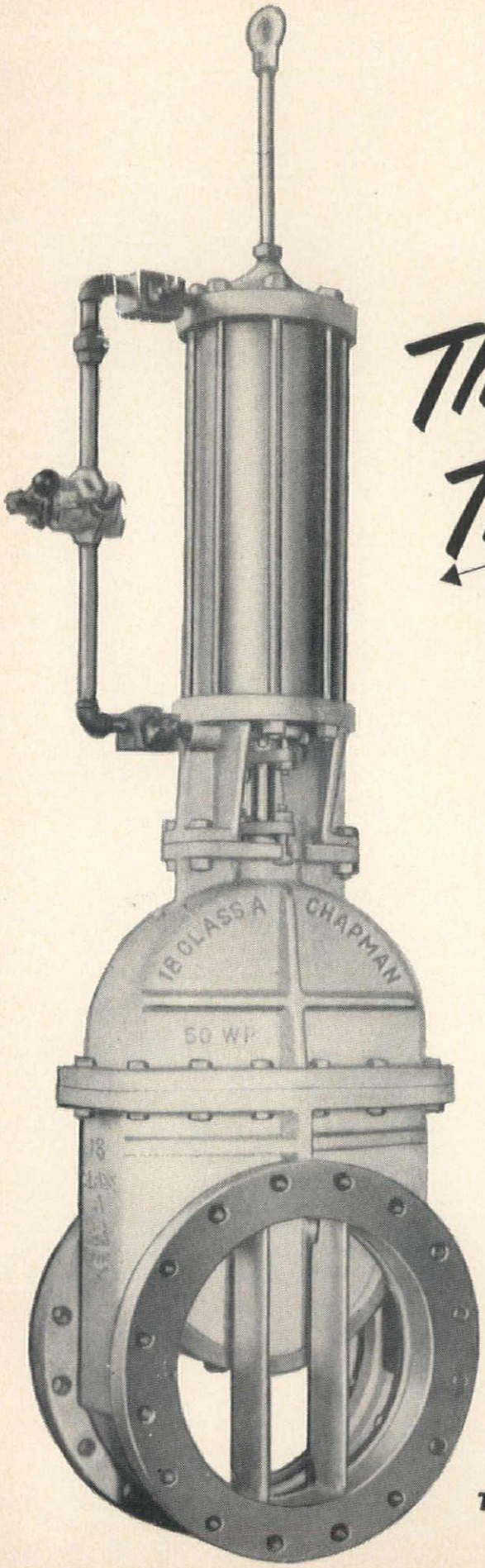


MANUFACTURING

MARINE

CONSTRUCTION

A. E. Brattman



There's Less Wear... Tighter Seating...

WITH CHAPMAN BEAMED WATERWAY GATE VALVES

Markedly Superior under throttling conditions to double disc, parallel seated gate valves, is this valve designed by Chapman. The bronze vertical beams in the downstream port prevent the disc from tipping into the waterway. Bearing contact between disc and body facing is increased 6 to 10 times . . . wear is evenly distributed on seat rings . . . leakage reduced to a minimum.

THIS BULLETIN TELLS THE COMPLETE STORY

The CHAPMAN VALVE MANUFACTURING COMPANY

INDIAN ORCHARD, MASSACHUSETTS

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

To meet the growing need for cement mortar pipe linings of both small and large diameter pipe, *Raymond Concrete Pile Co.* and *American Pipe & Construction Co.* have organized a new company: *Pipe Linings, Inc.*, with a Los Angeles office at Box 3428, Terminal Annex, Los Angeles 54, as well as a New York office. Large diameter pipes will continue to be lined in the West by the Centriline Division of American Pipe & Construction Co., with other sections of the country being taken care of by Centriline Corporation of New York. Small diameter pipes, successfully cement-lined for many years by Tate Pipe Linings, Inc., Andover, Mass., now in dissolution, will be handled by Pipe Linings, Inc. WILLIAM A. JOHNSON of American Pipe & Construction Co. is the president of Pipe Linings, Inc.; J. W. TAUSSIG of Raymond Concrete Pile Co. is vice president and J. P. CUMMINS is Eastern general manager. E. H. LEWIS, former owner of Tate Pipe Linings, will act as consultant.

☆ ☆ ☆

Announcement is made of the appointment of two new distributors in the Northwest by *Standard Steel Corporation*, pioneer Los Angeles manufacturer of asphalt plants and road building machinery. *Andrews Machinery* of Washington will represent Standard in Seattle, and *P. L. Crooks & Co., Inc.*, in Portland, Ore. Standard is already distributing in Spokane, Wash., through *Modern Machinery Co., Inc.*, and in Salt Lake City, Utah, through the *Lang Company*. The Standard line includes aggregate batching plants, bulk cement plants, sub-graders, finishers and portable and stationary boilers. A recent addition is a special cold mix plant for the Amalgapave process.

☆ ☆ ☆

Appointment of MARION H. FREEDMAN as division vice president of the Pacific Northwest Sales Division is announced by MARCUS J. AURELIUS, vice president-sales, *Columbia Steel Co.*, San Francisco. Simultaneously, Freedman announced the designation of MARSHALL B. HARRISON as manager of sales for the Oregon area of the Division, with offices in Portland, Ore. He has been with Columbia Steel since 1935. Freedman, who has served as Northwest Division Manager since January, 1949, will maintain his main office in Seattle. He first joined the United States Steel Corp. in 1920 with U. S. Steel Products Co. in San Francisco. In 1931 he was transferred to the Seattle office of Columbia Steel.

☆ ☆ ☆

Announcement was recently made in San Francisco of the appointment of ARTHUR C. MOORE as division vice president of the Intermountain Sales Division of *Columbia Steel Co.* Well known in steel trade circles, Moore maintains offices in the Walker Bank Bldg., Salt Lake City. He has been with this U. S. Steel subsidiary since the time of its inception in 1910. Starting his business career in 1902 as a clerk in Washington, in 1907 he moved to Portland, Ore., joining Columbia Steel Co. three years later. In 1923 he was assigned to the Intermountain area as a district sales representative, and six years later he became division manager of sales for that area.

☆ ☆ ☆

On Aug. 1, 1950, JOSEPH M. WOLFE was made assistant to the chief engineer of *Traylor Engineering & Mfg. Co.*, Allentown, Pa. A registered professional engineer, Wolfe started his business career in 1935 with Allis-Chalmers Mfg. Co. From 1940 to 1945 he was sales engineer for that company on mining and cement manufacturing equipment in South America. In 1945 he returned to Milwaukee and the next few years were devoted exclusively to machinery for the cement industry.

☆ ☆ ☆

The name of *Carter Products Corp.* has been changed to *Carlon Products Corp.*, according to a recent announcement from Cleveland by BRIGHAM BRITTON, president of the company. This change, affecting only the corporate name, is in line with company policy to consolidate all products and facilities under the trade name "Carlon." Sales of "Carlon" extruded plastic products (flexible and rigid types of pipe, tubing, water well casing, and a wide range of custom fabrications) have been increasing so rapidly that a new plant has been established in Corsicana, Tex., to provide greater capacity, according to President Britton.

☆ ☆ ☆

WALDO J. MORDINI has been promoted to Western Division engine sales representative for *Caterpillar Tractor Co.*, with headquarters in San Leandro, Calif., it has been announced by B. L. HAGGLUND, Western sales manager. A graduate engineer, Mordini has been employed in road construction work, and with Bendix Aviation Corp., South Bend, Ind., and was an officer with the Seabees before joining Caterpillar in 1946. He became a member of the Sales Engineering Division in 1949.

☆ ☆ ☆

Straub Manufacturing Co., Inc., Oakland, Calif., announces the appointment of *Migula & Company* as its exclusive representative for Kue-Ken Crushers for all of California lying south of Bakersfield. The Migula firm is headed by G. V. MIGULA, who for many years was in charge of engineering and plant layout for Robins Conveyors, Division of Hewitt-Robins, Inc. His company is now in position to furnish complete crushing plants including Kue-Ken crushers, Robins screens and conveyors. The firm is located at 117 East Colorado St., Pasadena, Calif. Straub Manufacturing Co. is under the management of JOHN R. KUENEMAN, president; DON KUENEMAN and C. P. KENVILLE, vice presidents.

☆ ☆ ☆

Engineering Sales Service, Inc., Boise, Idaho, recently contracted for the manufacture and distribution of the Parsons Win-Ro equalizer. According to Engineering Sales, this machine has been in limited use for a period of four or five years, and at the request of many highway contractors who have seen it, the owners of the patent have released it to Engineering Sales Service.

☆ ☆ ☆

R. L. (BOB) HOPKINS, who has been associated with oil field and industrial applications of wire rope for many years, has been named Tournarope sales engineer for southwestern United States, it was recently announced by W. H. WILSON, Tournarope sales manager. With headquarters in Houston, Texas, Hopkins will handle Tournarope applications and sales in Texas, New Mexico, Oklahoma, Colorado and Louisiana. Distributors of *R. G. LeTourneau, Inc.*, with whom he will work in meeting the wire rope needs in those states are: *Berry Brothers Machinery Co.*, Dallas; *J. E. Ingram Equipment Co.*, San Antonio, Corpus Christi and Edinburg, Texas; *Contractors Equipment & Supply Co.*, Albuquerque, New Mex., and El Paso, Texas; *Kessler-Simon Machinery Co.*, Oklahoma City, Okla.; *The Colorado Builders Supply Co.*, Denver; and *E. C. Ray Machinery Co.*, Shreveport, La.

☆ ☆ ☆

Andrews Machinery of Washington, Inc., Seattle, has opened a branch office in Tacoma at 225 East "F" St. This office will handle rental of construction machinery, which will serve the Tacoma district and areas south and west of Tacoma. STANLEY L. POSSEHL is branch manager. Joining the sales force in the Seattle office is DANIEL F. GOODMAN, formerly with *Pacific Hoist & Derrick Co.* MALCOLM H. FOX, who has been serving the company as salesman for the past two years, recently resigned.

☆ ☆ ☆

Andrews Machinery of Washington, Inc., Seattle, has signed a contract with *Standard Steel Corp.*, Los Angeles, Calif., to act as distributor of Standard's lines of portable and stationary asphalt plants and Standard subgraders in western Washington.

☆ ☆ ☆

The Euclid Road Machinery Co., Cleveland, Ohio, has appointed *Foulger Equipment Co.*, 1361 So. Second West, Salt Lake City, Utah, as distributor for Utah, southwestern Wyoming and the northeast section of Nevada. Foulger Equipment Co. is

Continued on page 120

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

Continued from page 119

distributor for several other leading manufacturers of mining and construction equipment. A new building now under construction at the present location will be ready for occupancy in the near future. B. L. FOULGER is president of the company, O. M. FOULGER, treasurer, and J. T. HOLLAND, sales manager.

☆ ☆ ☆

GORDON TUCKER has joined the *Allied Equipment Co.*, Fresno, Calif., as a salesman. Tucker is handling the Essick line of construction equipment for the firm.

☆ ☆ ☆

RAY C. HANSEN, JR., has been named sales engineer of the *National Tank & Pipe Co.*, Portland, Ore., a division of M and M Wood Working Co. National Tank & Pipe Co. is one of the country's largest manufacturers of wood tanks and pipes. Many city water systems in the Northwest have been constructed by this company. Hansen will make his headquarters at the company office, 2301 N. Columbia Blvd., and will serve the Northwest states.

☆ ☆ ☆

Newly named sales representatives to *Allis-Chalmers* West Coast offices are EDWARD E. WILSON and RONALD D. BROWN to the company's Portland district office; DAVID H. HOLMES to the Seattle district office, and JAMES V. MILLER to the Spokane district office. All men served in the U. S. Navy during World War II and have completed Allis-Chalmers' graduate training course since joining the company.

☆ ☆ ☆

RAY GOODMAN recently joined the sales staff of *Coast Equipment Co.*, San Francisco. Goodman was previously with Bay Cities Equipment, Inc., Oakland, and is well known in the construction industry. He will cover the San Francisco Bay area and counties north for Coast Equipment.

☆ ☆ ☆

Heil Equipment Co., San Francisco, has been appointed Northern California distributor for *Bartlett Trailer Co.* of Chicago. This company manufactures an hydraulic 5th wheel for trailers that is controlled from the driver's seat.

☆ ☆ ☆

LORNE W. MCRAE has been appointed sales manager for *Purves E. Ritchie & Son, Ltd.*, equipment supply dealers of Vancouver, B. C. He joined the organization in 1946 as representative in the Okanagan Valley with headquarters at Kelowna, B. C.

☆ ☆ ☆

LOUIS C. BALL has been named assistant to the general manager of *Kaiser Gypsum*, a division of Kaiser Industries, Inc., Oak-

Continued on page 122

UNIT BID SUMMARY

Water Supply . . .

Water Main Extensions for Salt Lake City

Utah—Salt Lake City—City. United Concrete Pipe Corp., Baldwin Park, Calif., with a bid of $374,316, was low before the Engineering Department of Salt Lake City Corp. for constructing Watermain Extension No. 2339, from First North and Eighth West Sts. to Thirteenth South and Third East Sts., Salt Lake City. Unit bids were as follows:

	Incl. Pipe Items. Nos. 3, 3-A, 3-B	Incl. Pipe Items. Nos. 3-C, 3-D, 3-E	Incl. Pipe Items. Nos. 3-F, 3-G, 3-H	Incl. Pipe Items. Nos. 3-I, 3-J, 3-K	Incl. Pipe Items. Nos. 3-L, 3-M, 3-N
(1) United Concrete Pipe Corp...	No bid	No bid	No bid	No bid	$374,316
(2) J. Kenneth Thayn...	No bid	$468,324	$468,324	$481,934	No bid
(3) Griffith, Cornall & Carman, Inc., & R. M. Jensen...	No bid	424,888	430,610	442,615	423,109
(4) Enoch Smith Sons Co...	No bid	No bid	442,908	448,733	437,083

No.			(1)	(2)	(3)	(4)
1.	23,500	cu. yd. excav. of trenches for pipe lines incl. backfill	3.00	1.25	1.40	1.50
2.	375	cu. yd. excav. for structs. incl. backfill	6.00	1.50	3.00	3.00
3.	800	lin. ft. furn. and laying 24-in. welded steel pipe complete, incl. inside protec. coating of coal-tar primer and coal-tar enamel and outside protect. coating of gunite	.....	.....	.....	.....
3-A.	11,650	lin. ft. same as Item No. 3 above, except that pipe diam. shall be 30-inch O.D.	.....	.....	.....	.....
3-B.	9,000	lin. ft. same as Item No. 3 above, except that pipe diam. shall be 36-in. O.D.	.....	.....	.....	.....
3-C.	800	lin. ft. same as Item No. 3 above, except that pipe shall have bevel-ends for butt-welded field joints. 24-in. O.D.	.....	13.00	12.43	.....
3-D.	11,650	lin. ft. same as Item No. 3 above, except that pipe diam. shall be 30-in. O.D. and pipe shall have bevel-ends for butt-welded field joints	.....	17.50	16.24	.....
3-E.	9,000	lin. ft. same as Item No. 3 above, except that pipe diam. shall be 36-in. O.D. and pipe shall have bevel-ends for butt-welded field joints	.....	20.70	18.44	.....
3-F.	800	lin. ft. same as Item No. 3 above, except that pipe shall have plain ends with welded steel strap collar and butted field jts. 24-in. O.D.	.....	13.00	12.60	.....
3-G.	11,650	lin. ft. same as Item 3 above, except that diam. of pipe shall be 30-in. O.D. and pipe shall have plain ends with welded steel strap collar and butted field joints	.....	17.50	16.48	16.50
3-H.	9,000	lin. ft. same as Item No. 3 above, except that diam. of pipe shall be 36-in. O.D. and pipe shall have plain ends with welded steel strap collar and butted field joints	.....	20.70	18.75	19.00
3-I.	800	lin. ft. same as Item No. 3 above, except that pipe shall have plain ends for mechanically connected field joints, using Dresser coupling, or approved equal, which shall be furn. and placed by contractor. Pipe 24-in. O.D.	.....	13.40	12.88	13.00
3-J.	11,650	lin. ft. same as Item No. 3 above, except that pipe diam. shall be 30-in. O.D. and pipe shall have plain ends for mechanically connected field joints, using Dresser coupling, or approved equal, which shall be furn. and placed by contractor	.....	18.10	17.02	17.00
3-K.	9,000	lin. ft. same as Item No. 3 above, exeept that diam. of pipe shall be 36-in. O.D. and pipe shall have plain ends for mechanically connected field joints, using Dresser coupling, or approved equal, which shall be furn. and placed by contractor	.....	21.40	19.36	19.00
3-L.	800	lin. ft. furn. and laying 24-in. I.D. lock-joint steel cyl. conc. pipe complete	9.00	.....	12.44	13.00
3-M.	11,650	lin. ft. furn. and laying 30-in. I.D. lock-joint steel cyl. conc. pipe complete	11.00	.....	15.26	16.00
3-N.	9,000	lin. ft. furn. and laying 36-in. I.D. lock-joint steel cyl. conc. pipe complete	15.30	.....	19.51	19.00
4.	56	lin. ft. laying 18-in. I.D. cast-iron pipe and fittings complete. Pipe and fittings to be furn. by the City	5.00	2.00	1.56	3.00
5.	40	lin. ft. laying 12-in. I.D. cast-iron pipe and fitting complete. Pipe and fittings to be furn. by the City	4.00	1.75	1.20	3.00
6.	5	ea. hauling, handling and setting 24-in. bevel-gear, hub-end and flange gate valves, to be furn. by the City	200.00	100.00	90.00	75.00
7.	1	ea. hauling, handling and setting 18-in. bevel-gear hub-end gate valve, to be furn. by the City	150.00	100.00	72.00	75.00
8.	3	ea. hauling, handling and setting 16-in. hub-end gate valves, to be furnished by the City	100.00	90.00	48.00	50.00
9.	2	ea. hauling, handling and setting 12-in. hub-end gate valves, to be furnished by the City	60.00	80.00	36.00	30.00
10.	1	ea. hauling, handling and setting 6-in. hub-end gate valves, to be furnished by the City	40.00	50.00	24.00	20.00
11.	3	ea. hauling, handling and setting air release valves and assemblies complete, to be furnished by the City	60.00	80.00	24.00	50.00
12.	5	ea. hauling, handling and setting air release and air vacuum valves and assemblies complete, to be furn. by the City	60.00	80.00	24.00	50.00
13.	3	ea. furn. matls., and const. special reinf. conc. valve boxes complete, for housing 24-in. bevel gear, hub-end gate valves	$1,100	750.00	768.00	$1,200
13-A.	1	ea. furn. matls. and const. special reinf. conc. valve box complete, for housing 24-in. bevel-gear, flange gate valves 3rd East and 13th South Sts.	$2,300	$1,500	$1,458	$2,500
14.	1	ea. furn. matls., and const. spec. reinf. conc. valve box complete, for housing 18-in. bevel-gear, hub-end gate valve	800.00	450.00	577.20	800.00
15.	3	ea. furn. matls. and const. conc. valve boxes complete, for housing 16-in. hub-end gate valves	900.00	450.00	276.00	500.00
15-A.	4	ea. furn. matls. and const. conc. valve boxes complete for housing 6-in. and 12-in. hub-end gate valves	500.00	300.00	186.00	150.00
16.	3	ea. furn. matls. and eonst. reinf. conc. boxes complete, for housing air release valves and assemblies	500.00	300.00	421.20	350.00
16-A.	1	ea. furn. matls. and const. reinf. conc. boxes complete, for housing air release and air vacuum valves and assemblies	500.00	300.00	493.20	300.00
17.	20	cu. yd. furn. matls. and const. conc. thrust anchors and/or conc. bedding in the pipe trench	20.00	40.00	18.00	25.00
18.	140	sq. yd. furn. matls. for tearing, or breaking-out exist. Portland cement conc. roadway surface pavement, removal and disposal of same, and placement of new Portland cement conc. roadway surface pavement complete, including curing	8.00	20.00	4.80	10.00
18-A.	320	sq. yd. furn. matls. for tearing or breaking-out of exist. conc. road-base pavement, removal and disposal of same, and placement of new concrete roadbase complete	8.00	18.00	4.32	6.00

Continued on page 122

PIONEER RUBBER MILLS' New Rayon Braided and Molded Hose Promises Lower Operational Costs

Yes, Jim has really stepped up his efficiency since he's been using "54-40" hose because it's more flexible—easier to handle. Jim's boss gains in another way, too, because the new *engineered* construction of "54-40" hose increases hose life and reduces operating and replacement costs.

ALL-PURPOSE, AIR, BOOSTER, SPRAY, WATER, WELDING HOSE IS STRENGTHENED THROUGH "54-40" CONSTRUCTION

No doubt about it . . . *PIONEER'S method of balanced braiding of rayon yarn is news . . . Good News for hose users. "54-40" means 54 degrees, 40 minutes — the "optimo" or perfect angle for the braiding of rayon yarn on hose. It's the angle of lock that provides hose with the braided reinforcement needed to give* maximum strength, reduced weight, *and* increased flexibility.

Fighting Name Significant

Students of our early Western history will remember the slogan, "Fifty-four forty or fight!" Now it's doubly significant that PIONEER RUBBER MILLS, an old Western firm, is making new history with its "54-40" line of Rayon Braided and Molded Hose by enabling hose users to win the fight against rising replacement costs with a longer lasting hose.

Get the facts about this new "54-40" line now!

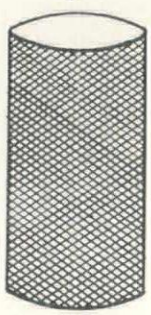
Here are a few advantages of the new PIONEER "54-40" line

1. *Greater resistance to inner pressures and kinking.*
2. *Increased flexibility. Rayon fibres do not "stretch" and "buckle" when hose is bent under pressure.*
3. *Longer life, because it's molded in polished steel presses under pressure 5 times greater than is possible in conventional methods of manufacture.*

New Braid Angle Does the Trick

PIONEER RUBBER MILLS shows you what "54-40" means. Note these braid angles.

Treated rayon reinforcement is woven at 54 degree, 40 minute angle, the ideal to provide added strength, reduce weight, increase flexibility.



Here's why "54-40" hose is superior to ordinary rayon or cotton reinforced hose.

When braid is woven at this angle. Too long. Decreases burst, shortens under pressure, kinks easily.

PIONEER RUBBER MILLS will be happy to give you full and complete information about this new line of "54-40" braided and molded hose without obligation.

PIONEER RUBBER MILLS

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SPOKANE · BOISE . *Intermountain Equipment Co.*
SALT LAKE CITY . . *National Equipment Co.*
DENVER . . . *Western Belting & Packing Co.*
TERR. OF HAWAII . . *American Factors, Limited*

NEWS of MANUFACTURERS

Continued from page 120

land, Calif. He will assist General Manager CLAUDE E. HARPER in the discharge of various administrative duties.

☆ ☆ ☆

From Geneva, Utah, it was announced by DR. WALTHER MATHESIUS, president, that F. RAY FRIEDLEY has been elected a director and comptroller of *Geneva Steel Co.* and *Columbia Iron Mining Co.*, subsidiaries of United States Steel Corp. He succeeds C. B. VERNOOY in these positions and assumed his new duties as of July 1. Vernooy will leave Utah to become assistant comptroller of U. S. Steel Corp. of New Jersey in New York City.

☆ ☆ ☆

CAPTAIN HOWARD THOMAS ORVILLE, prominent Navy aerologist and one of the nation's foremost weather authorities, is retiring voluntarily after 29 years' service to become director of engineering for the *Friez Instrument Division of Bendix Aviation Corp.*, Baltimore, Md., it was recently announced by LEROY D. KILEY, general manager.

☆ ☆ ☆

L. J. LANGE, *International Harvester Co.*, Chicago, has been appointed industrial power product specialist of that company, as revealed by A. J. PETERSON, manager, general sales department, in a recent announcement. His duties will be concerned with the design and sale of industrial wheel and crawler tractors, and power units. Lange has been with the company since 1936, and succeeds S. L. SIEGFRIED in his new capacity.

☆ ☆ ☆

JOHN F. MYERS was recently elected president of *Westinghouse Electric Supply Co.*, succeeding DAVID M. SALSBURY. Salsbury, formerly of San Francisco and Seattle before moving to New York City as president, several months ago requested to be relieved of his duties to return to the West Coast. As of July 1, he becomes vice-president in charge of Texas and Pacific Coast operations for the supply company, with headquarters at 410 Bush St., San Francisco. Myers brings to his new position 30 years' experience in marketing both consumer and industrial products manufactured by the electrical industry.

☆ ☆ ☆

Columbia Steel Co., San Francisco, has decided to increase substantially the steel-finishing facilities of its Pittsburg, Calif., plant, according to an announcement made by ALDEN G. ROACH, president of this West Coast subsidiary of United States Steel. Additional cold reduced sheet and tinplate facilities will be installed, and when completed, will enable Columbia Steel to increase materially its production of both tin mill products and sheets, for which there is an ever-increasing demand on the Pacific Coast.

Continued on page 124

19.	5,700	sq. yd. furn. matls., breaking-out exist. bitum. type or asphaltic pavement, removal and disposal of same, and placement of compacted stone-filled sheet asphalt pavement	.18	.50	.25	1.00
20.	600	ton furn. matls. for hauling, handling and placing of compacted gravel base complete	6.00	15.00	14.40	12.00
21.	100	sq. ft. furn. matls. for breaking-out conc. walk pavement, removal and disposal of same, and placement of conc. walk pavement complete, over trench	.50	.50	.60	1.00
22.	300	sq. ft. furn. matls. for breaking-out, removing and disposing of conc. driveway pavement, and the placement of conc. driveway pavement complete over trench	1.00	.84	1.00	.50
23.	20	ton furn. matls. for hauling, handling and placing of compacted gravel topping on unpaved driveways	3.00	1.80	2.00	1.50
24.	1	m.f.b.m. furn. matls. and placing lumber in trench bottom for pipe bedding	400.00	216.00	175.00	500.00
25.	1	m.f.b.m. furn. matls. for placing sheet piling, lagging, bracing, etc.	400.00	543.00	175.00	500.00
26.		furn. matls. for hauling, handling and placing gravel in trench bottom	3.00	3.00	3.00	2.00
27.		removing trees encountered in or near location of pipe line trench.				
	1	ea. up to 12 in.	40.00	50.00	24.00	30.00
	1	ea. over 12 in.	60.00	90.00	36.00	50.00

Storm Sewer and Pumping Plant for City Subdivisions

California—Sacramento County—City. A. Teichert & Son, Inc., Sacramento, with a bid of $244,156, was low before the Sacramento City Council for constructing a storm sewer for Tallac Village and Fruitridge Manor subdivisions. Unit bids were as follows:

(1) A. Teichert & Son, Inc. $244,156
(2) P. & J. Artukovich 273,721
(3) Artukovich Bros., Inc. 247,013

		(1)	(2)	(3)
1,700	lin. ft. 6-in. V.C. pipe sewer to construct	2.00	3.00	1.60
3,330	lin. ft. 8-in. V.C. pipe sewer to construct	2.00	3.50	2.00
3,567	lin. ft. 10-in. V.C. pipe sewer to construct	2.55	4.00	2.25
1,585	lin. ft. 12-in. V.C. pipe sewer to construct	3.05	6.00	2.50
1,422	lin. ft. 15-in. V.C. pipe sewer to construct	4.25	7.00	4.00
617	lin. ft. 18-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 standard strength)	5.30	6.25	6.00
1,098	lin. ft. 21-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 standard strength)	6.15	8.00	7.50
734	lin. ft. 24-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 extra strength)	8.00	9.00	9.25
803	lin. ft. 27-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 extra strength)	9.35	11.00	11.50
719	lin. ft. 30-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 extra strength)	10.75	13.00	14.50
1,662	lin. ft. 39-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 extra strength)	15.80	20.00	16.50
2,161	lin. ft. 42-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 extra strength)	19.50	22.00	18.30
1,511	lin. ft. 54-in. reinf. conc. pipe sewer (A.S.T.M. C76-41 extra strength)	22.90	24.00	24.10
34	only P.C. conc. manhole (standard cut No. 3) to construct	135.00	250.00	150.00
24	only P.C. conc. manhole (Type A) to construct	250.00	350.00	225.00
1	only P.C. conc. manhole (Type B) to construct	900.00	750.00	400.00
61	only cast-iron gutter drain Cut No. 11, to install	25.00	50.00	30.00
43,724	sq. ft. pavement (4-in. crusher run base, 2-in. plant mix) to construct	.20	.22	.20
375	ton asphaltic conc. pavement, seal coat and screening to construct	8.00	8.50	6.50
1,150	lin. ft. curb and gutter Cut No. 13, to construct	1.50	2.25	1.00
20	lin. ft. 24-in. diam. 14 gauge, corru. metal pipe (galvanized) in place	30.00	50.00	20.00
1,430	lin. ft. P.C. conc. curb and gutter to remove	.50	.50	.30
190	lin. ft. P.C. ditch with 2-in. thick conc. lining, to remove	1.00	1.00	.50
Lump sum,	pumping plant complete with house, pumps sump, force main and all mechanical and electrical equipment	$52,000	$38,868	$52,000

Dam . . .

Earthfill Tiber Dam and Dike

Montana—Liberty County — Bureau of Reclamation. Western Contracting Corp. and Massman Construction Co., Sioux City, Ia., with a bid of $11,564,347, were low before the Bureau of Reclamation for construction of Tiber Dam and dike.

Principal features are an earth-fill dam across the Marias River; an earth-fill dike across a low saddle in the crest of the divide between the Marias River and Pondera Coulee; a concrete spillway in the right abutment of the dam; a river-outlet works consisting of trashrack structure, tunnel, gate chamber, and valve house; and a canal-outlet works consisting of a concrete conduit, gate structure, and length of concrete lined tunnel.

Dam will be approximately 4,300 ft. long at the crest and will have a maximum height of about 205 ft. above lowest foundation. The dike will be approximately 17,000 ft. long with a maximum height of 60 ft.

Central or impervious portion of the dam and dike will consist of a moistened and rolled earthfill embankment of selected clay, sand, and gravel; semi-pervious portions will be placed outside the impervious central portion of the dam; and portions of pervious material will be placed outside the semi-pervious portions and compacted by crawler-type tractor. In the dike the semipervious portions will be omitted and the pervious material compacted by crawler-type tractor will be placed directly against the impervious core. The upstream slope of the dam above the berm at elevation 2,960 will be protected by a 3-ft. layer of rock riprap and the upstream slope of the dike will be protected by a 3-ft. layer of rock riprap.

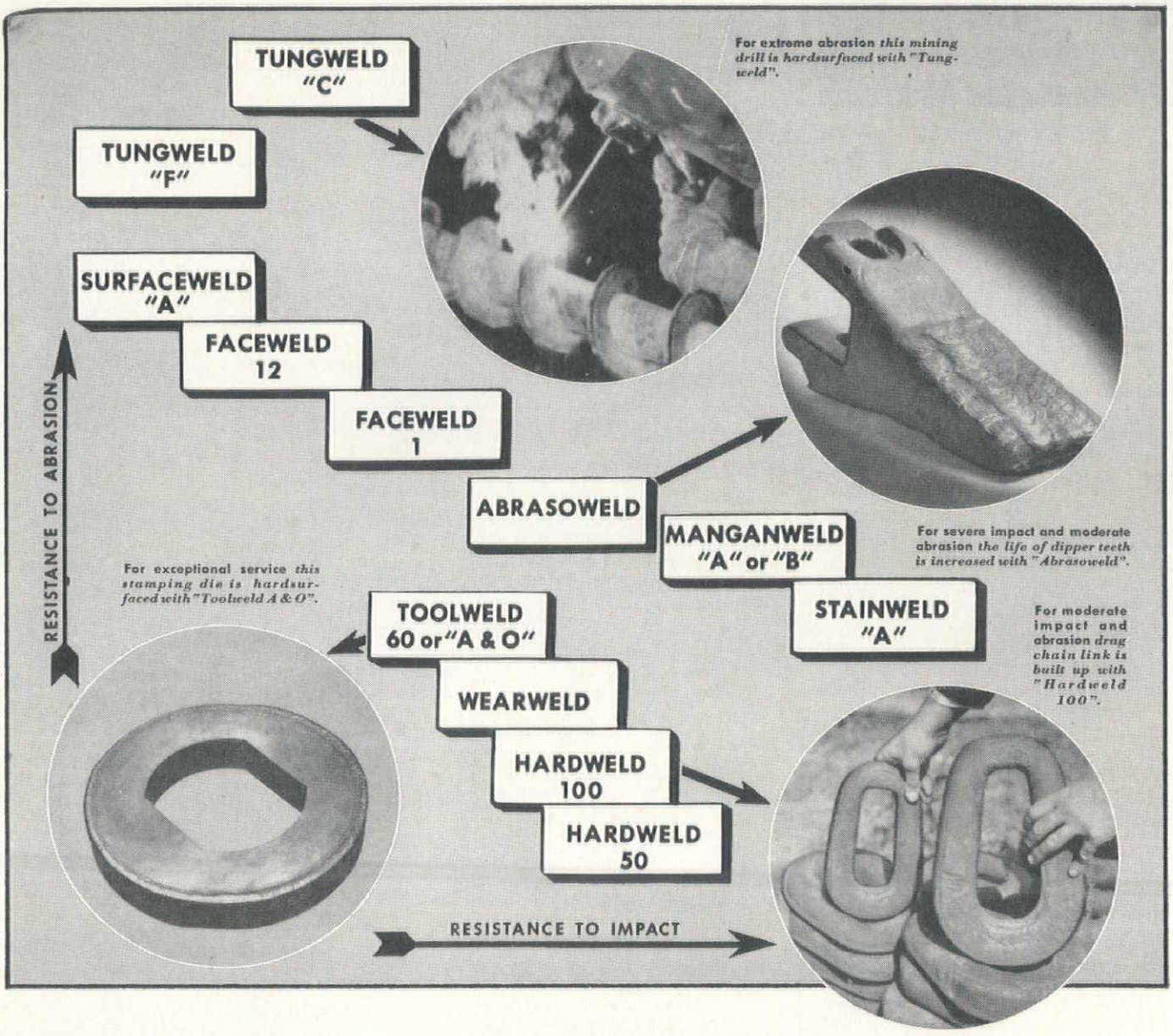
The spillway at the right abutment of the dam will be a concrete lined open channel spillway with a concrete gate structure for 3 radial gates. The river-outlet works will consist of a trashrack structure with a vertical intake 7 ft. in diameter at the top of which the trashracks will be installed; a concrete lined, 1,700-ft. long outlet tunnel 14 ft. in diameter, a part of which includes the concrete lined gate chamber; and a valve house located at the downstream portal of the tunnel. A 5-ft. by 5-ft. high-pressure hydraulically operated slide gate will be installed in the gate chamber.

Unit bids were submitted as follows:

(1) Western Contracting Corp. & Massman Construction Co. $11,564,347
(2) C. F. Lytle Co., Amis Construction Co., & San Ore Construction Co. 11,693,560
(3) Utah Construction Co. $11,698,650
(4) Grafe-Callahan Construction Co. 11,888,355
(5) Guy F. Atkinson Co. 12,387,076
(6) Engineer's estimate 11,504,562

Lump sum,	diversion and care of river during const. and unwatering foundations	75,000	50,000	178,500	166,500	133,000	150,000
1,000,000	cu. yd. excav., unclass., in open cut for spillway and river outlet	.70	.34	.53	.50	.50	.38
180,000	cu. yd. excav., unclass., in open cut for canal outlet	.70	.46	1.00	.97	.50	.56
20,000	cu. yd. excav., unclass., in tunnels	22.00	20.00	21.00	19.00	20.00	18.00
970,000	lb. furn. and placing perm. structural-steel tunnel supports, steel tunnel-liner plates, and steel lagging	.22	.21	.195	.32	.15	.17
417,500	cu. yd. excav., unclass., for dam foundation, first 417,500 cubic yards	.60	.70	.48	.51	.90	.50

Continued on page 124



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NEWS of MANUFACTURERS

Continued from page 122

Concurrently with this announcement, WALTHER MATHESIUS, president of *Geneva Steel Co.*, another U. S. Steel subsidiary, announced the installation of new facilities at its Geneva, Utah, plant, for the production of an additional 100,000 net tons of hot rolled steel sheets annually. When these two programs are completed, Columbia Steel and Geneva Steel will be in a better position to help meet the growing steel needs of the West, as they will then have a combined annual capacity for the production of approximately 640,000 tons of sheet and tinplate products, as well as a large capacity for the production of other steel products in demand on the Pacific Coast.

☆ ☆ ☆

Baldwin Locomotive Works, Eddystone, Pa., has been awarded the contract for one hydraulic turbine, the first to be installed in the Big Cliff Dam power plant, a U. S. Army Engineers project on the North Santiam River in Oregon. The Big Cliff Dam plant is located immediately below Detroit Dam for which Baldwin is also supplying the hydraulic turbines.

☆ ☆ ☆

Announcement that the Government would reopen additional plants for the manufacture of American rubber brought the following comment from JOHN L. COLLYER, president of *The B. F. Goodrich Co.* of Akron, Ohio. "American rubber stands today as a comforting assurance that it can supply military requirements and preserve our industrial and transportation systems, all of which is indispensable to our national security." When in full operation the additional Goodrich facilities, combined with those now operating, will produce general purpose rubber at a rate of 600,000 tons a year.

☆ ☆ ☆

Announcement of the election of GORDON TONGUE to succeed C. T. W. HOLLISTER as president of the *Northwestern Portland Cement Co.*, Seattle, Wash., was recently made by JAMES D. BURNS, chairman of the board of directors. Tongue, widely known in the cement industry in the Pacific Northwest, became vice president and general manager of the company about a year ago. He was also elected to fill a vacancy on the board as a result of the death recently of MAJOR HARRY K. METCALF, who had been a director since January, 1932.

☆ ☆ ☆

Construction work is commencing on a new building for *International Harvester Co.*, which will house a service parts depot and a machine transfer in Broadview, a suburb of Chicago. The building, which will cost approximately $5,000,000, has been approved by MERCER LEE, vice president in charge of supply and inventory. J. R. ALLAN, manager of Harvester's in-

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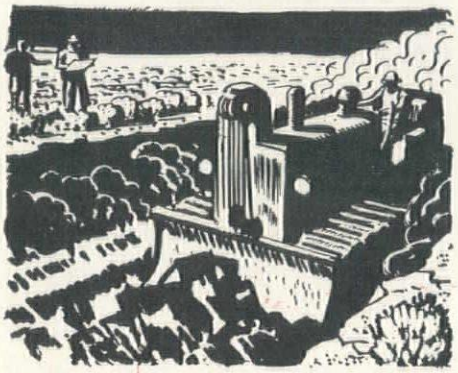
417,500 cu. yd. excav., unclass., for dam foundation, over 417,500 cubic yards	.60	.23	.38	.20	.40	.46
250,000 cu. yd. excav., unclass., for foundation of dike	.30	.20	.22	.47	.25	.25
1,250,000 cu. yd. excav., stripping borrow areas	.30	.24	.23	.20	.15	.20
875,000 cu. yd. excav. in borrow area "E" and transptn. to dam embank., first 875,000 cu. yd.	.40	.35	.30	.44	.48	.28
875,000 cu. yd. excav. in borrow area "E" and transptn. to dam embank., over 875,000 cu. yd.	.40	.25	.24	.25	.18	.26
1,390,000 cu. yd. excav., in borrow area "H" and transptn. to dam embank.	.40	.36	.30	.25	.20	.30
3,675,000 cu. yd. excav. in borrow area "M" and transptn. to dam and dike embank. and blanket under disposal area "A," first 3,675,000 cu. yd.	.40	.54	.46	.46	.56	.55
3,675,000 cu. yd. excav. in borrow area "M" and transptn. to dam and dike embank. and blanket under disposal area "A," over 3,675,000 cu. yd.	.35	.39	.38	.36	.24	.51
800,000 cu. yd. excav. in borrow area "N" and transptn. to dike embank., first 800,000 cu. yd.	.30	.30	.24	.31	.53	.22
800,000 cu. yd. excav. in borrow area "N" and transptn. to dike embankment, over 800,000 cu. yd.	.25	.20	.20	.20	.20	.18
11,000 gal. covering shale surfaces with sprayed protective coating	2.00	.80	1.10	.70	.55	1.00
2,060,000 cu. yd. earthfill in dam embank., Zone 1 and 2, first 2,060,000 cu. yd.	.12	.185	.16	.17	.24	.11
2,060,000 cu. yd. earthfill in dam embank., Zone 1 and 2, over 2,060,000 cu. yd.	.10	.135	.12	.13	.17	.10
25,000 cu. yd. special compaction of earthfill in embank.	3.00	4.40	5.00	6.15	3.50	2.50
700,000 cu. yd. earthfill in dike embank., Zone 1, first 700,000 cu. yd.	.12	.215	.16	.17	.24	.11
700,000 cu. yd. earthfill in dike embank., Zone 1, over 700,000 cu. yd.	.12	.155	.12	.13	.11	.10
2,650,000 cu. yd. sand, gravel, and cobble fill in dam emb., Zone 3, first 2,650,000 cu. yd.	.08	.11	.09	.09	.22	.09
2,650,000 cu. yd. sand, gravel, and cobble fill in dam emb., Zone 3, over 2,650,000 cu. yd.	.06	.08	.07	.04	.09	.07
500,000 cu. yd. sand, gravel, and cobble fill in dike emb., Zone 3	.08	.15	.085	.06	.15	.08
2,700 cu. yd. placing and sluicing sand, gravel, and cobble fill around canal-outlet structs.	.30	.80	4.70	.62	.35	4.00
47,000 cu. yd. backfill	.40	.22	.50	.22	.20	.70
14,000 cu. yd. dumped riprap	6.00	6.35	7.15	8.10	6.75	7.50
170,000 cu. yd. riprap on upstream slopes of dam and dike embank.	6.00	6.35	6.50	8.05	7.00	7.00
4,500 cu. yd. placing graded sand and gravel base layer for filter under spillway floor	.60	1.05	5.40	1.14	2.00	2.75
4,500 cu. yd. placing graded gravel top layer for filter under spillway floor	3.00	2.95	3.90	3.40	2.50	3.00
220 cu. yd. continuous gravel drains back of spillway walls	3.00	6.00	12.00	10.00	6.00	8.00
8,200 lin. ft. furn. 8-in. diam. sewer pipe and const. embank. drains with uncem. joints	2.30	2.05	2.00	1.55	1.70	2.50
4,200 lin. ft. furn. 12-in. diam. sewer pipe and const. embank. drains with uncem. joints	3.00	3.10	3.50	2.10	2.00	3.75
3,600 lin. ft. furn. 4-in. diam. sewer pipe and const. spillway drains with uncem. joints	.80	2.10	1.30	1.35	1.50	1.50
900 lin. ft. furn. 6-in. diam. sewer pipe and const. spillway drains with uncem. joints	1.00	2.40	1.70	1.65	1.60	2.00
5,700 lin. ft. furn. 8-in. diam. sewer pipe and const. spillway drains with uncem. joints	1.20	3.25	2.30	2 40	1.65	2.50
400 lin. ft. furn. 12-in. diam. sewer pipe and const. spillway drains with uncem. joints	2.00	4.30	3.60	3.80	2.50	3.75
500 lin. ft. furn. and laying 4-in. diam. sewer pipe with cemented joints for spillway	1.00	2.15	1.70	1.65	1.60	1.50
130 lin. ft. furn. and laying 12-in. diam. sewer pipe with cemented joints for spillway	3.00	4.20	4.40	4.00	2.50	3.50
170 lin. ft. drilling weep holes	1.00	1.80	3.00	4.10	2.50	4.00
5,800 lin. ft. drilling grout holes in stage betw. depth of 0 foot and 20 feet	1.00	2.64	1.90	2 60	4.25	2.50
1,650 lb. furn. and placing std. black pipe and fittings for grouting	.70	42	.70	.41	.60	.50
1,800 lb. furn. and installing std. zinc-coated pipe and fittings, and special grout outlets	.80	.60	.90	.70	1.80	.80
5,800 cu. ft. pressure grouting	1.50	2.64	2.20	2.50	3.00	2.00
6,800 cu. yd. concrete in lining of tunnels	33.00	42.00	34.00	36.00	50.00	30.00
425 cu. yd. conc. in river-outlet trashrack struct. and upstream retaining walls	50.00	56.00	43.30	45.00	65.00	55.00
255 cu. yd. conc. in river-outlet valve house and downstream retaining walls	50.00	56.00	57.60	43.00	55.00	60.00
365 cu. yd. conc. in river outlet, second stage	70.00	58.00	33.60	44.50	80.00	40.00
17,000 cu. yd. conc. in spillway floors	18.00	13.00	21.60	17.00	20.00	20.00
13,000 cu. yd. conc. in spillway walls	28.00	33.00	46.40	40.00	40.00	35.00
2,450 cu. yd. conc. in spillway crest struct. below elevation 2980.0	20.00	16.50	18.20	17.00	22.00	25.00
1,150 cu. yd. conc. in hghwy. bridge, operating bridge, curtain walls, and center piers above elevation 2980.0	55.00	52.00	42.20	53.50	55.00	50.00
90 cu. yd. concrete in gutters	20.00	28.00	45.30	51.50	48.00	50.00
65 cu. yd. conc. in spillway battery house and piezometer terminal wells	80.00	135.00	135.00	133.00	135.00	80.00
1,150 cu. yd. conc. in canal-outlet upstream from gate structure	25.00	50.00	36.30	37.00	35.00	40.00
630 cu. yd. conc. in canal-outlet gate struct. below elevation 2989.0	35.00	56.00	37.70	43.00	52.00	35.00
210 cu. yd. conc. in canal-outlet gate struct. above elevation 2989.0	40.00	56.00	68 70	61.00	70.00	50.00
6,000,000 lb. furn. and placing reinf. bars	.15	.116	.12	.135	.12	.08
2,750 lin. ft. furn. and placing type "M2" metal seals	2.00	2.00	1.70	2.05	2.75	2.00
3,600 lin. ft. furn. and placing type "N1" metal seals	1.75	2.16	1.30	1.56	2.75	1.75
550 lin. ft. placing rubber water stops	.70	1.80	1.60	2.10	1.60	2.00
250 sq. ft. furn. and placing resilient-type joint filler	1.70	1.80	2.90	1.80	1.15	2.00
289,000 lb. installing radial gates	.07	.05	.11	.075	.07	.06
93,000 lb. installing radial-gates and slide-gate hoists	.13	.08	.10	.075	.06	.08
25,000 lb. installing stop-log guide keys	.08	.15	.10	.15	.09	.15
4,600 lb. installing ice prevention air system	.20	.34	.55	.35	.55	.25
21,600 lb. installing slide gates	.08	.06	.08	.15	.09	.15
3,600 lb. installing hydraulically operated gate valve	.10	.18	.33	.12	.25	.15
79,000 lb. installing high-pressure gate and metal conduit liners	.08	.09	.09	.06	.09	.12
12,000 lb. installing control-apparatus for high-pressure gate and for hydraulically oper. gate valve	.20	.19	.29	.40	.28	.40
80,000 lb. installing outlet pipe	.25	.06	.14	.09	.09	.08
2,500 lb. installing butterfly valve	.10	.18	.29	.12	.09	.20
16,000 lb. installing trashracks	.06	.09	.07	.10	.07	.10
3,000 lb. installing reservoir level gage pipe and copper tubing	.15	.21	.35	.35	.55	.40

Continued on page 126

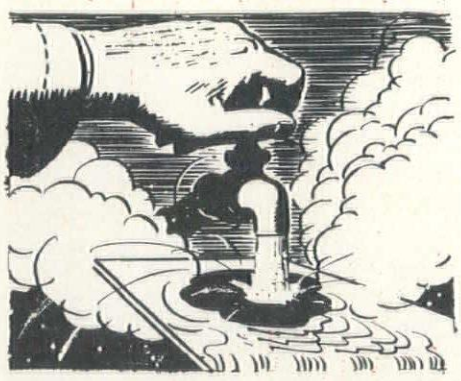
How to reduce your grease inventory and get better lubrication

UNOBA



1. Contractors throughout the West are proving that you can actually concentrate your grease inventory to *one* single product—and get *better* over-all lubrication performance than ever before! The answer is UNOBA, Union Oil Company's great multi-purpose lubricant that resists *both* heat and water.

2. For example, UNOBA not only reduced material and inventory costs for one California contractor* but eliminated a lot of serious bearing trouble in track rollers on D8 cats. And this equipment operated in temperatures up to 130 degrees F., under such severe dirt conditions that drivers could *not* see the instruments. **Name available upon request*



3. Just what is UNOBA? It's a *barium* base grease that assures proper lubrication under the most *severe* conditions. It sticks to metal surfaces with a tenacity that boiling water can't break! And it gives thorough protection at temperatures from below freezing to over 300 degrees F.

4. Because of this flexibility, multi-purpose UNOBA *simplifies* lubrication. It performs on jobs formerly requiring *many* different types and brands of grease. And this results in reduced inventories, smaller storage space, less chance of using the wrong lubricant, and *lower* maintenance costs.

Let your Union Oil Representative tell you the complete UNOBA story, or write Sales Dept., Union Oil Company, Los Angeles 17, Cal.

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NEWS of MANUFACTURERS

Continued from page 124

dustrial engineering and construction department, said that completion of the building project would depend upon availability of materials in the months immediately ahead, but it is hoped the work will be completed the latter part of next year.

☆ ☆ ☆

J. D. FLETCHER, a vice president of *Caterpillar Tractor Co.*, resigned that post on June 30. He has been in charge of the New York office of Caterpillar and will continue to serve the company as a consultant, realizing a long-held ambition to return to California. He will be located at the company's San Leandro plant.

☆ ☆ ☆

LAWRENCE F. BLACK of Cleveland, Ohio, has been appointed general superintendent of the Geneva Plant, *Geneva Steel Co.*, U. S. Steel subsidiary, LOREN J. WESTHAVER, vice president and manager of operations at Geneva, Utah, recently announced. Black was formerly assistant chief engineer of the American Steel & Wire Co., another U. S. Steel subsidiary.

☆ ☆ ☆

EARL MENDENHALL, president of *Sterling Electric Motors, Inc.*, recently announced in Los Angeles the appointment of ALAN J. BRONOLD as sales manager for the company. He will take over the duties of ALLEN ADAMS, who for a number of years has been head of Sterling's international and domestic sales organization, but due to illness is stepping down from active sales management, though continuing as an officer and secretary-treasurer of the company. In his new capacity as sales manager, Bronold will be responsible for the development and expansion of sales for Sterling Speed-Trol, and Slo-Speed electric power drives, and Sterling Klosd and Klosd-Tite constant speed motors.

☆ ☆ ☆

Formation of the *Guardian Valve Co.* has been completed at Redwood City, Calif., to market a newly patented type of valve which closes off gas lines in instances of severe earthquakes and major explosions. It is understood that the company will manufacture a complete range of units for installation in every type of structure from residence to largest buildings. Principals in the new organization are OLIVER J. HOBSON, for many years in the San Mateo County Engineers' Office, who is credited with having designed the new type safety unit, and FRED A. SCHMITZ, head of Brand Plumbing Co., one of the largest plumbing organizations on the San Francisco peninsula.

☆ ☆ ☆

JOHN J. O'FARRELL has been named management engineer in charge of methods engineering, inventory control and I.B.M. departments, according to an announcement by EUGENE CALDWELL, vice president and general manager of the *Hyster Com-*

Continued on next page

18,000	lb. installing ventilating system	.15	.12	.35	.35	.16	.25
4,600	lb. installing metal pipe, fittings, and valves	.25	.21	.46	.47	.30	.30
6,500	lb. installing pipe handrailing	.15	.21	.40	.29	.11	.20
600	lin. ft. installing wire fence	.50	1.50	1.15	.50	.28	1.00
9,300	lb. installing miscl. metalwork	.10	.22	.23	.42	.27	.25
85	sq. ft. furn. and installing metal doors	7.00	5.60	5.20	9.50	10.00	10.00
40	sq. ft. furn. and installing metal-sash windows	6.00	5.00	5.80	6.60	6.00	5.00
25	sq. ft. furn. and installing metal louvers	10.00	5.00	6.30	8.50	5.00	6.00
360	sq. ft. furn. and placing roofing	.80	.55	1.15	1.10	.80	.80
2,050	lin. ft. furn. and installing elect. metal conduit 1-in. or less in diam.	1.60	1.30	1.00	1.50	1.50	1.50
990	lin. ft. furn. and installing elect. metal conduit 1¼ and 1½ inches in diam.	2.00	1.50	1.30	1.90	2.10	2.00
160	lin. ft. installing elect. metal conduit 2 and 2½ inches in diam.	2.30	1.20	1.45	1.55	3.00	1.75
225	lb. furn. and installing ground wire	1.00	2.40	.75	2.10	1.24	2.00
1,590	lb. installing electrical conductors	1.00	2.00	.85	1.10	.95	1.00
2,825	lb. installing electrical apparatus	1.00	1.60	.60	.70	.66	.80
Lump sum,	installing spillway storage battery	900.00	756.00	865.00	713.00	200.00	500.00
30	lin. ft. drilling 4-in. min. diam. holes for settlement apparatus	16.00	3.60	14.00	8.50	9.50	5.00
375	lin. ft. drilling 1½-in. min. diam. holes for piezometer apparatus	1.50	3.20	3.60	3.40	4.50	3.00
4,500	lb. installing settlement apparatus in dam	1.50	.32	.40	.78	.60	.70
1,400	cu. yd. trenches for test apparatus	4.50	8.40	10.00	9.50	11.00	6.00
78,500	lin. ft. installing piezometer tubing in dam emb.	.08	.12	.15	.08	.23	.12
Lump sum,	installing test apparatus in terminal wells for dam	$1,000	$1,800	$1,500	$2,200	$2,500	$1,000
135	points installing surf. settlement points on dam embankment	65.00	6.00	15.00	13.00	35.00	10.00
14	structs. constr. type-HS struct. with 50-ft. poles	420.00	350.00	470.00	445.00	270.00	250.00
28	structs. constr. type-HS struct. with 55-ft. poles	460.00	360.00	520.00	485.00	300.00	275.00
20	structs. constr. type-HS struct. with 60-ft. poles	500.00	420.00	540.00	519.00	320.00	302.00
12	structs. constr. type-HS struct. with 65-ft. poles	520.00	450.00	580.00	554.00	350.00	331.00
4	structs. constr. type-HS struct. with 70-ft. poles	570.00	500.00	630.00	598.00	380.00	362.00
2	structs. constr. type-HS struct. with 75-ft. poles	630.00	500.00	690.00	658.00	420.00	395.00
1	struct. constr. type-3A struct. with 60-ft. max. pole length	590.00	550.00	640.00	613.00	470.00	387.00
1	struct. constr. type 3-A struct. with 65-ft. max. pole length	590.00	550.00	690.00	658.00	530.00	430.00
1	struct. constr. type-3A struct. with 70-ft. max. pole length	700.00	600.00	750.00	712.00	550.00	476.00
1	struct. constr. type-3AC struct. with 65-ft. max. pole length	780.00	600.00	850.00	806.00	610.00	525.00
1	struct. constr. type-3AC struct. with 70-ft. max. pole length	860.00	639.00	946.00	901.00	650.00	571.00
1	struct. constr. type-3AC struct. with 75-ft. max. pole length	920.00	695.00	$1,020	970.00	680.00	620.00
1	struct. constr. type-3AT struct. with 55-ft. max. pole length	500.00	450.00	557.00	529.00	550.00	387.00
1	struct. constr. type-3AT struct. with 60-ft. max. pole length	550.00	430.00	600.00	574.00	600.00	427.00
1	struct. constr. type-3AT struct. with 65-ft. max. pole length	590.00	500.00	650.00	619.00	670.00	470.00
1	struct. constr. type-3AT struct. with 70-ft. max. pole length	650.00	550.00	716.00	683.00	720.00	516.00
1	struct. constr. type-3T struct. with 50-ft. max. pole length	580.00	405.00	635.00	604.00	520.00	435.00
1	struct. constr. type-3T struct. with 55-ft. max. pole length	640.00	450.00	706.00	673.00	580.00	472.00
1	struct. constr. type-3T struct. with 60-ft. max. pole length	700.00	520.00	755.00	718.00	620.00	512.00
1	struct. constr. type-3T struct. with 65-ft. max. pole length	750.00	650.00	820.00	782.00	690.00	555.00
1	struct. constr. type-3T struct. with 70-ft. max. pole length	800.00	650.00	895.00	851.00	720.00	601.00
1	struct. constr. type-3T struct. with 75-ft. max. pole length	900.00	700.00	993.00	945.00	780.00	650.00
1	struct. constr. type-4SWT struct. with two 50-ft. poles, and two 70-ft. poles for overhead grnd. wire; and complete with 3-pole disconnecting switch	$2,000	$2,000	$2,210	$2,109	$6,000	$4,400
5	X-braces assembling and attaching X-braces	55.00	48.00	57.00	55.00	45.00	40.00
10	guys constructing single guy	30.00	30.00	34.00	32.00	21.00	25.00
50	guys constructing double guy	48.00	50.00	52.00	50.00	32.00	30.00
1	guy constr. stub guy with 60-ft. pole	170.00	180.00	193.00	183.00	175.00	170.00
1	guy constr. stub guy with 65-ft. pole	200.00	200.00	220.00	208.00	205.00	190.00
55	anchors placing plate or cone anchor	33.00	30.00	34.00	33.00	18.40	20.00
5	anchors placing grouted anchor	40.00	35.00	45.00	42.00	42.00	25.00
5	protectors installing guy protector	8.00	8.00	8.00	8.00	8.40	7.00
609	assemblies assembling and attaching suspension-insulator assembly with 7 insulator units	10.50	15.00	11.50	11.00	34.00	28.00
6	assemblies assembling and attaching suspension-insulator assembly with 8 insulator units	11.00	15.00	12.50	12.00	42.50	32.00
18	assemblies assembling and attaching suspension-insulator assembly with 9 insulator units	11.00	15.00	12.50	12.00	47.50	36.00
54	assemblies assembling and attaching tension-insulator assembly with 9 insulator units	20.00	20.00	22.00	21.00	44.50	36.00
12	3-phase circuit miles string No. 4/0 AWG steel-reinforced aluminum conductor	$2,000	$2,500	$3,630	$3,465	$1,950	$1,800
54	dampers attaching vibration damper to aluminum conductor	10.00	7.00	11.50	11.00	9.50	8.00
3	weights attaching 50-lb. hold-down weight for suspension insulators	20.00	20.00	21.00	20.00	24.00	20.00
3	weights attaching 100-lb. hold-down weight for suspension insulators	35.00	35.00	38.00	36.00	33.00	30.00
12	mi. of line stringing two ⅜-in. galvanized-steel overhead ground wires	500.00	835.00	728.00	693.00	760.00	600.00
50	posts placing fence ground post and grouding fences	10.00	10.00	10.00	11.00	13.00	7.00
6	structs. constr. type-SS struct. with 35-ft. pole	43.00	60.00	47.00	44.00	116.00	95.00
27	structs. constr. type-SS struct. with 40-ft. pole	53.00	60.00	57.00	54.00	132.00	104.00
6	structs. constr. type-SS struct. with 45-ft. pole	63.00	70.00	70.00	66.00	147.00	114.00
4	structs. constr. type-SS struct. with 50-ft. pole	85.00	85.00	94.00	89.00	163.00	125.00
1	struct. constr. type-SD struct. with 35-ft. pole	60.00	65.00	67.00	64.00	147.00	110.00
1	struct. constr. type-SD struct. with 40-ft. pole	75.00	75.00	84.00	79.00	163.00	119.00
1	struct. constr. type-ST struct. with 40-ft. pole	90.00	90.00	99.00	94.00	190.00	150.00
1	struct. constr. type-ST struct. with 45-ft. pole	105.00	100.00	115.00	109.00	205.00	160.00
1	struct. constr. type-SA struct. with 50-ft. pole	57.00	80.00	63.00	59.00	147.00	130.00
1	struct. constr. type-SAT struct. with 45-ft. pole	75.00	90.00	84.00	79.00	158.00	150.00
2	structs. constr. type-SAT struct. with 50-ft. pole	90.00	90.00	99.00	94.00	174.00	161.00
10	guys constr. single guy	30.00	40.00	33.00	32.00	21.00	25.00
25	guys constr. double guy	48.00	45.00	52.00	50.00	32.00	30.00
35	anchors placing plate or cone anchor	33.00	30.00	35.00	33.00	8.00	20.00

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NEWS of MANUFACTURERS

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pany, Portland, Ore., manufacturers of auxiliary tractor tools and materials handling trucks. O'Farrell has been with Hyster for the past three years. His previous experience includes five years with the Kaiser Company in Vancouver, Wash., and sixteen years as a practicing civil and structural engineer in Oregon, Washington and Idaho. He is a member of the American Society of Civil Engineers. Assisting him in his new position, are SHERMAN D. BUCHER and LELAND R. VIAR.

Another recent Hyster appointment is that of KIRK LOWE to the position of pressed metals engineer in the manufacturing engineering department. A graduate of General Motors Institute of Industrial Engineering, he spent three years with Young Iron Works of Seattle and several years with Isaacson Iron Works, and the Boeing Airplane Co., also in Seattle.

Now in charge of sub-contracting for Hyster is ROBERT M. REMMEN, who has been with the company for the past thirteen years.

☆ ☆ ☆

Extensive sales plans for marketing *Galion Allsteel Body Co.'s* Fulcrumatic line of hydraulic dump truck hoists and bodies have been given new impetus with the appointment of V. K. GASTON as director of sales and R. H. STEVENS as sales manager. The appointments by the firm, a division of Central Ohio Steel Products, Galion, Ohio, were announced by C. H. HENKEL, president. Both men bring with them a wide background of experience in the automotive and truck equipment field. For 20 years Gaston has been the firm's Western regional sales manager. Stevens is well versed in every phase of Galion equipment design and manufacture and has made an intensive field study of both distributor's and owner's problems. Both men will make their headquarters at the firm's home offices in Galion.

☆ ☆ ☆

W. H. SCHNEIDER has been elected vice president-comptroller of *Mack Trucks, Inc.,* New York City, it was recently announced by E. D. BRANSOME, chairman and president of Mack. He was also elected a member of the board of directors. Schneider has been assistant comptroller of Mack since 1943. He succeeds J. E. SAVACOOL, who is retiring after 37 years' service with Mack.

☆ ☆ ☆

GENERAL DONALD ARMSTRONG, president of *United States Pipe & Foundry Co.* of Burlington, N. J., recently announced that the company has purchased a 70-acre plant site in Decoto, Alameda Co., Calif. A plant has been designed by the company's engineering department and the Austin Company will build it. This plant, which is scheduled for completion the last half of 1951, will be the first on the Pacific Coast

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NEWS of MANUFACTURERS

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to produce centrifugally cast iron pipe. It is being built to meet the ever increasing demand for cast iron pipe in the far Western States, and to give its many users the best possible product and service.

☆ ☆ ☆

The Eugene, Ore., branch of *Electric Steel Foundry* held open house recently calling attention to its new modern office located at 1464 West 6th St., Eugene. The structure, embracing 5,700 sq. ft. of floor space, is modern in every respect and enables ESCO's Eugene branch to maintain fully adequate stocks in the many lines of industrial, logging and mill supplies handled by the company. In addition to the ESCO lines of contractors equipment, logging rigging and sawmill parts, the branch represents *J. W. Minder Chain & Gear Co., Dodge Mfg. Co., American Chain & Cable Co., U. S. Electrical Motors, Union Roller Chain Co., Moline Malleable Iron Co., Armco Steel Corp., Carpenter Steel Co., Tri-Clover Machine Co.*, and *Ohio Gear Co.* The Eugene operation serves the area from Salem south to Dunsmuir, Calif., and the six-member staff is headed by L. F. MAXWELL.

☆ ☆ ☆

F. RAY FRIEDLEY has been elected a director and comptroller of *Geneva Steel Co.* and *Columbia Iron Mining Co.*, subsidiaries of United States Steel Corp., it was recently announced in Geneva, Utah, by DR. WALTER MATHESIUS, president. Friedley succeeds C. B. VERNOOY in these positions, and assumed his new duties on July 1. Vernooy now become assistant comptroller of U. S. Steel of New Jersey in New York City.

☆ ☆ ☆

Election of JOHN E. BARBER as treasurer of *Columbia Steel Co.*, San Francisco, a subsidiary of United States Steel Corp., has been announced by ALDEN G. ROACH, president. Barber will succeed E. H. DANIEL, who will retire September 1 after serving as Columbia Steel Co.'s treasurer for the past 21 years. Barber is currently a vice president of *Consolidated Western Steel Corp.*, a subsidiary of U. S. Steel, at Los Angeles.

☆ ☆ ☆

Universal Form Clamp Co. of Chicago recently purchased three acres in San Leandro's industrial area, across the Bay from San Francisco. Preliminary to the construction of a 200 x 100-ft. concrete building a little later on, a temporary corrugated steel building is being erected. The new plant will serve seven Western states. Universal Form Clamp Co. is one of the leading manufacturers of form clamping and tying device accessories used in reinforced concrete in the United States. Negotiations for the acquisition of the new building site were handled by B. R. HOERR, Pacific Coast manager of the company who will be in charge of the new plant.

90 insulators, furn. and install. crossarm insulator with pin	5.00	4.00	5.30	5.00	8.50	6.00
45 insulators furn. and install. pole-top insulator	5.00	4.00	5.30	5.00	13.00	6.00
47 insulators furn. and install. spool-type insulator and bracket	5.00	5.00	5.30	5.00	16.00	4.00
9 clevises installing insulated clevis	7.00	6.00	7.30	7.00	6.00	4.00
30 assemb. furn. and attaching single-unit tension insulator	9.00	12.00	9.30	9.00	9.50	6.00
2 4-wire circuit mi. of line, stringing No. 4A copperweld-copper conductor	$1,300	$1,587	$1,350	$1,287	$1,800	$1,800

Bridge and Grade Separation . . .

Concrete Bridges for County Road

California—Tulare County—County. L. C. Clark, Visalia, with a bid of $20,025, was awarded a contract by the County Road Commissioner for constructing Bridges Nos. 252, 273, and 285 in Tulare County. Unit bids were as follows:

(1) L. C. Clark $20,025
(2) Wheeler Construction Co. 22,696
(3) F. Fredenburg Construction Co. 22,900
(4) B. S. McElderry 24,085
(5) Dahs Construction Co. $24,690
(6) Anderson Co. 26,057
(7) Paul E. Woof 26,950

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
450 cu. yd. structure excavation	2.00	1.125	3.00	3.50	2.50	2.50	3.00
320 cu. yd. Class "A" Portland cement conc.	40.00	47.00	45.00	48.00	47.00	56.00	52.50
55,000 lb. furn. and placing bar reinf. steel	.09	.10	.10	.10	.12	.10	.12
275 lin. ft. steel railing	5.00	6.00	6.00	6.00	7.00	5.50	8.00

Two Treated Timber Pile Bridges

Montana—Phillips County—State. Walter Mackin & Son, Billings, with a bid of $21,011, was low before the State Highway Commission of Montana for constructing two treated timber pile bridges on the highway between Malta and Loring. Unit bids were as follows:

(1) Walter Mackin & Son $21,011
(2) L. V. Lockwood 22,430
(3) Schye & Sullivan $23,013
(4) Paul Lee 24,715

	(1)	(2)	(3)	(4)
64.91 m.b.m. treated timber	240.00	254.00	258.00	284.00
3.93 m.b.m. untreated timber	240.00	254.00	260.00	284.00
16 ea. 35.0-ft. tr. timber piles	65.00	75.00	80.00	75.00
29 ea. 40.0-ft. tr. timber piles	75.00	80 00	85.00	85.00
15 ea. 50.0-ft. tr. timber piles	85.00	95.00	100.00	100.00

Substructure for Reinforced Concrete and Steel Bridge

California—Sacramento County—State. Lord & Bishop, Sacramento, with a bid of $608,569, was low before the California Division of Highways for building the substructure for a bridge and constructing a portion of the north embankment on the American River near Elvas. Unit bids were as follows:

(1) Lord & Bishop $608,569
(2) Erickson Phillips & Weisberg 623,191
(3) Bates & Rogers Construction Co. 682,320
(4) C. B. Tuttle Co. $684,022
(5) Underground Construction Co. 697,290
(6) Granite Construction Co. 724,168

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, clearing and grubbing	$1,000	$6,732	$5,610	$6,000	600.00	$11,000
3,000 cu. yd. roadway, excav.	1.00	.70	.83	1.00	1.15	.50
4,650 cu. yd. struct. excav. (Type A)	12.50	3.00	15.55	13.00	15.00	17.00
5,830 cu. yd. struct. excav. (Type B)	2.00	2.00	4.50	3.00	2.00	3.00
132,000 cu. yd. imported borrow (Type A)	.50	.35	.49	.60	.45	.35
23,000 cu. yd. imported borrow (Type B)	.50	.45	.49	.60	.45	.30
Lump sum, dev. water supply and furn. water equip.	$2,500	$4,000	$1,860	$2,000	$1,000	$3,000
3,200 M. gal. applying water	1.50	2.00	1.45	1.50	1.30	1.00
30 ton liquid asph., SC-2 (pen. tr.)	25.00	27.00	26.00	30.00	25.00	20.00
1,480 cu. yd. Class "A" P.C.C. (footing block)	25.00	23.00	21.60	40.00	29.00	20.00
4,800 cu. yd. Class "A" P.C.C. (struct.)	38.00	40.00	46.70	40.00	47.00	51.00
15,700 lb. structural steel	.30	.25	.31	.20	.20	.29
48,525 lin. ft. furn. steel piling	2.50	2.70	2.45	2.50	3.00	2.60
1,280 ea. driving piles	24.00	60.00	28.00	32.00	35.00	55.00
128 ea. steel pile splices	12.00	15.00	24.10	15.00	20.00	15.00
720 cu. yd. sacked conc. riprap	30.00	35.00	29.35	30.00	30.00	30.00
150 lin. ft. 8-in. C.M.P. down drain (16 ga.)	1.65	1.50	1.65	2.00	1.70	2.00
4 ea. spillway assemblies	32.00	28.00	39.50	50.00	35.00	30.00
4 ea. slip joints for down drains	15.00	10.00	27.10	10.00	15.00	15.00
619,000 lb. bar reinforcing steel	.08	.09	.084	.09	.08	.09

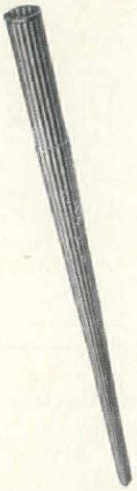
Concrete Bridge and Untreated Timber Piling

Washington—King County—State. State Construction Co., Seattle, with a bid of $352,942, was awarded the contract for building the Duvall Bridge of reinforced concrete and surfacing .2 mi. on the King County road. Unit bids were as follows:

(1) State Construction Co. $352,942
(2) S. S. Mullen, Inc. 361,284
(3) Anderson Bridge Construction Co. 363,805
(4) Manson Construction & Engineering Co. $398,513
(5) M. P. Butler 398,974
(6) Guy F. Atkinson Co. 454,550

	(1)	(2)	(3)	(4)	(5)	(6)
1,136 cu. yd. common excav. including haul	.75	1.00	1.00	1.00	1.00	1.00
345 cu. yd. common borrow including haul	.80	1.00	1.00	1.50	2.00	2.00
8 cu. yd. structure excavation	3.00	4.00	5.00	10.00	3.00	2.50
180 cu. yd. selected roadway borrow in place	1.55	2.00	2.00	1.00	3.00	3.00
60 cu. yd. furn. and place. cr. stone surf. top course	4.00	4.75	4.50	4.00	5.00	5.00
125 cu. yd. furn. and place. cr. stone surf. base course	4.00	4.75	4.50	4.00	5.00	5.00
1 only catch basin in place	100.00	200.00	100.00	300.00	200.00	300.00
31 lin. ft. std. bm. guard rail in place	2.50	4.75	4.00	5 00	4.00	3.00
363 lin. ft. remov. and resetting exist. beam guard rail	2.50	1.50	2.00	2.00	2.00	2.00
85 cu. yd. removing and relaying exist. loose riprap	3.50	1.00	5.00	2.50	5.00	5.00
41 sq. yd. removing exist. concrete sidewalk	1.00	1.00	.50	1.50	1.00	2.00
51 lin. ft. plain conc. culv. pipe 12-in. diam. in place	2.00	1.50	2.00	5.00	2.00	3.00

Continued on page 130



How to cut your overhead —underground

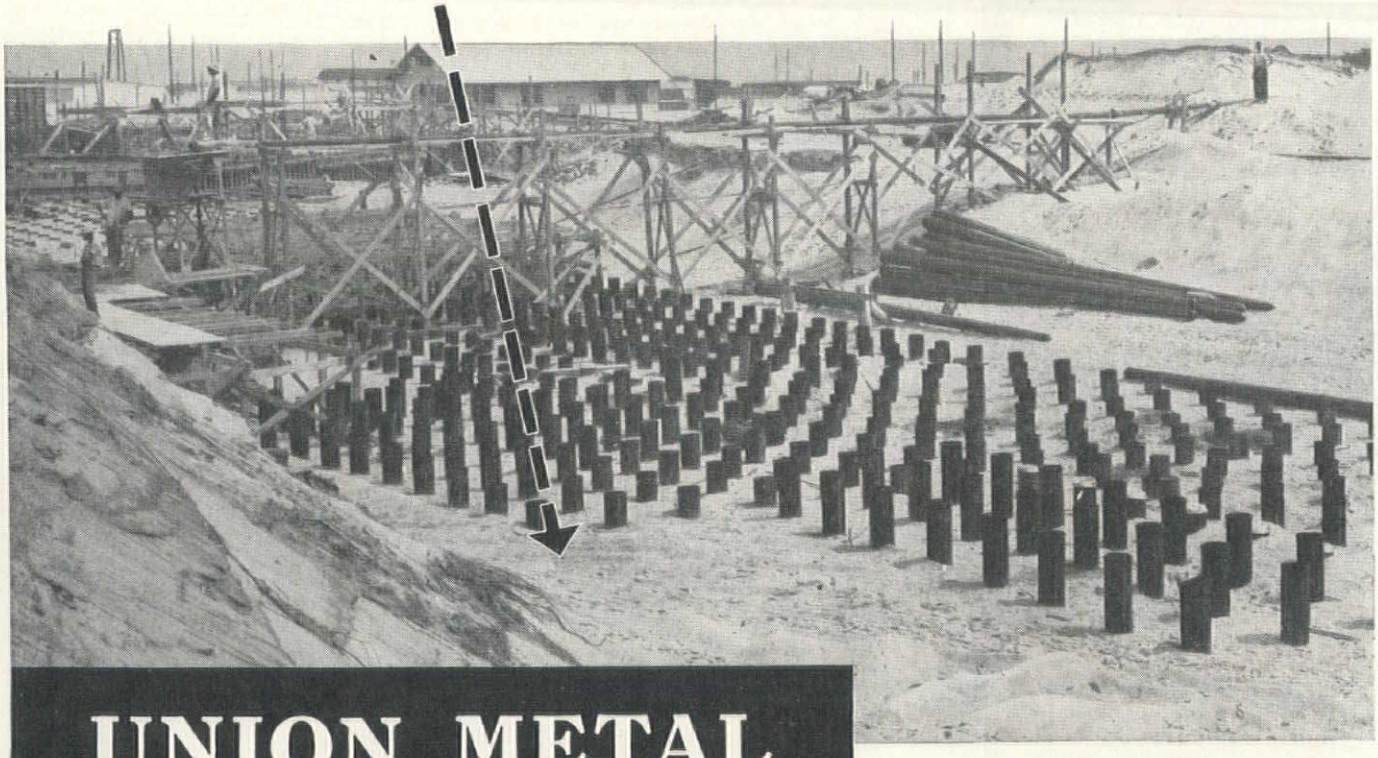
IF you think that there aren't ways of saving on foundation costs, you'll be surprised when you see what Monotube Steel Piles can do for you.

Monotubes are manufactured in 3 tapers; from a standard 8″ nose they taper uniformly to any of four standard diameters, all extendible for an indefinite length to satisfy conditions known or unforeseen. Gauge of metal may be varied for any section as needed—providing economical construction. These light, sturdy tubes result in structurally sound, lasting installations. Jobs started with Monotubes can be *completed* with them—avoiding delays, complications, and undue expense.

And Monotubes are adaptable to practically any type of structure. Their fluted, cold-rolled construction adds strength and stability to resist severe driving as well as uplift, lateral and torsional forces.

Moreover, Monotubes are light in weight which simplifies and speeds handling. They require no special driving equipment. Cut-offs can be made easily, with minimum waste. These and other advantages mean foundations will *cost less* per ton of load supported.

For complete information, write The Union Metal Manufacturing Company, Canton 5, Ohio.



UNION METAL

Monotube Foundation Piles

BRIDGE						
2,282 cu. yd. structure excavation	4.00	3.50	5.00	3.00	5.00	2.50
Lump sum, shoring and cribs in place	.....	.....	.....	.....	.....	.....
10 days mechanical tamper	40.00	40.00	40.00	50.00	40.00	60.00
7,827 lin. ft. furn. timber piling (untreated)	.40	.54	.50	.50	.60	.55
3,680 lin. ft. furn. precast concrete pile extensions	5.15	4.50	5.50	4.50	6.40	4.00
60 only driving timber piles (untreated) in place	48.00	48.00	30.00	30.00	20.00	40.00
152 only driving composite piles in place	46.00	48.00	50.00	35.00	30.00	80.00
2,818.7 cu. yd. concrete Class A in place	70.00	74.00	70.00	85.00	70.00	96.00
272.5 cu. yd. concrete Class D in place	40.00	28.00	40.00	25.00	70.00	30.00
573,551 lb. steel reinforcing bars in place	.09	.096	.095	.10	.10	.10
30,074 lb. structural carbon steel in place	.30	.26	.30	.30	.27	.30
2,945 lb. cast steel in place	.45	.51	.50	.60	.60	.70
2,302 lin. ft. steel hand railing in place	8.50	11.50	10.00	12.00	13.50	11.00
2 only reflector units in place	10.00	10.00	10.00	20.00	10.00	20.00

Highway and Street . . .

Grading and Asphaltic Concrete Paving

Oregon—Coos County—State. E. L. Gates & Co., Inc., Medford, with a bid of $379,324, was low before the Oregon State Highway Department for grading and paving 2.1 mi. between Chrome Plant and Cedar Point. Unit bids were as follows:

(1) E. L. Gates & Co., Inc. $379,324
(2) Roy L. Houck & Son 388,159
(3) Parker-Schram Co. 407,695
(4) McNutt Bros. 419,810
(5) Leonard & Slate Ore, Ltd. and E. C. Hall Co. $465,350
(6) Coos Bay Dredging Co. 493,460

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, clearing and grubbing	$14,000	$34,850	$21,750	$28,244	$21,000	$47,000
2,700 cu. yd. struct, excav., unclassified	3.00	2.50	3.50	3.00	3.00	3.50
150 cu. yd. trench excav., unclassified	2.00	2.00	2.00	2.00	2.00	3.50
330,000 cu. yd. general excav., unclassified	.44	.51	.49	.44	.68	.645
1,141,000 yd. sta. short overhaul	.01	.01	.01	.01	.02	.02
9,500 cu. yd. sta. long overhaul	.50	.50	.60	.40	.50	.60
2.10 mi. finishing roadbed and slopes	500.00	500.00	500.00	800.00	$1,000	900.00
8,800 lin. ft. rounding cutbanks	.15	.15	.20	.20	.20	.25
2,850 lin. ft. 8-in. perf. metal drain pipe, coated	2.10	1.80	2.00	2.20	2.00	2.65
150 lin. ft. 24-in. perf. corru. metal pipe	4.25	5.50	6.55	6.00	5.00	6.50
380 lin. ft. 84-in. corru. metal pipe, uncoated	43.50	45.00	44.00	53.00	40.00	35.00
150 lin. ft. extra for installing 24-in. perf. pipe	9.50	2.50	3.00	19.00	10.00	6.50
1,150 lin. ft. 18-in. concrete pipe	2.85	3.10	4.00	3.65	4.00	3.75
200 lin. ft. 24-in. concrete pipe	4.00	4.37	5.65	5.00	5.00	5.00
220 lin. ft. 24-in. conc. pipe extra strength	4.70	5.25	6.45	5.50	6.00	5.40
350 lin. ft. 30-in. concrete pipe	6.00	6.40	7.90	7.00	7.00	8.25
250 lin. ft. salvaging culvert pipe	1.00	2.00	2.00	3.00	3.00	2.00
640 cu. yd. ⅜-in. - 0-in. backfill in drains	5.00	3.50	6.00	8.00	5.00	4.25
1 only Type "A" manhole, open cover	150.00	200.00	200.00	375.00	200.00	175.00
200 lin. ft. metal guard rail	4.00	3.00	3.50	3.35	4.00	3.05
120 only concrete sight posts	13.00	10.00	11.75	9.00	10.00	12.00
12,400 cu. yd. 2½-in. - 0-in. material in base	3.75	2.75	3.45	4.90	3.25	3.75
4,100 cu. yd. ¾-in. - 0-in. material in base and shldrs.	4.00	2.75	4.70	4.90	4.00	4.10
1,460 cu. yd. salvaging surfacing materials	1.00	1.00	.75	1.50	1.00	1.25
1,000 M. gals. sprinkling	3.00	2.50	2.50	2.00	3.00	3.50
320 cu. yd. ¾-in. - 0-in. matl. in binder course	4.00	4.00	5.05	5.40	4.50	4.75
50 ton furn. and placing RC-3 asph. in binder crse.	50.00	40.00	45.00	55.00	50.00	50.00
9,850 ton Class "B" asph. conc.	8.30	7.00	8.35	8.10	7.50	8.00
30 ton emulsified asph. in seal coat	55.00	42.00	50.00	70.00	55.00	42.00
150 cu. yd. aggregate in seal coat	6.00	4.00	6.00	6.00	5.50	4.50

California—San Luis Obispo County—State—Grade and Surf.

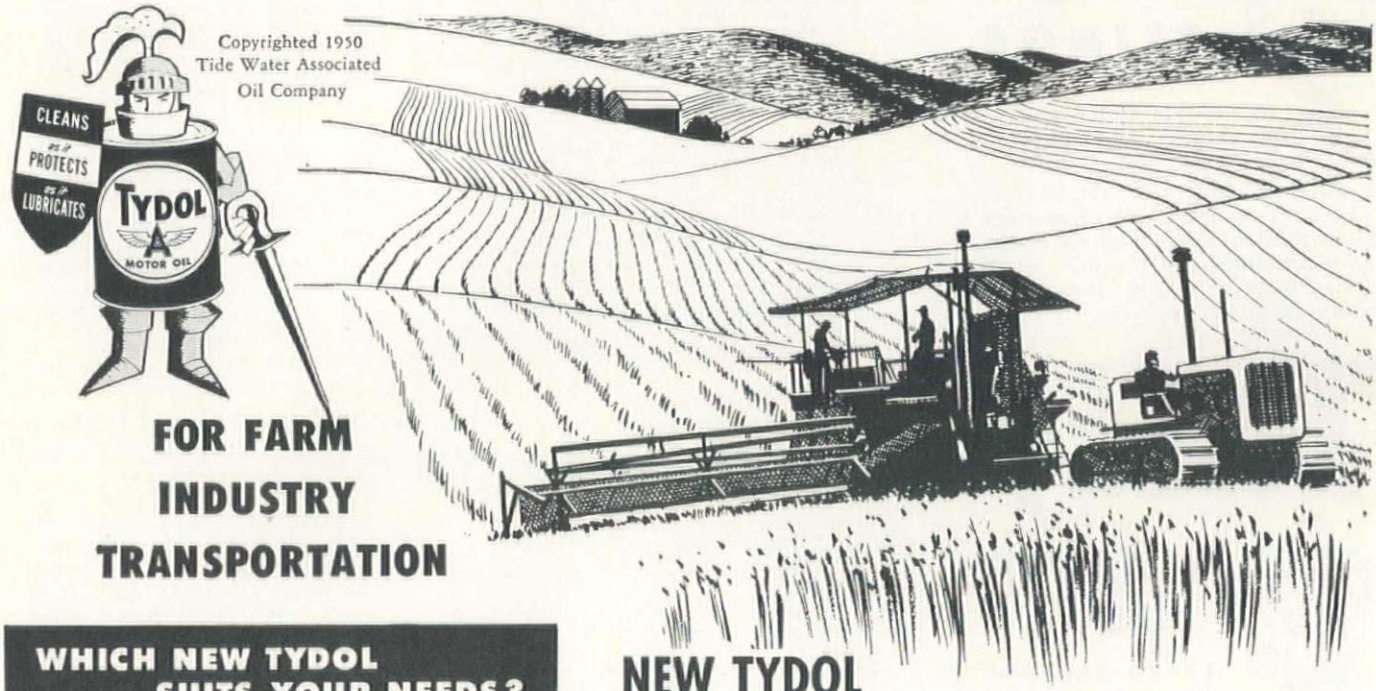
M. J. B. Construction Co., Stockton, Calif., with a bid of $649,296, was low before the California Division of Highways for construction of 4.1 mi. highway surfaced with plant-mixed material on imported base treated with cement. The work includes two reinforced concrete girder bridges, and is located between Atascadero and 1 mi. south of Templeton. Unit bids were as follows:

(1) M. J. B. Construction Co. $649,296
(2) Madonna Construction Co. 651,777
(3) Fredrickson & Watson Construction Co. 664,455
(4) Griffith Co. 675,000
(5) Fredrickson Bros. 698,702
(6) Granite Construction Co. 703,335
— Dimmitt & Taylor & T. M. Page 744,082
— Peter Kiewit Sons' Co. 711,331
— Guy F. Atkinson Co. 731,497
— Clyde W. Wood & Sons, Inc. $766,776
— Dan Caputo & Edward Keeble 768,927
— Eaton & Smith and Clements Co. 778,528
— N. M. Ball Sons 781,527
— Cox Bros. Construction Co. & J. E. Haddock, Ltd. 790,540
— A. Teichert & Son, Inc. 797,611
— Nomellini Construction Co. & George R. Patterson 848,486
— Fredricksen & Kasler 863,192

	(1)	(2)	(3)	(4)	(5)	(6)
340 cu. yd. removing concrete	4.00	2.50	2.00	4.50	2.25	2.45
110 lin. ft. removing conc. bridge railing	3.00	2.00	2.00	2.00	2.25	2.50
221 sta. clearing and grubbing	20.00	50.00	134.00	34.00	50.00	80.00
325,000 cu. yd. roadway excav.	.24	.27	.26	.31	.25	.28
3,900 cu. yd. struct. excav.	2.50	2.00	2.30	1.95	2.75	2.25
460 cu. yd. struct. excav. Type "A" (bridges)	10.00	4.00	10.50	6.00	18.50	5.00
1,150 cu. yd. struct. excav. Type "B" (bridges)	2.00	2.00	2.30	3.90	2.25	2.00
1,300 cu. yd. ditch and channel excav.	.80	1.25	.90	1.10	1.00	1.60
42,000 sq. yd. compacting orig. ground	.05	.03	.03	.935	.04	.04
7,000,000 sta. yd. overhaul	.003	.005	.003	.002	.003	.003
19,200 ton imp. borrow	1.25	1.10	1.17	1.15	1.29	1.15
133,000 ton imp. base material	.51	.55	.47	.56	.69	.60
40 ton lightweight base matl. (bridge)	10.00	4.00	7.00	12.50	8.00	18.50
Lump sum, dev. wat. supply and furn. wat. equip.	$5,000	$16,500	$7,200	$19,000	$8,000	$9,000
31,500 M gal. applying water	1.10	1.00	.40	1.05	1.25	1.00
218 sta. finishing roadway	20.00	15.00	17.00	9.00	16.00	10.00
145,000 sq. yd. mix. and compact. (cem. tr.)	.16	.12	.165	.23	.18	.13
10,500 bbl. Portland cem. (cem. tr.)	4.00	3.75	3.90	3.60	4.05	3.50
370 ton liq. asph., SC-2 (pr. ct.)	22.00	18.00	21.25	17.00	20.00	20.00
132 ton asphaltic emuls. (pt. bdr. and sl. ct.)	32.00	27.00	31.00	29.00	27.50	27.00
1,200 ton screenings (sl. ct.)	5.00	5.50	6.30	5.00	5.50	5.75
38,200 ton min. aggr. (P.M.S.)	2.85	2.63	3.00	2.60	2.80	3.30
2,100 ton paving asph. (P.M.S.)	16.00	15.00	17.60	16.00	17.50	16.00
24 ton liq. asph., SC-3 (P.M.S. stockpiled)	8.00	15.00	20.00	19.00	17.50	20.00
350 lin. ft. raised traffic bars	1.50	.80	1.15	1.00	1.00	1.00
34,000 sq. ft. placing P.M.S. (gutters and ditches)	.12	.10	.13	.10	.10	.10
3,000 lin. ft. placing P.M.S. dikes	.20	.10	.21	.30	.08	.15

Continued on page 132

THRIVES ON RUGGED DUTY!



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TIDE WATER ASSOCIATED OIL COMPANY

1,130 cu. yd. Cl. "A" P.C.C. (struct.)	46.00	48.00	49.00	49.00	54.00	54.00
410 cu. yd. Cl. "A" P.C.C. (footing blocks)	32.00	25.50	27.00	25.00	23.50	20.00
667 lin. ft. conc. railing	7.00	5.00	6.35	5.00	5.75	6.00
9,390 lin. ft. furn. Douglas fir piling	.67	.78	.68	.70	.65	.70
960 lin. ft. furn. conc. piling	3.30	2.75	2.50	3.00	2.75	4.00
267 ea. driving piles	29.00	28.00	31.00	29.00	28.00	60.00
60 cu. yd. Cl. "A" P.C.C. (curbs)	38.00	35.00	46.00	41.00	40.00	50.00
156 ea. right-of-way monuments	6.00	5.00	5.00	6.00	5.50	5.00
11 ea. center line monuments	15.00	20.00	5.00	6.00	6.50	10.00
580 ea. instal. met. culv. mkrs., cl. mkrs., guide posts and mon. mkrs.	3.00	3.00	4.50	5.00	5.00	4.25
44 ea. horizontal reflector units	4.00	5.00	9.00	6.00	8.00	10.00
2.6 mi. new property fence (Type "A")	$1,000	800.00	900.00	$1,000	975.00	870.00
0.4 mi. new property fence (Type "B")	$1,200	$1,000	$1,150	$1,500	$1,100	$1,950
3 ea. drive gates	60.00	50.00	50.00	60.00	50.00	50.00
2,200 lin. ft. chain link fence	1.20	.80	1.20	1.15	1.30	1.10
1,200 lin. ft. 18-in. R.C.P. culv.	3.80	3.00	3.35	3.60	3.10	3.50
2,040 lin. ft. 24-in. R.C.P. culv.	5.40	5.00	4.85	5.00	4.65	5.30
1,290 lin. ft. 30-in. R.C.P. culv.	7.00	7.00	6.20	6.50	5.95	7.00
160 lin. ft. 54-in. R.C.P. culv.	20.00	18.00	17.00	15.50	17.00	18.50
130 lin. ft. 24-in. C.M.P. culv. (14 ga.)	4.50	4.00	4.00	3.50	4.00	3.80
7 ea. spillway assemblies	30.00	25.00	27.00	25.00	27.50	37.00
160 lin. ft. 8-in. C.M.P. down drains (16 ga.)	2.00	1.50	1.80	1.50	1.75	1.60
7 ea. spillway assembly down drain slip joints	20.00	10.00	14.00	11.00	15.00	15.00
7 ea. down drain pipe anchors	20.00	10.00	18.00	20.00	25.00	6.00
170 lin. ft. salv. exist. pipe culv.	1.00	1.00	1.00	1.00	1.25	1.30
70 lin. ft. relay. salvaged C.M.P.	1.50	1.00	1.00	1.00	1.25	1.30
130 lin. ft. 16-in. welded steel pipe (7 ga.)	3.50	4.50	5.00	6.00	4.50	5.00
220,000 lb. bar reinf. steel	.076	.06	.085	.09	.08	.08
190 lb. misc. steel	.35	.30	.41	.40	.40	.40
1 ea. drop inlet frame and cover	100.00	50.00	75.00	50.00	60.00	60.00
1,800 sq. ft. steel sheeting	2.50	2.80	2.80	2.30	2.75	4.00
1,700 lin. ft. metal plate guard railing	3.20	3.00	2.80	3.00	3.10	2.70
Lump sum, remov. exist. bridge	$1,800	500.00	$3,600	$1,500	500.00	$1,600

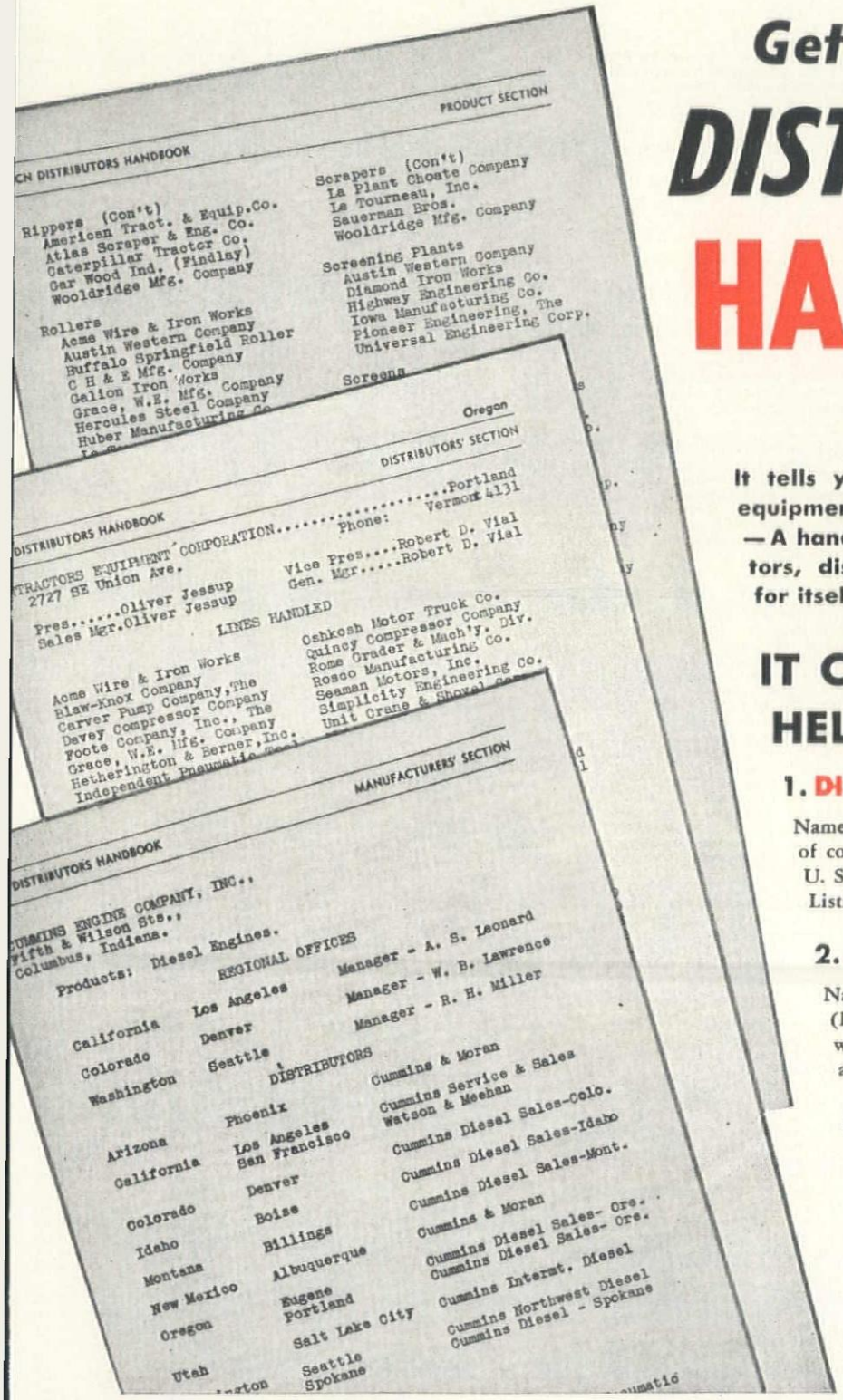
Plantmix Surfacing on Cement-treated Base for Divided Highway

California—San Diego County—State. Griffith Co., Los Angeles, with a bid of $691,205, was low before the California Division of Highways for constructing a four-lane divided highway, involving 3.7 mi. of grading and surfacing with plantmix surfacing on cement-treated base. Unit bids were as follows:

(1) Griffith Co. $691,205
(2) Fredericksen & Kasler 704,255
(3) R. E. Hazard Contracting Co. & C. G. Willis & Sons, Inc. 704,785
(4) Peter Kiewit Sons Co. $767,190
(5) N. M. Ball Sons 780,444
(6) Clyde W. Wood & Sons, Inc. 789,375

	(1)	(2)	(3)	(4)	(5)	(6)
49 cu. yd. removing concrete	8.00	7.00	10.00	20.00	7.00	10.00
Lump sum, clearing and grubbing	$4,000	$4,800	$14,336	$8,000	$25,000	$5,000
103,000 cu. yd. roadway excavation	.31	.29	.33	.35	.35	.25
7,700 cu. yd. structure excavation	1.50	2.10	1.20	1.50	1.70	2.50
1,800 cu. yd. ditch and channel excavation	.90	1.00	1.00	3.00	.90	1.00
770,000 sta. yd. overhaul	.003	.005	.005	.005	.004	.005
39,100 sq. yd. compacting original ground	.02	.03	.06	.04	.05	.05
410,000 cu. yd. imported borrow (Type A)	.42	.305	.47	.55	.436	.39
10,000 cu. yd. imported borrow (Type B)	.80	.90	.92	1.30	.70	1.50
37,900 cu. yd. imported subbase material	.66	1.08	.57	.85	1.00	.89
Lump sum, dev. wat. supply and furnish wat. equip.	$5,000	$10,200	$2,000	$2,600	$15,500	$5,000
17,100 M. gal. applying water	1.35	1.14	1.50	1.20	1.30	1.50
Lump sum, finishing roadway	$1,500	$1,200	$3,000	$2,000	$2,800	$4,000
35,000 ton mineral aggregate (cem. tr. base)	1.22	1.63	1.15	1.30	1.18	1.25
11,200 bbl. Portland cement (cem. tr. base)	3.25	3.85	3.35	3.70	3.65	3.50
380 ton asphaltic emulsion	29.00	32.00	27.25	32.00	38.00	30.00
560 ton crushed rock backfill	1.95	5.00	2.05	7.80	3.00	4.00
20,700 ton untreated rock base	1.65	1.94	1.55	1.50	2.00	2.50
68,000 sq. yd. prep. mix. and shap. surf. (bit. surf. tr.)	.09	.10	.07	.12	.06	.08
8,500 ton mineral aggregate (R.M.S.)	1.25	1.90	.57	.55	2.16	2.60
59,400 sq. yd. mix. and compact. (rd. mixed surf.)	.10	.12	.125	.15	.10	.10
1,010 ton liq. asphalt, SC-3, SC-4 or SC-5	15.00	16.50	15.00	16.70	20.00	19.50
22,500 ton mineral aggregate (P.M.S.)	4.50	3.00	4.51	3.00	3.40	4.25
1,140 ton paving asphalt (P.M.S.)	15.50	15.00	17.50	15.70	16.00	17.00
485 ton sand (seal coat)	3.50	5.00	4.50	3.50	3.50	5.00
1,270 ton screenings (seal coat)	4.00	4.60	4.50	5.20	4.50	6.00
740 lin. ft. raised traffic bars (rolls and chevrons)	1.00	1.00	.35	.80	1.10	1.00
10,050 lin. ft. placing P.M.S. dikes	.15	.20	.20	.06	.50	.15
390 sq. yd. placing P.M.S. down drains	1.00	1.00	1.15	2.80	.50	2.00
19 cu. yd. Class "A" P.C.C. (pavement)	17.00	28.00	20.00	30.00	19.00	20.00
1,290 cu. yd. Class "A" P.C.C. (structures)	35.00	47.00	28.00	45.00	45.00	58.00
23 cu. yd. Class "A" P.C.C. (sewer pipe encasem't)	14.00	33.00	20.00	30 00	28.00	25.00
33 cu. yd. P.C.C. (curbs and gutters)	32.00	60.00	30.00	50.00	33.00	40.00
155 ea. right-of-way monuments	5.00	6.00	7.50	7.00	7.00	7.00
1,132 lin. ft. metal plate guard railing	2.70	2.65	2.50	3.50	3.00	3.25
325 lin. ft. mov. and reconst. met. plate guard rail	2.60	1.80	1.25	2.80	2.00	2 00
144 ea. reflectorized guide posts	3.25	6.00	7.50	7.00	9.00	7.80
260 ea. culvert markers and guide posts	2 60	5.00	5.00	5.50	8.00	6.50
2.2 mi. new property fence	$1,700	$1,550	$1,000	$1,500	$1,700	$1,500
270 lin. ft. wire mesh fence	1.70	1.20	1.50	1.50	1.70	2.50
411 lin. ft. salvag. and reconstr. existing wood fence	1.00	1.00	1.00	1.40	2 00	.50
78 lin. ft. 12-in. reinforced conc. pipe culverts	2.15	3.50	2.60	3.00	2.80	2.85
352 lin. ft. 18-in. reinforced conc. pipe culverts	3.10	4.50	3.50	4.00	4.25	4.25
2,852 lin. ft. 24-in. reinforced conc. pipe culverts	4.30	6.00	4.20	5.60	5.50	5.80
276 lin. ft. 30-in. reinforced conc. pipe culverts	5.60	8.00	6.00	7.00	6 50	7.50
512 lin. ft. 36-in. reinforced conc. pipe culverts	7.00	10.00	7.00	8.90	9.50	9.50
116 lin. ft. 54-in. reinforced conc. pipe culverts	12.50	17.00	13.00	16.00	17.00	16.75
124 lin. ft. 72-in. reinforced conc. pipe culverts	19.00	24.00	19.00	24.00	25.00	21.50
63 lin. ft. 24-in. C.M.P. (14 gauge)	4.50	3.50	3.20	5.00	4.25	4.45
454 lin. ft. 22-in. x 13-in. C.M.P. arch (16 gauge)	3.20	3.50	2.50	4.00	4.00	3.70
195 lin. ft. 26-in. x 15-in. C.M.P. arch (16 gauge)	3.90	4.00	2.75	4.60	4.25	4.30
294 lin. ft. 29-in. x 18-in. C.M.P. arch (14 gauge)	5.00	5.00	3.60	6.00	5.50	5.65
194 lin. ft. 36-in. x 22-in. C.M.P. arch (14 gauge)	6.30	6.00	4.25	7.40	7.00	7.00
620 lin. ft. 6-in. vitrified clay sewer pipe	1.30	1.60	1.00	1.60	.85	2.00
240 lin. ft. 24-in. vitrified clay sewer pipe	7.10	5.00	8.00	8.90	5.70	9.75
2 ea. spillway assemblies	23.00	31.00	25.00	32.00	28.00	31.00
140 lin. ft. 8-in. C.M.P. down drains (16 gauge)	1.80	1.60	1.10	2.80	1.80	1.65
5 ea. spillway assembly down drain slip joints	16.00	15.00	15.00	16.00	14.00	12.00
430 lin. ft. salvage exist. reinforc. conc. pipe culv.	1.00	1.00	1.00	1.60	1.00	1.00
192 lin. ft. relaying salv. reinforc. conc. pipe culv.	1.00	1.00	1.25	1.70	1.50	2.00
281 lin. ft. salvag. exist. C.M P. culverts	.85	.50	1.50	.90	1.25	1.00
7 ea. salvag. spillway assemblies	6.00	3.00	10.00	10.00	8.00	5.00
7 ea. install. salvag. spillway assemblies	6.00	10.00	10.00	3.00	11.00	5.00
106 lin. ft. salvag. exist. spillway assemblies dn. drain	.85	.30	.50	.80	1.30	.50
106 lin. ft. relay. salvag. spillway assemblies dn. drains	.85	.50	.50	1.30	1.40	.50
53 ea. W23R reflector units	5.00	6.00	10.00	12.00	2.00	8.00
188,000 lb. bar reinforcing steel	.09	.105	.08	.09	.09	.10

Continued on page 134



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2,710 lb. misc. iron and steel	.18	.30	.20	.30	.40	.50
702 lin. ft. remov. & relay. 1-in. to 2-in. wat. pipe lines	1.80	1.20	1.25	1.00	.70	.50
4 ea. manholes	240.00	300.00	160.00	300.00	175.00	250.00
Lump sum, remov. 5 spans Ward Road bridge	$1,500	$1,200	480.00	$1,300	$3,000	$2,500
575 cu. yd. sewer trench excav.	1.30	2.50	1.25	1.10	3.30	2.00
Lump sum, engineer's office	$1,200	$2,100	$2,000	$1,400	$2,000	$2,500

California—Santa Clara County—State—Grade and Surf.

Guy F. Atkinson Co., South San Francisco, Calif., with a bid of $1,392,744, was low before the California Division of Highways for about 1.8 mi. to be graded and surfaced with plant-mixed surfacing on cement treated base, between 3.7 mi. north of Santa Cruz County Line and 1.1 mi. south of junction with Route 42 in Los Gatos. Unit bids were submitted as follows:

(1) Guy F. Atkinson Co. $1,392,744
(2) Fredericksen & Kasler 1,405,398
(3) Fredrickson & Watson Const. Co. M & K Corp. and Piombo Construction Co. 1,411,427
(4) Harms Bros.; N. M. Ball Sons, and Ball & Simpson 1,496,322
(5) Eaton & Smith 1,497,197
(6) Bressi & Bevanda Constructors, Inc. 1,512,096
— Parish Bros. 1,524,394
— Granite Construction Co. 1,541,728
— United Conc. Pipe Corp. and Ralph A. Bell $1,557,159
— Peter Kiewit Sons' Co. 1,577,672
— Dimmitt & Taylor and T. M. Page 1,577,974
— H. Earl Parker, Inc. 1,585,289
— Cox Bros. Const. Co. and J. E. Haddock, Ltd. 1,688,388
— McNutt Brothers 1,730,147
— Fredrickson Bros. 1,880,876
— Chas. L. Harney, Inc. 2,014,335

	(1)	(2)	(3)	(4)	(5)	(6)
105 cu. yd. remov. conc.	2.15	6.00	2.30	3.00	2.25	10.00
70 acres clearing and grubbing	300.00	410.00	557.00	900.00	800.00	500.00
1,73,000 cu. yd. roadway excav.	.25	.325	.324	.40	.35	.33
28,600 cu. yd. struct. excav.	1.85	2.00	1.56	2.25	2.35	2.50
17,800 cu. yd. channel excav.	.35	.50	.52	.33	.40	.45
4,300 cu. yd. ditch and channel excav.	.75	1.50	1.00	1.50	1.00	.75
21,000,000 sta. yd. overhaul	.0035	.0025	.004	.003	.0025	.003
4,800 roller hrs. rolling	8.50	14.50	13.60	15.00	11.40	11.50
51,000 sq. yd. compacting orig. grnd.	.035	.03	.035	.05	.045	.05
2,500 sq. yd. scarifying exist. surfacing	.035	.10	.05	.10	.20	.10
91,900 ton imported rock slope protection	1.80	1.04	.90	.47	1.10	1.50
62,500 ton imp. B.M.	1.85	1.00	.95	.88	.85	1.25
5,000 lb. seed (eros. cont.)	.28	.33	.25	.25	.23	.50
Lump sum, dev. wat. sup. & furn. wat. equip.	$5,575	$14,000	$50,500	$30,000	$76,650	$12,000
45,500 M. gal. applying water	.95	.84	.40	.30	.40	1.40
Lump sum, finishing roadway	$1,750	$1,700	$2,500	$1,400	$2,000	$3,000
59,000 sq. yd. mix. and compact. (C.T.B.)	.25	.18	.16	.18	.20	.25
6,000 bbl. P. C. (C.T.B.)	3.40	3.65	3.63	3.70	3.25	3.75
114 ton asph. emuls.	35.25	34.00	32.00	35.00	32.00	45.00
55 ton liq. asph. SC-1 (pr. ct.)	26.00	25.00	30.00	30.00	25.00	27.00
296 ton screen. (sl. ct.)	6.45	6.50	5.90	5.00	5.00	6.00
250 ton sand (sl. ct.)	4.10	7.00	4.65	4.00	5.00	5.00
16,070 ton min. aggr. (R.M.S.)	4.45	2.93	3.63	3.50	3.35	3.00
804 ton pav. asph. (P.M.S.)	26.00	18.00	20.00	19.00	15.00	17.00
4,650 lin. ft. raised traffic bars	.95	1.00	.98	1.07	1.00	.90
2,085 cu. yd. Cl. "A" P.C.C. (struct.)	56.85	55.00	43.50	42.50	50.00	55.00
105 cu. yd. rubble masonry	26.50	18.00	46.00	17.00	35.00	50.00
70 cu. yd. sacked conc. riprap	24.50	28.00	22.00	18.00	25.00	35.00
13 cu. yd. Cl. "B" P.C.C. (curbs)	53.00	95.00	41.00	42.50	40.00	35.00
170 cu. yd. Cl. "B" P.C.C. (channel lining)	28.80	50.00	41.00	30.50	35.25	30.00
270 ea. curb dowels	.95	.60	.90	.50	.60	1.00
116 ea. right-of-way mon.	4.70	7.00	5.20	5.50	5.25	5.00
10 ea. survey mon.	29.50	15.00	25.00	27.00	30.00	50.00
5,000 lin. ft. met. plate grd. rail.	2.85	2.60	3.00	3.00	2.50	3.00
294 ea. install. culv. mkrs. and guide posts	3.50	3.00	4.00	3.37	5.00	4.50
0.38 mi. new prop. fence (Type A)	$1,325	$1,250	$1,600	$1,500	$1,250	$1,000
0.19 mi. new prop. fence (Type B)	$1,465	$1,500	$1,500	$1,000	$1,350	$1,200
2,100 lin. ft. chain link fence	1.20	1.20	1.38	1.35	1.40	1.40
3 ea. chain link drive gates	53.00	70.00	120.00	120.00	125.00	115.00
2,350 lin. ft. timber prop. fence	.60	.72	.70	.55	.65	1.00
80 lin. ft. 12-in. R.C.P. culv. (std. str.)	1.85	3.00	2.15	2.10	2.50	2.75
600 lin. ft. 24-in. R.C.P. culv. (std. str.)	4.70	4.00	5.15	5.50	4.80	5.50
600 lin. ft. 30-in. R.C.P. culv. (std. str.)	5.85	5.50	6.60	7.00	5.00	7.00
180 lin. ft. 48-in. R.C.P. culv. (std. str.)	12.40	18.00	12.95	14.00	12.50	13.50
488 lin. ft. 48-in. R.C.P. culv. (4000-D)	16.80	19.00	17.00	14.00	20.00	18.00
916 lin. ft. 12-in. C.M.P. (16 ga.)	1.95	2.25	2.00	2.20	2.50	2.00
2,100 lin. ft. 18-in. C.M.P. (16 ga.)	2.70	3.00	2.80	3.10	3.00	3.00
60 lin. ft. 18-in. C.M.P. (12 ga.)	4.15	4.50	4.20	5.00	4.00	4.00
12 lin. ft. 30-in. C.M.P. (14 ga.)	5.40	5.50	5.50	7.00	7.50	6.00
28 lin. ft. 36-in. C.M.P. (12 ga.)	7.90	8.00	8.00	10.00	10.00	8.00
1 ea. C.M.P. reducing elbow	67.50	65.00	67.00	80.00	70.00	60.00
160 lin. ft. 120-in. field assembled plate culv. (610)	48.25	55.00	47.00	70.00	60.00	50.00
2,100 lin. ft. 2-in. horizontal drns.	1.75	6.00	6.00	5.00	6.20	4.00
6,150 lin. ft. 6-in. P.M.P. underdrains	.95	1.25	1.11	1.30	1.40	1.25
1,300 cu. yd. filter mat'l.	5.00	5.00	6.90	8.00	5.00	6.50
290 lin. ft. 8-in. C.M.P. conduits (16 ga.)	1.40	1.50	1.56	1.50	2.00	1.50
320 lin. ft. 8-in. C.M.P. dwn. drns. (16 ga.)	1.45	1.55	1.62	1.80	1.75	1.50
10 ea. spillway assem.	31.15	31.00	30.00	30.00	30.00	30.00
35 ea. pipe anchors	41.15	25.00	19.65	20.00	18.50	27.00
6 ea. spillway assem. dwndrn. slip jts.	16.10	17.00	18.50	14.00	15.00	17.00
710 lin. ft. salv. exist. pipe culv.	1.30	1.00	1.15	1.00	1.10	1.00
552,000 lb. bar reinf. steel	.094	.09	.079	.08	.078	.08
5,300 lb. misc. iron and steel	.35	.37	.26	.27	.40	.45
270 lin. ft. steel rail (debris rack)	2.35	2.70	3.00	3.20	5.00	2.00
Lump sum, obliterating temp. connections	$1,050	$1,100	800.00	$1,000	765.00	$1,000
7 ea. horizontal reflector units	8.80	8.00	8.00	8.50	8.00	10.00
BIN TYPE RETAINING WALL						
96 ea. 8″x16″x9′ stringers (16 ga.)	15.40	15.50	16.00	14.78	17.00	14.50
47 ea. 8″x16″x9′ stringers (14 ga.)	17.35	18.00	18.00	16.65	19.00	17.00
51 ea. 8″x16″x9′ stringers (12 ga.)	21.50	22.00	21.90	20.61	24.00	20.00
366 ea. 8″x16″x9.5′ stringers (16 ga.)	15.40	14.30	15.70	14.78	17.00	14.50
193 ea. 8″x16″x9.5′ stringers (14 ga.)	17.35	16.10	18.00	16.65	19.00	17.00
163 ea. 8″x16″x9.5′ stringers (12 ga.)	21.50	20.00	22.00	20.61	24.00	20.00
25 ea. 6″x19½″x7.4′ spacers (16 ga.)	8.50	8.50	9.00	8.15	10.00	8.00
56 ea. 6″x19½″x9.6′ spacers (14 ga.)	12.85	13.00	13.10	12.30	14.00	12.00
121 ea. 6″x19½″x11.8′ spacers (12 ga.)	20.75	19.30	21.20	19.91	24.00	20.00
208 ea 6″x19½″x14′ spacers (12 ga.)	26.60	24.70	27.00	25.50	29.00	26.00
4 ea. 6″x15¼″x7.4′ bottom spacers (16 ga.)	6.90	7.00	7.00	6.66	8.00	6.50
6 ea. 6″x15¼″x9.6′ bottom spacers (14 ga.)	10.50	11.00	10.60	10.14	12.00	10.50
10 ea. 6″x15¼″x11.8′ bottom spacers (12 ga.)	17.00	17.50	17.30	16.39	19.00	16.00
14 ea. 6″x15¼″x14′ bottom spacers (12 ga.)	21.75	22.00	22.00	20.85	24.00	21.00
10 ea. 6½″x8¾″x5.33′ columns (8 ga.)	13.40	14.00	13.80	12.85	15.00	13.00
10 ea. 6½″x8¾″x6.67′ columns (8 ga.)	16.40	16.00	16.80	15.71	19.00	16.00
29 ea. 6½″x8¾″x8′ columns (8 ga.)	19.50	20.00	20.00	18.73	22.00	19.00
15 ea. 6½″x8¾″x9.33′ columns (8 ga.)	22.70	23.00	23.00	21.76	26.00	22.00

Continued on next page

7 ea. 6½"x8¾"x10.67' columns (8 ga.)	25.90	26.00	26.50	24.84	29.00	25.00
59 ea. 6½"x8¾"x12' columns (8 ga.)	29.15	30.00	29.90	27.94	33.00	27.00
1 ea. 3¼"x8¾"x5.33' split columns (8 ga.)	6.40	6.50	6.50	6.12	7.00	6.00
3 ea. 3¼"x8¾"x6.67' split columns (8 ga.)	7.80	8.00	8.00	7.48	9.00	7.50
2 ea. 3¼"x8¾"x8' split columns (8 ga.)	9.25	9.50	9.50	8.93	11.00	10.00
2 ea. 3¼"x8¾"x10.67' split columns (8 ga.)	12.35	12.50	12.50	11.82	14.00	12.00
2 ea. 3¼"x8¾"x12' split columns (8 ga.)	13.80	14.00	14.00	13.26	18.00	13.00
62 ea. 6⅛"x8⅞"x2' column splices (10 ga.)	4.25	4.50	4.30	4.05	5.00	4.00
68 ea. 16"x22' base plates (1 ga.)	5.20	5.50	5.20	5.00	6.00	5.00
34 ea. 6⅛"x8⅜" column caps (12 ga.)	.95	1.00	1.30	.90	2.00	1.00
12 ea. 2½"x3⅝"x9' stringer stiffeners (8 ga.)	4.50	4.50	4.60	4.35	7.00	4.50
21 ea. 2¼"x3⅜"x9.5' stringer stiffeners (8 ga.)	4.50	4.50	4.60	4.35	7.00	4.50

Oregon—Jackson County—State—Grade and Pave

Central Heating Co., Eugene, Ore., with a bid of $159,010, was low before the Oregon State Highway Department for the grading and paving with asphaltic concrete of the Cascade Gorge-Prospect section of the Crater Lake Highway. Unit bids were submittted as follows:

(1) Central Heating Co. $159,010
(2) Parker-Schram Co. 160,433
(3) K. F. Jacobsen & Co., Inc. 160,858
(4) Warren Northwest, Inc. 166,460
(5) J. C. Compton Co. $167,445
(6) Porter W. Yett 178,355
(7) Rogers Constr. Co. & Babler Bros., Inc. 192,498

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
7.50 mi. roadbed widening and shaping	$1,250	$1,800	$2,500	$2,000	$1,600	$2,000	$3,000
110 cu. yd. struct. excav., unclassified	5.00	2.50	3.00	3.50	3.00	6.00	3.00
1,400 lin. ft. 12-in. conc. pipe	3.00	2.45	1.40	1.75	2.00	3.00	2.20
70 lin. ft. 18-in. conc. pipe	4.50	4.50	2.75	3.00	3.50	3.50	4.00
20 lin. ft. 24-in. conc. pipe	5.00	6.25	4.00	6.00	7.00	4.00	6.00
6,000 cu. yd. 2-in. - 0-in. material in base	3.25	2.90	2.75	3.00	3.00	2.80	2.75
5,000 cu. yd. ¾-in. - 0-in. matl. in base & shldrs.	3.00	3.10	2.90	3.25	3.00	3.20	3.00
150 M. gal. sprinkling	3.00	3.00	3.00	2.50	3.00	3.00	4.00
16,000 ton Class "B" asph. conc.	6.50	6.50	6.40	6.75	7.00	7.40	8.00
80 ton emulsified asph. in seal coat	50.00	46.00	48.00	50.00	50.00	50.00	50.00
400 cu. yd. aggregates in seal coat	3.50	4.15	4.50	4.00	6.00	6.00	5.00

Gravel Surfacing on Gravel or Crushed Rock Base

Utah—Tooele County—State. W. W. Clyde & Co., Springville, with a bid of $219,858, was low before the State Road Commission of Utah for constructing 19.4 mi. of gravel surfaced road between Vernon and St. John. Unit bids were as follows:

(1) W. W. Clyde & Co. $219,858
(2) Reynolds Construction Co. 225,738
(3) Whiting & Haymond 232,049
(4) Germer, Abbott & Waldron $233,644
(5) Strong Co. 234,870
(6) Engineer's estimate 251,474

	(1)	(2)	(3)	(4)	(5)	(6)
108,500 ton cr. rock or cr. gravel surface course	.625	.65	.78	.69	.74	.75
68,000 ton gravel or crushed rock base course	.60	.60	.645	.59	.62	.70
4,000 ton cover material (place in stockpile)	2.00	2.00	1.50	2.00	1.75	2.00
205,000 cu. yd. unclassified excavation	.18	.18	.18	.22	.17	.20
125,000 st. yd. overhaul, Class "A"	.015	.015	.01	.015	.01	.015
3,000 yd. mi. overhaul, Class "B"	.20	.15	.20	.20	.12	.15
4,300 1,000-gal. watering	1.75	1.50	1.50	2.25	2.00	2.00
3,300 hr. rolling	4.00	5.00	3.75	4.50	5.00	5.00
140 lin. ft. 15-in. C.G.M. pipe	2.20	2.60	2.40	2.40	2.60	2.50
1,450 lin. ft. 18-in. C.G.M. pipe	2.80	3.00	2.90	2.80	3.00	2.80
1,834 lin. ft. 24-in. C.G.M. pipe	4.30	4.50	4.25	4.10	4.30	4.70
356 lin. ft. 30-in. C.G.M. pipe	5.30	5.30	5.00	5.20	6.00	5.70
670 lin. ft. 36-in. C.G.M. pipe	8.30	8.30	7.75	8.00	9.00	9.00
138 lin. ft. C.M. pipe arches 22-in. x 13-in.	3.00	3.15	3.10	2.95	3.20	2.60
184 lin. ft. C.M. pipe arches 29-in. x 18-in.	4.50	4.20	4.30	4.75	5.00	5.00
46 lin. ft. C.M. pipe arches 36-in. x 22-in.	5.50	5.60	5.50	5.65	6.50	6.00
50 lin. ft. C.M. pipe arches 43-in. x 27-in.	8.60	9.00	8.25	8.25	11.00	9.35
62 lin. ft. relaying 36-in. C.G.M. pipe	2.00	3.00	1.50	2.50	2.50	1.00
40 lin. ft. 8-in. cast iron pipe	6.00	10.00	4.00	4.25	6.00	3.50
1,600 cu. yd. excavation for structures	1.50	2.00	1.50	.50	1.25	1.50
2,500 cu. yd. channel excavation	.40	.50	.30	.25	.60	.35
77 cu. yd. concrete, Class "A"	70.00	60.00	60.00	60.00	60.00	50.00
15,500 lb. reinforcing steel	.12	.10	.13	.115	.12	.11
175 acre clearing and grubbing	25.00	10.00	15.00	15.00	18.00	35.00
25 ea. guide posts	5.00	7.00	4.00	6.00	5.00	4.00
4,500 lin. ft. surface ditches	.06	.10	.05	.10	.08	.14
5,600 lin. ft. right-of-way fence, Type "A" special	16	.20	.17	.18	.21	.20
11,500 lin. ft. right-of-way fence, Type "B" special	.18	.25	.18	.20	.24	.25
8,207 lin. ft. moving fence	.14	.30	.18	.14	.16	.20
10 ea. 16-ft. gates	35.00	35.00	28.50	37.50	35.00	35.00
250 ea. right-of-way markers	5.00	6.00	4.00	5.00	5.00	5.00
1 ea. F.A.P. markers	20.00	20.00	20.00	20.00	25.00	20.00

California—Stanislaus County—State—Grade and Surf.

Munn & Perkins, Modesto, Calif., with a bid of $197,800, was low before the California Division of Highways for construction of about 11.2 mi. of highway near Oakdale. The work consists of plant-mixed bituminous surfacing on untreated rock base. Unit bids were submitted as follows:

(1) Munn & Perkins $197,800
(2) Granite Construction Co. 199,865
(3) M. J. Ruddy & Son 204,765
(4) Rand Construction Co., Inc. 212,142
(5) N. M. Ball Sons 214,553
(6) M. J. B. Construction Co. 217,187
(7) Harms Bros. 225,707
— Fredrickson Bros. $228,239
— United Concrete Pipe Corp. 232,870
— Rice Bros., Inc. 239,897
— Fredrickson & Watson 244,009
— A. Teichert & Son, Inc. 246,315
— McGillivray Construction Co. 247,260

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.0 mi. excav. border trenches	500.00	200.00	250.00	500.00	$1,200	600.00	$2,400
13 cu. yd. removing conc.	5.00	10.00	4.00	10.00	6.00	10.00	25.00
170 cu. yd. struct. excav.	2.50	4.00	2.50	3.00	3.50	3.00	4.00
32,000 cu. yd. imp. borrow	.65	.77	.80	.70	.87	.70	1.00
Lump sum, dev. wat. sup. and furn. wat. equip.	$1,500	$1,000	$3,800	$11,000	$2,500	500.00	$3,000
4,300 M. gal. applying water	.80	1.00	.90	1.25	1.45	1.50	1.10
47,000 ton untreated rock base	1.50	1.40	1.40	1.62	1.47	1.60	1.56
20,000 ton min. aggr. (P.M.S.)	3.10	3.10	3.25	3.00	3.37	3.57	3.45
980 ton paving asph. (P.M.S.)	20.00	21.00	22.00	19.50	22.00	21.00	20.00
185 ton liquid asph. SC-2 (pr. ct.)	25.00	28.00	25.00	23.60	28.00	28.15	27.00
605 ton sand (pr. ct. and sl. ct.)	3.00	4.00	2.00	2.75	3.50	4.00	4.50
135 ton asphaltic emuls. (sl. ct. and pt. bdr.)	33.00	35.00	40.00	31.60	35.00	33.00	35.00
1,480 ton screenings (sl. ct.)	5.00	5.00	4.40	4.15	3.62	4.50	5.00
270 lin. ft. 12-in. C.M.P. (16 ga.)	2.50	3.00	2.45	2.00	2.50	2.50	3.00

NEW EQUIPMENT

MORE COMPLETE INFORMATION about any of the new equipment or products briefly described on the following pages may be obtained at no charge. Send your request to Equipment Service, Western Construction, 609 Mission St., San Francisco 5, Calif. For quicker service, designate items by number.

1001

Streamlined Speed Drill

Manufacturer: SpeedWay Manufacturing Co., Cicero, Ill.

Equipment: Drill with aluminum die castings throughout.

Features claimed: The No. 400 ½-in. SpeedDrill weighs only 8¾ lb., but delivers a full half horsepower at the drill point under normal load. It is characterized by compact design and streamlined appearance. Drill is powered by a series-wound universal motor which makes it possible to deliver more power per pound. A cast-in air cooling system with oversize die cast fan, baffles and channels serves to cool the motor and clear away chips from the working surface. Wide faced, cut gears of alloy steel run on shafts which are supported on both ends by anti-friction bearings.

1002

GMC Diesel Tractors

Manufacturer: General Motors Corp., Pontiac, Mich.

Equipment: Two tractors designed to haul loads of 45,000 and 55,000 lb. gross combination weight.

Features claimed: A compression ratio of 16 to 1 and accompanying increase in thermal efficiency contribute materially to low fuel consumption. An injector system, mounted in the head of each cylinder and is operated by rocker arms and pushrods from the camshaft, meters, atomizes, and injects fuel directly into the combustion chambers at extremely high pressure, thus eliminating high pressure fuel lines; this is a material factor in easy starting. This type of unit enables the engine to be used for braking on long grades without any need for occasionally racing the engine to lubricate the injector mechanism. There is an optional rear axle which is a planetary two-speed type with the low range obtained through planetary gearing; this is designed primarily for tractor work requiring power for heavy loads and hilly or mountainous country; at the same time it provides higher road speeds in level country.

1003

Portable Steam Generator

Manufacturer: Vapor Heating Corp., Chicago.

Equipment: Vapor steam generator for supplying large quantities of high-pressure steam for short or sustained periods for pile-driving, asphalt plants, or chemical processing.

Features claimed: The machine develops 200 lb. working steam pressure in two minutes from cold water and makes over 3,500 lb. of steam an hour, at 75 to 300 lb. steam pressure. This is accomplished by hot gases from an efficient forced draft fuel-oil fire wiping over a patented 575-ft. steel coil. Steam is made only when it is needed in this machine. Once started, automatic controls take over, causing the machine to turn off when the predetermined steam pressure is reached; controls turn on again when the steam pressure drops 15 lb.

1004

Two-phase Motors for Research

Manufacturer: Minneapolis-Honeywell Regulator Co., Philadelphia.

Equipment: Fractional hp., reversible 60-cycle motors with power requirement low enough to permit field excitation from an electronic amplifier.

Features claimed: This low inertia drive motor, although designed for use in industrial recording instruments, is adaptable for apparatus where positive positioning, by way of a reversible motor, is a primary operating factor. Motor can be used in servo-type mechanisms as remote positioners, for auto-bridge and auto-potentiometric circuits and similar arrangements.

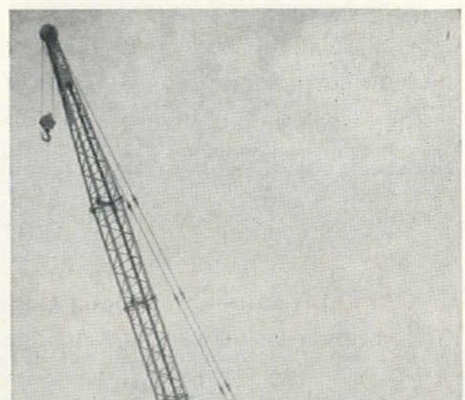
1005

Truck Cranes

Manufacturer: Unit Crane & Shovel Corp., Milwaukee.

Equipment: Truck cranes featuring Bendix-Westinghouse air steering, and one-man control.

Features claimed: Model 1520T has a



lifting capacity range up to 20 tons, and ¾ yd. in excavator service. Standard equipment includes: improved, independent worm-type boom hoist, operated by multiple disc-clutches running in oil; a high gantry, which lends itself to long boom applications, is retractable for low headroom when traveling. Air-power steering and one-man control are optional equipment on Model 1014, which has a lifting capacity of 10 tons, and ½ yd. as an excavator.

1006

Valve-in-Head Truck Engine

Manufacturer: Four Wheel Drive Auto Co., Clintonville, Wis.

Equipment: Increased horsepower and torque engine installed as standard equipment on Model HA truck.

Features claimed: The 195 GKA has a torque of 245 lb. ft. as compared to 237 in the previous standard. This model, rated at 125 maximum brake horsepower has been increased from 105 hp. in the previous engine. Added power and torque will provide greater speed, greater hauling ability, and will permit peak truck performance at fewer revolutions per minute, reducing engine wear.

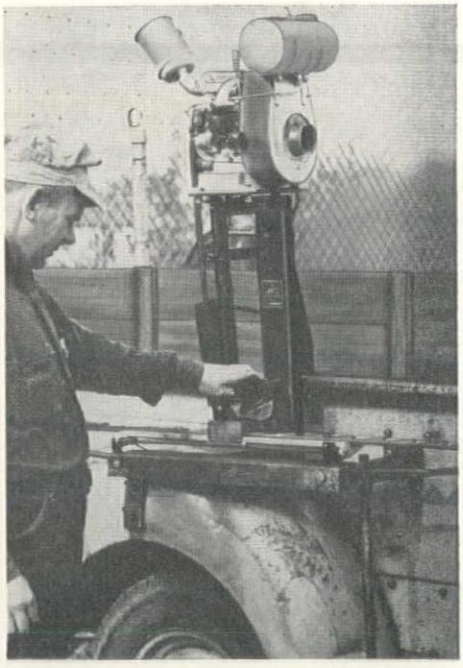
1007

Sickle Grinder on Truck

Manufacturer: Lantz Manufacturing Co., Inc., Valparaiso, Ind.

Equipment: Machine for grinding mower sickles on the job for highway maintenance crews.

Features claimed: Lantz Grinder grinds on both coming and going movements, as the grinding stone is mounted on a swinging arm which can be moved back and forth, toward the sickle bar. This gives a more uniform cutting surface. Unit handles



sickle bars from 1 to 7 ft. in length, with extension arms to support bars of greater length. Entire unit can be mounted on the wall.

1008

Concrete Sealing Compound

Manufacturer: Owens-Corning Fiberglas Corp.

Equipment: Fiberglas expansion joint for concrete structures.

Features claimed: Fiberglas expansion joint prevents foreign matter from entering the joint in pavements and render it ineffectual for opening and closing to relieve thermal or upheaval stresses. An asphalt impregnated, bonded glass wool board, faced on both sides with a heavy asphalt-saturated kraft paper, the joint is designed for use in concrete highways, canals, sidewalks, airport runways, bridges, and factory floors.

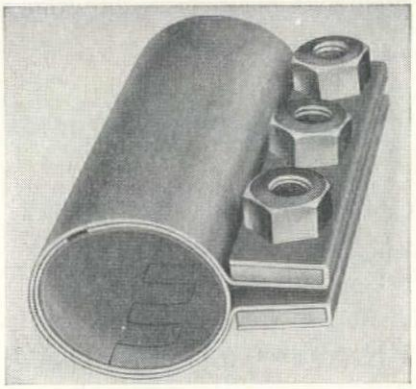
1009

Pipe Couplings

Manufacturer: Morris Coupling and Clamp Co., Ellwood City, Pa.

Equipment: Couplings available in zinc-coated steel or aluminum in all sizes to 8 in.

Features claimed: Couplings can be used for permanently joining either plain end or threaded pipe or a combination of the two. It is the only compression band-type coupling on the market and serves to hold the



entire surface of the joint in compression. The coupling is easy to apply with a socket or crescent wrench and gives each joint the advantage of a pipe union.

1010

Universal Hard Facing Electrode

Manufacturer: Eutectic Welding Alloys Corp., New York.

Equipment: Abrasion-resistant electrode which deposits a bead having hardness of Rockwell C 63-68.

Features claimed: EutecTrode 10 is well suited to the hard-facing of roller cams, rolling dies, pulverizing rollers and will withstand the severest operating conditions without appreciable wear. This AC-DC electrode is dependable for application to heavy-duty equipment which must continue to function at high temperatures, because it will not become soft or lose strength at higher temperatures; its red hardness is far above that of most conventional alloys.

1011

Six-Wheel Truck Models

Manufacturer: International Harvester Co., Chicago, Ill.

Equipment: Trucks designed for smooth operation under adverse conditions.

Features claimed: A new third differential mounted on the forward tandem axle permits these six-wheel units to absorb road shocks before they can reach the springs. A single propeller shaft runs to the forward axle and from there, through the third differential, to the rear axle. This construction is an improvement over the usual power divider and two separate propeller shafts. Model LF-194 with a 9-yd. dump body has a gross vehicle weight rating of 38,000 lbs. Model LF-192 with a concrete mixer body has a gross vehicle weight rating of 35,000 lbs. These two truck engines develop 154 maximum brake horsepower at 3,200 r.p.m., and have a compression ratio of 6.3.

1012

Off-highway Dump Truck

Manufacturer: Sterling Motors Corp., Milwaukee, Wis.

Equipment: Truck with powerful hoist providing a 65-deg. dumping angle for discharging load quickly and easily.

Features claimed: This chassis, known as Model SF7506D, is built to haul payloads

up to 45 tons. It has a gross vehicle rating of 160,000 lb. and is equipped with a heavy-duty body having a struck capacity of 25 cu. yd. This capacity can be increased to 28 cu. yd. through use of removable side boards.

1013

Automatic Grip Pullers

Manufacturer: Owatonna Tool Co., Owatonna, Minn.

Equipment: Pullers with patented gripping feature which grips harder as the pull becomes greater.

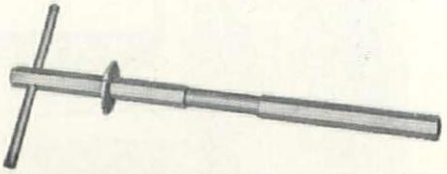
Features claimed: Grip-O-Matic Pullers, with thin jaws and great strength, are safe, and will not slip off the work. Power-pitch threads on the forcing screw provide 32% more power than the conventional V-type thread. There are 14 sizes of pullers in both two-jaw and three-jaw types ranging from 3¼-in. to 36-in. reaches.

1014

Brake Adjusting Tool

Manufacturer: Owatonna Tool Co.

Equipment: Tool for adjusting Wagner hydraulic brakes on late model International Trucks.



Features claimed: This tool is a time-saver for work on brakes FR, FR25, and FR25D and is built to withstand hard use.

1015

Power Take-Off

Manufacturer: Mobile Power, Inc., Lansing, Mich.

Equipment: Top-mounted take-off eliminating need for a conventional V-belt drive.

Features claimed: The Tangen is manufactured to fit almost every make of truck. It is capable of transmitting the full rated power of the truck engine for operating generators, pumps, air compressors, mobile cranes, sprayers, grinders, searchlight units,

hoists, arc welders, and winches. The unit is directly connected to the vehicle engine, operating at full efficiency whether vehicle is in motion or stationary. Speed is governed by crankshaft speed without relation to transmission range.

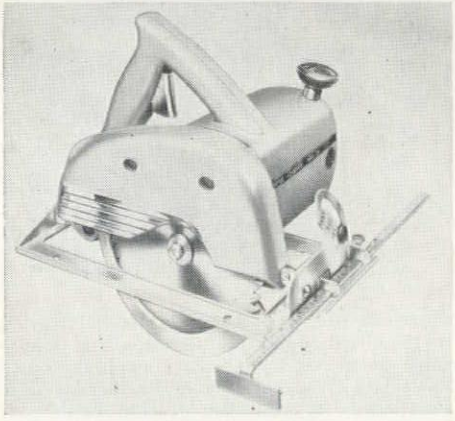
1016

Electric Hand Saw

Manufacturer: Portable Electric Tools, Inc., Chicago.

Equipment: Light-weight, all-purpose saw with fan-cooled motor.

Features claimed: Zephyr Model 625 incorporates an improved streamline design throughout; universal 115-120 v., AC-DC high-speed motor with precision, dynamically balanced armature for smoothest running; helical gears; self-oiling, sleeve-type bearings; quick-return rotating; and telescoping safety guard to protect the operator.



1017

Reversible Electric Drill

Manufacturer: Cummins Portable Tools, Chicago.

Equipment: ½-in. drill with built-in toggle-type reversing switch for deep boring.

Features claimed: The drill was designed for use with heavy timbers, creosote planking, and all kinds of sappy wet lumber. The tool turns in reverse at a flick of the switch, eliminating hand turning and struggling to remove the bit from wood. The drill, with ½-in. capacity in metal, 1-in. capacity in wood, has a die-cast aluminum body and weighs 8¼ lb.

1018

Drip-Proof Motors

Manufacturer: Sterling Electric Motors, Inc., Los Angeles.

Equipment: Single phase capacitor-type motors.

Features claimed: Klosd motors may be sidewall mounted, inverted ceiling mounted or floor mounted, and still retain the drip-proof feature by simply rotating the end bells so that the air vent openings point downward. The single-phase motors have a starting relay that eliminates the necessity of centrifugal switches or rotating devices such as throw-out switches, commutators, or brushes.

1019

Concrete Mixing and Elevating Plant

Manufacturer: Mixermobile Manufacturers, Portland, Ore.

Equipment: 2-yd. Mixermobile with hydraulically operated self-loading skip for receiving batched aggregates directly from trucks, portable batching plants, or front-end loaders.

Features claimed: When the drum of the M-7 model is revolving, the mixture can be visually inspected through either front or rear openings of the drum. An improved electronic water meter, that can be set and locked, measures amounts of water from zero to 100 gal. automatically and without variation.

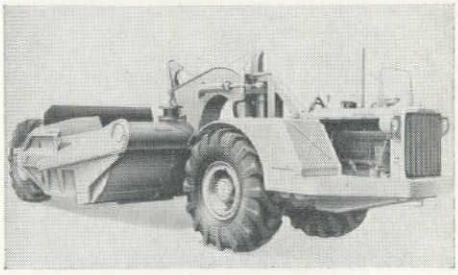
1020

Earthmoving Machines

Manufacturer: Caterpillar Tractor Co., San Leandro, Calif.

Equipment: Four-wheel diesel tractor-wagon combination, and two-wheel diesel prime mover.

Features claimed: These machines, the DW20 tractor with W20 wagon and the DW21 with No. 21 scraper, offer heavy construction contractors the following:



high-speed, rubber-tired, large capacity units for long haul and pusher loading operations; track-type tractor and scraper combinations for rough ground conditions that require power in place of speed; track-type tractor and bulldozer units where trac-

tion is needed for leveling, spreading and for pioneering work.

1021

Load Binder

Manufacturer: Canton Cast Products, Canton, O.

Equipment: Tension-pull load binder available in sizes from 3,000-lb. capacity to 30,000-lb. capacity.

Features claimed: Each operation of the handle of the load binder takes up slack and tightens until desired tension is reached. Compound leverage action enables one man to exert up to 4,500 lb. of tension pull on the chain without use of any additional equipment.

1022

Propane Engines

Manufacturer: Fageol Products Co., Kent, O.

Equipment: Commercial engines for use with 125-octane propane.

Features claimed: Propane engines will find their chief applications in trucks, buses, construction and maintenance equipment, marine craft, saw mills, generators, drill rigs, rock crushers, feed mills, irrigation pumps, hoists, and sand pumpers. There are four different models available of from 162- to 250-brake hp. A compression ratio of 10 to 1 (15 to 1 ratio is available) is standard on the engines.

1023

Rolling Measurement Tape

Manufacturer: Rolatape, Inc., Santa Monica, Calif.

Equipment: Unit for safe and accurate measurements vertically, horizontally, or around curves, to almost unlimited lengths by a single individual.

Features claimed: When using the Rolatape, an automatic counter clocks the measurements in feet and in cycles of 100 ft. A click sounds for every 2 ft. measured and a bell rings at the 100-ft. mark.

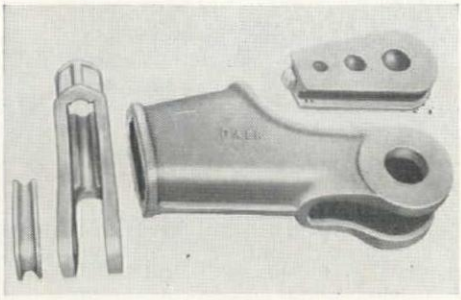
1024

Dragline Sockets

Manufacturer: Baer Steel Products, Inc., Auburn, Wash.

Equipment: Wire-rope sockets that reduce dragline rope breakage.

Features claimed: Socket and wedge grip the rope in true-circle seats. Wide shoulders limit pinching—prevent rope distor-



tion and cutting, and prevent seats from wearing out of round. The rope cannot flatten or crush, rarely breaks at the socket. Sizes from ½-in. to 2¼-in. rope.

1025

Backfill Blade Attachment

Manufacturer: Schield Bantam Co., Waverly, Ia.

Equipment: Backfiller with fast mechanical controls that can roll big loads of dirt

into a trench more quickly and easily than scoop-type backfillers.

Features claimed: Equipment consists of a cable-operated steel blade mounted on a wishbone dip stick, with two tubular control arms, which hold the blade vertical to the ground as it is pulled toward machine. Designed for fast, interchangeable operation with the ⅜-yd. truck-mounted trench hoe.

1026

Portable Industrial Engines

Manufacturer: Waukesha Motor Co., Waukesha, Wis.

Equipment: Power units with interchangeable carburetors for gas or gasoline fueling.

Features claimed: This series is built around three basic sizes, one 4-cylinder and two 6-cylinder engines. They are made as diesels, gasoline, butane, or natural gas engines. The three natural gas, butane, and gasoline, power units which are counterparts of the diesel power units, and which have interchangeable mountings, may be supplied with either gas, gasoline, or combination gas-gasoline carburetors. Being high-compression, overhead-valve engines, there is no other change than carburetor and timing adjustment needed when switching from gas to gasoline operation.

1027

Disconnecting Hydraulic Coupling

Manufacturer: Twin Disc Clutch Co., Racine, Wis.

Equipment: Type of hydraulic drive which dumps the hydraulic fluid, when desired, to serve as its own master clutch and provide a complete disconnection between the prime mover and the load.

Features claimed: This coupling, Model HUD, saves weight and space commonly devoted to a master clutch. It provides all other advantages of a hydraulic drive, such as smooth pick-up of the load, protection against stalling, and absorption of sudden shocks and overloads.

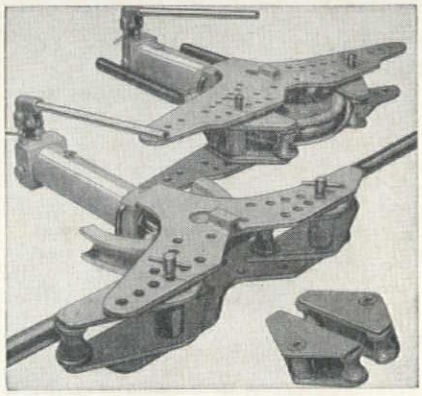
1028

Radiant Heat Pipe Benders

Manufacturer: Tal Bender, Inc., Milwaukee, Wis.

Equipment: Attachment for making 180-deg. bends in pipe.

Features claimed: The two wings, for use in 2, 3 and 4-in. pipe benders, are now each a single unit without any loose parts. A different frame from the previous model



makes it possible to put the pipe in the bender, and without resetting of the wings, to make in one single performance the 180-deg. bends. If used with motor attachment, bends can be made in rapid succession.

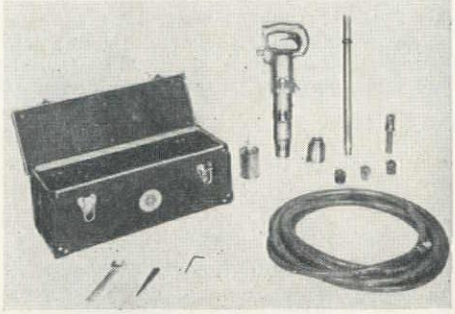
1029

Lightweight Utility Drill

Manufacturer: Gardner-Denver Co., Quincy, Ill.

Equipment: Drill equipped with complete kit of accessories and handy carrying case.

Features claimed: The S17 drill is a handy tool for placing anchor bolts, for running conduit, cable, pipe, and other jobs. It will drill either concrete, brick, or



stone with standard drill steel. An adapter furnished with the drill accommodates standard star drills. The drill can be converted into a lightweight chipping hammer or pick, simply by making use of a special stop-rotation feature.

1030

Gearshift Drive

Manufacturer: The Lima Electric Motor Co.

Equipment: 5-hp. selective-speed drive for machinery requiring a low range of selective operating speeds.

Features claimed: Type R3AC Drive in-

corporates both primary and secondary gear reductions. The drive is a compact combination of a 5-hp. 1,200-rpm., integrally mounted electric motor and a four-speed sliding gear transmission.

1031

Low-priced Measuring Tape

Manufacturer: Evans & Co., Newark, N. J.

Equipment: White steel tape with jet-black markings baked into enamel base.

Features claimed: Tape glides freely in and out of the case at the slightest touch, but a new type of self-actuating brake clamps the tape firmly at any position when the tape is released. Brake will not scratch or wear off the markings. Rule retails at 98¢ for 6-ft. length, $1.19 for 8-ft. length, and $1.49 for 10-ft. length.

1032

Snow Plow Wax

Manufacturer: Speco, Inc., Cleveland.

Equipment: Liquid compound with silicone added to provide a smoother, hard, slick surface off which snow slides easily.

Features claimed: Addition of silicone to Snow-Rem increases the lasting qualities of each wax application. The compound eliminates costly delays necessitated by clearing, or breakdowns from overloading. Apply with an ordinary paint brush or spray gun.

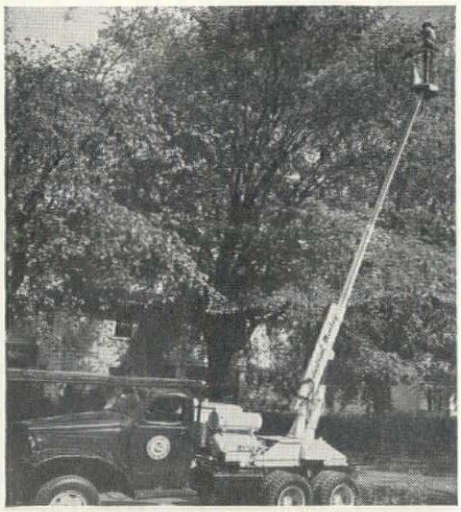
1033

Pole Climbing Eliminated

Manufacturer: Harsch Machine Works, Portland, Ore.

Equipment: Hydraulic truck-mounted boom enabling transmission line worker to work safely and comfortably at heights up to 40 ft.

Features claimed: The labor-saving Industrial Monkey consists of an extendable



steel boom mounted on any 1½-ton or large truck. On the end of the boom is a rail-protected, automatically self-leveling work platform insulated to protect against 8,000 volts.

1034

198-hp. Truck

Manufacturer: Cook Bros. Equipment Co., Los Angeles.

Equipment: Truck designed and engineered especially for heavy hauling.

Features claimed: The C12 makes an ideal tractor for hauling large semi-trailers. A third axle or dual gear drive is available if desired. The truck has a Fuller 5-speed transmission and a 3-speed gear splitter auxiliary transmission, providing plenty of power and traction. Westinghouse air brakes assure smooth, dependable stops with any load.

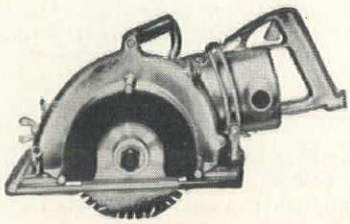
1035

Portable Electric Saw

Manufacturer: Skilsaw, Inc., Chicago.

Equipment: Portable electric saw with maximum grooving capacity.

Features claimed: When used with a 7-in. dado set, the heavy-duty Model 117 can cut away a maximum cross-section of 4 sq. in. Dado sets are adjustable to dado and



plough up to 2-1/6 in. wide, and built-in depth adjustment allows range of 0-deg. to 2-1/16-in. depth of groove. A regular combination blade of 10-in. diameter may also be used with this saw for standard crosscut and rip sawing in lumber up to 3⅜ in. thick.

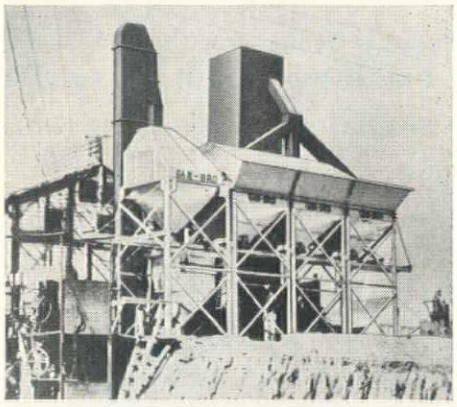
1036

Cement Storage and Batching

Manufacturer: Gar-Bro Manufacturing Co., Los Angeles.

Equipment: Unit batch plant for handling the charging of one-yard mixers or smaller.

Features claimed: The plant is available in single or dual aggregate units which may be hooked up in series with a bulk cement bin unit and with an auxiliary cement silo,



if additional storage is required. Units may be rearranged to meet other conditions. A weigh hopper, mounted on a double rail track, travels from bin to bin without interruption and may be set to dump from either side or either end.

1037

Hydraulic Truck Crane

Manufacturer: Pitman Manufacturing Co., Kansas City, Mo.

Equipment: Mobile truck crane for use with any make winch and easily installed on any type of truck.

Features claimed: Operator of the Hydra-Lift can pick up and set down loads exactly where he wants them, without any slipping, swinging or over-swing,

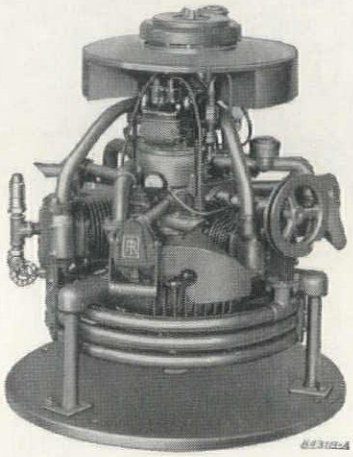
through smooth, positive, hydraulic action. There are no gears or clutches to wear out. Truck driver can control all swinging and lifting from his cab with excellent visibility.

1038

Portable Compressor

Manufacturer: Ingersoll-Rand Co., New York.

Equipment: Light and compact gasoline-driven air power compressor with wheelbarrow mounting for portability.



Features claimed: Although weighing only 265 lb., the 36 cfm. Spot-Air Compressor is large enough to operate four I-R tamping guns for track maintenance. It is used by pipeline construction and maintenance gangs for digging, pipe-tapping and backfill-tamping. A horizontal arrangement of three power cylinders and three air cylinders spaced alternately at 60-deg. intervals around a vertical single-throw crankshaft gives a smooth conversion of engine power into air power without need of a heavy flywheel.

1039

Slow-speed Power Drives

Manufacturer: Sterling Electric Motors, Inc., Los Angeles.

Equipment: Electric drives available in single phase, capacitor-type design, equipped with single or double reduction gears.

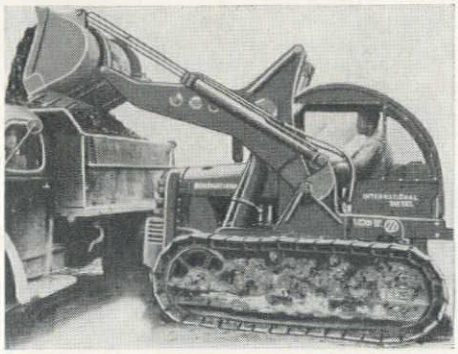
Features claimed: Motors utilize a starting relay that eliminates the necessity for centrifugal switches or any rotating devices, thus reducing maintenance.

1040

Tractor Shovel

Manufacturer: Service Supply Corp., Philadelphia.

Equipment: Front-end and overhead loading shovels for International crawler tractors.



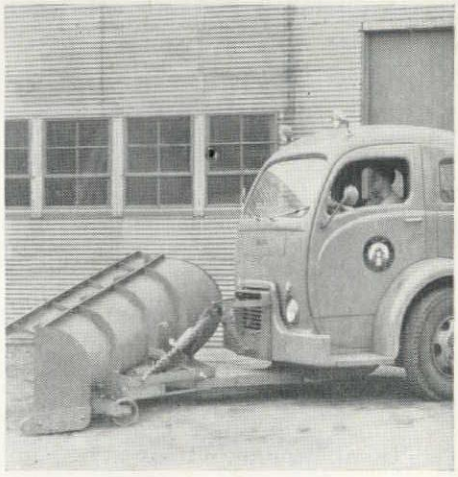
Features claimed: The 1-yd. Lodover greatly increases loading production, because it allows the tractor to operate without constantly turning around. Output is stepped up as much as 50%. Lodover operates effectively on streets with heavy traffic and under overhead obstructions. Many attachments available.

1041

Truck and Snow Plow

Manufacturer: White Motor Co. and Good Roads Machinery Co.

Equipment: White 3000 truck with dump body and snow plow attachment, especially for highway and street department use.



Features claimed: Plow blade and frame

detaches easily. Hydraulic jack for raising and lowering the plow is easy to get at and is equipped with single detachable joints.

1042

Invisible Water Repellant

Manufacturer: United Laboratories, Inc.

Equipment: Liquid coating which, when applied to unpainted exterior masonry or stone surfaces, repels water and moisture.

Features claimed: Hydropel after application actually makes rain and snow bounce back on contact. The water-repellant quality also prevents dirt and soot from being driven into the pores along with moisture. Tiny pores at the surface and below are coated—not filled—with Hydropel. This process allows masonry to continue its normal and necessary breathing process. May be applied by brush or spray. Usually one coat is sufficient and a gallon will ordinarily cover from 100 to 300 sq. ft. per gal., depending on porosity of the surface. Dries in about 2 hours. Does not form a film on the surface and lasts indefinitely.

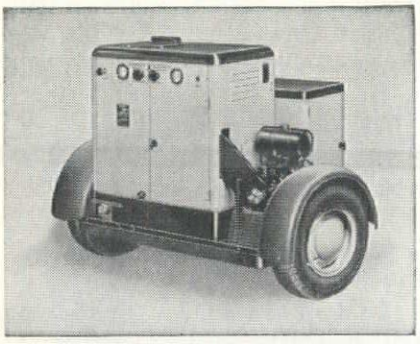
1043

Steam Cleaner

Manufacturer: Clayton Manufacturing Co., El Monte, Calif.

Equipment: Gasoline engine-powered steam cleaner for every type of cleaning in the field.

Features claimed: Model AR combines in one unit the advantages of a steam cleaner and a modified version of high pressure washing equipment. Volume and pressure from the rinse unit are ample for rinsing and knocking off mud and heavy encrustations prior to steam cleaning. Machines have been tested under extreme climatic and geographical conditions.

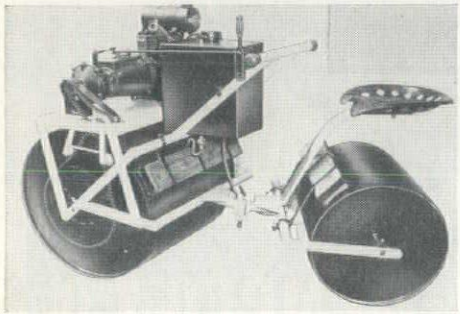


1044

Bituminous Surface Roller

Manufacturer: Gabb Manufacturing Co., Windsor Locks, Conn.

Equipment: Motoroller equipped with water tank, spray bars, and cocoa mats for speeding up hot-top surface construction.



Features claimed: Series AR tandem model roller prevents adhesion when compacting bituminous concrete and other material, because its drums are constantly kept wet. The wet-drum development greatly facilitates use of the Motoroller in construction on hot-top surfaces such as sidewalks, basketball courts, and tennis courts.

1045

Dividers for Steel Shelving

Manufacturer: Equipto, Aurora, Ill.

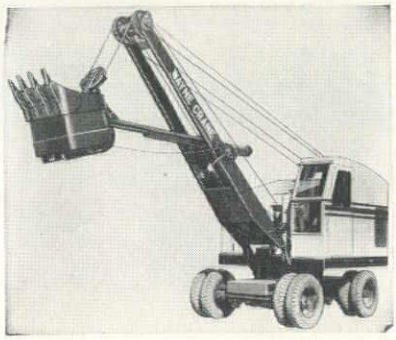
Equipment: Tilt-divider for parts bins and drawers that stops hand injuries.

Features claimed: This separator gives full visibility regardless of how full the drawer is. Dust-proof grooved side panels on these tilting drawers give positive rigid adjustment of dividers.

1046

½-yd. Crane Shovel

Manufacturer: Wayne Crane Division, American Steel Dredge Co., Inc., Fort Wayne, Ind.



Equipment: Shovel that travels, lifts, booms and swings simultaneously or independently.

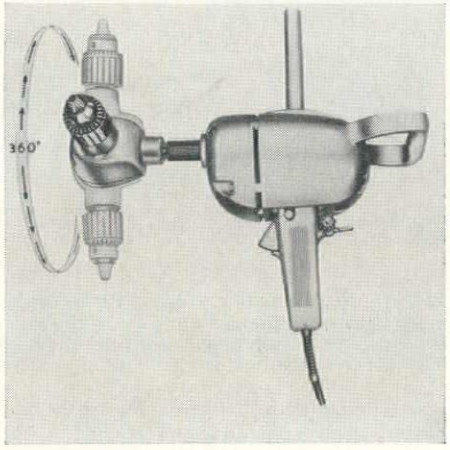
Features claimed: Model 20 has a 10-ton lifting capacity with extended outriggers and auxiliary counterweight. The self-propelled, rubber-mounted machine has a working weight of 30,360 lb., is easily convertible to all front-end attachments.

1047

2-Speed Drill

Manufacturer: Cummins Portable, Chicago, Ill.

Equipment: Drill with all-angle head feature for getting into tight spots often inaccessible with an ordinary drill.



Features claimed: This tool can speed up work tremendously and has an extremely wide range of usefulness; it uses its low speed of 275 rpm. for deep boring, its high speed of 1,100 rpm. for small holes and drilling lumber. Capacities range from ½ in. in steel to 4 in. in soft woods.

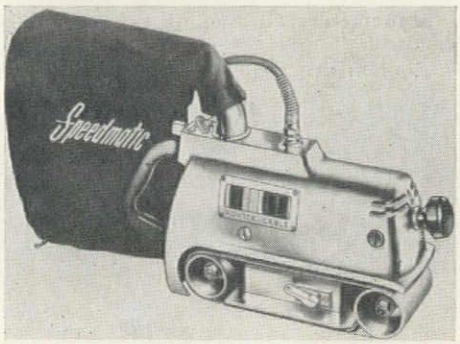
1048

Heavy-duty Belt Sander

Manufacturer: Porter-Cable Machine Co., Syracuse, N. Y.

Equipment: Dustless four-in. sander for quality sanding in quantity production.

Features claimed: The big belt on the



Speedmatic Model 500 Sander contains 33% more sandpaper area, assuring more work between belt changes. The sander produces an excellent straightline finish on such metals as stainless steel and aluminum sheet. Assures fast removal of paint, varnish, shellac and other finishes from large flat surfaces without using torches or solvents. Belt can be changed in seconds.

1049

Rust-proof Steel Replacement

Manufacturer: United States Plywood Corp.

Equipment: Glass-fiber tube and pipe material with strength of steel and resistance to rust and corrosion.

Features claimed: Glasweld is a laminated tubing in which glass fibers, in the form of cloth, mat or tape, are bonded with resins to develop a rugged tube impervious to extreme heat, chemical action and sledgehammer blows.

1051

Trailer-type Spreader

Manufacturer: Wausau Iron Works, Wausau, Wis.

Equipment: Low cost, self-contained unit attachable to any dump truck.

Features claimed: The sturdy axle and differential of this spreader provides power for both hopper agitator and spinner. It

discharges an even coating of sand, cinders, chips, lime, calcium or other materials from 8 ft. to 20 ft., depending upon truck speed and fender setting. Thickness of the coating is regulated by a lever within safe, easy reach of the operator. Another lever regulates width of spread and control of left side for oncoming traffic.

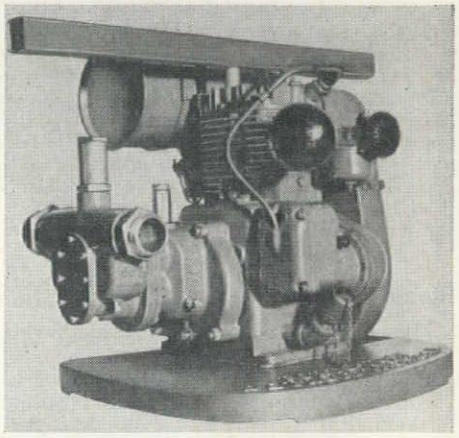
1052

Rubber Gear Pump

Manufacturer: Porto Pump, Inc., Detroit.

Equipment: Pump for pressure testing and chlorinating water mains.

Features claimed: Portable pump quickly develops required pressures up to 200 lb.



and delivers g.p.m. at free flow. In addition to use on water mains, it is excellent for cleaning dirty earth moving equipment; is efficient for spraying and jetting; has unusual value for fire fighting purposes because it can take water from any source.

NEW LITERATURE

YOU MAY OBTAIN any of the publications reviewed below. Send your request to Western Construction, 609 Mission St., San Francisco 5, Calif. The literature is free, unless otherwise indicated. Please designate the desired items by number.

★★★★★★★★★★★★★★★★★★★★★★★★★★

1053

SELF-PRIMING PUMPS—New catalog bulletins have been made available by **Rice Pump & Machine Co.,** Milwaukee, which completely describe the Rice 3-in., 15M self-priming centrifugal pump, as well as the 7M and 10M pumps. The bulletins tell about such improvements in Rice pumps as: bellow-type shaft seals entirely enclosed within a cartridge, hardened steel wearing plates, built-in check valve, large clean-out openings, trash-type impellers.

1054

PICTURE EQUIPMENT INDEX—**Syntron Co.,** Homer City, Pa., has published a 44-pg. catalog with brief descriptions, specifications, and pictures for each Syntron product. Intended to serve as a handy pocket-sized reference booklet, the catalog includes mention of the full lines of electric vibrators, feeders, selenium rectifiers, electric hammers, drills, and saws.

1055

TRENCHER BULLETIN — **Parsons Co.,** Newton, Ia., announces a catalog describing recent improvements made on its Model 221 Trenchliner. Attractively printed and illustrated, the 12-pg. book shows in detail how the Trenchliner is suited to handle road and airport drainage work, underground conduit, water and gas main trenching.

1056

SELECT CORRECT P.I.V. DRIVE—P.I.V. variable speed drives, available in 8 sizes and 16 types, in horsepowers of ½ to 25, with manual and automatic controls, are illustrated, listed and described in a new 88-pg. book published by **Link-Belt Co.,** Chicago. A special feature of the new book is the convenience with which a P.I.V. of the right specifications for a specific service may now be selected directly from its 36 pages of pre-selected drives.

1057

DEEP WELL TURBINE PUMPS—This 20-pg. booklet has large illustrations showing construction details, various types of drive and typical installations of deep well turbine pumps manufactured by **The Deming Co.,** Salem, O. Cutaway drawings and photographic views are enhanced by blue and yellow color plates emphasizing the outstanding features of these pumps, which are furnished for wells with inside diameter of four in. or larger.

1058

STRUCTO BUILDING TOOL CATALOG—**Arrow Tools, Inc.,** Chicago, has placed on the market a new line of tools for use by building contractors, steel fabricators, bridge builders, road and street contractors, under the trade name of Structo. A catalog describing the line is ready for distribution. The line consists mainly of moils and chisels for concrete breaking, sledges, hammers, rivet sets, tongs, wrenches, drift pins, and air hammer tools.

1059

POWER SHOVEL WITH 1-YD. CAPACITY—The Lorain-50 series of

power shovels and cranes is presented in a catalog published by **The Thew Shovel Co.**, Lorain, O. The one-yd. shovel is the first machine in that class to be equipped with a hydraulic coupling as standard equipment. The catalog describes and illustrates new features such as swing clutches, one-piece cast steel turntable bed, air controls for steering, and tread lock. Four different size crawlers are available in this series as shovel, dragline, clamshell, crane, and hoe.

1060

CHOICE OF MOUNTINGS FOR SHOVELS AND CRANES—An 18-pg. catalog, published by **The Thew Shovel Co.**, Lorain, O., describes the Lorain-TL series of power shovels and cranes in the ½ and ¾-yd. classes, which may be mounted on a wide variety of crawler and rubber tire mountings according to varying ground and travel needs. The many combinations available to choose from are explained in detail in this new catalog.

1061

SAND CONDITIONER—A Nite-Gang bulletin lists 20 improvements recently incorporated in its motive sand preparation unit, manufactured by **Beardsley & Piper, Division of Pettibone-Mulliken Corp.**, Chicago. Capacity of the Nite-Gang has been increased from 40 to 50 tons per hour of blended, iron-free, thoroughly screened and aerated sand. Bulletin lists complete operation and construction details.

1062

CHAIN SAWS IN ONE AND TWO-MAN MODELS—A brightly illustrated folder issued by **Reed-Prentice Corp.**, Dept. R-14, Worcester, Mass., explains the features of the R-P Model 50 chain saws. One-man models range in cutting capacity from 20 in. to 36 in., while two-man models equipped with an idler-type tailstock are offered in 24-in., 30-in., 36-in., 48-in., and 60-in. capacities.

1063

ABC'S OF WELDING HIGH TENSILE STEELS—In simple question and answer form, this booklet, issued by **Arcos Corp.**, Philadelphia, shows guide buyers and users the importance and effectiveness of low hydrogen electrodes for welding (1) low alloy, high tensile steels, (2) mild steel under highly restrained conditions, and (3) sulphur-bearing free machining steels.

1064

SURVEYING AND ENGINEERING INSTRUMENT CATALOG—Transits, engineers levels, alidades, and other instruments are described in the revised edition of Catalog No. 50, published by **W. & L. E. Curley.** The 66-pg. catalog illustrates various stages in the manufacture of Curley instruments, from lens grinding to collimation.

1065

AIR COMPRESSORS—**Ingersoll-Rand,** New York, offers a bulletin describing its T Series stationary air compressors. The series consists of two lines: one designed for normal industrial pressures of 100-125 lb.; the other rated at 200 lb. for continuous service, and up to 250 lb. on intermittent pump-up service. The bulletin shows various sizes and models and gives cross-sectional views, engineering data, sizes and dimensions.

1066

DIAL-CONTROLLED VARIDRIVE MOTORS—A colorful bulletin exhibiting 15 features of the recently developed low-priced line of fractional horsepower Varidrive motors, manufactured by **U. S. Electrical Motors, Inc.**, Los Angeles. The bulletin features the VA series of variable speed motors and illustrates seven modifications of the design, including three-phase and single-phase, combination geared drives and types with flanged bracket for direct connection to the driven machine.

1067

DUAL CRUSHING PLANTS—A catalog on dual portable plants for crushing, screening, and loading has been issued by **Smith Engineering Works,** Milwaukee, Wis. A color spread shows typical Telsmith dual plant installations, from the dual portable with plant-mounted feed hopper and truck loading conveyor, to the dual portable combined with a complete washing and screening plant.

1068

FIREPROOFING WITH PERLITE—Two reports, published by **Perlite Institute** of New York, supply a comprehensive amount of basic information on perlite plaster and concrete. They give mix proportions in plaster, "k" factors and strength of concrete in several densities. Also included are 17 detailed fire resistance ratings by ASTM standard methods.

1069

GRADER IN ACTION—A neat 20-pg. two-color catalog presenting **Allis-Chalmers'** new 34.7-hp. Model D Grader has been released by the company's Tractor Division. A lively front cover action picture shows the low cost Model D handling a large windrow. A panel of 15 action pictures portrays the machine in bank sloping, ditch pulling, shoulder work, scarifying, road maintenance operations, and several rear-end loader applications. This

model incorporates several features usually found only on big graders: tandem rear-wheel drive, tubular frame design, and rear-mounted engine-transmission construction for improved visibility.

1070

TROUGHING IDLERS—New information on troughing idlers and return idlers, which eliminate high-speed rattle, is available in two folders issued by **The Conveyor Co.** of Los Angeles. Each type troughing idler is designed for specific fields of use, varying from sanitary food handling to rugged operations in mines, smelters, pits and quarries.

1071

"WOLMANIZED" LUMBER—A 44-pg. illustrated report covering 25 years of service records, a case history file, for "Wolmanized" pressure-treated lumber has been published by the **American Lumber & Treating Co.**, Chicago. Considered one of the most extensive files in the wood preserving industry, this report cites the case histories of more than 55,000,000 board feet of treated material in service and lists 581 specific installations where this clean-treated, decay and termite-resistant wood has been used. Use classifications break down to: wet process industries, docks and boardwalks, railroad structures, bridges and highway structures, mines, refrigeration plants, buildings, water works, and stadiums, records for which are charted in the report.

1072

EQUIPMENT FOR EXPORTING—**D. W. Onan & Sons, Inc.**, Minneapolis, Minn., manufacturers of electric generating equipment, and an active exporter for many years, has prepared an interesting booklet describing the entire line of Onan products available to the export market. Included in the 12-pg. folder is a list of suggestions for negotiating export documents. Electric generating plants, both gasoline and diesel powered, are shown. Four different models of water-cooled marine generating plants are illustrated, and a special section describes electric plant accessories which include rubber-tired, 2-wheel dollies, automatic controls, line transfer controls, gas-gasoline carburetors, and heat exchangers.

1073

SEALING WITH RUBBER PUTTY—A catalog section on its Plastikon rubber putty, recommended for many types of glazing and sealing, and particularly suitable where vibration, corrosion or moisture exists, has been published by **The B. F. Goodrich Co.** The section cites the advantages of the product, gives directions for use and lists stock colors and grades.

1074

HAND-HELD ROCK DRILLS—This **Worthington Pump and Machinery Corp.** bulletin contains pictures and specifications for the WS-45 drill with cylinder bore of 2⅝ in., 52-lb. weight and 19-in. length. The WS-55, with cylinder bore of 2⅝ in., weighs 62¾ lb. and is 20½ in. in length. The third drill described is the WS-30 drill with cylinder bore of 3 in.; it is 83 lb. in weight and 23¾ in. in length. Design features are described and screw feed mountings specified in the bulletin.

1075

BITUMINOUS JOINTING COMPOUND—**The Atlas Mineral Products Co.** announces the publication of a bulletin on its G-K Sewer Joint Compound. G-K Compound is a bituminous jointing compound in use for almost a half century for making quality, permanent joints. This bulletin contains handy tables showing the quantities of the compound required for each joint of sewer pipe.

1076

CONDENSED REFERENCE FOR WIRE ROPES—Complete and quick reference for all information pertaining to plow steel wire rope can be found in a bulletin published by **Macwhyte Co.**, Kenosha, Wis. Breaking strength and weight for each size rope are contained in a single large table. The bulletin contains information on how to order wire rope; it explains and describes wire rope construction for each classification.

1077

COMPLETE LINE OF STEEL DERRICKS—Steel derricks, with capacities of up to 250 tons, are shown in a 36-pg. handsomely-printed catalog, published by **American Hoist & Derrick Co.**, St. Paul, Minn. Six different types of derricks are treated separately in sections which include complete specifications, outline drawings, and full-page operating pictures. Following these sections are complete construction details from boom point to sill connections. To assist users, one page is devoted to the correct method of determining boom length for lifting a required load to a predetermined height at a given radius.

1078

HOW A WELLPOINT SYSTEM FUNCTIONS—"The Wellpoint System in Principle & Practice" is not a catalog but a handbook, published by **Griffin Wellpoint Corp.**, 881 East 141st St., New York 54, containing information on how a wellpoint system functions. It describes the method of planning, the layout, installation,

operation, and removal of the system. The 102-pg. manual is pocket-sized and illustrated with 59 photographs and diagrams. The price is $1.50 per copy, but contractors and engineers may obtain a complimentary copy upon request.

1079

PLASTIC-LINED PIPE — **The Dow Chemical Co.** announces the availability of a catalog on Saran lined steel pipe, fittings, and valves. It deals with the properties and fabrication of material lined with Saran, which is a Dow plastic claimed to be resistant to most chemicals, oils, and solvents. Photographs, cross-section and dimensional drawings are included in the catalog.

1080

FIREPROOFING WITH PLASTER —Two folders on fireproofing with lightweight Permalite plaster have been made available by the **Building Products Division of Great Lakes Carbon Corp.**, New York. They will be of importance to anyone specifying building materials because they include an actual detailed drawing and a short form specification which can be copied verbatim as a part of a job specification. One of the folders is on the fireproofing of steel columns and gives necessary specifications for getting ratings of 1, 2, 3 or 4 hours. The other folder is on a suspended ceiling under non-combustible construction which has a 4-hour fire rating.

1081

STAINLESS STEEL CURTAIN WALL CONSTRUCTION — **Allegheny Ludlum Steel Corp.**, Pittsburgh, has published a 24-pg. interim progress report on proposed methods of curtain wall construction, in which prefabricated sections of stainless steel sheathing backed by insulating material would replace masonry or other materials in the construction of exterior walls of multi-story buildings. Scale drawings are employed to illustrate types of stainless steel curtain walls, noting details such as facings, insulation, joints, vents, and window sections.

1082

STUD WELDING—A 16-pg. illustrated booklet reprinting the chapter on "Stud Welding" from the third edition of the Welding Handbook, recently published by the American Welding Society, has been made available by the **Nelson Stud Welding Division of Morton Gregory Corp.**, Lorain, O. The article explains the stud welding method of fastening, describes the equipment and its principal uses, and gives stud locating procedures and other data.

1083

ANTI-RUST PAINT — **Speco, Inc.**, Cleveland, has published a bulletin describing Rustrem anti-rust paint and other remedy paint products. The bulletin lists complete instructions for use of Rostrem, which can be applied right over rust without wire brushing, scraping or sand-blasting. Other products described are Heat-Rem heat-resisting aluminum paint, Chem-Rem chemical-resistant black paint, and Wood-Rem wood-preservative paint.

1084

SLUDGE CONTROL VALVE—**The American Well Works**, Aurora, Ill., has published a technical supplement which gives complete design data on its Telescoping Sludge Control Valve as used in sewage and industrial waste treatment. Illustrations show a typical sludge valve installation view, alternate mountings, components of the assembly and exploded isometric. It also gives information on the use of the

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sludge control valve to adjust the quantity and quality of return activated sludge or settled tank contents for recirculation to other points in the process.

1085

INDUSTRIAL RUST PREVENTION—Rust protection is discussed thoroughly in a catalog published by **Rust-Oleum Corp.**, Evanston, Ill. Machinery and implement finishes, heat-resistant and chemical-resistant coatings, floor coatings, and sealers for materials other than iron and steel are featured in this catalog. Specifications given clearly indicate drying time, thinner requirements, and application methods.

1086

GUIDE TO STEEL SELECTION—A bulletin, prepared by **Joseph T. Ryerson & Son, Inc.**, Chicago, lists all popular grades of hot rolled and cold finished carbon and alloy steel bars, giving principal characteristics, mechanical properties and uses. It serves as a quick, convenient, and helpful guide to the selection of suitable and economical qualities of bar steel for miscellaneous jobs that come up in the average shop.

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