WESTERN CONSTRUCTION NEWS

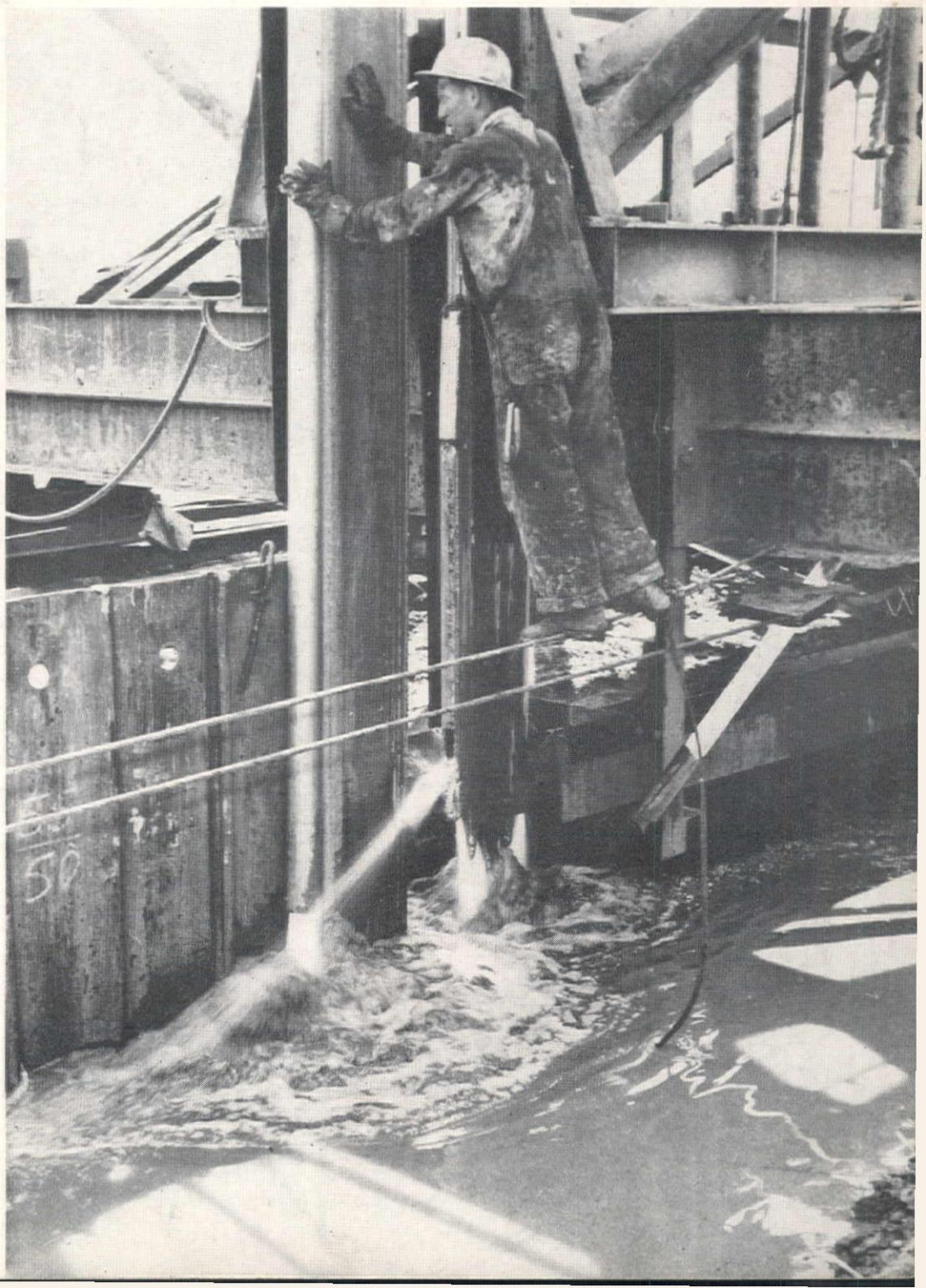
WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XXIV, No. 11

NOVEMBER 15 • 1949

35 CENTS A COPY
$4.00 PER YEAR

IN THIS ISSUE



DOUBLE JETTING the sheet piling for the cutoff under the fill at Garrison Dam. A spade jet is first sunk and withdrawn to open a hole and then needle jets follow down both sides of the pile as it is driven.

KEEP OUT RUST AND WEAR

ASSURE better compressor performance with the Texaco air compressor oils made to meet your operating conditions.

Photo Courtesy Joy Mfg. Co., Sullivan Division

No guesswork when you lubricate with Texaco air compressor oils. There is a complete line of them so that, *regardless of your operating conditions,* you can be sure of clean valves, free rings, open ports and clear air lines. Here's the set-up —

For regular service, Texaco straight mineral oils.
For water conditions, Texaco compounded oils.
For rust prevention, Texaco rust-inhibited oils.
For severe service and elimination of carbon and gum troubles, Texaco heavy-duty oils.

All are designed to give you greater operating efficiency . . . prolong compressor life . . . reduce your maintenance costs.

To be sure of getting the right lubricants for your compressors, let a Texaco Lubrication Engineer help you select them. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LONGER LIFE FOR OPEN GEARS

Lubricate open gears with Texaco Crater X Fluid. It goes on as a liquid, then quickly forms a tough, long-lasting film that absorbs noise, shock and wear. Gears last much longer, with this economical protection, easily applied by brushing, spraying or pouring.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Buy for the TOUGH JOBS!

. . . and the easy jobs take care of themselves!

Another Northwest in Rock! — and did you ever notice how many Northwests you see in rock?

It has everything a real Rock Shovel needs, and when you have a real Rock Shovel you never have to worry about output in any kind of digging.

The Dual Independent Crowd — independent plus automatic — utilizes force other shovels waste. Cast steel machinery bases and machinery side-frames keep shafts in alignment and reduce wear on bearings under the strain of rock digging. The Cushion Clutch eliminates the effect of shock overload on parts under power. The "Feather-Touch" Clutch Control increases output by assuring easier operation and the *feel of the load* when handling the "big ones". These are just a few of the advantages you won't find on other shovels — just a few of the features that will make more money for you in the heart of your job. Plan ahead to have a Northwest for your *Key Spots*. Let us tell you how.

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

cal NORTHWEST sales agents

BUTTE, MONTANA
Hall-Perry Machinery Co.

SIDNEY, MONTANA
Northland Machinery Co.

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

PHOENIX, ARIZONA
State Tractor & Equip. Co.

PORTLAND, OREGON
Balzer Machinery Co.

CHEYENNE, WYOMING
Wilson Equip. & Supply Co.

DENVER, COLORADO
Constructors Equipment Co.

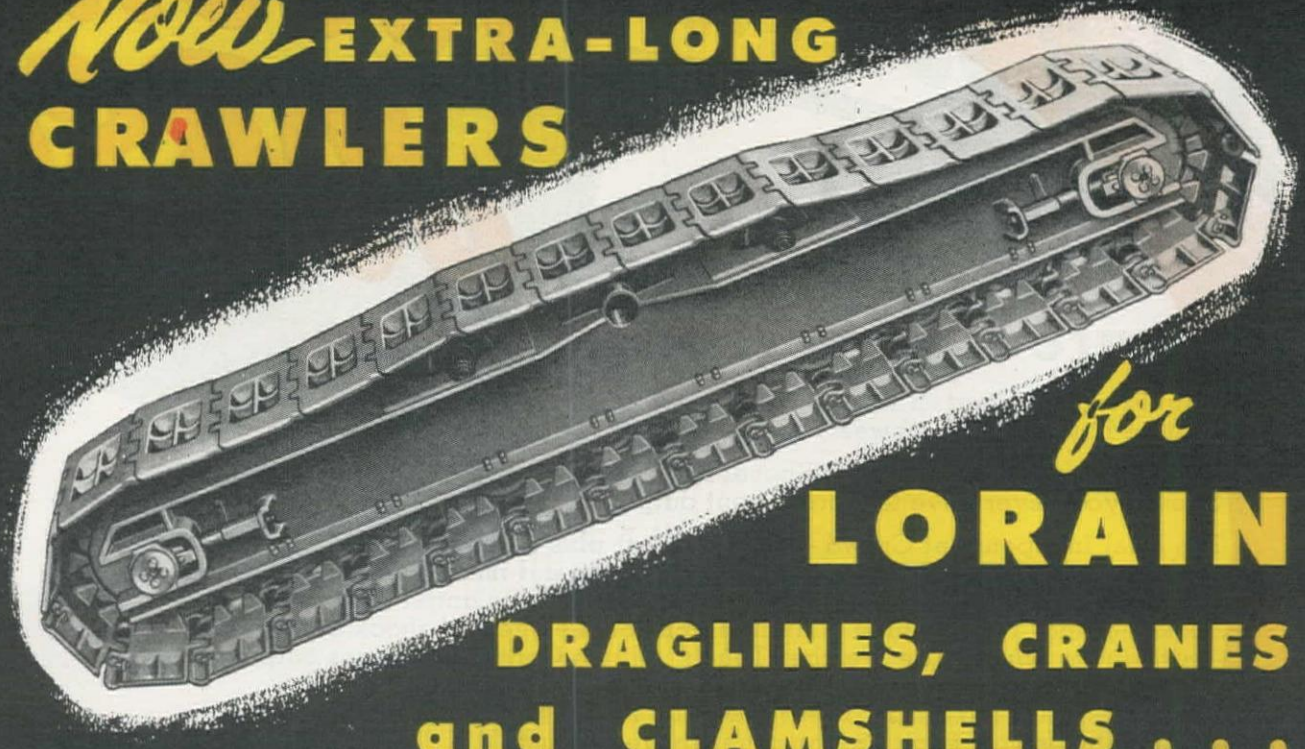
NORTHWEST SALES OFFICES:

LOS ANGELES, CALIF.
3707 Santa Fe Ave.

SAN FRANCISCO, CALIF.
255 Tenth Street

SEATTLE, WASHINGTON
1234 Sixth Ave., South

Now EXTRA-LONG CRAWLERS



for LORAIN DRAGLINES, CRANES and CLAMSHELLS . . .

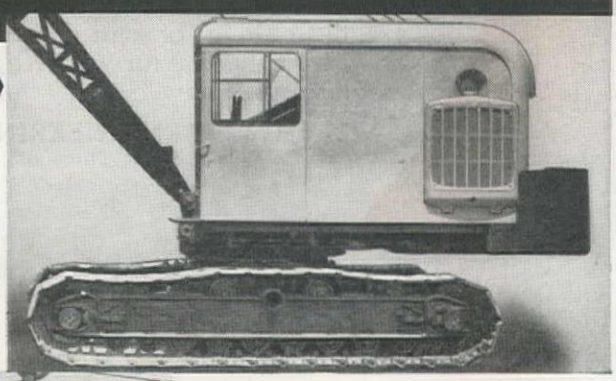
OVER 160 LORAIN COMBINATIONS *To Select From*

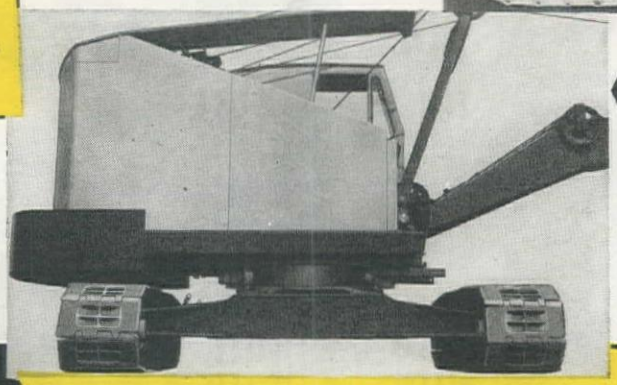
3 series of models with new capacities and many new crawler and rubber-tire mountings, make the Lorain line more complete than ever before . . . the most complete assortment in the field. Today your Thew-Lorain distributor can fit your requirements exactly.

THE THEW SHOVEL CO.
LORAIN, OHIO

ENJOY THESE EXTRA-LONG CRAWLER *Advantages . .*

1. Greater ground bearing areas.
2. Lower ground pressures.
3. Improved soft-ground flotation.
4. Elimination of "nosing-in" while digging.





EXTRA-WIDE CRAWLERS, *Too*

1. Available for TL and L-50 series.
2. Straddle wide trenches.
3. Distributes crawler ground pressures to prevent cave-ins.

MORE FOR YOUR $ IN A LORAIN

See Your **THEW® Lorain** *Distributor*

ANDREWS EQUIPMENT SERVICE OF WASHINGTON, INC.
Spokane, Wash.

BUNTING TRACTOR CO., Inc.
Boise, Twin Falls, Gooding, Fairfield, Burley, Carey, Idaho

CATE EQUIPMENT CO.
Salt Lake City 4, Utah

CENTRAL MACHINERY CO.
Great Falls and Havre, Mont.

COAST EQUIPMENT CO.
San Francisco 3, California

A. H. COX & COMPANY
Seattle 4, Tacoma & Wenatchee, Wash.

P. L. CROOKS & CO., INC.
Portland 10, Ore.

INLAND MACHINERY CO.
LaGrande, Oregon

LE ROI-RIX MACHINERY CO.
Los Angeles 22. Branches: Bakersfield, Long Beach 6, Calif.

LIBERTY TRUCKS & PARTS CO.
Denver 1

MOUNTAIN TRACTOR CO.
Missoula and Kalispell, Mont.

LEE REDMAN EQUIPMENT CO.
Phoenix, Arizona

SOUTHERN IDAHO EQUIPMENT CO.
Idaho Falls, Idaho

TRACTOR & EQUIPMENT CO.
Sidney, Mont. Branches: Miles City, Glasgow, Mont.

WORTHAM MACHINERY CO.
Cheyenne, Wyo. and Billings, Mont. Branches: Sheridan, Greybull, Casper and Rock Springs, Wyo.

Editorial Director
JAMES I. BALLARD

Editor
JOHN M. SERVER, JR.

Managing Editor
John J. Timmer

Associate Editor
Richard C. Clark

Washington Editor
Arnold Kruckman

News Editor
Arthur J. Urbain

Editorial Assistant
M. A. Carroll

Staff Correspondents
R. E. Livingston
A. E. Niederhoff
B. Thompson
O. N. Malmquist
F. H. Fullerton

Published Monthly by
KING PUBLICATIONS
609 Mission Street
San Francisco 5, California
Phone YUkon 2-4343

Arthur F. King . . . . . President
L. P. Vrettos . . V.-P. & Treasurer
L. B. King . . . . . Secretary
V. C. Dowdle . . Advertising Mgr.
E. F. Hubbard . Circulation Mgr.
R. J. Kamlade . Production Mgr.

Please address all communications to the San Francisco Office

District Offices

NEW YORK OFFICE
Franklin B. Lyons, District Manager
Weston Road, Georgetown, Conn.
Telephone Georgetown 374

CLEVELAND OFFICE
Richard C. Burns, District Manager
7708 Deerfield Dr.,
Cleveland 29, Ohio
Telephone TUxedo 5-1848

CHICAGO OFFICE
A. C. Petersen, District Manager
3423 Prairie Ave., Brookfield, Ill.
Telephone Brookfield 532

SAN FRANCISCO OFFICE
R. C. Williams, District Manager
609 Mission St., San Francisco 5, Calif.
Telephone YUkon 2-4343

LOS ANGELES OFFICE
C. G. Beardslee, District Manager
3757 Wilshire Blvd., Los Angeles 5
Telephone DUnkirk 4-9462

WASHINGTON OFFICE
Arnold Kruckman, Washington Editor
1120 Vermont Ave., N.W.
Washington 5, D. C.
Telephone DIstrict 8822

ABC

Subscription Rates

The annual subscription rate is $4 in the United States and countries in the Pan American Postal Union. To Canada, England, Australia and New Zealand, $5 per year; all other countries, $11.00 per year. Single Copies, 35¢

Entered as Second Class Matter at the Post Office in San Francisco, California under the Act of March 3, 1879.

WESTERN CONSTRUCTION NEWS

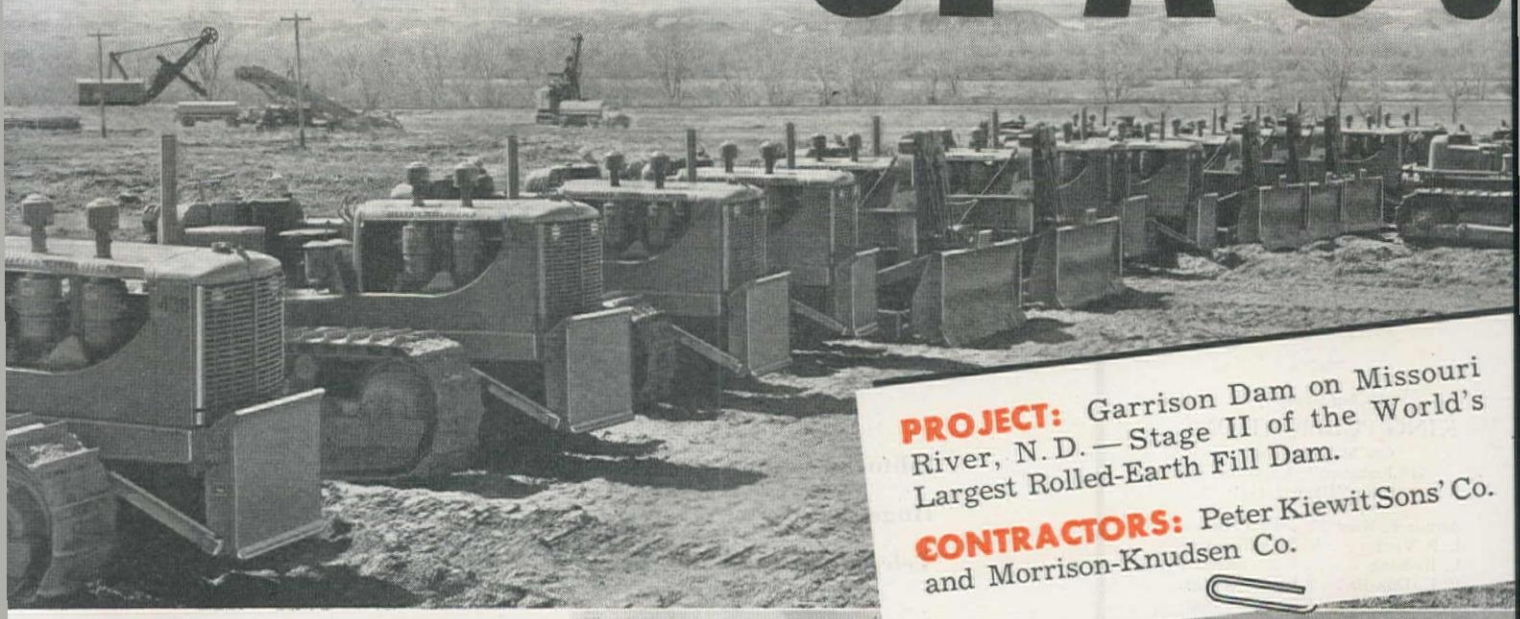
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

Volume 24 **NOVEMBER 15 • 1949** Number 11

TABLE OF CONTENTS

Covering Construction in the Western Half of the United States

FLEETS OF A-C's



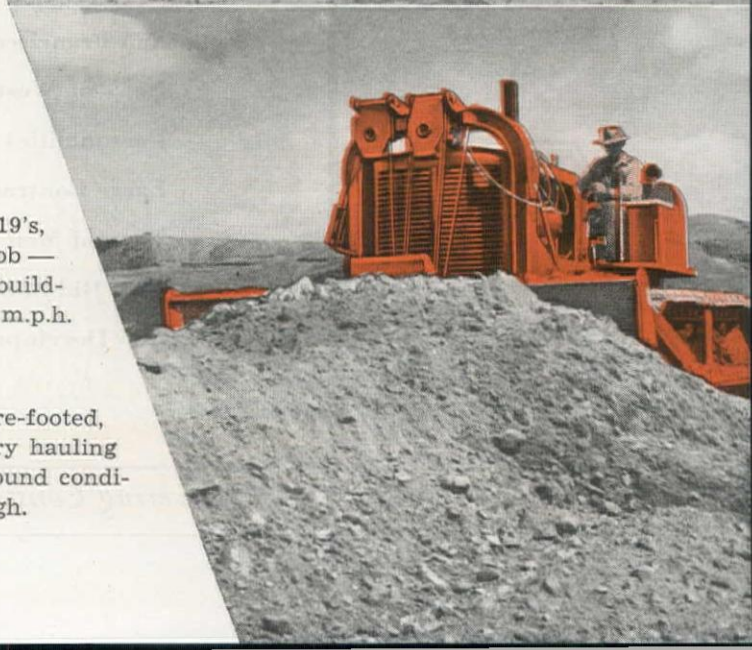
PROJECT: Garrison Dam on Missouri River, N. D. — Stage II of the World's Largest Rolled-Earth Fill Dam.

CONTRACTORS: Peter Kiewit Sons' Co. and Morrison-Knudsen Co.

42 HD-19 HYDRAULIC TORQUE CONVERTER TRACTORS

PULL and PUSH BIG LOADERS (right)—Heavy, powerful HD-19's keep big loaders operating at capacity in the tough going. Synchronize speeds — start and stop with throttle . . . no constant clutching. Spillage is negligible, there's less wear and tear on loader and tractors.

BOOST HAULING UNITS — HD-19's with pusher plates, "patrol" the job . . . keep the heavily loaded wagons moving through the mucky material. Catch them quickly, make a smooth contact and stay with 'em — match speeds exactly.



HANDLE ALL TYPES OF BULLDOZING (right)—Fleets of '19's, with matched 'dozers, are everywhere, speeding up every job — clearing, leveling fills, cleaning up around shovels, sloping, building haul roads, pulling equipment. High reverse — to 5.5 m.p.h. No worrying about overloads — can't kill engine.

PULL SCRAPERS, ROLLERS, OTHER EQUIPMENT — Big, sure-footed, better-balanced HD-19's really bear down and lug on every hauling job. Automatically move equipment as fast as load and ground conditions permit — up to 3.0 m.p.h. in low, to 7.0 m.p.h. in high.

help rush big job

12 MODEL AD MOTOR GRADERS

KEEP HAUL ROADS SMOOTH — A continuous procession of big hauling units tear, whip and grind the earth as they travel. Keeping the way smooth, to keep the material moving fast, is the job assigned to the fleet of A-C Motor Graders . . . plus cutting and sloping banks. Strong, powerful, fast, diesel-powered Allis-Chalmers Motor Graders can "take on" the toughest jobs, handle them smoothly, quickly, at lowest possible cost. Only A-C Motor Graders have the "Roll-Away" Moldboard — less power required to move more material at faster speeds.

HD-5 WITH TRACTO-SHOVEL

VERSATILE — There's no limit to the applications of this outfit with its many interchangeable attachments. Here it picks up oversize rock from the fill with specially designed forks. Small stones go through the forks, the big ones remain — and are loaded into trucks. Think of the savings on man-hours! Other attachments include various sizes and types of buckets, bulldozer blades and a "V" snowplow.

SEE YOUR ALLIS-CHALMERS DEALER

ARIZONA
Phoenix—Neil B. McGinnis

NORTHERN CALIFORNIA
Oakland—Buran Equipment Co.
Modesto—J. M. Equipment Co.
Fresno—Food Machy. & Chemical Corp.
Paso Robles—E. C. Livingston Co.
Sacramento—Moore Equipment Co., Inc.
Stockton—Moore Equipment Co., Inc.
Mountain View—Redwine Tractor Co.
Visalia—Tulare County Tractor Co.

SOUTHERN CALIFORNIA
Bakersfield—San Joaquin Tractor Company
Los Angeles—Shaw Sales & Service Co.

IDAHO
Boise—Olson Manufacturing Co.
Idaho Falls—Southern Idaho Equip. Co.

MONTANA
Missoula—Mountain Tractor Co.
Sidney—Northland Machinery Co.
Billings—Seitz Machinery Co., Inc.

NEVADA
Reno—Moore Equipment Co., Inc.
Elko—C. W. Paul Hardware & Machy.

OREGON
The Dalles—Mid-Columbia Supply & Equipment Co.
Eugene—Farm & Industrial Equip. Co.
La Grande—Oregon Tractor Co.
Medford—Tractor Sales & Service, Inc.
Redmond—Tri-County Equip. Co., Inc.
Klamath Falls—West Hitchcock Corp.
Portland—Wood Tractor Co.

UTAH
Salt Lake City—Cate Equip. Co., Inc.

WASHINGTON
Seattle, Tacoma and Wenatchee—A. H. Cox & Company
Walla Walla—Northern Harris
Spokane—Fred M. Viles & Co., Inc.
Yakima—Wikstrom Motors, Inc.

WYOMING
Casper—Studer Tractor & Equip. Co.

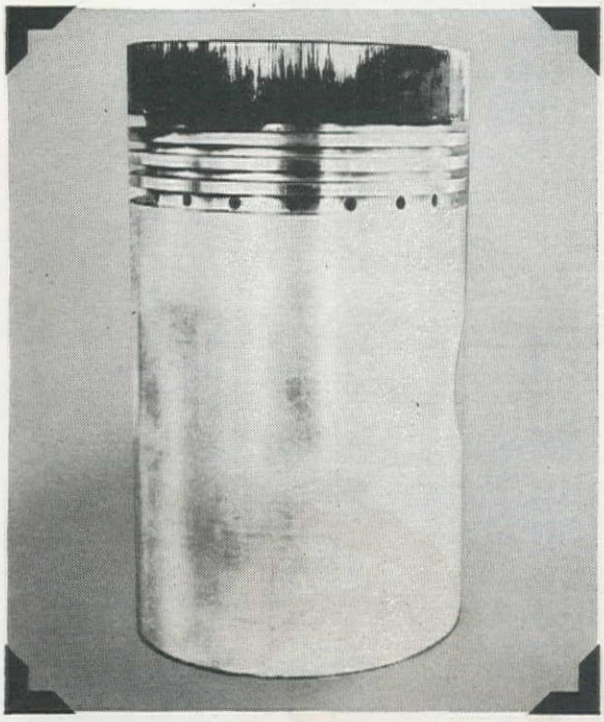
STANDARD ENGINEER'S REPORT

RPM DELO

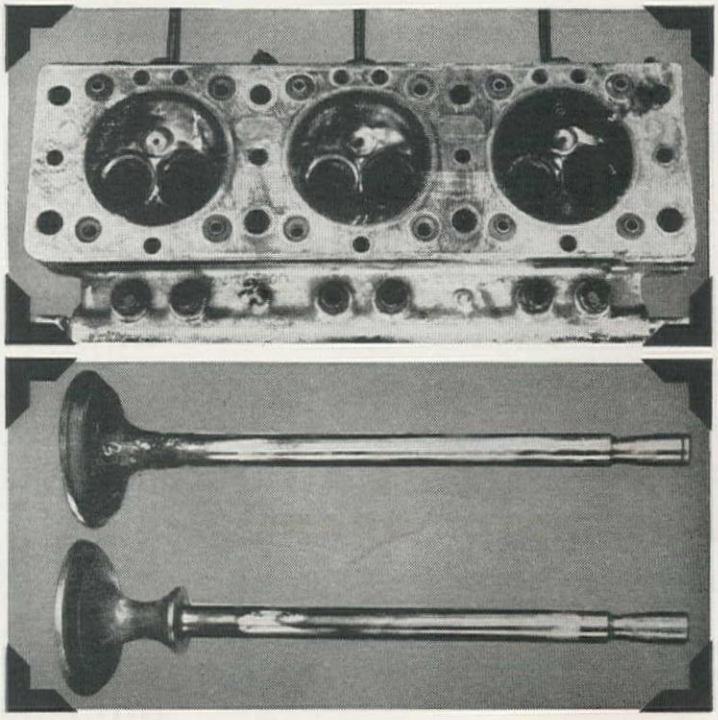
TEST DATA

LUBRICANT	RPM Delo Supercharged Lub. Oil
UNIT	Caterpillar Diesel - D13000 5¾×8"
CONDITIONS	Cont. high load - Pumping water
FUEL	Regular commercial Diesel fuel
TEST PERIOD	4 months
LOCATION	Coolidge, Arizona

CYLINDER WEAR REDUCED 75% BY NEW LUBRICATING OIL



RPM DELO SUPERCHARGED LUBRICATING OIL held cylinder wear to 0.0007 inches per 1000 hours in a stationary Diesel where ordinary heavy-duty type oil had allowed over four times more wear, or 0.0031 inches. The piston, head, and valves above, photographed after they had operated in the engine 965 hours under severely accelerated conditions on RPM DELO Supercharged, are typical of the excellent condition of parts and cleanliness maintained throughout the engine by this newly developed oil. All piston skirts were varnish-free, all oil-return holes open. Average ring-gap increase per 1000 hours was reduced from 0.01625 inches to 0.00350 by the use of RPM DELO Supercharged Lubricating Oil.



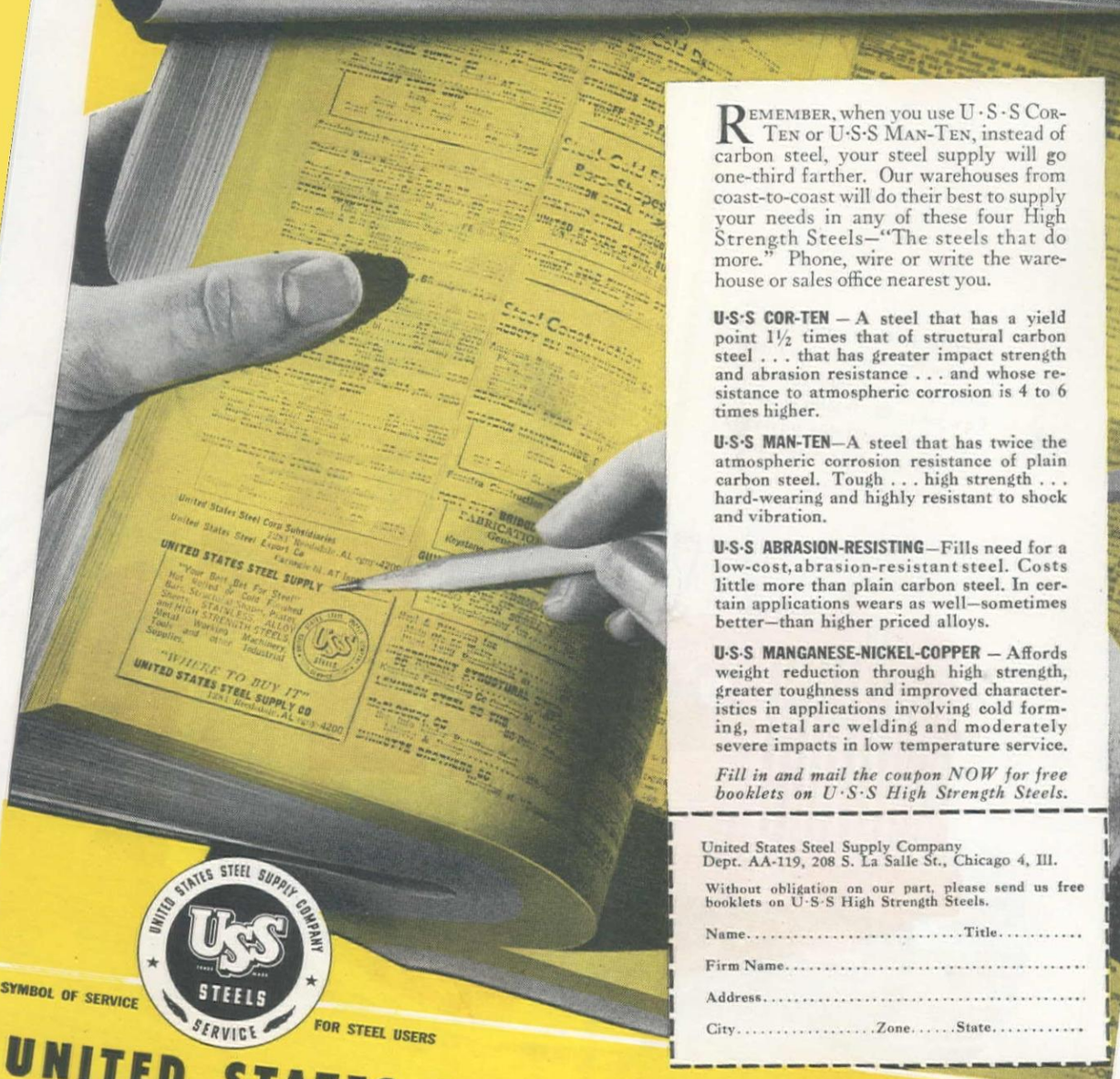
REMARKS: This new product in the RPM DELO line is specially compounded to solve ring-sticking, deposit formation, and excessive wear problems in Diesel engines operating in extra hard service. Many field tests have proved it to be particularly valuable where continuous high loads or high-sulphur content Diesel Fuels cause these conditions.

In the test reported here, the engine ran the full 965 hours at approximately 90% of governed full load engine rating. Drain periods were extended to 240 hours, however all 24 piston rings remained free, no troublesome deposits formed in the ring belt or on other parts, and oil compound depletion was negligible.

Besides providing unusual resistance to oxidation, the compounds in RPM DELO Supercharged Lubricating Oil clean existing gum and lacquer from parts, prevent internal rusting and bearing corrosion and stop oil foaming.

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

WHEN YOU NEED HIGH STRENGTH STEELS—*CALL Us!*



REMEMBER, when you use U·S·S COR-TEN or U·S·S MAN-TEN, instead of carbon steel, your steel supply will go one-third farther. Our warehouses from coast-to-coast will do their best to supply your needs in any of these four High Strength Steels—"The steels that do more." Phone, wire or write the warehouse or sales office nearest you.

U·S·S COR-TEN — A steel that has a yield point 1½ times that of structural carbon steel . . . that has greater impact strength and abrasion resistance . . . and whose resistance to atmospheric corrosion is 4 to 6 times higher.

U·S·S MAN-TEN—A steel that has twice the atmospheric corrosion resistance of plain carbon steel. Tough . . . high strength . . . hard-wearing and highly resistant to shock and vibration.

U·S·S ABRASION-RESISTING—Fills need for a low-cost, abrasion-resistant steel. Costs little more than plain carbon steel. In certain applications wears as well—sometimes better—than higher priced alloys.

U·S·S MANGANESE-NICKEL-COPPER — Affords weight reduction through high strength, greater toughness and improved characteristics in applications involving cold forming, metal arc welding and moderately severe impacts in low temperature service.

Fill in and mail the coupon NOW for free booklets on U·S·S High Strength Steels.

United States Steel Supply Company
Dept. AA-119, 208 S. La Salle St., Chicago 4, Ill.

Without obligation on our part, please send us free booklets on U·S·S High Strength Steels.

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

Firm Name.....

Address.....

City.....Zone.....State.....

UNITED STATES STEEL SUPPLY COMPANY · SYMBOL OF SERVICE · USS STEELS · SERVICE · FOR STEEL USERS

UNITED STATES STEEL SUPPLY COMPANY

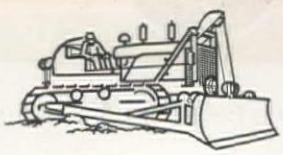
SAN FRANCISCO (1), P. O. Box 368, 1940 Harrison St., MArket 1-4988, ENterprise 1-0017 (Trans-Bay Only)
LOS ANGELES (54), P. O. Box 2826—Terminal Annex, 2087 E. Slauson Ave., LAfayette 0102
SEATTLE (4), Washington, Cor. 3rd So. & Lander St., ELliott 3014
PORTLAND (10) ORE., 2345 N.W. Nicolai St., CApitol 3283

Warehouses: BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH · PORTLAND, ORE. · SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL)
Also Sales Offices at: KANSAS CITY, MO. · PHILADELPHIA · TOLEDO · TULSA · YOUNGSTOWN

UNITED STATES STEEL

This TD-24, shown spreading its load on the crest of an earthfill dam, speeds up work cycles from cut to fill. It turns in new records for profitable payloads. No other crawler tractor can match it in work capacity.

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS



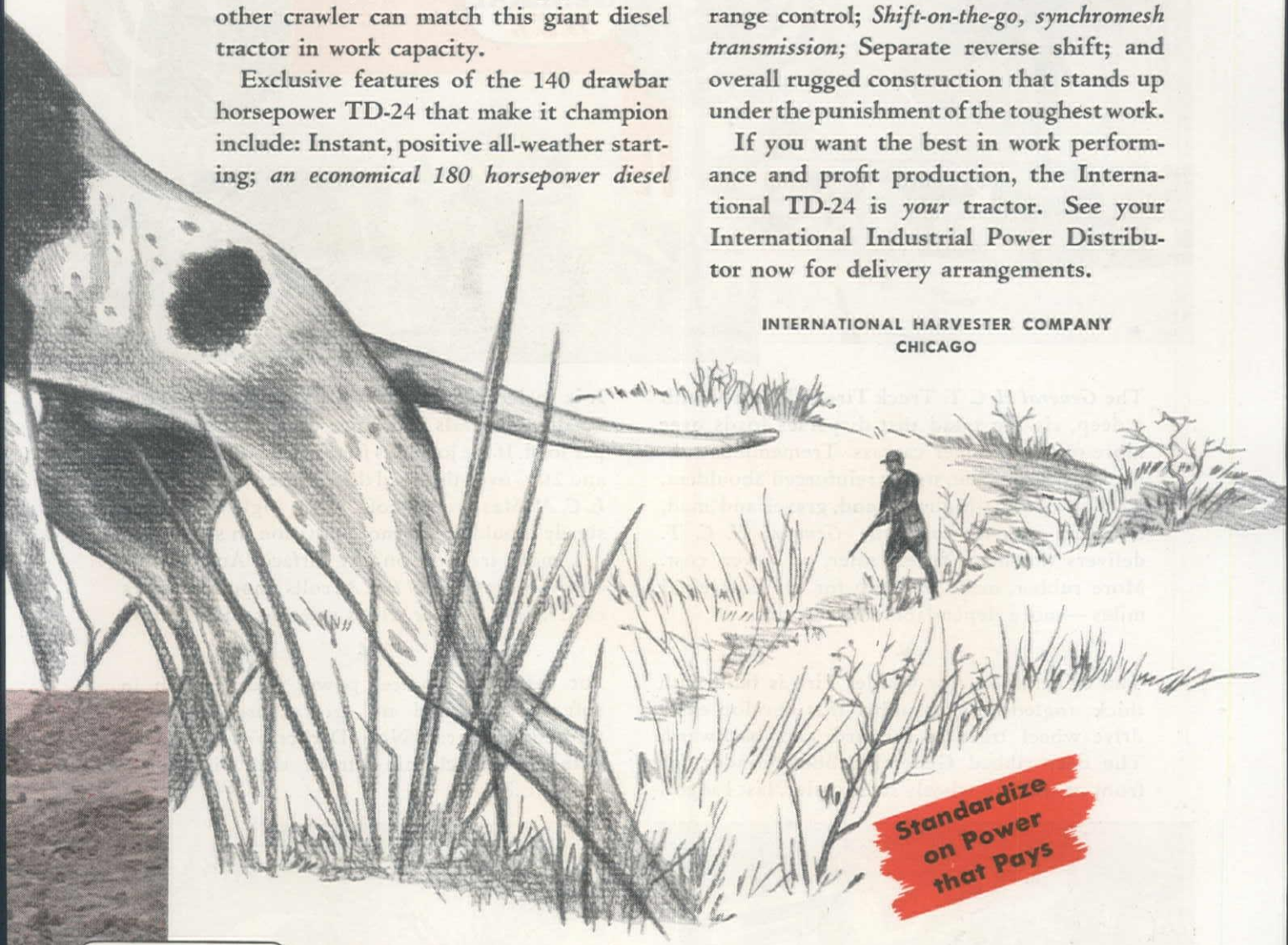
CHAMP

For a performance advantage that pays bigger profits, put the job-proved *champion* of all crawlers—the International TD-24—on your earthmoving jobs. No other crawler can match this giant diesel tractor in work capacity.

Exclusive features of the 140 drawbar horsepower TD-24 that make it champion include: Instant, positive all-weather starting; *an economical 180 horsepower diesel engine;* "Planet-power" steering which means greater drawbar pull on turns; *8 speeds forward and 8 in reverse with speeds to 7.8 m.p.h.;* Finger-tip high-low speed range control; *Shift-on-the-go, synchromesh transmission;* Separate reverse shift; and overall rugged construction that stands up under the punishment of the toughest work.

If you want the best in work performance and profit production, the International TD-24 is *your* tractor. See your International Industrial Power Distributor now for delivery arrangements.

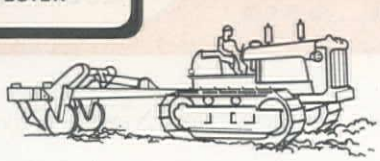
INTERNATIONAL HARVESTER COMPANY
CHICAGO

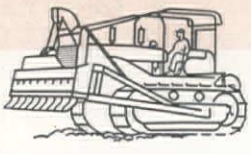


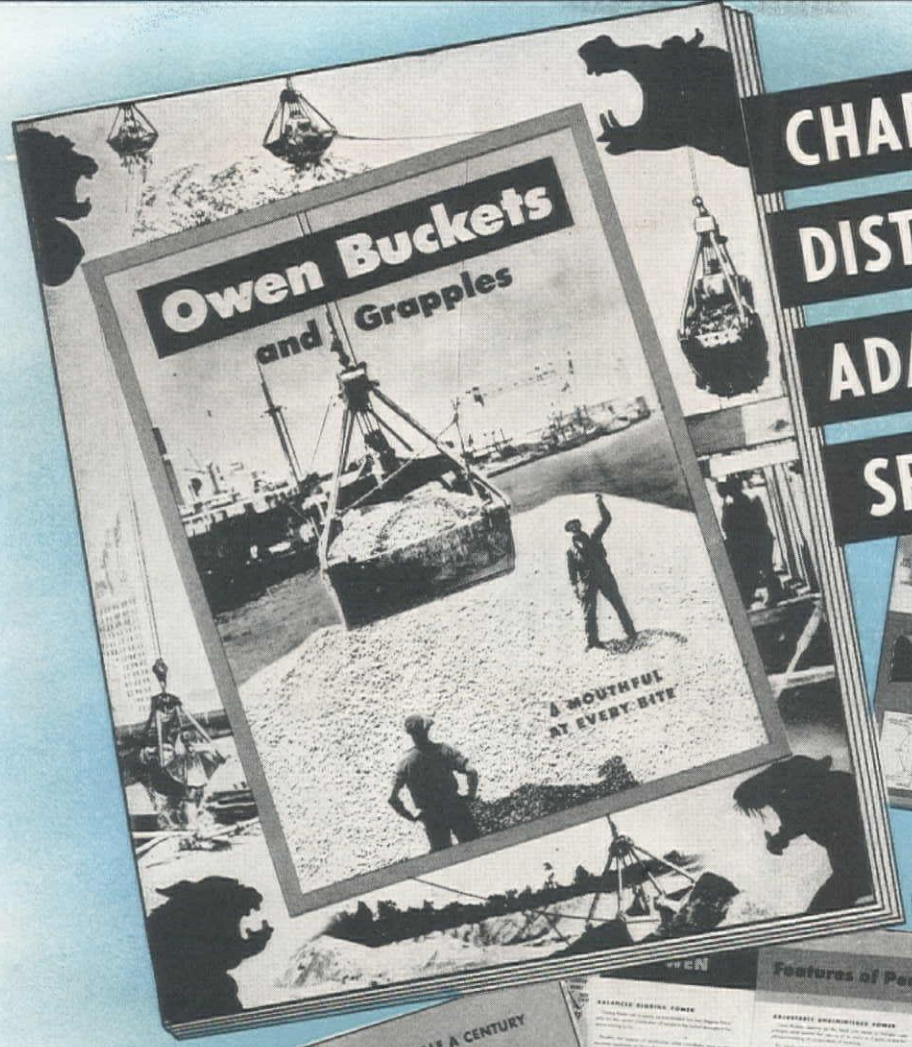
Standardize on Power that Pays

INTERNATIONAL HARVESTER

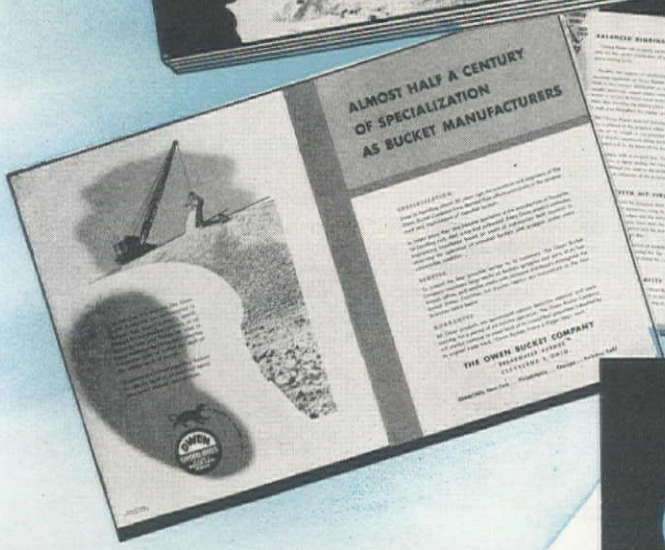
INTERNATIONAL
INDUSTRIAL POWER

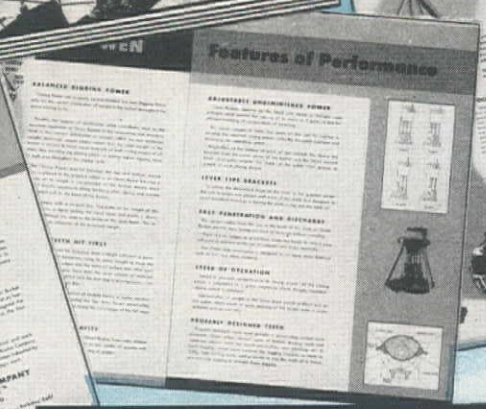


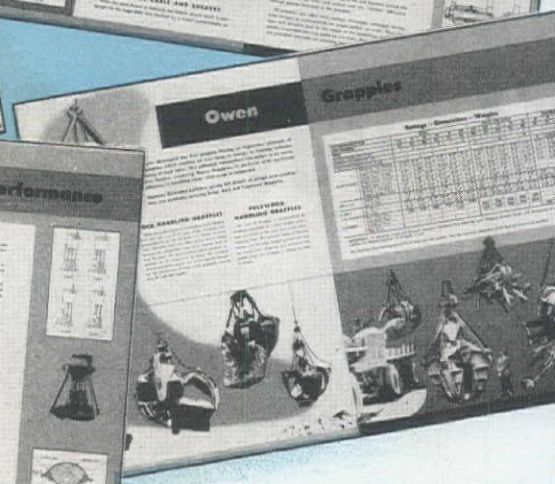




CHARACTERISTICS
DISTINCTIVE FEATURES
ADAPTABILITY
SPECIFICATIONS







The New Catalog of
Owen Buckets and Grapples

This and other helpful information to aid in selecting the proper bucket is contained in this profusely illustrated catalog. You'll want to be informed as to its contents.

TO ASSURE A MOUTHFUL AT EVERY BITE

SEND COUPON FOR YOUR COPY ➡

Date_____

THE OWEN BUCKET CO. 6060 Breakwater Avenue • Cleveland, Ohio

Branches_____

Name_____

Address_____ City_____

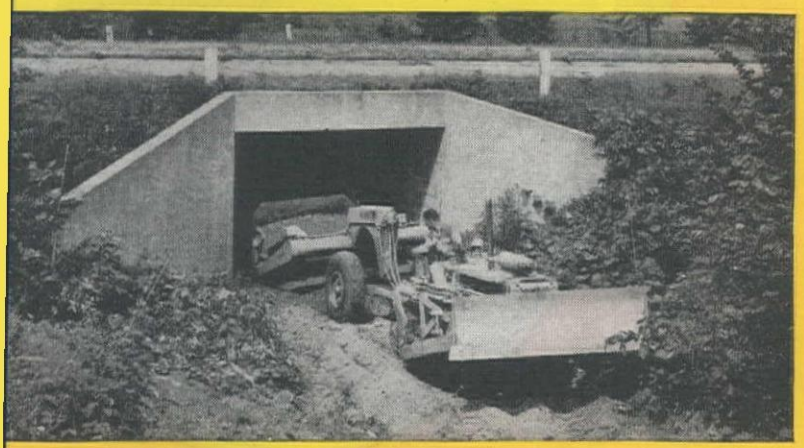
Company_____

Title_____

"Caterpillar" announces a NEW earthmoving power package

Working on 500-foot one-way hauls, this "Caterpillar" No. 40 Scraper loads an average of 46 yards per hour—360 cubic pay yards per 8-hour day. Proper blade angle and 43 drawbar hp. pile in heaping loads in less than a minute.

YOU may have thought of the "Caterpillar" Diesel D4 Tractor as a "small" unit. But there's nothing small about its production when teamed up with the "Caterpillar" No. 4A Bulldozer and the new No. 40 Scraper. Here's perfectly matched equipment that fits into any number of construction and maintenance programs. Some of its advantages are:



Ideal for the tough jobs, this "Caterpillar" package is small enough to get in and out of tight spots, yet a heaped scraper rating of 4½ cubic yards is an assurance of high production.

1. Low first cost and low operating cost, coupled with high production capacity.
2. An all-"Caterpillar" team, with units designed for each other. One dealer's service keeps all equipment in top working condition.
3. All-hydraulic controls. A handy changeover valve next to operator permits fast switching from 'dozer to scraper. One man can easily disconnect scraper from tractor.
4. The 'dozer blade can be angled or tilted to suit all needs.
5. Scraper blade designed for grader-smooth spreading close to vertical banks or structures.
6. 'Dozer-type ejection on the scraper pushes load forward and under the blade, spreading smoothly.
7. Rear tires mounted inside the cut allow loading or spreading close to vertical banks or structures.

Write today for full information on this money-saving, money-making earthmoving "package."

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

Specifications

"CATERPILLAR" DIESEL D4 TRACTOR

Drawbar Hp.	Belt Hp.	Weight*	No. Forward Speeds	Drawbar Pull** in Low Gear
43	48	10,060 lbs.	5	9450 lbs.

*Standard 44" gauge. **At rated engine speed.

"CATERPILLAR" NO. 40 SCRAPER

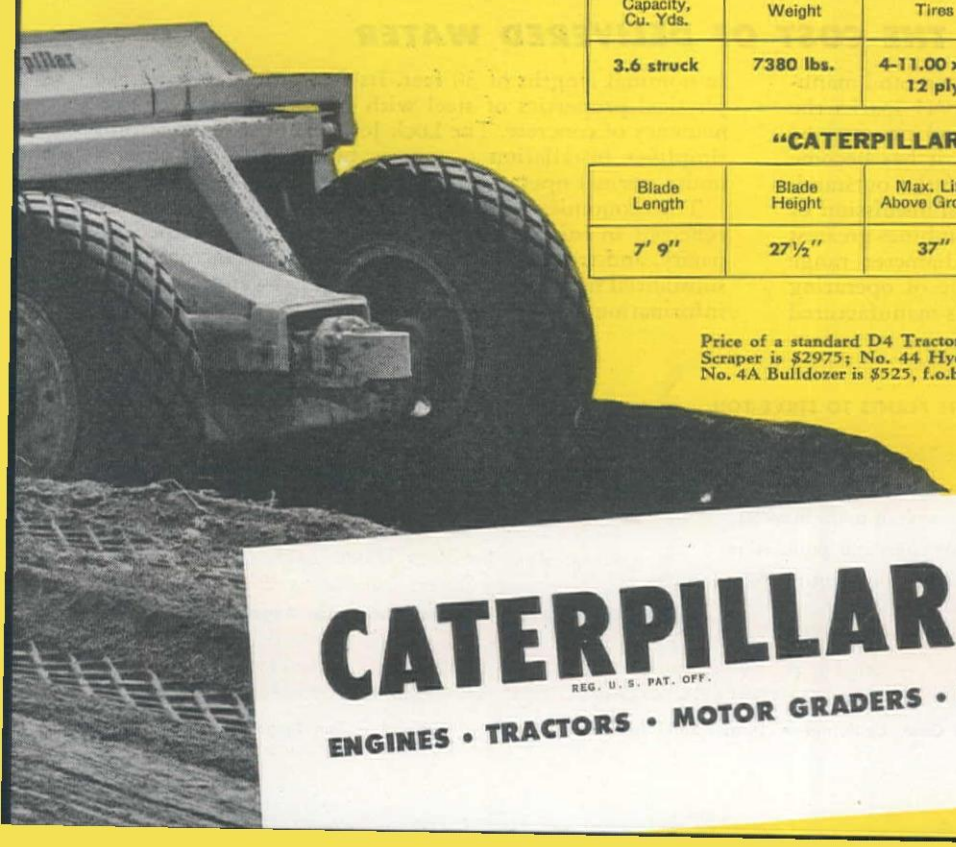
Capacity, Cu. Yds.	Weight	Tires	Blade Width	Overall Length	Width
3.6 struck	7380 lbs.	4-11.00 x 20 12 ply	6'	21'	7' 5½"

"CATERPILLAR" NO. 4A BULLDOZER

Blade Length	Blade Height	Max. Lift† Above Ground	Max. Drop Below Ground	Max. Blade Tilt	Blade Angle
7' 9"	27½"	37"	13¾"	6"	25°

†With blade angled 25°

Price of a standard D4 Tractor is $4425; No. 4A Bulldozer is $1380; No. 40 Scraper is $2975; No. 44 Hydraulic Control for use with No. 40 Scraper and No. 4A Bulldozer is $525, f.o.b. Peoria, Illinois, subject to change without notice.

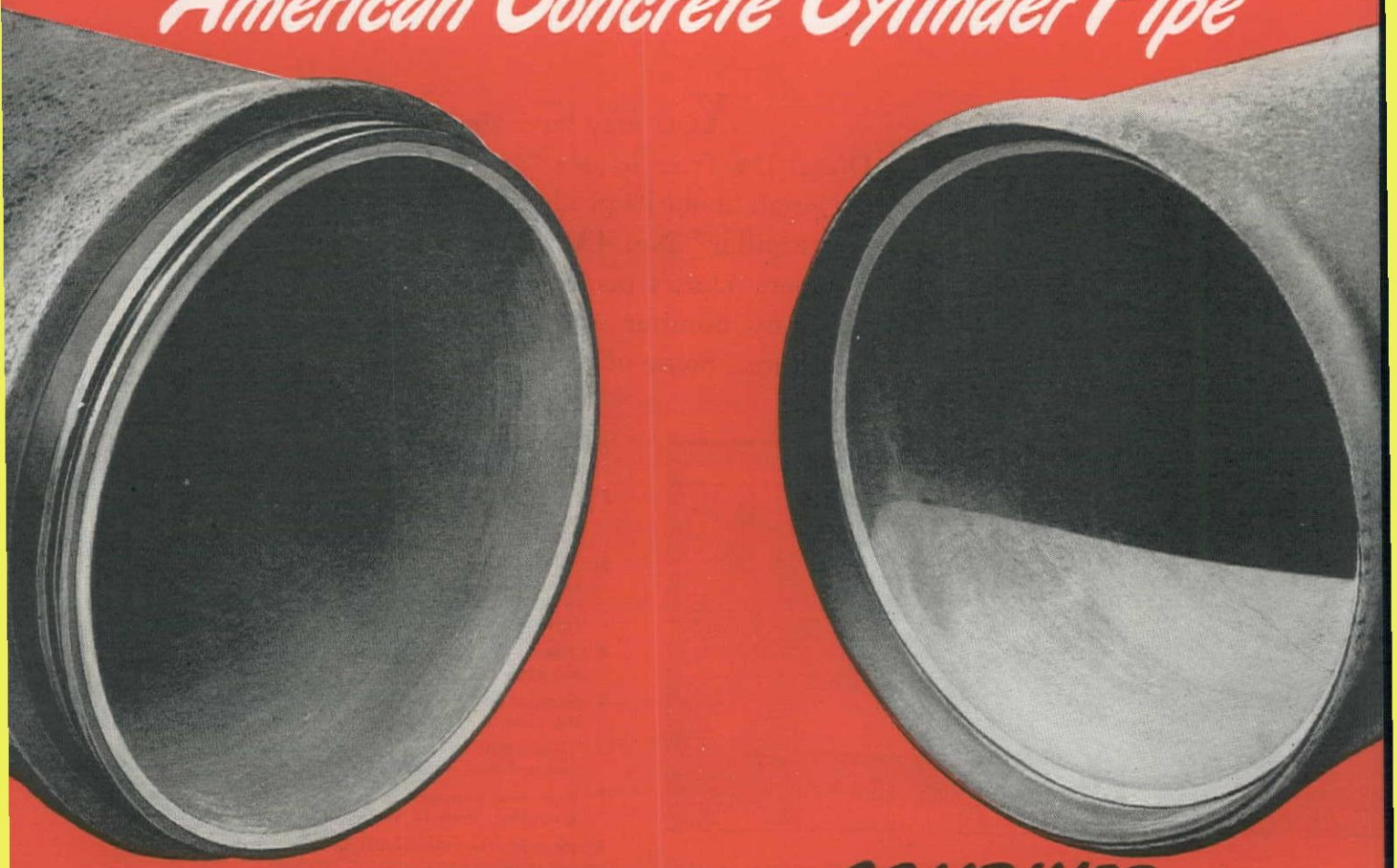


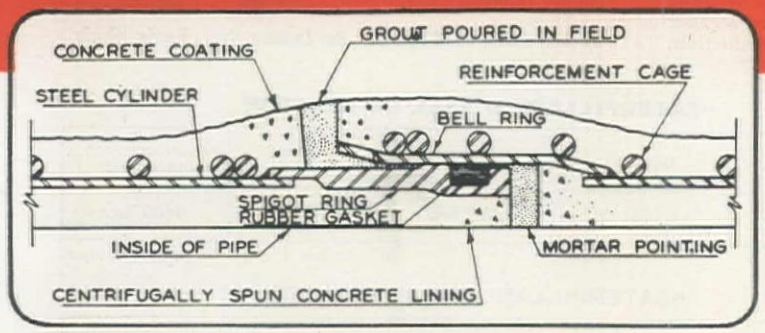
CATERPILLAR DIESEL

REG. U. S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

American Concrete Cylinder Pipe





COMBINES

- ✓ **The physical strength and characteristics of steel**
- ✓ **The positive protection and permanency of concrete, inside and out**
- ✓ **The simplicity, flexibility and safety of Lock Joint Rubber Gasket Joints**

TO REDUCE THE COST OF DELIVERED WATER

Although the Company began the development and manufacture of this pipe eighteen years ago, 1941 marks the first appearance of this composite, modified pre-stressed pipe in its present form. Since that time, it has become established throughout the West as one of the outstanding developments in the field of pressure transmission of water. American Concrete Cylinder Pipe combines greatest efficiency and economy in the medium diameter range from 14" to 36" inclusive and in the range of operating pressures from 100 psi upward. This pipe is manufactured in nominal lengths of 30 feet. Its design incorporates the physical properties of steel with the protection and permanency of concrete. The Lock Joint Rubber Gasket Joint simplifies installation — assures positive water-tightness under normal operating conditions.

The economies of American Concrete Cylinder Pipe are reflected in initial cost, ease of installation, sustained capacity, and trouble-free service. All of these factors mean substantial savings in the cost of delivered water. Complete information is available upon request.

THREE PLANTS TO SERVE YOU

Over 750,000 feet of American Concrete Cylinder Pipe are now serving more than 50 major cities and population centers throughout the West.

American PIPE AND CONSTRUCTION CO.

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

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

QUALITY PIPE LINE PRODUCTS MANUFACTURED AND INSTALLED BY AMERICAN INCLUDE . . . LOCK JOINT CONCRETE CYLINDER PIPE, AMERICAN CONCRETE CYLINDER PIPE, PRESTRESSED LOCK JOINT CONCRETE CYLINDER PIPE, CENTRIFUGAL CONCRETE PRESSURE PIPE

Main Offices and Plant — 4635 Firestone Boulevard, South Gate, California • District Sales Offices and Plants — Oakland — San Diego — Portland, Oregon

TYPICAL TRAXCAVATOR JOBS

Above — T6 TRAXCAVATOR tearing up old brick preparatory to re-surfacing a main thoroughfare.

Right Big T7 TRAXCAVATOR ripping up and loading broken concrete from a municipal airport runway.

Tough work — but not too tough for TRAXCAVATORS. These powerful tractor-excavators mounted on "Caterpillar" track-type tractors take these and other equally hard jobs in their stride . . . in less time and at greater profit to their owners.

They are the most versatile machines of their type in the world . . . put them to work excavating, tearing up old pavement, grading, leveling new or old streets, removing snow, or any other of the many jobs they are capable of doing and watch production go up and costs come down.

For full information on these multiple-purpose machines, see your Trackson-Caterpillar dealer today or write direct to the TRACKSON COMPANY, Dept. WC-119, Milwaukee 1, Wisconsin.

PROFITABLE

requires TOP LUBRICATION

On big earthmoving jobs around the world, Wooldridge Terra Cobras have piled up records for fast, dependable, low cost operation. This rugged equipment often operates at top speed day and night, for months at a time... under job conditions that vary from sub-zero to tropic temperatures, and include every type of soil and terrain.

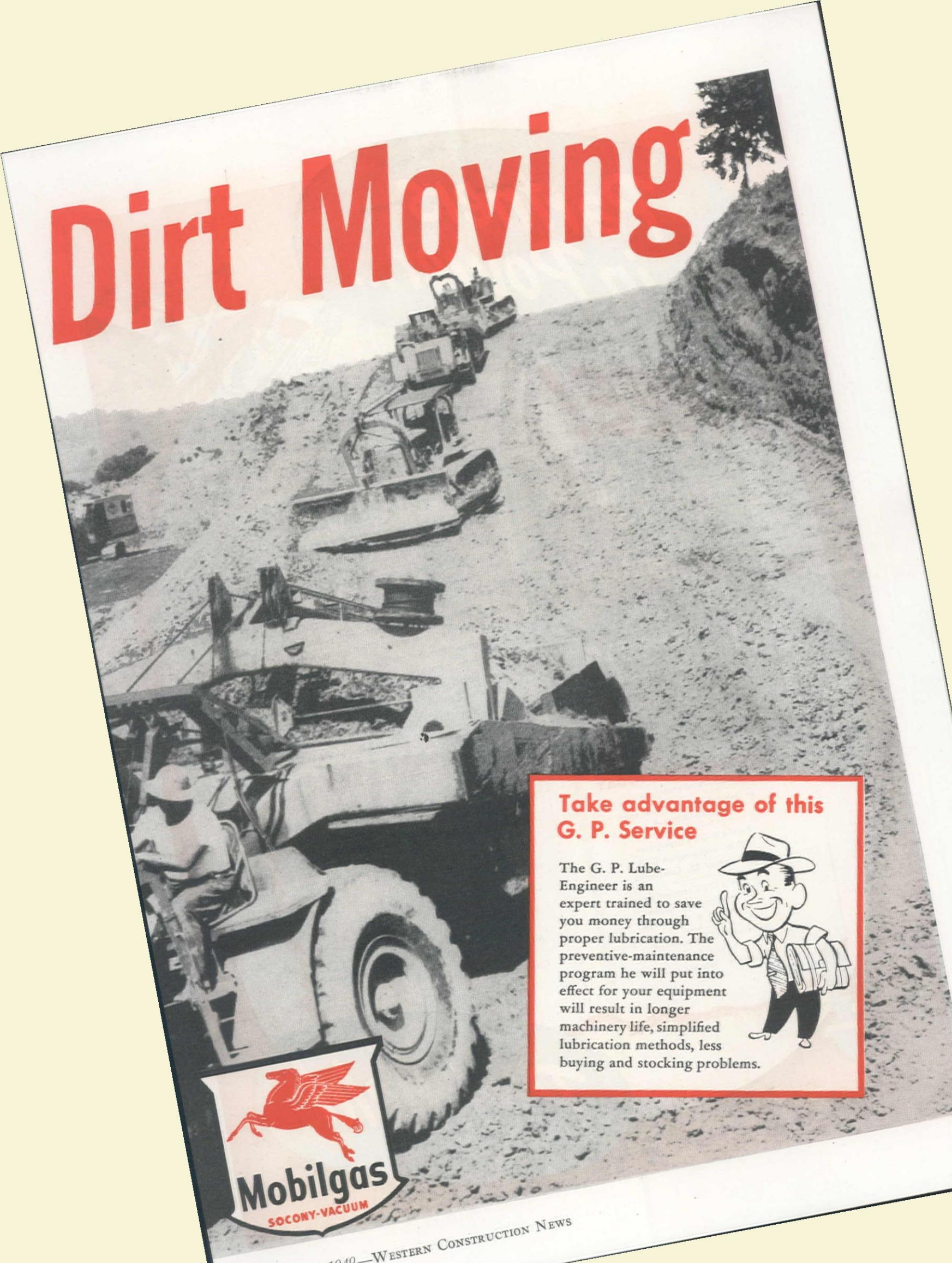
On these high-speed, heavy-duty jobs, Terra Cobras must have the protection of top lubrication, and that's what they get with approved Gargoyle and Mobil Products. This lubrication service is the Terra Cobra operator's best insurance against losses caused by breakdowns and replacements—a major help toward profits on earthmoving contracts.

"Profit-wise" contractors have found that it pays to use General Petroleum and Socony-Vacuum Products and the G. P. Lube Engineering Service for all their equipment lubrication needs.

GENERAL PETROLEUM
CORPORATION

Serving the West Since the Start of the Century

Dirt Moving



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.

Mobilgas
SOCONY-VACUUM

Partners in Power...

FREE!

Your Guide to Lower Costs with RICHFIELD

The West's Only Complete Line of Fuels and Lubricants that are fully rust-inhibited to give you More Power plus Lasting Engine Protection

SAVE TIME!
SAVE MONEY!

ONLY RICHFIELD GIVES YOU THIS COMPLETE ENGINE PROTECTION

Now — both Richfield fuels and lubricants are RUST-PROOFED. That means more power . . . greater economy . . . longer periods between overhauls . . . for your gasoline, Diesel and butane equipment. Only Richfield gives you this extra value — at no extra cost.

Learn more about Richfield's plan of *complete protection* against rust and corrosion. Send today for the free booklet, "Your Guide to Lower Costs." Or ask your Richfield agent for the full story of how Richfield gives you MORE POWER — PLUS RUST PROTECTION.

SEND COUPON TODAY

to address nearest you . . .

or get a free copy from your Richfield agent

Richfield Oil Corporation
155 W. Washington Blvd.
Los Angeles 15, California

Richfield Oil Corporation
333 Montgomery Street
San Francisco 4, California

Richfield Oil Corporation
217 Pine Street
Seattle 1, Washington

RICHFIELD OIL CORPORATION

(For fast service, send to nearest address at left.)

Without obligation, send me my FREE copy of Richfield's new manual, "YOUR GUIDE TO LOWER COSTS."

Name.....

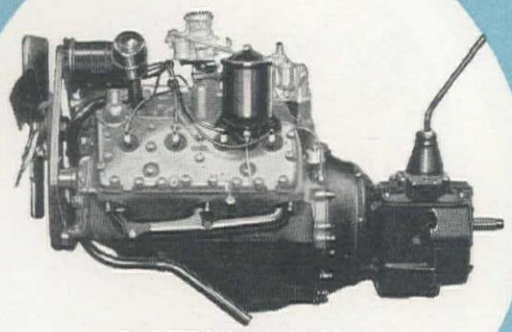
Firm name.....

Address.....

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

Richfield

Here's why FORD Power is RIGHT 3 Ways!

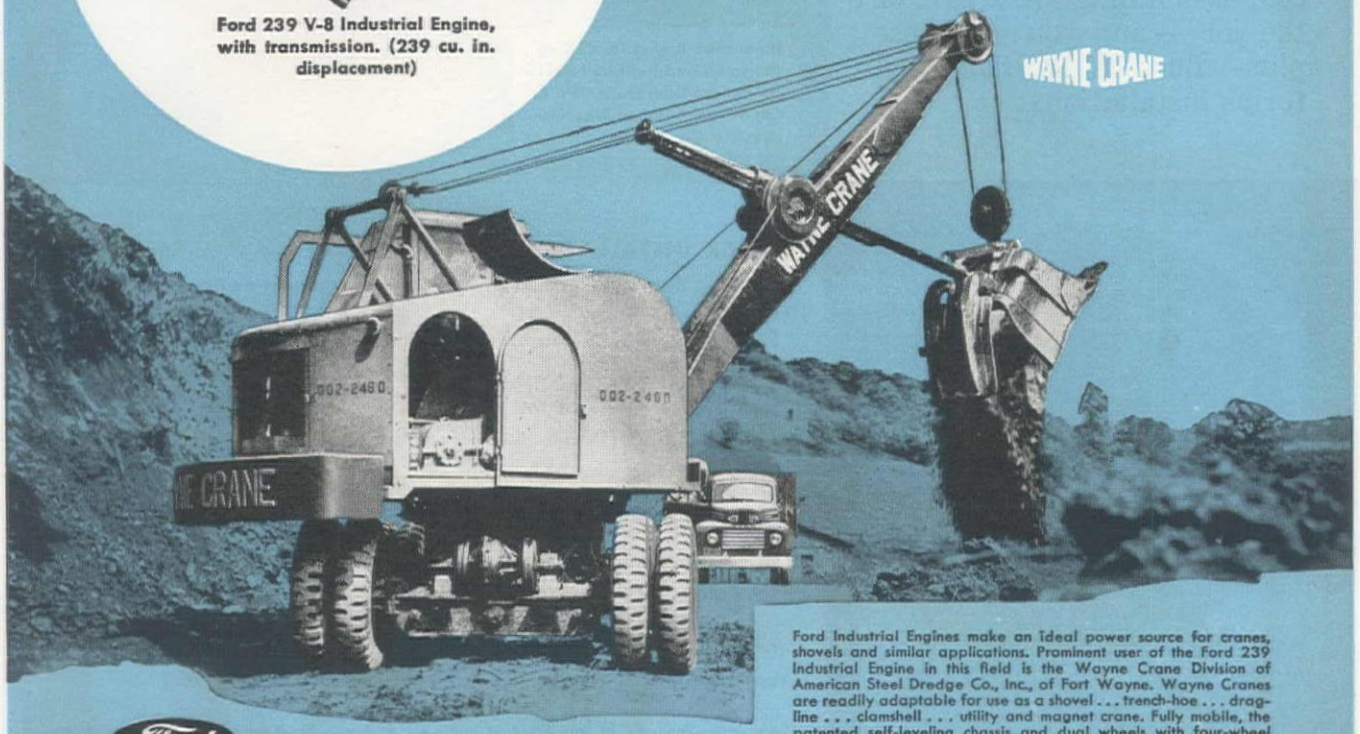


Ford 239 V-8 Industrial Engine, with transmission. (239 cu. in. displacement)

1 **RIGHT POWER** for your job. A tailor-made choice of five great engines in the Ford Industrial Engine line — and ranging from engine alone to complete power unit!

2 **RIGHT FEATURES** — the best and the newest in industrial power, direct from Ford's famed progressive engineering laboratories.

3 **RIGHT SERVICE,** right around the corner from you . . . at Ford Dealers' everywhere!



Ford Industrial Engines make an ideal power source for cranes, shovels and similar applications. Prominent user of the Ford 239 Industrial Engine in this field is the Wayne Crane Division of American Steel Dredge Co., Inc., of Fort Wayne. Wayne Cranes are readily adaptable for use as a shovel . . . trench-hoe . . . dragline . . . clamshell . . . utility and magnet crane. Fully mobile, the patented self-leveling chassis and dual wheels with four-wheel drive permit operation wherever trucks can haul dirt.

Ford INDUSTRIAL ENGINES

For power that's *right*, *Ford's* right! Now there are five great engines in the Ford Industrial Engine line —a "four" of 120 cu. in. displacement . . . two "sixes"—226 cu. in. and 254 cu. in. displacement . . . two "V-8's"—239 cu. in. and 337 cu. in. Here's the new power, the right power for your job—farming . . . construction . . . generating sets . . . compressors . . . material handling . . . lumber and sawmill equipment . . . pumping . . . many others. For complete specifications, write today.

INDUSTRIAL ENGINE SALES DEPARTMENT

FORD MOTOR COMPANY

Dearborn, Michigan

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

Save time, money, & headaches on Concrete Jobs with NOBLE STEEL FORMS

Horseshoe tunnel form, 8'x6', designed and built by NOBLE for Platora Dam Outlet Works. Contractor, Hinman Bros. Construction Co., Denver.

NOBLE'S steel forms experts are ready to help you estimate steel form costs on such concrete construction jobs as siphons, walls, conduits, tunnels, gravity or multiple arch dams. Practical designing and custom-building are a part of the job — and you get these plus-values in NOBLE steel forms installations:

Tunnel form with 4-foot circle, 6 feet deep, built by NOBLE for Campbell-Bennett, Ltd., Vancouver, B. C.

QUICK INSTALLATION—All NOBLE forms are shop-fitted at the factory, then marked, so on-the-job assembly is easy and fast.

SMOOTH WALLS—Joints of all skin plates are carefully fitted and ground smooth, so walls are free of ridges or indentations. Tunnel forms have doors at top and sides, making it easy to use vibrator while pouring. Doors open into tunnel, shut with positive wedge lock, do not protrude beyond skin plate when locked.

SAFETY FACTOR—NOBLE forms are designed and built with a safety factor of 2 to 4 times the load actually expected on your job. They are quickly stripped and moved.

FAST DELIVERY—We have 2 specialties . . . Steel Forms and Batching Equipment; on either we can make fast delivery.

HELP BEGINS WITH ESTIMATING

NOBLE engineers are ready to help you at every step—from estimating to trouble shooting. Call on us NOW. No obligation, just wire, write, or phone Steel Forms Division, Box 41W.

DESIGNERS AND BUILDERS OF

CEMENT AND AGGREGATE BATCHING PLANTS . . . BULK CEMENT PLANTS . . . AGGREGATE BINS AND CEMENT SILOS . . STEEL FORMS FOR CONCRETE CONSTRUCTION JOBS . . . TUNNEL AND DRILL JUMBOS CONVEYORS AND ELEVATORS . . WEIGH METERING DEVICES

NOBLE CO.

1860 - 7th STREET - OAKLAND 20, CALIFORNIA
TEMPLEBAR 2-5785

STAR MACHINERY COMPANY, Seattle; ENGINEERED SALES, San Antonio; HALL-PERRY MACHINERY COMPANY, Butte; RAY L. HARRISON CO., Albuquerque; LOGGERS & CONTRACTORS MACHINERY CO., Portland; EQUIPMENT SALES CORP., Oklahoma City, Okla.; TRI-STATE EQUIPMENT CO., El Paso; TRI-STATE EQUIPMENT CO., Spokane; J. K. WHEELER MACHINERY CO., Salt Lake City; CONNELL BROS., LTD., San Francisco; SIERRA MACHINERY CO., Reno, Nevada.

25,000 yards handled...or 5 times normal belt life expectancy

This Conway Mucking Machine is at work on a tunneling job where the pace is torrid. It's slam bang all the way for this granite-devouring monster that moves with amazing speed and agility. The largest of its type ever built, this machine will load a muck car to overflowing in little more than a minute.

One major operating problem was to secure conveyor belts that would stand battering abuse. *Normally, Mucker Belt life is measured in yardage handled—averaging from 5 to 7 thousand yards. This Pioneer Mucker Belt has moved over 25,000 yards—and its condition indicates it's good for many more yards.*

This 38" belt has specially compounded covers, breaker strips, top and bottom, and super-carcass ply construction. Special edges are built to prevent fraying even though traveling at high speed through granite chips that become wedged at the sides. And another secret to lower cost operation is prevention of rot—Pioneer Mucker Belt fabric is fully protected.

If you move bulk materials of any kind, chances are your Pioneer Rubber Mills distributor can help you lower costs by making money-saving suggestions. This on-the-job know-how is backed by the research laboratories and manufacturing technicians of **Pioneer Rubber Mills**—*Leaders in Industrial Rubber since 1888.*

Distributors:

SEATTLE • TACOMA *Washington Belting & Rubber Co.*
PORTLAND • EUGENE . . . *Munnell & Sherrill, Inc.*
KLAMATH FALLS . . . . . *Klamath Machinery Co.*
SPOKANE • BOISE . . *Intermountain Equipment Co.*
SALT LAKE CITY . . . . *National Equipment Co.*
DENVER . . . . *Western Belting & Packing Co.*

PIONEER RUBBER MILLS

BELTING • HOSE • PACKING • RUBBER COVERED ROLLS

PIONEER RUBBER MILLS • 345-53 SACRAMENTO ST. • SAN FRANCISCO 11 • BRANCHES: LOS ANGELES • CHICAGO • ST. LOUIS • FACTORIES: PITTSBURG, CALIF.

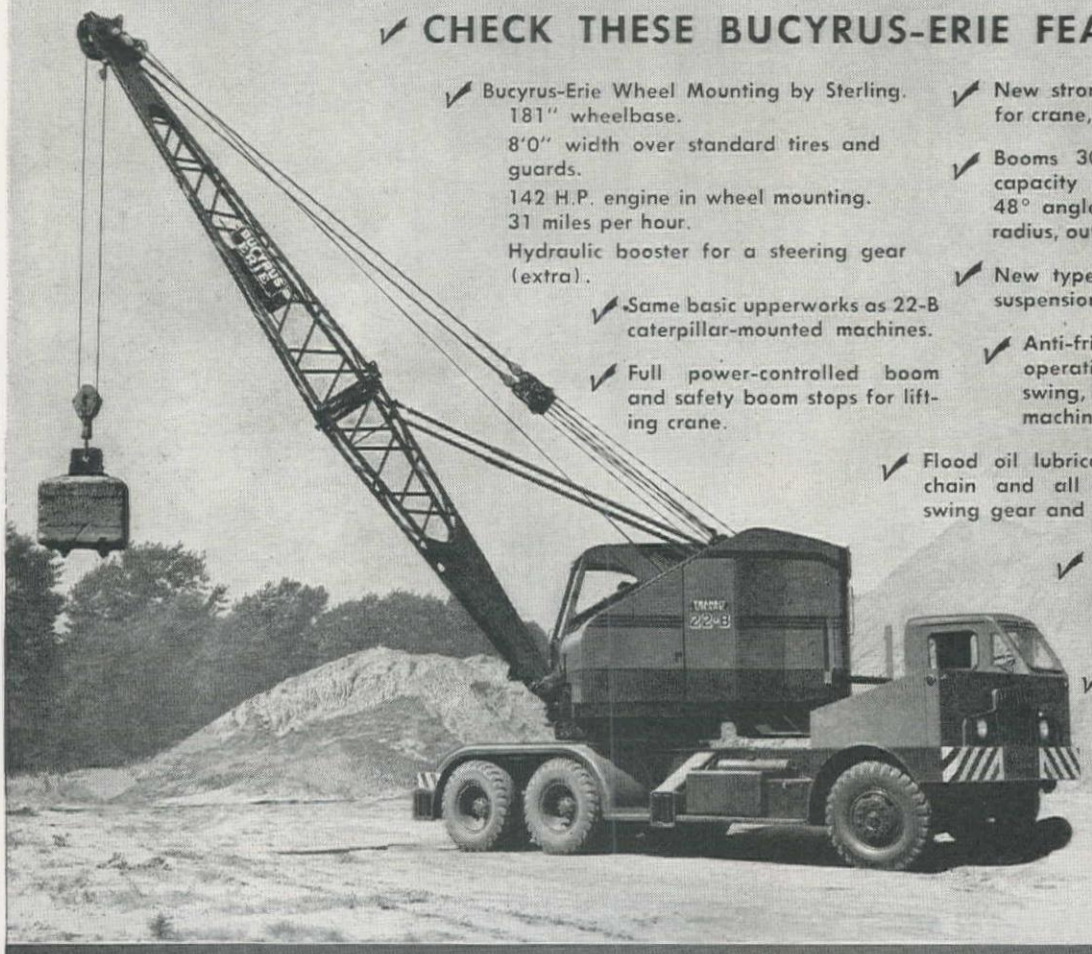
FOR BIG OUTPUT ON WHEELS

Look into the New Bucyrus-Erie 22-B Transit Crane

Now you can get the 22-B on a big fast-moving new wheel mounting! That means speedy mobility plus famous 22-B output, dependability, and economy—the combination you need for fast profitable handling of scattered, diversified jobs.

Look over the partial list of important features that make the new 22-B transit crane outstanding among wheel-mounted machines. Ask your Bucyrus-Erie distributor for complete details today.

BUCYRUS-ERIE COMPANY • South Milwaukee, Wis.



✓ CHECK THESE BUCYRUS-ERIE FEATURES:

- ✓ Bucyrus-Erie Wheel Mounting by Sterling. 181" wheelbase. 8'0" width over standard tires and guards. 142 H.P. engine in wheel mounting. 31 miles per hour. Hydraulic booster for a steering gear (extra).
- ✓ Same basic upperworks as 22-B caterpillar-mounted machines.
- ✓ Full power-controlled boom and safety boom stops for lifting crane.
- ✓ New stronger crane type boom for crane, clamshell, or dragline.
- ✓ Booms 30 to 80 feet; lifting capacity with 40-ft. boom at 48° angle and 30-ft. operating radius, outriggers set—10,200 lb.
- ✓ New type 8- or 16-part boom suspension.
- ✓ Anti-friction bearings on all operating parts in hoist, swing, boom hoist, and crowd machinery on the main frame.
- ✓ Flood oil lubrication for transmission chain and all gears (except main swing gear and pinion).
- ✓ Interchangeable friction clutches and clutch parts for hoist, swing, crowd, propel.
- ✓ Reversible friction band linings—practically double lining life.

178E49

Convertible Crane, Clamshell, Dragline, Shovel, Dragshovel

SEE YOUR BUCYRUS ERIE DISTRIBUTOR

BROWNING-FERRIS MACHINERY CO.	DALLAS & HOUSTON
CLYDE EQUIPMENT COMPANY	PORTLAND & SEATTLE
THE COLORADO BUILDERS' SUPPLY CO.	DENVER
CROOK COMPANY	LOS ANGELES
GREAT NORTHERN TOOL & SUPPLY CO.	BILLINGS
R. L. HARRISON COMPANY, INC.	ALBUQUERQUE
INTERMOUNTAIN EQUIPMENT COMPANY	BOISE, POCATELLO, SPOKANE
THE LANG COMPANY	SALT LAKE CITY
THE MERRILL-BROSE COMPANY	SAN FRANCISCO
NEVADA EQUIPMENT SERVICE	RENO, NEVADA
THE O. S. STAPLEY COMPANY	PHOENIX
TRI-STATE EQUIPMENT COMPANY	EL PASO
WESTMONT TRACTOR & EQUIPMENT COMPANY	MISSOULA & KALISPELL

EXC-3

SHOVELS • DRAGSHOVELS • DRAGLINES • CLAMSHELLS • CRANES • ⅜ TO 2½ YD.

Each step a safe step—scientifically designed U·S·S Multigrip floor plate gives maximum skid resistance from every angle... even after years of use. And it adds the strength of steel to the flooring, permanently.

For Safety's Sake—Specify Multigrip

From any angle, Multigrip floor plate is the modern way to surface a floor where safety is a factor. Practical, comfortable Multigrip is easy to install, easy to clean, provides easy traction for wheeled vehicles... always with top safety.

Among its many uses are factory aisles, of course ...and ramps, fire escapes, sidewalk openings, steps and platforms, expansion joints. The possibilities are almost endless. And users have found Multigrip increases employee efficiency as it increases comfort and safety. Multigrip reduces maintenance cost... Multigrip wears and wears and keeps on wearing.

Columbia, as Western producing member of United States Steel, combines its own modern facilities with those of others in the U·S·S family to supply the West with everything in steel. For information on Multigrip or any other steel product, contact your nearest Columbia office or write Columbia Steel Company, Room 1422, Russ Bldg., San Francisco 4, California.

Columbia Steel Company

San Francisco Los Angeles Portland Seattle Salt Lake City

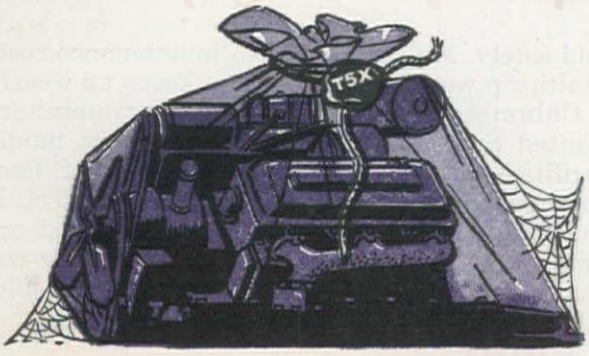
UNITED STATES STEEL

You Get GREATER ENGINE PROTECTION with T5X—*the famous purple* oil*

1. T5X—the remarkable purple motor oil—gives greater protection to any type of internal combustion engine in any industrial operation. This fully compounded, detergent-type oil easily passes the most demanding lubricant requirements—including the U. S. Army Specification 2-104b, the "L-4" Coordinating Research Council gasoline engine tests and the grueling 500-hour continuous-run Diesel engine test.

2. T5X is a highly refined, 100% pure, paraffin-base oil obtained from highest quality base stock. An exclusive detergent compound is added to this base stock that retards sludge formation to a remarkable degree. With T5X, oil lines, ring grooves and pistons stay clean far longer!

3. A special oxidation inhibitor in T5X greatly retards oxidation and gives high heat stability. A neutralizing agent protects against corrosion. Another ingredient suppresses foaming even under the most adverse operating conditions. With T5X, wear is reduced to a minimum!



4. T5X forms an extremely tenacious and enduring oil film on metal surfaces that gives maximum protection against scuffing and seizure. This tough film assures the greatest possible defense against rusting — even when engines are idle for long periods.

For full information on T5X phone your local Union Oil Representative or write Sales Department, Union Oil Company, Los Angeles 14, California.

ANOTHER

UNION OIL

SUCCESS-TESTED PRODUCT

*T5X gets its distinctive color from an exclusive ingredient that helps give the oil its remarkable stability.

MACK TRUCKS *haul* Profitable Payloads

10 TO 50 TONS

Gasoline or Diesel • Four or Six Wheels

Truck or Tractor

Model LJX — 10-ton payload

Model LMSW-M — 15-ton payload

Model LV — 22½-ton payload

Model LMX — 20-ton payload

Model LRSW — 30-ton payload

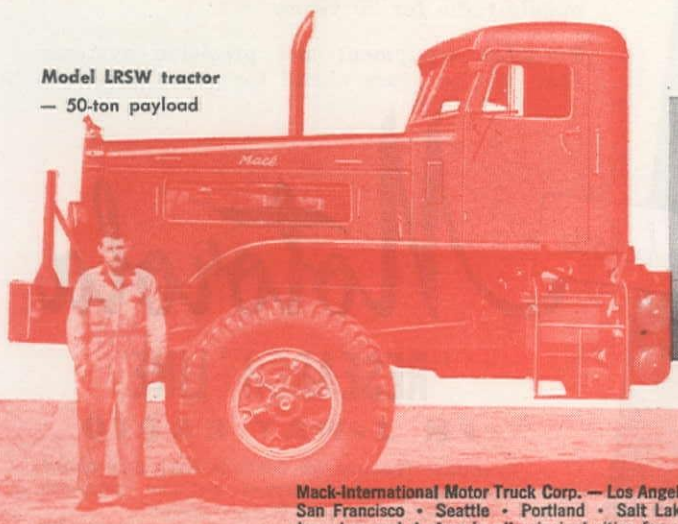
● In pit and strip mining, in quarrying and excavating work — wherever an off-highway, earth-moving job calls for rugged strength and stamina — there's a Mack truck *sized right* and *built right* to do the job as only a Mack can do it — with masterful efficiency, bed-rock economy, and enduring reliability.

Power and brawn for the heaviest loads! Maneuverability and ease of control for fast loading and unloading! Traction and flotation for the most slippery mud or sand! These are the qualities that assure greater profits through greater output. You get them all with Mack trucks because only Mack offers so many outstanding and exclusive features of design and construction.

We'll be glad to send you detailed information on these profit-building features, together with complete specifications on any or all of the Mack models shown here. Write for copies of our catalogs.

IT'S PART OF THE LANGUAGE:

Built Like a **Mack** *Truck*



Model LRSW tractor — 50-ton payload

Model LR — 32-ton, bottom-dump coal hauler

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

ONLY THOR OFFERS SO MANY FEATURES

IN PORTABLE ELECTRIC SAWS

EXCLUSIVE LONG-SHAFT TRANSVERSE MOTOR MOUNTING transmits as much as 25% extra power, supports blade on oversize ball bearings from one side of the tool clear to the other.

EXCLUSIVE SAFETY-LOCK SWITCH—positive protection against accidental starting.

EXCLUSIVE SHOCK-ABSORBER GEARING harnesses the added power of these great new saws, gives extra life to motor, gears, spindle and blade.

EXCLUSIVE PROTECTED DEPTH AND BEVEL SCALES are in plain sight when you use them—out of the way when you don't. Always accurate.

EXCLUSIVE EXTRA-WIDE REENFORCED STEEL SAFETY BASE for better balance—easier to handle, far safer to use.

PLUS powerful, built-in sawdust blower . . . over-size ball bearing construction . . . automatic ball bearing blade-guard . . . die-cast aluminum housings . . . steel inserts for bearings and threads . . . finger-tip depth and bevel control . . . convenient handles . . . steel rip guide . . . extra-capacity switches . . . most powerful motors ever used in electric saws.

Silver Line means "new design"—from rip guide to switch—to give you the safest, easiest handling, most powerful saws on the market today. 15 new features . . . many of them exclusive . . . each of them thoroughly field tested and approved for economical, trouble-free operation. Six sizes to meet every demand from the lightweight "6" to the sturdy "12". Try these great new Silver Line Saws now available at your Thor distributor. Independent Pneumatic Tool Co., Aurora, Illinois.

Export Division: 330 West 42nd St., New York 18, N. Y.

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

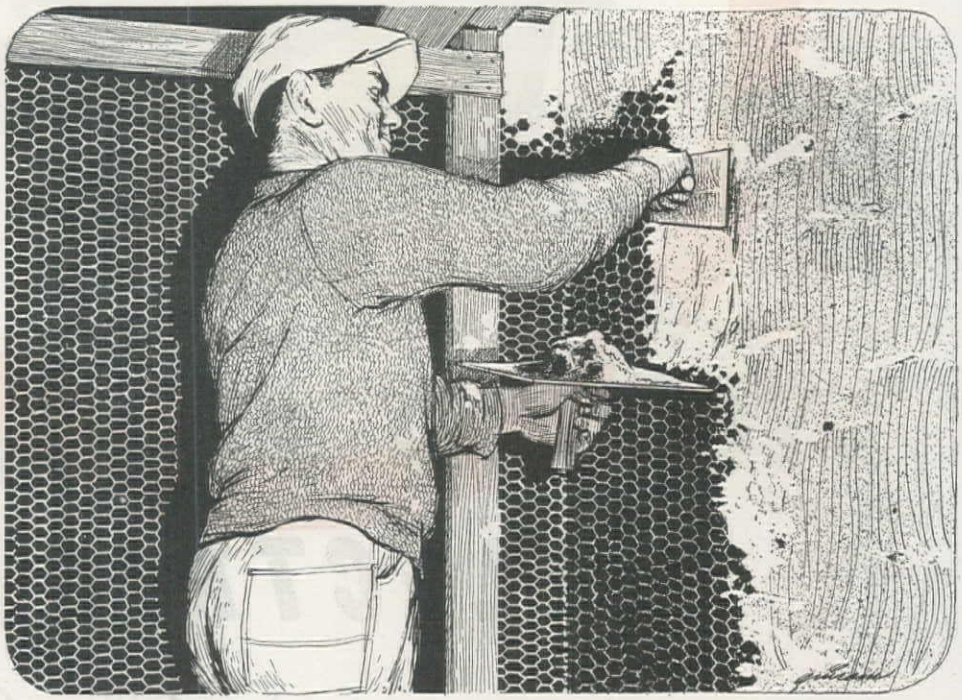
Thor PORTABLE POWER TOOLS

ELECTRIC • PNEUMATIC

SPECIAL PURPOSE CEMENTS

Case No. 142

EXTERIOR STUCCO



STANDARD PORTLAND

MODIFIED PORTLAND

HIGH EARLY

LOW HEAT

SULPHATE RESISTANT

PRONTO

PORTLAND POZZOLAN

BRICK MIX

PLASTIC CEMENT

OIL WELL CEMENT

PERMANENTE PLASTIC CEMENT

Permanente Plastic Cement is produced to provide a cement suitable for making fine exterior stucco, with the proper working qualities, plus the durability of good concrete.

Permanente Plastic Cement is composed of Permanente Portland Cement interground with selected plasticizing agents. These agents actually reduce the quantity of water needed to produce workable mortar. Mortar strength is substantially increased, while shrinkage characteristics are lowered. These properties assure a hard, durable wall.

Mortar made with Permanente Plastic Cement is smooth, workable and highly adhesive. It spreads well, is fireproof, vermin proof, weather resistant and has excellent insulating qualities.

PERMANENTE CEMENT COMPANY

On the job – On time

PERMANENTE, SANTA CLARA, DIAMOND, YOSEMITE AND KAISER BRANDS OF PORTLAND CEMENT AND PERMANENTE LIME PRODUCTS

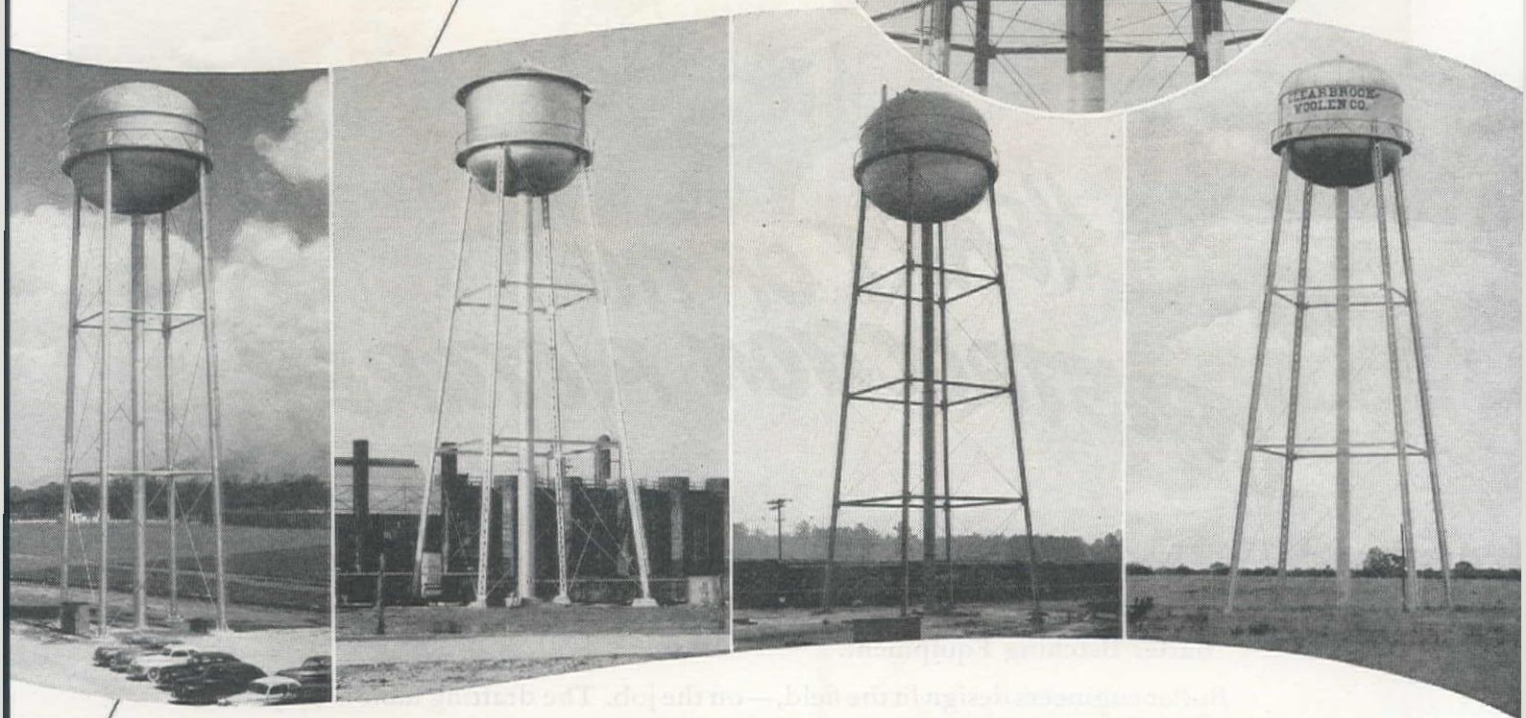
PERMANENTE CEMENT COMPANY

OAKLAND · SEATTLE · HONOLULU

On Guard

FOR PLANT PROTECTION
WITH DEPENDABLE
WATER SUPPLY

PITTSBURGH • DES MOINES



Industrial Elevated Steel Tanks

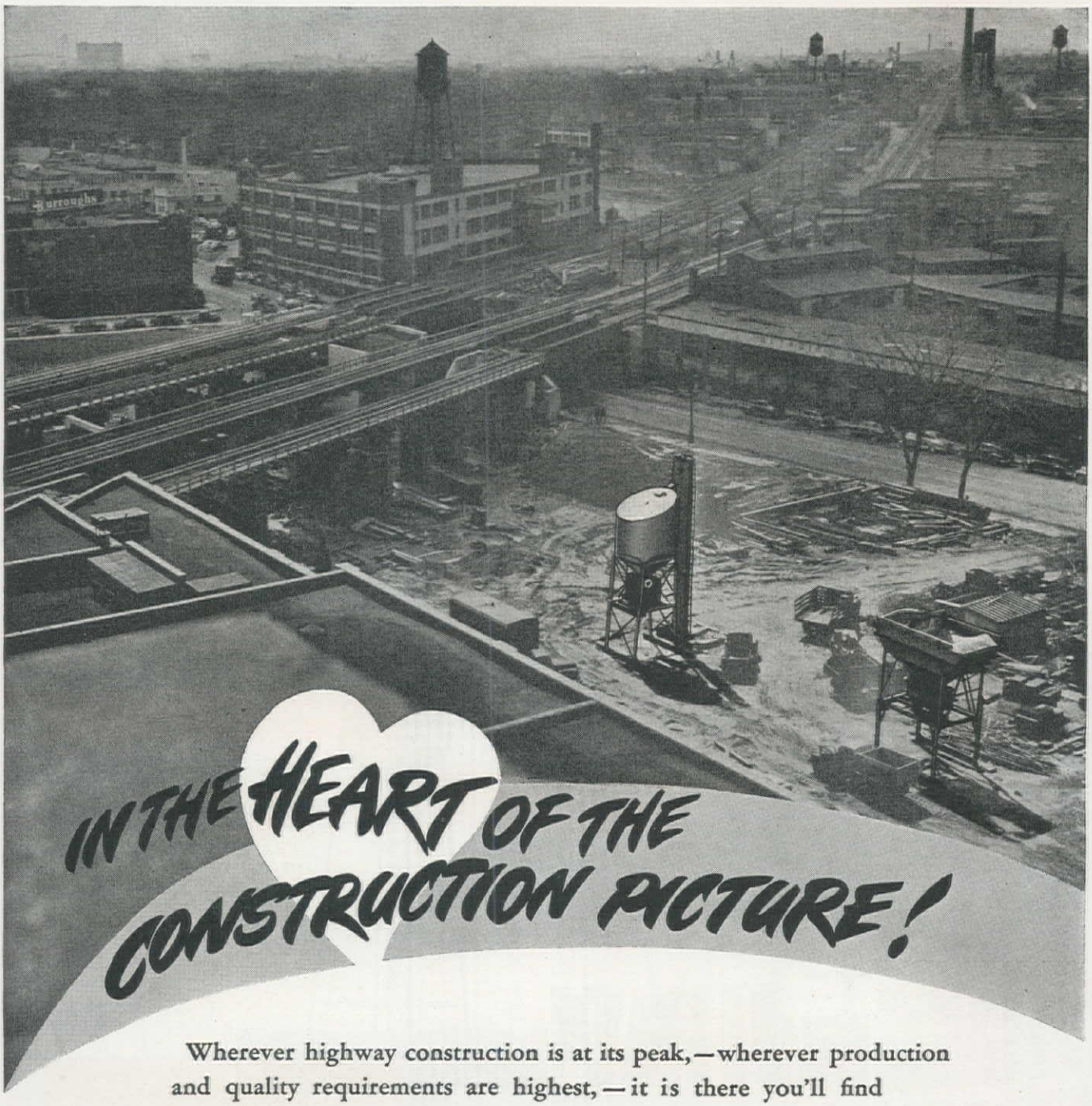
When a modern Pittsburgh-Des Moines Elevated Steel Tank supplies your sprinkler and fire-hose lines, you *know* you have water when you need it! Joined to this dividend-paying protection is the benefit of better, low-cost general water service—equally dependable and efficient. *We have the facts for you; just write—without obligation.*

PITTSBURGH · DES MOINES STEEL CO.
Santa Clara, Cal.

PLANTS AT SANTA CLARA, PITTSBURGH and DES MOINES

Sales Offices at:

SANTA CLARA, CAL. . 627 Alviso Road
PITTSBURGH . . 3420 Neville Island
NEW YORK . Room 919, 270 Broadway
CHICAGO . . . 1224 First National Bank Building
SEATTLE . . . . . 928 Lane Street
DES MOINES . . . 921 Tuttle Street
DALLAS . . 1225 Praetorian Building

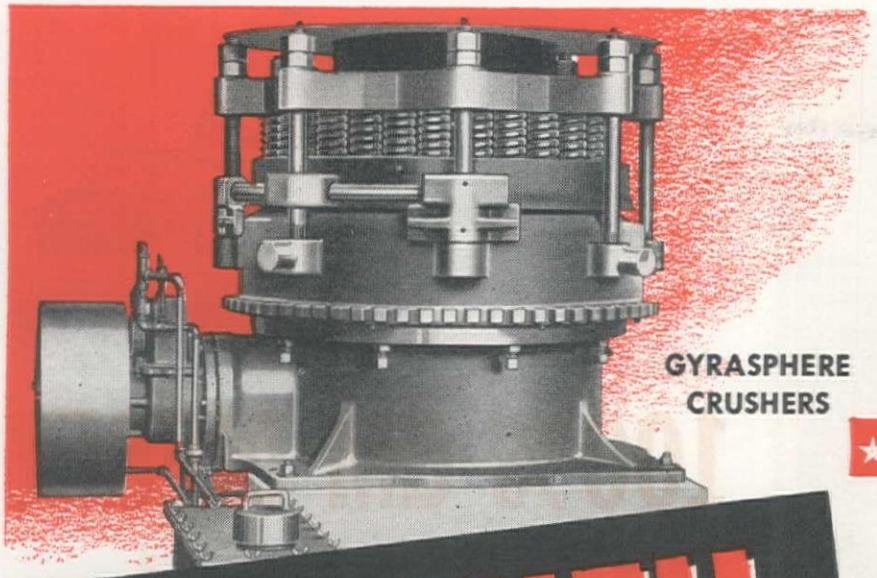


IN THE HEART OF THE CONSTRUCTION PICTURE!

Wherever highway construction is at its peak,—wherever production and quality requirements are highest,—it is there you'll find Butler Batching Equipment.

Butler engineers design in the field,—on the job. The drafting table is only for refinement of the basic idea. That's why Butler equipment is *ahead* of job requirements in performance. Butler, knowing at first hand the standards of today's production,—designs, engineers and builds for what then become the standards of tomorrow.

That's why in Butler equipment there's an extra profit for the road-builder, and any other producer of concrete regardless of quantity requirements.



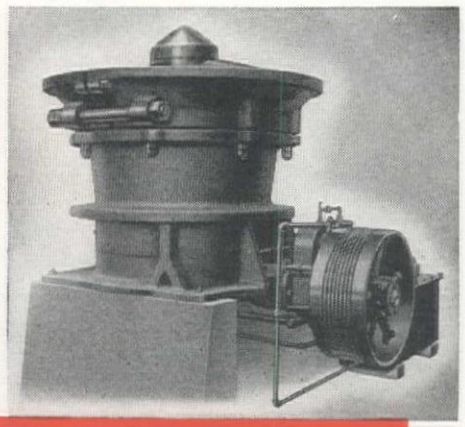
GYRASPHERE CRUSHERS

TELSMITH CRUSHERS

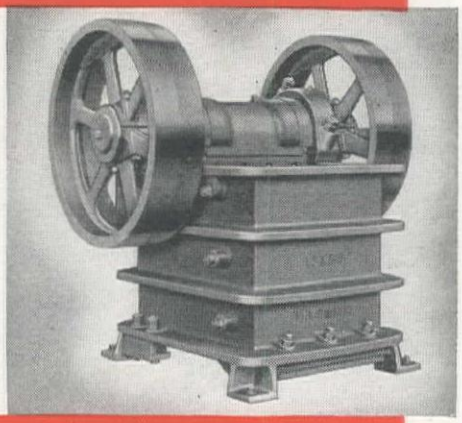
for

BETTER PRODUCT • BIGGER CAPACITY LOWER COST

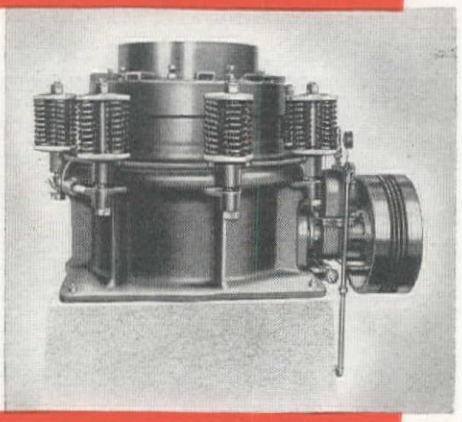
What do you want to crush? What size product do you want to make? Coarse . . . intermediate . . . fine . . . or a wide range of sizes? Telsmith Crushers can do it for you—most *dependably*. You can be sure that Telsmiths will be right for your particular job *always*. Because Telsmith builds crushers 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 40-page Crusher Guide No. 271. C-7



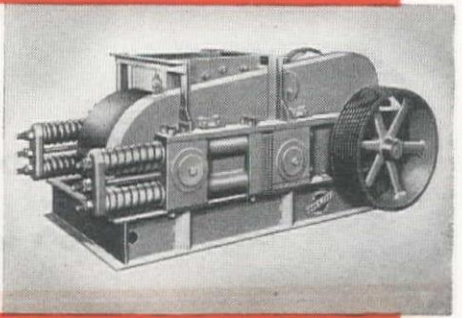
★ GYRATORY BREAKERS



★ JAW CRUSHERS



★ INTERCONE CRUSHERS



★ DOUBLE ROLL CRUSHERS

TELSMITH

PRIMARY CRUSHERS

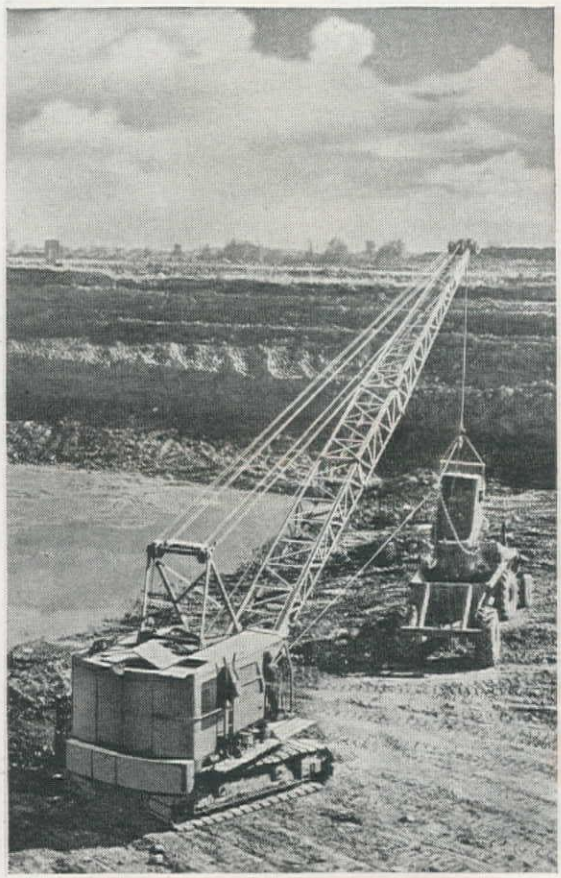
Jaw Crushers: Sizes 10 x 16 in. to 30 x 42 in., 22 to 240 tons per hr. capacity.
Gyratory Breakers: Sizes 6-B to 25-B, 26 to 400 tons per hr.

SECONDARY CRUSHERS

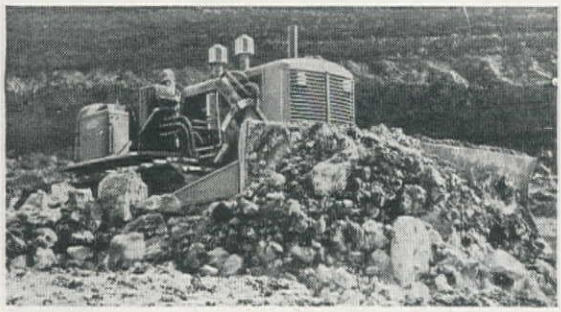
Gyrasphere: Sizes 24 to 48 in., 15 to 210 tons per hr. ***Intercone:*** Sizes 18 to 28 in., 26 to 68 tons per hr. ***Double Roll:*** Sizes 24 x 16 in. to 40 x 22 in., 75 to 132 tons per hr.

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

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



GM Diesel-powered Koehring 605 dragline with 1½ yd. bucket, loads shale in Euclid bottom dump. The GM Diesel-powered Euclids haul 17 yard loads up a 15% grade climbing out of the cut.



Allis-Chalmers HD-19 pulling a 12-ton "rooter" scrapes heavy shale off rock vein in final stage of stripping at National City, Michigan. A General Motors 6-71 Diesel powers the HD-19.

GM Diesel-powered Euclid loader, pulled by Allis-Chalmers HD-19 tractor, teams up with 7 GM Diesel-powered Euclid bottom dumps to move as much as 150,000 yards of earth a month.

100% GM DIESEL POWER—"100% PLEASED"

Says the Contractor

Stripping a 55-foot overburden of Michigan's hard clay, heavy soil and shale to bare gypsum deposits takes plenty of rugged, reliable power. That's why A. S. Leffler, contractor, standardizes on General Motors Diesels. Leffler operates 16 of them.

"We get more work done at about one-half the cost," says Mr. Leffler. "We went to the one make of engine 100% because of our previous satisfactory experience. Standardization on GM Diesels also helps keep our parts inventory low."

Remember all GM Series 71 Diesels have the same bore and stroke. Thus most wearing parts are interchangeable between engines of different sizes. Result: lower parts inventory, less time out for repairs, a big reduction in maintenance costs.

No wonder so many operators rely on these brawny 2-cycle Diesels to speed production and trim costs. You too, will find it pays to specify GM Series 71 Diesels. Get the facts from your local GM Diesel distributor.

DETROIT DIESEL ENGINE DIVISION

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

GENERAL MOTORS

DIESEL BRAWN WITHOUT THE BULK

GM GENERAL MOTORS DIESEL POWER

Evans Engine & Equipment Co.
SEATTLE 9, WASH.

Cate Equipment Co.
SALT LAKE CITY, UTAH

Fred M. Viles & Company
SPOKANE 8, WASH.

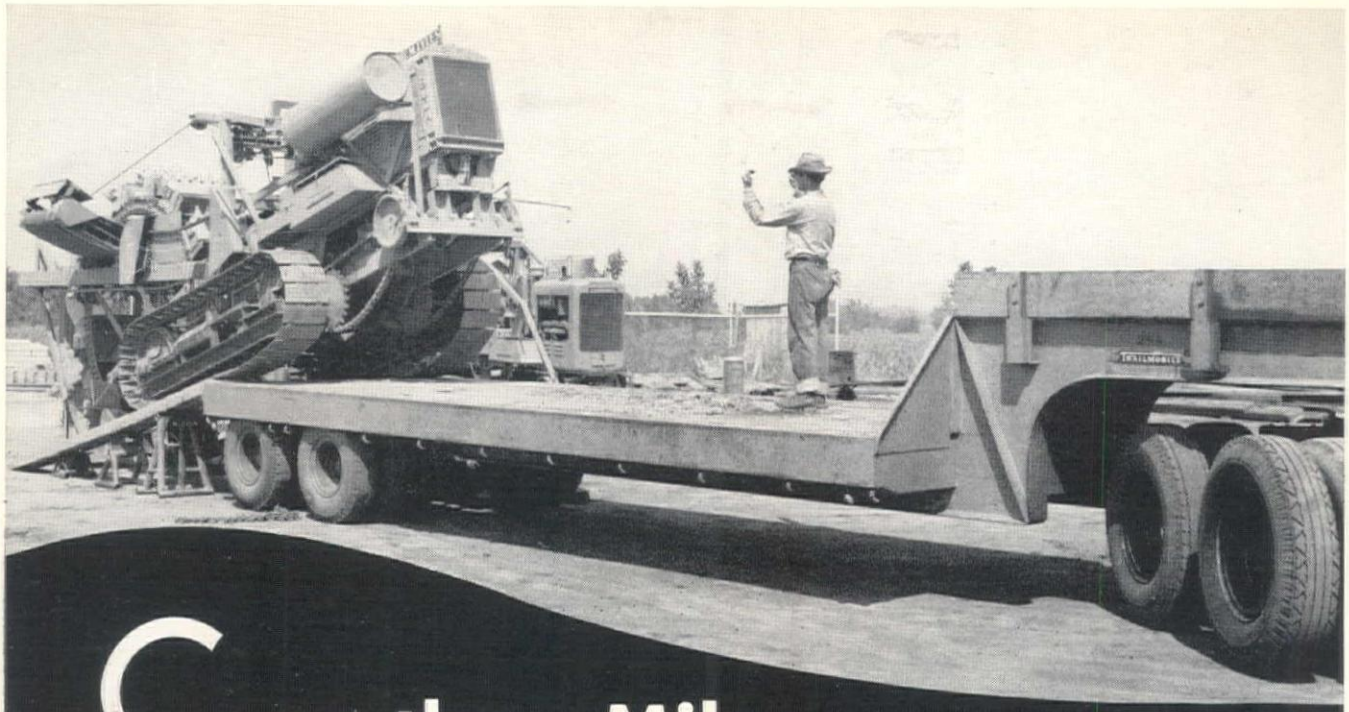
Mountain Tractor Co.
MISSOULA, MONT.

Gunderson Bros. Equipment Corp.
PORTLAND 9, ORE.

Olson Manufacturing Co.
BOISE, IDAHO

Capitol Tractor & Equipment Co.
SACRAMENTO, CALIF.

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



Countless Miles — Exceptional Service . . W. M. LYLES CO.

The W. M. Lyles Company, contractors of Avenal, California, operate Trailmobile trailers with which they transport their heavy construction machinery from one job to another. Commenting on their experience with their Trailmobiles, Homer C. Lentz says: "We have hauled our heavy equipment countless trouble-free miles both on the highway and in the field on our Trailmobile trailers. They have given us exceptional service and we are especially pleased with their easy pulling characteristics."

Yes, "exceptional service" is the type of report we get on Trailmobiles from some of the largest machinery movers and riggers on the Pacific Coast. It is the kind of report we expect to come back to us, because "exceptional service" is just what Trailmobile builds into every trailer sold to the construction industry. If you need trailers for hauling machinery or materials, investigate TRAILMOBILE.

THE TRAILMOBILE COMPANY
BERKELEY, CALIFORNIA

FOR CONTRACTORS
Flat Beds
Low Beds
Lumber Rolls
Hopper Dumps
Dump Trailers
Oil Tankers

TRAILMOBILE

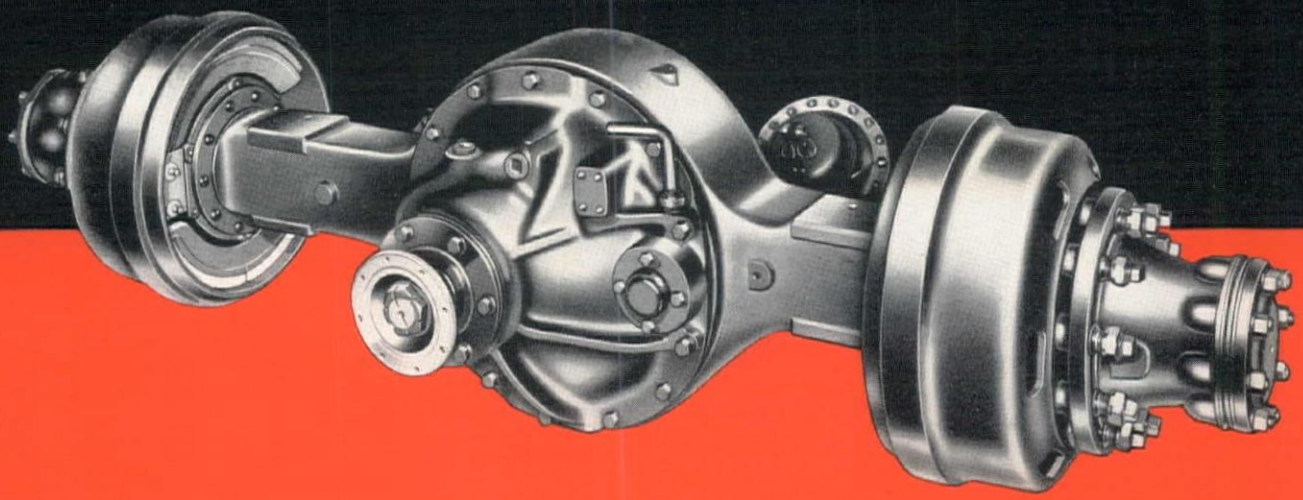
LOS ANGELES · VENTURA · SAN LUIS OBISPO · BERKELEY · SACRAMENTO · SANTA ROSA · FRESNO · SAN JOSE · BAKERSFIELD · STOCKTON
EUREKA · SAN DIEGO · SEATTLE · SPOKANE · PORTLAND · HONOLULU

EATON
2-Speed Truck
AXLES

Reduce Maintenance Costs—
Make Trucks Last Longer

The exclusive features of Eaton 2-Speed Truck Axles assure extra service with freedom from repairs. *Only Eaton* Axles provide planetary gearing, which minimizes stress and wear because gear speeds are slower and gear loads are distributed over a number of teeth. *Only Eaton* Axles provide forced-flow oiling, which reduces friction because lubrication begins the instant the axle turns over. *Only Eaton* Axles provide a housing designed for abnormal service. *Only Eaton* Axles provide driving gears engineered for maximum durability. Ask your truck dealer to show you how Eaton Axles make available exactly the right gear ratio for every condition of road and load.

More Than a Million Eaton 2-Speed Axles in Trucks Today



Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • 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

WICKWIRE ROPE

A PRODUCT OF CF&I

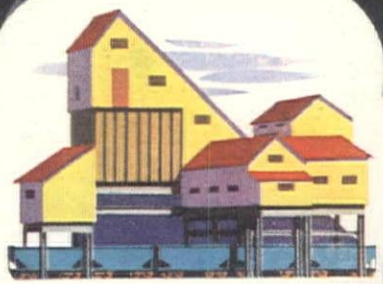
Ask any user . . . you'll find them everywhere

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® *Pre*formed. 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.

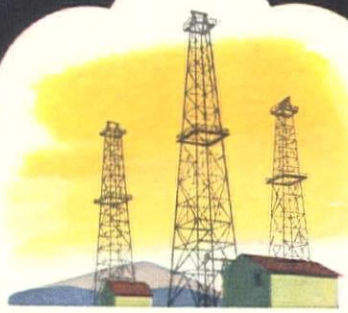
IN THE EAST—Wickwire Spencer Steel Div. of C. F. &I.
500 Fifth Ave., New York 18, N. Y.
IN THE ROCKIES—The Colorado Fuel and Iron Corp.
Continental Oil Bldg., Denver, Colo.
ON THE WEST COAST—The California Wire Cloth Corp.
1030—19th Ave., Oakland 6, Cal.

LOGGING

TRANSPORTATION



MINING



PETROLEUM

MANUFACTURING

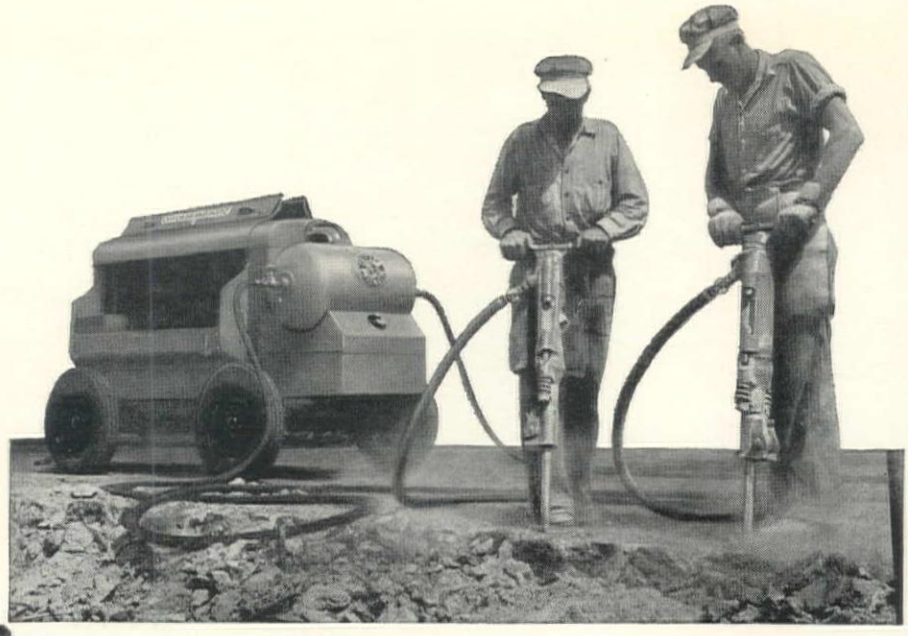
MARINE

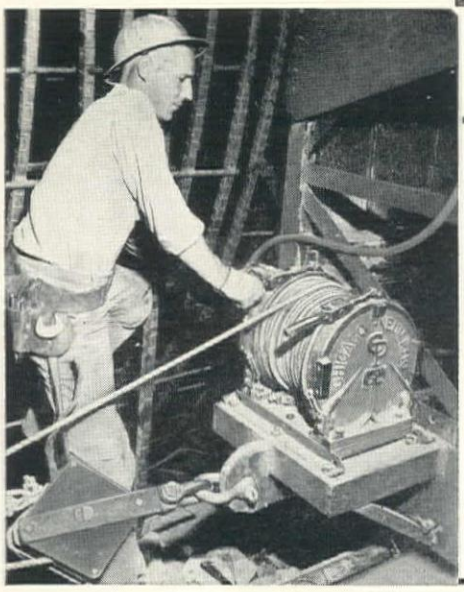
CONSTRUCTION

A. E. Brotman

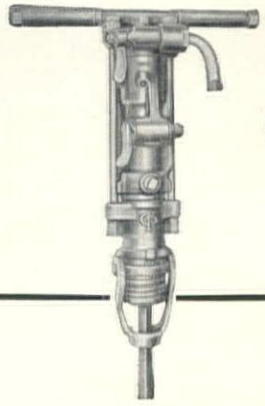
● There's a CP Portable Compressor exactly suited for any particular type of work. CP gasoline-driven compressors range from 60 to 315 c.f.m.; Diesel-driven, from 105 to 500 c.f.m. Gradual speed regulator, with other CP features, make possible large fuel savings and lower maintenance.

The world's largest line of demolition equipment ranges from the light CP-111 (25 lb. class) demolition tool to the heavy-hitting CP-117 (80 lb. class)—shown in illustration—designed for breaking dense concrete and other extremely hard material.





equipment that keeps jobs on schedule



Powered with gasoline, electric or air motors, CP Utility Winches have precision control provided through clutch and brake levers. Unsurpassed for single or multiple line hoisting, spotting cars, handling timber, structural steel, etc.

Write for further information.

New! Tops in all-around performance: CP-59 Sinker (55 lb. class) with four-in-one backhead for (1) plain dry, (2) blower dry, (3) plain wet, (4) air-water operation. Changeovers made quickly, inexpensively.

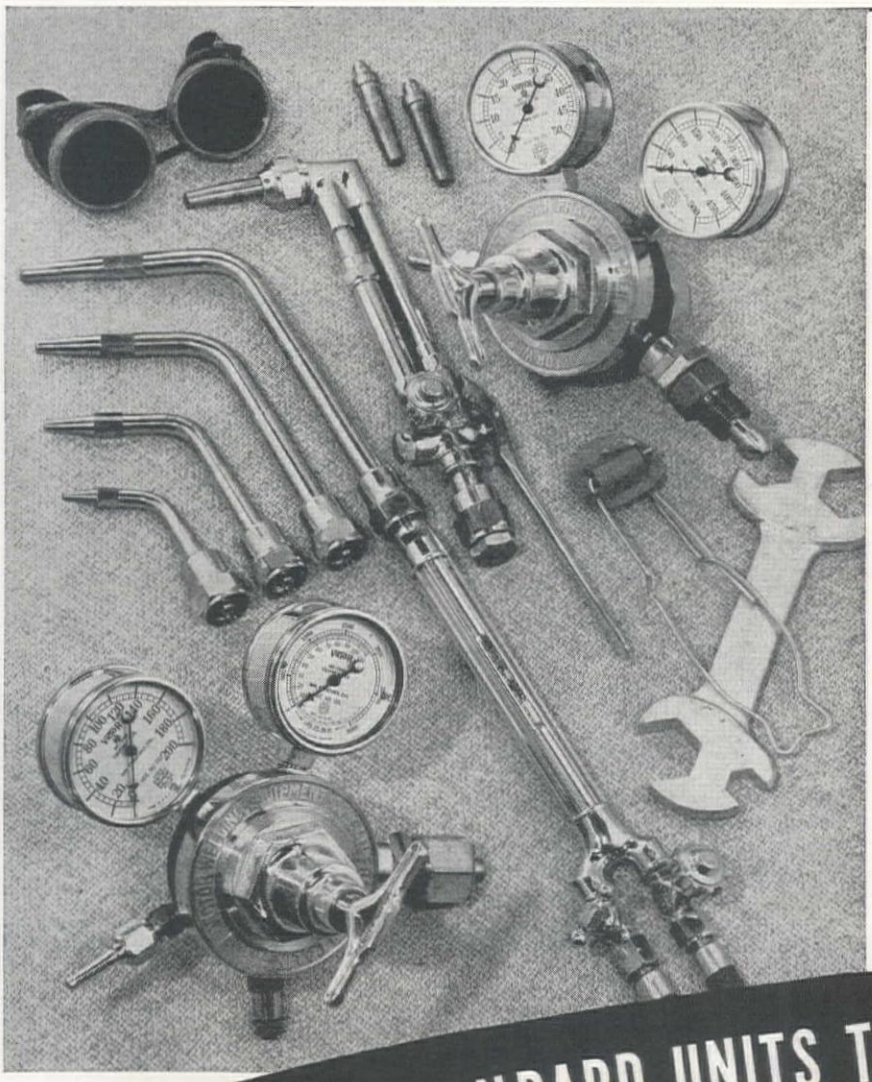
Heavy-duty CP Air Impact Wrench easily runs nuts up to 1¼" bolt size. CP Pneumatic Corner Drills speed drilling and reaming operations.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

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

Distributors

WESTERN MACHINERY CO., 760 Folsom St., San Francisco Calif., Phone: EXbrook 2-4167; WESTERN MACHINERY CO., 500 North 16th St., Sacramento, Calif., Phone: 2-1211; WESTERN MACHINERY CO., 5722 So. Santa Fe Ave., Los Angeles, Calif., Phone: LOgan 3371; BALZER MACHINERY COMPANY, 2136 S.E. Eighth Ave., Portland, Oregon; WESTERN MACHINERY CO., N. 808 Division St., Spokane, Washington; HALL-PERRY MACHINERY CO., 812 E. Iron St., Butte, Montana; YUKON EQUIPMENT, INC., Seattle-Alaska. HONOLULU IRON WORKS COMPANY, Nuuana and Queen Streets, Honolulu 2, T. H.



VICTOR

REGULATORS for

acetylene
carbon dioxide
compressed air
hydrogen
liquid pet. gases
medical gases
oxygen

TORCHES for

air gas
brazing
bunsen burner
descaling
flame cutting
flame hardening
hand cutting
heating
lead burning
machine cutting
preheating
soldering
surface hardening
welding

USE VICTOR STANDARD UNITS TO CUSTOM-BUILD Your Welding and Cutting Outfit

CYLINDER MANIFOLDS for

all types of
cylinder gases

CYLINDER TRUCKS

EMERGENCY FLAME CUTTING OUTFITS

WRITE us now for descriptive literature and name of nearest distributor.

Assembling your welding and cutting outfit is simple and low-cost if you start with one of VICTOR's basic units, such as the WC-1 shown here. WC-1 handles all ordinary welding jobs and cuts metal up to 10" thick. For flame cutting, descaling, multi-flame heating or other special work, you add just the VICTOR tips, nozzles, or attachments which your job requires.

VICTOR makes welding and cutting equipment for all types of work, from fine jewelry manufacture, to cutting armor plate. Ask your nearest VICTOR distributor to help you custom-build the outfit best suited to your needs NOW.

VICTOR
FOR WELDING

NOW VICTOR hard-surfacing rod for every need.
See your VICTOR dealer.

VICTOR EQUIPMENT COMPANY
844 Folsom Street, San Francisco 7, California
3821 Santa Fe Avenue, Los Angeles 11, California
1312 W. Lake Street, Chicago 7, Illinois

EUCLIDS

JOB PROVED FOR PRODUCTION AND PROFITS!

BOTTOM-DUMP EUCLIDS
13 to 25 cu. yd. capacity. Top speeds loaded up to 34.4 m.p.h.

REAR-DUMP EUCLIDS
10 to 34 tons payload capacity. Loaded top speeds up to 32.2 m.p.h.

Engineered and built for heavy duty off-the-highway and industrial hauling, Euclids are job proved for high production at the lowest cost per ton or yard moved.

Owners prefer Euclid equipment for its efficiency and dependability under a wide range of operating conditions. Long service life combined with low operating and maintenance costs result in more profits and less down time. Operators prefer "Eucs" for their ease of handling, riding comfort, and positive control on soft fills and rough haul roads.

"Euclid is the best earth moving equipment we've ever used," say owners . . . "it does more work and costs less to own in the long run." Production records from hundreds of jobs prove that Euclids are the best for performance and profits.

The services of a Euclid specialist are available without cost or obligation. Call or write for an estimate on your present work or future jobs.

The EUCLID ROAD MACHINERY Co. Cleveland 17, Ohio

EUCLIDS *Move the Earth*

for CHEWING ROCK . . .

Cedarapids Built by IOWA

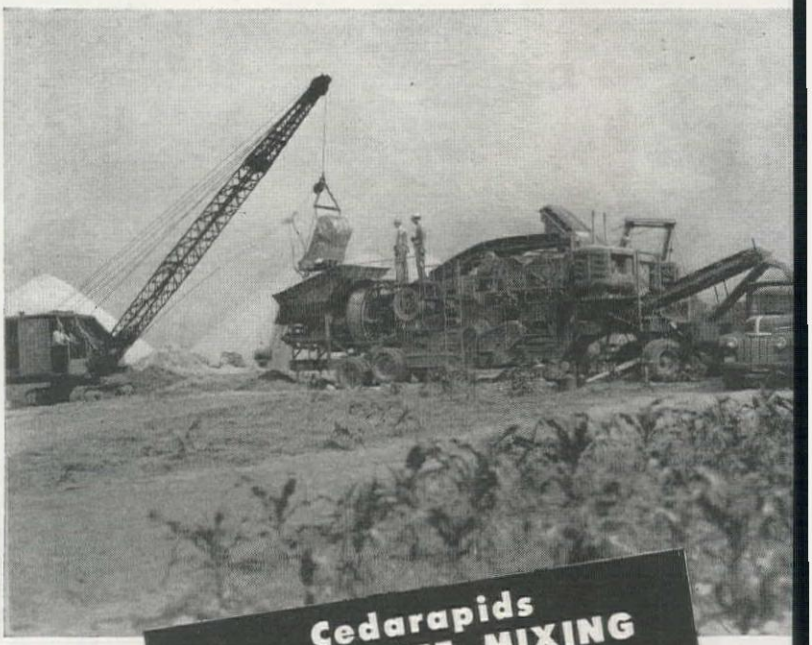
Highest Quality Equipment means

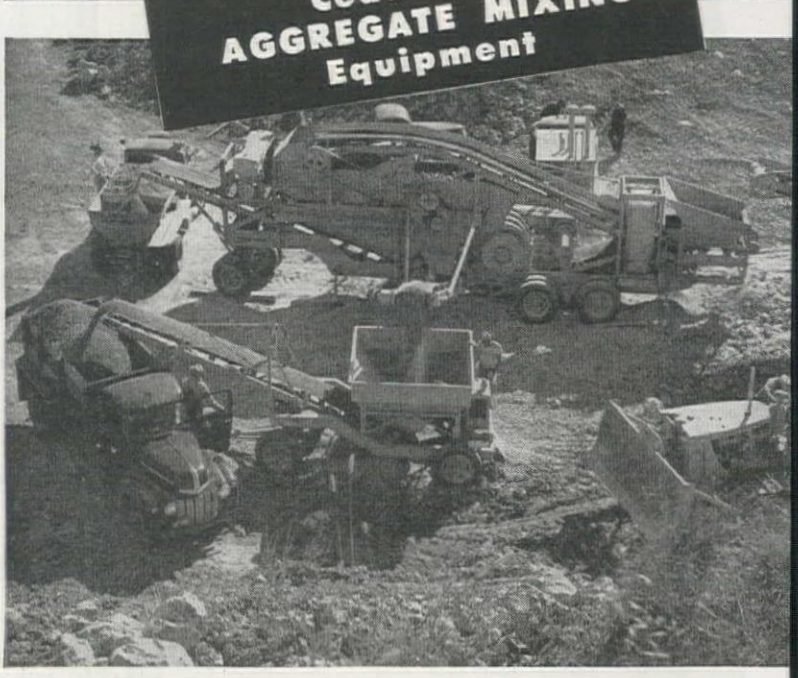
JUNIOR TANDEM

A rock-chewing workhorse for an all-around variety of rock and gravel jobs, quality-built for big volume production and low-cost operation. The Cedarapids roller bearing jaw crusher used is engineered for maximum capacity and minimum maintenance; exclusive bearing seals reduce lubrication time and expense; heavy, counterbalanced flywheels slash power requirements. The high capacity, heavy duty roller bearing roll crusher is made with manganese steel roll shells to guarantee long wear and economy. Cedarapids *horizontal* vibrating screens provide more accurate grading, larger capacity, better screening action and lower maintenance. In addition to these cost-cutting quality advantages, you get capacities ranging from 70 to 100 tons per hour, *and more,* of 1" material. Complete portability, plus fast set-up and take-down, gets machines on the job fast. It's a money-maker on any rock or gravel job!

4033 HAMMERMILL SECONDARY

HERE'S a peak-efficiency machine for a wide variety of reduction jobs. 100 to 180 tons of 1½" roadstone, or 20 to 60 tons of agricultural limestone, or a percentage of both can be produced in one operation. The Cedarapids heavy duty hammermill features a new principle of crushing to give a larger output of finer and more uniform finished products, and will produce more tons per hour than other comparable types of pulverizing equipment. A separate power unit with variable speed control operates the hammermill to produce the type of finished product desired without affecting the speed of screens and conveyors. Convenient portability, fast and easy set-up and take-down, minimize lost time between jobs. And for double duty service that puts money in your pocket, you can interchange the 4033 hammermill unit with a 4024 Cedarapids roll crusher to make this plant a high volume rock crushing secondary.



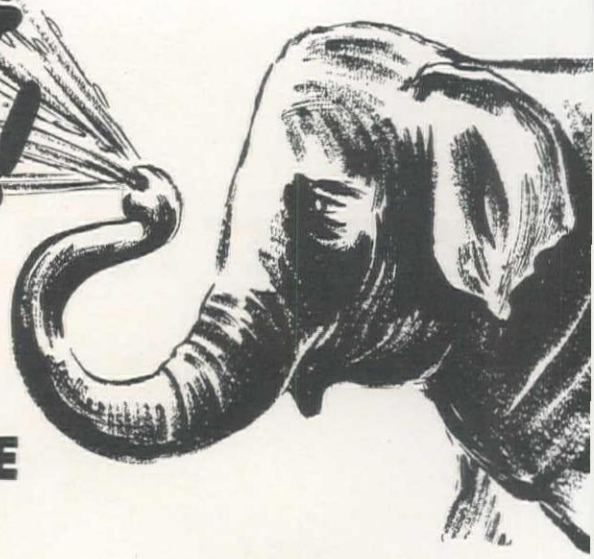


Buy the best . . . Buy Cedarapids

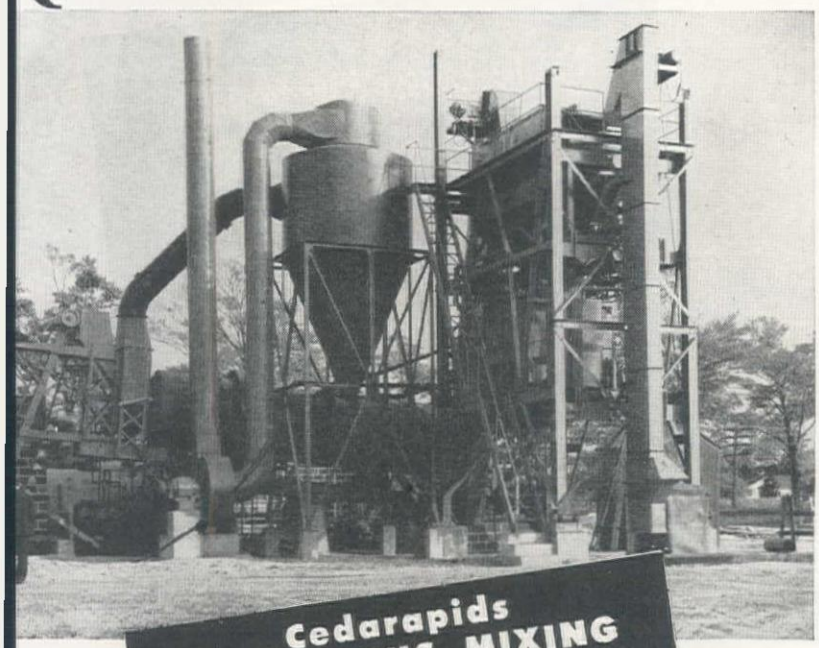
IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U.S.A.

. . . or SPOUTING BLACKTOP!



BIG VOLUME OUTPUT
MINIMUM MAINTENANCE
LOW COST OPERATION



Cedarapids BITUMINOUS MIXING Equipment

MODEL "E" BITUMINOUS MIXING PLANT

FOR "spouting blacktop" in volumes to meet your biggest production needs. This all-electric batch type plant handles 2000, 3000, or 4000 lbs. per batch, combining high capacity and accurate batching with great portability and economy. Perfectly matched screens, batchers, pug mills, elevators and driers meet the most exacting specifications with a smooth, steady flow of material. The Cedarapids-Symons horizontal vibrating screen, with the driving unit mounted outside the hot zone, is fully protected from heat and dust. Cedarapids famous twin shaft pug mill thoroughly mixes the bitumen and aggregates at high speeds. Aggregate is thoroughly dried by Cedarapids driers. Individual electric motor drives on all units assure smooth, efficient operation and low maintenance costs. Push-button controls are centrally located within easy reach and sight of the operator.

MODEL "FA" BITUMINOUS MIXING PLANT

PORTABILITY plus! The Model "FA" is the most portable batch type bituminous mixer in the Cedarapids line, and can be set up for operation in a matter of hours. Just lift the top section of the elevator, extend the bottom section and install the cover; drop the operator's platform and lower section of the skip track into position; raise the skip head pulley frame; level up the scale frame and the "FA" is ready to grade the aggregates, weigh the material, mix it to meet the most rigid specifications, and do it all at lower cost. The perfectly matched screen, 25 cu. ft. batcher and pug mill, and elevator will produce as much as 350 tons per day. Centralized air controls insure fast, easy, one-man operation. Quality construction of every part means long-term service at lowest cost operation and maintenance.

Cedarapids Built by IOWA

THE IOWA LINE

of Material Handling Equipment Is Distributed by:

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

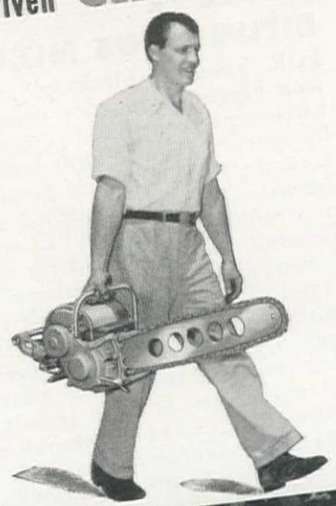
See Your Cedarapids Distributor For Full Details

YOU GET FOUR FOR ONE

with this **HOMELITE ONE MAN**

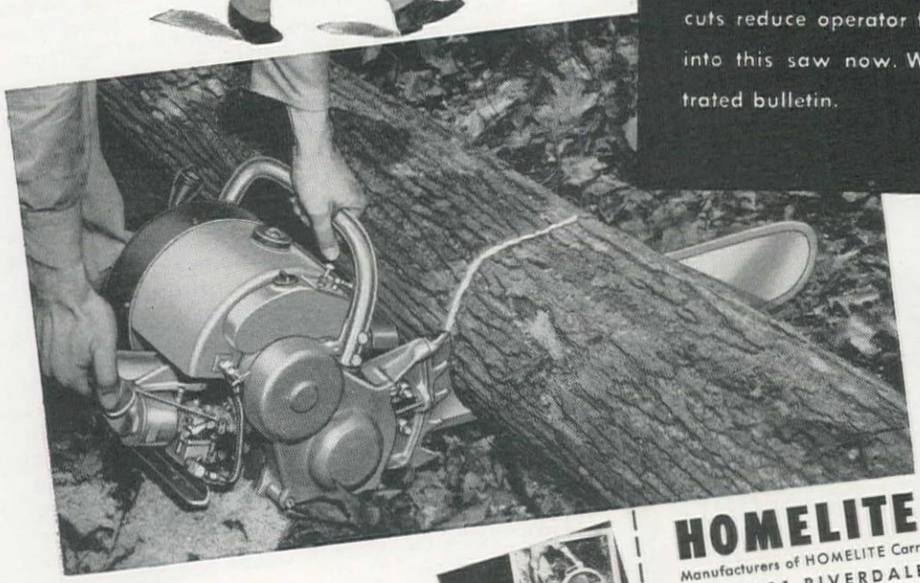
Gasoline Engine Driven **CHAIN SAW**

EASIEST HANDLING
FASTEST CUTTING
LIGHTEST WEIGHT
LOWEST MAINTENANCE



It's the Easiest Saw to Handle

It weighs only 33 lbs. complete . . . and is perfectly balanced. It cuts at any angle. Handles any type of cut. And flips . . . in two seconds flat . . . from vertical to horizontal cutting position. What's more, its two simple controls are easily operated by either left or right hand in a normal comfortable position. Yes, and its low vibration *plus* a spiked bumper plate that permits protection of saw and holds guide bar straight on even the heaviest cuts reduce operator fatigue to nil. Look into this saw now. Write for new illustrated bulletin.



Built and Backed by HOMELITE, Manufacturers of More than 275,000 Gasoline Engine Driven Units.

Send Coupon NOW for NEW Bulletin

HOMELITE CORPORATION

Manufacturers of HOMELITE Carryable Pumps • Generators • Blowers • Chain Saws

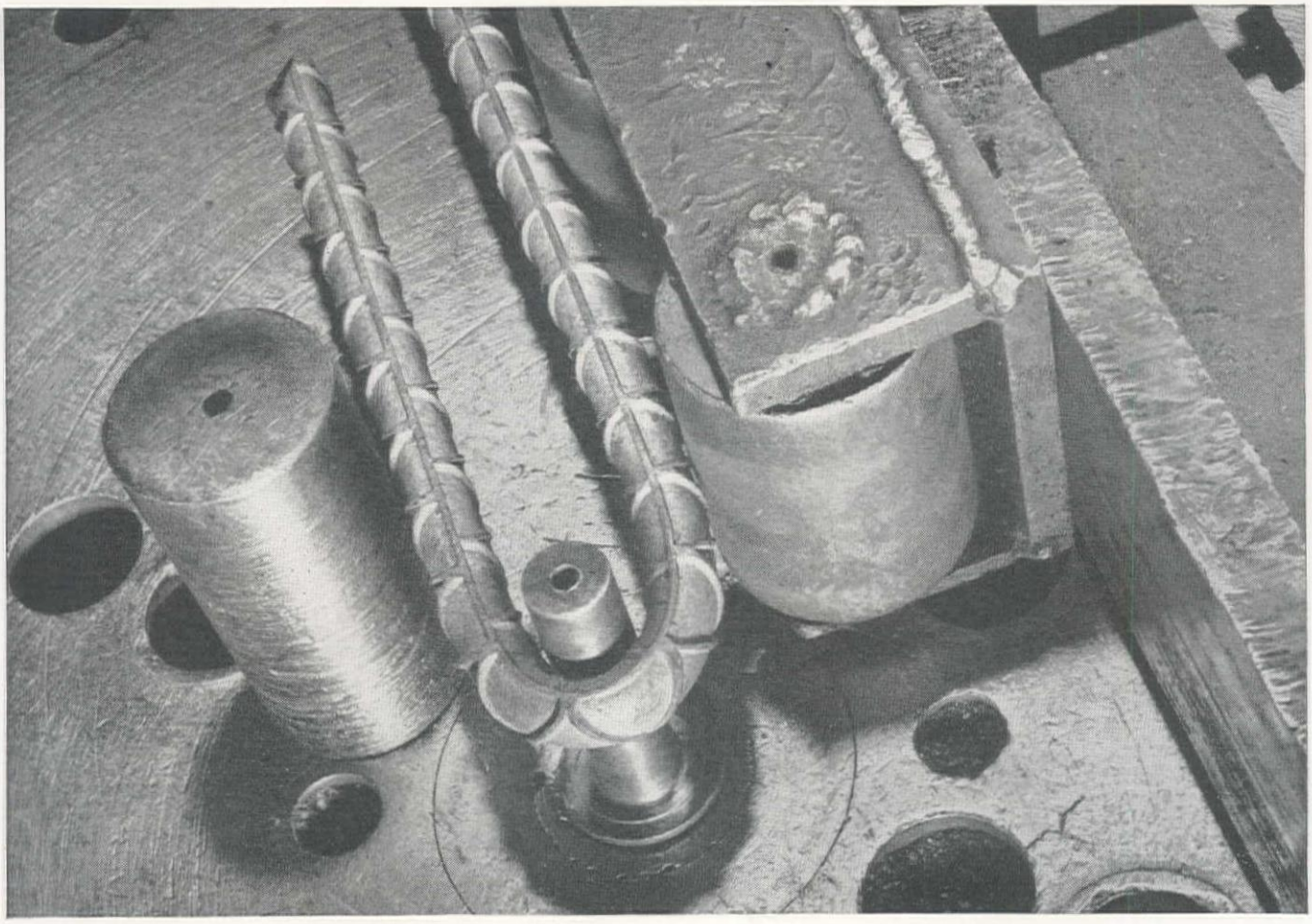
1311 RIVERDALE AVE., PORT CHESTER, N. Y.

Please send me your new illustrated bulletin on Homelite Gasoline Engine Driven Chain Saws.

NAME.....

ADDRESS.....

Built and Backed by HOMELITE,
Manufacturers of More than 275,000 Gasoline Engine Driven Units.



Why New-Billet Steel Makes Better Reinforcing Bars

Manufactured strictly from new-billet steel, Bethlehem Pacific's intermediate and structural-grade reinforcing bars have several advantages over bars made from steel of unknown or uncertain analysis. Among these advantages are:

1. Bethlehem Pacific structural-grade bars under 3/4-inch diameter are ductile enough to be bent 180 degrees around their own diameter without breaking, and intermediate-grade bars under 3/4-inch diameter can be bent 180 degrees around 3 times their own diameter. This means easier, faster fabrication . . . breakage from unloading and rough handling is eliminated . . . danger of failure of the finished structure due to earthquake shocks is reduced.

2. Bethlehem Pacific bars are rolled in lengths up to 60 feet or over where required, suitable for any type of reinforced-concrete structure. Building designs are unimpaired by the need for excessive overlapping of shorter bars.

3. Bethlehem Pacific bars contain high-grade steel, that is uniform in analysis and ductility. Contractors can count on uniform results every time.

In addition to producing high-grade reinforcing steel Bethlehem Pacific operates fabricating shops in three convenient localities where bars can be cut and bent to the customer's specifications. Detailed information is available at any of the offices below.

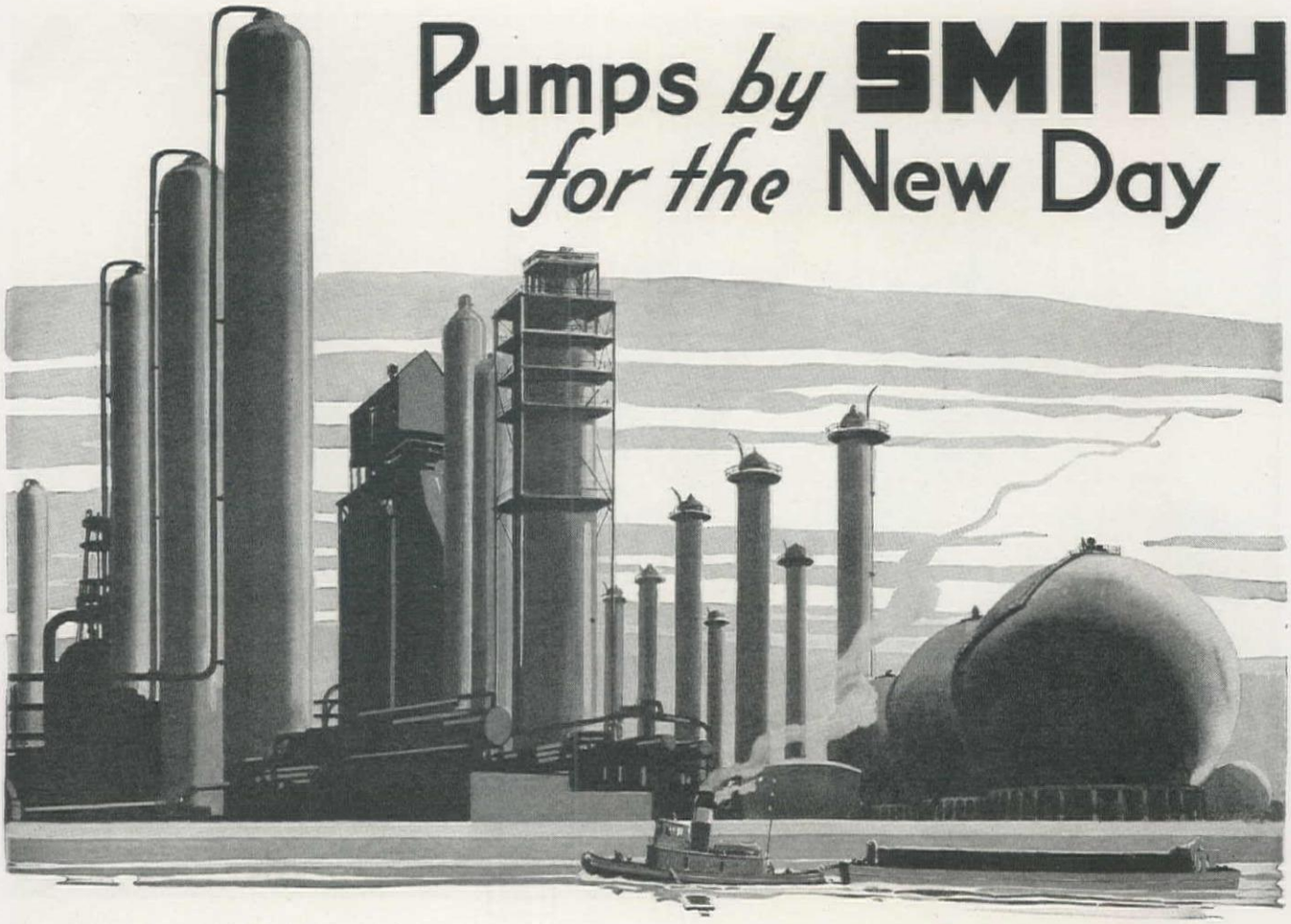
BETHLEHEM PACIFIC COAST STEEL CORPORATION

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

Steel Plants and Reinforcing Bar Shops: South San Francisco, Los Angeles, Seattle

BETHLEHEM PACIFIC ★ BETHLEHEM STEEL ★

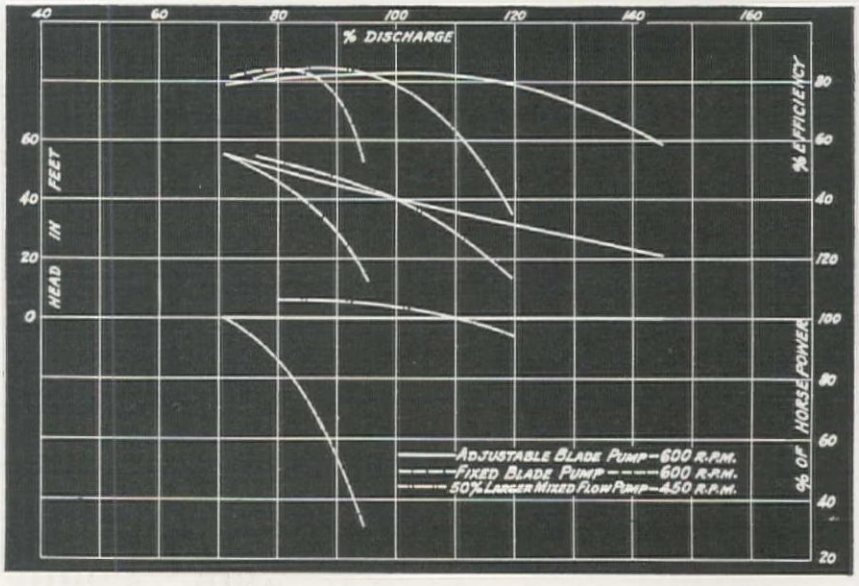
Pumps *by* SMITH *for the* New Day



If It's Hydraulics~ Put It Up to Us!

CLIMAXING nearly 75 years of hydraulic achievement, these SMITH propeller pumps, as a study of the Graph will reveal, offer extraordinary operating advantages.

As an example, in one installation of two pumps, sufficient water is lifted to serve the requirements of a huge modern Butadiene Plant. Write for details - Bulletin No. 148.

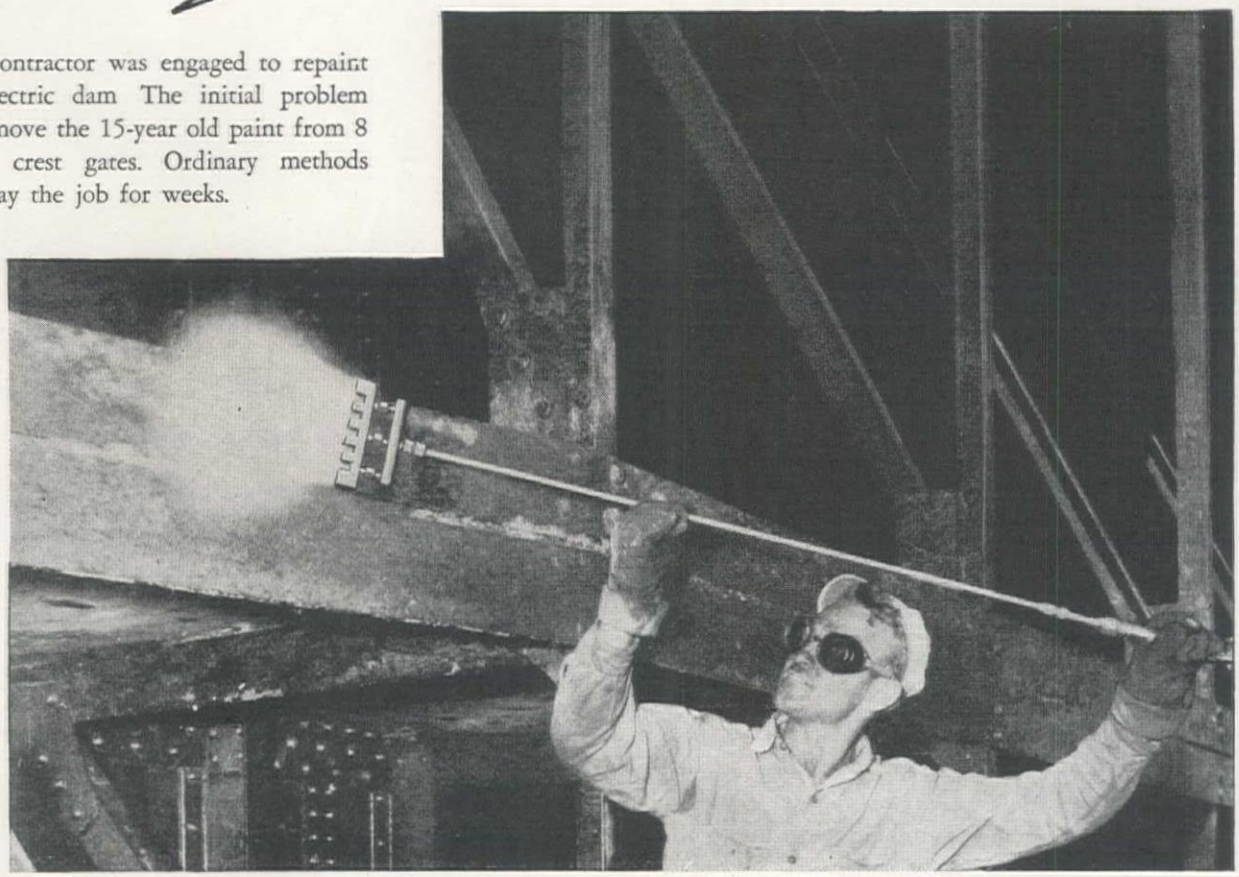


S. MORGAN SMITH Co.

YORK, PENNA. U.S.A.

Flame cleaning speeds 'face lifting' on giant dam

A paint contractor was engaged to repaint a hydroelectric dam The initial problem was to remove the 15-year old paint from 8 enormous crest gates. Ordinary methods would delay the job for weeks.



The Airco Technical Sales Representative suggested oxyacetylene flame cleaning with Series 9200 Torches and Airco Style 120 tips. Quickly and easily applied, the intense heat of the flame cockled the old paint, loosened scale and drove off surface moisture in a single operation.

The Company found that a flame cleaned surface made for a better finished paint job. An executive said, "We're convinced that flame cleaning is the most efficient and economical method of preparing steel surfaces prior to painting. We now use it almost exclusively in our rust and scale removing work."

TECHNICAL SALES SERVICE — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

To assure its customers of high efficiency in all applications of the oxyacetylene flame or electric arc, Air Reduction has available the broad, practical experience of its Technical Sales Division personnel. The collective experience and knowledge of these specialists has helped thousands to a more effective use of Airco processes and products. Ask about this Airco "Plus-Value" service today. Write your nearest Air Reduction Pacific Company office.

WCN

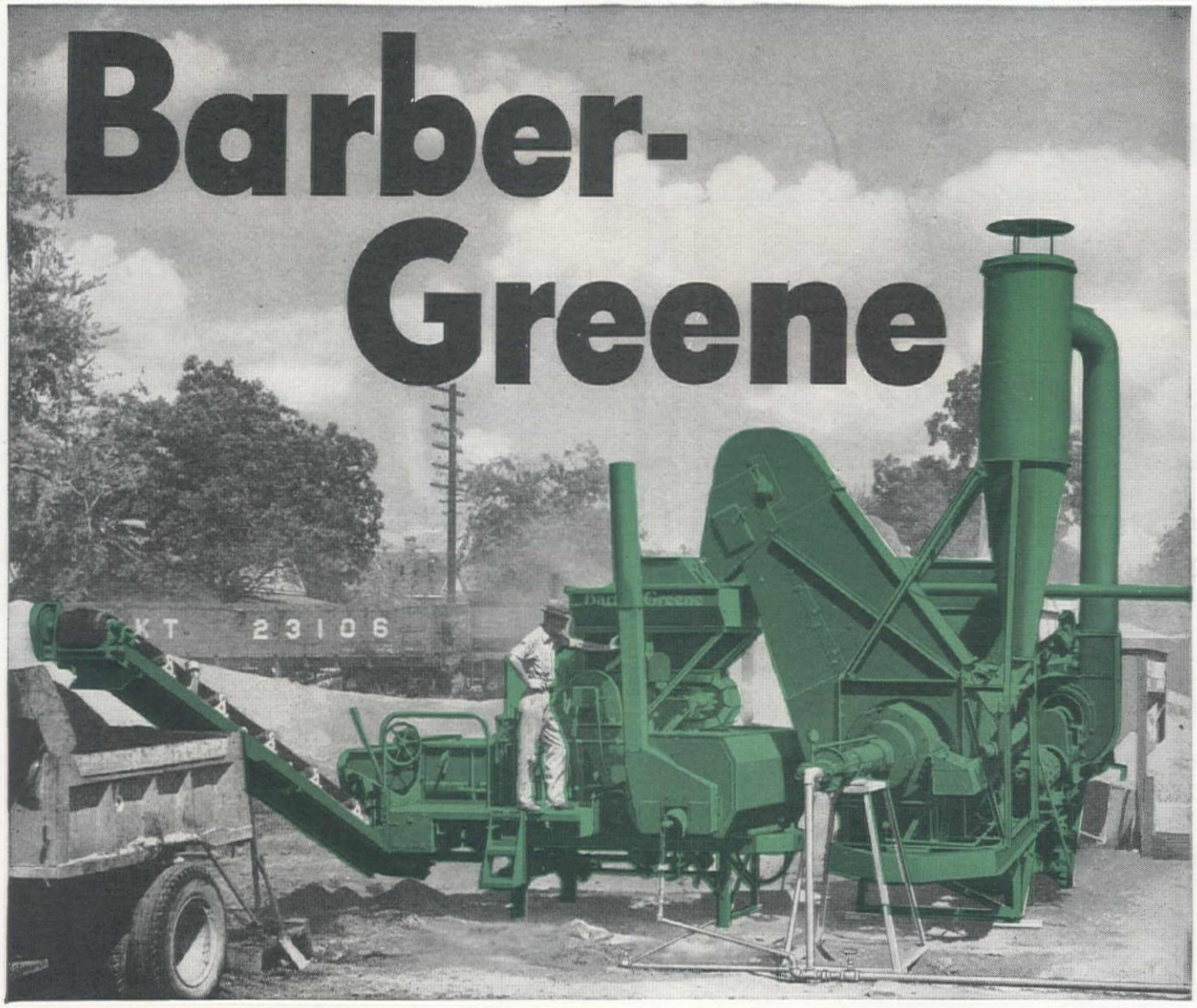
AIRCO

AIR REDUCTION PACIFIC COMPANY

Los Angeles • Emeryville • Portland • Bakersfield • Fresno
San Francisco • Tacoma • Sacramento • Seattle

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

Barber-Greene



Typical set-up of the Barber-Greene Maintenance Plant. Various combinations to meet your immediate needs may be easily arranged.

This *Small* Bituminous Mixing Plant Does a *BIG* Job!

Here's a complete, easy-to-operate, small bituminous mixing plant! It is specifically designed for maintenance and repair work, small road building projects and a variety of other surfacing jobs. The B-G Maintenance Plant will handle any type of mix, and its capacity is remarkable, considering its size and portability.

The B-G Maintenance Plant is truly portable and easily erected. Small enough to operate at low cost on maintenance and general repair work, it is still large enough to handle small construction projects. It operates on the same principles as the larger Barber-Greene Central Plant, measures the correct amount of aggregate and bitumen, thoroughly mixes them and discharges the mix into trucks.

It consists of two basic units—the 840 Mixer and 830 Aggregate Dryer. Each unit is equipped with a towing hitch and pneumatic tires to trail smoothly behind your truck when going from job to job. A complete line of auxiliary equipment available including Reciprocating Feeder, Bins, Dust Collector, etc. For illustrative literature, write Barber-Greene Company, Aurora, Illinois.

50

BARBER-GREENE COMPANY • AURORA, ILLINOIS

Constant Flow Equipment

LOADERS PERMANENT CONVEYORS PORTABLE CONVEYORS COAL MACHINES BITUMINOUS PLANTS FINISHERS DITCHERS

FOR SALE BY: Brown-Bevis Equipment Co., Los Angeles 11, Calif.; Columbia Equipment Co., Spokane, Wash., Seattle, Wash., Boise, Idaho, Portland 14, Ore; Wilson Equipment & Supply Co., Cheyenne, Wyo., Casper, Wyo.; Contractors Equip. & Supply Co., Albuquerque, N. Mex.; Ray Corson Machinery Co., Denver 9, Colo.; Jenison Machy. Co., San Francisco 7, Calif.; Western Construction Equip. Co., Billings, Mont., Missoula, Mont.; Kimball Equipment Co., Salt Lake City 10, Utah; State Tractor & Equipment Co., Phoenix, Ariz.

Twenty Years Ago . . .

Items of Interest from

WESTERN CONSTRUCTION NEWS — November, 1929

An engineering Board of Review was appointed by the directors of the Los Angeles Metropolitan Water District to select the route of the Colorado River Aqueduct. The Board consisted of **Andrew J. Wiley,** consulting engineer, Boise, Ida.; **Richard R. Lyman,** consulting engineer, Salt Lake City, and **Thaddeus Merriman,** Chief Engineer of the Board of Water Supply of New York City.

●

More than 10,000 contractors had complied with the new California statute requiring the registration and licensing of all contractors.

●

At the first meeting of the California State Board of Registration for Civil Engineers, held in Sacramento, **Donald M. Baker,** consulting engineer of Los Angeles was elected president, and **Henry J. Brunnier,** consulting structural engineer of San Francisco, was named vice-president.

●

George Pollock Co. of Sacramento, Calif., had completed a grading contract for the south approach to Suisun Bay Bridge. The company moved 500,000 cu. yd. of earth onto a high fill in 144 working days, average daily movement being 3,500 cu. yd. with an average haul of 2,000 ft. **C. A. Jones** supervised the work.

●

Preceding public dedication of Pardee Dam of the East Bay Municipal Utility District near Valley Springs, Calif., 450 guests gathered on top of the dam for a "Dam Luncheon" given by the **Atkinson Construction Co.,** prime contractors for the construction. **Lynn Atkinson** presided as toastmaster.

●

W. E. Blomgren, who had been project engineer for the Bureau of Reclamation on the Fort Hall Project in Idaho, was transferred to the Denver office of the Bureau to work under **J. L. Savage** on studies and designs for Boulder Dam.

●

Two means for improving the relations between engineers and contractors were discussed in an article by **James G. Tripp,** superintendent of construction on Lake Pleasant and Coolidge dams in Arizona. He suggested a greater construction symmetry of design and that inspectors be more experienced.

(Continued on page 52)

LIGHT IN WEIGHT

BIG IN VALUE

B37 Paving Breaker

joins famous Gardner-Denver family

Weighs only 38 pounds! Yet the Gardner-Denver B37 Paving Breaker is packed with many of the same big values that have proved so popular in the medium B67 and heavy B87 machines.

The tough-slugging B37 makes fast work of light demolition jobs. It's light and safe in the hands of the operator who must work from scaffolding, or wherever footing is treacherous. It's built to endure years of hard work. Here are some of the reasons why:

Renewable chuck liner — easily replaced at low cost — a new liner protects both tool and breaker against a loose-fitting shank.

Double-life hammer — block type piston hammer is reversible for double life — an exclusive feature. Use of tappet minimizes wear on hammer striking face. Tappet operates in renewable bushing.

Extra safety — exclusive throttle valve lock works like the safety on a gun — prevents accidents before they happen.

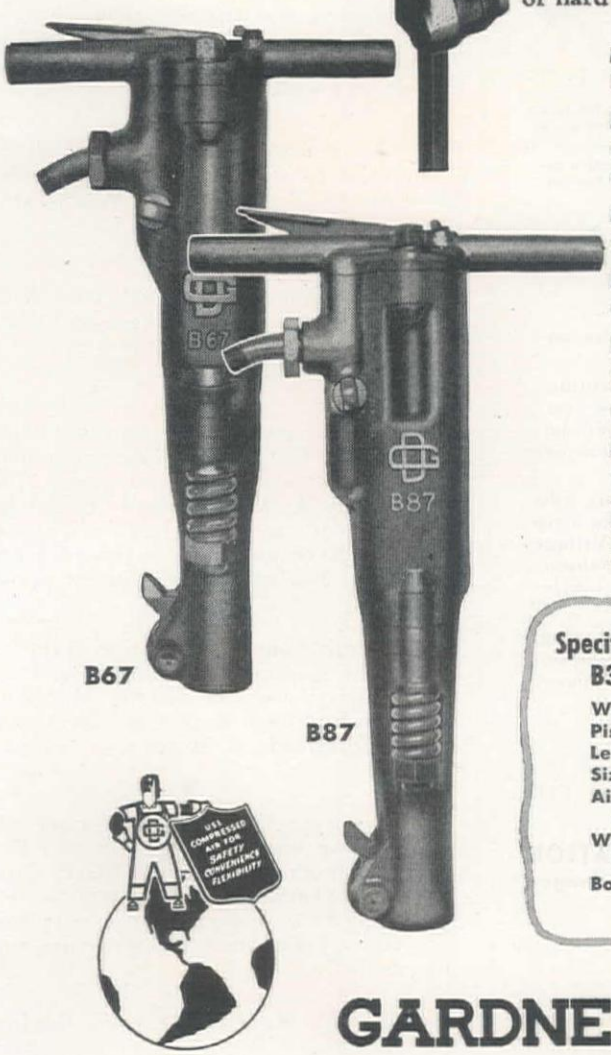
Easy riding — fast cutting action without violent recoil means less operator fatigue. Holding handles stay cool.

Low air consumption — with efficient low-lift plate valve. Long piston stroke gives hard-hitting blow. Exhaust will not "freeze."

Quick acting latch type steel retainer — holds tool securely.

Positive lubrication — integral oil reservoir meters oil to every working part, including tool shank. Lubricated shank reduces chuck wear and breakage of gads.

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



Specifications for GARDNER-DENVER B37 PAVING BREAKER

Weight	38 lbs.
Piston Diameter	1⅞"
Length	22"
Size of Tool Shank	1" Hex. x 4¼"
Air Hose Recommended	¾"
Weight, Boxed for Shipment	61 lbs.
Boxed Dimensions	8" x 16" x 26" 1.9 cu. ft.

GARDNER-DENVER

SINCE 1859

WESTERN BRANCH OFFICES:

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

Twenty Years Ago...

(Continued from page 50)

Precautions in erecting through, continuous, steel spans for the Springfield highway bridge over the Willamette River in Oregon were described by **A. H. Benedict,** then assistant highway engineer with the Bureau of Public Roads at Portland.

●

Failure of the rock-fill Littlefield Dam in Arizona during construction was discussed by **J. A. Fraps,** Engineer on Dam Supervision with the Arizona Highway Department. Reasons for the failure was cited as inadequate design and faulty construction methods.

●

The Calaveras Flood Control dam near Stockton, Calif., was described as the first dam of its type to be constructed in an article by **K. L. Parker,** superintendent for Bent Bros., Inc. The dam is a variable-radius arch with a decided overhang downstream at the center and upstream at the abutments, combined with gravity-section abutments and a gravity wall.

●

Design and erection of an elevated steel tank with 100,000 gal. capacity by Chicago Bridge & Iron Works at Seattle, Wash., was reviewed.

●

An obituary was published for **Arthur R. Wilson,** founder and president of the Granite Rock Co. and the Granite Construction Co.

●

Construction of the Portland cement concrete Pacific Highway north and east from Sacramento was reviewed. Fredrickson & Watson and Fredrickson Bros. contracted for the 8.7-mi. highway at $323,686 and made a record average run of 360.4 cu. yd. of concrete per day.

●

Tenth Annual Convention of the California Section, American Water Works Association was held at Del Monte with **John Burt,** San Rafael, president and **C. S. Olmstead** of Monterey, vice-president.

●

Steel erection on the 29-story Shell Building was under way in San Francisco under the direction of **G. E. Greenwood,** general superintendent for P. J. Walker Co., managers of construction. Henry J. Brunnier was structural engineer.

●

E. W. Kramer, District Engineer, U. S. Forest Service, California district, was appointed to cooperate with the Board of Consulting Engineers on the investigation of San Gabriel dam site.

●

Otto von Geldern, consulting engineer of San Francisco, was publishing his "Reminiscences of the Pioneer Engineers of California."

LOWER COST EARTHMOVING PAYS OFF IN *REPEAT ORDERS*

A. T. NOLAN
DASSELL, MINN.
Original Order — 2 Motor Scrapers
Repeat Order — 1 Motor Scraper

CENTRAL CONSTRUCTION CO.
INDIANOLA, IOWA
Original Order — 2 Motor Scrapers
Repeat Order — 1 Motor Scraper

Some of the Many Other Repeat Buyers

R. TOMLINSON, Jonesville, La. . . . Original Order—Motor Scraper. Repeat Order—2 Motor Scrapers.

•

AMIS CONSTRUCTION CO., Oklahoma City, Okla. . . . Original Order—1 Motor Scraper. Repeat Order—1 Motor Scraper.

•

SPENCER CONSTRUCTION CO., Carrollton, Texas . . . Original Order—2 Motor Scrapers. Repeat Order—1 Motor Scraper.

•

CONDON & CUNNINGHAM, Omaha, Nebraska . . . Original Order—1 Motor Scraper. Repeat Order—2 Motor Scrapers.

•

ARMSTRONG BROS. CONSTRUCTION CO., Brampton, Ontario, Canada . . . Original Order—2 Motor Scrapers. Repeat Order—1 Motor Scraper.

ACTUAL job performance proves LaPlant-Choate Motor Scrapers move more dirt at lower cost! That's why so many Motor Scraper owners are repeat buyers. Year after year, more successful outfits add more Motor Scrapers to their fleets . . . because they know they can be sure of profitable, dependable service.

Ask any LPC repeat order buyer about Motor Scraper advantages. *Big capacity* . . . 14 cu. yds. struck . . . 17.5 cu. yds. heaped; *big power* . . . 225 H.P. . . . over 16 H.P. for every struck yard of scraper capacity; *big speeds* . . . up to 19.3 m.p.h.; *big tires* . . . 24:00 x 29 . . . with ample traction and flotation for all operating conditions. Many other additional advantages combine to keep earthmoving costs low, earthmoving efficiency high.

Ask your nearest LaPlant-Choate dealer to demonstrate how you can move dirt faster at the lowest possible cost per yard. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa — 1022 77th Ave., Oakland, Calif.

INDUSTRIAL EQUIPMENT COMPANY OF SOUTHERN CALIFORNIA
4441 Santa Fe Avenue, Los Angeles 11, California

WESTERN CONSTRUCTION EQUIPMENT CO.
505 N. 24th Street, Billings, Montana
Stephens & Mount Avenue, Missoula, Montana

GENERAL EQUIPMENT COMPANY
1201 East 2nd Street, Reno Nevada

HEINER EQUIPMENT & SUPPLY CO.
501 W. Seventh Street South, Salt Lake City, Utah

N. C. RIBBLE CO.
1304 N. Fourth Street, Albuquerque, New Mexico

ENGINEERING SALES SERVICE, INC.
410 Capitol Blvd., Boise, Idaho

COLUMBIA EQUIPMENT COMPANY
1240 S.E. 12th Ave., Portland 14, Ore., and Seattle, Washington

LaPLANT C CHOATE

THE LAST WORD in Fire Protection

. . . for a West Coast Plant

This Horton elevated tank serves as the "last word" in fire protection for the Portland, Ore. plant of the Continental Can Co. The 75,000 gallons of water in the tank is the secondary supply for the automatic sprinkler system at the plant. Should the pressure in the city mains drop too low to supply the sprinkler system, the water in the tank will flow as soon as a sprinkler head opens.

Here's why this "last word" safety feature is important. At this plant—like many others—manufacturing operations are carried out in several different buildings. The plant has a total floor area of about 240,000 sq. ft. and practically the entire area of the plant is protected by a total of 3,000 sprinkler heads. To keep a fire from starting and spreading, water must flow the instant any sprinkler head opens. The secondary *elevated* supply in the tank is assurance that water will always be available under unfailing gravity pressure.

Horton ellipsoidal-bottom elevated water tanks like this one are built in capacities of 15,000 to 500,000 gals., and are also used to furnish reliable water pressure for general service at industrial plants. It's good business to equip your plant with a Horton elevated tank that won't let fire have the "last word." Write or phone our nearest office for estimating data and quotations.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2183 Healey Building
Birmingham 1.....1598 North Fiftieth Street
Boston 10.....201 Devonshire Street
Chicago 4.....McCormick Building
Cleveland 15.....Guildhall Building
Detroit 26.....Lafayette Building
Houston 2.....National Standard Building
Havana.....402 Abreu Building
Los Angeles 14..1544 General Petroleum Building
New York 6.....165 Broadway Building
Philadelphia 3.....1700 Walnut Street Building
Salt Lake City 1..1555 First Security Bank Building
San Francisco 11....1213—22 Battery St. Building
Seattle 1.....1355 Henry Building
Tulsa 3.....Hunt Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA.

In Canada—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

November 15, 1949 — Vol. 24, No. 11

Equipment and Design Advance Together

DEVELOPMENTS in construction equipment play a major part in advancing the growth of civil engineering, in spite of the apparent separation of technical design and field procedure. The common denominator of all design and construction can be reduced to "cost per unit of finished structure." Any development out in the field which results in cutting costs permits a designer to extend his economic horizon, and by the same analysis any technical advance making possible the safe design of a structure of larger size provides the incentive to develop larger and more efficient equipment.

A perfect example of this interdependence of office-and-field is illustrated in the current construction of Garrison Dam. In the days when hauling units were measured by team-and-scraper, or even in motorized equipment of a few yards capacity, engineers would have had to consider any man-made structure containing 75,000,000 cu. yd. of compacted fill as economically infeasible. Likewise, if the technical advance in earthdam design had not made it practical to call for larger volumes of fill there would have been no necessity to develop larger earth moving units. But, larger equipment, and resulting lower unit costs have given the engineer more freedom of design, and better design knowledge has produced plans which, in turn, initiated the urge for bigger equipment. This step-by-step advance has applied to many other types of work such as highways, bridges and canals, and extends to structures built of steel, concrete or timber. The result emphasizes the need for the complete interchange of knowledge and closer coordination between the office and the field throughout the entire industry.

Commensurate Compensation

NO OTHER SEGMENT of state government involves larger expenditures of funds, or has contact with more citizens than the highway department. Its functions require leaders and administrators with a technical background and its organization is generally considered to represent an opportunity for a life-time career in public service. Yet, in many Western states the compensation for positions of major responsibility is so inadequate, when compared to the duties and responsibilities, that capable engineering executives must forego the career they might like to pursue through inclination and training. The story is an old one, but it is brought into new and sharper focus by the resignation of Roy McLeese, state highway engineer of Utah, because of a grossly inadequate salary. As bad as the results of such a resignation are at the top, the effect on the lower levels, where young engineers are embarking on what they look upon as their life's work is shattering. The State of Utah should be actively engaged in building up strength and enthusiasm in its highway organization for the expanding program it must face in the coming years. A short-sighted policy in the state administration, which has failed to provide compensation even remotely commensurate with responsibility, has rendered a distinct disservice to the state, its citizens and the loyal men of its highway organization. The action of Mr. McLeese should have a salutary effect on many Western states.

John Austin

THERE IS no more characteristic feature of construction work in the West than hard-rock tunneling, and no more familiar figure in the field of tunneling than "Long" John Austin. A sketch of his career in this issue reviews the record of a man who selected one specialized phase of construction and set out to make himself an expert in this field. Such a plan, when the man is endowed with the element of leadership and with genius in getting the most out of equipment, always results in recognition in his chosen field. To John Austin this recognition has come not only in the West, but from tunnel men throughout the country, and from foreign countries in need of tunneling talent. Holder of many tunnel driving records, he is equally proud of his achievements in advancing the place of safety in underground work. John Austin has carved out of the rock of Western mountains a record which marks him as one of the outstanding construction men of this region.

A New Chapter in Water Resources

TECHNICAL PROBLEMS of reclaiming water from sewage and industrial waste have had known solutions for years. However, except at a few sites where the economics of recovery were particularly favorable, the practical application of this engineering achievement has not been employed. The economic urge has not made it necessary. During these years, however, the well-known water supply problems in the general Los Angeles area have become increasingly aggravated with acute deficiencies developing in the availability of water for agriculture and industry. Attention of public officials of the county has been directed toward reclamation as they observe the records showing million of gallons of water per day being used for the non-returnable purpose of conveying wastes to the ocean. A comprehensive study was ordered and the resulting engineering report finds that the reclaiming of this water is not only feasible from a technical point of view, but is also economically sound, based on the comparative cost of additional water of like quality from other sources. Of particular engineering interest is the cost estimate developed in the report for large plants designed exclusively for reclamation, as distinct from established plants which have been operated with reclaiming of effluent as an adjunct to treatment of total flow. Local conditions must be understood in any appraisal of these costs which include such favorable items as: (1) existing trunk lines with flows allowing a pre-determined and steady diversion, and (2) developed spreading areas which reduce the cost of getting the end product into the ground to help replenish the supply of agricultural water. These conditions may cause engineers to consider the economic finding as representing a "special case," but the report represents an important new chapter in the solution of a basic Western problem.

The New "201" CRUSHING and SCREENING PLANT

The shovel-loading hopper is fitted with inclined grizzly, and mechanical feeder. All principal units are shaft and V-belt driven. Notice the fully-enclosed brakes.

You'll Like Its—

HIGH OUTPUT. With its jaw and roll crushers, the "201" is capable of producing especially large amounts of ¾" and smaller product.

CHOICE OF FEED. The "201" may be had with either shovel-loading hopper, or swivel drive for separate feed conveyor.

READY PORTABILITY. The "201" is of a size and weight that can be transported over most highways without a special permit.

ENCLOSED BRAKES. Hydraulic brakes, mounted on the *outside* of the wheels, are dustproof and watertight.

TOP-NOTCH ENGINEERING. All bearings of anti-friction type; all principal units, shaft and V-belt driven; all moving parts well protected by guards.

The full-length platform provides a clear view of the screen. The clutches can be operated from the platform, or from the ground.

When fitted with shovel-loading hopper, the "201" Plant is completely portable. No parts need be removed for transporting.

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

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

WESTERN CONSTRUCTION NEWS
NOVEMBER 15 • 1949

WITH 10,000,000 cu. yd. in place the embankment and powerhouse excavation in the foreground, this aerial view shows the general area of operations.

Garrison Dam—
Fill Moves at Rate of "Dam-a-Day"

Two large contracting organizations are moving embankment material at record rate on Missouri River project in North Dakota under direction of Corps of Engineers

AS MUCH DIRT as is contained in many completed earth-fill dams is being placed every day in the embankment for Garrison Dam, huge Corps of Engineers' power and flood control dam being constructed on the main stem of the Missouri River near Garrison, N. Dak., about 75 mi. from Bismarck, the state capital.

The great structure, destined to be the largest rolled earth dam in the world, with an embankment fill of 75,000,000 cu. yd., is rising at the amazing rate of 200,000 cu. yd. per day. It has a second unique feature, in that this tremendous yardage is secured from a balanced cut and fill program, virtually all the required embankment material in the right side of the dam coming from the excavation for the intake channel leading to the powerhouse, the powerhouse site (12,000,000 cu. yd.) and the tailrace channel, while sufficient earth will be removed from the spillway area on the left abutment to construct the embankment on that side of the river. It is a rare occurrence that suitable fill material is obtainable from the necessary excavation, and that the total quantity available should virtually equal the requirements.

Design and early construction of Garrison Dam was discussed in *Western Construction News* for Nov., 1948. Construction has advanced rapidly, however, in the intervening year, and what appeared at that time as a few scratches on the prairie now begins to look like a dam.

Two miles long; 200 ft. high

The main features of the project are the main embankment, to be 210 ft. high at the maximum section, 11,343 ft., or more than 2 mi. long, and about 3,700 ft. thick at the toe in the maximum section; a spillway 1,440 ft. wide and 12,000 ft. long, around the left abutment; a powerhouse to accommodate five 80,000-kw. generators, located in a deep cut in the downstream face of the right abutment; an intake channel 15,000 ft. long in the bed of the reservoir, leading from the river channel to a reinforced concrete intake structure at the upstream end of the powerhouse penstocks; eight tunnels, each 29 ft. in diameter, through the right abutment, 5 to carry 24-ft. steel penstocks from the intake structure to the powerhouse, and 3 to serve as flood control and water regulation outlets; and a tailrace channel 6,000 ft. long, from the powerhouse to a discharge point in the river.

The first major contract to be awarded was to Garrison Builders, Inc., in October, 1947. This firm is a joint venture composed of Forcum James Co., H. N. Rogers & Sons Co., and S. K. Jones & Son Co., all of Memphis, Tenn. As mentioned in the previous article, this contract embraces about 14,000,000 cu. yd. of excavation and embankment fill on the right abutment, also drilling of a full-scale pilot tunnel to investigate conditions in the penstock area, and driving of a steel sheet piling cutoff wall for the entire length of the dam. This contract

is now considered virtually completed.

The next major contract was to Peter Kiewit Sons' Co. and Morrison-Knudsen Co., Inc., in September, 1948, for spillway excavation and embankment construction on the left abutment. Another contract was awarded recently to S. A. Healy Co. of New York for construction of the eight 29-ft. diameter tunnels through the right abutment. Further contracts are to be let when these outlet facilities are available for by-pass purposes, for closure of the river and raising the embankment to final grade. It is anticipated that the closure can be made after the spring rise of 1952, probably in the month of July.

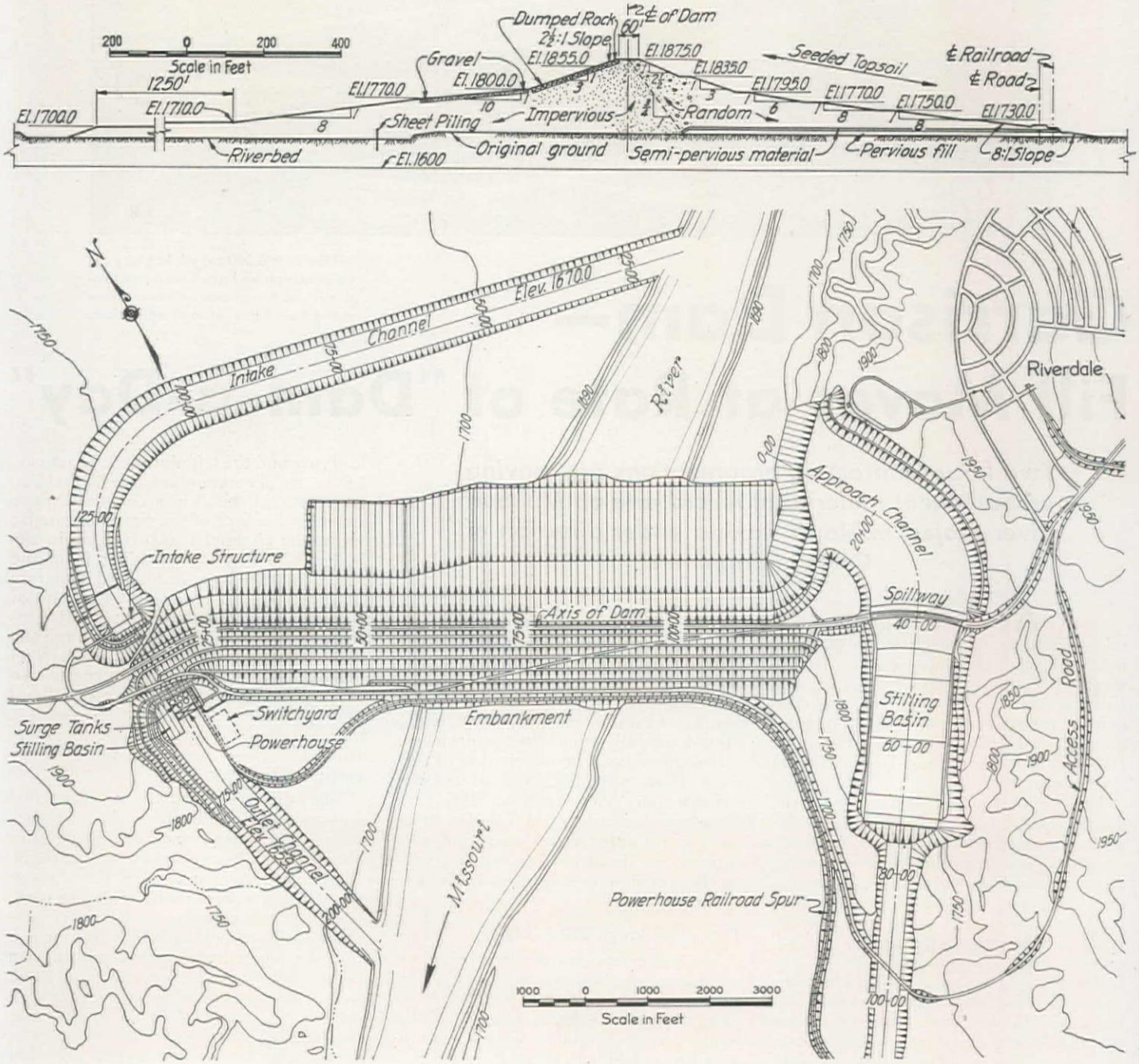
Euclids for earth work

Both major embankment contractors are using the same earth movement procedure, namely excavation by power shovels or Euclid loaders, and hauling to the point of placement in Euclid bottom-dump trucks. The Garrison Builders equipment fleet was mentioned in the previous article and will not be discussed again here. On the PK-MK contract, however, a fleet of 60 Euclids, each hauling 30 cu. yd., is being employed. These are loaded in the spillway excavation area by 3 Bucyrus-Erie 5-cu. yd. electric shovels and 5 Euclid loaders, working by the bench method in the spillway cut.

Material for a 10-ft. impervious blanket beneath the downstream toe of the dam is secured from one portion of the intake channel where suitable gravel was discovered, and is being excavated and hauled by similar methods. One portion of the intake channel excavation, however, is being handled by a Bucyrus-Erie walking shovel.

Excavation and fill is complicated by the presence of seams of lignite coal, varying in thickness from a few inches to 8 ft., which must be excavated separately and hauled to stockpile, as it does not make suitable embankment material. To date a stockpile of over 100,000 cu. yd. of this coal has accumulated. It is hoped that a sale can be found for it, and meanwhile small portions of it are being used for heating at Riverdale townsite and in other places about the project. It constitutes something of a fire hazard in the stockpile, though much of this danger has been eliminated through compaction of the pile by tractors, eliminating air pockets as far as possible. The tunnel excavation is also complicated by this same factor of coal seams, since they are heavily water-bearing. One thick seam lies almost along the bottom of the tunel grade.

BALANCED cut-and-fill provides the 75,000,000 cu. yd. for the rolled embankment from the spillway, intake, powerhouse and tailrace channels. Main embankment is 11,343 ft. long and 3,700 ft. thick at the base of the maximum section. Height is 210 ft. Note line of steel sheet piling for cutoff.



Large sprinklers on fill

The fill material, being placed at a rate of about 200,000 cu. yd. daily, through the combined efforts of the two contractors, is spread by the bottom-dump trucks in 9-in. layers, and compacted by tandem sheepsfoot rollers with a weight of 3,500 lb. per lin. ft. or 640 lb. per sq. in., making a total of 10 passes, which compress the layer to about 6 in.

In order to achieve specified compaction, sprinkling is done by a fleet of specially-designed Euclid sprinklers, having a capacity of 10,000 gal. The tractor for this water wagon is identical with that used for the earth movers on the job, being powered with Hall-Scott 300-hp. butane engines. The rig can sprinkle a 50-ft. wide area, and can be completely emptied in 8 min. To generate this pressure, a Gorman-Rupp pump, driven by a LeRoi butane engine is mounted on the tank, completely separate from the tractor. Moisture penetration is adjustable, and the sprinkler is remotely operated from the truck cab.

The Corps of Engineers has two field laboratories mounted in trucks for continual on-the-spot testing of the fill. Density tests on strategically located cores can be completed in 45 min. to an hour and a quarter after removal from the embankment. When compaction is found to be inadequate, the contractor is required immediately to scarify and re-roll the section.

Sheet piling cutoff wall

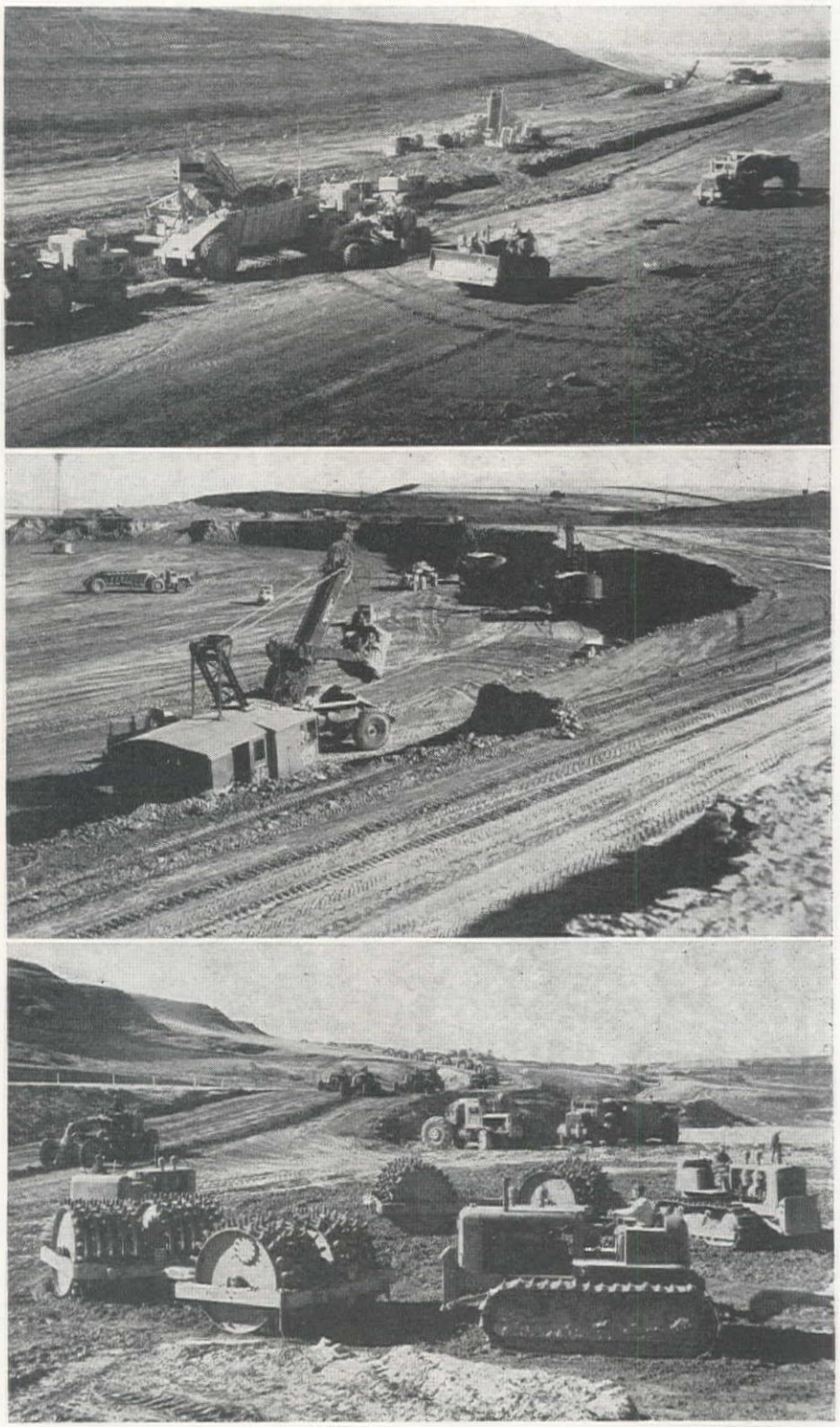
Little preliminary excavation was required at the dam site beyond clearing of vegetation and rubbish. As a cutoff, however, steel sheet piling is being driven to an impervious strata of Ft. Union shale, which generally requires a piling length of 105 ft., which allows about 6 ft. to protrude above the ground for imbedment in the fill.

The piling is being driven by Garrison Builders. The maximum daily placement of piling has been about 4,000 lin. ft. of pile. To facilitate penetration into the ground, a spade jet of water at high pressure is guided into the earth along the driver leads, to open a preliminary path for the piling. This is then withdrawn and the pile set in place in the leads and interlocked with its predecessor. As it is lowered and driven by the steam hammer, needle jets accompany it on either side, to further soften the material and open the way for the pile. After driving to refusal, impervious material is placed alongside the projecting pile tops and compacted with manually-operated pneumatic compactors.

To facilitate movement of trucks, railroad cars, and other vehicles across the river, a temporary trestle has been erected across the stream a short distance inside the final downstream toe of the dam. When the fill is completed and river closure effected, this trestle will simply be buried, and the access road and railroad spur will remain in the same position.

Anticipated tunnelling methods

The Healy contract for excavation of the 8 tunnels through the right abutment will probably be one of the most interesting portions of the entire project, and an article will be devoted to that phase later. However, in preparation for the work, the Healy company has set up an interesting and well-organized plant. Alternate tunnels will be driven simultaneously, although no two will be at the same depth at the same time. Only after the first four are completed and lined will excavation begin on the intervening bores.



MOVING 200,000 cu. yd. of material into the dam per day requires massed equipment of large capacity in the pits and on the fill. Loading is by traveling excavator (top) into 30-yd. wagons in the spillway cut, and by 5-yd. electric shovels (center) in another location. On the fill the material is spread in 9-in. layers compacted to 6 in. (bottom) by 10 passes of the rollers.

Much valuable information has been secured on bearing and other characteristics of the Ft. Union shales, through which the tunnels will be driven, by observations taken in the pilot tunnel completed two years ago, and the required spacing of support ribs is known from that experiment. The only factor remaining undetermined is the effect of blasting in new tunnels on those already completed.

Healy expects to use full face tunnel-

ling, with 85 to 90 holes per shot, fired in 9 delays. Perimeter charges would be fired within 1 ft. of the neat line in the Ft. Union material, or 18 in. in the coal seams. Based on the experimental results, about ½ lb. of powder will be required for each cubic yard of excavation. Conway muckers and 4-cu. yd. cars will be used for removal of broken material.

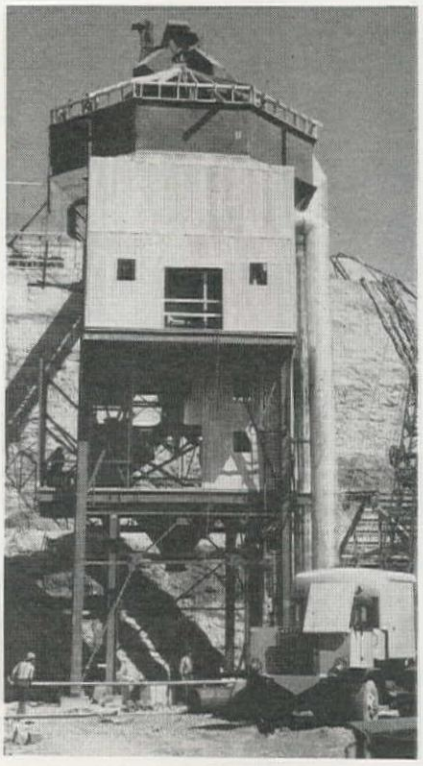
A large Johnson batching plant has been set up in the powerhouse excavation, and a 90,000-cu. yd. aggregate bin established on the right abutment, both installations being equipped for operation in either summer heat or winter cold. The batcher, designed to produce 80 to 100 cu. yd. of concrete per hour, is equipped with cold air refrigeration for summer work, and will use freezing water, so that concrete will be delivered at not over 60 deg. F.

On the other hand, steam pipes have been installed under the aggregate piles, so that warmed aggregate will be available at all times in winter. Aggregate is hauled by railroad from a quarry 115 mi. distant directly to the bin side, where it is bottom-dumped into hoppers beneath the track and carried by conveyor belts and movable gantry belts to any spot in the bin. From the bins, another belt operating in a tunnel underneath, will convey aggregate to the batcher shown at the right.

The main cement silo in the aggregate yard holds 7,315 bbl., and from this a Robinson activator will blow cement to a smaller 500-bbl. storage tank at the batcher.

Organization

Garrison Reservoir, when completed, will impound about 23,000,000 ac. ft. of water, forming a lake which will extend 200 mi. upstream, beyond the town of Williston, and practically to the mouth of the Yellowstone. Some diking is to be done in order to protect a few low-lying portions of the town of Williston.



BATCHING PLANT provides for 500 bbl. of cement storage, and the entire concreting plant is equipped to provide for winter heating and summer cooling of the concrete as placed.

AGGREGATE arrives by train from a quarry more than 100 mi. distant and moves into storage, handled by the stacking conveyor (top) in the background. From storage the material moves by belt (bottom) to bins in the top of the batching plant located in the excavation for the powerhouse.

Approximately 390,000 ac. will be inundated.

For the Corps of Engineers, Col. J. S. Seybold is District Engineer of the Garrison District, with headquarters at Ft. Lincoln, near Bismarck. John W. Sibert, Jr., is chief construction engineer, and Robt. H. Hayes is chief of the engineering division. Resident engineer on the embankment is Olaf Lein, Jr., on the tunnels, Everett L. Knutson, and on Riverdale townsite construction, H. D. Hutchins.

For the contractors, Ben Williams is project manager for Kiewit-Morrison-Knudsen, Joe Carter is project manager for Garrison Builders, and Mark Foote occupies a similar position for S. A. Healy Co.

Pipeline for Salt Lake City

A $1,070,000 pipeline system to transmit water from the Provo River Project in Utah to areas in Salt Lake County has been approved by a special committee appointed by the county's commission. The water supply would be obtained from the aqueduct of the Salt Lake Metropolitan Water District, which owns 46 per cent of the Provo Project water.

Tentative plans call for construction of a diversion line from the aqueduct to a 2,000,000-gal. equalizing reservoir from which water would be distributed to waterworks systems within the confines of a contemplated conservancy district comprising the east side of Salt Lake Valley. The organized district would construct, finance and operate the system.

The system was designed by David I. Gardner and C. J. Ullrich.

Exploring a Tough Foundation Site

Almost no subsidence allowed in specifications on telescope foundations—Deeply faulted sandstone atop Mt. Hamilton, Calif., heavily grouted to get test cores — Piles favored over spread footings

By
HENRY T. TAYLOR
Job Engineer
Dames & Moore
Foundation Engineers
San Francisco, Calif.

SURPASSED ONLY by the Hale Telescope atop Mt. Palomar, the 120-in. telescope mirror, now being designed for the University of California's Lick Observatory on Mt. Hamilton, will replace the 100-in. mirror on Mt. Wilson as the world's second largest chunk of optical glass. With this distinction also is a series of foundation problems at Lick that may well rank among the most delicate to be found anywhere. Probably nowhere else in the construction and engineering field are computations carried to the number of significant figures that are used for the foundations and mountings to support an optical mirror.

Supporting loads of about 50 tons, each of the three legs of the tripodal support for the second largest telescope in the world is designed to rest on a separate foundation with differential settlement restricted to .045 of an inch. Any settlement greater than the .045 in. specified would be very undesirable after the telescope and its precisely accurate mirror had been adjusted. Such an extremely small allowance for differential settlement calls for stable supporting material, and subsurface exploration of the proposed site was necessary to determine whether or not the foundation material would meet requirements.

Mount Hamilton, located about 12 mi. east of San Jose, is composed of sedimentary rock of the Franciscan group overlain by a thin layer of rock debris and soil. Since very little solid rock was visible upon the site, the first operation was to dig three exploratory pits at one possible location of the tripodal support. These pits were excavated to a minimum depth of 32 ft. and disclosed that the underlying material was a fractured sandstone with numerous layers of crushed and weathered shale. Undesirable differential settlements of the spread footings planned were probable at this location. Consequently, an alternate location on the site was stripped of its topsoil and an existing asphalt-surfaced tennis court to expose the rock underneath. This rock consisted of badly fractured sandstone varying from a little to a considerable degree of decomposition.

Exploratory borings

In order to determine fully the nature of this sandstone formation, a Failing rotary drill rig was utilized to drill a number of 6-in. exploratory borings. The rig was equipped with a saw-tooth core barrel, designed to retain continuous cores of the rock drilled, and a drive-type extra heavy soil sampler. The exploration program called for two test borings straddling each telescope leg location. Three such borings were drilled to depths of 20 to 25 ft. with considerable difficulty.

In the drilling operation circulating water was used to wash the rock cuttings out of the boring and to cool the bit. It was impossible to obtain the return of this water since it would escape in the numerous cracks, leaving the cuttings in the hole and hindering further progress. Furthermore, rock fragments were continually breaking loose from the boring wall and jamming the core barrel. Sealing solutions such as aquagel and bentonite were used in an attempt to solidify the walls with little success. When further progress became very difficult the boring was filled with high early strength cement and redrilled the next day. This did seal off many of the cracks, permitting cleaning out of the cuttings and prevented caving, but it was very time consuming and had to be repeated frequently as further progress was made.

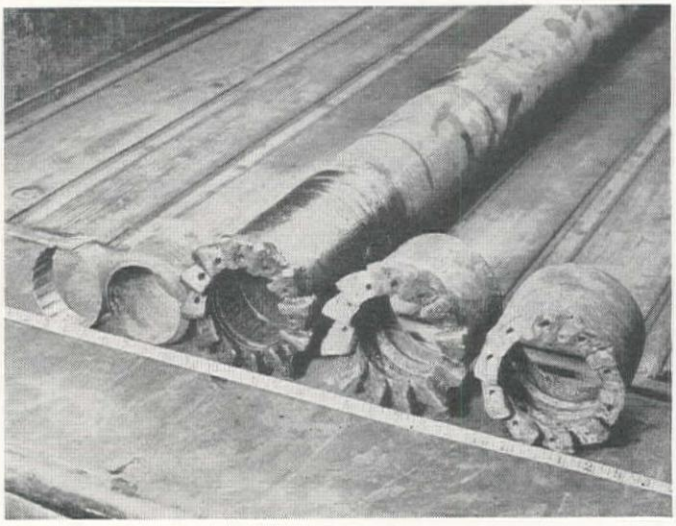
Core recovery

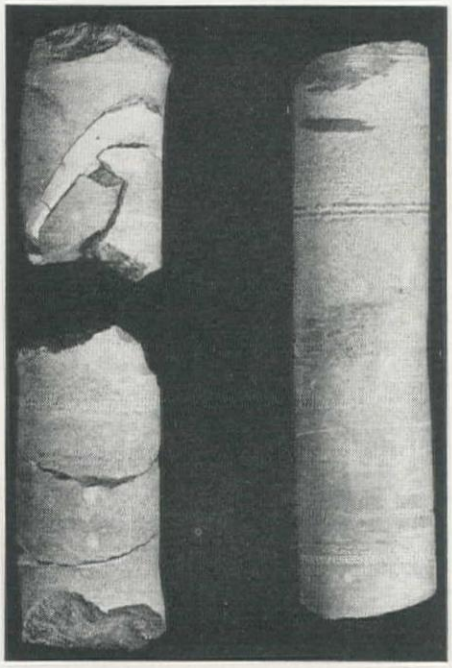
The recovery of the core varied with the degree of decomposition and fractures in the rock. The borings disclosed that the rock varied from a very hard and slightly factured sandstone to a badly fractured, fairly weak sandstone with soft clay seams running through the cracks. In these weaker zones the core recovery was very poor since the fractured pieces were not retained by the core barrel. A few samples were obtained in these zones with the drive type soil sampler. Even in this weaker rock some of the larger fragments were quite hard and a number of sampler bits were broken during the driving.

Due to poor water circulation, 4 to 12 in. of rock cuttings would remain in the boring and have to be penetrated before an undisturbed sample could be obtained. While the cores and samples obtained indicated the general nature of the rock formation, they were not complete enough to eliminate the possibility of a layer or zone weak enough to cause undesirable settlements. Therefore, it was advisable to modify the exploration procedure in the interest of obtaining more complete core recovery.

BORINGS are drilled at the site with a Failing rotary drill rig, equipped with an extra heavy drive-type soil sampler for the difficult exploration.

ROTARY TYPE saw-tooth double-tube core barrel as refined and used by the contractor; l. to r., retaining spring, inner tube, three outer tube bits.





CORE SAMPLES of greenish gray sandstone at Mount Hamilton show, upper left, a core at 15-ft. depth fractured but well grouted; lower left, at 16 ft., little fractured and with no visible grout; right, at 10-ft. depth, in ideal unfractured condition.

Two 5-in. holes were drilled about 18 in. on either side of and to a depth slightly greater than the next proposed test boring. These were drilled to serve as grout holes through which the rocks of the proposed test boring could be cemented together. No cores were attempted in these holes. However, a record was kept of the time required to drill successive 6-in. increments of depth in an attempt to correlate drilling speeds with the character of the rock, as would be shown by the core removed from the proposed test boring.

Approximately 50 sacks of cement at a mix of 7 gal. per sack were poured into the grout holes with no rise in the grout level. It was not until the mix had been gradually thickened to 4 gal. per sack that any progress was made in filling the grout holes. The grout level was brought to the top of the grout holes using this mix; the holes were capped and more grout was pumped in.

It was impossible to build up any pressure on the grout so the grouting was discontinued after a total of 185 sacks had been used. Since the computed amount of grout necessary to fill the two grout holes was only 10 sacks, valuable information was gained as to the extent of the fractures. The grout was allowed to set and the test boring was drilled to a depth of 21 ft. Very little trouble was experienced in the drilling since the circulation of drilling water was maintained and the boring wall was solidified. The over-all core recovery was increased more than twice that previously obtained.

The cores obtained from this boring indicated certain facts:

1. The correlation was poor between actual changes in rock structure and the changes as indicated by variations in the drilling speed of penetration. The speed of penetration varied with both the hardness of the rock and the amount of fractures in the rock. Therefore, it was impossible to determine the weak zones, which might influence the settlements, by drilling the borings and not taking cores.

2. The zones of rock in a state of advanced decomposition and containing considerable clay in the cracks did not permit any perculation of the grout. This was expected and samples of this material had to be obtained with the soil sampler.

3. In zones of partial decomposition and with little clay the grouting was fully effective in maintaining water circulation but only partly effective in cementing the particles together so that they would core as a continuous piece. However, due to the elimination of the described drilling difficulties, core recovery in these zones was as much as 100 per cent where previously no cores had been obtained.

4. In the zones of good unweathered rock, the grouting was effective. Fractures as wide as 2 in. were found to be completely filled with grout in the core. Although the bond between the cement and the sandstone was not strong enough to bind the core into one solid piece, the core fragments could be easily fitted together.

Facts learned from the exploration were: 1. All the rock underlying the site of the proposed telescope is sufficiently strong to support the loads to be imposed. 2. If spread footings were used, they might have undesirable differential settlements due to the presence of the large fractures and the weaker, more highly decomposed zones. Therefore, it was concluded that each telescope leg should be supported upon drilled, cast-in-place concrete piles, suitably reinforced and 20 to 30 ft. long, depending upon the location in the structure.

A 16 to 24-in. diameter pile was recommended to permit complete inspection of the holes drilled for the piles. This inspection was believed advisable to detect any condition not disclosed by the test borings since the exploration had indicated that there was very little continuity in the rock structure. The piles recommended would furnish supporting capacities greatly in excess of that required to support the weight of the telescope, but still would be advisable in order to limit future possible settlements to very slight amounts. It was further planned that the location of each pile be grouted through three holes located at the apexes of an equilateral triangle circumscribing the location. Grouting the rock would serve to fill the voids, furnishing better support for the piles and would also greatly facilitate drilling the holes for the piles.

W. W. Baustian is Senior Engineer for the Lick Observatory. Professor Louderback of the University of California was consulting geologist. John Case, Structural Engineer of Los Angeles designed the foundations for the structure. J. N. Pitcher Co., Daly City, Calif., performed the exploratory drilling. Dames & Moore, Foundation Engineers, rendered engineering services in connection with the exploration.

AEC Sandia Laboratory Operation Changes Hands

THE ATOMIC Energy Commission has signed a contract with the Western Electric Co. for the operation of the Sandia Laboratory at Sandia Base near Albuquerque, N. Mex., according to George P. Kraker, AEC Field Manager for Sandia Base.

The Laboratory was transferred from the present operator, the University of California, to the Western Electric Co., on Nov. 1. The new contract is effective through Dec. 31, 1953.

The Western Electric Co. will operate the Sandia Laboratory through a new, wholly-owned subsidiary named the Sandia Corporation, which will call upon both the Western Electric Co. and the Bell Telephone Laboratories for scientific services and technical and managerial assistance.

The Sandia Laboratory has been operated by the University of California since 1945 under the University's contract for the operation of the Los Alamos Scientific Laboratory. Several months ago the University expressed a desire to be relieved of its responsibilities at Sandia.

The Sandia Laboratory is an important link between laboratory development work and manufacturing operations in the field of atomic weapons. It is operated under the general direction of the AEC Santa Fe Operations Office, Los Alamos, N. M., of which Carroll L. Tyler is manager.

1949 Pushes 1925 for All-Time Building Construction Record

CONTINUING record-breaking construction of new homes and apartments will probably make 1949 the all-time peak year for home building.

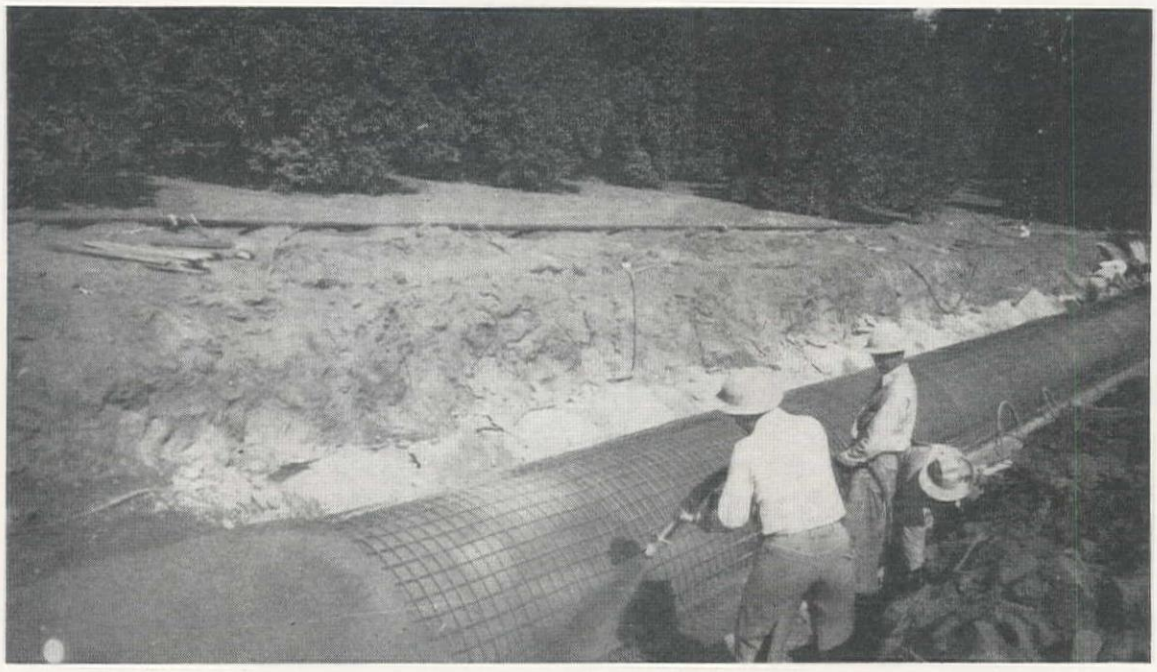
During the first nine months of the year approximately 750,000 homes and apartments were started over the nation. This is more than 100,000 more units than were started in the same period of 1948, now regarded as the biggest building year in history.

According to the Bureau of Labor Statistics, the government's official new-home counting agency, 100,000 housing units were put under way in September. This is the first time in history that as many as 100,000 new homes were put under way during this month.

Home building has stayed at record-breaking levels since May of this year. That month, the number of new houses started hit 95,400 and moved to 100,000 in June. July and August had 96,000 and 98,000 respectively with September rounding out the 100,000 mark again.

Official high year for building, according to government count, was in 1925 when 937,000 dwelling units were produced. Last year, the BLS put the figure at 931,000 although all private agencies agreed that the actual production was well over a million units. The sustained high volume of building this year should send the total building figure even beyond 1948.

Improved Gunite Pipe for Irrigation



SHOOTING the footing sections along both spring lines tends to hold the form in place and equalize the load when shooting the arch. Man beyond nozzleman is using an air jet to keep the footing and construction joint free of dirt.

Thickened section at spring line provides a shoulder to develop arch action in the top half of the pipe and a water seal at the joint

By

C. R. BROWNING

Consulting Civil Engineer

Tustin, Calif.

IMPROVEMENTS in design have made possible the further development of shot-in-place gunite pipe to withstand an 8-ft. depth of backfill and up to 23-ft. hydrostatic head. This represents an advance over the pipe which was described ten years ago in *Western Construction News*, and includes the introduction of sufficient footing at the spring line to develop arch action in the top half of the pipe.

The first step in this development occurred in 1943 when it became necessary to extend for 1 mile the 48-in. line described in the 1939 article. Engineers of the Navy, in charge of construction for the El Toro Marine Air Station specified that the pipe must be designed to carry an 8-ft. backfill. Designed for arch action the line was built, and paid for by the Navy at a cost which was about ⅓ the estimated cost for precast concrete pipe. After two years of service inspection of this line found the pipe in excellent condition with no cracks.

The most recent development has been the design and construction of 3,432 ft. of 60-in. line for the Santa Ana Valley Irrigation Co., designed for a 23-ft. head at an inverted siphon about midpoint of the line. This design called for a 3-in. thickness of gunite shell reinforced with 2 x 6-in., 8-gauge welded mesh. The invert section extended 4 in. above spring line (see illustration), and the bottom of the footing was at the spring line forming a shoulder and water seal at the junction of invert and arch.

A last-minute change in design was required by lack of the specified steel mesh, and 4 x 4-in. 6-gauge was used, with a double layer of mesh where the line withstood hydrostatic pressure.

Sand consolidated for invert

Borings determined the depth of coarse running sand to be encountered in excavating. At the low point in the siphon it was found to be 10.5 ft. to loam soil where the invert excavation would stand up. As a result, the specifications provided that if the contractor could find some method of stabilizing the sand, he could raise the grade line in the sandy area to provide for a minimum of 3 ft. of cover. This he did by spraying water glass (sodium silicate) on the wet sand immediately behind the excavation. He found it formed a hard crust about 1 in. deep, which withstood the abrasive effect of placing the mesh and the force of the gunite as it was applied. The sand had been saturated with water by irrigation prior to excavation.

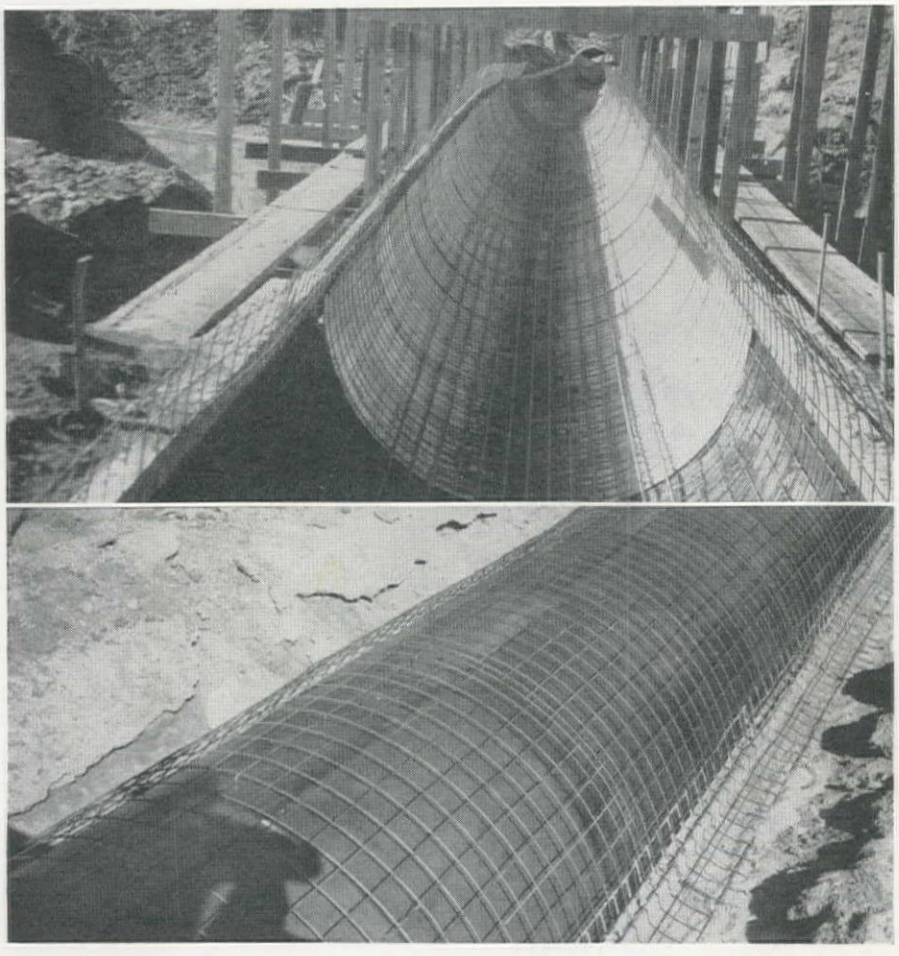
The actual head on the siphon, as constructed, is 18 ft. and the corresponding reduction in excavation over that provided in the specifications saved the contractor many yards.

Construction procedure followed by the contractor provided for shooting 150 ft. of invert in forenoon and 150 ft. of arch in the afternoon. This schedule was maintained except when interrupted by weather conditions with 150 ft. of completed pipe per day. The arch was shot each day on the section of invert shot the morning of the previous day. This schedule made it possible to make one setup of equipment each day and to eliminate the need to shoot through more than about 200 ft. of material hose.

Arch forms were ¼ circle, 14-gauge sheets lapped on the ridge pole (see illustration). The metal sheets were doubled so that the circumferential seams would be flush. The timber supports have no nails, except between posts and a ridge pole, and the supports and forms readily collapse and can be quickly removed and set up again.

TEN YEARS AGO, the author presented his first report on this method of constructing a conduit for conveying irrigation water by guniting separate invert and arch sections, in place. The article appeared in WESTERN CONSTRUCTION NEWS, June 1939, p. 203. The present article brings this interesting Western idea to date. Mr. Browning reviews the improvments in design used in constructing a line of 60-in. diameter. It represents a contribution to the literature available on the conveyance and conservation of water.

Editor.



SPANNING a 17-ft. creek (top) this section of pipe is of special, self-supporting design, including thirteen ⅝-in. bars in the bottom of the invert which was thickened to 4 in. Invert forms were corrugated metal sheets which were later removed. Spacing of mesh above the metal arch form (lower) was maintained by cutting and bending down longitudinal wires to provide chairs.

The difference in head (intake to discharge) on the pipe line is 9 ft., and since Kutter's *N* should be .013, the capacity of the line is about 132 sec. ft. When the pipe line was tested the discharge end was bulkheaded and water backed up to the top of the pipe at the intake. One leak showed up with little or no pressure on the line at the low point in the siphon—an expansion crack in the arch. This was repaired from the inside after dewatering the line.

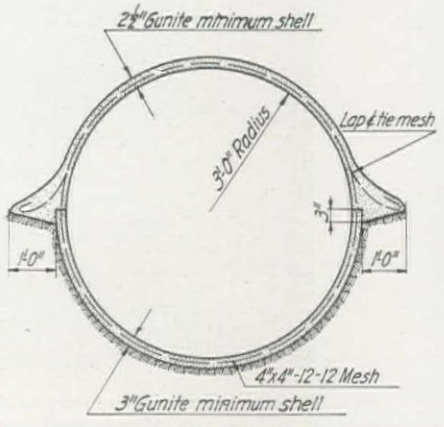
The purpose of this 60-in. line is to eliminate 4,500 ft. of old unlined canal and the construction of two new skew concrete culverts, totalling approximately 1,000 ft., to carry the water under a new limited access four-lane divided highway. The project was constructed under a joint agreement between the irrigation company and the state highway department.

Bids are called on (1) approximately 3,450 ft. of 60-in. gunite pipe and (2) precast concrete pipe with double rubber gasket joints, as alternate. There were three gunite bids and three precast concrete bids. The low bid for gunite was $12.76 per ft. The low bid for precast pipe was $27.00 per ft.

SUPPORTS for the ¼-round metal forms for the arch section. Setting these forms, placing the mesh and shooting of the invert are the progressive stages of work in the background.

Contractor

The contractor on the job was California Gunite Co., Frank Freeman, manager. The excavation contractor was



SHOULDERS shot as the first operation in forming the arch make possible the arch action which is the feature of the improved design.

Mathews Excavating Co., Robt. Peterson, superintendent. Mr. Freeman had charge of constructing the 48-in. gunite pipe in 1943 for the Navy as Superintendent for Case Construction Co.

Loren Blakeley, consulting engineer for the Santa Ana Valley Irrigation Co., had charge of field surveys.

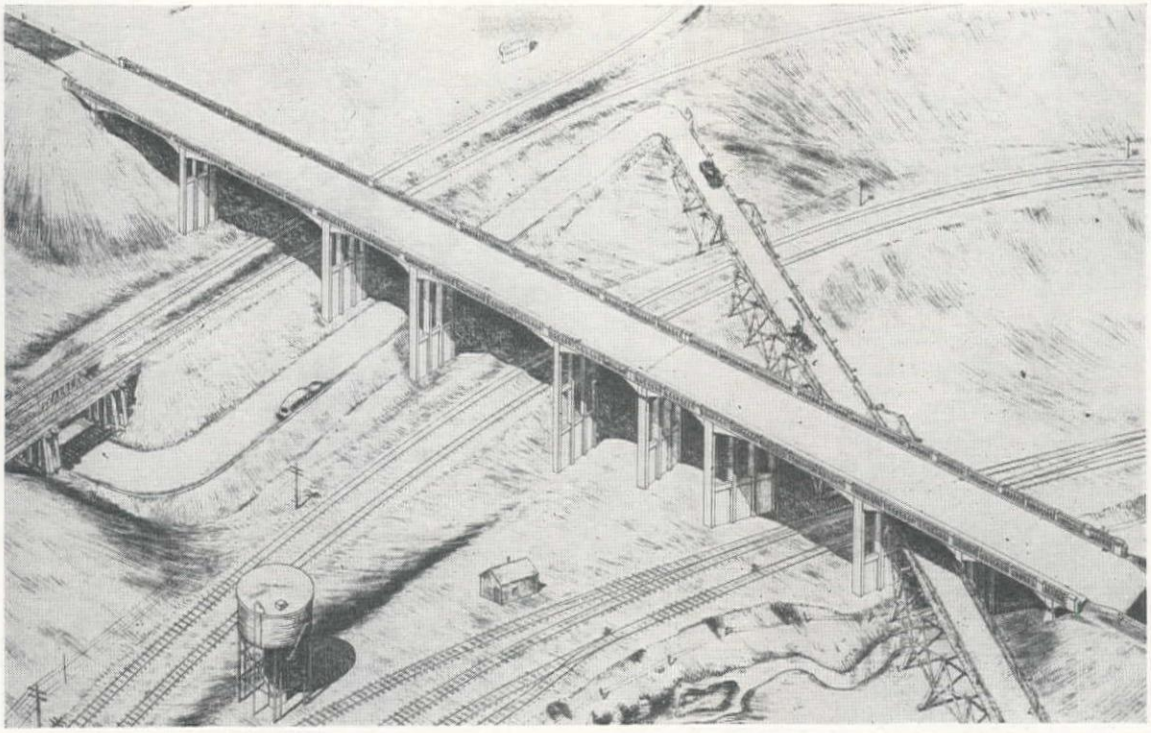
The author is not inclined to recommend gunite pipe in the pressure field, at least not greater than 25 ft. of pressure head. Therefore, it would not be in direct competition with precast reinforced concrete pipe in most pipe projects.

Recently the City of Huntington Park called for bids on a large storm sewer project in connection with Los Angeles County. Specifications provided for both gunite and precast concrete pipe as alternates. The contract was awarded for concrete pipe for about $452,000. Gunite was low, but the difference was not enough to make up for the inconvenience of having trenches open in the streets for seven days while the gunite was reaching sufficient strength to backfill and carry traffic load.

However the city had tests made on a 72-in. section of gunite pipe by Smith-Emery Co. This was a typical section for the main trunk line. Three sections of pipe shot, each 2½ ft. long and 72-in. in diameter. The first was the only one tested under simulated field conditions as this test section far exceeded the specified loading for pipe meeting the city's conditions.

Patent has been applied for by the author on the subject of this article, based on features which include the type of footing and construction joint and water seal between invert and arch.

Fancy Falsework, Forms for Bridge



THE COUNTY BRIDGE crosses six lines of railroad tracks to straighten kinks in the road between Spokane and Marshall.

Contractor on Spokane County's Marshall Bridge works fast and surely to keep high column forms steady before strong wind—Trussed beams used on falsework to give railroad tracks big clearance

"WATCH THOSE TRACKS" —is the order of the day on a county bridge now nearing completion in Spokane County, Wash., that is noted for its size, falsework, formwork, and the fact that it has been built across the tracks of three railroads without hindering rail service. For a county job, the Marshall Bridge is a big one, being built by Clifton and Applegate, Spokane contractors, under a $249,000 Federal Aid Secondary contract and involving some 1,800 cu. yd. of concrete for footings, piers and columns, girder spans, and deck. The 547-ft. bridge is located just east of Marshall, about 5 mi. south of the city of Spokane, where the county road crossed the tracks of the Northern Pacific, Union Pacific, and Seattle, Portland, and Spokane railroads on an old timber structure that had already served a long and useful life. Each railroad has had an inspector to check on the job to insure minimum clearances between the tracks and falsework. Riggers working on the high piers have become accustomed to seeing the trains pass below them.

The job began last July, with the ripping apart of the original timber bridge. The deck and bents were dismantled, beginning in the middle of the structure, and the lumber hauled over the remaining span to the abutments on the side of the canyon, where it was stored for future use in the falsework system. All the posts, and most of the caps and sills were salvaged in usable condition. The small percentage of rotten sections were cut out and destroyed on the spot.

Since there was no room on the sides of the canyon for an office, nor space for field carpentry, several thousand cubic yards were bulldozed out of the hill. While progress was temporarily disrupted by a carpenters' strike, the contractor used this time to excavate the footings on each of the 10 piers. A total of 7 footings were dug and lagged during this short space of time, giving the contractor a head start on the 68,800 cu. yard of excavation on the job.

High columns

One of the outstanding features of the project and a point that immediately stands out is the height of the columns on the Marshall Bridge. There are 11 piers, the tallest one being 53 ft. between footing and girder, and others ranging from 31 to 47 ft. Eight of the piers consist of columns connected at the bottom by web walls, and of these, two are on a skew and consist of four columns connected by three web walls. Besides the usual complications that arise in the formwork for high columns, several special problems were encountered between the drafting board and the finished concrete. Heavy winds in the canyon at the job site grappled with the high column forms, frequently in the middle of a pour, and it required special precautions on the contractor's part to hold each column exactly on line. The method of control successfully used was to put more tension on the guy wires and keep the dead-men buried deeply, for when gusts of wind up to 50 mph. ripped across the job, the forms and bars

RALPH E. CLAPP is General Superintendent for Clifton and Applegate, Spokane contractors.

bowed as if the gusts were 70 mph. or better. In spite of these conditions, the contractor managed to keep pours on schedule and maintain the guyed columns to within .01 ft. of line. In general, the heavier the wind the heavier the torque on the turnbuckles. Tractors were first tried as adjustable deadmen for the first columns, but a 1-in. take-up on the turnbuckle at one side made the columns pull on the opposite guy-wire with a tug on a D-6 that moved it 4 in. sideways. After that experience, the heavily guyed forms were kept vertical with dead-men.

Side dump through windows

Concrete crews on the piers held the rate of pour to a conservative 4 ft. per hr., at 75° F., using the contractor's home-made side dump bucket. This type bucket dumping through windows in the forms proved to be the easiest method of pouring on this particular job, since with the large amount of steel in the columns did not provide enough room for an elephant-trunk from the top. Using the special bucket, the contractor handled up to 4 cu. yd. of concrete per 15 min. period, in a pouring operation involving whip lining and booming on the crane. This pouring speed conformed to the 4 ft. per hr. rise, and was satisfactory for the columns. The maximum free fall of the mix from the windows was 5 ft. Two long-shaft vibrators, each with extra long, flexible cables, were used on each pour. The columns were vibrated to the limit, using special care to avoid redistribution of graded aggregate or settling out the fines. On the entire job only two men had the physique necessary to get into the cramped columns to handle the vibrators.

To relieve stresses due to the final-set contraction and temperature expansion of the concrete, there are four different types of joints used in the bridge; fixed, hinge, expansion, and rocker joints. Reinforcing steel for the columns beneath joints for the hinged-end spans crosses itself in an "S" curve, as shown in the view of the columns. From left to right, pier number 1 has a rocker joint; pier 2, hinge; piers 3 and 4, fixed; pier 5, hinge; pier 6, expansion; piers 7 and 8, fixed; piers 9 and 10, hinge; and pier 11, rocker.

The entire job, as originally planned, involves 1,800 cu. yd. of concrete, half of which was placed in the girders and deck by power buggies, with concrete supplied from transit mix trucks.

The bridge has a 40-ft. addition to the south end, involving an extra pier and span to eliminate the need for a closed box culvert under a fill on the bridge approach, as shown in the County Engineer's perspective drawing, prepared by Herman Pounds. Statistics on the flow of irrigation water in this culvert revealed the need for future expansion, which would be expensive with a box culvert under a bridge approach fill.

Forms for the piers are standardized as much as possible, and horizontal rings series of strongbacks, vertically spaced on 2-ft. centers, are used exclusively to back up the vertical facing. These strongbacks are made of 4 by 6-in. timber, notched to receive the two short members, and tied by ½-in. round pull rods.

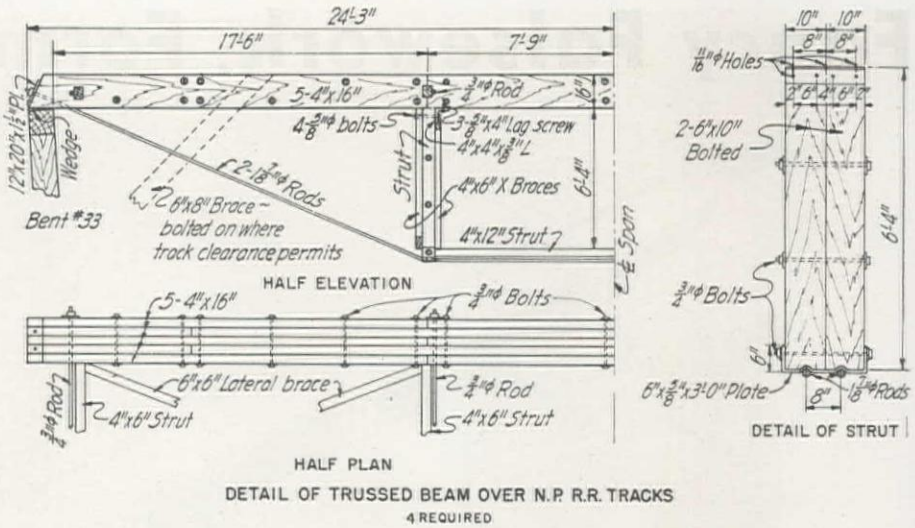
Two of the 11 bents, numbers 7 and 8 at the Northern Pacific pair of tracks, are on a skew, and these forms presented a challenge to the crews who had to tighten 2 by 4-in. ties on the forms to collar the skewed strongbacks on 4 columns and the 3 web walls between. Web walls on bents 7 and 8 were tied in to the skewed strongbacks with 2 by 4-in. walers.

The piers were cured by using a shrimp netting, double thickness, for cover. During hot weather on the earlier part of the job, the surface temperature of the bents would reach 110° F. and over, and a big problem was to keep water losses on the face of the concrete down, until such time as the finishers could get to work.

As is often the case on tricky jobs, small events that break the right way are a distinct advantage to the contractor. When the column forms in the piers near the railroad tracks became slightly top-heavy and began to lean, they leaned in the direction of the tracks. This coincidence meant that most of the guy wires were placed away from the rail, and thus the necessary 24-ft. vertical clearance over all 6 railroad tracks was maintained without too much trouble. No stop order for trains on any of the three railroads was necessary during construction, showing a contractor's cooperation that was greatly appreciated by the railroads. Vibration from the moving trains had no effect upon the formwork when properly guyed for the wind.

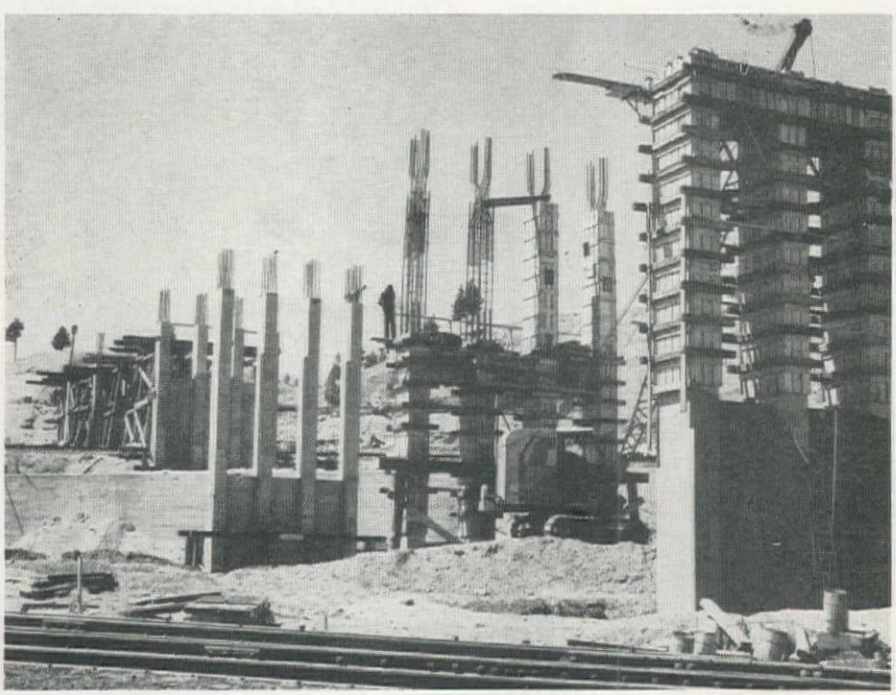
Extra clearance falsework

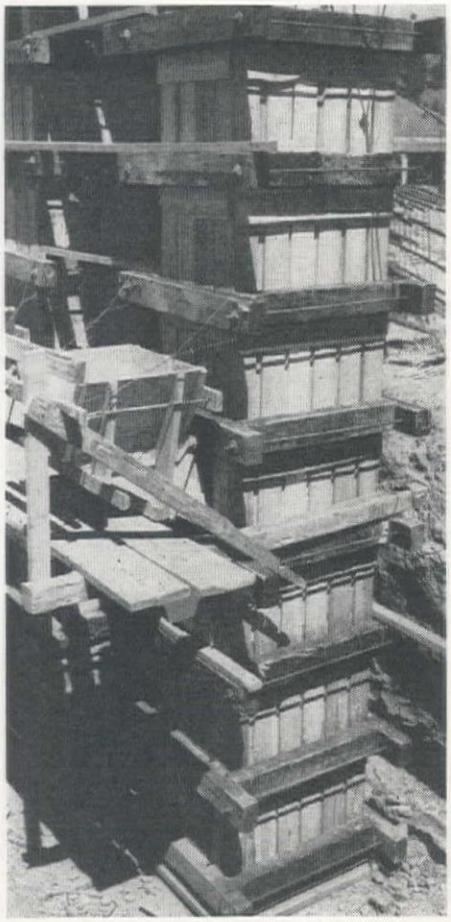
Considerable thought was put into the trussed beams for the falsework on the Marshall Bridge. Spans required in the falsework for original construction



DETAIL OF TRUSSED BEAM OVER N.P. R.R. TRACKS
4 REQUIRED

RE-USEABLE strongbacks were favored for these forms. The crossed reinforcing bars at the top of the cages, second pier from right, were used where the columns supported a hinge-type joint on the superstructure. Conventional falsework, unlike that over tracks, progresses inboard from far abutment.





CROWDED steel required use of side dump buckets through windows in column forms. Strongbacks on 2-ft. centers were used exclusively for formwork.

totaled 478 ft. and made necessary 46 falsework bents. Of these 46 bents, 14 are on a skew and are on the largest individual spans. This required a 50½-ft. skewed falsework span over the Northern Pacific tracks, and a similar 37½-ft. span over those of the Union Pacific. To give support for the loads during construction and still maintain the necessary railroad clearance, the contractor's general superintendent designed the timber trusses that are used. The problem was to build something that could be dismantled and removed from over the railroad tracks without having bents or beams that interfered with the trains. These trusses were used because they could be unbolted and removed without scaffolding and would carry the loads where vertical clearance was cramped. There were a total of eight trusses required for the two falsework spans; the largest of these is shown here in detail.

Construction of the Marshall Bridge is under the direction of C. J. Chaffins, Spokane County Engineer, and Ray Biggs, the county's Supervising Engineer. Jim F. Eaton is inspecting for the Washington State Highway Department.

General Superintendent for Clifton and Applegate, and designer of the trussed falsework as used on the job, is Ralph E. Clapp. Earl Clapp is the contractors Job Superintendent.

Sparling Steel Co. of Spokane is the subcontractor for the 355,300 lb. of reinforcing steel.

U. S. District Court Rules on Private Transmission Lines Over Public Domain

A COURT RULING that may effectively alter one phase of the Federal Government's power policy in the Western states came last month when the United States District Court at Boise, Ida., ruled that the Department of Interior could not stop the Idaho Power Co. from building a transmission line over government-owned land. With more than 50 per cent of the land area west of and including the Rocky Mountain area as public domain, the problem has been typically Western. Many private power companies have delayed transmission line construction awaiting the outcome of the controversy.

A snarl of claims and counter-claims complicated the court battle. On Aug. 8, the Department of the Interior, in the person of Secretary Krug, obtained a restraining order against the private power firm, describing the company's initial construction on the transmission line from Boise to American Falls across public lands as a "flagrant instance of willful trespass." Idaho Power officials contended they had received permission from the Federal Power Commission to construct the $3,000,000 line to meet expected emergency demands. The utility had also applied for the right-of-way to the Bureau of Land Management but withdrew this application April 11.

It was rumored that the Secretary of the Interior was prepared to appeal the decision of the Idaho court before the U. S. Circuit Court of Appeals in San Francisco. However, on Oct. 14, the Federal Power Commission, at the request of Krug, authorized the firm to construct its lines as planned with the condition that the company must carry power over those lines for the Federal Government.

The F.P.C. statement said that "under this provision, the United States shall have the right to transfer energy over the lines in amounts that will not unreasonably interfere with the company's use of the lines, but only to consuming facilities of the United States and to public bodies and cooperatives entitled to statutory preference in connection with the distribution and sale of electric energy by the United States."

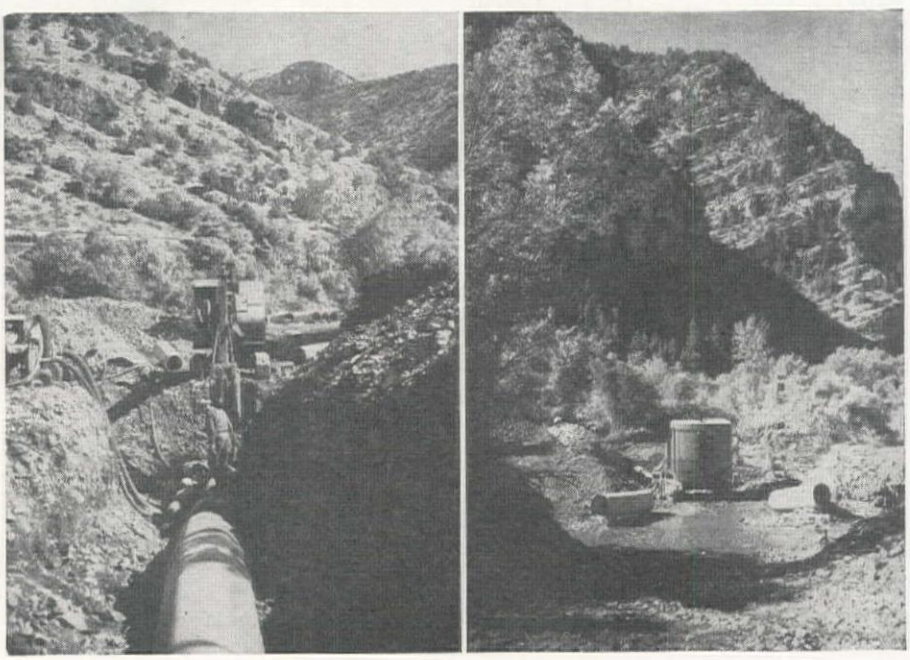
Local Self-Government to Be Given to Boulder City

APPOINTMENT of Dr. Henry Reining, Jr., professor of public administration at the University of Southern California, as special consultant to conduct a public hearing looking to the establishment of local self-government in Boulder City, Nev., has been announced by the Bureau of Reclamation. At the present time, municipal affairs are under the administration of the Bureau.

Boulder City was originally a construction camp established in connection with the building of Hoover Dam. Since completion of the dam and under the impetus of war industries and postwar tourist travel, the city has expanded rather than contracted as was at first anticipated, until now it is third in size in Nevada.

TOUGH TRENCHING FOR WATER LINE IN LOGAN CANYON

EXTRA CARE is taken in this hard trenching job for Logan, Utah, by the Utah-Idaho Concrete Pipe Co. of Salt Lake City. The $262,000 contract calls for 16,000 ft. of 24 and 36-in. water pipe in Logan Canyon. At this point, the 8-ft. sections of double rubber gasket pipe cross a stream bed. Supt. Philip Fairbanks is using a backhoe to trench one section at a time in the porous rock and gravel, while using three pumps to discharge the infiltrating stream.



Drag Snags to Clear Hungry Horse

DRAGGING an 800-ft. loop of 2-in. cable, equipped with swivels at 100-ft. intervals, down a snag-covered slope was the unique development of a contractor in clearing thousands of acres of burned-over land in the reservoir site.

Contractors' clearing operations and logging of merchantable timber extend over 22,500 acres of the reservoir area for the major storage project on the Flathead River in Montana

By
W. E. WHEELER
Office Engineer
Bureau of
Reclamation
Kalispell, Mont.

REMOVAL of burned snags standing in heavy second-growth timber over almost 7,000 ac. of the rugged Hungry Horse Reservoir area was the unusual problem faced by Wixson, Crowe & J. H. Trisdale on their clearing contract. Their solution was a procedure developed on the job consisting of dragging an 800-ft. length of 2-in. steel cable in a loop pulled down the slopes by two tractors. In addition to the clearing of the burned areas the 22,500-ac. reservoir site contained an estimated 70,000,000 bd. ft. of merchantable and salvageable timber covering 14,000 ac. which was logged off under another contract.

The Hungry Horse Project is a key unit in the Columbia River development, providing a large storage reservoir on the South Fork of the Flathead River, a headwater stream of the Columbia River Basin. Benefits to be derived from the release of its waters will be felt all the way to tidewater below Portland, Ore. It will provide storage for flood waters which may be released during low water periods, beginning in late summer and extending into April of the following spring. Release of water at these times will increase the firm power output of existing downstream plants by an estimated 334,000 kw., and that of proposed plants by more than 500,000 kw. This total of 834,000 kw. of additional firm power to be developed is almost three times that of the installed capacity of 286,000 kw. proposed for Hungry Horse.

Because of the critical power needs in the Pacific Northwest to meet the ever increasing demand for domestic and industrial power, early storage in the Hungry Horse Reservoir is essential. Gate closure is scheduled for the fall of 1951 to store 1,000,000 ac. ft. of the 1951-1952 winter runoff. To get this storage the reservoir site must be cleared to about Elev. 3450, only 110 ft. from high-water at Elev. 3560. Only two full working seasons remain to accomplish this program.

As the Hungry Horse reservoir is the first large project of the Bureau of Reclamation in which a sizeable quantity of merchantable timber had to be cleared, the experiment of offering for sale the merchantable timber for removal by standard logging operations was decided upon. As a result, timber sale specifications were drawn which required removal of all salvageable timber by logging operations. Instead of the government paying for the removal of the trees, as in a construction contract, the contractors bid for the timber on a stumpage basis, paying for the timber as it is removed.

Two contracts were awarded, one to the F. K. and L. Lumber Co., and the other to the Flathead Timber Products, Inc. The latter firm is composed of five local lumber companies and businesses. They bid in eight of the ten schedules which contain in excess of 64,000,000 bd. ft. of timber. All of these schedules are located beyond the area being cleared by Wixson and Crowe and Trisdale, at an average haul distance of 35 miles from Coram, the nearest railhead. All of the merchantable timber up to Elev. 3450 must be logged in 300 days, with the balance in 600 days. A dozen portable tie mills have been set up to produce railroad ties from the larch and fir.

The Great Northern Railway has been buying the entire production which amounts to approximately 160,000 bd. ft. per day. The slabs are resawed into 1 and 2-in. dimension boards for sale on the local market. Pine and spruce is being hauled out to sawmills in Coram, Columbia Falls or Kalispell for manufacture into building material.

The Flathead Timber Products Co. had planned to drive the logs, other than tie stock, down river to Hungry Horse Creek and then load on trucks for hauling to the mills, but a steady drop in the river flow resulted in one of the lowest water years on record, which necessitates abandonment of the plan until fall rains come. The company has gone to considerable expense to construct deflector and catch booms. Although no logs had moved to market by the river, continuing operations in the woods resulted in production of over 10,000,000 bd. ft. of ties and saw stock.

Wixson, Crowe and J. H. Trisdale contract

The big operation going forward in the reservoir area is that of Wixson, Crowe and J. H. Trisdale in clearing the 7,210 ac. in three schedules. The three schedules were laid out along natural boundaries, arranged so that the degree of difficultness could be judged by the bidders. Schedule 1 was bid in at $262, Schedule 2 at $230, and Schedule 3 at $240. Schedule 1 was the steepest of the three and accordingly required the greatest amount of hand work, but surprisingly, it is estimated that only 15% of the total area had to be cleared by hand.

The first concern of Wixson and Trisdale in commencing their operation, was to find a method of removing the innumerable, burnt and scarred, standing snags. Obviously it would be costly to fell all of the snags by woodsmen with power saws as the area was thoroughly matted with downed timber and heavy second growth which made it impossible to move in saw equipment. Secondly, hand operations would be extremely hazardous to the workmen as the slightest disturbance at the base of the tree would often cause the top to break off.

Thus, the success of their contract venture could well depend upon the developing of a method of felling the snags. Accordingly, their bid was submitted, based on the success of a procedure which was untried. The method was unusual, but simple.

An 800-ft. length of steel cable, fastened at each end to a tractor was pulled through the woods. The tractors proceeded at uniform speed in the same direction at a distance varying from 50 to 100 ft. apart, depending upon the density of the timber growth. Care had to be exercised by the operators because direct contact with a snag might cause the top to snap and tumble down. To prevent injury to operators and equipment from falling timber, heavy steel plates and framework were welded on the tractors for protection.

Several lengths of cable were used up before the right combination was found. A continuous length of cable would tend to kink, ravel and finally break. The best solution was found to be an 800-ft. length of drag made up of 2-in. wire cable with heavy navy anchor swivels spaced at 100-ft. intervals. The heavy swivels increased the effectiveness of the drag as the weight held the cable near the ground causing a shearing effect, cutting at the base, or pulling the smaller trees from the ground (see illustration). In the snagging operations it wasn't unusual to see a tall, barren tree moving along in an upright position for 50 to 100 ft. before its momentum would cause it to topple either forward or backwards.

SEVERE CONDITIONS for equipment operation in the second-growth cover on steep slopes where uprooted trees and brush were dozed down slopes to burning areas.

After an area had been de-snagged by the cable, two or three tractors would go to work to root up and bunch all the smaller trees and brush, with the dead snags and downed material. A 500-ft. fire break was then run around the areas in which burning was to be done. Rakes on the tractors effectively uprooted snags and brush not already loosened. In the bunching operations the rakes loosened and shook the dirt and rocks from the roots, permitting clean burning in the piles. Fire was permitted to run through one area after the de-snagging operation had been done, after which the tractors moved in and rooted and bunched the remaining stumps and unburned tree trunks.

Use of mechanical equipment

Maximum use was made of mechanical equipment. Tractors working in teams would pair up and push side by side all trees and brush down the slopes to the burning area. Many of these slopes range up to 60 deg. in steepness. Without a doubt this was a most grueling test of machinery and men. Bunching of the piles for burning at the bottom of the slopes or in creek beds was an aid because up-drafts helped in securing a roaring hot fire.

As a result of fast work last fall, to take advantage of unusually favorable weather, and then starting early this spring, approximately 80% of the total contract was completed in one year's time, or less than one-half of the total time allowed.

Three areas had live standing timber totaling about 3,000,000 bd. ft. This timber was sold to Earl Wagner on the stump for removal by logging operations. Some 1,200,000 bd. ft. were cut and sawed at a mill set on Murray Creek during the dead of winter when snow depths reached 4 ft. Roads were maintained and kept open to Martin City during this time, permitting removal of the lumber. One area which has a considerable amount of saw timber standing has been cleared of all small trees and underbrush and now presents a park-like appearance awaiting the loggers.

To facilitate the clearing operations, Wixson and Trisdale set each schedule up under a clearing superintendent, with specified amounts of equipment and authority to hire their own personnel. Schedule 1, of 1,540 ac., located closest to the dam was under the direct supervision of "Pete" Whitehurst. Pete had previous experience in clearing, working with the Bureau's C.C.C. forces on

PART OF the 22,500-ac. of cleared reservoir area looking upstream from the dam site. An estimated 70,000,000 bd. ft. of merchantable lumber was logged off and sold under a separate contract. Calling bids for merchantable timber on the stump was a new procedure.

PERSONNEL on clearing operations include these in a field conference: (front row) Alex E. Ketchen, Reservoir Engineer for the Bureau, talking to J. H. Trisdale of Wixson, Crowe and J. H. Trisdale, and John D. Officer, Assistant Field Engineer. Standing are W. C. "Whitey" Fields, clearing foreman for the contractor and Howard S. Latham, Safety Engineer for the Bureau.

Shasta Reservoir, and as foreman from 1938 to 1941 on clearing and tunnel jobs in Oregon and Washington. Since 1946 he has been employed by Johnny Trisdale on similar work. In two shift operations, Vic Cameron worked as shift foreman for Pete.

W. C. "Whitey" Fields has the 3,040-ac. schedule 2 with J. C. Bridge and Charles "Shorty" Rogers working as shift foremen.

Emil Felstat is in charge of 2,630-ac. schedule 3, with Jack Anderson and Bob Inks as shift foremen. Other key personnel are "Doc" Binkley, Lawrence Parsons, Ed Mermis and Bob Robinson, mechanics, charged with the responsibility of keeping 30 tractors, a road patrol, trucks and power wagons operating. Several low bed trailers are available for transporting the heavier pieces of equipment from place to place.

Seemingly, there is little which might recommend clearing work as an occupation when other types of work are available. But there is romance and deep satisfaction in a job well done. In the words of Pete Whitehurst, "There is something about clearing that gets in your blood, every acre of every job is a challenge." Nothing could be truer than that in clearing Hungry Horse Reservoir.

Martin City, the community at the South Fork Road is 15 miles from Riverside Creek, the operational center of the Wixson, Crowe and Trisdale clearing job. A camp was established at Riverside with two quonset dormitories 20 by 100 ft., to accommodate 50 men. Shower rooms were provided in a separate building. A 40 x 80-ft. quonset houses the mess hall where seven meals a day were served while clearing was being conducted on a two shift basis during the long summer days. Operations are now on a one shift basis with about 100 employees served.

Los Angeles Tests Flood Control Defense With Simulated Storm Record Runoff

COL. W. D. LUPLOW, District Engineer of the Los Angeles District, Corps of Engineers, and Chief Engineer H. E. Hedger of the Los Angeles County Flood Control District arranged a joint exercise to test simulated storm and flood-fighting in the Los Angeles area on Oct. 10, 11, and 12. The purpose of the joint operation was to try out the plan as outlined in the Flood Control Manual which was prepared by the Corps of Engineers in April, 1948, and revised to September 15, 1949.

Col. Luplow explained that the Los Angeles office did not set up the test nor have any pre-knowledge of the details. The entire problem was worked out at the South Pacific Division in Oakland, and the details were administered and umpiring was done by a group from the division office.

The problem was based on an intense storm . . . which the hydrology experts of the Los Angeles office who were assigned to the problem soon deduced to be that of Jan., 1943 . . . with this variation: In the problem the ground was assumed to be in a saturated condition from 24 hr. of hypothetical rain previous to commencement of the test. The storm came in from the southwest, and the first precipitation was in San Fernando Valley. When the exercise ended, it posed a second and consequent test . . . because the forecast was for a second storm to strike in 5 days. Thus, the flood-fighters were faced with the problem of getting rid of the water still in the flood-control reservoirs from the first storm in time to accommodate a fresh supply which would drain into them if the second storm, which had been forecast, should materialize. Complicating the picture was the fact that, because of the still unimproved condition of certain stretches of several channels, outflows had to be carefully restricted in volume in order to avoid overtopping and breaching of the banks.

As regards the test itself, peak flows into the basins included in the problem all were held back, with a margin of safety in each case. These basins were: Sepulveda, Hansen, Santa Fe and Prado, for the Corps of Engineers; and Pacoima, Big Tujunga, San Gabriel No. 1, San Gabriel No. 2, and Morris, for the County Flood Control District.

Completion of work essential

The point which has been brought out most sharply in this whole simulated storm is the justification and imperative need for complete flood-control improvements . . . because a check of the theoretical damage wrought in every instance can be traced directly or indirectly to some uncompleted link in the overall comprehensive flood control plan. Had the contemplated dams at Whittier Narrows and Lopez Canyon been standing, and had all channels been improved and unobstructed, there can be no reasonable doubt but that all overflows and washouts could have been avoided. Another fact stands out: So long as there are channels left to be improved, and dams to be built, there will be menace in the flash floods. Only when the entire system will have been completed will there be complete reassurance against the torrential floods which result from occasional heavy winter rainstorms.

Personnel engaged in the problem test, according to local reports, did a splendid job. Some minor mistakes were made—as they are usually in first runs—but by and large it was a creditable performance, and the joint chiefs have a new sense of pride in the men on whom they depend. They feel that the time picked for the exercise was psychologically right, and that a tremendous impetus has been given to preparedness for possible floods by joint test of the coordinated plan.

Wyoming Hydro Project Plan

LOWER VALLEY Power and Light, Inc., of Freedom, Wyo., has asked the Federal Power Commission to issue a license authorizing the construction of a proposed hydroelectric project on Strawberry Creek in Lincoln County, Wyo.

The cooperative is proposing to build a low concrete dam near Bedford, Wyo.; a 2-mi. steel pipeline; a powerhouse containing initially two 725-hp. turbines connected to two 500-kw. generators with provision for ultimate installation of a third hydroelectric unit of equal size; a substation; and a 12.5-kv. transmission line connecting with the main transmission line of the cooperative system.

Further Bay Bridge Report Rejects Plan of Committee

Toll Bridge Authority finds inadequate the recommendations of the engineers employed by legislative committee

THE LATEST move in the tangled problem of a new traffic crossing for San Francisco Bay is a report from the Division of San Francisco Bay Toll Crossings, of which Ralph A. Tudor is chief engineer, recommending against three major proposals advocated by Eastern engineers employed last spring by the Dolwig Committee of the California Legislature.

The State Legislature, disagreeing with the original report of Tudor's division, and the State Toll Bridge Authority, both of which recommended a bridge duplicating the existing structure and immediately parallel to it, declined to grant the Bay Crossing Division's request for additional funds, in the amount of about a million dollars, until a special committee (the Dolwig group) should look into the whole question of bay crossings.

It was felt that not all the factors favoring a crossing originally proposed by an Army-Navy Board in 1946, located several miles to the south of the present bridge, had been considered by the division, and that insufficient thought had been given to traffic handling at the approaches to the proposed twin bridges.

The Dolwig Committee employed three well-known Eastern engineers, Ole Singstad, who had been the consultant for the 1946 Army-Navy Board, O. H. Amman, and T. T. McCrosky, to sit in the hearings and make recommendations to the committee and eventually to the Legislature. These consultants recommended three phases of new construction as a substitute for the proposed parallel span:

I. Replace transbay interurban trains with busses so that two additional traffic lanes can be added to the lower deck of the bridge. The lower deck would then be used for mixed truck, bus and passenger auto traffic.

II. Provide a four-lane, rather than six, southern crossing along the same alignment proposed by the Joint Army-Navy Board in 1946 and heretofore investigated by the State.

III. Add cantilever wings to the upper deck of the existing bridge so that two 2-lane roadways may be provided on this level for light vehicular traffic in each direction.

Given rejection slip

The Legislature then ordered the Bay Crossing Division to study this alternate proposal in detail, before it could spend any further funds on the parallel plan. The present report is the result of the Division's subsequent study.

"The proposals will not afford prompt or lasting relief of congestion on the Bay Bridge," says the report. "In addition, the Committee Consultants' plan offers no protection whatever against head-on collisions on the upper deck of the Bay Bridge until the completion of Stage III, which would be about 15 years from now."

Financing and construction of the three-stage plan of the Dolwig Committee would require not less than 15 years, would cost an estimated $210,096,000, and would not promptly or adequately relieve traffic congestion on transbay crossings, the report asserts. The original report estimated that the parallel span would cost $155,000,000 though subsequent studies have indicated this is too moderate.

Commenting on the proposal to deck over the space presently reserved for interurban rails, the report says,

"The abandonment of mass transportation by rail and the consequent substitution of busses is an essential element of the Dolwig Committee plan. Busses can carry the present load, but would be unable to handle satisfactorily the load that existed during the war. If rails are abandoned on the present bridge, there is no likelihood that they ever will be replaced in a subaqueous tube or otherwise. This will effectively restrict to busses any realistic planning for future transbay mass transportation. Transportation by busses very probably would mean an increase in fares and no increase in revenue for the bridge."

The need for a southern crossing, Stage II of the committee recommendation, had already been discounted in Tudor's earlier report, and is repeated in the new statement.

Stage III of the committee plan is to add cantilever wings to the upper deck of the present structure. Each of these wings would carry two lanes for passenger auto traffic. The existing upper deck would be changed from three to two lanes in each direction with a center parking strip slightly raised above roadway surface. Approaches at both bridge heads would be improved.

Claim 15 years needed for three stages

According to the Division's report: "If Stage I of the Committee's plan were carried out some relief would be afforded to congestion on the upper deck of the bridge. This would be about 1952. Stage II could not be financed until about 1955, and could not be completed before 1959. This would again relieve to some extent congestion on the bridge. Stage III could not be financed until about 1961, and could be completed about 1964.

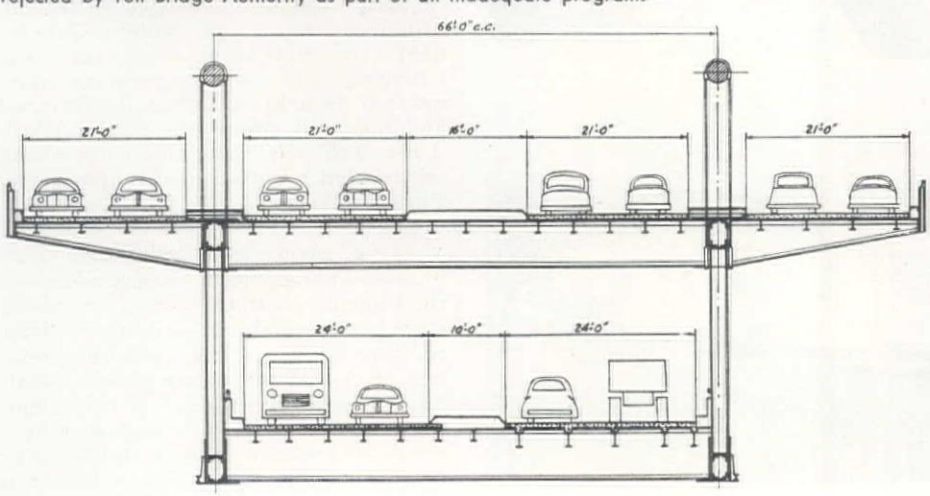
"If only the minimum estimates of traffic are realized, conditions on the bridge would be somewhat worse than at present for a few years, until Stages I and II could be completed. For the remaining time, until Stage III could be finished in about 1964, the bridge would be close to, or would exceed, 'practical capacity.'

"Facilities should be planned to accommodate at least 15 per cent more traffic than the minimum estimates. The records of the past 8 years indicate a strong probability that such an increase in volume of traffic will be realized. If traffic continues to grow as it has for the past several years, congestion on the bridge will be greater that at present for the next 15 years, until 1964. About 7 years later, in 1971, traffic again will exceed practical capacity. By contrast, parallel bridges will provide adequate capacity to well beyond 1971, even though traffic exceeds minimum estimates by 15 per cent or more.

"This failure to provide early and continuous relief from congestion on the Bay Bridge is considered a most serious deficiency in the Committee Consultants' plan." In the original proposal for a parallel span, it was indicated that the new bridge would be open by 1954.

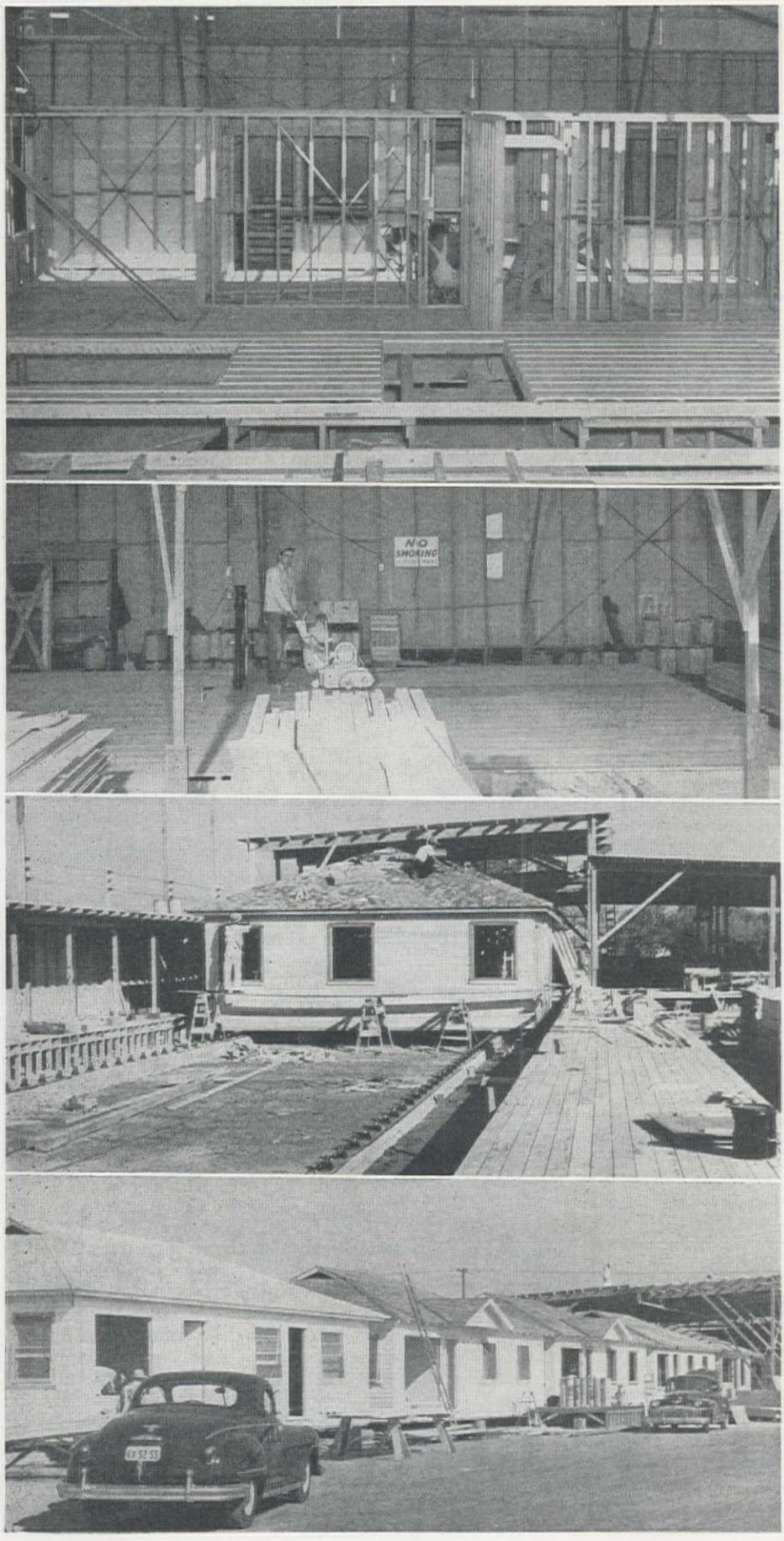
The Crossings Divisions also engaged the services of Eastern men, including George L. Freeman, consulting engineer of New York; Ralph Smillie, chief engineer of New York's Triborough Bridge and Tunnel Authority; George W. Burpee of Coverdale & Colpitts, New York industrial engineers; and Wm. H. Draper, of Dillon, Read & Co., Inc., New York bankers.

CANTILEVERED WINGS suggested by committee engineers as a means of adding extra lanes and rejected by Toll Bridge Authority as part of an inadequate program.



Portable Houses From Assembly-Line

Mobilhome Corp. of America builds well-framed houses on production-line basis to beat high transportation costs of labor and materials



THE OIL PROSPECTOR walked into a Bakersfield, Calif., building supply office and presented his problem: Could a house be built that was tough enough to be moved to a new site in case a test well proved to be a duster? Hugh Curran, the building supplies dealer, thought it out and the result is the Mobilhome Corp. of America, a company conceived from a serious attempt to build homes on the assembly-line principle.

Mobilhomes are built to conventional designs, using conventional methods, and the value of this new prefabrication industry is due in large measure to the fact that it offers all the economies of mass-production without sacrificing qualities that can be put into dwellings erected on the site. Curran reasoned that a house constructed so that it could be moved without damage could be built for less in Bakersfield than on the final site. This type house would help to solve a typically Western problem in home-building, where great distances and sparsely settled areas frequently make the cost of skilled labor and delivery of materials for site-built houses almost insurmountable.

Illustrations at the left indicate construction techniques at the Phoenix factory. The house construction begins under plant cover. By the time a dwelling has progressed to the point where it has its own roof, it is in the open. The balance of the work is completed inside and out, as the Mobilhome moves toward the end of the line. If the weather makes it necessary, the interior may be heated as the house moves along. Each crew of workmen has its own allotted task. The materials for each portion of the work are at hand in a series of sheds, placed at proper intervals. A mill-work plant is on the assembly-line site to keep these sheds stocked. Outside and interior walls are built on horizontal work tables and swung into place by a traveling hoist. The first assembly line of the Mobilhome Corp. was built in Bakersfield. The method devised there was patented, and the corporation then granted franchises to locally financed and operated companies in the West. A few of the Western cities where plants are located to produce the homes are, Phoenix, Amarillo, San Diego, and Sacramento.

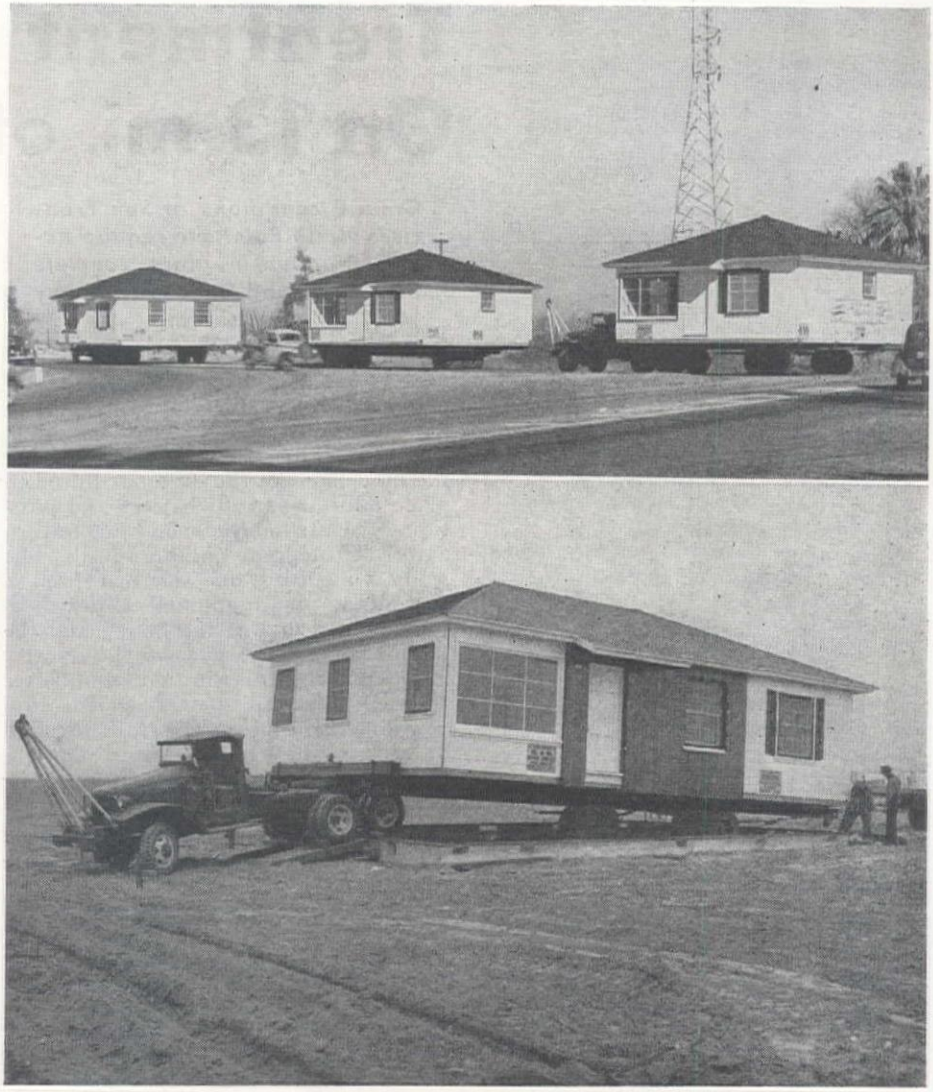
As each plant was built, improvements in assembly line methods were added. In the Phoenix plant, the last section of the track upon which the units travel after the time floors are laid, rests on permanent jacks. When a completed Mobilhome reaches this section of the assembly line, the house is raised so that a specially-designed tricycle trailer may be placed underneath. The structure is

then lowered onto the trailer and trucked to the site. The tricycle trailer prevents torsion from bumps and uneven roads that would otherwise spring the framing. At the site, the foundation has been constructed in advance and the utilities prepared for fast plugging in. Preliminary landscaping is optional.

Buyers have a wide selection of designs and sizes, ranging from 1 to 3 bedrooms, individual color schemes for interior and exterior. They may inspect the work daily as it progresses at the plant, and deviations from standard plans may be arranged in advance, permitting custom-building. It requires 15 days to produce a complete unit at Phoenix, and at any stage of construction it is still possible for the buyer to make changes in those items not yet completed.

The cost of the units includes the foundation, installation of utilities, and everything except the lot. The homes comply with standards for FHA and G.I. financing, insurance companies, and building codes. Because of special framing to meet stresses of transportation, the homes exceed most strength requirements. They meet those needs of the earthquake-conscious Pacific Coast better than the average site-constructed house.

Hugh F. Knoell, president of the recently added Mobilhome Corp. of Phoenix, believes the Mobilhome is the answer to the Western problem of isolated home construction in thinly populated areas. Other officers at Phoenix include Walter C. Jaynes, vice-president, and Joe O'Connell, secretary-treasurer. William Rice is assistant secretary-treasurer, and Paul Van Leer is sales manager.



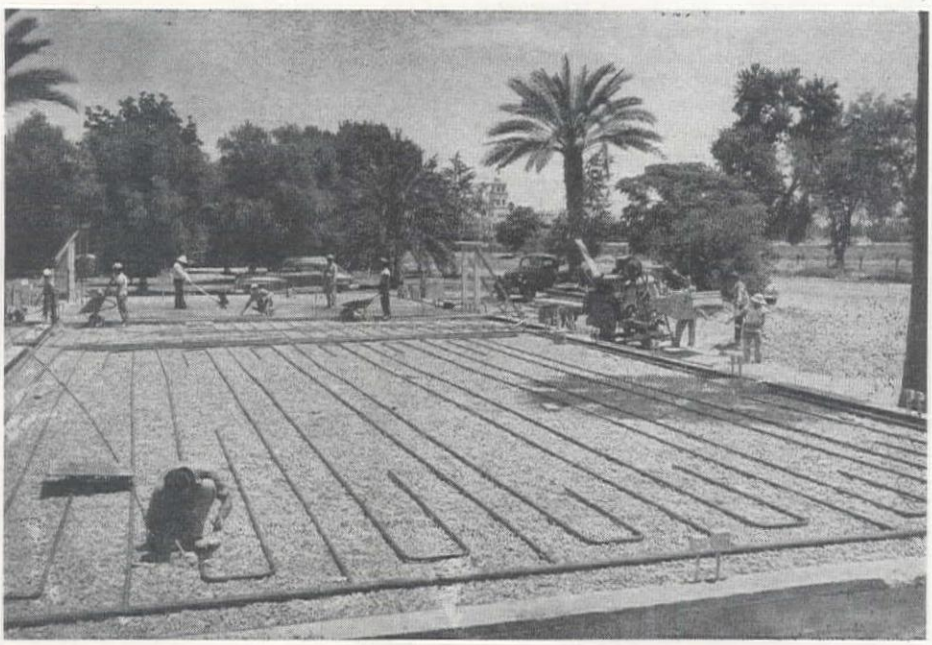
Award Clearing Bid For Hungry Horse

CONTRACT for clearing 1,070 ac. of land in the Hungry Horse Reservoir area is being awarded to Coleman H. Dykes, Knoxville, Tenn., on a low bid of $508,950, C. H. Spencer, Construction Engineer for the Bureau of Reclamation at the Hungry Horse Project has announced.

The contract covers the first two of seven schedules included in specifications issued by the Bureau for clearing the remaining 15,765 ac. in the Hungry Horse reservoir.

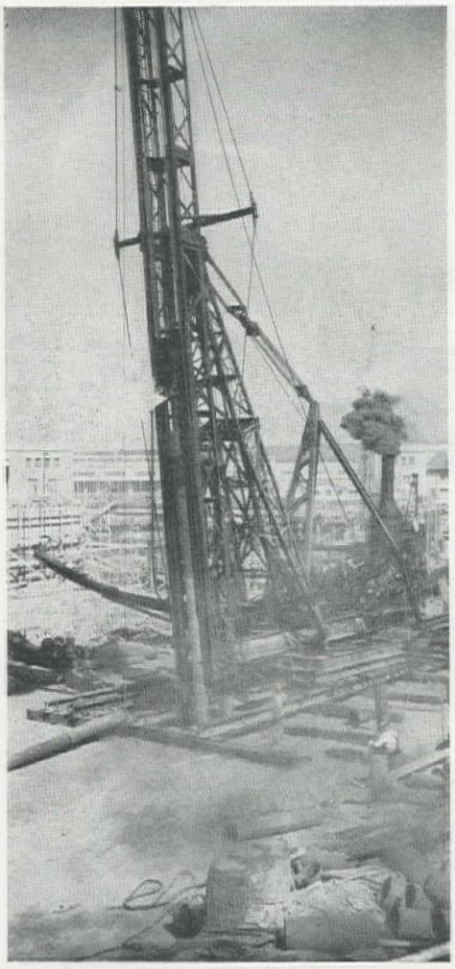
All bids received on schedules three to seven inclusive, have been rejected due to restrictive stipulations included in the bids, and new invitations have been issued. The new bids, which will cover approximately 14,695 ac., will be opened at the Bureau's Hungry Horse office on Nov. 29. This will be the third invitation for bids on this portion of the clearing work.

In this issue, a review of clearing work already under way is presented on page 68, and in the Unit Bid Summary section is the tabulation of the two previously received bid schedules.



Perlite Covered by Coarse Gravel Insulates Radiant Heating Pipes and Stops Moisture

PERLITE, the lightweight aggregate of volcanic origin that can be utilized in its natural form, is gaining rapidly in popularity as a combined roof or floor base and insulation material. Above, pipes for radiant heating are being laid over a base of Perlite covered by coarse gravel at the new building for the Great Southwestern Life Insurance Co. and National Reserve Insurance Co. at Phoenix, Ariz. The Perlite keeps moisture from reaching the pipes and also serves as effective insulation against heat loss. C. R. Siglin, general contractor of Phoenix, used Perlite for both roof and floors.



Treatment Plant Rests On 13 mi. of Concrete

Ground conditions at San Francisco North Point site require extensive pour-in-place concrete pile work and unusually heavy steel shoring

GROUND CONDITIONS have made necessary very exacting work on San Francisco's North Point Sewage Treatment Plant, now under construction as part of the city's $38 million overall plan for interception and treatment of sewage. In a city that has always had ticklish foundation problems, the new treatment plant is being built with a great portion of its structures on poured-in-place concrete piles.

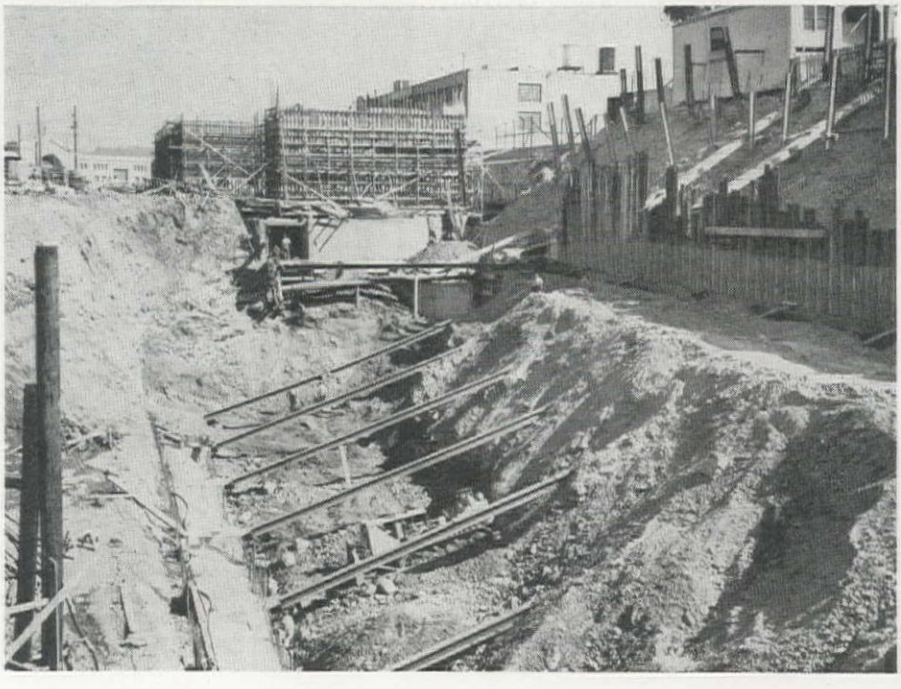
Acting as joint venturers on the $8,289,000 contract are M & K Corp. of San Francisco, Stolte, Inc., of San Leandro, Fred J. Early, Jr., Co., Inc., of San Francisco, and Haas and Rothschild of San Francisco. The contract consists of $7,765,962 in a lump sum bid for the five major structures and their mechanical equipment, and five smaller lump sum and unit bid items for untreated and treated piles, emergency repair shops and garage, and individual pumping units. The largest of these unit bid items is for an estimated 60,000 lin. ft. of poured-in-place concrete piles on a subcontract to Raymond Concrete Pile Co.

Of particular interest on the Raymond subcontract is the "universal-batter driver" rig. The number of batter and double batter piles on the job required the use of two of these special drivers on the site; one mounted on cap timbers, run beams, and wooden rollers, and the other of the crawler type. With these rigs it is possible to drive batter piles without tilting the turntable or inserting jacks or wedges, and operate at a radius of 40 ft. from center. Resembling any modern steam driver, the universal batter driver has more adjustments than have previously been assembled on a single machine, materially decreasing the movement of the driver required to place piles at various batters and positions. The turntable can be made to turn a full 360 degrees on the bedsill. The leads swing from one side of center to the other, pivoting about a universal joint on the end of the boom, and the moonbeam at the end of the spotter guides and controls the amount of batter for each pile. The spotter itself is conventional, and moves the leads forward or back, changing the point of penetration, for either batter or reach. The hoist is a 5-drum steam unit and two separate engines are used for spotting, one on the spotter and one on the moonbeam. A 40-hp. boiler powers the engine for the boom line, hammer line, pile line, and swing, in addition to the engines underneath the A-frame for the spotter and moonbeam. The rig was used in the West for the first time during construction of the Alameda, Calif., Naval Air Station. On the North Point project, the pile driver was equipped with a #1 Raymond hammer on a 36-in. stroke and 5,000-lb. ram. Carl Bergstrom is foreman of the operating crew, now winding up work on 2,100 concrete piles that are from 8 to 66 ft. long.

There is a great deal of rock outcrop on the site, but underneath the surface cover, boulders and faults are unpredictable completely as to exact boundaries. Test piles were not used because the wide range of conditions and changing location of the faulted rock made it too expensive to test individually each area under the structure foundations. Piles penetrate the surface to hardened zones and then stop. All piles are driven to refusal into rock at the City's standard specifications of a minimum of 10 blows per in. with a #1 hammer. Frequently the ¾-in. thick steel mandrel apparently drives the corrugated metal shells into 3 and 4 ft. of soft rock. At no time on driving operations on the site did the piles run; in fact, a few of the toughest conditions found the contractor driving around 8 blows per in. for 22 to 25 ft. in order to drive piles to refusal. In general, hard bedrock was found at greater depths than those first estimated, and the completed pile operations in this unpredictable material will have approximately 15% additional lineal footage than that indicated at the beginning of the job during design stage and time of test borings.

All piles are topped with a #6 16-in. shell, later to be capped and incorporated in the foundation structure. With an average length of 32 ft., most of the piles are driven with 11-in. blunt points, with the shorter ones having 12 to 15-in. points. Many of the 2,100 stepped taper piles are on a 1:8 batter. Design of the plant calls for 340 treated and untreated wood piles for smaller subsurface structures. When the under-

TWELVE-INCH SHORES act like flying buttresses as they reinforce sheet piling on foothill. Concrete footing built by contractor to support shores is being incorporated into foundation design.



ground concrete force mains and tunnels between plant units cannot be based on an outcrop of bedrock, treated wood piles were specified. Untreated piles were specified for all conduits below elev. —5. The piles used this way will have the benefits of submersion in salt water, but few of the defects, principally destruction from the infamous teredo borers and limnoria worms that have plagued harbor construction in San Francisco Bay for the past 100 years. Beneath the systematic lattice of streets that will be replaced throughout the treatment plant site will be tunnels for the city's operating and maintenance crews. Where these tunnels are in the dry, sedimentary earth and man-made fills, their weight rests upon capped, treated timber piles.

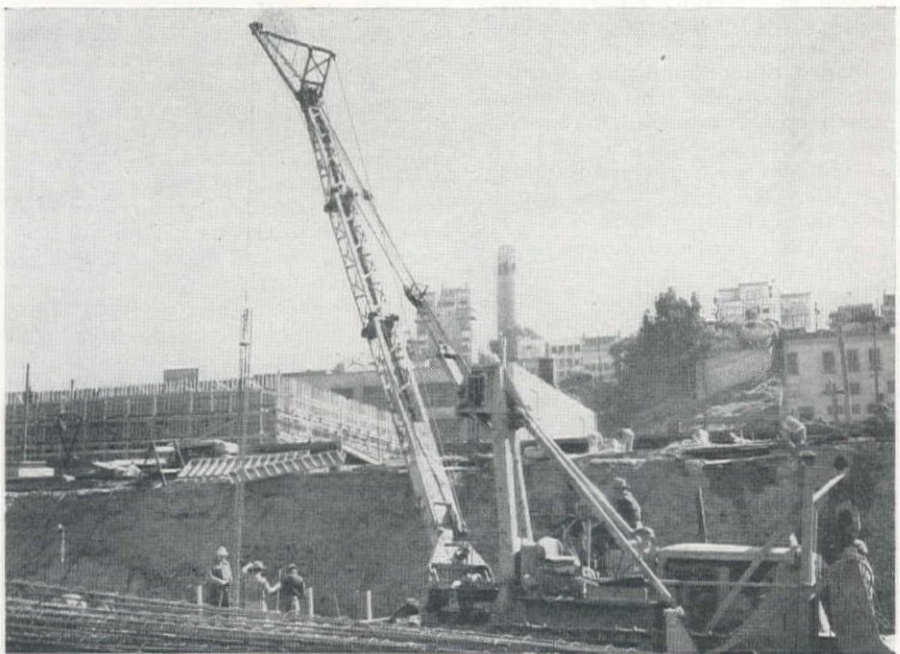
To retain a high hillside on the south edge of the job, 190 pieces of sheet piling have been placed and driven down to rock. A massive concrete footing was put in to act as a kicker for a series of 12-in. I-beams used for shoring the exposed 1-block section of the hill. The footing is being incorporated into the foundation design of the structures, and will be left in place virtually intact. Tricky catskinning is proceeding with small clearance beneath the steel shoring. The shoring is connected to a 24-in. I-beam waler in place and secures the sheet piling. Without the heavy reinforcement below, the entire block above with its houses and improvements could subside unceasingly in future years. A forest of vertical 12-in. I-beams below the last remaining house on the street were driven plumb and in line, and have now skidded with the surrounding earth.

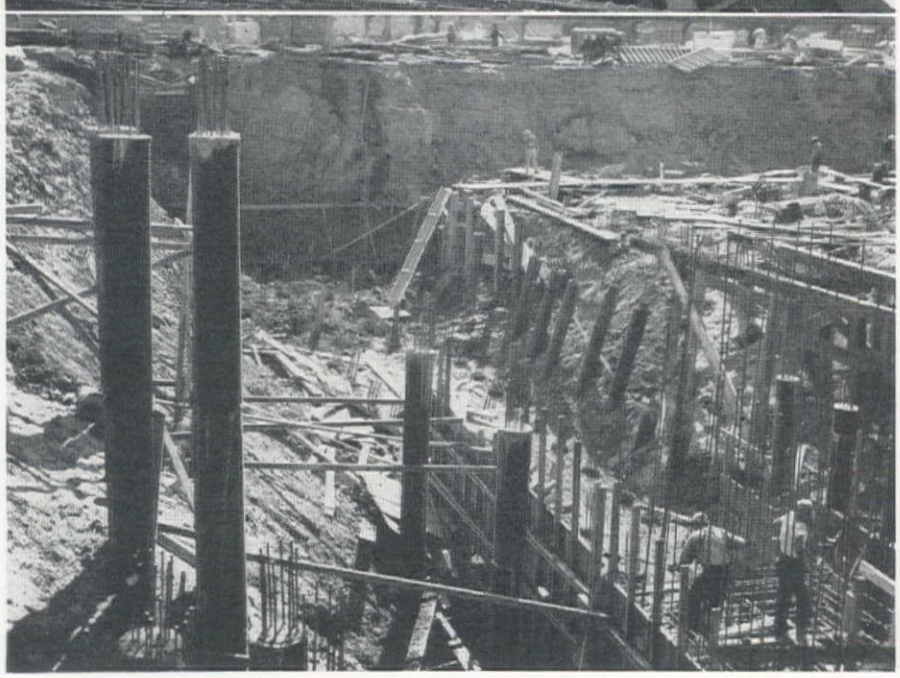
The present sheeting is the first of three walls to be installed. It has been driven just outside the wall line of the adjacent structure, and when excavation is completed and foundations are in, a new line of sheeting will be driven farther up the hill and will be shored against the building foundation. Progressive sheeting and excavation are necessary to hold the unstable, faulted rock in place. The final and third row of piling will not be left permanently in place to hold the city block secure, but will be replaced by a reinforced concrete retaining wall.

CARL BERGSTROM

HARRY TOBEY

CAGES totaling 400 tons of reinforced steel are returned out on production line basis, top. Bottom, a high percentage of the 13 mi. of concrete piling is on a single and 2-way batter.





The North Point project is located on the Embarcadero water front, at the north foot of Telegraph Hill on North Point Street. It is 2 sq. blocks in area, and occupies a site through which the bay shore line once ran. This was later filled in with rock from Telegraph Hill and rubble from the 1906 earthquake.

For the structures, about 3,000 tons of reinforcing steel from Bethlehem Pacific Coast Steel Corp. are being used, of which 1,400 tons are for the Pre-aeration and Sedimentation building alone, the largest unit in the entire plant. When completed, the plant will receive raw sewage from a wedge-shaped area, with interceptors draining 70% of the city's 30,000 acres, including most of the downtown Western addition, Mission, Marina and Potrero Districts. Sludge from the North Point plant will be pumped through a 6-mi. line south to the Islais Creek sludge treatment plant where it will be processed into a commercial fertilizer base. The Islais Creek unit will cost $4,486,000 and has been let to MacDonald, Young and Nelson Co. and Morrison-Knudsen Co., joint venturers.

Included in the many good-sized quantities on the North Point project are 35,000 cu. yd. of concrete for structures and 75,000 cu. yd. mixed rock and earth excavation.

Organization

The entire North Point Project is under the direction of H. C. Vensano, Director of Public Works, and Ralph G. Wadsworth, City Engineer, of the City and County of San Francisco. Fred D. Brown is Resident Engineer; Charles Ferraris, Assistant Resident Engineer; and Ken Morrison and Al Holubar, Cost Engineers for the City's field office. Hugh Robbins and Charles Gallagher are the Structural Inspectors, and Don Preble is the Mechanical Inspector for the City.

Fred L. Burrows is General Superintendent for the joint venturers, and Al Keubel is Job Superintendent. Carl C. Cramer is District General Superintendent and Harry Tobey is Job Superintendent for Raymond Concrete Pile Co.

Portrait—Hard Rock Tunnel Champ

John Austin has punched holes at record speeds through mountains all over the West—With a keen understanding of men and equipment he handles both with emphasis on safety

By HENRY HOUGH
Denver, Colo.

MUCKING MILLIONS of yards of rock with crews of men numbering in the thousands and using the most modern equipment is a nice "relaxful" business, according to John Raymond Austin. His John R. Austin Construction Co. is one of the big ones, with offices in Denver and various jobs in progress marked by pinpoints on a big map.

Sure, this is "Long John" Austin, world's foremost tunnel driver. Today he owns his own business and operates as contractor, in a nice position to profit if his men continue to perform his modern miracles. It wasn't quite that way on a lot of jobs when "Long John" was making newspaper headlines and staggering engineers in his world of hardrock tunneling. On most of these jobs, he was superintendent for the contracting company that had the job. Contractors were proud of Austin, didn't mind his affinity for world's records and publicity. His was the glory—theirs was the profit.

Untangling fact from fable isn't easy with the John Austin story. The guy is a modern Paul Bunyan and his friends tell their favorite John Austin stories with any embellishments or exaggerations they feel like tossing in. Knowing Austin, it is easy to see why.

When you're six feet eight and a healthy young construction worker, it dawns on somebody that you'd make a pretty good foreman. Consequently John Austin has been bossing men on construction jobs for about forty years, since he was 21.

The North Carolina farm his father owned held him until he was 17, but then John got a job with a railroad construction crew. He claims he was dreaming of driving tunnels before he left the farm. At any rate, he soon found himself foreman of a tunnel crew working for the Louisville & Nashville Railroad on a hole through the hills near Quicksand, Kentucky. Other jobs in the south and east, mostly on railroad tunnels, led to a six-year assignment handling concrete work on the Welland Canal between Ontario and New York state.

While on this job he married the daughter of a Buffalo newspaper editor, which he still considers his most noteworthy achievement. She has had a lot to do with his success and has usually been within yodeling distance of the portal on the various jobs the Austins have tackled. Today, one of their sons, John Jr., after a six-year stretch with the Coast Guard, is in business with his father, as is George, one of the twin boys. The other twin, Charles, is still in school. Helen, the daughter, is married to a Colorado rancher.

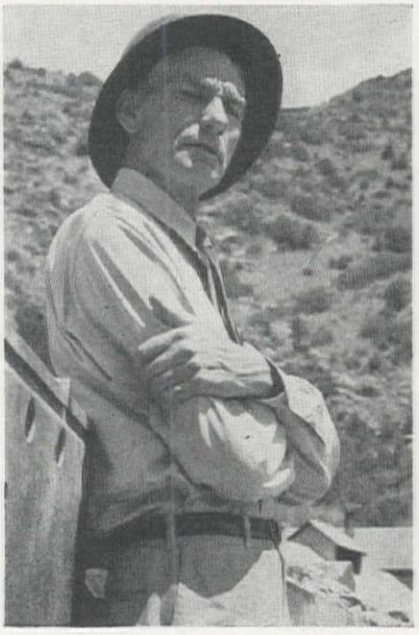
Big time tunneling first proved Long John's mettle in the Thousand Palms tunnel No. 1 on the Colorado River aqueduct project in 1935. The Metropolitan Water District was engaged in its great project to bring water 392 miles from the Colorado River to the Los Angeles area. Thousand Palms No. 1 was one of the 37 tunnels in that vast construction job.

Desert heat was the worst problem Austin's crews had to contend with, but even with the thermometer touching 130 degrees his men began setting records that attracted attention. Austin was working his men two weeks, then giving them two weeks off while other crews took over. Many a day his men advanced 45 ft. through none-too-solid rock, an achievement in a 19-ft. horseshoe-shaped tunnel requiring continuous steel support. In a blaze of effort, the Austin crews made 1,101 ft. that November in 26 working days, which made those familiar with the undertaking realize John R. Austin was a world-beatin' tunnel man.

The Rockies provided Long John's next tunnel assignment and proved to have the kind of lure that holds a man in spite of everything. He has been offered fancy figures for work in Switzerland and France, and in various parts of the United States, but he is in the Rockies to stay, he says firmly.

Cripple Creek's famous gold mines had filled with water and a long drainage tunnel was projected to drain a 30-square mile area. Fresh from his first Colorado job—finishing the Jones Pass water diversion tunnel for the Denver Water District—Long John grinned broadly when they explained that this was a four-year job. With the toughest crew he could assemble, Austin drove the six-mile tunnel in a shade under two years. Newspapers in the region and mining journals everywhere ran bulletins on the day-by-day progress of the operation after it had bowled over a score of world's records. His crews averaged 48 ft. a day and one day in September, 1940, made 78 ft. with one sensational 8-hr. shift turning in an incredible record of 27 ft.

"LONG JOHN" AUSTIN



World War II saw Austin's tunnel jobs piling up on him. Getting out strategic metals and minerals was of crucial importance and Austin was assigned to drive the 6,300-ft. extension to the Treasury tunnel near Ouray in the San Juan mountains of southwestern Colorado. This was a haulage tunnel, to open up rich zinc, lead and copper ore bodies in the Black Bear and other mines once served by an aerial tram that had been carried away by an avalanche nearly a generation before.

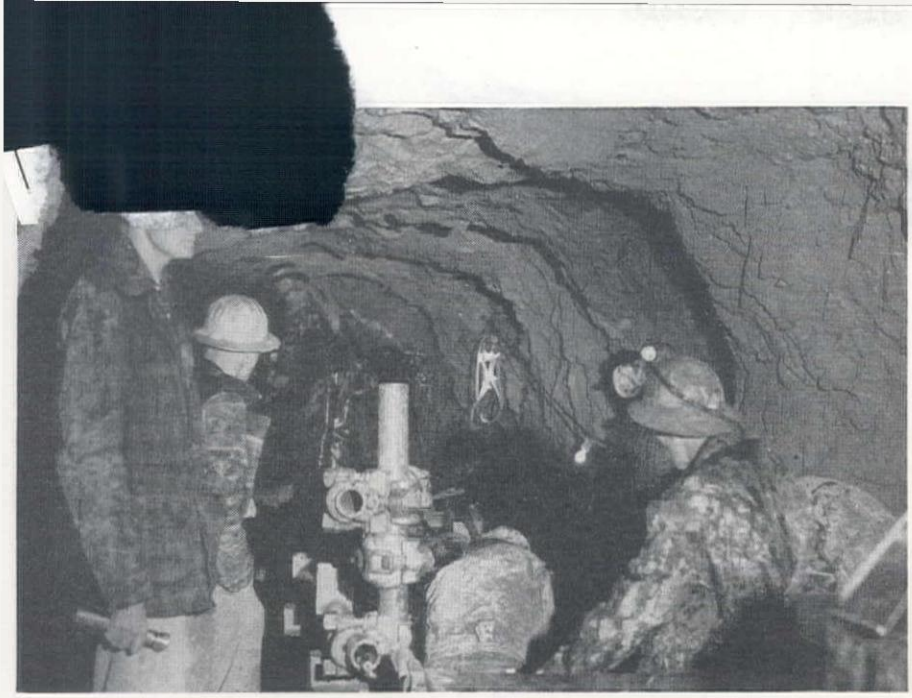
Of a similar nature to the Carlton tunnel at Cripple Creek was the Leadville drainage tunnel, a projected 3¼-mi. bore to de-water some of the greatest mines the West has ever known. This enterprise, still awaiting additional funds for its completion, eventually will open up some four million tons of zinc, lead, manganese ore and precious metals in the heart of the Leadville area.

While working on these projects during the war, Austin was phoned by Harold Ickes, then Secretary of the Interior. Austin knew why. One of the smaller tunnels on the Moffet Tunnel line of the D. & R. G. W. had a bad fire and resulting cave-in. Transportation of important war material needed in the Pacific was being delayed.

"John, you've got to get that tunnel opened up at once," Ickes said.

The lanky Southerner really hit top speed on that emergency job. He burned up long distance lines telephoning all the experienced tunnel men he knew who hadn't already gone overseas. Fighting carbon monoxide gas as well as the wreckage left by the fire and cave-ins, Austin's men labored for ten weeks restoring service on the important transcontinental line.

Pneumonia that hit him just as that job was nearing completion had Long John Austin flat on his back when he should have celebrated one of his greatest days. Holing through of the 13-mile Colorado-Big Thompson water tunnel under the Continental Divide took place when he couldn't be there. But his men crawled through the hole after the final blast had been set off by Washington



IN FAMILIAR SURROUNDINGS, John Austin watches equipment with an eye toward suggesting logical improvements and watches his men in the interest of improving his enviable record for safety.

dignitaries, and the Austin men shook hands with the equally-rugged crews of men employed by S. S. Maggofin who drove the tunnel from the eastern side. Austin had been superintendent for Stiers Bros. Construction Co. of St. Louis, which had the contract for driving from the west portal.

Other phases of the Colorado-Big Thompson project still engage the attention of Long John and his men. There were more tunnels—Horsetooth No. 3 and No. 5—that had to be put through. But by this time Austin had set up his own contracting company and was bidding and getting some of the big jobs.

Never satisfied with the tools he has to work with, Long John has devised many improvements. Some of these have been adopted by other tunnel men. Several are being manufactured by prominent machinery companies to whom Austin has licensed the patents. Some were such Rube Goldberg contraptions that nobody but Austin would use them, but at the time they served their purpose and helped driving speed while holding up Austin's enviable and hard-won safety record.

This man is tough. He never pretended to be anything else. His men look up to him because he can do anything they can do and usually do it better. His rules are law and everybody around him knows better than to treat an Austin rule lightly. But when a job is done and there is a moment for relaxation, you'll find Long John and his men having a high old time where the songs are merry and the drinks are free. Then you'll begin to understand how this man became a legend and how his men accomplish seemingly impossible things.

Somebody is always coming along with a job that looks like it shouldn't even be attempted. And somebody is likely to suggest that this is a job for Long John Austin. After a little parleying, you'll hear the biggest man in the room say,

"I'll bet a hat I can do it."

And you can bet your hat that he will.

Reclamation of Water From Sewage

Board of Engineers recommends program for Los Angeles County to provide a supplemental supply for replenishment of groundwater resources and for industry

RECLAMATION of water from sewage and industrial wastes at costs estimated from $15.30 to $19.05 per ac. ft. from new plants designed exclusively for such purpose, and its re-use for (1) agriculture, (2) industry, (3) recreation and (4) augmenting underground water supplies, were found feasible and recommended in the report of a Board of Engineers appointed by the Los Angeles County Board of Supervisors. The Board, comprised of: (1) A. M. Rawn (Chairman), Chief Engineer and General Manager, County Sanitation Districts, (2) C. E. Arnold, County Engineer and Surveyor, and (3) H. E. Hedger, Chief Engineer, County Flood Control District, rendered its report to the Supervisors after a study extending over a fourteen-month period. It supplemented the technical findings and conclusions of the report with recommendations for Board action designed to advance the legal and administrative preliminaries necessary for establishing such a water reclamation program. The findings submitted by the Engineers to the Supervisors are presented on the following page.

Based on their studies the Engineers recommended that the Board of Supervisors take steps outlined as follows:

(1) Approve the feasibility of reclamation of water from the spent and waste waters flowing in the sewerage system of the County Sanitation Districts of Los Angeles County, and adopt a policy looking toward such reclamation.

(2) Approve a sequence of procedure, when legally possible, for the purchase, construction and operation of necessary works. This procedure would include purchase and operation of several existing sewage treatment plants, the negotiation of a contract with oil refineries for constructing a reclamation plant and the building and operation of new works designed exclusively for water reclamation.

(3) Establish a policy which would provide that areas or industries benefited would pay for the cost of any venture designed for its exclusive benefit. The Los Angeles County Flood Control District would be the agency to establish conservation zones and finance reclamation work benefiting these zones. The County Sanitation Districts would design, build and operate the works.

(4) Authorize legal action designed to obtain necessary legislative amendments, which would permit the Flood Control District and the County Sanitation Districts to carry out the reclamation program.

General findings

After pointing out that the process for reclaiming water from sewage and industrial wastes is "an accomplished fact," and that several treatment plants provide for the re-use of water, the report discusses the characteristics of the sewage in the existing trunk lines of the districts.

Analysis shows that the sewage in the lines of the sanitation districts contains about 1,000 p.p.m. of solids, of which domestic sewage contributes about 300 p.p.m. If garbage is disposed of in sewers, another 300 p.p.m. would be added. The Board also observed that industrial wastes might be of such a character as to render the sewage totally unfit for re-use.

As to the need for a program of reclamation, the Board reviewed the continuing problem of increasing population and diminishing water supply, particularly ground water resources. Currently, more than 95% of all sewage and industrial waste from Los Angeles County is discharged at sea; and the

COST OF A TYPIC[illegible] WATER REC[illegible]

(Sewage w[illegible])

Land:	
10 acres at $4,000	[illegible]
Structures:	
Entrance channel, bar screen chamber	20,000
Primary sedimentation tanks (incl. pre-aeration) (2)	75,000
Aeration tanks (9)	290,000
Final sedimentation tanks (4)	100,000
Blower and pump house	100,000
Office and laboratory	30,000
Maintenance yard	10,000
Equipment:	
Bar screen	10,000
Sludge removal mechanisms, primary	20,000
Sludge removal mechanisms, secondary	40,000
Aeration tank equipment	150,000
Blowers (4)	100,000
Sludge pumps and piping (all yard piping)	60,000
Air piping—to tanks	10,000
Electrical equipment	60,000
Chlorinating equipment	20,000
	$1,135,000
Pipelines:	
Reclamation Plant to Spreading Grounds, Trunk Sewer to Reclamation Plant, 4000 ft. of 30-in. R.C. pipe at $15.00	60,000
	$1,195,000
Engineering and Contingencies 20%	239,000
Total Cost	$1,434,000
Estimated cost of operation and maintenance of plant	$8.50/ac. ft.
Estimated cost of spreading	2.00/ac. ft.

[illegible] alleviated by reclaiming spent or waste waters,

(b) That the system of trunk sewers constructed and operated by the County Sanitation Districts of Los Angeles County is so arranged as to permit of the segregation of wastes which might otherwise so contaminate the spent waters desired to be reclaimed as to render them noxious and unfit for reclamation,

(c) That the existence of a complete and adequate sewerage system for use by the Sanitation Districts greatly minimizes the difficulties and costs of building and operating water reclamation plants.

(d) That water which may be produced at spent water reclamation plants is of good quality, entirely acceptable and better than some supplies obtained from underground storage or imported into the area,

(e) That the reclamation of a satisfactory limited supply of water from the spent and waste waters of the area may be accomplished safely and economically, and, finally:

(f) That amendments to the Los Angeles County Flood Control Act and to the County Sanitation District Act would permit these two agencies to finance, plan, build and operate the necessary rectification and distribution works.

urgency of the water supply situation focuses attention on the fact that sewage can provide reclaimed water for specific uses.

Use of reclaimed water

Water reclaimed from sewage may be used directly in agriculture, industry and for recreational purposes. Last year, the Board states that reclaimed water was being used in agriculture at 124 places in the United States. The industrial wastes flowing in the trunk sewers of the district could be regulated to eliminate materials, particularly minerals, which would make the reclaimed water unsuitable for agricultural use.

Although there are important limitations in the use of reclaimed water in industry, there are many existing examples of such use for cooling and condensing operations in industrial plants.

Recreational use includes lawn sprinkling in public parks, where the quality of the reclaimed water would have to meet agricultural water standards.

In addition to the foregoing generally accepted uses for reclaimed water, the special conditions in Los Angeles County direct attention to the replenishment of underground water supplies. At the present time, the County Flood Control District spreads flood flow over grounds designed to return water to underground basins. With proper treatment, the Board concludes that reclaimed water could be used in this same manner, provided the following conditions existed: (a) proper spreading area, (b) water reclamation plant and (c) adequate supply of sewage with proper mineral quality.

Legal problems

Construction, and/or operation, of water reclamation plants would require a permit from the State Board of Public Health. Such permit would require the plant to meet public health and safety regulations similar to any sewage treatment plant. Operations would have to be carried out without public nuisance, inconvenience or menace to the public health. The State Board of Health has already established regulations for the use of reclaimed water for crop irrigation, but there has been no similar ruling defining the quality of water for industrial use.

The State Health Department has indicated that it will consider individual applications on their merit, in reference to spreading reclaimed sewage water to replenish underground basins. The Board also notes that city and county zoning regulations may conflict with the location of proposed works.

Specific plans and programs

More than 100 m.g.d. of waste water is discharged from the ocean outfall of the County Sanitation Districts, and this flow will probably increase progressively to 300 m.g.d. during the next fifty years. This waste includes water which is suitable for reclamation and re-use, for agriculture and industry.

At present, the Flood Control District operates spreading areas at Rio Hondo, and other locations where flood waters are introduced to recharge the depleted ground water supplies.

As an estimate of economic feasibility the Board found that reclamation facilities could be constructed to treat 10 m.g.d. of raw sewage and apply the reclaimed water to the Rio Hondo Spreading Grounds at a cost of $16.40 per acre foot. Expansion of such facilities to 50 m.g.d. would lower the estimated cost to $15.30. Estimates of plants, in other locations, on the existing trunk lines indicate reclaimed water costs of $18.00 per acre foot at one location, and $19.05 at another.

In order to indicate a comparison in the cost of water, the Board has taken a figure of $15.00 per acre foot for unsoftened Colorado River water, plus the cost of delivering and spreading such a supply.

In planning the sequence of a logical program, the Board proposes the purchase of the facilities existing at the Tri-Cities, Whittier and El Monte Sewage Treatment Plants and their use for water reclamation.

An estimate is shown in the accompanying table indicating the costs of a plant designed exclusively for water reclamation, capable of handling 10 m.g.d. and delivering this water onto the spreading grounds at Rio Hondo.

Adjustable Pipe Carriage Handles Pipe for—

East Bay Sea-Level Sewer Tunneling

Contractor devises rig to handle 84-in. concrete pipe inside tunnel liner with 8-in. clearance on section of East Bay Municipal Utility District's $23½-million interceptor and disposal project

By ROD WESTFALL and RALPH EAKIN
Assistant Engineer Junior Engineer
East Bay Municipal Utility District
Oakland, Calif.

COMMUTERS TO San Francisco may not realize it, but strange things have been happening underneath the tracks and overpasses they ride on at the eastern end of the San Francisco Bay Bridge, where the East Bay Municipal Utility District is constructing a 23½ million dollar interceptor and sewage disposal project. The joint venture tunnel operations are merely a part of the whole Utility District undertaking, yet the holing through of a 500-ft. tunnel under the highways and tracks in the same type of sand and mud that plagued engineers on the Bay Bridge is in itself a man-sized project. For information on earlier sections of the entire project, reference is made to *Western Construction News* for April 15, 1949.

Proximity to heavy industrial installations and traffic approaches to the San Francisco-Oakland Bay Bridge required that tunneling be employed for portions of Section 4 of the North Intercepting sewer line now under construction for the cities of Albany, Berkeley, Emeryville and Oakland. Successful bidders on the project were Stolte, Inc., and United Concrete Pipe Corp., joint venturers.

Pipe inside tunnel

A special carriage, featuring adjustable legs, built to transport, place, and position 9-ton sections of concrete pipe inside lining, is the important construction innovation on the tunnel.

Tunneling operations will be conducted in four separate localities along the route of the contract which begins at Potter Street in Berkeley and parallels the Eastshore Highway to the treatment plant site at the foot of 34th St., Oakland. Work included here covers experience gained in the installation of the first 500 ft. of tunnel.

The contractor had the option of installing the 7-ft. circular conduit in the tunnel by either of two methods: (1) install precast concrete pipe, or (2) install cast-in-place monolithic concrete tunnel. The contractor elected to use the former method. This called for excavation of tunnel, installation of tunnel liner plate, precast sections of pipe, and placing of concrete backfill into the space between the outer wall of the pipe and tunnel lining. The section of tunnel described here called for 84-in. I.D. pipe with a wall thickness of 7 in. This left a working space of 8 in. between pipe and tunnel lining.

To accommodate this size pipe, and to provide for 8-in. backfill around pipe, a minimum tunnel diameter of 9½ ft. was required with an additional ½ ft. allowed as a safety margin for small deviations from true grade and alignment. With these requirements in mind, a 10-ft. section was selected.

A steel tunnel liner of the corrugated pan type was used, each pan or plate being 1.33 ft. wide and 3.14 ft. long. With this length, each foot of diameter required one plate, that is a 10-ft. diameter tunnel required 10 plates per ring. Each plate of 3/16-in. thickness had 2-in. flanges with bolt holes for attachment to those plates previously installed. Liner plate was supplied by Commercial Shearing & Stamping Co., Youngstown, Ohio.

Expendable steel

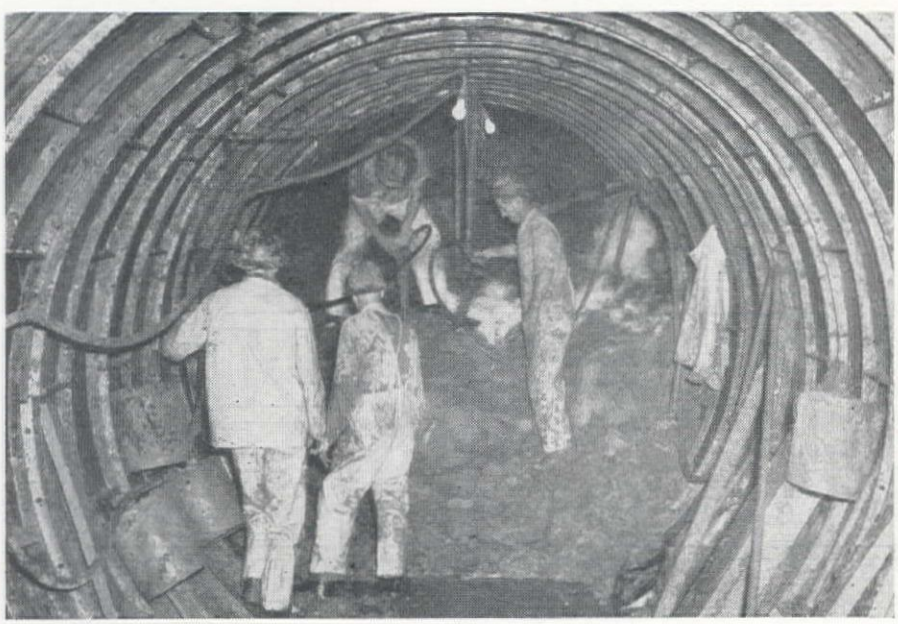
No intermediate rib stiffeners were necessary in the first 380 ft. of tunnel, although soil conditions later encountered indicated the advisability of inserting them at every other ring of plates. Ribs of 6-in., 8.2-lb. channel steel, rolled to conformity with the tunnel section, were installed in 90-deg. arcs with channel flanges bolted to flanges of the liner plates. Both the liner plate and ribs were considered temporary support and were used only for the purpose of permitting installation of pipe sections. No attempt was made to recover this steel.

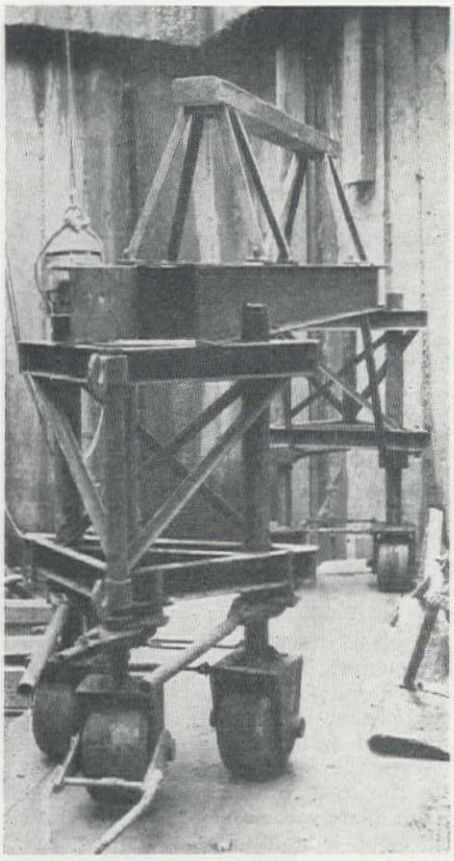
Shafts providing access to the tunnel were located at sites of future manhole structures. Shaft excavations 18 by 30 ft. in plan, were made to a depth of 6 ft. below invert of the tunnel liner. This added depth was provided to serve as a dumping pit for excavated material from the tunnel heading, which was removed by a crane with clam bucket. Operations were on a two-shift basis of 7 hr. each.

Installation of the first ring of tunnel liner required that timber sheeting of the manhole structure be chopped out to accommodate the ring. The pre-assembled ring was then inserted into the heading so formed. Thereafter, individual plates were attached to previously installed plates. A crew composed of four men advanced the heading by excavating with pneumatic spaders on an approximate 1:1 slope. Such a slope eliminated the necessity for extensive breast-boarding. Earth removed from the heading was loaded into a side-dump car by a Gardner-Denver (GD-9) mucking machine operating on 16-lb. rails.

Plate installation was carried forward by utilizing several crown plates before

BY EXCAVATING with pneumatic spaders on an approximate 1:1 slope, the contractor eliminated extensive breast-boarding as the crews wormed through tenacious clays and water-bearing gravel.





MAURICE McCLURE, contractor's engineer, devised the rig to carry and adjust pipe to position.

lower plates were set in place. To keep the leading edge of the liner at proper elevation, a jack was rested upon a shoulder cut into the heading below the liner plate. As each ring was completed, the overbreak behind that ring was blocked and filled.

Prior to laying pipe in the tunnel, the tramway was removed and a concrete floor slab laid to an elevation 3 in. lower than the outer wall of the pipe. This slab served as a runway for transportation of pipe sections into the tunnel and provided a solid foundation for blocks on which to rest the pipe before placing of concrete backfill.

Walking dolly

The unique feature of the work was the manner in which an 8-ft., 9-ton pipe section was carried into the tunnel and placed to specified grade and alignment. To accomplish this, the contractor's engineer, Maurice McClure, designed a carriage consisting of a carrying beam and adjustable legs, for raising and lowering of the pipe sections. One notable detail was that the wheels of the carriage could be adjusted to ride upon the invert of a previously laid section to obtain a tight-fitting joint and maintain the length of pipe at a constant elevation.

A pneumatic winch provided motive power for transportation of pipe sections within the tunnel. Screw jacks on the wheel caster shafts allowed accurate raising and lowering of the carrying beam. These jacks also made possible the temporary transfer of the weight of the pipe and carriage to the leading wheel on the forward end when set upon the invert of previously laid sections of pipe. The rig worked so well on this job that the contracter is now building a new and improved model, to be equipped with hydraulic jacks on the wheel caster shafts for easier, faster operation. When load transfer was complete, the carriage was moved forward until the two matched forward wheels were positioned inside the previously laid pipe sections. Screw jacks were then adjusted to secure an even distribution of weight of pipe and carriage between front and rear wheels. Minor adjustments for grade and alignments were easily made by the various screw jacks.

Once in place, the pipe rested on small concrete blocks and steel shims, with a pair of jacks placed over it to prevent displacement when concrete was poured around the pipe. These jacks were set about 2 ft. from the forward end of the pipe at an angle of 30 deg. from the vertical axis. These were left in place and not recovered.

Backfill placing

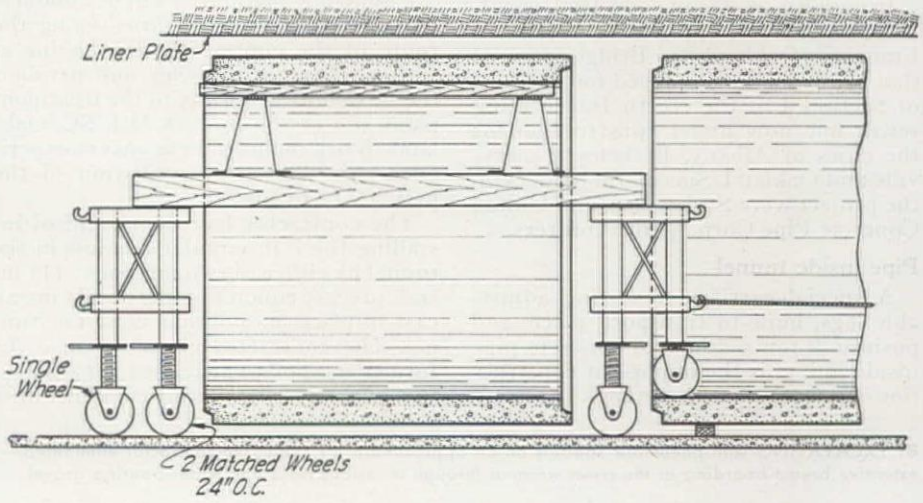
Placing of the concrete backfill was accomplished by pumping through a 6-in. line from a point on the ground surface to the crown of the annular space to be filled. A Rex Pumpcrete machine, of 15 cu. yd. per hr. capacity, was used to transfer the concrete from transit mix trucks to the tunnel interior. The steel pipe line was constructed in 5 and 10-ft. sections, with the shorter sections placed near the discharge end to provide the means of progressively shortening the line as backfilling progressed. These were laid on timber beams supported by the tunnel liner at a height of 2 ft. above the tunnel invert. Bends of 45 deg. near the discharge end facilitated carrying the line to the crown of the tunnel. An airline attached to the pumpline at the upper 45-deg. bend served to alleviate the difficulty of pumping against a head of concrete rising to the height of the discharge end of the line. The air expansion forced the concrete into the space at the crown of the tunnel between the upper bend and the end of the discharge line, thus obtaining a tight, compact lining. A sectional steel bulkhead at the end of the pour provided a vertical construction joint.

On the basis of an 8-hr. work shift, a daily progress of 16 ft. of pipe, laid and backfilled, was maintained.

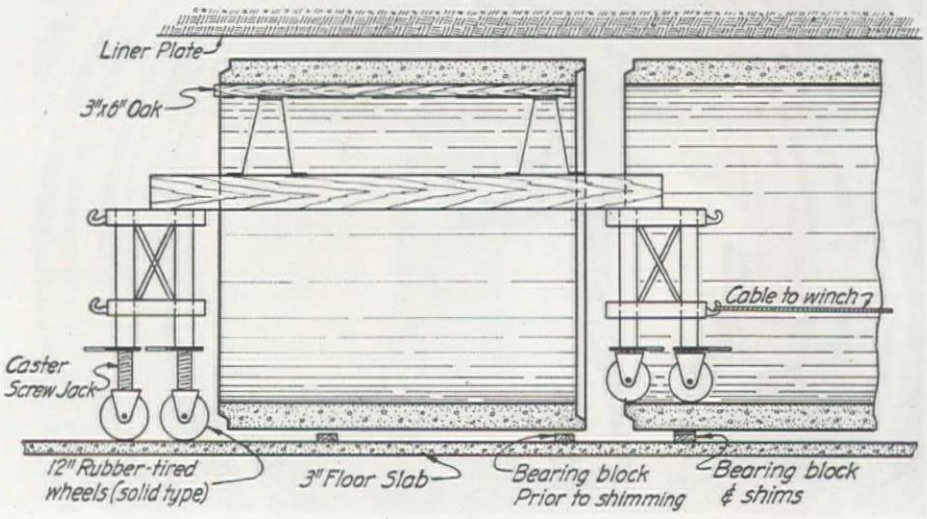
Organization

These tunnel operations were part of the entire sewage disposal construction

Continued on page 116



THE DOLLY carries each 8-ft., 9-ton section of pipe to place, sets it on grade, and supports it until joint and concrete backfill have set. Lead wheel, top, supports load until followers are turned up.



Old Earthfill Reconditioned And Spillway Repaired

Ochoco Dam in central Oregon strengthened and tightened in carefully timed construction program to avoid interference with irrigation deliveries

REHABILITATION of the Ochoco Dam near Prineville in central Oregon presented unusual problems of: (1) Repairing a seeping earthfill structure which was built with too steep side slopes; (2) working from meager records of the original construction and (3) scheduling field work for minimum interference with irrigation withdrawals. The structure was built in 1921 on Ochoco Creek by the Ochoco Irrigation District, financed by a bond issue of $1,425,000. It is an earthfill, hydraulically placed, extending about 125 ft. above the stream bed.

Initial construction methods were relatively crude and records are meager. For instance, one abutment of the dam is built on a talus slope and there is little evidence that excavation was extended through this material to a solid foundation prior to placing the fill. The dam was built with side slopes considerably steeper than would be used under present practice. On the first filling of the reservoir a considerable seepage developed through the dam at two-thirds its height, and this was reported to have probably been due to the placing of frozen material at this elevation. Considerable leakage also developed through the right abutment.

The repair of an existing dam, particularly where records of construction are inadequate, is often more difficult and intricate than original construction. The Denver office of the Bureau of Reclamation, which prepared the design, had to balance optimum design against economy of construction and other factors. It was also necessary that design and construction procedures would keep to a minimum any interference with operation of the reservoir for irrigation.

Study of the existing spillway disclosed that water would pile up against the left side and to counteract this the revised design was based on a model test of the spillway to aid in the location and size of a suitable deflector block. Deflecting fins were also designed for the outlet of the spillway to discharge the flow in alignment with the adjacent channel.

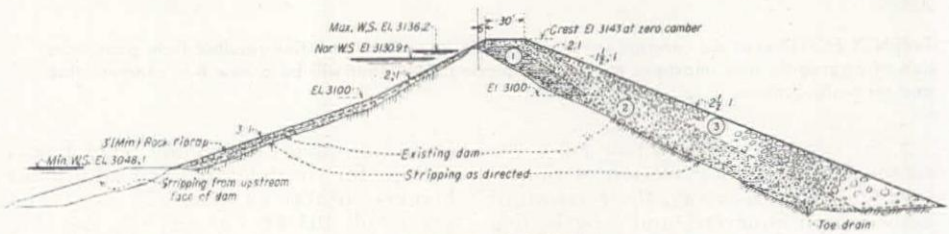
Features requiring repair

1. The dam, because of inadequate design and unsafe construction, endangered life and property in the city of Prineville, approximately 6 mi. downstream, whenever more than normal runoff occurred. The structure is being stabilized and strengthened by placing an extensive gravel fill with a rock fill cover on the downstream face. The gravel is being obtained approximately ½ mi. downstream and the rock is being obtained from a rock ledge about 3,500 ft. below the dam.

2. The control gate, a 6 x 6-ft. cast iron slide gate, required repair, as did the concrete outlet. The gate, located at the inlet to the outlet structure, will be repaired and used as an emergency gate. A 44-in. steel outlet pipe will be installed inside the present concrete conduit and a 39 x 39-in. high-pressure, hydraulically operated slide gate will be installed at the outlet end.

3. The overflow spillway at the left end of the dam was of concrete but proper precautions had not been taken in the selection of aggregate, or in mixing and placing, with the result that the concrete had deteriorated to the point where failure was imminent. Repairs will consist of pouring a new floor slab over the existing slab, guniting the existing walls, and extending the outlet end of the spillway, after pouring imbedded column supports.

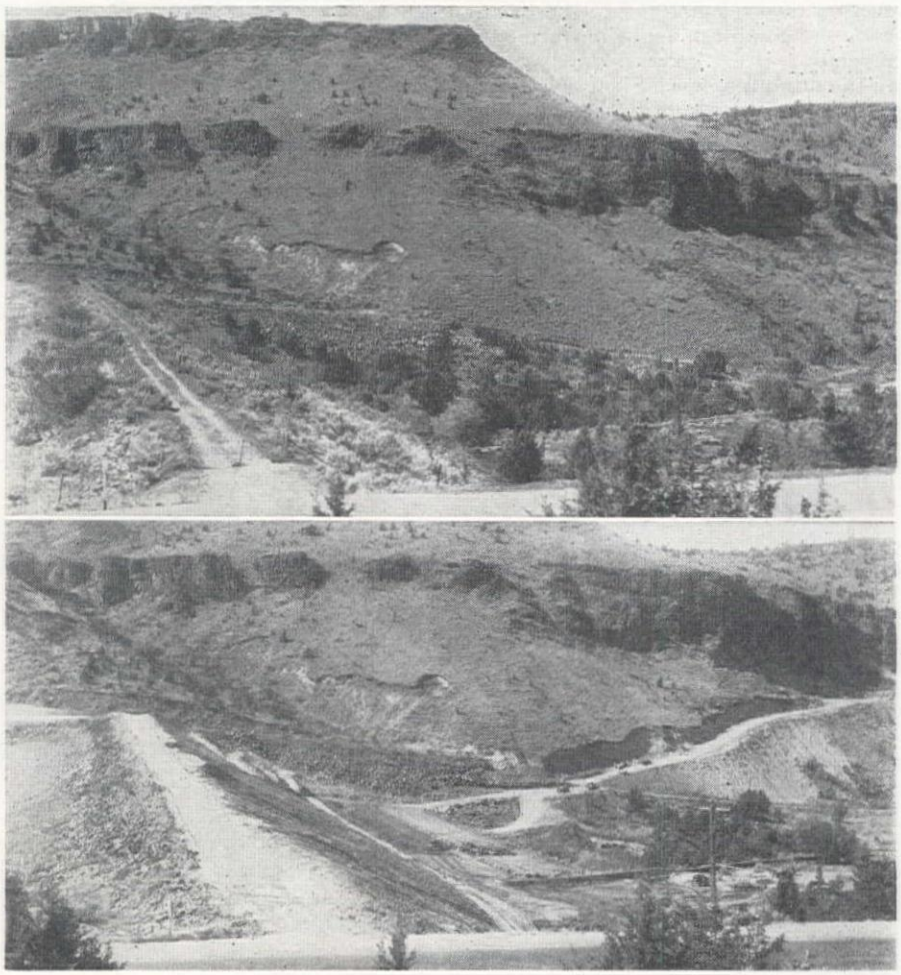
4. Another feature is the blanketing of the right abutment with impervious clay 5 ft. thick to retard seepage and loss of valuable irrigation water. Rock riprap will then be placed on this abutment and the upstream face of the dam. Impervious material is to be obtained from a gravel and clay deposit adjacent to Ochoco Creek, approximately ½ mi. below the dam.

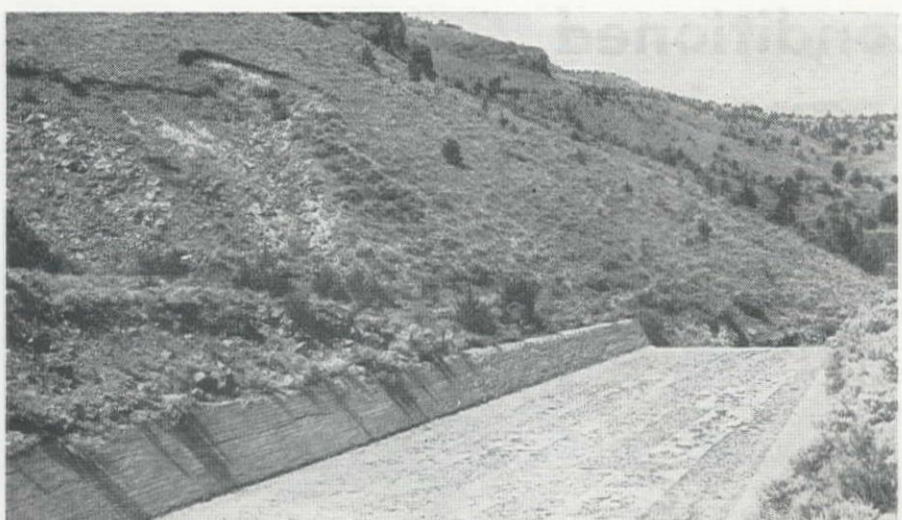


MAXIMUM SECTION

SECTION through original structure (above) showing the new fill which consisted of: (1) impervious material of selected clay, sand and gravel in 6-in. compacted layers; (2) pervious material of sand and gravel in 12-in. layers compacted by tractors; (3) rockfill.

ORIGINAL DAM (upper) before the start of the rehabilitation program. Same view with work in progress (lower) showing contractor's road to rock quarry and the beginning of fill operations on the downstream face. Present repair program is designed to reduce long-continued seepage through the right abutment by the addition of a 5-ft. upstream blanket of impervious clay.





TWENTY-EIGHT year old concrete in the spillway in its present condition resulted from poor selection of aggregate and improper mixing and placing. This floor will be a new 6-in concrete slab, and the walls gunited.

5. A relatively minor repair job is the removal of a wooden section of the diversion canal wasteway, the removal of deteriorated concrete, and lengthening the structure and rebuilding it of concrete.

Timing most important

Construction is not more complex than comparable jobs except that the work must be timed with exactness. For instance, the repair of the existing control gate and installation of the upper section of steel pipe inside the existing concrete conduit must be performed immediately after the reservoir is drained to the minimum level. Since this conduit is the only means of discharging water from the reservoir at low stages, and cannot be used while the work is in progress, the work must be completed with dispatch so that the cost of caring for accumulating streamflow will not be excessive. Similarly, work on blanketing the upstream face and right abutment must be timed for performance at low water level.

Bids for this work were opened at office of the Bureau of Reclamation at Bend, Ore., on May 3, 1949. The lowest bidder of ten was Dragline Rentals Co., Long Beach, Calif., at $573,545.25. Other bids ranged from $608,454.50 to $889,252.

Major equipment on the job on Oct. 1 consisted of:

- 1 Northwest Shovel—1½ cu. yd.
- 1 Northwest Dragline—1½ cu. yd.
- 2 T-L Limas, Model 1201
- 3 Caterpillar D-8 Tractors
- 1 Caterpillar, Model 12, Road Patrol
- 1 Caterpillar D-4 Tractor
- 1 Gar Wood Scraper—15 cu. yd.
- 1 Diamond-T Water Tank Truck, 2,500 gal. capacity
- 1 Hobart Arc Welder
- 1 Gardner-Denver (105 c.f.m.) Compressor
- 11 Mack (20 cu. yd.) Dump Trucks
- 3 Euclids (10 cu. yd.) Dump Trucks

Principal quantities include: (1) Excavation for foundation and abutment blanket, 68,000 cu. yd., (2) sand and gravel fill 103,000 cu. yd., (3) earthfill, 40,000 cu. yd., (4) rockfill and riprap, 130,000 cu. yd., (5) reinforcing steel, both bars and fabric, 225,000 lb., and (6) concrete of all types, 2,020 cu. yd.

Notice to proceed was received by the contractor on June 27, but on June 10, prior to the receipt of this notice, the contractor had moved his first pieces to the site. Work was started on June 13.

R. F. Murphy is work superintendent for Dragline Rentals Company.

J. W. Taylor, construction engineer for the Deschutes Project of the Bureau of Reclamation, with headquarters at Bend, Oregon, is in charge of reconstruction of the Ochoco Dam.

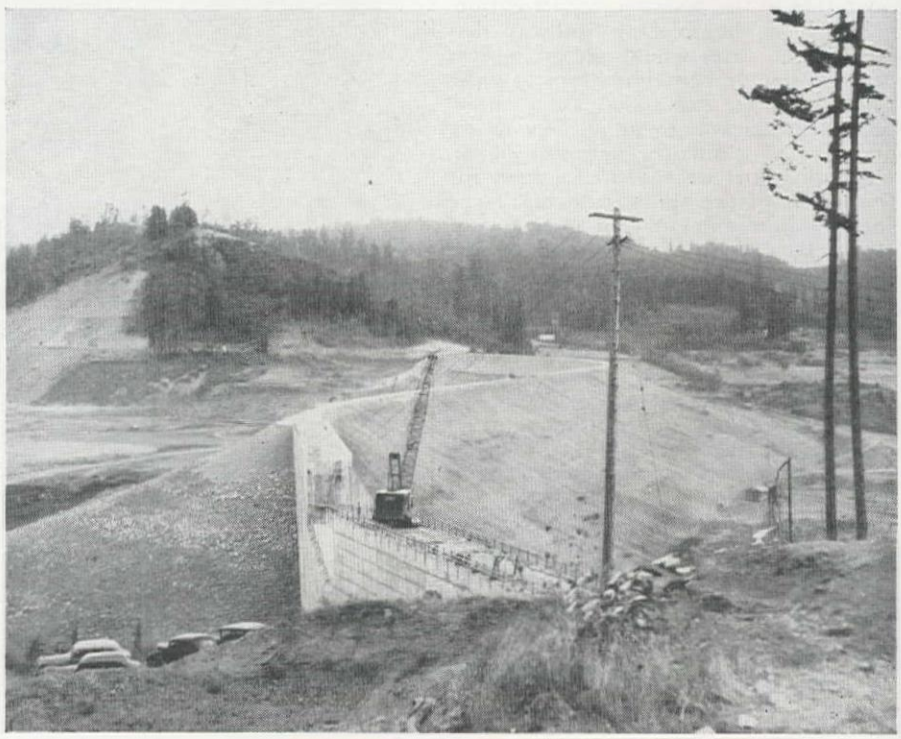
Agreement Reached on Site For Large Dam in California

AN AGREEMENT is reported reached on the location and size of a big dam on the Feather River near Oroville, Calif. Edward Hyatt, State Engineer of California, stated in a speech last month that the Bureau of Reclamation, the Army Engineers and the California State Division of Water Resources had agreed upon the dam's location at the "Oroville" site, approximately 5½ mi. upstream from the city of Oroville, and a reservoir to be created by the dam to contain approximately 3,000,000 ac. ft.

Hyatt stated that the dam, in order to create a reservoir with that capacity, would have about twice the volume of concrete as in Shasta Dam and would have to be 75 ft. higher than Shasta. The Federal agencies had proposed that two dams be constructed instead, one at Bidwell Bar and the other at Big Bend, on the Feather River's middle and north fork respectively. The one-dam plan was originally proposed by the California agency as early as 1931, according to Hyatt.

DORENA DAM COMPLETED AND READY FOR DEDICATION

THE $14,000,000 flood control unit is part of the Willamette River Valley program being built by the Corps of Engineers for the improvement of river control and navigation. Dorena Construction Co. carried out the contract, completing the work well ahead of the July 1950 completion date. The site is 6 mi. east of Cottage Grove, Ore., and dedication ceremonies were announced last month by Lt. Col. D. A. Elliget, acting Portland District Engineer. Construction operations were reviewed in *Western Construction News*, January, 1949, page 89.



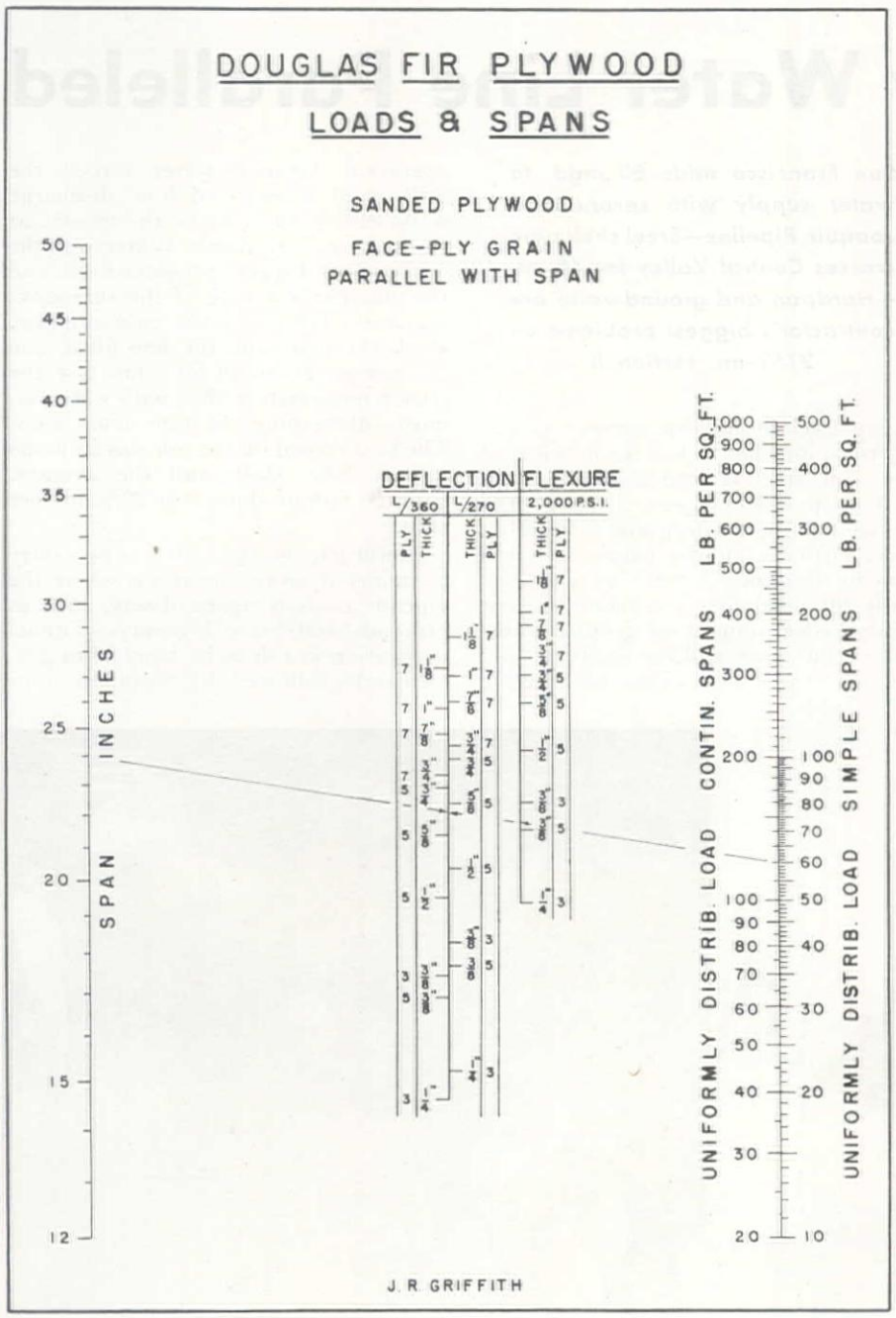
Construction Design Chart

CXIII . . . Douglas Fir Plywood Loads and Spans

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

A CHART FOR Plywood Form Sheathing was presented in the Jan., 1937, issue, giving the spans and allowable loads for a deflection of $L/360$. A similar chart was later presented giving the same information based on an allowable deflection of $L/270$. These two charts may be found on pages 112 and 114 of the 1947 edition of our reprint.[1]

Since the presentation of the original charts on plywood, the use of this material has become much more general. When designing forms for concrete construction, the deflection of the sheathing is usually the determining factor rather than the stress. Under such circumstances, where appearance is the principal factor, the original charts were adequate. However, in a more general application of plywood, I have since found a need for more complete information including that for flexural stress. The accompanying chart has been prepared from data published by the Douglas Fir Plywood Association.[2] It is representative of current technical information concerning this material of many uses.



As noted, the accompanying chart is based on sanded plywood, laid so that the grain of the surface plies are parallel with the span for maximum strength and stiffness. The required thickness is shown for three conditions:

Deflection at $L/360$

Deflection at $L/270$

Flexural stress at 2,000 p.s.i.

Under actual working conditions, the allowable stress may vary from 1,500 p.s.i. to 2,500 p.s.i., depending upon the grade of plywood, exposure conditions, duration of loading, building code limitations, etc. Thus the 2,000 p.s.i. used, represents average conditions only. The allowable loads, as determined by the chart, must then be varied as the allowable stress varies from the 2,000 p.s.i. used on the chart. Thus, for an allowable stress of 1,600 p.s.i., the permissible load would be $\frac{1,600}{2,000} = 0.8$ of the value obtained from the chart.

The chart computations were made on the basis of simple spans. In most cases, plywood is laid so that it is continuous over a number of spans. Under continuous span loading, the end spans become the critical ones. The chart has been prepared on the basis that under continuous span conditions the uniformly distributed load may be doubled. While this ratio is not exactly double for both stress and deflection, it represents average end span conditions for continuous span loading.

A solution line has been drawn on the chart assuming 24-in. spacing of supports with a uniformly distributed load of 60 lb. per sq. ft. for a simple span, or 120 lb. per sq. ft. for continuous spans. The following conditions will be noted on their respective scales:

For deflection @ $L/360$, ¾ in. × 5 ply, may be used,

For deflection @ $L/270$, ⅝ in. × 5 ply, may be used,

For stress @ 2,000 p.s.i., ⅜ in. × 3 ply, may be used.

In order to check the above results, the following allowable loads were obtained by use of the curves prepared by the Douglas Fir Plywood Association,[2] for a simple span of 24 in.:

¾ in. × 5 ply, $L/360$, Allowable load = 75 p.s.f.

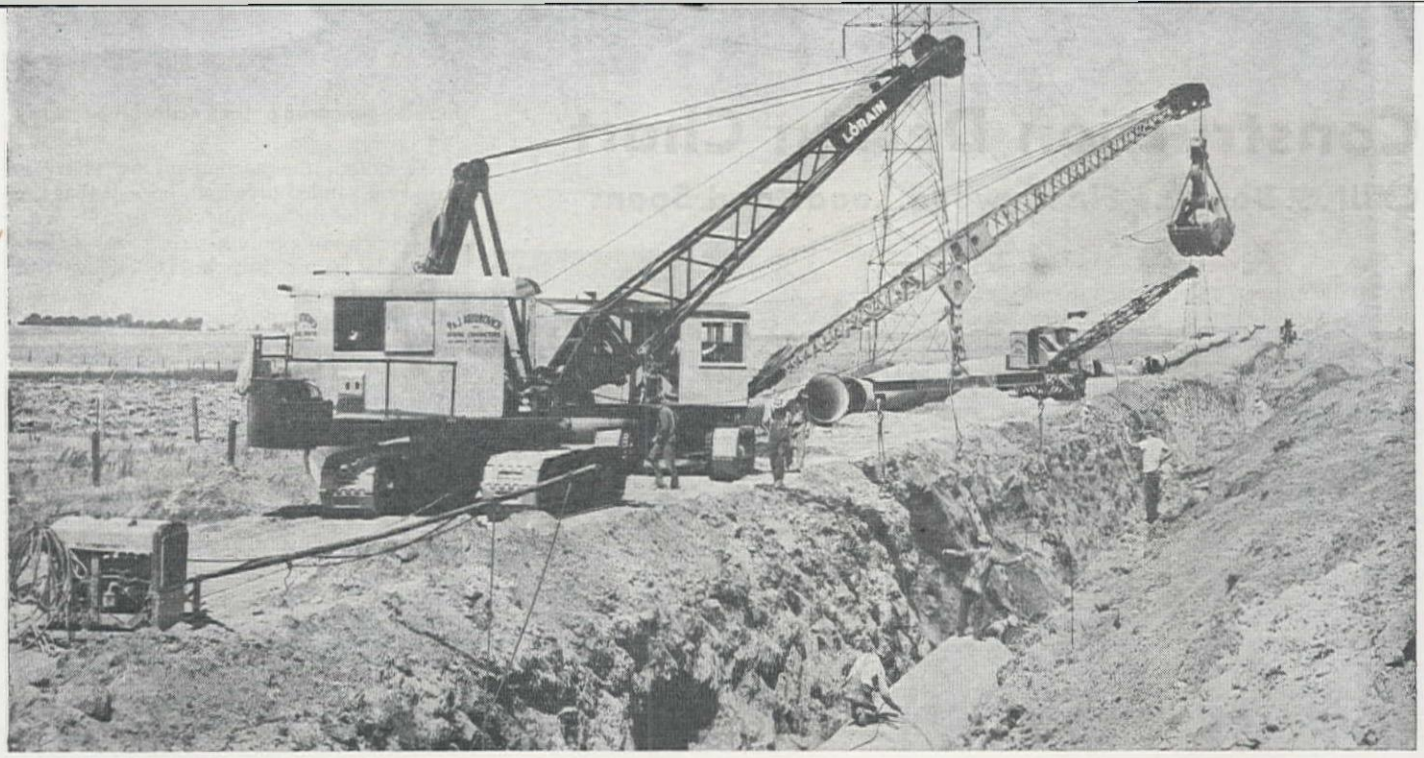
⅝ in. × 5 ply, $L/270$, Allowable load = 65 p.s.f.

⅜ in. × 3 ply, $f = 2,000$ p.s.i., Allowable load = 70 p.s.f.

If the reader will draw separate solution lines on the accompanying chart, from the 24-in. span, through the three determined sections, he will note on the load scale identical values as listed above from the Plywood Association curves. The accompanying chart has the advantage that all thicknesses are available on the same sheet, whereas in ref. 2 each thickness is shown on separate sheets.

[1] *Construction Design Charts*, Western Construction News.

[2] *Technical Data*, Douglas Fir Plywood Association, Tacoma, Wash.



Hetch Hetchy Water Line Paralleled

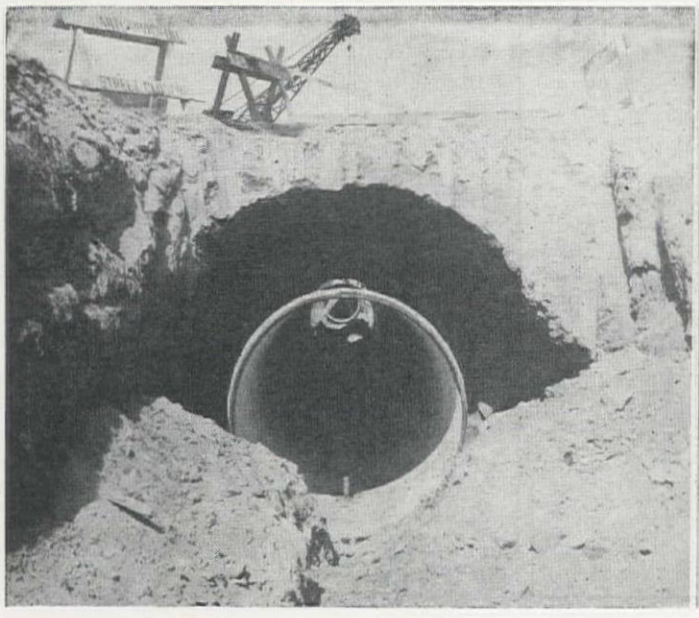
San Francisco adds 60 mgd. to water supply with second San Joaquin Pipeline—Steel shell pipe crosses Central Valley for 48 mi. —Hardpan and groundwater are contractor's biggest problems on 21½-mi. section B

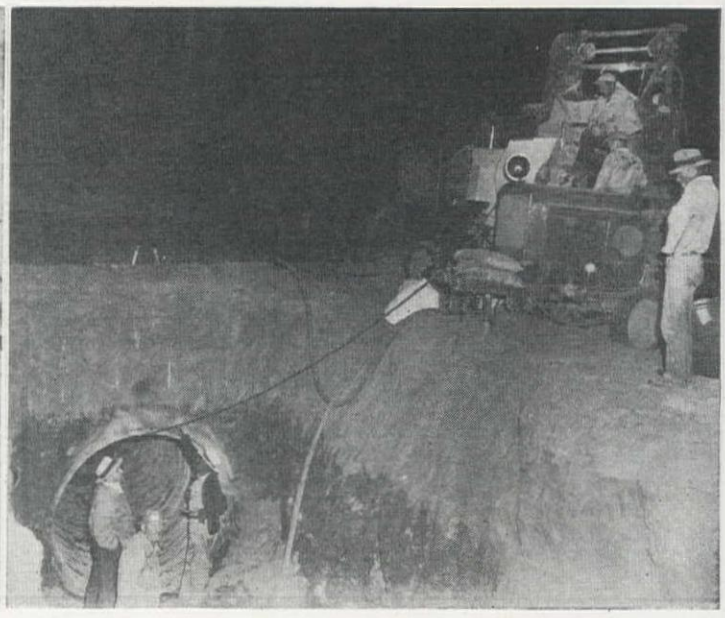
TO SATISFY NEW DEMANDS created by a population increase of 24% in the past 8 years, San Francisco will draw twice as heavily upon the water impounded behind its O'Shaughnessy Dam, located approximately 140 mi. east of the city in Yosemite National Park. An additional 60 mdg. will be added to the water supply by construction of the San Joaquin Pipeline No. 2.

The pipeline has been divided into four sections for convenience in awarding contracts. Section B, 21.5 mi. in length, shown here graphically, was recently completed under a $5,296,219 contract to P. & J. Artukovich, Inc., of Los Angeles.

Picture at top: Steel shell mortar lined and coated pipe is placed with a 2-point sling by the contractor in the sedimentary earth of the San Joaquin Valley. Each of the 30-ft. sections weighs 9½ tons, and has a 3-in. protrusion of the ½-in. steel shell at the ends for a double-lap welded joint. Although the trench was 9½ ft. deep and 6 ft. 10 in. wide, virtually all the excavation was done by draglines. A trencher was originally intended for this operation, but an excessive amount of ground water was encountered and the slippery mud and soft trench walls called for dragline operation. Ground water forced the drilling of a series of 6-in. discharge wells, 820 ft. apart along the trench, at an average 53-ft. depth. Water was the contractor's biggest problem here, and the outright lowering of the surrounding water table was the only solution. With the pipe laid, the line filled, and the pumps turned off for a line test, the trench immediately filled with water, almost submerging the pipe from view. The best record on the job was 55 joints in one 8-hr. shift, and the average, through rain or shine, was 29 joints per shift.

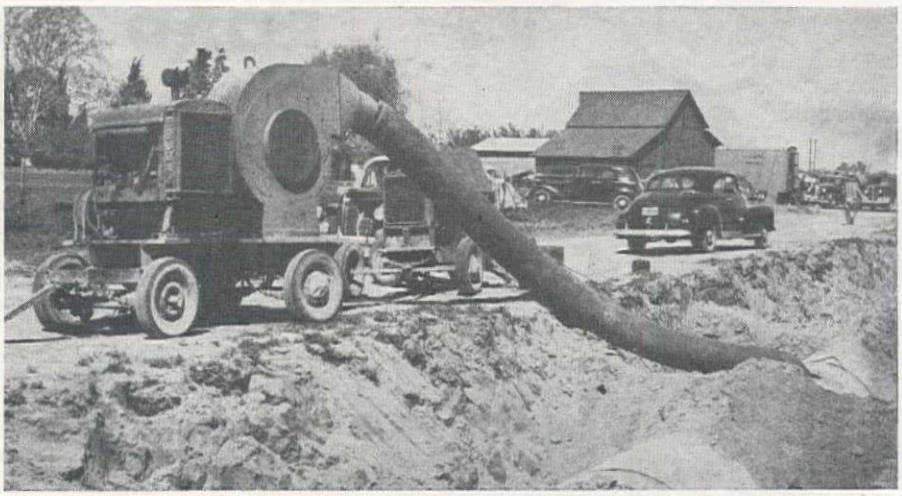
Lower left and right: It was necessary to tunnel at several locations where the pipeline crossed rights-of-way, such as railroads and State highways. Tunnel excavation was done by hand labor, immediately followed by installation of





Armco prefabricated steel liner plates. After the tunnel liner was in place, holes were burned in the plate to receive a short length of 2-in. pipe nipple. These nipples were on 10-ft. centers, and through them the contractor pumped grout under low pressure to fill the small void between the outside of the liner plate and the surrounding earth. Concrete saddles were then poured on the bottom of the liner plate, using a screed to curve them to fit the pipe. The saddles established the grade and served as a sled upon which the pipe was pulled to place in the tunnel. The pipe slid easily and without damage on a rich mud of fireclay and water. After the pipe had been tested and pulled into the tunnel, the space between the pipe and liner was filled with additional grout.

Top, left to right: L. O. White, Office Engineer; Thomas Condon, Resident Engineer, and Pete Artukovich, principal in the firm of contractors laying this section of line. Mitchell Bennich was the contractor's superintendent.



Below: A portable blower was used to blow welding smoke from pipe, making it possible for a maximum of 15 welders to work with comparative ease in the confined area.

Bottom, left: Lining up the skids used for sliding pipe on grade under the Santa Fe railroad tracks at Riverbank. Skids are made of wood to fit the outside contour of the pipe, and are covered with fireclay and water. Another type of encasement was used on the job, where the contractor made agreements with the Santa Fe Railway Co. to open cut across 16 pairs of tracks. The encasement consisted of a 6 ft. 10 in. square concrete jacket around the pipe.

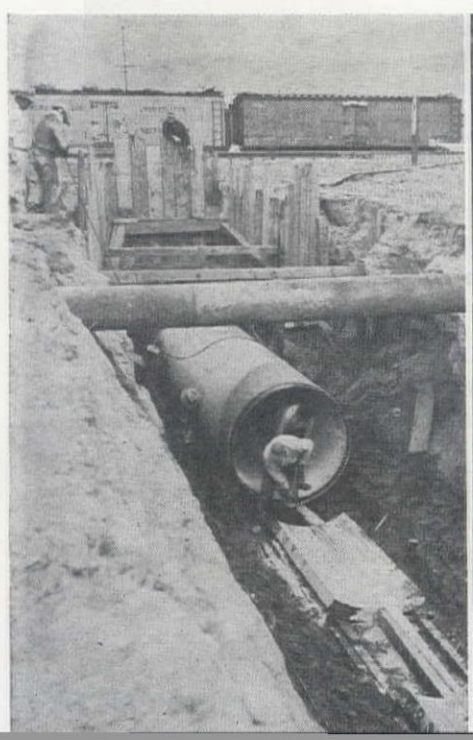
Bottom, center: Pouring concrete from a ready-mix truck into portable sheetmetal forms around pipe at the joint. This operation covers the welded joint with 3 in. of concrete, making a continuous seal for the steel pipe against the surrounding soil. The inside of the joint was then hand plastered with a trowel.

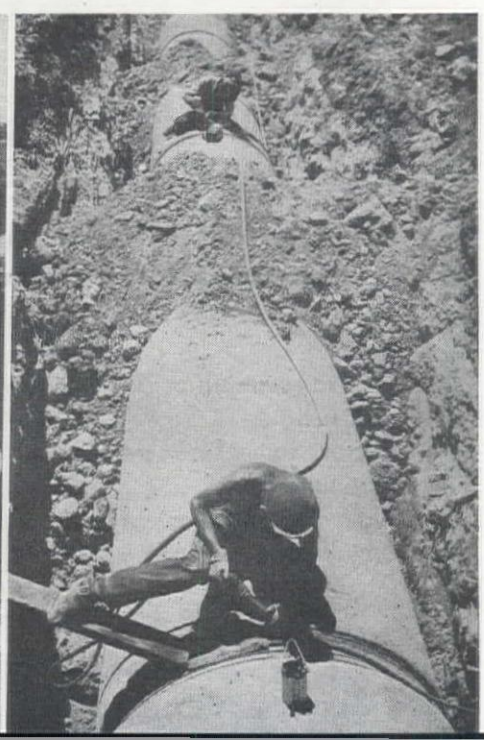
Bottom, right: Chipping and rewelding tack welds prior to final test. The tacks hold the pipe in place during the laying operation, and insure a tight joint.

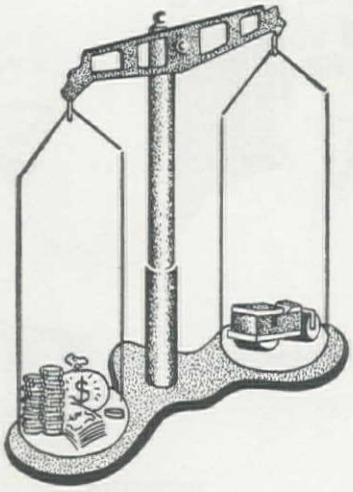
After the pipe has been tested, the trench was backfilled by the puddling method. The procedure is first to fill the line full of water, then backfill the trench slightly to assure against any possible floating of the pipe. Water is let into the trench a little at a time, and the dirt pulled from the spoil bank over the lip of the trench into the water with a dragline mormon board. This method was used on the major portion of the job where the earth was of a fine sandy texture. Where hardpan clay and soft sandstone were encountered, the material was placed in the trench by using the jetting and poling method, in which the large chunks in the spoil bank were broken up in the trench by high pressure water jets and tamping with poles.

The new aqueduct, in order to add 60 mgd. to San Francisco's supply, crosses only 48 mi. over the Valley, because tunnels and other structures carrying water over the two mountain ranges were built two decades ago for more than double the capacity of the first aqueduct. Section A, to be awarded

Continued on page 116





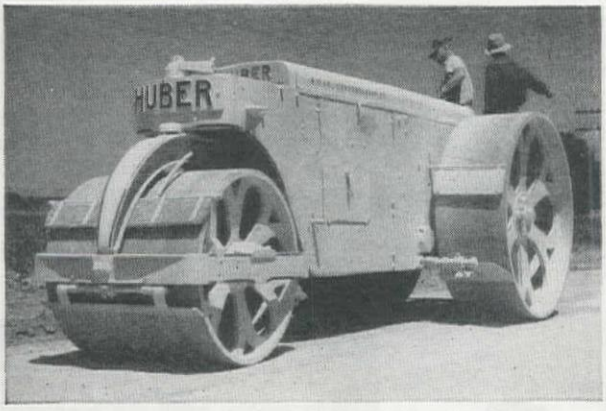


the Balance
IS IN YOUR FAVOR WITH MODERN HUBER ROAD MACHINERY

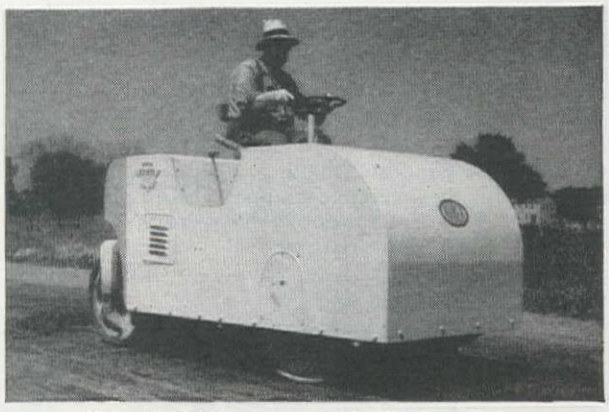
Huber's versatile Road Maintainer—a lift loader, berm leveler, bulldozer, patch roller, snow plow, or rotary broom all in one.

Today's conditions demand that your operation's budget balance out. Modern Huber road machinery will help you do better than that – the efficient, result-producing Huber line will actually tip the balance in your favor.

Road men, from maintenance crews to new road contractors recognize the "extras" that are built into every piece of Huber equipment. Plenty of power . . . economical operation . . . dependable performance . . and the ability to do any job are Huber traits that point to more profitable road operations for you. Write today for bulletins on the Huber equipment that will best serve you.



Huber's always dependable 3-Wheel Rollers—built in sizes, from 5 to 12 tons, suited to any rolling operation.



Huber's highly manueverable Tandem Rollers lend themselves to many special tasks. Variable weight models from 3 to 14 tons.

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

LEE & THATRO EQUIPMENT CO.....Los Angeles 21, California
JENKINS & McCLOUD.....Reno, Nevada
CONTRACTORS' EQUIPMENT & SUPPLY CO.....Albuquerque, New Mexico
NEIL B. McGINNIS CO.....Phoenix, Arizona
FEENAUGHTY MACHINERY CO.....Portland 14, Oregon
FEENAUGHTY MACHINERY CO.....Boise, Idaho
FEENAUGHTY MACHINERY CO.....Spokane 2, Washington
FEENAUGHTY MACHINERY CO.....Seattle 4, Washington
EDWARD F. HALE CO.....Hayward, California
FOULGER EQUIPMENT CO., INC.....Salt Lake City 8, Utah
THE COLORADO BUILDERS' SUPPLY CO.....Denver 9, Colorado
THE COLORADO BUILDERS' SUPPLY CO.....Casper, Wyoming
MONTANA POWDER & EQUIPMENT CO.....Helena, Billings, Montana

Concrete and Glass Sandwich for Walls

AN INSULATED panel wall fabricated from cellular glass and concrete is offering new freedom in curtain wall design and construction. The panels consist of cellular glass insulation cores and concrete veneers made into thin, flat sandwich walls. To date they have been fabricated in several practical sizes and thicknesses for use in all three basic curtain wall systems—spandrel (horizontal), vertical and bayfilling. Produced by Pittsburgh Corning Corp., it has been used so far on construction of only a few large industrial plants.

The panels are made in-the-flat to any practical size. The largest panels, made to date, measure 256 sq. ft. each. The popular thickness is 6 in. (2 in. of cellular glass core with 2-in. exterior and 2-in. interior veneers). This is less than half as thick as the conventional masonry wall.

Marketed as PC Foamglas, the core material is an inorganic, closed-cell, rigid cellular glass insulation. The Foamglas stops moisture vapor migration from one side of the panel wall to the other so that destructive condensation cannot take place with either veneer. Of importance is the fact that there are no "cold spots" in the walls, not even at the joints. The same thermal transfer takes place at the joints as anywhere in the wall.

The new type wall is particularly adaptable to any design regardless of floor plan, window arrangement or structural skeleton. It may be hung on the frame or, in some designs, carry its own weight. The popular thickness panel wall weighs from 40 to 60 lb. per sq. ft., depending on aggregate used.

Mass production techniques are practical in turning out the panels. A 24-hour casting-to-lifting is used successfully. Panels can be placed directly into final position and left to cure.

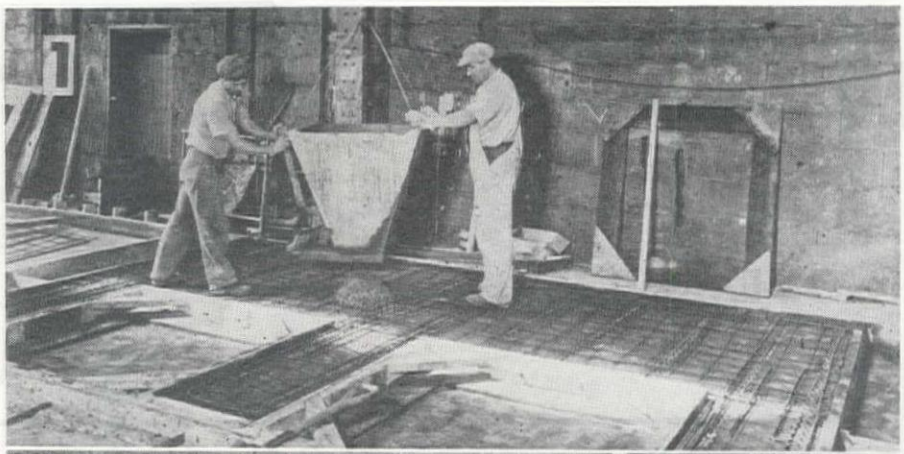
The manufacture and erection of the walls is illustrated by the four views as follows:

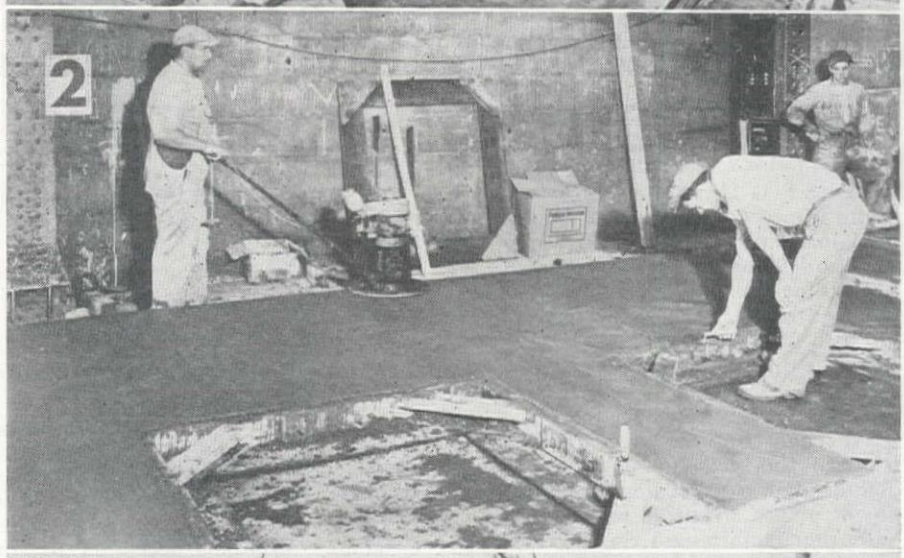
1. An early step in the manufacture of the walls which will undoubtedly set a pattern for future curtain walls. Workmen are shown pouring concrete onto the steel reinforcing mesh in the casting form for the big, flat sandwiches.

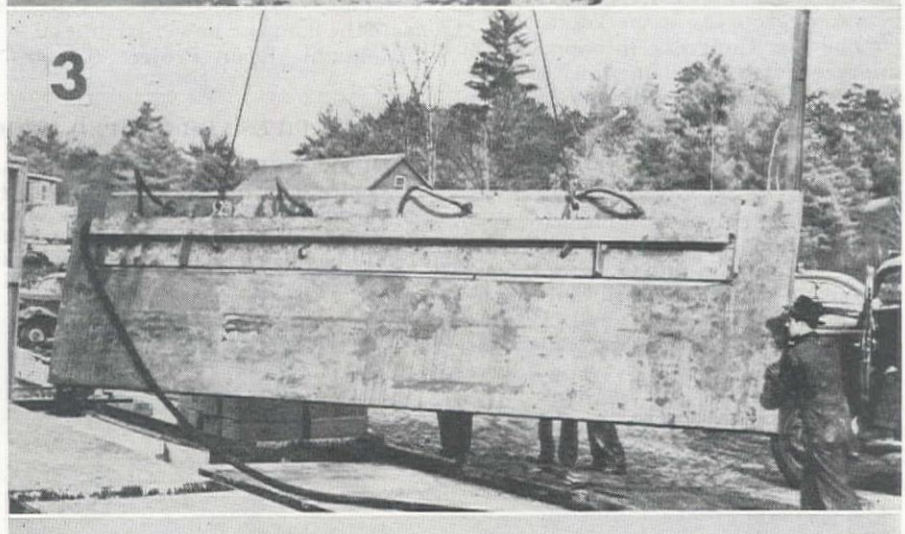
2. Exterior and interior faces of the walls are finished in the process of casting and require no additional finishing. This can produce a major saving in original and maintenance cost. Interior surface can be made smooth enough to paint, while exterior finishes can be supplied to create any desired architectural effect.

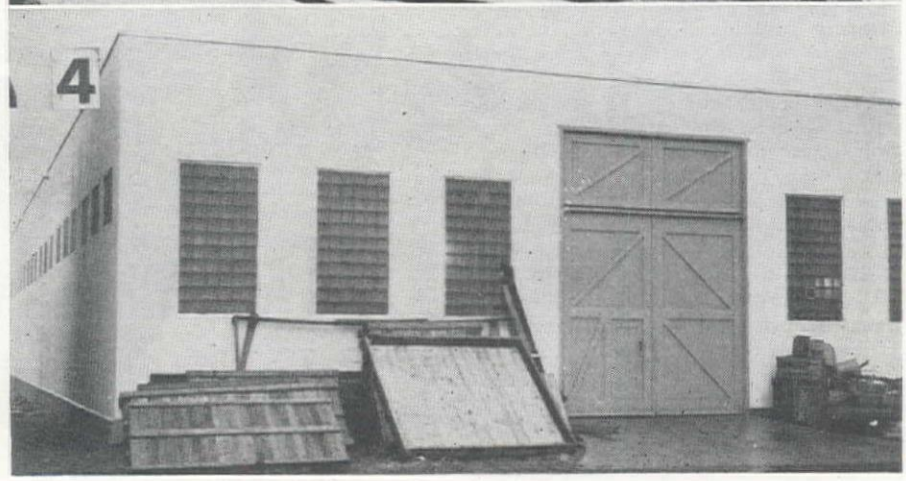
3. A vacuum mat is used to lift a completed spandrel sandwich from a casting form.

4. An example of successful fabrication of sandwich walls insulated with cellular glass. On construction of this particular building, cast in glass fenestration was accomplished while the panels were being made in-the-flat.









NEWS OF WESTERN CONSTRUCTION

NOVEMBER 15, 1949

Reclamation Budget Provides $387,000,000 for the West

A WEST-WIDE construction program, unprecedented in the Bureau of Reclamation's 47 years of water resources development, approaching $387,000,000 for this fiscal year, has been announced by Reclamation Commissioner Michael W. Straus. The figure represents the total construction program, including $333,961,638 in new funds, plus funds previously appropriated.

This construction program is going forward this year on 63 projects and includes work on 35 storage dams, nine power plants, over 200 miles of canals, and other facilities for the development of water resources in the West.

"The 81st Congress, in approving an unprecedented Reclamation program this year, handed the Bureau of Reclamation a challenging responsibility," the Commissioner announced, "for moving dirt and pouring concrete in record volume."

While the emphasis dollarwise is on construction, a far-reaching program of investigations for future water conservation and utilization work is also under way, reaching into all of the 17 Western States, to satisfy demands for more water and more power. The Congress also approved two and one-half million dollars in a supplemental appropriation, for project rehabilitation, permitting some much needed repairs and modernization on projects which have long been in operation. The total Bureau appropriation for this fiscal year, including deficiency funds approved thus far, is $356,514,510.

Work embraced by the schedules will make new and supplemental irrigation water available for an additional 400,000 ac. and increase hydroelectric power generating capacity by about half a million kilowatts by next June 30. This will increase the total acreage for which Reclamation water is available to 5,750,000 and increase the total installed Reclamation project power capacity to approximately 3,250,000 kw.

Furthermore, it will represent major progress on long-range construction programs pointed toward new and supplemental irrigation water for an additional 4,000,000 ac. and installation of approximately 2,000,000 kw. in additional power generating capacity by 1956.

Included in the general program are the following major appropriations for specific projects:

Davis Dam, $37,455,945, to complete the dam powerhouse structure and install generating machinery.

Central Valley Project, $64,500,627, for improvements at Shasta Dam. Work on the major canal system, the Tracy pumping plant and transmission lines.

Anderson Ranch Dam, $3,620,000, miscellaneous items necessary to complete the dam and power facilities.

Columbia Basin Project, $79,148,757, to continue work on the pumping plant; complete dams in the Coulee, and continue work on the canals and pumping units.

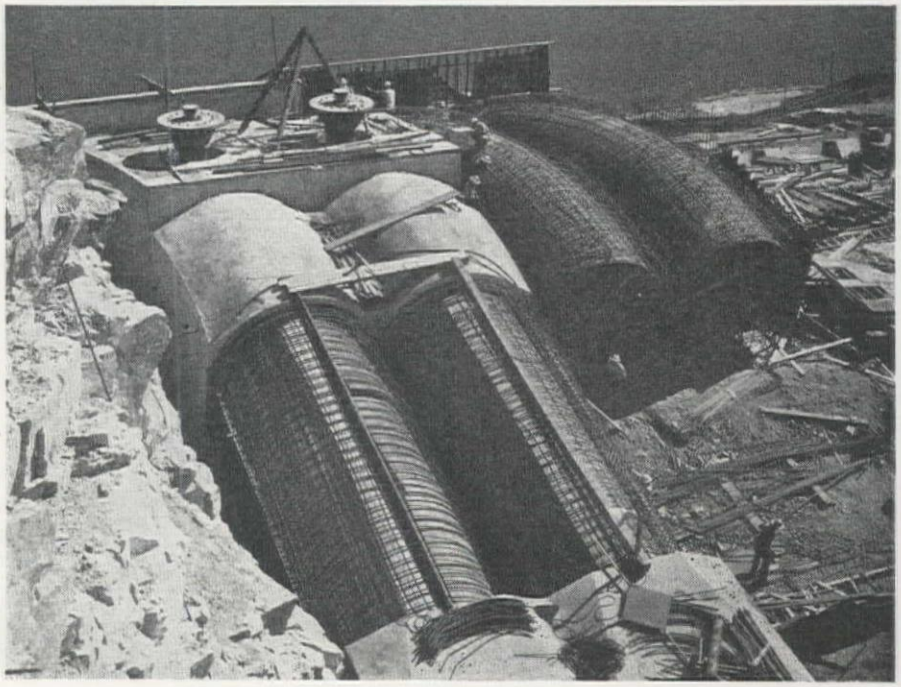
Pine Flat Dam Bid

LOW BIDDER on the Pine Flat Dam project, at $24,339,776.50, to be built by the Corps of Engineers on the Kings River near Fresno, California, was: Guy F. Atkinson Co.; Bressi & Bevanda Constrs., Inc.; Chas. L. Harney, Inc.; J. A. Jones Constr. Co.; A. Teichert & Sons, Inc. (joint venturers).

The second low bid of $24,935,977 was submitted by Morrison-Knudsen Co., Inc.; Peter Kiewit & Sons' Co.; and Macco Corporation (joint venturers).

PIPES FOR PUMPED IRRIGATION WATER AT GRAND COULEE

OUTLET PIPES which will handle water pumped out of the reservoir behind Grand Coulee dam for discharge into the Grand Coulee that will serve as the first 50 mi. of canal to deliver the supply onto irrigable lands in the Columbia River Basin. Water will be lifted 280 ft. out of the reservoir, and each pair of these twin pipes will handle enough water to supply the combined populations of New York City and Chicago. The Bureau estimates that water can be delivered to 87,000 ac. by 1952.



Structural Engineers of California Discuss Designs for Earthquakes

THE LARGEST convention in its history is the record established by the Structural Engineers' Association of California at its meeting Oct. 13-15 at Yosemite Park, with nearly 350 engineers and their ladies enjoying the well-conducted and interesting technical sessions and numerous pleasant social events. Under the direction of President John A. Blume of San Francisco, half-day sessions were devoted to foundation problems, structural welding, public relations and legislation, diaphragms and earthquakes, and business matters.

Out-of-state speakers included Leon C. Bibber, chief research engineer of Carnegie Illinois Steel Corp., Chicago, T. K. May of Timber Structures, Inc., Portland, Ore., Anton Tedesko, of Roberts & Schaefer Co., Chicago, and L. L. Markwardt, Assistant Director of the Forest Products Laboratory, Madison, Wis. Bibber spoke on technical refinements of welding, dimensional changes in steel due to welding, and the effect of welding on residual stresses. May delivered a paper on the effect of duration of load on working stresses in timber, and design requirements because of it. Tedesko spoke on thin shell long span concrete arch roofs designed and constructed by his company for buildings with wide clear space requirements.

Important papers by members of the association included a report of the work of the joint committee on lateral forces, including its findings relative to earthquake design so far, by John E. Rinne, chairman of the committee; a discussion of building costs and possible means of controlling and lessening them, by Arthur B. Smith, president of the Central California Chapter of Associated General Contractors; application of the study of soil mechanics to foundation investigations, by Trent R. Dames; discussions on the action of diaphragms by the following men: Steel, S. B. Barnes; structural concrete, John Mendenhall, and timber, A. C. Horner; and a presentation of the present practices of the State Architect's office in school design, by D. C. Willett.

Harry W. Bolin, of Los Angeles, was elected president of the association for the ensuing year. The program for the convention was under the direction of Henry Degenkolb, and J. W. Herron was general chairman in charge of convention arrangements.

Three Prominent Highway Engineers Retire With 64 Years Total Service

THREE IMPORTANT figures in the California Division of Highways retired from that organization last month. They are T. H. Dennis, Maintenance Engineer for the past 23 years; Spencer V. Cortelyou, Assistant State Highway Engineer in charge of District VII, the Los Angeles area, for 25 years; and Edward S. Gripper, City and County Projects Engineer in Cortelyou's district for the past 16 years.

All three of the men originally started with the Division of Highways in 1912, and during their period of service have achieved national recognition in their fields.

Dennis started as an instrument man at San Luis Obispo, and a few months later became chief of survey party in Sacramento and a little later became a resident engineer in Eureka and at Sacramento. He was made Assistant Engineer in 1922 and Principal Assistant Division Engineer in 1923. In 1925 he was appointed to the post he held at the time of his retirement. Throughout his career he has been active in the work of the American Association of State Highway Officials and the Highway Research Board, and has published numerous important articles on highway maintenance.

Cortelyou started with the State organization as Principal Assistant Engineer in the Los Angeles District in 1912, having previously done engineering work for Los Angeles County Road Department and in the Philippines, and in 1924 was made Division Engineer, the post he has held continuously ever since, with one or two changes in title. He was more influential in development of the famous Ridge Route and its present-day successor, linking the Los Angeles area with southern San Joaquin Valley, described in the June 15, 1949 issue of *Western Construction News*, than any other man, and the present high grade roadway is a lasting monument to his ability. The Coast Route to San Diego, and the vast freeway plan now under construction in and about Los Angeles are also evidence of his capable leadership in highway planning and construction.

Gripper began as the chief of a survey party in the Los Angeles District at almost the same time Cortelyou began his career there, and was instrumental in carrying out many of the same projects to which Cortelyou's name has been linked, usually doing the survey and field work. His service was not continuous with the State, but since 1933 he has been continuously City and County Projects Engineer for District VII of the Division of Highways.

Suit Filed Against Bureau On Montana Power Project

A $3,000,000 CLAIM has been filed against the Bureau of Reclamation in connection with the proposed Yellowtail Dam on the Big Horn River in Montana. Big Horn Canyon Irrigation & Power Co. is claiming compensation in that amount for property rights, engineering work and surveys at the dam's site. According to John J. Harris of Chicago, president of the firm, the company established water rights on the Big Horn in 1912 and 1915 and extensive engineering data gathered by the company was made available to various government agencies. The firm had contemplated construction of a dam on almost the identical site as that of the proposed Yellowtail Dam.

New Harbor Terminal at Los Angeles To Be Built at Cost of $6,000,000

A MODERN and efficient passenger-cargo marine terminal will be immediately constructed at berths 195-199, Wilmington District of Los Angeles Harbor, at a cost of $6,000,000, it has been announced by the city Board of Harbor Commissioners. The new 46-ac. facility, which will be a mile closer to downtown Los Angeles and be served by the new Harbor Freeway, will be preferentially assigned to the Matson Navigation Co. It will be completed early in 1951.

The large passenger-cargo marine area will be 2,350 by 860 ft., and will be served mainly by Alameda Blvd. north and south; and Pacific Coast Highway and Anaheim St., east and west. The area is bounded on the east by the Los Angeles-Long Beach boundary and on the west by the Wilmington Boat Works. (See picture next page.)

E. C. Earle, Harbor Engineer, said that plans and specifications will be drawn immediately by Harbor Department engineers, and that advertisements for bids for initial construction will be issued within 90 days.

"Three major projects are involved in this new facility," Earle explained. "There will be a new wharf 2,270 ft. long and two new single-span overhead construction transit sheds. The first shed will be 200 by 1,200 ft., and the other, 200 by 500 ft. In addition, a parking area situated north of the shed and wharf area, will be arranged to handle 3,000 automobiles." All structures in the new terminal will be of permanent fireproof construction. The facility will also be provided with modern rail, truck and roadway facilities for movement of cargo.

The new concrete wharf will have a 38-ft. concrete apron from shipside, the 200-ft. transit shed floor, a 12-ft. canopied platform for low-line rail trackage

COSTING $6,000,000 a new unit in the development of Los Angeles harbor will be built within the area marked. Construction will start at once.

and trucks. The 46-ac. area will be landscaped with palms, shrubbery and flower beds.

According to the engineering department, East Basin, adjacent to the new facility, will be dredged to a depth of 36 ft. and provide a turning basin. This will facilitate the berthing of large vessels using the new passenger-cargo terminal.

Kings River Hydro Program Up to Power Commission

WHO IS BEST qualified to build a $70,000,000 hydroelectric project on California's Kings River—Pacific Gas & Electric Co., the Bureau of Reclamation or the Fresno Irrigation District? That was the question posed before the Federal Power Commission last month at Washington, D. C.

P. G. & E. has applied for permission to build three dams with reservoirs totaling 1,128,000 ac. ft. on the river's North Fork and Main Channel in Fresno County, but E. K. Davis, counsel for the Bureau of Reclamation, asked the commission to reject the application and give the Bureau authority to build the project instead. Bureau claims are that the Kings River is part of the overall Central Valley Project.

P. G. & E. counsel Paul Gerdes claimed the private power firm is the only one of the three organizations able to get to work on the project soon to give the area its badly needed power supply.

The Commission has taken the case under submission.

PERSONALLY SPEAKING

Roy W. McLeese, Chief Engineer of the Utah State Road Commission for the past 4½ years, resigned last month to enter private enterprise, probably as a consulting engineer. McLeese stated the reason for his resignation in a letter to the commission as "inequalities in the engineering pay schedules . . . not commensurate with the duties and responsibilities attached." He had been receiving $4,500 a year. McLeese entered the Utah highway department 18 years ago and was district engineer at Cedar City before appointment to the post he has just vacated. Later last month, the resignation of **Harry S. Wright,** for the past 7 years Traffic and Safety Engineer for the Utah State Road Commission, was also announced. Reason for his resignation was also given as inadequate pay.

* * *

O. C. Williams, Arizona State Land Commissioner, resigned last month, and **W. W. Lane,** civil engineer of Phoenix, was immediately asked by Arizona's Governor Garvey to fill the vacated position.

* * *

Norman J. Stiene, formerly assistant city engineer of Redondo Beach, Calif., has been apopinted city engineer of Pomona, Calif. He succeeds **Fred C. Froehde** who retired recently after 28 years at the post.

* * *

W. C. Lefebvre, State Highway Engineer of Arizona, was named to the executive committee of the American Association of State Highway Officials at the close of the group's annual convention held this year at San Antonio, Texas. **D. C. Greer** of Austin, Texas, was named President of A.A.S.H.O.

* * *

James Robertson has been named principal assistant city engineer of Seattle to succeed **Cameron G. Will** who retired last month. Robertson has been with the city's engineering department for 25 years, since 1941 as senior supervising engineer in charge of city street maintenance. **W. R. Johnson,** formerly Robertson's assistant, was promoted to city street maintenance engineer.

* * *

C. R. Browning, for the past 12 years a resident engineer with the Arizona State Highway Department, has been named to the new post of construction engineer of the department. In his new capacity, he will actively supervise all road construction jobs in the state, both in the field and from the department's offices at Phoenix, and all of the department's resident engineers will henceforth report directly to him.

* * *

Ralph L. Parshall, retired irrigation engineer with the United States Department of Agriculture who was stationed at Colorado A. & M. College for 35 years, is the recipient of the gold medal award of the Colorado Engineer Council. His best known contribution to the field of irrigation is the Parshall flume.

* * *

George Ebner, formerly manager of the Valier Land & Water Co. at Valier, Mont., has been appointed a superintendent of the Bureau of Reclamation and manager of the Greenfield Irrigation District at Fairfield, Mont., to succeed **Charles L. Bailey,** resigned. Ebner graduated from the University of North Dakota with a degree in civil engineering.

* * *

Fred Ervast, formerly with the Corps of Engineers at Sacramento, Calif., has accepted an appointment as Road Commissioner of Placer County, Calif.

* * *

The Portland Cement Association, national organization devoted to improving and extending the uses of Portland cement and concrete, has opened a new district office in Salt Lake City with **Edgar B. Wilson,** formerly structural field engineer with the Association's Oklahoma City office, as district engineer in charge. The new office is located in the David Keith Bldg., 248 S. Main St., Salt Lake City 1. Wilson is a Registered Professional Engineer.

* * *

Leo Braun is now employed by the City of Fresno, Calif., as structural engineer.

* * *

Earl Bickmore, formerly resident engineer for the Oregon State Highway Department at Baker, has been named assistant division engineer at La Grande, Ore.

* * *

Harlowe M. Stafford, Senior Hydraulic Engineer with the Surface Water Branch, Water Resources Division, U. S. Geological Survey, is now the engi-

neer-in-charge of a California District sub-office being established at Sacramento from which water resources investigations will be carried out in the Central Valley drainage area. He was formerly engineer-in-charge at the Los Angeles sub-office. The new office at Sacramento will facilitate cooperation of the Geological Survey with the State Division of Water Resources, the Bureau of Reclamation and the Corps of Engineers.

* * *

B. V. Howe, consulting engineer of Denver, Colo., is the elected chairman of the Rocky Mountain Section of the American Water Works Association. **Charles Caldwell** of Santa Fe, N. M., is the new vice-chairman.

* * *

John G. Meyer is the new District Engineer for District 10 of the California Division of Highways with headquarters at Stockton. He replaces **Charles "Ed" Waite, Jr.,** who is now Engineer of Design in the Sacramento office of the Division of Highways.

* * *

John R. Ficklin is the new city manager of Hayward, Calif. Formerly manager at Petaluma, Calif., he replaces **Gordon L. Burt.**

* * *

Richard H. Smith, formerly city manager of Ventura, Calif., and Phoenix, Ariz., has been appointed as the first city manager of Monrovia, Calif.

* * *

William E. Alwarth has resigned as city manager of Palm Springs, Calif., after 4 years at that post. His successor is **Russell Rink,** formerly assistant city manager at San Diego, Calif. Alsworth will continue his duties as vice-president of the City Managers Department of the League of California Cities.

* * *

Howard Church is the new city manager at Whittier, Calif.

* * *

After teaching hydraulic and sanitary engineering at the University of Alabama for 11 years, **Gilbert H. Dunstan** has taken a position as sanitary engineer with the Alaska Health and Sanitation Department of the U. S. Public Health Service. A graduate of the University of Southern California, he also taught there for several years.

* * *

Ending a long and distinguished career with the Bureau of Reclamation, **R. B. Williams,** assistant district manager for the Bureau's Columbia Basin Project in Eastern Washington, retired October 28. Joining the Bureau in 1912, he served in Montana, Arizona, Nevada, California and Washington before going to Washington in 1937 as assistant commissioner. Because of his love for the West, he requested return to the field in 1939 and was assigned to the Bureau's Friant Division of California's Central Valley Project. There he supervised construction of Friant Dam and its canal system. In 1945 he was assigned as assistant supervising engineer for the Columbia Basin Project. When the Columbia River District was formed he became assistant district manager. Upon his retirement, he moved with his family to Carlsbad, Calif., where he will operate a small ranch.

On Oct. 14, Williams and **Orin G. Patch,** Chief Concrete Engineer of the Columbia River District, were awarded a Department of Interior Gold Medal and Distinguished Service Certificate for superior contributions to the advancement of the nation's vast multiple-purpose water conservation program in the West. Patch, who retired Sept. 30 at the age of 70, has been closely associated with the development of the arts of concrete control and placement since 1927. He was extremely active in the development of ideas, methods, processes and equipment for the improvement of concrete and its products.

* * *

Two Bureau of Reclamation employees at the Hungry Horse Project in Montana have been honored with certificates of honorable mention and cash awards under the Interior Department's suggestion award program. **William E. Wheeler,** Chief of the project's engineering section and a frequent contributor of articles to *Western Construction News,* received a $50 award for his development of a new and more efficient bidding procedure which has been adopted for use throughout the Bureau of Reclamation. An award of $35 and certificate of honorable mention went to **John P. Vertrees,** chief inspector at the project, for his development of a new method for automatically measuring and mixing fluid admixtures in concrete mixing plants.

* * *

L. J. "Larry" Dolan, engineer for the Bureau of Reclamation on construction of the Horsetooth dams near Fort Collins, Colo., is now inspection and supervision engineer on construction of the Bureau's Cedar Bluff dam near Ellis, Kansas.

* * *

W. H. Lynch, Division Engineer for the U. S. Bureau of Public Roads in Portland, Ore., has moved his offices from the Broadway Oak Bldg. to Room 753 in the Morgan Bldg., corner of Broadway and Washington in Portland. The Oregon District office of the Bureau will continue to maintain offices at 202 Financial Center Bldg., Portland. Post office address of both offices will continue at Box 3900, Portland.

* * *

J. B. Cleary has left his position as Chief Engineer for Engineers, Inc., at Great Falls, Mont., to resume private engineering practice at Bothell, Wash.

* * *

Recent graduates with Bachelor of Science degrees in Civil Engineering from engineering schools in the West are discovering that their education in engineering has barely begun. Among those who are beginning their climb in the profession are the following. **Harold C. Lacy** is working on design and construction of fish hatchery installations for the Oregon State Game Commission. **Walter J. Bushnell** is working on hydraulic design for the Corps of Engineers at Portland, Ore. **Robert F. Scherzinger** is with the Power Plant Design Branch of the Corps of Engineers at Portland. **David F. Bates** is operating a land survey office at Salem, Ore. **David P. Swanson** is with the Traffic Control Department of the Washington State Highway Department at Yakima, Wash. **Keith Hadley** is in the Planning Division of the Corps of Engineers at Walla Walla, Wash. **Robert S. Brewster** is well started in the engineer trainee staff development program of the Bureau of Reclamation, Denver, Colo. **Paul Chuvarsky, Jr.,** is a draftsman for the Colorado State Highway Department at Denver. **Howard H. Boswell** is a highway engineer trainee with the U. S. Bureau of Public Roads at Ogden, Utah. **Gail Gronewald** is working on preliminary investigations for flood control projects with the Corps of Engineers at Walla Walla, Wash. **Perry Bruvold** is contracting building construction at Laramie, Wyo. **John E. Hildreth** is a job superintendent trainee with Peter Kiewit Sons' Co. at Sheridan, Wyo. **Donald E. McCrimmon** is working on irrigation installations for the U. S. Soil Conservation Service at Hatch, N. M. **Fred A. Powers** is resident engineer on highway construction at Twin Falls, Ida., for the Idaho Bureau of Highways. **Gerald E. Ingram** is at Florence, Ariz., as assistant county engineer of Pinal County. **John R. Kardell,** as Assistant Civil Engineer, is working on triangulation and surveys for the Division of San Francisco Bay Toll Crossings, California Department of Public Works. **Raymond G. Martin** is working on sewer design with the City of Los Angeles. **George C. Weddell** is a trainee in the rotational program of the Sacramento District, Corps of Engineers. **William H. Hyland** is assistant to the city engineer at Santa Maria, Calif. **J. Eugene Smith** is working on canal designs and estimates with the Bureau of Reclamation at Sacramento, Calif. **Charles E. Paulsen** is drawing highway plans for District 3 of the California Division of Highways at Marysville. **Robert S. Poole** is a Junior Engineer with the Department of Public Works, City of San Francisco. **James B. Turner** is assisting the Alameda County Surveyor at Oakland, Calif. **Richard H. Roberts** is with the California Division of Highways at Salinas. **E. H. Willman** is working on highway design for the Texas Highway Department at Gonzales. **Louis E. Youngblood** is with the Texas Highway Department at Pearsall. **Billie E. Davis** is doing field work for the Texas Highway Department at Stephenville. **John A. Peckham** is employed by V. V. Long & Co., consulting engineers of Oklahoma City, and is acting as resident engineer on waterworks improvements. **T. W. Shaunfield** is working on highway construction for the Texas Highway Department at Groesbeck.

OBITUARIES . . .

George Francis McGonagle, 73, one-time Utah State Engineer, City Engineer of Salt Lake City and private construction engineer, died Oct. 18 at his home in Salt Lake City after several years' illness. During his lifetime, he also served as a member of the Utah State Utilities Commission and as resident engineer for the Oregon Short Line Railroad. He was engaged in partnership with C. J. Eldrich in the construction engineering business until retiring many years ago.

* * *

Frank E. Robarge, 64, construction superintendent for S. J. Groves & Sons, died Oct. 15 at Glasgow, Mont.

* * *

William Lincoln Riley, 84, pioneer Los Angeles construction engineer, died Oct. 4 in Los Angeles. He was head of the W. L. Riley Construction Co. from 1887 to 1927 and formerly was president of the Second Street Tunnel Association in Los Angeles, excavation of that tunnel being his best known project.

* * *

Robert Beryle, 90, pioneer Los Angeles contractor who superintended construtcion of the famous Broadway Tunnel in Los Angeles, died Oct. 18 without the knowledge that the monument to his skill was being torn down to make way for a downtown freeway (see *Western Construction News* for October, 1949). His family had successfully withheld news of the current construction from him.

* * *

Walter C. Galloway, 63, County Surveyor of Benton County, Ore., since 1912, died Oct. 12 at Corvallis, Ore. An engineer graduate of Oregon State College in 1909, he was holder of the first surveyor's license issued by the State of Oregon and also of the 44th license for a registered engineer.

* * *

W. Chester Morse, 75, superintendent of Seattle's City Water Department since 1938 and chairman of the Seattle Board of Works, died Sept. 21. Well established in private engineering practice, he first entered public service as City Engineer of Seattle in 1927, serving at that post for one year. In 1931, he was appointed superintendent of Seattle City Light and served in that position for two years. He played a major role in many construction projects in the Seattle area, both as a public figure and in his private engineering practice. An authority on water works, he served as a national director of the American Water Works Association for one term and as regional director for the association's Northwest section. He held memberships in various other professional engineering societies.

* * *

A. B. Hartley, Chief Sales Engineer of the Edward R. Bacon Co., construction equipment distributors of Oakland, Calif., died Oct. 1.

Frederick H. Paget, 51, Senior Hydraulic Engineer with the California Division of Water Resources and president of the Sacramento Section, American Society of Civil Engineers, died Sept. 16 of a coronary occlusion. He first entered state service as Junior Hydraulic Engineer in 1930. In charge of California's Snow Survey, he was also an active member of the Western Snow Conference in which he served as Chairman of the Executive Committee for the South Pacific Area. He was a member of the American Geophysical Union.

* * *

Llewellyn De Cew, 54, Senior Engineer in the San Francisco City Engineer's office, died last month after a six months' illness. He had been in the office of the City Engineer for 21 years.

* *

A. E. Schlecht, owner of the Dayton Sand & Gravel Co., Dayton, Wash., was caught in the grinding machinery of his rock crusher Sept. 24 and killed instantly.

Clara Annie Latimer, 66, the first woman to graduate from the School of Engineering of the University of Utah, died Sept. 21. She served during her life as a land surveyor, teacher, office engineer for a consulting engineer, a designing engineer and draftsman for a machinery firm, and in the engineering department of Utah Power & Light Co. She graduated from the University in 1908.

* * *

L. Deming Tilton, 59, city planning director for San Francisco from 1942 to 1946, died Oct. 15. He had served 15 years with a St. Louis planning firm and later served as director of planning for Santa Barbara, San Diego and Orange Counties in Southern California.

* * *

Anders Peter Anderson, 78, formerly a partner in the construction firm of Rowan and Anderson of Seattle and later associated with the Erickson Construction Co., died Sept. 11 after a brief illness.

SUPERVISING THE JOBS

Earl Blevins is the superintendent for Huling & Sons on construction of a $230,000 hospital building at Burns, Ore. Foremen on the job are **Chester Clark, Elroy Kendall** and **Marvin Townsend.**

* * *

Supervising construction of a $224,000 hospital building at Enterprise, Ore., for contractor E. Chuck Mardis is **H. H. Powell. Raymond Corn** is foreman on the job.

* * *

L. B. Harradine is directing construction of a building for the First Natl. Bank of Oregon at Enterprise, Ore., for contractor E. W. McCormack. Foremen are **John Lowe** and **Linn Stone.**

* * *

J. L. "Jack" Wilson is the project superintendent for Tawco Construction, Inc., Fresno, Calif., on the $649,000 Modoc County hospitals, consisting of the Alturas and Cedarville units. General foremen are **Kyle H. Smith** at Alturas and **G. B. McGehee** at Cedarville. Project office manager is **E. G. Lamme.**

* * *

On construction of a $300,000 housing project by Mac-Low Men Corp. near Torrance, Calif., **Lowell Henderson** is project manager and **Thomas A. Heatfield** is superintendent.

* * *

On erection of a $137,000 concrete and brick building for the University of Idaho at Moscow, **C. B. Lauch** is the contractor, **S. G. Lauer** is superintendent, and foremen include **Doyle Christeson** and **Walt Toltz. Bill Johnson** is the lead carpenter and **W. Maloney** is the job engineer.

* * *

Art Bechtel is the project manager for N. Fiorito Co. on construction of Highway 99 at Castlerock, Wash. **J. Nord** is carpenter on the job and **Roy Day** is grading foreman. **Bill Clark** is in charge of the job shop.

* * *

Charles Sylvar is the superintendent for Far West Construction Co., San Francisco, on construction of a temporary bridge between Manchester Ave. and Sepulveda Blvd. as part of the Los Angeles Municipal Airport extension project. **Frank Way** is carpenter foreman and **Ross "Slim" Stog** is labor foreman.

* * *

R. J. O'Meara is the general superintendent for Northwest Engineering Co., Rapid City, S. D., on their $392,000 contract for placing of heavy gravel base and mat from Murdo to Draper, S. D. **Paul Larson** is foreman on the job and **Lyle Shroll** is the job office manager. The firm also has a $257,887 contract from the South Dakota Highway Commission for highway construction near Custer. **Lester Davis** is supervising this job and **W. L. Jahnke** is the job office manager.

* * *

On their $57,308 contract for general construction on the Army Engineers' Umatilla Ordnance Base at Umatilla, Ore., Weaver-Stafford Construction Co.

have as their superintendent **Clifford Tomlinson.** Foremen are **Elvin McCullough** and **Eston Boley.**

* * *

John Green is the superintendent for Miller-Pearce, Inc., on their $114,121 contract from the Corps of Engineers for construction of housing facilities at McNary, Ore.

* * *

Edward Gutschmidt is the contractor for a unique pumice block building being constructed for Consolidated Dairy at Pendleton, Ore. **Carroll Brown** is the project manager.

* * *

R. T. Hurdle of H. T. Hurdle & Sons Engineering Co., Billings, Mont., is directing construction of a new bridge across the Marias River at Chester, Mont.

* * *

Principals in a new concrete pipe company at Rosamond, Calif., are **Ben Pasley,** manager, and **Albert Morsesian** and **Walt Parks,** partners. They also operate the Wasco Concrete Pipe Co., at Wasco, Calif.

* * *

Paul R. Splane of Van Nuys, Calif., who recently went into the contracting business, has completed his first paving job and is now moving his rock plant from Kern to Inyokern, Calif. He is also constructing an asphalt plant at Inyokern. His superintendent is **George Grabe.**

* * *

Allen Bom is the superintendent for Sackett & Graham on their $293,648 contract from the Bureau of Public Roads for a grading job near Burns, Ore. **Douglas Button** is foreman. **G. P. Todd** is timekeeper.

* * *

Robert J. Jenks is the project manager and **John J. Morton** is the general superintendent for McNary Dam Contractors on the south shore construction of McNary Dam, 2 mi. east of Umatilla, Ore., under a $15,835,539 contract. Assistant general superintendents are **Theodore Thorgerson** and **A. G. Chaussee.** Other personnel actively engaged on the Washington shore portion of the McNary Dam construction retain their respective positions on Oregon shore operations. On completion of the Washington shore operations by McNary Dam Contractors, key men have been as follows: **W. D. Rives,** assistant superintendent in charge of concrete; **Glenn Roper,** structural steel and rigging; **W. D. Brown,** master mechanic; **Leo Stewart,** assistant master mechanic; **Norton Stone,** general carpenter foreman; **Walt Hill,** excavation superintendent; **Fred Coleman,** office engineer; **E. L. Govan,** master electrician; **J. Goode,** assistant master electrician; **Lou Shedde,** assistant superintendent in charge of pile driving; **Charles F. Ewing,** business manager; **P. C. Johnson,** personnel manager, and **T. F. Foran,** office manager. This portion of the job is slated for completion in Sept., 1950, while the south shore work is scheduled to be

done in August of 1951. McNary Dam Contractors consists of Guy F. Atkinson Co., J. A. Jones Construction Co. and Ostrander Construction Co.

* * *

On school construction at Mohall, N. D., **Lester Ralston** is the superintendent for Macklay & Ralston of Minot, N. D., and **A. L. Larsen** is foreman.

* * *

On their $237,000 contract from the South Dakota Highway Commission for a bituminous surfacing job in Beadle County, C. H. Lien Construction Co. of Rapid City have as their superintendent **Henry Kaiser. Tom Finden** is foreman. The same men are directing a similar $139,999 contract in Hutchinson County.

* * *

M. A. Garland is acting as project manager on construction of the $336,000 Civil-Mechanical Engineering Building for South Dakota State School of Mines and Technology at Rapid City for M. A. Garland Construction Co. **Walter Stone** is the general superintendent. The same men are directing construction for the firm on two elementary school buildings in Rapid City under a $278,370 contract.

* * *

John C. Beebee, contractor, is acting as project manager on construction of a $190,000 school building at Grand Forks, S. D. **Ralph Honda** is in charge of concrete work and **Gordon Olson** is carpenter foreman.

* * *

George Smith is directing construction of a 750,000-gal. reservoir at Carrington, N. D., for Swingen Construction Co.

* * *

G. J. Henry is project manager and **Jim Ferguson** is superintendent for Henry's Construction Co. on erection of a $160,000 church building in Lemmon, S. D.

* * *

John Galster is acting as superintendent for Galster Construction Co. of Beulah, N. D., on construction of sewer and water mains in Beulah. **Robert Lindsey** is pipe foreman and **Leonard Galster** is excavation foreman.

* * *

Peter Kolling, Sr., Joe Kolling and **Frank Kolling** are directing construction of buildings in Dickinson, N. D., for the Kolling Construction Co.

* * *

John W. Brown is project manager on the Bureau of Reclamation's power plant and penstock now nearing completion at Estes Park, Colo. Peter Kiewit Sons' Co. and Morrison-Knudsen Inc., are contractors on the $2½ million project. **Howard Smith** is field engineer for the Bureau. For the contractors, **G. A. Nelson** is penstock superintendent, **E. L. Bennett** is engineer, and **Sam Cooper** is field engineer. **H. H. Sall, L. C. Peterson**, and **William Hill** are carpenter foremen. **Glenn Benedict** is the master mechanic.

TRADE WINDS

News of Men Who Sell to the Construction West

Western Distributor News Round-up

UNDER THE general sponsorship of Region Eleven, Associated Equipment Distributors, and with a direct invitation from the Construction Equipment Distributors of Northern California, a joint meeting of equipment men and general contractors was held at Del Monte, California, October 13-14. The purpose of the meeting was to discuss problems of mutual interest and to get better acquainted. The meeting was held under the leadership of Jack How, president, Edward R. Bacon Co., and Director of Region Eleven, A.E.D. It was the first meeting of its type to be held by these groups and may develop into an annual event.

During the business session on the first day, a group of speakers representing both distributors and contractors, reviewed subjects of common interest including the joint activities being sponsored by both organizations at the national level, the "force account" problem, the training of apprentice craftsmen and the place of A.E.D. in national affairs. Among the speakers was Al Garlinghouse, a past national president of A.E.D., who reviewed the background behind the committee work now active between the distributor and contractor organizations.

One of the high spots of the meeting was the talk by George Loorz on "What a Contractor Expects From His Equipment Supplier." Alex Kostyzak described "My Idea of a Construction Machinery Salesman."

The continuing encroachment of governmental agencies and their force account operations was reviewed by Robert V. Edwards of the Southern California Chapter, A.G.C.

Ralph Stiles of the Austin-Western Co., described the formation of and the background for the Construction Industries Association. He pointed out that it originated as the Manufacturers Division of the American Road Builders Association, but was being broadened and divorced from the A.R.B.A. to cover the entire field of construction equipment and machinery. He stated that in the future this organization will be the sponsoring agent for the "Road Show" which will become a construction equipment show.

On the second morning, the equipment distributors present from both northern and southern California held a business meeting, and the afternoon was devoted to a golf tournament.

☆ ☆ ☆

CRAMER MACHINERY CO., Portland, Ore., have been appointed distributors for McKIERNAN-TERRY CORP., manufacturer of steam pile hammers.

☆ ☆ ☆

LEWISTON TRUCK & TRACTOR CO., dealers at Lewiston, Ida., for the equipment of INTERNATIONAL HARVESTOR CO., have opened their spacious new building on Main St. in Lewiston, according to **F. O. Reichow,** manager. The new building, with 20,000 sq. ft. of floor space, has twice the area of the firm's old building and has a large shop and sales floor and parts department. It is located on a railroad spur.

☆ ☆ ☆

BI-COUNTY EQUIPMENT CO. of Pasco, Wash., has been purchased by **Frank J. Smith** and his son, **Ralph F. Smith,** and will henceforth be known as SMITH TRUCK & TRACTOR. The firm will be the authorized dealer for INTERNATIONAL HARVESTOR CO. in the Pasco area. Parts and service department will be continued on the same basis as before the transaction.

☆ ☆ ☆

A. H. COX & CO. AND RENTAL MACHINERY CO. announce the opening of their new branch at 313 N. Mission St., Wenatchee, Wash., for the sales, rentals, parts, and service of construction and industrial equipment. The new building is 60 by 80 ft., plus a paved parking and display area at the rear. The building is air-conditioned and the repair shop is radiant

heated. **C. A. "Chuck" Russell** is Branch Manager; **Tom Devlin** is Parts Dept. Manager; **Scott Jamison** is Asst. Parts Dept. Manager, and **Howard Hunter** is Shop Superintendent. **Paul Payne** is the traveling serviceman who will work out of both the Seattle and Wenatchee offices. The entire personnel consists of men who have had excellent training and were taken from the Seattle staff.

☆ ☆ ☆

News of Western Manufacturers

John W. Miller was appointed superintendent of production planning at the Fontana plant of KAISER STEEL CORP. Miller came to the Kaiser plant on Jan. 1, 1945, as assistant superintendent of production planning, and will replace **Tom Jones,** who resigned.

☆ ☆ ☆

Richard A. Claussen has been appointed technical superintendent of the Pittsburg, Calif., factory of PIONEER RUBBER MILLS. He was formerly with the V-belt research department of the General Tire & Rubber Co.

☆ ☆ ☆

William A. DeRidder, President of GENERAL METALS CORP., has announced the promotion of **Roy C. Menzel** to the position of Secretary and Treasurer of the corporation. Menzel has been associated with the company for the past 25 years, most of which have been spent in the Southern California area. His title at the Los Angeles plant was Works Manager.

☆ ☆ ☆

Harold Q. Noack has been named Division Vice-president, Central Sales Division of COLUMBIA STEEL CO., a U. S. Steel subsidiary, it was announced recently. Noack will direct sales functions in Central and Northern California.

☆ ☆ ☆

PIONEER RUBBER MILLS announces the appointment of **John H. Hanna** as manager of the engineering department in the Pittsburg, Calif., factory. His present duties include rubber processing and production equipment improvements, designing of new molds, and other changes required by Pioneer's current product development program.

☆ ☆ ☆

Allen G. Jones, Pacific District Manager of the GENERAL ELECTRIC CO. Apparatus Dept., retired Oct. 1 after 44 years of service with the company. In 1926 he became manager of the company's San Francisco Central Station Division, and some years later he was made Pacific District Manager of both Central Station and Transportation divisions. In 1945 he was named Pacific District Manager of the entire Apparatus Department with headquarters in San Francisco. His successor will be named at a later date.

☆ ☆ ☆

The STANDARD OIL CO. OF CALIF. advertisement series, "The Standard Engineer's Case File" and "The Standard Engineer's Report," appearing in *Western Construction News,* won second prize in a national selection made by the Industrial Advertisers Association. Basis of the award was "For the campaign which in the opinion of the judges is of outstanding excellence in its planning and execution."

☆ ☆ ☆

Earl R. Stuver is forming a new firm to be known as Al-Rod Co. to manufacture and distribute welding rod for aluminum and aluminum alloys. Stuver describes his new product as a no-flux, low temperature welding rod that will fill a much needed spot in the trade to weld any aluminum or alloy. The firm will headquarter at 2136 Mallory St., San Bernardino, Calif.

☆ ☆ ☆

Three new western ALLIS-CHALMERS general machinery division dealers are the NORTHLAND MACHINERY CO., Sidney, Mont., for the company's centrifugal pumps and Texrope drive equipment in nine counties; the STROM ELECTRIC CO., Troy, Idaho, for motors,

controls, and centrifugal pumps in Latah, Nez Perce, and Clearwater counties; and the SNELL REFRIGERATION SUPPLY CO., Dallas, Texas, for controls and centrifugal pumps in Dallas county. Newly named Allis-Chalmers certified service shop for motors, controls, and transformers in Cochise county is the COPPER ELECTRIC CO., Bisbee, Ariz. **C. W. Morris** is president and **W. H. Clark** is in charge of service work at Copper Electric.

☆ ☆ ☆

To increase production to meet the growing demands of the West, **Henry J. Kaiser** announced the acquisition of the Redwood City, Calif., gypsum products plant formerly operated by Pacific Portland Cement Co. The newly acquired plant and that of the Kaiser affiliated Standard Gypsum Co. of Calif., located at Long Beach, will henceforth be owned and operated by KAISER GYPSUM, a Division of Kaiser Industries, Inc.

☆ ☆ ☆

Edwin C. Auld, southwestern district representative for the JAEGER MACHINE CO., died suddenly at his home in Pasadena, Calif., on Sept. 5.

☆ ☆ ☆

Work has started on a $300,000 expansion program which will greatly diversify steel fabricating facilities at the Seattle Structural Steel Division of PACIFIC CAR AND FOUNDRY CO., Seattle, it was announced recently by **Paul Jacobson,** Manager of Pacific Car's Seattle steel plant. The 85-ft. by 420-ft. new building, when completed and equipped, will give Pacific Car more modern steel facilities and greater variety in its steel fabrication division. The building should be ready for use in four months. With new equipment such as automatic welding devices, gantry power riveting machines, new plate shearing and forming equipment, the new plant will increase the service to builders with structural steel requirements in the Northwest.

TRADE WINDS

☆ ☆ ☆

Mark R. Colby, president of the COLBY STEEL & ENGINEERING CO., Seattle, announces the formation of a new company at Olympia under the name, COLBY STEEL & MANUFACTURING, INC. The new company will assist the Seattle plant, for over 40 years builders of cranes, marine elevators, and material handling equipment. The incorporators of the new company are all business associates of Colby and Colby Steel & Engineering Co. **M. S. Alexander** has been vice-president for over 25 years; **A. L. Senn, Sr.,** has been supervising engineer for over 30 years; **Charles D. Gould,** Chief Engineer, has been with the company 12 years; and **Fred Wubbena,** who has been with the company for 18 years as assistant treasurer, will now be the treasurer of the Olympia corporation. The Colby Steel & Engineering Co. will continue in business in Seattle's Central Bldg., and the two companies will be collaborating and jointly sharing offices under the same roof. The Colby organization built the seven large double cantilever cranes running on the high trestles during the construction of Grand Coulee Dam. The span of these cranes is 330 ft., and they were balanced to travel on a 43-ft. gage track to permit the passing of four lines of railroad tracks underneath. Similar cranes were later furnished for Friant Dam in California and for the T.V.A. near Knoxville, Tenn. All of these cranes have been relocated and are now working elsewhere.

☆ ☆ ☆

Manufacturing News From the East and Midwest Regions

Wm. E. Madden, recently elected Vice-president, has now been made General Sales Manager of the GEORGE HAISS MFG. CO., INC., New York, division of the Pettibone Mulliken Corp., Chicago.

☆ ☆ ☆

The SCHIELD-BANTAM CO., Waverly, Iowa, recently announced the appointment of **G. O. Britton** as Sales Manager. Britton comes to the power shovel company from the Athey Products Corp., where he also served as sales manager.

☆ ☆ ☆

W. J. Fredrick has been named manager of the MACK TRUCK CO., Newark, N. J., branch, and **G. F. Zeller** has been named the company's manager for the New Brunswick, N. J., branch.

☆ ☆ ☆

Retirement of **William T. Keenan** as district sales manager of the Chicago branch, mechanical goods division, UNITED STATES RUBBER CO., was

Continued on page 102

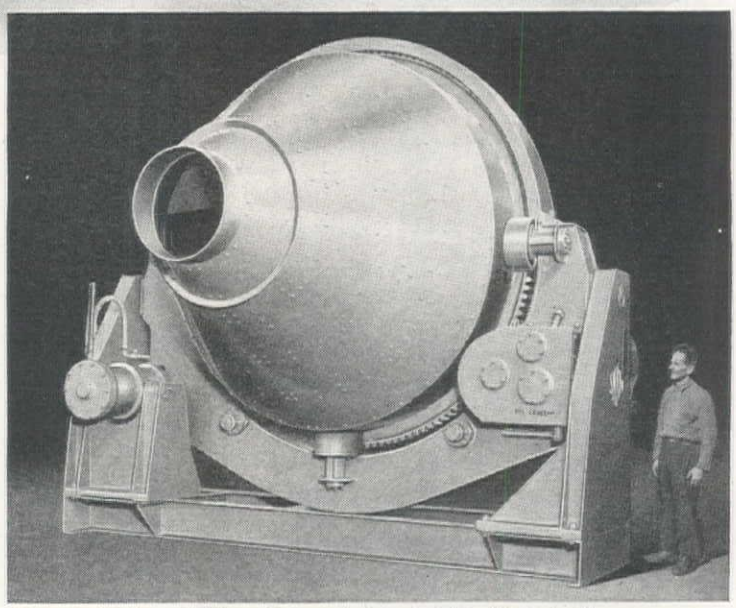
Yes Sir! We Really $ave with these TWO PROFIT MAKERS

You can make more money mixing concrete in a Smith 6 yard Tilter and delivering the concrete in Smith-Mobile Agitators . . . a profit-making combination for big concrete projects and Ready-Mix plants.

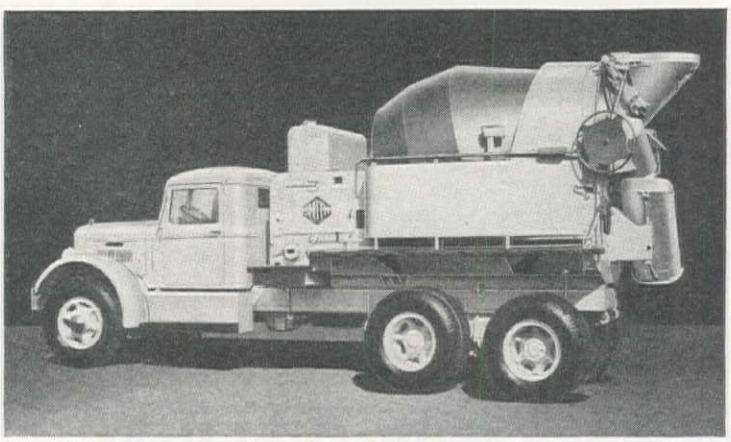
The initial cost of a Smith 6 yard Tilter is not much more than a 4 yard mixer, but it will give you 50% greater output with practically the same labor, power and overhead cost. It steps up your plant capacity, gets agitators out of the yard in a hurry, reduces the cost per yard of concrete to rock bottom.

Smith Tilters mix any type of concrete at any slump and discharge it with absolutely no segregation. Six sizes available — 1, 2, 3, 4, 5, or 6 cu. yds. per batch.

Smith-Mobiles are designed to deliver the maximum payload per pound of mixer. No deadweight. Built of the toughest wear resistant materials. Four sizes available — 2, 3, 4½ and 5½ yards as truck mixer — 3, 4¼, 6⅛ and 7⅜ yards as agitator.



New Smith 6 yard Tilter. Compact. Low height. Fits into the same space formerly used by a 4 yard Mixer. One batch fills a 6⅛ yard agitator.



Smith-Mobile 6⅛ yard Agitator. Loads and discharges at top speed, even dry, low slump concrete. Takes entire batch of a Smith 6 yard Tilter.

GET THESE NEW CATALOGS

Just off the press. Bulletin No. 244 describes the new Smith 6 yard Tilter. Catalog No. 239 describes Smith-Mobile Truck Mixers and Agitators. Write for your copies.

The T. L. SMITH COMPANY

2871 N. 32nd STREET • MILWAUKEE 10, WIS., U. S. A.

SMITH MIXERS

FOR BIG CONCRETE PROJECTS AND READY-MIX PLANTS

A 5631-1P

Contracts . . .

Summary of Major Construction Contracts Awarded Last Month

Puget Sound Bridge & Dredging Co., Seattle, Wash., and **Macco Corp.**, Paramount, Calif., with a joint bid of $1,169,755, will be awarded the contract for first major construction at the $21,000,000 Lucky Peak flood control and irrigation dam project on the Boise River near Boise, Ida. The Walla Walla District, Corps of Engineers, have recommended the award. The contract will be for construction of a tunnel, including excavation for an inlet channel, intake and outlet structures and appurtenant work.

Peter Kiewit Sons' Co., Longview, Wash., was awarded a $998,673 contract by the Washington State Highway Commission for paving the 5.2-mi. Dodson-Bonneville section of the new Columbia River Highway.

Charles L. Harney, 575 Berry St., San Francisco, with a bid of $1,039,903, was awarded the contract by the San Francisco Department of Public Works for construction of influent and effluent sewers at the North Point Sewage Treatment Plant project in San Francisco.

W. E. Logan & Sons of Muskogee, Okla., were the successful bidders on the first section let for construction on Oklahoma City's multi-million dollar urban project. The company bid $508,860 for 1.8 mi. of grading and drainage for a 104-ft. wide roadbed with two 24-ft. traffic lanes to be paved with asphaltic concrete.

J. A. Terteling & Sons, Boise, Ida., have begun construction of a 7-mi. railroad spur from lines of the North Pacific and Union Pacific railroads to the atomic city of Richland, Wash., under a $1,035,000 contract. Included in the contract are construction of three bridges, the drainage of a large area of lowland to stabilize quicksand for footings, and relocation of a length of irrigation canal.

Pacific Dredging Co., 14409 S. Paramount Blvd., Paramount, Calif., was awarded an $870,611 contract by the Portland District, Corps of Engineers, for dredging the upper 10.5 mi. of main ship channel at Coos Bay, Ore. The channel is to be 300 ft. wide with a depth of 30 ft. at mean-lower low water. The project includes the dredging of an anchorage basin and two turning basins to the same depth as the channel.

Hermann Co., 417 S. Hill St., Los Angeles, has been awarded a $635,815 contract by the Santa Barbara City Council for construction of a new sewage treatment plant at Santa Barbara, Calif.

Dan Caputo and **Edward Keeble,** Box 397, San Jose, Calif., with a joint bid of $476,581, were awarded the contract by the California Division of Highways for construction of a structural steel beam bridge on reinforced concrete piers and the grading and plant-mix surfacing of 0.9 mi. of the highway between Watsonville Junction and First St. in Watsonville, Calif.

Granite Construction Co., Box 900, Watsonville, Calif., was awarded a $661,807 contract by the California Division of Highways for the grading and surfacing of 2.5 mi. for a 4-lane divided highway at the boundary between Ventura and Santa Barbara Counties.

Lembke Construction Co., Box 144, Albuquerque, N. M., will build the new New Mexico State Office Building at Santa Fe under a $777,209 contract.

MacIsaac and Menke, 3440 E. 22nd St., Los Angeles, have been awarded the general contract for construction of the $1,100,000 office and factory building for the Pittsburgh Plate Glass Company's Paint Division at Torrance, Calif.

Swinerton & Walberg, 225 Bush St., San Francisco, will remodel an office building at Howard and Fremont Streets in San Francisco at an approximate cost of $800,000 for the California Packing Corp.

Gennaro Iannini, 2701 Sepulveda Blvd., Manhattan Beach, Calif., with a bid of $472,787, was awarded the contract by the Los Angeles City Board of Public Works for construction of the Administration Laboratory Building of the Hyperion Activated Sludge Plant at El Segundo.

John J. Moore Co., 959 - 33rd St., Oakland, Calif., has been announced as the contractor for construction of a 6-story reinforced concrete terminal warehouse building at 6th and Channel Streets in San Francisco. Estimated cost is $8,000,000.

J. C. Boespflug Construction Co., Seattle, Wash., was awarded the $2,000,000 general contract for construction of a 6-story hospital building at Missoula, Mont.

L. M. White Contracting Co., Tucson, Ariz., was awarded a $174,291 contract by the Arizona State Highway Commission for construction of 2 mi. of the East Speedway, Tucson East, in Pima County. The work begins at the city limits of Tucson and consists of grading, draining, aggregate base, and bituminous plant mix.

Dodge Construction Inc., Fallon, Nev., was awarded a $147,430 contract by the Nevada Department of Highways for construction of a 13-mi. portion of the State highway system in Washoe County near Gerlach.

Hutcheson Construction Co., Denver, Colo., was awarded a $324,132 contract by the Colorado State Highway Department for construction of a part of the Combined Colorado Project, in Pueblo County. The 3.3 mi. length of work involves grading and structures north of the Pueblo city limits.

VCK Construction Co., Los Angeles, was awarded a contract by the City of Redondo Beach, Calif., at $547,575 for the installation of sanitary sewers.

Malcolm W. Larson, Denver, Colo., was awarded a contract by the Bureau of Reclamation at Denver in the amount of $233,465 for construction of conductor and overhead ground wire and appurtenant electrical equipment on the Davis, Hoover, and Parker Dam transmission lines.

Arizona Sand and Rock Co., Phoenix, Ariz., was awarded a $566,215 contract by the City of Phoenix for furnishing and installing 18,800 ft. of 60-in. water main and appurtenances.

B & R Construction Co., San Francisco, was awarded a $627,974 contract by Glenn County, Calif., for construction of a county hospital at Willows.

Zoss Construction Co., Los Angeles, was awarded a $642,600 contract by the Public Buildings Administration, Wash., D. C., for construction of an additional story to the Los Angeles Post Office Terminal Annex.

H. C. Smith Co., Los Angeles, was awarded a $237,875 contract by the Imperial Irrigation District, El Centro, Calif., for construction, and testing of No. 1 turbine-generator and appurtenant work on the All-American Canal, about 15 mi. east of Calexico.

L. T. Johnson Construction Co., Ogden, Utah, was awarded a $480,000 contract by the Utah State Road Commission for construction of a 6.6-mi. length of plant-mixed road in Weber County, between Unitah and Ogden, a section of US 30-S and SR 103.

Bressi & Bevanda Constructors, Inc., North Hollywood, Calif., were awarded a $1,854,624 contract by the Los Angeles District, Corps of Engineers, for improvement of the Tujunga Wash, Los Angeles River to Hansen Dam, between Magnolia Blvd. and Vanowen St. The work involves concrete structures, street paving, bridge construction, and fencing.

Guy F. Atkinson Co., 10 W. Orange Ave., South San Francisco; **Bressi & Bevanda Constructors, Inc.**, P. O. Box 439, North Hollywood; **Charles L. Harney, Inc.**, 575 Berry St., San Francisco; **J. A. Jones Construction Co.**, 209 West Fourth St., Charlotte, North Carolina; and **A. Teichert & Son, Inc.**, Box 1113, Sacramento, all acting as joint venturers, were low bidders before the Sacramento District, Corps of Engineers, on construction of the Pine Flat Dam Project, located near Delpiedra, 27 mi. east of Fresno, Calif., on the Kings River. The joint venturers' low bid was $24,339,776. Work on the contract includes diversion of water; design, construction, maintenance, and removal of cofferdams; excavation and foundation preparation; construction of concrete dam and appurtenant structures, consisting of mass and reinforced concrete; production and transportation of concrete aggregate; furnishing and storage of cement, mixing and placing concrete, and furnishing and placing reinforcing and structural steel and miscellaneous metal; installation of government-furnished sluice gates and tainter gates with machinery and accessories; furnishing and installation of test conduit and penstock liners; furnishing and installation of architectural materials, mechanical equipment, and all items in the control tower; and all fixtures and wiring for power and light. Quantities involved include 2,150,000 cu. yd. mass concrete; 2,100,000 lb. reinforcing steel; 1,600,000 bbl. Portland cement; and 1,560,000 lb. penstock liners.

TRADE WINDS

Continued from page 98

announced recently by **W. A. Tipton,** branch sales manager. Keenan was a veteran of 39 years of service with the company. **Joseph A. Conlon,** formerly assistant district sales manager, has been named to succeed him.

☆ ☆ ☆

A. J. Rinnander has become a member of the HARNISCHFEGER CORP. of Milwaukee, it was announced recently by **F. Salditt,** vice-president in charge of sales.

☆ ☆ ☆

C. H. Collier, Jr., eastern truck sales manager for HYSTER CO., Peoria, Ill., recently announced the following personnel changes. **John Mitchell,** formerly retail salesman in the Hyster Chicago store, has been promoted to the position of district manager of truck sales for the northeastern section of the country. **John Cusick** has been named lift truck sales district manager responsible for the central portion of the country. **W. J. O'Brien** is named district manager in the southwestern territory, **C. E. Houston** in the northwest district, and **Fred Schultz** in the southeastern territory.

☆ ☆ ☆

Appointment of **T. H. Cable** as a member of the sales department, central staff of KOPPERS COMPANY, INC., was announced recently. Cable has been eastern advertising manager for the Westinghouse Electric Corp. for the last three years prior to this appointment.

Joseph D. Cotton, Vice-president and Director of the FOUR WHEEL DRIVE AUTO CO., died suddenly at his home in Clintonville, Wisc., on Sept. 23. Largest individual stockholder of the company, he had been connected with FWD since 1915.

☆ ☆ ☆

The WILLIAM F. KLEMP CO., fabricator of structural steel footwalks, opened a new plant to serve its customers in Houston and the Gulf Area. The new plant, which during the war was part of Howard Hughes' strut plant in Houston, will produce electro-forged open steel grating and treads, diamond riveted steel and aluminum gratings and treads, open steel bridge decking, Hexteel surface armor used as ganister lining in cat crackers, and Floorsteel flexible floor armor. Sales representative for the Houston plant is **H. L. Thompson,** who has been the Houston representative of the Chicago plant for the past 20 years.

☆ ☆ ☆

Ray McLean, for the past four years executive vice-president of the JAEGER MACHINE CO., Columbus, Ohio, was elected president at the company's annual meeting held recently. He succeeds **O. G. Mandt,** with whom he has for some time been sharing executive responsibilities, due to the latter's impaired health. McLean joined the Jaeger organization in 1939 as manager of its Truck Mixer Division.

The POWERMATIC VENTILATOR CO. of Cleveland, Ohio, makers of Iron Lung roof ventilators, intake units, and related items, has announced a change of name, effective immediately. The new name is IRON LUNG VENTILATOR CO.

☆ ☆ ☆

GAR WOOD INDUSTRIES, INC., announced recently the appointment of **W. S. Blakeslee, Jr.,** as Assistant General Sales Manager for the company. Prior to his appointment, Blakeslee was Sales Manager of the Wayne Division in Michigan. Succeeding Blakeslee as Wayne Division Sales Manager is **R. J. Nymberg.**

☆ ☆ ☆

Gwilym A. Price, president of WESTINGHOUSE ELECTRIC CORP., held a press conference in San Francisco, Sept. 23, during which he commented on the business, consumer goods, television, radio, employment, and jet propulsion problems and findings of the company. Price also commented, "In common with most other companies, Westinghouse has produced less in physical volume so far this year than it did during the same period of 1948. However, in dollar volume, our net sales billed for the first eight months of 1949 were just about the same as those for the same months a year ago, as we were, to an extent, shipping out of inventory. As did other companies, Westinghouse thus reduced its investment in completed stocks of goods. New orders received this year totaled $637,892,000, a drop of 13 per cent from the same period of 1948." Price added that in considering these figures, it is well to keep in mind the fact that 1948 was a record peacetime year for Westinghouse, as it was for most other business.

ADAMS Long-Life Dependability brings Repeat Orders from Officials and Contractors

In the picture above, Mr. Perley Dodge poses with the Model 101 Adams Motor Grader which for 19 years he operated for Columbia County, Wisconsin. Despite approximately 39,000 working hours, this machine required only normal maintenance service.

Since 1930 Columbia County has purchased 21 Adams Motor Graders, with 19 still in year-around operation. They are used for grading, ditching, bank sloping, oil mix, gravel spreading, road maintenance, etc., in summer—for snow removal in winter.

The R. B. Tyler Company, Louisville, Kentucky, who operate on a large scale throughout the south, own 21 motor graders, a number of which are Adams.

Tyler officials say, "We like Adams machines—like their adaptability, ease of operation, wide range of speeds and over-all economy. That's why we continue to buy them year after year."

For complete information on dependable, long-life Adams Motor Graders, see your local dealer—there's one located conveniently near you.

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

See Your Local ADAMS Dealer

J. D. ADAMS MFG. CO.
Western Factory Branch
San Francisco, California
Adams Distributors at: Oakland, Los Angeles, Sacramento, Redding, Riverside, San Jose, Fresno, Stockton, Salinas, Santa Rosa, Modesto, Visalia, Merced, Bakersfield, Santa Maria and San Diego, Calif.

THE O. S. STAPLEY CO.
Phoenix, Arizona

McKELVY MACHINERY CO.
Denver, Colorado

INTERMOUNTAIN EQUIPMENT CO.
Boise and Pocatello, Idaho
Spokane, Washington

INDUSTRIAL EQUIPMENT CO.
Billings and Missoula, Montana

NORMONT EQUIPMENT CO.
Great Falls, Montana

NEVADA EQUIPMENT SERVICE
Reno, Nevada

CLARK COUNTY WHOLESALE MERCANTILE CO. INC.
Las Vegas, Nevada

J. D. COGGINS CO.
Albuquerque, New Mexico

HOWARD-COOPER CORPORATION
Portland, Ore., Seattle, Wash.

THE LANG CO. INC.
Salt Lake City, Utah

GLENN CARRINGTON & CO.
Fairbanks, Alaska

NEW EQUIPMENT

MORE COMPLETE INFORMATION of any of the new products or equipment briefly described on the following pages may be had by sending your request to Equipment Service, Western Construction News, 609 Mission Street, San Francisco 5, Calif. For quicker service, please designate the item by number.

1101

Four-Wheel Tractors

Manufacturer: Gar Wood Industries, Findlay Division, Findlay, Ohio.

Equipment: Five scraper models for the Allis-Chalmers fleet of industrial tractors.

Features claimed: The models range in size from 7.6 to 28 cu. yd. capacity. Each scraper is fabricated and welded from steel to insure maximum usage and long life. Digging and loading are positive with a heavy-duty cutting edge and extension cutting edge. Cutting edge and extension cutting edge are reversible and replaceable. Large apron opening insures easy loading and ejecting of loads. Heavy-duty outside apron arms are designed to close and open the apron with minimum loss of power from the control unit. One important feature is the draft point being located aft of the cutting edge.

1102

Plastic Cement

Manufacturer: Calaveras Cement Co., San Francisco.

Equipment: Calaveras Plastic Cement for all types of stucco work.

Features claimed: Six distinct advantages are claimed for the plastic cement: Greater sand-carrying capacity, plasticity, mortar strength, resistance to shrinkage cracks, more accurate control, and the durability obtainable from concrete made of Portland Cement. The product surpasses all federal government and A.S.T.M. strength specifications.

1103

Brake Lining and Clutch Facing

Manufacturer: Johns-Manville, New York, N. Y.

Equipment: Wire-Klad brake lining and S-W clutch facing.

Features claimed: Wire-Klad is a wire-reinforced lining using a new type of flexible wire mesh reinforcement. Because of flexibility, internal stresses during manufacture are avoided, with the elimination of distortion or concavity during use even when the lining is exposed to extremely hot drum surfaces. The S-W spiral wound clutch facing is made of asbestos-metallic yarns and is the product of new manufacturing techniques that make it possible to match the specific clutch action of any clutch design, with fewer variations in torque under a wide range of temperature and load conditions.

1104

Paving Breaker

Manufacturer: Cleco Div. of Reed Roller Bit Co., Houston, Texas.

Equipment: RC-80 paving breaker.

Features claimed: The tool incorporates the new Reed-Cleco rock drill type valve that gives full control of both power and

reserve stroke, assuring hard, uniform blows, fast action, minimum recoil, easy riding qualities, and low air consumption. The reversible grooved piston is cushioned on the power and return stroke, reducing operator fatigue and eliminating side rod breakage.

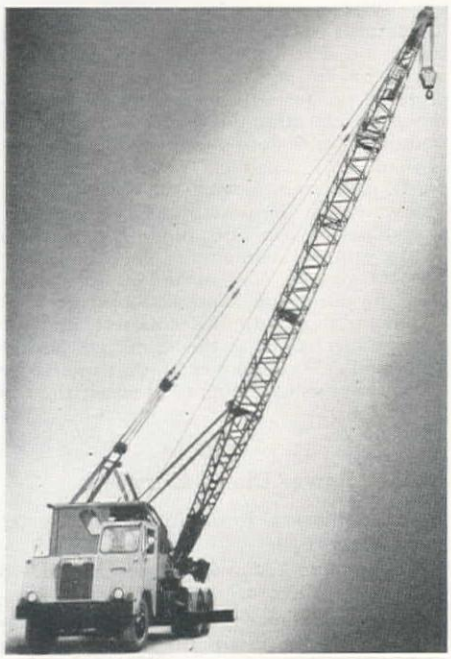
1105

Tire-mounted 25-ton Cranes

Manufacturer: Bay City Shovels, Inc., Bay City, Mich.

Equipment: Model 190-T61 CraneMobile and 190 CW CraneWagon with new 25-ton crane.

Features claimed: The CraneMobile is mounted on a specially designed, three-axle crane carrier, powered by separate heavy-duty 779 cu. in. displacement, automotive



type gasoline engine and drive and Timken tandem rear axle unit with through worm drive. Main and auxiliary transmission provides 12 forward speeds up to 35 mph. and three reverse speeds. Front axle is spring mounted, whereas rear dual axles are arranged with strongly reinforced equalizer beams on rocker arm and parallel torque rods to equalize weight distribution and insure correct alignment. Air brakes are furnished for all wheels, and an emergency brake is mounted on the drive shaft. Outrigger beams fore and aft of rear axles are of the sliding type. The CraneWagon is a self-propelled one-engine crane, mounted on a six-wheel carrier also with air brakes on all wheels. The carrier frame is all welded construction using heavy section I-beam with outside flanges boxed in for side frames. Deep section cross members, reinforced rigid type outriggers forward and rear, together with reinforced mounting plate join frame together into strong stable unit. Drive is from reversible travel clutches and two-speed transmission in crane upper to two-speed transmission in carrier through vertical propelling shaft providing 4 travel speeds in either direction. Power is then carried to single reduction bevel gear differential which operates jackshaft driving sprockets. Final drive on four rear wheels is through roller chain to wheel sprockets bolted to brake drum flanges. Wheel hubs and brake drums are Timken bearing mounted on stub spindles pressed into walking beams on either side of frame, permitting independent vertical wheel movement, perfect chain alignment,

full oscillation and proper load distribution. The crane machinery on both rigs is powered by a 517-cu. in. industrial type gasoline engine. The boom for both rigs is of deep section, consisting of basic 30-ft. two-piece pin-connected sections and intermediate 5, 10, and 20 ft. sections. Boom head is equipped with three ball-bearing mounted sheaves as is the load block, permitting use of 2, 4 or 6 parts of line. Adjustable jibs are also available in 15 and 30 ft. lengths.

1106

Automatic Side-Dump Bucket

Manufacturer: John Franco Co., Palo Alto, Calif.

Equipment: Francoist, including automatic side-dump bucket, cables, pulleys, and hoist.

Features claimed: Requiring no standard tower, the Francoist needs only 2 runners for its bucket and can be used to lift concrete or plaster or other materials requiring bulk elevation in the construction of buildings of 20 floors or more. The bucket is made in ½ cu. yd., ¾ cu. yd., and 4½ cu. ft. capacities, cutting the cost of initial investment to one-fourth of that needed for a standard tower. The simple construction of the runners contributes largely to the low installation cost of the system. It is ideal for elevating sand and cement used in pneumatically applied concrete, and for regular mix concrete the ¾-cu. yd. bucket will handle 20 cu. yd. per hr. on a one-story lift without using a hopper at either the top or bottom.

1107

Higher Power Diesel Crawlers

Manufacturer: International Harvester Co., Chicago, Ill.

Equipment: "A" models of the TD-18 and TD-14 tractors.

Features claimed: The heavy-duty TD-18A, second largest in International's line of five Diesel crawlers, has 87 drawbar hp., compared with 80.5 in the previous model.

Net engine horsepower at the flywheel, which was 97 in the last model, is now increased to 107. Belt horsepower, previously 91.5, has been raised to 101. Drawbar pull is at a new high of 22,400 lb. in 1st gear with engine operating at maximum torque. The drawbar has been strengthened by welding, in addition to riveting. For improved traction, wider 20-in. shoes are now standard. This model has six speeds forward, to a high of 5.7 mph., and two reverse, up to 3.5 mph. In the TD-14A, third largest of the crawler line, horsepower has been increased to 76 at the engine flywheel, 60.5 drawbar, and 72 belt. With the added power, this tractor has higher maximum drawbar pull of 16,600 lb. in 1st gear. The TD-14A has the same speeds as the TD-18A. Both tractors feature spring boosters on the steering clutch hand levers for greater ease of operation; a closed cooling system which prevents loss of coolant when the tractor is working on a steep grade; and increased-efficiency lubricating oil

filters which cut maintenance costs by greatly extending the usual oil change period. An air-tight radiator cap and a low-pressure valve in the overflow pipe seal the cooling system and prevent liquid from spilling out. The valve opens under slight pressure, so that steam is released and the engine will not overheat. The new lubricating oil filters have increased filtering area and require changing only every 240 hr. of operation under normal conditions, compared to the previous 100-hr. change period. Other newly-designed parts now standard include crown-shaved transmission and final drive gears; spiral bevel gears; improved engine clutch hand levers; bonded clutch facings; dowel bolts in sprocket gears; split type steering clutch couplings, and steering clutch pilot bearings with staked nuts. Transmission gear shifts are equipped with a positive lock to prevent gear "pop-out" under heavy going. A glass water trap in the Diesel fuel system permits operator or mechanic to determine service needed by quick visual check.

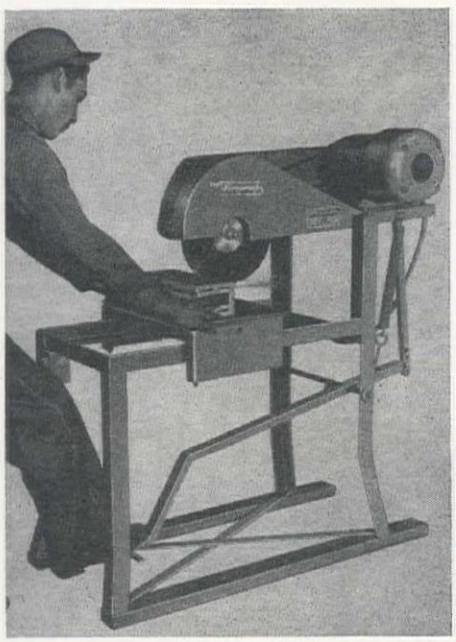
1108

Masonry Saws

Manufacturer: Martin Fireproofing Corp., Buffalo, N. Y.

Equipment: Saws that enable dry cutting without dust and automatic positioning of cutting table.

Features claimed: The saws have an exclusive patented cutting table. To adjust for cutting material of varying thickness, simply lift and it automatically locks in place, easily lowered with fingertip control release levers. All working parts of the



blade assembly function as a single unit, mounted on a pivoted arm. The frames are of angle iron and the protective shields are of extra heavy gauge sheet steel. The whole is permanently welded into a single unit. All saws in the line are portable and may be readily moved. Four models are offered.

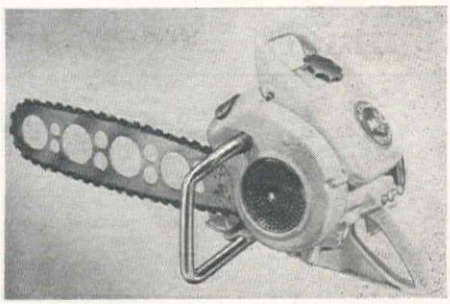
1109

Portable Power Saw

Manufacturer: McCulloch Motors Corp., Los Angeles.

Equipment: Model 3-25 chain saw.

Features claimed: Total weight of the gasoline-powered saw is 25 lb., yet it develops a full 3 hp. It will operate at full power in any position or angle, and its portability lessens the time and labor to maintain or remove trees at difficult locations. Two 18-in. or 24-in. straight blade



models are available, or a 14-in. bow saw. The power unit is a single cylinder, two-cycle, air-cooled gasoline engine, built almost entirely of high-strength magnesium-alloy die castings. The cylinder is an aluminum die casting with a cast iron liner. The carburetor is a new diaphragm type, without float. The ignition breaker points, which occasionally need inspection or adjustment on any engine, are mounted outside in a dustproof case for easy accessibility.

1110

Steel Bridging for Wood

Manufacturer: Dravo Corp., Pittsburgh, Pa.

Equipment: Tru-Tye steel bridging for reinforcing wood joists.

Features claimed: Ready to use without cutting or fitting, the bridging comes in one stock size for wood joists of any standard depth installed on 16-in. centers. The steel

Continued on page 118

UNIT BID SUMMARY

Tunnel . . .

Utah—Wasatch County—Bur. of Recl.—Tunnel

On the Duchesne Diversion Dam and Sluiceway, and Duchesne Tunnel and Tunnel Intake on the Provo River Project, Utah, being built by the Bureau of Reclamation, the Grafe-Callahan Construction Co. & Rhodes Bros. & Shofner, of Los Angeles, were low bidders on schedules 3, 4 and 5, with a bid of $1,580,784 on schedule 3, $1,505,200 on schedule 4, and $4,379,961 on schedule 5. There were no bidders on schedules 1 and 2. Unit bids and stipulations were submitted as follows:

	Schedule 3	Schedule 4	Schedule 5
(1) Grafe-Callahan-Rhodes-Shofner	$1,580,784	$1,505,200	$4,379,961
(2) Kenney Construction Co.	1,609,130	1,537,700	no bid
(3) T. E. Connolly, Inc.	no bid	1,772,850	no bid
(4) S. S. Magoffin Co.	1,857,025	1,776,000	no bid
(5) Wunderlich Contracting Co.	no bid	no bid	5,146,520
(6) Utah Construction Co.	no bid	no bid	5,249,570
(7) Arundel Corp. & L. A. Dixon Co.	2,209,557	2,083,987	5,499,318

(8) Engineer's estimate: Schedule 1 $740,735; schedule 2 $654,150; schedule 3 $1,396,750; schedule 4 $1,296,425; schedule 5 $3,837,414.

Stipulations: (1) On schedules 3 and 4, proposal is based on the award of schedules 3 and 4 combined and not separately and all items therein, and is based on an award being made within thirty days from date unless changed by mutual consent. On schedule 5, proposal is based on an award of all items in schedule 5, and based on award being made within thirty days unless changed by mutual consent. (2) Schedule 3 to be combined with schedule 4. (4) Will accept schedule 3 and schedule 4 combined as one contract, and will accept neither one alone. Unit prices on items 34, 35, 36, 37, and 38 are based on existing conditions in the 3,500 lin. ft. of tunnel which was possible to inspect. If conditions beyond this point have developed which are appreciably worse than those in the portion which could be inspected, then the work under the above items will be performed cost plus under Paragraph 9 of the specifications. (5) Due to lack of air in existing tunnel it was impossible to make inspection beyond station 254 + 00. This bid is based on the assumption that conditions between that station and station 199 + 48 are similar to the conditions between station 321 + 75 and 254 + 00. (7) Schedules 3 and 4 will be accepted together and not alone. Schedule 5 is based upon the award of all items in that schedule.

SCHEDULE 3—Duchesne Tunnel, Stations 5 + 10 to 105 + 10

			(1)	(2)	(4)	(5)	(7)	(8)
20	140	cu. yd. excav., common, in open cut	4.20	2.00	5.00	.....	4.00	2.50
21	840	cu. yd. excav., rock, in open cut	9.40	10.00	5.00	.....	4.00	5.00
22	40,000	cu. yd. excav., all classes, in tunnel	30.60	36.50	41.50	.....	50.70	31.00
23	485,000	lb. furn. and install. perm. steel tunnel sup'ts	.36	.17	.225	.....	.25	.17
24	260	M.B.M. furn. and erect. perm. timb. in tunnel	640.00	200.00	300.00	.....	190.00	250.00
25	500	lin. ft. drilling grout holes not more than 10 ft. deep	1.00	1.50	1.50	.....	2.10	3.00
26	250	lb. furn. and placing grout pipes and conn'cts	2.20	1.00	1.00	.....	1.75	1.00
27	1,000	cu. yd. pressure grouting	6.25	5.00	4.00	.....	5.50	3.00

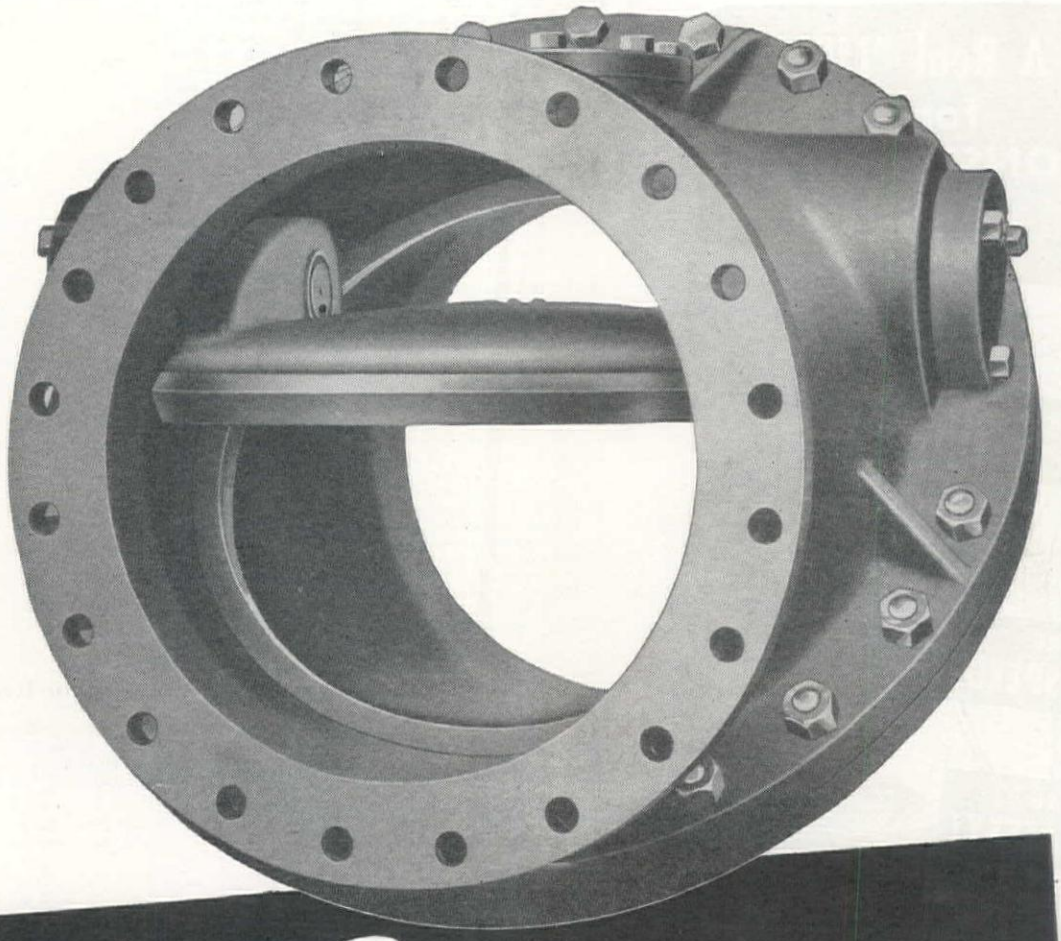
SCHEDULE 4—Duchesne Tunnel, Stations 105 + 00 to 321 + 75

			(1)	(2)	(4)	(5)	(7)	(8)
28	37,000	cu. yd. excav., all classes, in tunnel	30.60	36.50	41.50	.....	50.70	31.00
29	460,000	lb. furn. and install. perm. steel tunnel sup'ts	.36	.17	.225	.....	.25	.16
30	240	M.B.M. furn. and erect. perm. timb. in tunnel	640.00	200.00	300.00	.....	190.00	250.00
31	500	lin. ft. drilling grout holes not more than 10 ft. deep	1.00	1.50	1.50	.....	2.10	3.00
32	250	lb. furn. and placing grout pipe and conn'cts	2.20	1.00	1.00	.....	1.75	1.00
33	1,000	cu. ft. pressure grouting	6.25	5.00	4.00	.....	5.50	3.00
34	5	M.B.M. removal of timbering and timber tunnel supports in exist. tunnel	800.00	200.00	300.00	.....	500.00	75.00
35	10,000	lb. removal of steel tunnel sup'ts in exist. tun.	.80	.10	.30	.....	.40	.07
36	100	cu. yd. excav., all classes, for enlargment of existing tunnel	75.00	100.00	125.00	.....	105.00	50.00
37	400	cu. yd. removal of matl. from invert of exist. tunnel above working floor line	50.00	100.00	100.00	.....	50.00	10.00
38	100	sq. yd. removal of unexcav. matl. projecting within the "A" line on side walls and arch of existing tunnel	70.00	30.00	30.00	.....	35.00	10.00

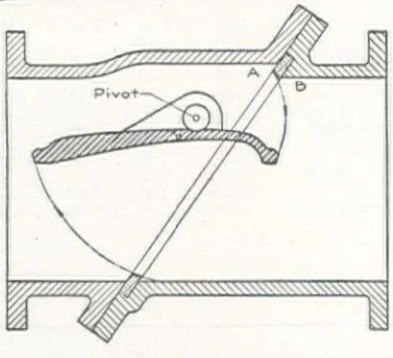
SCHEDULE 5—Duchesne Tunnel, Stations 5 + 10 to 321 + 75, including tunnel lining together with tunnel intake structure, and diversion dam and sluiceway.

			(1)	(2)	(4)	(5)	(7)	(8)
39	77,000	cu. yd. excav., all classes, in tunnel	28.15	.....	.....	41.00	43.50	30.00
40	950,000	lb. furn. and install. perm. steel tunnel supp'ts	.35	.....	.....	.30	.25	.16
41	500	M.B.M. furn. and erect. perm. timb. in tunnel	607.00	.....	.....	300.00	190.00	250.00
42	1,000	lin. ft. drilling grout holes not more than 10 ft. deep	.95	.....	.....	3.00	2.10	3.00
43	500	furn. and placing grout pipe and connections	2.20	.....	.....	2.00	1.75	1.00
44	2,000	cu. ft. pressure grouting	6.00	.....	.....	6.00	5.50	3.00
45	2,000	lin. ft. furn. matls. and constr. 6-in. diam. tunnel drain	10.00	.....	.....	10.00	8.20	3.50
46	200	lin. ft. furn. and laying 6-in. diam. sewer pipe with connected joints	6.10	.....	.....	5.00	1.50	3.00
47	Lump sum,	diversion and care of river during const. and unwatering foundations	$27,500	.....	.....	$25,000	$47,200	$20,000
48	315	cu. yd. excav., common, for structs.	6.15	.....	.....	10.00	4.00	2.00
49	945	cu. yd. excav., rock, for structs	6.15	.....	.....	15.00	4.00	6.00
50	850	cu. yd. excav., common, for dam	4.00	.....	.....	5.00	4.00	1.30
51	90	cu. yd. excav., rock, for dam	20.25	.....	.....	25.00	40.00	20.00
52	1,100	cu. yd. backfill	1.40	.....	.....	1.50	2.30	1.00
53	8,000	cu. yd. rock fill in dam	3.60	.....	.....	2.50	2.80	.80
54	2,020	cu. yd. riprap	9.30	.....	.....	15.00	8.50	5.00
55	268	cu. yd. concrete in structures	130.00	.....	.....	100.00	120.00	70.00
56	280	cu. yd. concrete in core wall	126.00	.....	.....	80.00	120.00	50.00
57	7,580	cu. yd. conc. in 5,000 linear ft. of tunnel lining betw. Stations 199 + 48 and 321 + 75	50.70	.....	.....	37.00	70.00	35.00
58	3,790	cu. yd. conc. in more than 5,000 linear ft. but less than 7,500 linear ft. of tunnel lining between Stations 199 + 48 and 321 + 75	28.60	.....	.....	39.00	33.00	31.00
59	3,790	cu. yd. conc. in more than 7,500 linear ft. of tun. lining betw. Stas. 199 + 48 and 321+75	28.60	.....	.....	39.00	33.00	31.00
60	4,028	cu. yd. conc. in 4,000 linear ft. of tunnel lining betw. Stas. 5 + 10 and 199 + 48	60.50	.....	.....	39.00	55.00	40.00
61	3,525	cu. yd. conc. in more than 4,000 linear ft. but less than 7,500 linear ft. of tunnel lining betw. Stas. 5 + 10 and 199 + 48	38.45	.....	.....	37.00	48.00	36.00
62	2,518	cu. yd. conc. in more than 7,500 linear ft. but less than 10,000 linear ft. of tunnel lining betw. Stas. 5 + 10 and 199 + 48	38.45	.....	.....	39.00	48.00	36.00

(Continued on next page)



THERE IS *No Slamming* WITH CHAPMAN TILTING DISC CHECK VALVES



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

BECAUSE of the design of the balanced hinge-pinned disc, Chapman Tilting Disc Check Valves always close smoothly and quietly. There is no slamming, no hammering, no destructive pipe-line stress.

When open, the disc rides smoothly in the flow. As it closes, the effect of the stream on the short flap cushions the contact with the body seat. There is no sliding action and therefore wear on seats is reduced to a minimum. In addition, head losses are lowered as much as 65% to 80% over those experienced with conventional type check valves.

Available in either iron or steel.

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASS.

63	19,039	bbl. furn. and handling cement for structs. and core wall and for conc. in 5,000 linear ft. of tunnel lining betw. Stas. 199 + 48 and 321 + 75, and for conc. in 4,000 linear ft. of tun. lining betw. Stas. 5 + 10 and 199 + 48	5.45	.....	.....	9.00	6.15	6.00
64	5,690	bbl. furn. and handling cem. for conc. in more than 5,000 linear ft. but less than 7,500 linear ft. of tunnel lining betw. Stas. 199 + 48 and 321 + 75	5.45	.....	.....	8.00	6.15	6.00
65	5,690	bbl. furn. and handling cem. for conc. in more than 7,500 lin. ft. but less than 10,000 lin. ft. of tunnel lining betw. Stas. 199 + 48 and 321 + 75	5.45	.....	.....	8.00	6.15	6.00
66	5,993	bbl. furn. and handling cem. for conc. in more than 4,000 lin. ft. but less than 7,500 lin. ft. of tunnel lining betw. Stas. 5 + 10 and 199 + 48	5.45	.....	.....	9.00	6.15	6.00
67	4,281	bbl. furn. and handling cem. for conc. in more than 7,500 lin. ft. but less than 10,000 lin. ft. of tunnel lining betw. Stas. 5 + 10 and 199 + 48	5.45	.....	.....	8.00	6.15	6.00
68	75,000	lb. furn. and placing reinf. bars	.175	.....	.....	.25	.17	.18
69	355	lin. ft. placing rubber water stops in joints	2.65	.....	.....	4.00	5.60	1.60
70	6,000	lb. installing radial gate and hoist	.19	.....	.....	.50	.20	.20
71	1,000	lb. installing miscl. metalwork	.80	.....	.....	1.50	.50	.30
72	5	M.B.M. removal of timb'g and timb. tunnel supports in exist. tunnel	800.00	.....	.....	500.00	500.00	75.00
73	10,000	lb. removal of steel tunnel sup'ts in exist. tun.	.80	.....	.....	.20	.40	.07
74	100	cu. yd. excav., all classes, for enlargment of existing tunnel	75.00	.....	.....	75.00	105.00	30.00
73	10,000	lb. removal of steel tunnel supp'ts in exist. tun.	.80	.....	.....	.20	.40	.07
74	100	cu. yd. excav., all classes, for enlargment of exist. tunnel	75.00	.....	.....	75.00	105.00	30.00
75	800	cu. yd. removal of matl. from invert of exist. tunnel	50.00	.....	.....	20.00	50.00	10.00
76	100	sq. yd. removal of unexcav. matl. projec. within the "A" line on side walls and arch of exist. tunnel	70.00	.....	.....	25.00	35.00	10.00

Colorado—Larimer County—Bur. of Recl.—Tunnel

G. L. Tarlton Contracting Co., St. Louis, Mo., were low bidders for earthwork, concrete lining tunnel, and structures for the Horsetooth Supply Conduit, stations 0 + 00 to 53 + 88.94, Horsetooth Feeder Canal stations 53 + 70.25 to 67 + 52.1, and access road, station 0 + 00 to 14 + 76.7 on the Colorado-Big Thompson Project, being built by the Bureau of Reclamation. Tarlton's bid is $1,328,100. Unit bids were submitted by the following:

(1) G. L. Tarlton Contracting Co.....$1,328,100
(2) Western Paving Construction Co..... 1,332,357
(3) Wunderlich Contracting Co. 1,375,780
(4) Peter Kiewit Sons' Co. $1,380,587
(5) Engineer's estimate 1,118,985

		(1)	(2)	(3)	(4)	(5)
Lump sum, diversion and care of river and unwatering foundations		$89,260	$75,000	$50,000	$25,000	$30,000
7,300	cu. yd. excav. for diversion struct.	12.50	5.80	7.00	9.00	4.50
10,900	cu. yd. excav. for structs. except diversion struct.	8.00	5.00	5.00	7.00	2.50
16,500	cu. yd. excav. in tunnel	28.20	30.85	33.00	35.00	30.00
200	cu. yd. excav. for tunnel enlargement	40.00	61.60	50.00	50.00	75.00
10,000	cu. yd. backfill about structs.	.60	1.00	1.25	2.00	.75
4,000	cu. yd. compacting backfill	4.50	6.00	8.00	3.50	3.50
15,000	cu. yd. excav. for canal	7.00	2.25	2.00	1.50	2.00
1,000	cu. yd. excav. for ditches, channels, and dikes	4.50	5.00	4.50	3.00	3.00
10,000	cu. yd. borrow excav.	.60	.50	1.00	1.40	.60
1,550	cu. yd. excav. for access road	2.00	.55	.80	1.40	1.30
2,000	sta. cu. yd. overhaul	.10	.10	.025	.10	.04
15,000	cu. yd. compacting embankments	.25	.50	.50	.60	.50
250	cu. yd. backfill at top of conc. canal lining	4.50	1.20	2.00	1.00	1.50
75	cu. yd. riprap and rock fill	10.00	10.00	10.00	7.00	5.00
455	cu. yd. one course road surfacing	8.00	2.65	5.00	5.00	3.00
5,820	sq. yd. preparing founda. for conc. canal lining	1.50	2.00	3.00	2.50	1.50
204,500	lb. furn. and install. perm. steel tunnel supports	.17	.20	.15	.20	.15
71	M.B.M. furn. and erect. perm. timber tunnel supports	300.00	400.00	300.00	350.00	225.00
1,000	lin. ft. drilling feeler or pilot holes	1.00	1.00	1.00	5.00	1.50
500	lin. ft. drilling grout holes	1.00	3.00	3.00	4.50	3.00
500	lb. furn. and placing grout pile and connections	1.50	1.00	1.00	1.00	1.00
1,600	cu. ft. pressure grouting	3.00	3.00	3.00	4.00	3.25
2,235	cu. yd. concrete in structures	65.00	86.50	100.00	85.00	65.00
340	cu. yd. conc. in tunnel inlet struct., and outlet transition and portal	63.00	100.00	100.00	80.00	75.00
1,610	cu. yd. conc. in tunnel lining	30.00	39.00	35.00	55.00	40.00
560	cu. yd. conc. in unreinforced canal lining	37.00	30.00	35.00	30.00	30.00
365	cu. yd. conc. in reinforced canal lining	39.00	35.00	35.00	35.00	33.00
7,300	bbl. furn. and handling cement	6.20	5.75	6.00	5.00	15.25
366,600	lb. furn. and placing reinforcement bars	.12	.155	.16	.15	.15
105	sq. ft. furn. and placing elastic filler in joints	2.00	1.00	2.00	1.00	1.50
50	lin. ft. placing rubber waterstops in joints	3.00	2.00	3.00	4.00	1.50
200	lin. ft. furn. and constr. 6-in. diam. underdrains with uncemented joints	6.00	2.00	3.00	2.50	2.50
1,500	lin. ft. furn. and constr. 6-in. diam. tunnel drain	6.00	3.00	4.00	2.50	5.00
1,930	lb. installing pipelines for compressed air and to meas. sect.	.70	1.00	.50	.50	.50
29,500	lb. installing grizzly bars and supts. and walkway supts.	.09	.20	.20	.15	.15
28,200	lb. installing miscl. metalwork	.15	.25	.40	.20	.25
18,900	lb. installing gates and gate hoists	.20	.20	.30	.15	.14
270	lin. ft. furn. and installing elect. conduits 1½ in. or less in diam.	2.00	2.00	2.00	1.50	2.50
100	lb. furn. and installing elect. conductors and ground-wires	3.00	1.00	5.00	2.00	2.00

Dam . . .

Montana—Flathead County—Bur. of Recl.—Clearing

All bids were rejected for clearing a part of the Hungry Horse Reservoir Project on the Hungry Horse Project near Kalispell, Mont. Mark Eischeid Contracting Co., New Hampton, Iowa, submitted the low bid for seven of the clearing schedules at $7,103,940. Unit bids and stipulations were submitted as follows:

(1) Mark Eischeid (7 schedules) .....$ 7,103,940
(2) Schutt Construction Co. & Assoc. (5 schedules)..... 7,548,821
(3) Volunteer Clearing Co., Inc. (7 schedules)..... 8,384,670
(4) Wixson & Crowe, Inc. and J. N. Triesdale, Inc. (7 schedules)..... 8,979,360
(5) Bay Construction Co. (7 schedules)..... 8,985,544

(Continued on next page)

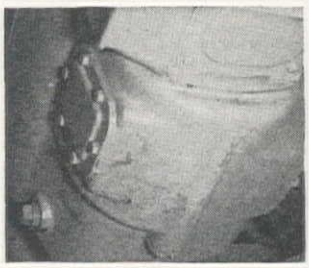
EASIER MAINTENANCE is a vital part of Terra Cobra PERFORMANCE LEADERSHIP

CABLES always accessible. Straight reeving, fewer sheaves, all away from dirt. Result: Longer cable life, less "down time."

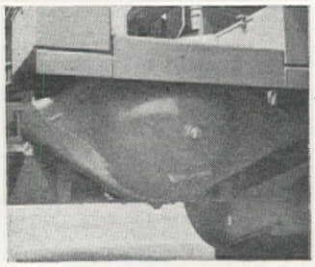
POWER CONTROL UNIT easily adjusted from outside without special tools. Entire assembly removable without disturbing other units.

DEPENDABLE CUMMINS DIESEL ENGINE requires minimum maintenance, easily inspected or removed. Fuel, lube and air filters readily accessible.

Where a few minutes of "down time" can quickly eat up the profits, rugged dependability and *simplified maintenance* are essential in earth-moving equipment. That's why reserve strength *and accessibility* have been engineered into every feature of the Wooldridge Terra Cobra. Every major component can be easily reached or removed without disturbing unrelated parts. Cost-wise contractors have proved that this means *less* servicing, *faster* maintenance, *more* productive time, *higher* profits. Ask your Wooldridge distributor for complete details—or write today for Bulletin No. TC-705.



RUGGED TRANSMISSION may be inspected or removed without disturbing engine, differential or other major units.



MASSIVE DIFFERENTIAL accessible at all times. May be removed in a matter of minutes without affecting transmission.

Scrapers Bulldozers • Rippers • Power Control Units

WOOLDRIDGE MANUFACTURING CO.

Sunnyvale, Calif. • 4710 W. Division St., Chicago 51, Ill.

WOOLDRIDGE
EARTH MOVING EQUIPMENT

PROVED AND APPROVED FOR EVERY TYPE OF EARTH-MOVING JOB

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, etc., required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946, of Western Construction News, published monthly at San Francisco, California, for October 1, 1949.

State of California, County of San Francisco, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared L. P. Vrettos, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the Western Construction News and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Arthur F. King, 609 Mission St., San Francisco, Calif.

Editor—John M. Server, Jr., 609 Mission St., San Francisco, Calif.

Managing Editor—John J. Timmer, 609 Mission St., San Francisco, Calif.

Business Manager—L. P. Vrettos, 609 Mission St., San Francisco, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

KING PUBLICATIONS, 609 MISSION ST., SAN FRANCISCO, CALIF.; Arthur F. King, 609 Mission St., San Francisco, Calif.; Louise B. King, 609 Mission St., San Francisco, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

L. P. VRETTOS (signed)
Business Manager

Sworn to and subscribed before me this 28th day of September, 1949.

(Seal) BERTHA RIESE ADLER
(My commission expires September 11th, 1950)

(6) Morrison-Knudsen Co., Inc. (7 schedules) 11,049,570
(7) E. L. Gates (7 schedules) 11,255,190
(8) Howard J. Poston (1 schedule) 56,700

Stipulations: Eischeid would accept no less than 1,895 acres nor more than 4,975 acres; Schutt, none or all; Volunteer, none or all; Wixson & Crowe et al, accept any one or combination of schedules not to exceed $6,375,000; Bay Construction reserved the right to choose one schedule or any combination; Morrison-Knudsen would accept award of schedules 3, 4 and 5 or 5, 6 and 7 or 1 through 7. If M-K was awarded all 7 schedules, $500,000 could be deducted from final payment; Gates would accept the following combination: (1, 6, 7) (1, 6) (1, 7) (3, 7) (4, 7) (5, 7) (6, 7) (1, 2) (1, 2, 7) (1, 5) or accept alone any of the schedules except 2.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1,000 acres	clearing	575.00	.....	908.00	560.00	998.49	645.00	825.00	.....
70 acres	clearing	895.00	.....	$1,258	750.00	$1,498	968.00	$1,125	810.00
3,335 acres	clearing	420.00	513.70	540.00	598.00	548.49	759.00	728.00	.....
2,950 acres	clearing	481.00	513.70	600.00	790.00	648.49	759.00	975.00	.....
3,505 acres	clearing	469.00	513.70	518.00	598.00	498.49	759.00	679.00	.....
1,895 acres	clearing	439.00	513.70	472.00	498.00	518.49	660.00	633.00	.....
3,010 acres	clearing	389.00	513.70	368.00	333.00	469.49	550.00	488.00	.....

On the second bid call, Coleman H. Dykes, Knoxville, Tenn., was the low bidder on schedules 1 and 2, for 1,070 acres clearing, and was awarded the contract for $508,950. It is reported that Dykes' bid was unavoidably held up in the mails, so that although it was not received in time to be opened with the other bids it nevertheless was legally acceptable. Unit prices of Dykes' $508,950 contract were not included in this abstract. The other unit bids and stipulations are as follows for the second call:

(1) Joe Slifka (schedule 2) ..... $ 49,700
(2) Howard J. Poston (schedule 2) 55,860
(3) Donald Hughes (schedule 2) 105,000
(4) George Shroyer (schedule 1) 514,000
(5) Robert Lee (schedules 1 and 2) 552,000
(6) Wright Contracting Co. (schedules 1 and 2) 705,450
(7) M. A. Pithoud (schedule 7) 1,243,130
(8) Mark Eischeid Contracting Co. (schedules 1, 2, 6, and 7) 2,716,245
(9) Wixson, Crowe & Trisdale, Inc. (schedules 1, 2, 5, 6, and 7) 3,932,050
(10) Schutt, Oman and Associates (schedules 3, 4, 5, 6, and 7) 6,373,585
(11) Nello L. Teer Co. (all 7 schedules) 6,715,100
(12) Bay Construction Co. (schedules 1, 2, 3, 5, 6, and 7) 7,121,225
(13) Engineer's estimate (all 7 schedules) 6,794,350

Stipulations: Lee would not accept schedule 2 alone; Wright would not accept schedule 2 alone; Eischeid would accept schedules 1, 6, or 7 alone, or (1 and 2), (2 and 6), or (2 and 7); Schutt would accept no award of less than three schedules; Teer would accept all or none; Bay would accept (1 and 2) or 1, 3, 5, 6, or 7 alone, but would not accept 2 alone.

		(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1,000 acres	clearing	654.00		575.00	485.00		500.00	900.00	510.00
70 acres	clearing	735.00		895.00	750.00		534.00	$1,000	750.00
3,335 acres	clearing					470.00	500.00	535.00	400.00
2,950 acres	clearing					522.00	472.00		525.00
3,505 acres	clearing				500.00	450.00	472.00	530.00	460.00
1,895 acres	clearing			479.00	390.00	383.00	372.00	530.00	440.00
3,010 acres	clearing		413.00	389.00	300.00	320.00	252.00	500.00	300.00

Sewerage . . .

California—Los Angeles County—City—Sewer

Bosco Construction Co., Inc., Los Angeles, was low before the Los Angeles City Board of Public Works with a bid of $184,555 for the construction of a sanitary sewer and appurtenant work in Woodman Ave. between Van Nuys Blvd. and a point approximately 800 ft. north of Valerio St., in the Van Nuys District of Los Angeles. Unit bids were submitted as follows:

(1) Bosko Construction Co., Inc. $184,555
(2) Steve P. Rados, Inc. 196,630
(3) Matt J. Zaich Co. 196,745
(4) Artukovich Bros. 204,799
(5) Edward Green 206,023
(6) Bebek & Brkich 216,745
(7) Hermco Construction Co., Inc. 219,030
(8) Mike Ramljak Co. $220,948
(9) R. A. Wattson Co. 224,079
(10) George Miller Construction Co. 231,016
(11) V. C. K. Construction Co. 236,524
(12) Martin Construction Co., Inc., Ltd. 246,044
(13) B. Pecel & Sons 273,154
(14) Engineer's Estimate 206,003

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
9,344 lin. ft. 24-in. ext. str. pipe sewer	10.90	12.04	11.97	12.75	12.65	13.00	13.42	13.70	13.50	13.70	14.19	15.00	17.60	12.60
5,119 lin. ft. 21-in. ext. str. pipe sewer	9.45	10.55	10.87	11.00	11.03	12.00	11.67	12.00	11.40	12.80	12.80	13.55	14.50	10.50
1,464 lin. ft. 18-in. ext. str. pipe sewer	8.00	9.60	6.97	10.00	9.65	11.00	10.00	10.00	9.70	11.60	11.76	12.35	11.00	.9.60
32 units manhole "B"	300.00	255.00	275.00	240.00	250.00	250.00	290.00	275.00	387.00	300.00	370.00	300.00	300.00	315.00
8 units junction chamber "F"	300.00	270.00	325.00	250.00	300.00	275.00	290.00	300.00	387.00	300.00	380.00	350.00	300.00	315.00
2 units junction chamber "G"	300.00	275.00	350.00	250.00	300.00	275.00	330.00	300.00	387.00	300.00	380.00	350.00	300.00	410.00
325 cu. yd. Class D concrete for pipe reinf.	25.00	12.00	17.50	12.00	13.00	15.00	18.00	14.00	23.00	20.00	15.00	15.00	12.00	18.00
1,589 sq. ft. Class C resurf.	1.00	.65	.60	.30	1.00	1.00	.53	.25	.80	.75	.20	.70	1.00	.60
308 sq. ft. Class AC-8 resurf.	.65	.65	.65	.30	1.00	1.00	.70	.25	.80	.50	.60	.80	.60	.50
438 sq. ft. Class RO-2 resurf.	.24	.15	.25	.15	.25	.50	.20	.10	.30	.12	.40	.30	.22	.20

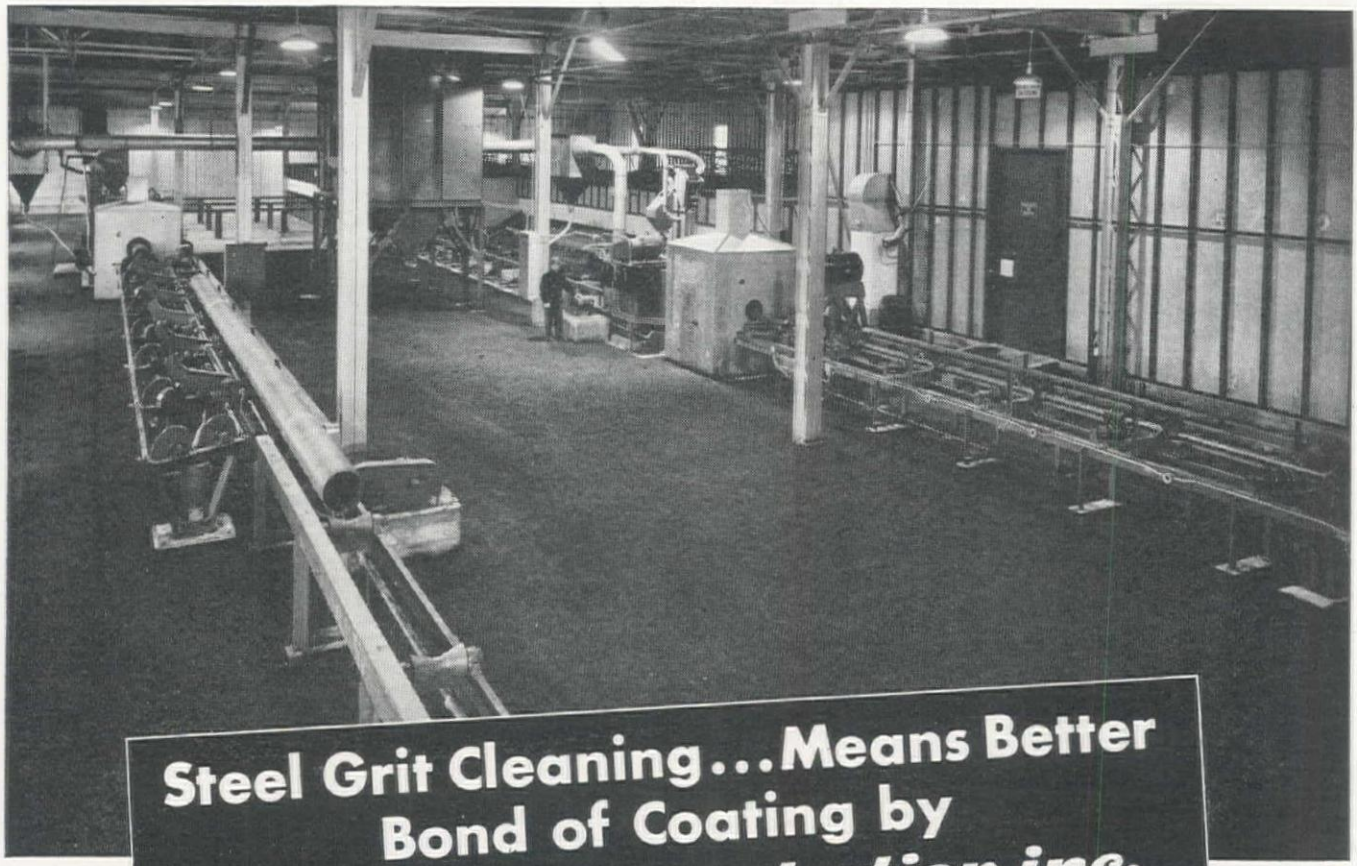
Canal . . .

California—San Joaquin County—Bur. of Recl.—Canal

Morrison-Knudsen Co., Inc.-M. H. Hasler Construction Co., Los Angeles, were low bidders for earthwork, concrete lining, and structures on the Bureau of Reclamation's Delta-Mendota Canal between station 3024+80 and 4108+50. The low bid was $2,173,507 for schedule 1 and $4,273,872 for schedules 1 and 2. Unit bids were submitted by the following:

	Schedule 1	Schedules 2 and 1
(1) Morrison-Knudsen Co., Inc.-M. H. Hasler Construction Co.	$2,173,507	$4,273,872
(2) Western Contracting Corp.	2,245,692	4,402,386

(Continued on next page)



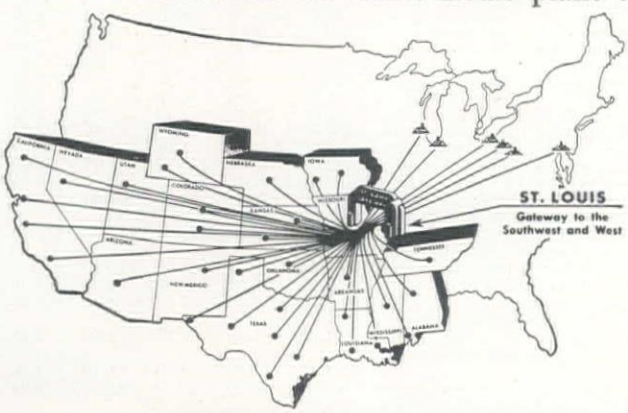
Steel Grit Cleaning...Means Better Bond of Coating by *standard pipeprotection inc.*

STEEL GRIT... used in two Wheelabrator cleaning machines, provides the ideal method of cleaning all your pipe . . . every joint . . . a positive method of removing all mill scale and rust.

In evaluating the bond of protective coatings to metal surfaces . . . the outstanding metal working industries rate steel grit as 100% efficient, while other methods tend to polish the surface and reduce bond performance.

Pre-warming and drying of pipe before cleaning and priming . . . are a part of the Standard Procedures established by ***standard pipeprotection inc.*** to bring you uniform coatings of the highest quality, at no increase in cost.

STORAGE-IN-TRANSIT... You can store your pipe in our yard up to 12 months without freight penalty . . . while determining final destinations . . . Through freight rates via our Saint Louis plant and our storage facilities save you money.



Wire, Phone or Write Now for Schedules

Immediate shipment or stop-over up to 12 months is permitted under existing railroad tariffs. When you ship your pipe through the Saint Louis Gateway . . . you enjoy "through freight rates" instead of higher combination rates generally used.

standard pipeprotection inc.

3000 South Brentwood Blvd. • St. Louis 17, Missouri

51

(3) Peter Kiewit Sons' Co.	2,314,574	4,479,381
(4) Utah Construction Co.	2,417,468	4,648,723
(5) Ashbach-Steenberg Co., Inc.	2,550,029	4,861,863
(6) Stolte, Inc.	2,527,889	4,961,649
(7) Bressi & Bevanda Constructors Inc.	2,597,059	4,968,616
(8) Parish Bros. and Erickson, Phillips & Weisberg	2,583,610	4,999,797
(9) Engineer's estimate	2,483,919	4,846,186

Stipulations: All bidders would accept all or none of the bid schedules.

SCHEDULE NO. 1	(1)	(2)	(3)	(4)	(5)	(9)
2,750,000 cu. yd. excav. for canal	.14	.14	.15	.115	.14	.16
50,000 sta. cu. yd. overhaul	.02	.02	.03	.02	.02	.02
83,000 cu. yd. compacting embankment	.40	.40	.20	.30	.30	.30
15,000 cu. yd. excav. for drainage channels and dikes	.30	.65	.25	.30	.275	.25
55,200 cu. yd. excav. for structs.	.65	1.00	.75	1.00	.78	.90
24,200 cu. yd. backfill	.60	.60	.60	.50	.44	.55
7,800 cu. yd. compacting backfill	3.00	4.25	3.00	3.00	3.00	3.00
600,000 sq. yd. trimming foundations for conc. lining	.28	.30	.30	.30	.34	.35
345 cu. yd. riprap	9.00	8.90	8.00	6.00	7.57	9.00
100 cu. yd. gravel and cr. rock bedding for riprap	7.00	8.80	8.00	5.00	5.55	5.00
5,900 cu. yd. conc. in structs.	58.00	56.00	56.00	60.00	55.50	55.00
66,200 cu. yd. conc. in unreinf. conc. canal lining	8.50	8.65	8.40	8.50	9.76	9.50
107,500 bbl. furn. and handling cement	3.15	3.05	3.20	4.00	3.84	3.75
820,500 lb. furn. and placing reinf. bars	.085	.085	.10	.09	.087	.10
67,000 lb. placing reinf. bars furn. by the Gov't	.03	.03	.04	.04	.05	.05
1,650 sq. ft. furn. and placing ½-in. elastic filler in jts.	1.75	1.60	1.80	1.50	1.66	1.80
60 sq. ft. furn. and placing ¾-in. elastic filler in jts.	2.00	2.40	2.40	2.00	2.12	2.25
255 sq. ft. furn. and placing 1-in. elastic filler in jts.	2.50	2.90	3.00	2.50	2.55	2.80
900 lin. ft. placing rubber water stops in jts.	2.00	1.80	1.10	2.00	1.54	1.75
4,350 lb. furn. and placing metal water stops in jts.	.60	.40	.45	.25	.42	.40
2,100 sq. ft. furn. and placing 1½-in. asph. plank on bridge floors	1.50	1.45	1.00	1.25	1.37	1.25
33.4 M.B.M. furn. and erect. untr. lumber in structs.	200.00	220.00	220.00	250.00	207.00	230.00
31.6 M.B.M. furn. and erect. tr. timber in structs.	230.00	260.00	280.00	350.00	248.00	280.00
35.5 M.B.M. erecting timber furn. by the Gov't	100.00	125.00	110.00	150.00	180.00	90.00
14 cattle guards furn. matl. and const. cattle gds.	355.00	320.00	350.00	500.00	300.00	400.00
13 mi. furn. and erect. barbed-wire right-of-way fence	890.00	960.00	$1,000	$1,400	$1,033	$1,200
3 mi. furn. and erect. comb. barbed-wire and woven-wire right-of-way fence	$1,075	$1,160	$1,100	$1,800	$1,190	$1,500
6 gates furn. and inst. metal fence gates	50.00	45.00	50.00	70.00	59.00	50.00
2,700 lin. ft. constr. graded sand drains	1.00	1.40	1.70	2.00	1.51	1.50
18,000 lin. ft. const. graded sand and grav. drains with 6-in. sewer pipe	1.00	1.40	2.25	2.50	2.28	2.25
300 lin. ft. laying 6-in. sewer pipe with cem. jts. for drain outlets	1.30	1.00	3.00	1.50	1.56	1.85
16 outlet boxes furn. and inst. outlet boxes for drs.	60.00	30.00	120.00	85.00	34.90	25.00
1,300 lin. ft. furn. and laying 15-in. diam. std. str. reinf. conc. pipe with rubber gasket or copper seal jts.	6.50	7.25	8.00	7.50	6.54	6.00
300 lin. ft. furn. and lay. 24-in. diam. extra str. reinf. conc. pipe w. rubber gasket or copper seal jts.	13.00	12.80	13.00	15.00	11.65	12.00
600 lin. ft. furn. and lay. 18-in. diam. std. str. reinf. conc. culvert pipe	5.20	4.10	5.00	6.00	5.58	4.50
700 lin. ft. furn. and lay. 24-in. diam. std. str. reinf. conc. culvert pipe	7.00	5.10	7.00	8.00	6.95	6.50
200 lin. ft. furn. and lay. 30-in. diam. ex. str. reinf. conc. culvert pipe	11.00	11.00	10.00	14.00	11.11	11.00
100 lin. ft. laying 30-in. diam. conc. pipe furn. by the Gov't	5.00	2.40	3.00	6.00	6.50	3.00
800 lin. ft. furn. and inst. 2½-in. diam. steel pipe	1.10	1.00	2.00	2.00	.92	1.00
120 lin. ft. furn. and inst. 14-in. dia. welded st. pipe	15.00	10.00	8.25	15.00	9.68	5.70
106,300 lb. installing gates and gate hoists	.10	.18	.15	.25	.14	.12
7,500 lb. furn. and inst. miscl. metalwork	.30	.55	.30	.85	.41	.50
34,000 lb. inst. misc. metalwork	.15	.25	.18	.20	.24	.25
520 lin. ft. furn. and inst. ¾-in. diam. elect. metal. conduit	1.00	2.00	2.00	1.00	1.24	1.50
340 lin. ft. furn. and inst. 1½-in. diam. elect. metal conduit	1.50	2.60	2.50	1.50	1.77	2.00
20 lin. ft. furn. and inst. 2½-in. diam. elect. metal conduit	2.50	3.90	3.00	3.00	3.40	2.50
310 lb. furn. and inst. elect. conductors and gd. wires	.50	1.30	2.50	1.00	1.90	1.80
SCHEDULE NO. 2						
2,500,000 cu. yd. excav. for canal	.14	.14	.15	.115	.14	.16
50,000 sta. cu. yd. overhaul	.02	.02	.03	.02	.02	.02
75,500 cu. yd. compacting embankments	.40	.40	.20	.30	.30	.30
3,000 cu. yd. excav. for drainage channels and dikes	.30	.65	.25	.30	.275	.25
18,100 cu. yd. excav. for structs.	.65	1.00	.75	1.00	.78	.90
13,100 cu. yd. backfill	.60	.60	.60	.50	.44	.55
8,700 compacting backfill	3.00	4.25	3.00	3.00	3.00	3.00
674,500 sq. yd. trimming foundations for conc. lining	.28	.30	.30	.30	.34	.35
200 cu. yd. gravel subbase under piers	6.00	7.20	6.00	7.00	6.85	6.00
460 cu. yd. riprap	9.00	8.90	8.00	6.00	7.57	9.00
150 cu. yd. gravel or cr. rock bedding for riprap	7.00	6.80	6.00	5.00	5.55	5.00
4,120 cu. yd. conc. in structs.	58.00	56.00	56.00	60.00	71.39	55.00
75,150 cu. yd. conc. in unreinf. conc. canal lining	8.50	8.65	8.40	8.50	9.76	9.50
105,900 bbl. furn. and handling cement	3.15	3.05	3.20	4.00	3.84	3.75
633,700 lb. furn. and placing reinf. bars	.085	.085	.10	.09	.087	.10
50,000 lb. placing reinf. bars furn. by Gov't	.03	.03	.04	.04	.05	.05
1,350 sq. ft. furn. and placing ½-in. elastic filler in jts.	1.75	1.60	1.80	1.50	1.66	1.80
120 sq. ft. furn. and placing ¾-in. elastic filler in jts.	2.00	2.40	2.40	2.00	2.12	2.25
490 sq. ft. furn. and placing 1-in. elastic filler in jts.	2.50	2.90	3.00	2.50	2.55	2.80
700 lin. ft. placing rubber water stops in jts.	2.00	1.80	1.10	2.00	1.54	1.75
96.1 M.B.M. furn. and erect. untr. timber in structs.	200.00	225.00	220.00	250.00	207.00	230.00
70 M.B.M. erecting timber furn. by the Gov't	100.00	125.00	110.00	150.00	180.00	90.00
2 cattle guards furn. matls. and const. cattle gds.	355.00	320.00	350.00	500.00	300.00	400.00
2 mi. furn. and erecting barbed-wire right-of-way fence	890.00	960.00	$1,000	$1,400	$1,033	$1,200
1 mi. furn. and erecting comb. barbed-wire and woven-wire right-of-way fence	$1,075	$1,160	$1,100	$1,800	$1,190	$1,500
2 gates furn. and inst. metal fence gates	50.00	45.00	50.00	70.00	59.00	50.00
26,700 lin. ft. const. graded sand drains	1.00	1.40	1.70	2.00	1.50	1.50
77,000 lin. ft. const. graded sand and gravel drains with 6-in. sewer pipe	1.00	1.40	2.25	2.50	2.28	2.25
300 lin. ft. laying 6-in. sewer pipe with cem. jts. for drain outlets	1.30	1.00	3.00	1.50	1.56	1.85
100 outlet boxes furn. and inst. outlet boxes for drs.	60.00	30.00	120.00	85.00	34.90	25.00
500 lin. ft. furn. and lay. 12-in. diam. std. str. reinf. conc. pipe with rub. gasket or cop. seal jts.	5.50	6.50	7.00	7.00	5.90	5.00
1,000 lin. ft. furn. and lay. 15-in. diam. std. str. reinf. conc. pipe with rub. gasket or copper seal jts.	6.50	7.25	8.00	7.50	5.61	6.00
3,000 lin. ft. furn. and lay. 18-in. diam. std. str. reinf. conc. pipe with rub. gasket or copper seal jts.	7.50	8.10	9.00	8.50	7.52	7.00

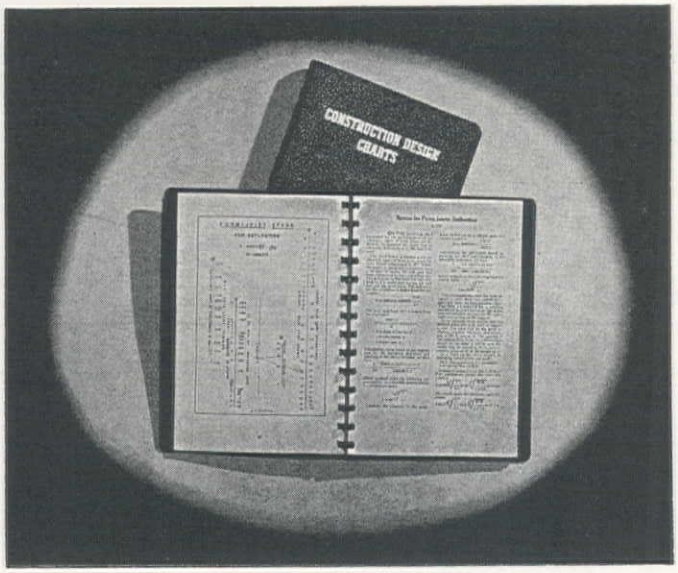
(Continued on next page)

Engineers ~ Carpenters ~ Concrete Men ~ Foremen ~ Superintendents

SOLVE ENGINEERING PROBLEMS

••••••••••AT A GLANCE!••••••••••

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



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

Here's the Solution to Your Christmas Gift Problems!

We will send CONSTRUCTION DESIGN CHARTS postage prepaid and Christmas wrapped to anyone you wish. Also, a special letter identifying you as the sender, and informing him that CONSTRUCTION DESIGN CHARTS is on the way and will be mailed to reach him by Christmas if your order is received no later than December 22.

Price

$5.00

Postpaid

California Address Add 15c Sales Tax if ordering from a

YOU GET ALL THIS...

How Nomographs Are Constructed
Concrete Design
Concrete Form Design
Earthwork
Highway Design
Hydraulics
Structural Design
Timber Design
Compressed Air Transmission
Measurement of Triangular Areas

...PLUS MUCH MORE!

MAIL THIS COUPON TODAY!

KING PUBLICATIONS, 609 Mission Street, San Francisco 5, California

YES, I want a Gift Copy of CONSTRUCTION DESIGN CHARTS sent to:

Name.....

Address.....

City..... Zone..... State.....

I enclose $5. (Add 15c if ordering from a California address) for your Special Christmas offer.

Name.....

Address.....

City..... Zone..... State.....

Position..... Company.....

EBMUD Sewer Tunnel

. . . Continued from page 80

project known as Special District No. 1, under the general direction of John S. Longwell, Chief Engineer and General Manager of the East Bay Municipal Utility District.

Robert C. Kennedy, Assistant Chief Engineer and Assistant General Manager, is coordinator for the project, and in charge of civil engineering design, with Daniel Root as Supervising Civil Engineer. H. A. Knudson, Manager, Mechanical and Electrical Division, is in charge of mechanical and electrical design, assisted by O. B. Ackerly, Jr., as supervising mechanical engineer. All field investigation and construction is under J. D. DeCosta, Manager, Water Distribution Division, assisted by W. R. McLean, Supervising Civil Engineer. The writers are engaged as inspectors of pipe installation and concrete on the North Interceptor under Robert Murdock, Resident Engineer, and Dan Prodanovich, Senior Civil Engineer.

McDONALD

TRIVITT

Elof Gustafson is general superintendent for Stolte, Inc. Assistant superintendents are Marvin W. McDonald, tunnels, and George Trivitt, open cut work.

San Joaquin Pipeline No. 2

. . . Continued from page 85

at a later date, begins at Oakdale Portal in the Sierra Range and extends west to the vicinity of the town of Oakdale, a distance of 14.5 mi. Section C is 1.1 mi. in length and extends mostly through a siphon section beneath the San Joaquin River. Section D begins at the river crossing and extends the remaining 10.7 mi. through the Valley to end at the Tesla Portal on the San Francisco peninsula.

The pipelines were constructed under the supervision of the Hetch Hetchy Water Supply, Power and Utilities Engineering Bureau, of which A. O. Olson is manager and chief engineer. The project was designed by W. W. Helbush, senior civil engineer, and H. E. Lloyd was chief construction engineer. Inspectors for the City were Glenn Smith, excavation; Bill Jacobs, pipe laying; H. T. May, welding; Oliver Braeske, airtesting; C. C. Ball, outside joints; and Robert Dahl, backfill operations.

—Photographs by Gene Edwards.

225 lin. ft. furn. and lay. 12-in. diam. std. str. reinf. conc. pipe with rub. gasket or copper seal jts.	9.00	9.10	10.00	10.00	8.46	8.20
300 lin. ft. furn. and lay. 24-in. diam. extra str. reinf. conc. pipe with rub. gasket or copper seal jts.	13.00	12.80	13.00	15.00	11.65	12.00
450 lin. ft. furn. and lay. 30-in. diam. extra str. reinf. conc. pipe with rub. gasket or copper seal jts.	16.00	18.10	18.00	19.00	15.60	15.00
225 lin. ft. furn. and lay. 36-in. diam. extra str. reinf. conc. pipe with rub. gasket or copper seal jts.	21.00	21.60	22.00	24.00	19.82	19.00
600 lin. ft. furn. and lay. 18-in. diam. std. str. reinf. conc. culvert pipe	5.00	4.10	5.00	6.00	5.11	4.50
200 lin. ft. furn. and lay. 24-in. diam. std. str. reinf. conc. culvert pipe	7.00	5.10	7.00	8.00	6.48	6.50
300 lin. ft. furn. and lay. 30-in. diam. extra str. reinf. conc. culvert pipe	11.00	11.00	10.00	14.00	11.47	11.00
300 lin. ft. laying 30-in. diam. conc. pipe furn. by the Gov't.	5.00	2.40	3.00	6.00	6.49	3.00
Lump sum, furn. and inst. 48-in. diam. conc. pipe and 2-in. diam. asbestos-cement pipe in turnout	450.00	300.00	500.00	350.00	415.00	200.00
500 lin. ft. furn. and instl. 12-in. diam. welded steel pipe	12.50	7.20	8.00	14.00	10.21	4.85
400 lin. ft. furn. and inst. 14-in. diam. welded steel pipe	12.50	10.00	8.25	15.00	10.00	5.70
700 lin. ft. furn. and inst. 16-in. diam. welded steel pipe	16.00	11.30	10.50	20.00	14.51	6.50
650 lin. ft. furn. and inst. 18-in. diam. welded steel pipe	17.00	17.25	11.00	21.00	15.75	7.40
150 lin. ft. furn. and inst. 20-in. diam. welded steel pipe	26.00	18.80	17.00	30.00	22.42	11.00
200 lin. ft. furn. and inst. 24-in. diam. welded steel pipe	28.00	22.00	20.00	38.00	27.93	13.00
275 lin. ft. furn. and inst. 30-in. diam. welded steel pipe	38.00	32.25	26.00	48.00	35.40	16.40
150 lin. ft. furn. and inst. 36-in. diam. welded steel pipe	45.00	45.00	30.00	63.00	45.67	20.00
50,700 lb. installing gates and gate hoists	.10	.18	.15	.25	.14	.12
7,900 lb. furn. and inst. miscl. metalwork	.30	.55	.30	.35	.41	.50
69,000 lb. installing miscl. metalwork	.15	.25	.18	.20	.24	.25
260 lin. ft. furn. and inst. ¾-in. diam. electrical metal conduit	1.00	2.00	2.00	1.00	1.24	1.50
210 lin. ft. furn. and inst. 1½-in. diam. elect. metal conduit	1.50	2.60	2.50	1.50	1.77	2.00
10 lin. ft. furn. and inst. 2½-in. diam. elect. metal conduit	2.50	3.90	3.00	3.00	3.39	2.50
150 lb. furn. and inst. elect. conductors and gd. wire	.50	1.30	2.50	1.00	1.90	1.80

Bridge and Grade Separation . . .

Oregon—Jackson County—State—Concrete and Steel Bridge

Lindstrom Bros., Inc., Portland, Ore., were low bidders before the Oregon State Highway Department at $130,950 for construction of a reinforced concrete and steel bridge, called the Rogue River Bridge, in Jackson County. Unit bids were submitted as follows:

(1) Lindstrom Bros., Inc. $130,950
(2) Tom Lillebo 136,815
(3) Snook Bros. 139,433
(4) Hamilton & Thoms $145,530
(5) VaDare Construction Co. 146,490
(6) General Construction Co. 174,370

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, shoring, cribbing, etc.	$5,500	$7,500	$12,200	$5,000	$10,000	$15,240
320 cu. yd. struct. excav.	6.00	7.00	5.00	10.00	8.00	10.00
30 cu. yd. struct. excav. below elevations shown	10.00	10.00	6.00	20.00	10.00	15.00
750 cu. yd. Class "A" concrete	55.00	54.00	47.50	55.00	50.00	80.00
123,000 lb. metal reinforcement	.10	.105	.096	.12	.11	.12
900 lin. ft. metal rail	12.00	12.00	10.00	12.00	10.00	12.00
368,000 lb. structural steel	.16	.17	.1875	.19	.20	.19

New Mexico—McKinley County—State—Bridge

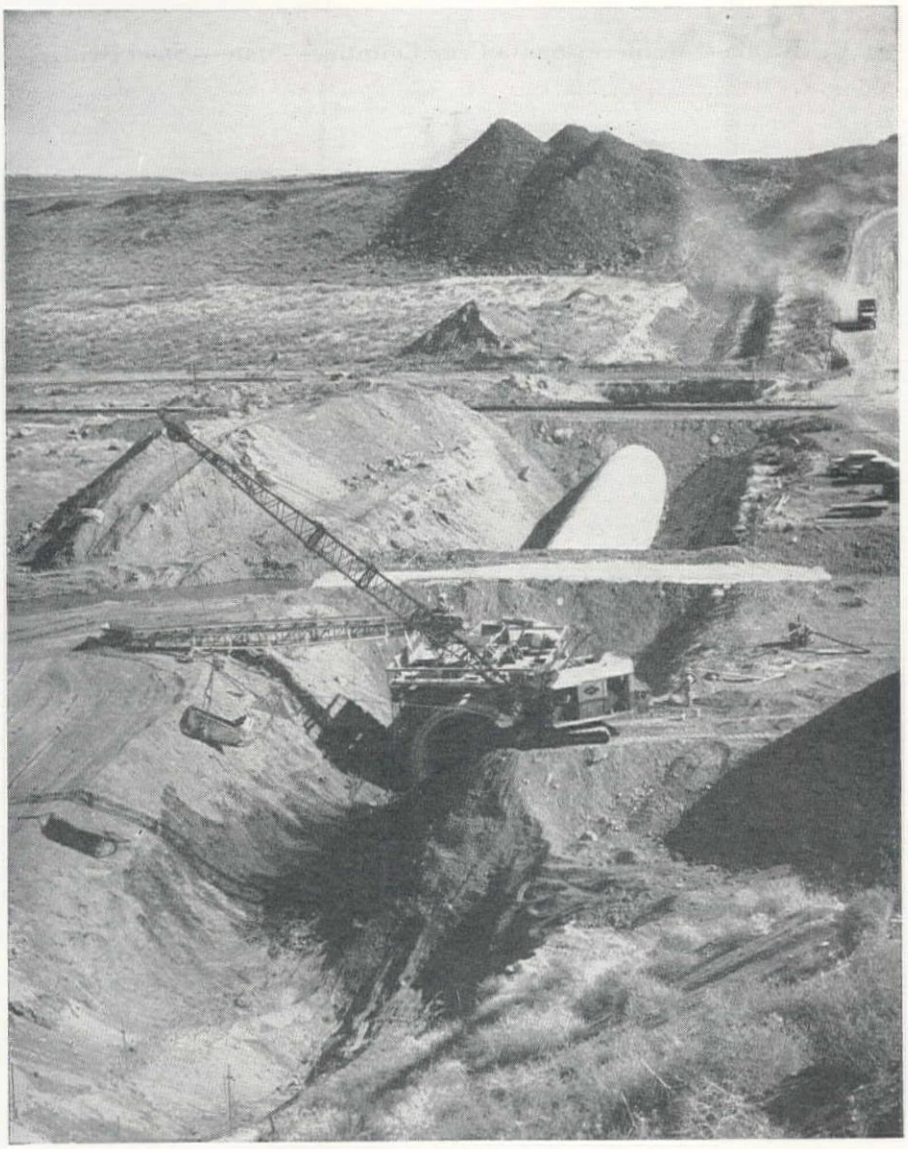
J. H. Ryan, Albuquerque, was low bidder before the New Mexico State Highway Department and was awarded a $425,557 contract for grading and structures on U. S. Highway 66, 1.514 mi., between Gallup, N. M., and the Arizona-New Mexico state line. Unit bids were submitted as follows:

(1) J. H. Ryan $425,557
(2) Brown Construction Co. 433,204
(3) Sharp & Fellows Construction Co. 435,915
(4) Miller & Smith Contractors 401,159
(5) Skousen-Hise Construction Co. $478,495
(6) Vinnell & Co., Inc. 519,622
(7) Engineer's estimate 457,583

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump sum, removal of old structs.	$20,000	$6,000	$22,500	$20,000	$1,700	$15,000	$26,600
Lump sum, removal of obstructions	100.00	100.00	120.00	100.00	100.00	100.00	100.00
133,700 cu. yd. excav.—unclassified	.30	.28	.36	.45	.37	.45	.35
75 cu. yd. excav. for structs.	2.00	2.00	3.00	2.50	3.00	2.60	2.00
135 cu. yd. excav. for pipe culverts	2.00	2.00	2.50	2.50	3.00	2.00	2.00
58,500 sta. yd. overhaul	.02	.01	.02	.02	.025	.01	.02
235,000 ¼ mi. yd. haul	.05	.05	.05	.06	.08	.065	.06
54,300 ton mi. haul	.06	.08	.16	.06	.09	.07	.06
309 hr. mechanical tamping	4.00	4.00	4.00	5.00	7.00	6.50	5.00
1,860 hr. rolling—sheepsfoot roller	4.00	4.00	4.20	5.00	5.00	6.50	5.00
60 hr. rolling—steel tired roller	10.00	6.00	6.00	7.50	6.00	10.00	5.00
145 hr. rolling—pneumatic tired roller	6.00	4.00	4.00	6.00	4.00	7.00	5.00
8,970 ton ballast	.75	1.09	.80	1.00	1.10	1.65	.65
6,160 ton leveling course	.70	.90	.95	.50	1.10	1.80	.55
3,740 M gal. watering	1.50	3.00	2.50	1.25	2.00	2.50	3.00
63.7 cu. yd. Class "AE-AR" concrete	40.00	40.00	61.00	40.00	55.00	60.00	40.00
193,164 lb. reinforcing steel	.095	.11	.11	.11	.10	.12	.12
172 lin. ft. stand. reinf. conc. pipe—24-in. dia.	6.00	5.50	7.50	5.50	6.00	7.00	5.25
340 lin. ft. stand. reinf. conc. pipe—30-in. dia.	8.00	7.00	10.40	7.00	8.00	9.00	7.00
166 lin. ft. corr. galv. metal culv. pipe—24-in. dia.	5.00	5.00	8.00	4.50	7.00	6.00	4.50
1 ea. monument and marker	50.00	50.00	50.00	50.00	100.00	30.00	50.00
7,470 lin. ft. galv. barbed wire fence	.15	.16	.14	.15	.20	.16	.15
2 ea. gates—Texas type	10.00	10.00	10.00	10.00	10.00	10.00	6.00
19 ea. bracing	10.00	5.00	5.00	5.00	5.00	2.50	5.00
96 ea. treat timb. warn. posts—reflect. (6-in. diam.)	7.00	8.00	8.00	7.50	10.00	5.00	7.50
23 ea. right-of-way markers	7.00	6.00	6.00	6.50	7.00	10.00	5.00
465 lin. ft. removing and rebuilding fence	.20	.10	.15	.15	.20	.16	.12
0.5 mi. obliterating old road	500.00	200.00	300.00	400.00	500.00	$1,000	200.00
855 bbl. cutback asph., Type MC-3	6.25	7.00	6.25	6.15	7.00	7.00	7.00

(Continued on next page)

Reserve Space Now IN THE SECOND ANNUAL REVIEW & FORECAST ISSUE OF WESTERN CONSTRUCTION NEWS



Forms Close December 10

Out January 15

GIVE your 1950 campaign a profitable start by using dominant space in WESTERN CONSTRUCTION NEWS' Annual Review & Forecast issue. You'll get sure-fire reader interest because it will contain:

1. **A review of the West's most important construction projects of 1949.**
2. **Surveys of work anticipated by the U. S. Bureau of Reclamation; U. S. Engineers; Public Roads Administration; and National Parks Service.**
3. **An outline of future State highway work, and the probable dollar volume.**
4. **Summaries of important municipal improvement projects — water supply, sewage disposal, street work.**
5. **Review of the expansion plans of private industry in the West.**

You'll reach 12,000 readers who are actively engaged in planning, engineering, and building the construction projects in the Western half of the U. S. Many will keep this annual issue for year-'round reference. So take advantage of this extra interest in our Annual Review and Forecast issue and send your space reservation NOW, stating whether bleed or color.

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

609 MISSION STREET SAN FRANCISCO 5, CALIF.

Telephone YUkon 2-4343

ADVERTISING OFFICES

NEW YORK OFFICE
Franklin B. Lyons, District Manager
Weston Road, Georgetown, Conn.
Telephone Georgetown 374

CHICAGO OFFICE
A. C. Petersen, District Manager
3423 Prairie Ave., Brookfield, Ill.
Telephone Brookfield 532

CLEVELAND OFFICE
Richard C. Burns, District Manager
7708 Deerfield Dr., Cleveland 29, O.
Telephone DUnkirk 4-9462

LOS ANGELES OFFICE
Clarence G. Beardslee, District Manager
3757 Wilshire Blvd., Los Angeles 5
Telephone FItzroy 9462

SAN FRANCISCO OFFICE
R. C. Williams, District Manager
609 Mission Street, San Francisco 5; Telephone YUkon 2-4343

New Equipment

. . . Continued from page 107

pieces are rustproofed and ribbed for extra strength. Only two nails are required for each bridge. The bridging is first placed in line over the top of one joist before the flooring is laid and prongs are driven and countersunk with one hammer blow. Flooring then can be laid before further work is done. Next step includes driving one nail through the bridging into the face of the two adjacent joists. The final step involves bending each end of the bridging around the base of the joists and driving the prongs into place. Strength of the bridging in tension is 2,000 lb., stronger than any wood bridging.

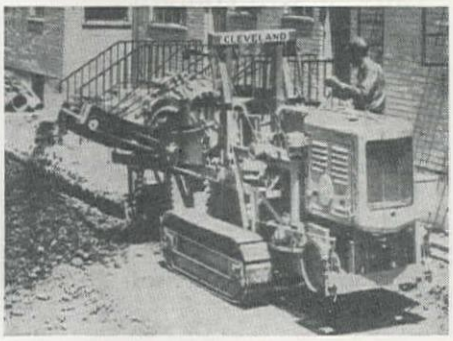
1111

Small Compact Ditcher

Manufacturer: Cleveland Trencher Co., Cleveland, Ohio.

Equipment: Baby Digger Model 92, especially adapted for gas, water and sewer house services.

Features claimed: Chief advantages of the new machine are its small compact size, allowing easy maneuvering in tight places and quick moves from job to job on its own rubber-tired tilt-bed electric-braked trailer, and its ditch capacities up to 5 ft. deep



and 10 to 20 in. wide. Other new features are: Clog-proof crawler tracks; operator-controlled conveyor giving instant control of the spoil bank; patented "Presto-Points" for quick and easy replacement of rooter teeth, and a crumbing shoe giving perfect grading and clean trench bottom, and which can be swung up and away to permit digging right up to foundation, walls and trees.

1112

Magnesium Wall Forms

Manufacturer: Symons Clamp and Mfg. Co., Chicago, Ill.

Equipment: Panel wall forms for concrete.

Features claimed: Magnesium's light weight makes the forms easily portable; the panels weigh less than 3 lb. per sq. ft. Through the use of 3/16-in. plate, high rigidity is obtained to insure a smooth surfaced wall without waves or dents. The forms will not rust or swell when wet, nor contract when dry. The magnesium possesses a high degree of resistance to corrosion by the alkalies in concrete.

1113

Hydraulic Coupling

Manufacturer: Hudlen Hydraulic Coupling Co., El Monte, Calif.

Equipment: Hudlen Safety Breakaway Coupling.

Features claimed: Ideally suited for tractors and road equipment, the coupling can

1,505 ton top course surfacing	.70	1.00	.90	.65	1.10	2.00	.55
1,392 mi. mixing asph. and aggregate	800.00	800.00	700.00	750.00	$1,500	800.00	800.00
157 bbl. cutback asph., Type RC-4	6.50	7.00	6.80	6.15	8.00	8.00	7.00
220 ton aggregate for seal coat	7.00	7.00	6.00	10.00	10.00	6.00	6.00
1.392 mi. asphalt processed base	800.00	800.00	700.00	750.00	$1,000	700.00	600.00
895 cu. yd. granular backfill	2.00	2.00	1.50	2.25	2.00	2.50	1.50
4 ea. drop inlet	150.00	600.00	220.00	150.00	300.00	200.00	150.00
1,084 cu. yd. excav. for structs.	5.50	5.00	5.25	5.00	6.00	7.50	7.50
620.3 cu. yd. Cl. "AE-AR" conc. superstruct.	60.00	60.00	55.50	55.00	70.00	61.50	50.00
957.7 cu. yd. Cl. "AE-AR" conc. substruct.	60.00	60.00	46.50	50.00	65.00	61.50	50.00
827,100 lb. structural steel	.148	.15	.128	.14	.13	.16	.135
17,870 lin. ft. treated timber piling	1.60	2.00	2.70	3.00	3.10	2.50	3.25
2,575 cu. yd. derrick stone riprap	6.00	6.00	4.50	7.50	9.00	8.00	6.50
2,320 cu. yd. excav. for riprap	2.00	2.00	2.25	1.50	3.00	2 60	2.00
1,100 lin. ft. wire rope—1-in. diam.	1.50	1.00	1.15	1.75	2.00	1.00	1.00
36 ea. treated timber anchor logs	12.00	10.00	8.50	10.00	15.00	20.00	2.00
75,075 lb. railroad rails and fittings	.07	.09	.75	.08	.08	.125	.10
430 cu. yd. excav. for wire rope & anchor logs	3.00	3.00	2.25	1.50	4.00	4.00	2.00

California—Monterey-Santa Cruz Counties—State—Steel Bridge

Dan Caputo & Ed. Keeble, San Jose, Calif., were low bidders at $476,581 before the Calif. Division of Highways for construction of a structural steel beam bridge on reinforced concrete piers and abutments on timber piles between Watsonville Junction and Front St. in Watsonville. Unit bids were submitted by the following:

(1)	Dan Caputo & Ed. Keeble	$476,581	
(2)	Granite Construction Co.	488,090	
(3)	Chas. McClosky Co.	492,813	
(4)	C. B. Tuttle Co.	498,112	
(5)	Bates & Rogers Construction Co.	503,994	
(6)	Chittenden & Chittenden	506,553	
(7)	Fredrickson Bros.	513,093	
(8)	Fredrickson & Watson Const. Co. & M. K. Corp.	521,812	
(9)	Lord & Bishop	$541,697	
(10)	Barrett & Hilp	541,873	
(11)	Elmer J. Warner	543,359	
(12)	Underground Construction Co.	554,057	
(13)	Erickson, Phillips & Weisberg	558,888	
(14)	Guy F. Atkinson Co.	577,062	
(15)	Judson Pacific-Murphy Corp.	577,581	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
275 cu. yd. removing conc.	10.00	10.00	14.00	25.00	5.55	20.00	12.00
Lump sum, remov. exist. bridge superstruct.	$8,000	$18,791	$9,000	$10,000	$14,570	$28,000	$25,000
16,600 cu. yd. road. excav.	.60	.60	.80	1.00	1.13	.75	.80
3,600 cu. yd. struct. excav. (bridge)	8.00	5.00	7.00	7.00	6.00	4.00	6.00
1,450 cu. yd. struct. excav.	2.50	2.50	3.30	2.00	3.55	3.00	3.00
4,700 tons imp. borrow	.80	1.00	1.00	2.00	1.20	1.05	1.15
5,000 cu. yd. salv. surf. and base	.60	1.00	.60	1.00	.85	1.05	.75
Lump sum, dev. wat. sup. & furn. wat. equip.	$1,000	$2,000	$1,500	$1,000	$1,540	$1,000	$1,500
700 M gal. applying water	1.50	1.50	2.00	2.00	1.35	2.20	2.10
14,700 tons crusher run base	2.10	2.10	2.00	2.00	2.35	2.20	2.10
38.5 tons liq. asph. SC-2 (pr. ct.)	45.00	36.00	40.00	35.00	24.70	30.00	30.00
6,590 tons min. aggr. (P.M.S.)	5.00	5.10	5.50	4.00	5.60	4.80	4.50
362 tons pav. asph. (P.M.S.)	20.00	25.00	18.50	25.00	23.10	22.00	22.00
140 lin. ft. raised bars & traff. fin. (P.M.S.)	1.50	1.00	2.00	1.50	1.03	1.00	1.25
27 tons asph. emuls. (pt. binder & st. ct.)	50.00	40.00	40.00	40.00	43.90	35.00	40.00
270 tons screen (sl. ct.)	6.00	6 00	5.00	5.00	5.40	5.00	5.00
2,375 cu. yd. Cl. "A" P.C.C. (struct.)	44.00	42.00	50.00	40.00	50.55	50.75	48.00
7.12 cu. yd. Cl. "A" P.C.C. (foot. blocks)	30.00	20.00	20.00	40.00	17.80	25.00	28.00
14 lin. ft. rubber waterstops	4.00	3.00	5.00	3.00	2.80	4.60	3.00
1,155,000 lb. struct. steel	.085	.09	.09	.095	.083	.075	.09
280 lb. misc. steel	1.00	.40	.60	.60	.60	.50	.45
19,269 lin. ft. furn. untr. timber piling	.64	.60	.60	.51	.56	.76	.62
6,881 lin. ft. furn. tr. timber piling	1.35	1.25	1.25	1.30	1.15	1.50	1.35
520 ea. driving piles	33.50	50.00	30.00	40.00	38.90	47.00	40.00
370 cu. yd. Cl. "A" P.C.C. (curbs and gutters)	28.00	33.00	30.00	30.00	35.95	35.00	40.00
95 cu. yd. Cl. "A" P.C.C. (sdwks. and drive.)	28.00	22.80	25.00	30.00	26.30	33.00	37.00
80 lin. ft. metal plate guard railing	4.00	3.00	6.00	4.00	3.60	3.00	4.00
1,062 lin. ft. steel railing	8.50	10.00	7.60	9.00	7.85	7.50	8.70
17 lin. ft. pipe hand railing	6.00	10.00	6.00	6.00	5.30	5.00	5.20
4 ea. metal guide posts	5.00	7.00	10.00	5.00	4.75	5.00	4.00
2 ea. horiz. reflect. units	10.00	10.00	15.00	10.00	6.80	5.00	5.75
610 lin. ft. 24-in. reinf. conc. pipe culv. (std. str.)	5.00	4.50	6.50	5.00	7.45	8.00	5.00
480 lin. ft. 36-in. reinf. conc. pipe culv. (std. str.)	8.50	8.60	11.00	8.50	14.05	15.60	8.50
10 lin. ft. 24-in. C.M.P. (14-ga.)	5.00	5.00	10.00	5.00	6.30	5.50	4.50
318,100 lb. bar reinf. steel	.075	.09	.08	.08	.07	.08	.077
3 ea. manhole frames and covers	60.00	40.00	75.00	50.00	69.75	50.00	40.00
3 ea. remodeling manholes	75.00	50.00	150.00	25.00	98.25	50.00	100.00
4 ea. drop inlet frames and grates	75.00	75.00	100.00	70.00	85.85	50.00	60.00
6 ea. adjust. drop inlet frames and grates to grade	50.00	32.00	50.00	25.00	52.00	50.00	75.00
900 lin. ft. temp. guard rail	3.00	2.00	3.00	3.00	2.75	2.00	2.50
Lump sum, traffic signal and light. system	$13,500	$13,134	$12,000	$14,000	$12,909	$11,750	$14,000
Lump sum, bridge light. system	$4,500	$3,500	$3,500	$4,000	$4,026	$2,550	$4,500

be installed quickly without the use of tools, chains, or brackets, and can be instantly and safely reconnected by hand against pressures up to 1,500 psi. It affords full unrestricted flow in ⅜-in., ½-in., ¾-in., and 1-in. sizes, and automatically seals the hose ends before the connection breaks. This sealing and locking feature before the ports are opened to release the trapped pressure protects the operator from receiving an oil bath.

1114

Dehumidifier

Manufacturer: Dryomatic Corp. of America, Baltimore, Maryland.

Equipment: Absorption type dry conditioner.

Features claimed: The new model is effective for humidity control in adaptable areas up to 8,000 cu. ft. It is extremely quiet in operation. Its 1/100-hp. motor operates a rotor type of fan which moves 32 cu. ft. of air a minute through the unit. Standard equipment also includes a removable air-filter which cleans out impurities before the air is dried.

1115

Stainless Steel Bituminous Distributor

Manufacturer: E. D. Etnyre & Co., Oregon, Ill.

Equipment: Large size distributor with stainless steel jacketing and heads.

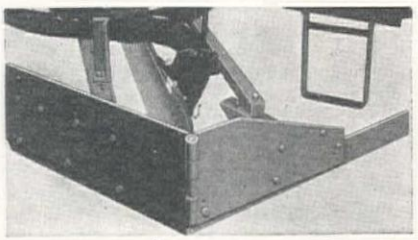
Features claimed: These "black-toppers" carry 3,500 gal. and were engineered to take a maximum load and still comply with weight requirements of the states in which they will be used. Basically, each machine is an Etnyre FX-400 Style D distributor having low pressure burners and a 24-ft. full circulating spray bar with relieving sections. The tank proper is 32 ft., 6 in. long with heating flues running the entire length of tank. The equipment is mounted on a specially engineered highway tandem axle semi-trailer.

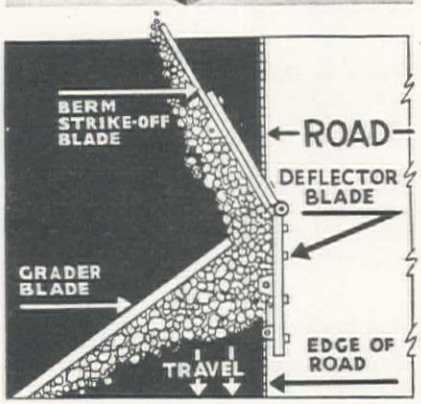
1116

Berm Shaper Attachment

Manufacturer: Galion Iron Works & Mfg Co., Galion, Ohio.

Equipment: Attachment designed to fill worn spots and replace the berm flush with





the surface of the pavement in one operation.

Features claimed: The attachment consists of a deflector plate, a distributor or strike-off blade, and connecting parts. It is attached to and works in conjunction with the motor grader moldboard and circle. The deflector plate lines up squarely with the front and rear wheels of the grader, and rides on and parallel with the edge of the pavement. The grader blade reshapes the uneven berm. The excss material flows off the end of the grader blade against the deflector plate of the attachment, and passes on to the strike-off blade. The concentration of excess material in the corner of the deflector assures a complete filling and reforming of the berm against the edge of the pavement.

1117

Electronic Detectors

Manufacturer: B. F. Klein, Santa Barbara, Calif.

Equipment: Model 87 pipe locator, model L-46 leak detector, and model 620 box and valve locator.

Features claimed: The pipe locator will trace any line, pipe, or cable accurately as fast as the operator can walk. At a distance beyond the dead end equal to the depth of the pipe, the signal fades out. Under favorable conditions, a leak can be found by the leak detector simply by placing the microphone on the pavement above the pipe, or the unit can be used to follow underground drill bits by detecting the sound of the bit as it bores through the ground. The valve and box locator can be operated by untrained personnel. It is simply carried over the ground and when a metallic object is passed over, a loud, sharp signal tone is heard in the headset.

1118

Hydraulic Power Digger

Manufacturer: Sherman Products, Inc., Royal Oak, Mich.

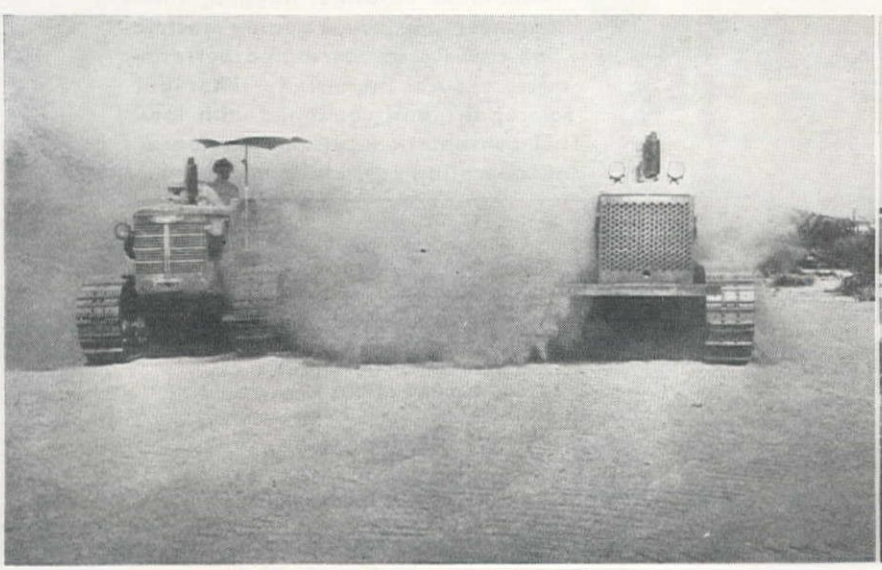
Equipment: Sherman Power Digger.

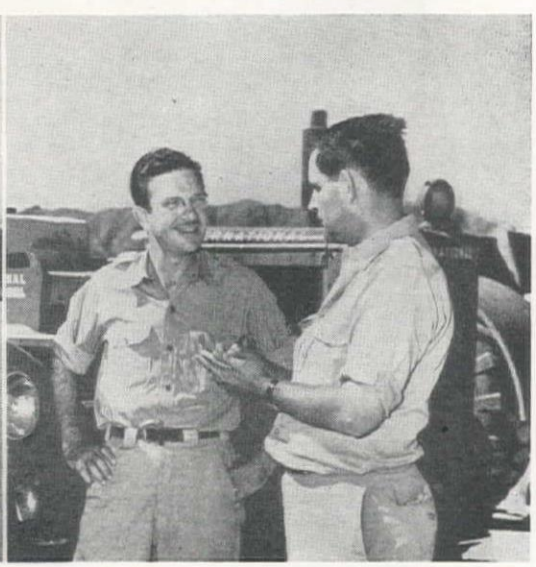
Features claimed: The digger works behind the tractor or at an angle, and dumps on either side of the tractor. All digger motions are hydraulic. The hydraulic pump

New Test Space for International Harvester

A tract of land consisting of more than 4,000 acres, located about 23 mi. south of Phoenix, Ariz., in the foothills of the Salt River Mountains, will become the site of INTERNATIONAL HARVESTER's combined test facility for its Industrial Power and Motor Truck Divisions, **H. T. Reishus** and **W. C. Schumacher,** general managers, respectively, of the two divisions, announced recently. The area, leased from the Arizona State Land Department, has been used as a testing ground for International Harvester's line of industrial power equipment since 1946. The officials pointed out that although the area will be used jointly by both operating divisions, each will carry on its own separate testing projects which will be supervised by permanent working forces of industrial power and motor truck engineering personnel. A new building, containing more than 9,000 sq. ft. of floor space, has been constructed to serve as headquarters for the motor truck testing facility. **John H. Smethers** has been appointed product development field engineer in charge of the motor truck testing project. The industrial power project will continue under the supervision of **J. A. Wesson,** who has been in charge of the company's industrial power test activities at Phoenix since 1947.

Smethers, at left, discusses operating conditions as Wesson takes field notes.





operated from a take-off on the power shaft, forces the shovel through the digging action while the tractor engine is at half-throttle. Protection is provided for the digger by a relief valve which by-passes pressure when the shovel reaches the limit of any of its motions. The shovel has a below ground reach of six feet and an 11-ft. digging reach behind the tractor. The swing arc is 93 degrees and the unit operates at the rate of 50 lin. ft. per hr. on a 6-ft. deep trench. The standard shovel cuts an 18-in. wide trench and has a capacity of 3.5 cu. ft.

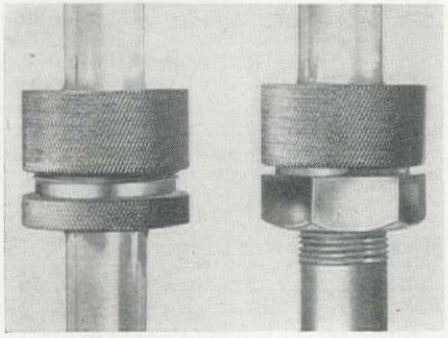
1119

Threaded Metal Coupling

Manufacturer: Fischer & Porter Co., Hatboro, Pa.

Equipment: Coupling for use with Pyrex glass pipe lines.

Features claimed: The new coupling greatly simplifies the installation of glass piping by replacing 3-bolt triangular metal flanges. The use of wrenches is no longer necessary and perfect alignment is assured.



Danger of breakage due to uneven take-up is eliminated. Metal couplings are available from stock in four sizes from ¼ to 1 in.

1120

Snow Plow Attachments

Manufacturer: Frank G. Hough Co., Libertyville, Ill.

Equipment: "V" and reversible blade type plows for the 4 wheel drive, 1½-cu. yd. Hough Model HM Payloader.

Features claimed: These plows readily interchange with the bucket to make this shovel as useful in the winter for snow removal as it is in the construction season for earth and material handling work. The Payloader is equipped with a 75-hp. gasoline or Diesel engine driving all four wheels, large earthmover tires for traction, and four speeds in each direction up to 24 mph.

1121

Hard Boiled Hat

Manufacturer: E. D. Bullard Co., San Francisco, Calif.

Equipment: Impregnated Fiberglas safety hat.

Features claimed: The Bullard Glass Hard Boiled Hat is made of resin-impregnated Fiberglas that under test has proved impervious to moisture and acids and passes all dielectric tests. The crown is non-shattering and non-deteriorating with age. The manufacturer can produce the hat in practically any color desired. The colors are permanent as the pigment is impregnated throughout the material. Superior resistance to radiant heat is expected to lower incidence of sun and heat stroke among crews.

1122

Bin Storage Units

Manufacturer: Lyon Metal Products, Inc., Aurora, Ill.

Equipment: Metal bins for flat storage, tool storage and box and small part storage.

Features claimed: All bin units are 3 ft. wide, one foot deep and 6½ ft. high. Dividers in all bins are adjustable horizontally each inch with no bolts, nuts or tools required. Shelves are adjustable up and down every 1½ in. A variety of accessories, including shelf boxes and sloping bins and dividers, are available.

1123

Overhead Threading Attachment

Manufacturer: Warner & Swasey Co., Cleveland, Ohio.

Equipment: Turret lathe overhead threading attachment.

Features claimed: The attachment, which speeds single-point chasing operations in non-ferrous metals, is mounted at the rear of the turret lathe headstock and extends a screw-adjustment slide tool holder to the right of the spindle. A fixed

overhead bar supports a counterweighted chasing bar on which a guide arm and chasing tool arm are located. When the chasing tool arm is lowered, a follower at the headstock end of the chasing bar engages a leader driven by gears from the spindle to move the bar and attached tool longitudinally in accordance with the pitch of the leader-follower combination chosen. An adjustable bracket fixed to the head of the machine provides a slide on which the guide arm rests for positive guiding of the chasing tool. The slide may be tilted so that a pipe thread can be cut.

1124

First Compressible Valve Lubricant

Manufacturer: Rockwell Mfg. Co., Nordstrom Valve Division, Pittsburgh, Pa.

Equipment: Hypermatic energized valve lubricant.

Features claimed: Users of pressurized plug valves may derive three distinct advantages from Hypermatic automatic lubrication: A decrease in the frequency of valve lubrication, maintenance of the valves in a state of 100% lubrication, and maintenance of the valves in operating condition without

GEORGE F. SCHERER, Hypermatic's inventor, traces path of lubricant in model valve.

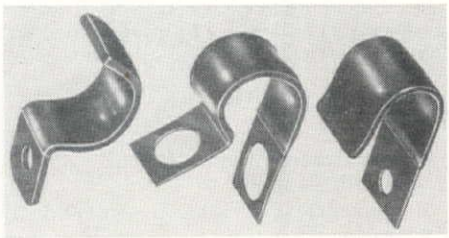
first stopping to relubricate. Performance of Hypermatic in a closed reservoir may be compared to the action of a tank of compressed air, that by reason of its compression has stored within itself sufficient energy to permit intermittent or continuous work to be done as the air is bled off to perform work. Hypermatic, compressed to a similarly energized condition within a valve chamber, performs the work of renewing the lubricant sealing surfaces. Compared to a standard lubricant, which is incompressible and maintains pressure within the valve only for a short time, the new product continues to exert pressure to fill lubrication voids until the confined pressure drops to a minimum of 50 psi. Full automatic lubrication is restored by adding more Hypermatic, either by insertion of the material in stick form or by a high pressure grease gun. The automatic performance could be duplicated to some extent with a standard, non-compressible lubricant, provided that the lubricant screw was turned or some means were used to keep pressure on the lubricant while the valve was being turned. Since Hypermatic is self-energized, this complete lubrication is entirely automatic over a great number of valve closures.

1125

Rubber Insulated Fasteners

Manufacturer: Automotive Rubber Co., Detroit, Mich.

Equipment: Insulated clips, clamps and fasteners.



Features claimed: The rubber insulated products are designed to prevent the slipping, chaffing, cutting and rattling in the securing of wire, loom, tube, pipe, cable rod, etc. They are available in a variety of shapes and each in a wide range of sizes.

1126

Triple Backfill Tamper

Manufacturer: Gunderson-Taylor Machinery Co., Denver, Colo.

Equipment: The new Triplex tamper.

Features claimed: Built to do a three-man job with only one operator, the Triplex equals and betters the work done by four individually operated single tampers. Greater thickness of fill can be compacted to specification. Over 90% of the cylinder blow is delivered to the ground rather than in raising the tamper. The unit has less than ½-in. vertical movement while in operation, and the tamper butts are

held farther from the operator's feet. The air consumption will not exceed 105 cfm. at 100 psi., and at elevations up to 8,500 ft.

1127

Tractor-Drawn Scraper

Manufacturer: LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa.

Equipment: Unit with a capacity of 14 cu. yd. struck and 17.5 cu. yd. heaped.

Features claimed: The Model C-314 is particularly designed for use with the newer larger tractors. Feature of the unit

is its interchangeability with the scraper unit S-300 of the TS-300 Motor Scraper. By changing the main frame and tires, if necessary, and the addition of rear wheel brakes, the unit can be hooked directly to the T-300 tractor to make a high-speed, self-propelled unit.

1128

Demountable Hub Sprockets

Manufacturer: Fort Worth Steel and Machinery Co., Fort Worth, Texas.

Equipment: Stock D.H. roller chain sprockets.

Features claimed: The new sprocket is made up of a steel plate, bored and drilled, to which a machined cast iron hub is attached by heat treated cap screws. The hubs are carried in stock with bores in increments of 1/16-in. between the minimum bore size of ½-in. up to a maximum of 4-7/16 in. They are produced with standard keyway and two set screws at no extra cost. Reboring of sprockets is not necessary with D.H. units, as interchangeable hubs are carried in stock in all bore sizes.

1129

Sinker Drill

Manufacturer: Gardner-Denver Co., Quincy, Ill.

Equipment: New 45-lb. class sinker drill.

Features claimed: Known as the S48, this new sinker has drilling, rotating, and hole-cleaning characteristics that make it especially suitable for use with tungsten carbide rock bits. Designed for either wet or dry drilling, the S48 can be changed from wet to dry or to automatic air-operated water control merely by changing the easily removed gland and tube. The conversion is made without taking the drill apart and without changing the backhead.

1130

Drafting Machines

Manufacturer: L. G. Wright, Inc., Cleveland, Ohio.

Equipment: Machine mounted in the extreme right hand corner of the board instead of the center or left corner.

Features claimed: The new instrument permits free movement of the scales over the entire drawing area without interference. It is a portable unit for the individual use of technical men who want to carry the machine with them for use anywhere. Drawing area is 20 by 26 in. The ball-bearing precision drafter is accurately calibrated through eccentric adjustments built into the mechanism. Interchangeable engine-divided scales in all of the standard graduations are available. The protractor can be locked at any angle.

1131

Snow Plow Wax

Manufacturer: Speco, Inc., Cleveland, Ohio.

Equipment: Liquid wax that gives a hard, slick surface.

Features claimed: "Snow-Rem" has a high Carnauba wax content and may be applied with an ordinary paint brush or

spray gun. It also acts as an effective means of preventing rust. It helps to prevent the piling up of snow and eliminates costly delays necessitated by "clearing" or breakdowns from overloading. A plow may be placed in operation within 20 min. after application of the wax.

1132

Truck Shovels and Cranes

Manufacturer: Quick-Way Truck Shovel Co., Denver, Colo.

Equipment: Model L ½-cu. yd. power shovel or 10-ton crane, equipped with 30-ft. folding-type boom.

Features claimed: With additional attachments the model L is easily converted to a trench-hoe, dragline, or clamshell. Powered by an International U-9 engine developing 55 brake hp., the basic machine weighs 12,000 lb. For rapid clamshell operation, cable speeds are the same on both front and rear drums when lagging is used on the haulback drum. Standard equipment includes drum lagging, hold-in clutch levers with the same operational function as snap-in or toggle-in clutches, and a combination power trip and automatic tagline winder. Five-, ten- and twenty-foot boom extensions are available. Most basic parts are interchangeable with those on the Quick-Way model E.

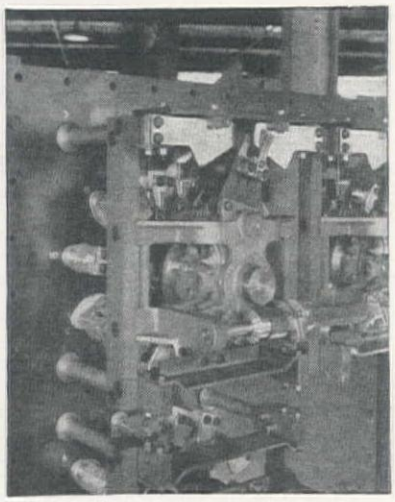
1133

Improved Load Tap Changer

Manufacturer: Westinghouse Electric Corp., Pittsburgh, Pa.

Equipment: Type URS step-type feeder voltage regulator equipped with self-contained load tap changer.

Features claimed: The changer is now standard equipment on the feeder voltage regulators up to ratings of 750 kva., three-phase, and up to 69 kv. in voltage. Smooth acceleration and deceleration with high



speed from one tap position to another and positive alignment at each position are achieved in the new URS load tap changer by means of geneva gears which permit direct connection between contacts and the driving motor. This positive drive eliminates springs, latches, and shock-absorbing equipment and has a small number of moving parts with resulting low maintenance time and expense.

1134

Portable Air Ventilators

Manufacturer: Mine Safety Appliances Co., Pittsburgh, Pa.

Equipment: Portable ventilators powered by gasoline or electricity.

Features claimed: Air is conveyed to the desired point through a 14-in. diameter, 16-ft. long canvas duct. Ducts are treated for flame and mildew resistance, and when not in use can be collapsed and folded into a compact bundle. A two-way air flow feature permits the duct to be connected to either the inlet or discharge side of the fan, allowing both dust or noxious gases to be drawn from the area, and fresh ventilating and cooling air supplied to the area. Up to 32 ft. of duct may be connected on the belt-drive models to either the inlet or discharge side of the fan. Ventilators may also be connected in series, considerably reducing power requirements.

1135

Western-Tailored Diesels

Manufacturer: White Motor Co., Cleveland, Ohio.

Equipment: New Diesel power units built especially for the Western market.

Features claimed: These Diesel models follow White's policy of using high alloy light-weight steel and proven aluminum units for high payload capacities. The Western Diesels in both trucks and trailer models will have special transmission and auxiliary transmissions that will provide additional gear reductions to fit the special requirements in the Western half of the country. White Diesel truck models include wheelbase ranges from 134 in. to 158 in. The models are powered by the Cummins NHB-600 Diesel engine of 743 cu. in. displacement, developing 200 hp. at 2100 rpm. The fuel system includes tractor oil bath type air cleaner and fuel tank capacity of 44 gal. Standard specifications include a front axle of the 12D Reverse-Elliot type and rear axle of the single reduction, full-floating type with gear ratios of 5.29:1. Propeller shafts are of the Spicer, needle bearing, 1800 series. The steering gear is of the twin lever and cam type. The instrument panel of the cab is of the built-in type with a detachable sub-panel for servicing instruments.

Tilt-Deck Trailers

1136

Manufacturer: Rogers Brothers Corp., Albion, Pa.

Equipment: Trailer with a capacity of 7 tons.

Features claimed: Road clearance of the new tilt-deck trailer is 16 in. The deck is 16 ft. by 8 ft., and 34 in. high. Air or vacuum

brakes are optional. One feature is the double acting hydraulic ram which cushions the deck when it is being raised or lowered.

1137

Reinforcing Rod Guillotine

Manufacturer: Manco Mfg. Co., Bradley, Ill.

Equipment: Manco Guillotine for cutting steel rod and wire rope.

Features claimed: Cutting ¾-in. reinforcing rod and 1-in. mild steel rod, the portable hydraulic hand tool can also be obtained with a shear-type blade that will cut both wire rope up to 1¼-in. and mild steel rod up to ¾-in. The Guillotine can also be adapted to perform crimping, swedging, and bending operations on large-diameter material. The Guillotine weighs 40 lb. and operates by hand pumping, using the operator's weight rather than strength to make the cut. The latest type oil seals prevent leakage at both maximum and zero pressure. Other new design features assure positive blade retraction when release valve is opened after cutting, and include a safety relief valve that prevents automatically any possible damage to the tool, due to overloading.

Rope Swivel

1138

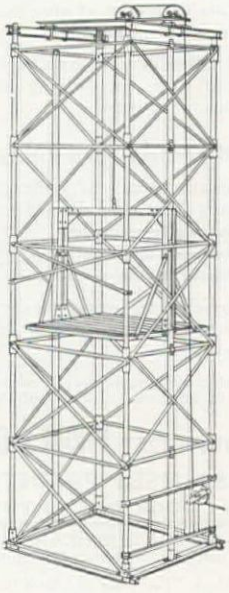
Manufacturer: Flexo Machines Co., Hampshire, Ill.

Equipment: Unit that will swivel under full load.

Features claimed: Features of the swivels with wire rope are: Both thrust and radial roller bearings; completely streamlined bodies; heavy load capacity in relation to size; permanent lubrication, and replaceable parts. The swivels are offered in five sizes.

1139

Materials Hoisting Towers



Manufacturer: Beaver Art Metal Corp., Ellwood City, Pa.

Equipment: Beaver tubular steel hoisting towers.

Features claimed: The hoisting towers are supplied in both heavy duty and light duty models. The heavy duty type, No. 5000, has a live load capacity of 5,000 lb., or a 35-cu. ft. concrete bucket, and can be erected to a maximum height of 1,200 ft. The No. 3200 light duty type has a live load capacity of 3,200 lb., and can be erected to a maximum height of 200 ft. Both towers are available in the three-wheelbarrow cage size, and in both single and double wells.

1140

Dual Impact Breaker

Manufacturer: New Holland Machine Co., New Holland, Pa.

Equipment: Model 5050 dual impact rock breaker.

Features claimed: After months of intensive testing, quantity production of the Model 5050 began this year on the biggest machine ever built to reduce material through dual impact in suspension. This heavy model has proved itself in breaking coal, linestone, slag, carbon, copper, lead-zinc ore, gypsum, talc, gravel, perlite, basalt, and many other substances.

LITERATURE FROM MANUFACTURERS...

Copies of the bulletins and catalogs described in this column may be had by addressing a request to Western Construction News, 609 Mission Street, San Francisco 5, Calif., using numbers for convenience.

★★

1141

CATERPILLAR PUMPING POWER—**Caterpillar Tractor Co.,** San Leandro, Calif., has released a 12-page illustrated booklet describing the power needs of various pumping jobs, information on the experiences and problems in industry, and general information on how various jobs in the fields of mining, irrigation, dredging, and water supply have been solved in the installation of Diesel power.

1142

HARDFACING RODS AND ELECTRODES—**American Brake Shoe Co.,** New York, N. Y., has released a four-page selector and comparison chart of hardfacing rods and electrodes. The chart lists each of Amsco's welding rods and electrodes and indicates the type of service for which each is designed. Metallurgical and physical descriptions of each rod are arranged to simplify selection by the user. For comparison purposes, competitive rods are listed which are the closest equivalents for the service noted, but not necessarily of the same composition or performance as Amsco rods.

1143

HYDRO DRILL JIBS—**Joy Manufacturing Co.,** Pittsburgh, Pa., has available a bulletin on the Joy Hydro Drill Jibs. The jib is a mounting to carry standard rock drills on either regular drill feeds or on long chain feeds, and operates hydraulically to raise and lower the drill with a minimum of effort and time. Illustrated are the jibs mounted on trucks, tunnel jumbos, and a labor and time-saving arrangement to drill holes for highway mud-jacking or sub-sealing.

1144

BOOK OF PIPE PROTECTION—The fifth edition of the Book of Pipe Protection, describing the latest advances in protection methods, has been published by Hill, Hubbell & Co., Division of **General Paint Corp.,** San Francisco. In 22 colorful pages, the book gives complete information on coating and wrapping application, Roto-Grit-Blast cleaning, pre-heating, inspection methods, delivery scheduling, and load unit shipping and field handling. The new edition has been designed as a buying aid for engineers, technicians, and purchasing executives interested in increasing efficiency of their pipe protection.

1145

STANDARDIZING FOR PROFIT—"Zoning the Job" is the title of a 12-page booklet made available from the Peoria, Ill., office of **Caterpillar Tractor Co.** Illustrated construction jobs are offered the reader who is interested in standardization of equipment. The book is based upon the statement, "Earthmovers the world over are proving the importance of zoning their jobs for maximum production at the lowest possible cost."

1146

AIR POWER—**Ingersoll-Rand Co.,** New York, N. Y., recently released a 34-page booklet entitled, "Air Power, The Key to Lower Production Costs." Completely indexed according to industry, application, and product, the booklet features 87 case histories where the use of air power on the job cut costs and where new equipment paid for itself in a short space of time.

1147

PAVING BREAKERS AND SHEETING DRIVERS—**Worthington Pump and Machinery Corp.,** Harrison, N. J., has released a six-page folder with descriptions and illustrations of their Blue Brute line of paving breakers, sheeting drivers, and sheeting driver attachments. Included in the folder are field pictures of the equipment and specifications of the models described.

1148

BENDING PIPE, TUBE, BARS, SECTIONS—**Wallace Supplies Mfg. Co.,** Chicago, Ill., has just released a pocket sized, 40-page catalog, well illustrated, containing specifications, descriptions, and data on pipe, tube, reinforcement bars, sections and structural shapes bending machines, both hand and hydraulically operated. It also has illustrations of sample bends and specially-built bending machines for specific uses.

OPPORTUNITY SECTION

No Charge to Employers

Construction Industry Specialists

ASSOCIATED PERSONNEL AGENCY

403 W. 8th Los Angeles MAdison 6-4675

Manufacturing Rights Available

- California engineer inventor wants well known equipment manufacturer to take over full manufacturing rights of entirely new type snow remover and destroyer. Drawings available to interested parties. Inventor's services available if needed. Patent research completed and patent applied for.

Reply Box 1065
WESTERN CONSTRUCTION NEWS
609 Mission Street
San Francisco 5, California

FOR RENT, LEASE OR SALE

MATERIALS AND CONSTRUCTION YARD

8 Acres. 438 ft. of Spur Track. Complete Machine Shop, Hot Plant and Bunkers.

Located on Middlefield Road, Redwood City.

Phone

MARSHALL S. HANRAHAN

Davenport 2-2563 Palo Alto, California

STOP WATER *With* FORUMULA NO. 640

A clear liquid which penetrates 1" or more into concrete, brick, stucco, etc., seals—holds 1250 lbs. per sq. ft. hydrostatic pressure. Cuts costs: Applies quickly—no mixing—no cleanup—no furring—no membranes. Write for technical data—free sample.

HAYNES PRODUCTS CO., OMAHA 3, NEBR.

EXPORT SALES REPRESENTATIVES

for both inside and outside positions. Preference will be given to qualified salesmen having technical or practical engineering training. Applicant should be under 36 years of age. Knowledge of heavy construction and mining machinery preferred. Write full particulars in first letter and enclose recent photo. Our sales organization knows about this ad. Write Box 1064, Western Construction News, 609 Mission Street, San Francisco 5, California.

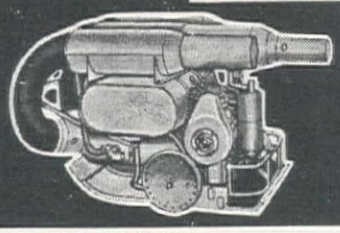
War Surplus White Motors

complete with all accessories, unused and packed for shipping, weight 1650 lb. Model 160AX-Type L-Head, 4 cycle, 6 cylinder, displacement 386 cu. in. Bore 4 in. stroke 5⅛ in. Brake H.P. 147 at 3000 r.p.m. Torque 325 ft. lb. at 1200 r.p.m. $475 F.O.B. Milwaukee, Wis.

H. R. DOUGLAS

1133 N. 25th Street, Milwaukee, Wisconsin
Phone Division 49766

HEAT PORTABLE HEATER SALE!



100,000 BTU PORTABLE
HEATER and DRYER

Stewart - Warner portable, powerful 100,000 BTU gasoline-burning Heaters, with Turbine type blowers; 1½ hp. air-cooled, ball-bearing engine; 3 ducts (45-ft. total). IMMEDIATE DELIVERY

SALE PRICE $195.00

Excellent Operating Condition **Guaranteed**

HEATING buildings, shops, sheds, barns, warehouses, tunnels, bldgs. under construction, spot-heating, etc.

DRYING plaster, paint, grains, mortar, concrete. Torrid blasts of heat

PRE-HEATING engines, tractors, trucks, equipment etc.

THAWING frozen areas, machinery, pipelines, tanks, etc.

- VAST QUANTITY OF REPLACEMENT PARTS
- Also SERVICE MANUAL & PARTS CATALOG

PHONE COLLECT—your Heater can be shipped within 2 hours, or, SEND FOR LITERATURE.

BERNSTEIN BROS.
MACHINERY CORPORATION
Phone 8404 • "Since 1890" • PUEBLO, COLO.

Available November 15

1—Noble Batch Plant Model CA 154 consisting of 500 bbl. silo, 150 ton 4 compartment bins, 220 ft. by 18" conveyor, electric powered and a 2-yard Koehring tilting mixer electric powered.

1—C. S. Johnson Co. cement silo Model TY 234, height 41 ft., capacity 1482 bbl.

1—Colby crane Model 200 Whirley w/125 ft. boom S/N 193. Has trawler wheels and leg extensions for additional height. Electric powered.

All Subject to Prior Sale

GRANBY CONSTRUCTORS
2401 W. 8th Ave., Denver 1, Colorado

FOR SALE

2—McCoy Rock Dozers for D8 Tractors.

1—Pioneer 4' x 10' Scalping Screen.

1—R.P.B. Junior Model T Breaker mounted on army ½-track.

11—13 Cu. Yd. Bottom Dump Euclids, bought new 1946 and 1947. 7 with GMC engines and 4 200 H.P. N.H. Cummins engines. A-1 condition.

1—Grout Outfit with 7 x 3 x 10 G.D. Group pump and 3 Tanks and agitators.

1—G.D. 115 Ft. Stationery Air Compressor, powered by 25 H.P. Electric Motor.

All Subject to Prior Sale

GRANBY CONSTRUCTORS
ALpine 1782
2401 W. 8th Ave., Denver 1, Colorado

SOLD
RENTED
REPAIRED
Transits
Levels
Steel Tapes
Compasses

PORTLAND INSTRUMENT CO.
334 S.W. 5th nr. Stark, Portland 4, Ore., AT 3598

SURVEYING INSTRUMENTS FOR RENT

LEVELS $15 PER MONTH

Daniel McFarland
624 Second Ave., San Francisco, BAyview 1-7804

Wanted—Sales Representative

By Industrial Rubber Manufacturing Company. Man who knows contractor personnel and contacts actual job sites. Commission basis with no objection to handling other lines. Reply Box 1066, Western Construction News, 609 Mission St., San Francisco 5, Calif.

INDEX TO ADVERTISERS
★ IN THIS ISSUE ★