

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

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MARCH 15 • 1950

IN THIS ISSUE

Bridge Deck Slabs
Practical and Fast

a Dam
Brought to Site

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Record Speed with New Features

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Leaders of Western Organizations

A Reclamation Leader
Portrait of Utah's William Wallace

**... Plus Other Short
Articles and Features**

SA-A
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J. Warren Nutt
San Rafael, Calif.



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per drill, per shift



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LUBRICANTS EP**
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against rust and wear

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FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN . . . TEXACO presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

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Here is but a part of the list of advantages that Northwest has for you — a list of advantages that puts Northwest far in the lead from the standpoint of low upkeep cost, ease of maintenance and high output. They deliver the satisfaction that makes the Northwest the best for the heart of the job. Plan now to have one. Let us tell you more about why one out of every three Northwests sold is a repeat order.

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- **Northwest Dual Independent Shovel Crowd**... Utilizes force other independent crowd shovels waste
- **Positive Traction** while turning as well as when going straight ahead gives the larger Northwest the ability to travel where other types of crawlers have difficulty.

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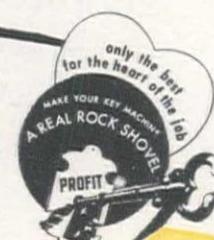
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Covering Construction in the Western Half of the United States

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B.F. Goodrich



ALL-NYLON tire record: no blowouts, no bruise breaks, no flex breaks!

THE B. F. Goodrich ALL-NYLON tire is proving successful on construction projects all over the country. The record speaks for itself—up to now no blowouts, no bruise breaks, no flex breaks! And that includes severe operating conditions on jobs where flex and bruise failures formerly were common.

Along with nylon, BFG uses weftless construction; no cross-threads in tire plies to hamper cord action and allow some cords to stretch out. Therefore, tire growth is reduced—tires last longer.

Nylon tires always provide big sav-

ings on construction projects, in quarry and other operations where heavy loads and rough terrain have made tire costs high.

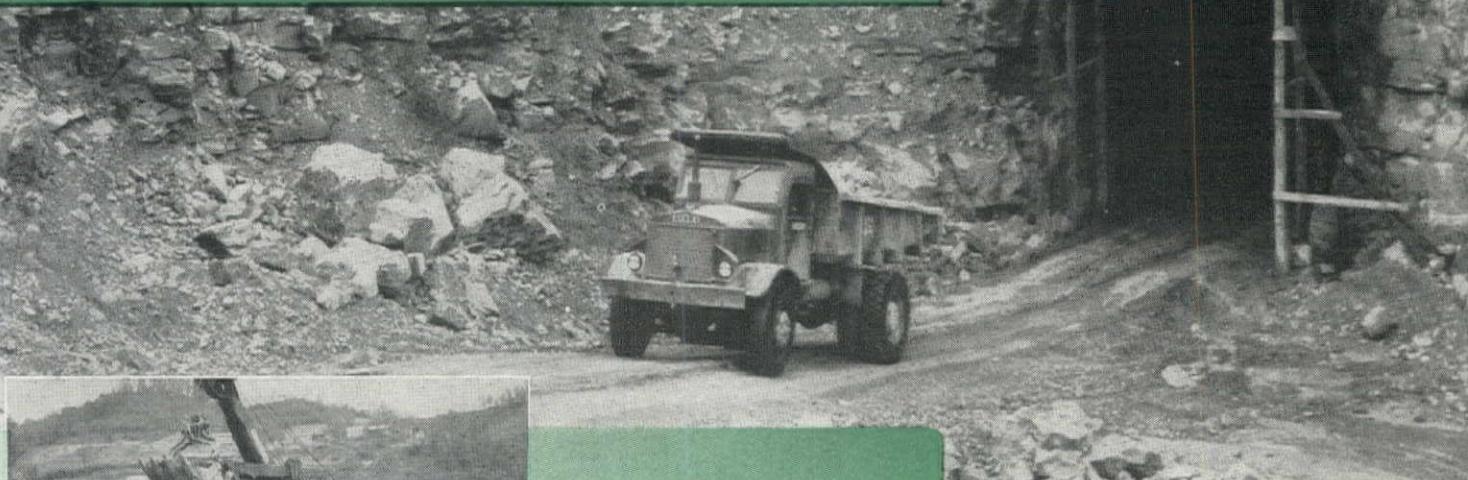
The new, all-nylon construction is typical of the continuous improvements being made in tires by B.F. Goodrich. Long ago, BFG engineers developed special types of tires for construction and other off-the-road service. For more information on the way B.F. Goodrich tires can do more work and save you money, call your BFG dealer—or write directly to *The B.F. Goodrich Company, Akron, Ohio.*



JOB PROVED...

10-Ton "EUC"

Emerging from a tunnel which leads to an underground loading area, this Model UD starts up the haul road to the crushing plant at C. A. Langford Stone Company in Tennessee.



The Acme Construction Company uses this 10-Ton Rear-Dump on a highway construction job at Matoaka, W. Va. The "Euc" is loaded with earth and shale by a 1 1/4 cu. yd. shovel.



Powered by a 125 h.p. diesel engine, the Model UD has a top speed of 35.7 m.p.h. and plenty of power for steep grades. The 860' haul road at the C. A. Langford quarry near Cookeville, Tenn., has a maximum grade of 10%.



High dumping angle and fast-acting Euclid hoist assure quick dumping. Here the "Euc" dumps a capacity load of limestone into crusher at the H. & R. Stone Company quarry at Ridgeville, Ind.

Built for jobs requiring a smaller capacity hauling unit for heavy off-the-highway service, the 10-Ton Rear-Dump Euclid has made good ... hauling more tons at less cost in mines, quarries, construction and industrial work. Owners like the Model UD because it is easy to handle ... has ample power and speed ... and can do a wide range of jobs economically.

You can depend on the 10-Ton Euclid for greater job profits and long service life. Your Euclid distributor will be glad to discuss your job requirements... write or call him today for information on the Model UD Rear-Dump or the complete line of Euclid earth moving equipment.

THE EUCLID ROAD MACHINERY CO.
CLEVELAND 17, OHIO

EUCLIDS
Move the Earth

4 LAPLANT-CHOATE MOTOR SCRAPERS MOVE 5000 YARDS A DAY UP AND DOWN STEEP GRADES



- 4 Motor Scrapers working for Frank J. Hickey on the 610,000 yard job at the University of California at L.A., are moving dirt at a profit-making pace, up and down steep grades. Each of the four LPC units is moving 1250 yards of 2600-lb. clay every 10 hour shift, on a 2800-ft. cycle, easily negotiating the steep grades occasioned by 30-ft. cuts and 60-ft. fills.

ON the level, LPC Motor Scrapers can't be beat! And up and down grades or in tough conditions, they're more unbeatable than ever for moving the *extra* yardage that gets the job done faster at lower cost per yard. Frank Hickey and other big time contractors lay the blue chips on Motor Scraper performance every time. For day-in, day-out dependability and production, LPC Motor Scrapers are first choice on more and more jobs each day. Get all the facts from your LPC distributor. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa — West Coast Branch, 1022 77th Ave., Oakland, Calif.

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- 225 H.P. Buda Diesel • 45 H.P. Continental Starting Engine • 12 Cu. Ft. Westinghouse Compressor • 32 Amp. Autolite Generator • Lipe Rollway Clutch—17" • Fuller Transmission—4 A 112 • 4-Wheel Timken-Detroit Air Brakes • Double-Acting Hydraulic Steering • Big 24:00 x 29 Traction Type Tires • Big Capacity—14 yds. struck—17.5 yards heaped • Big speeds—up to 21.2 mph • Positive Forced Ejection plus High Apron Lift.

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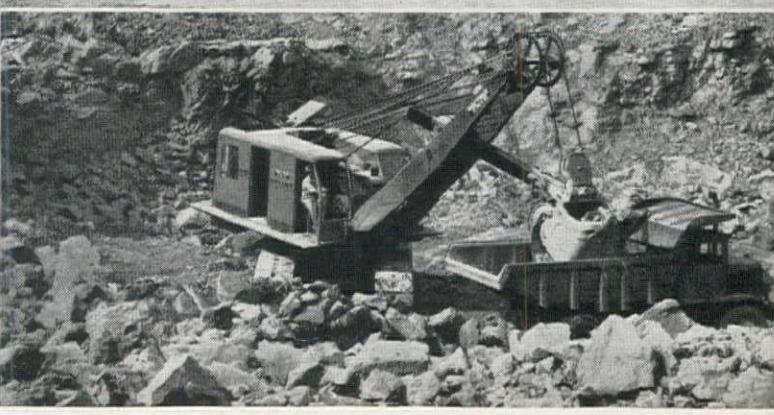
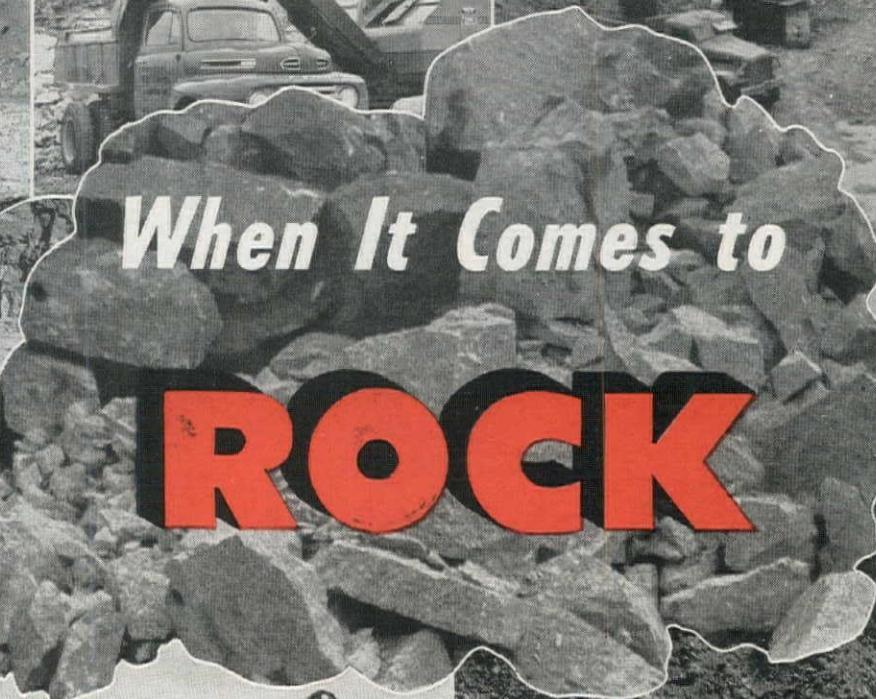
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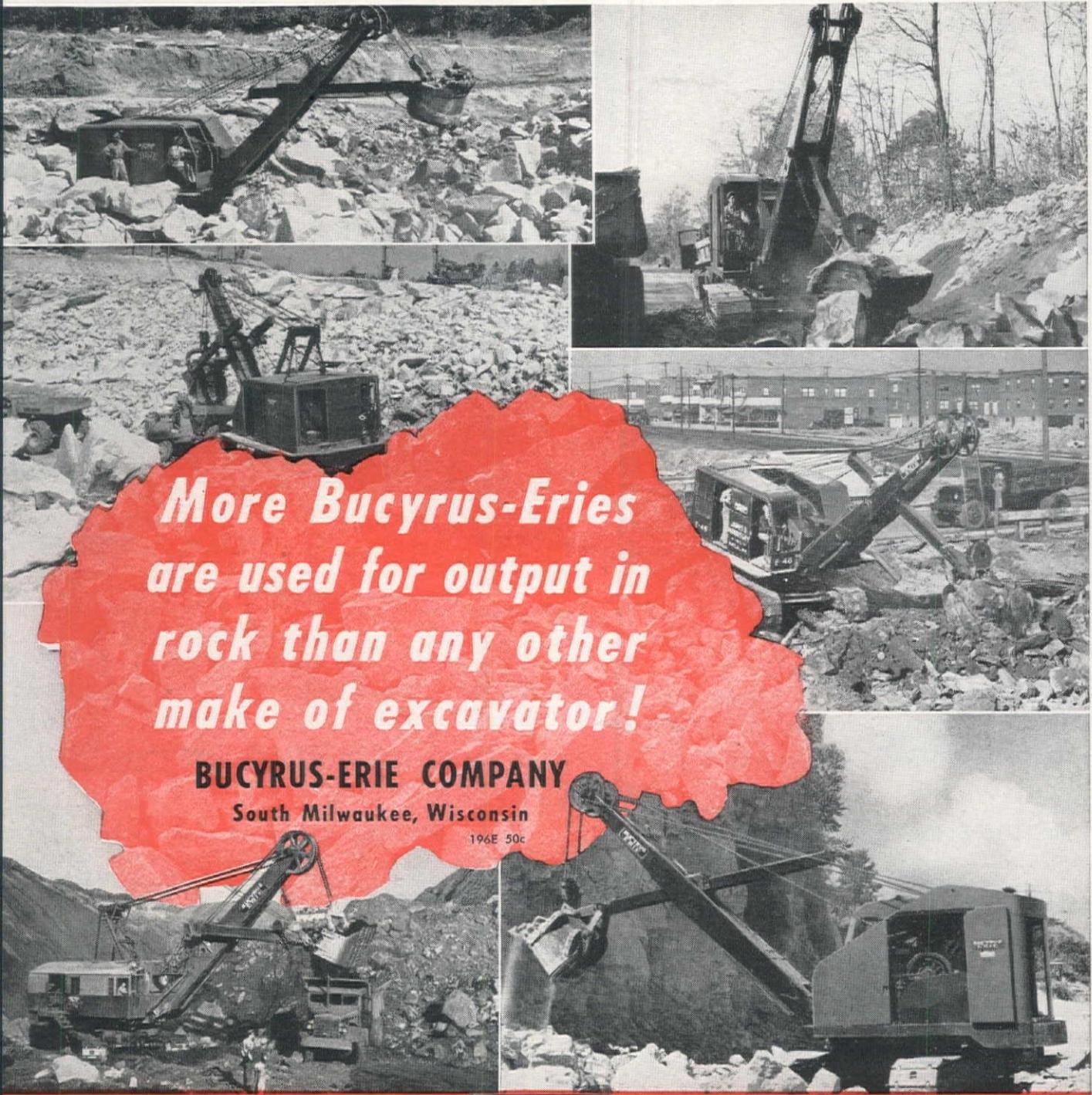
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TOURNAPULLS*



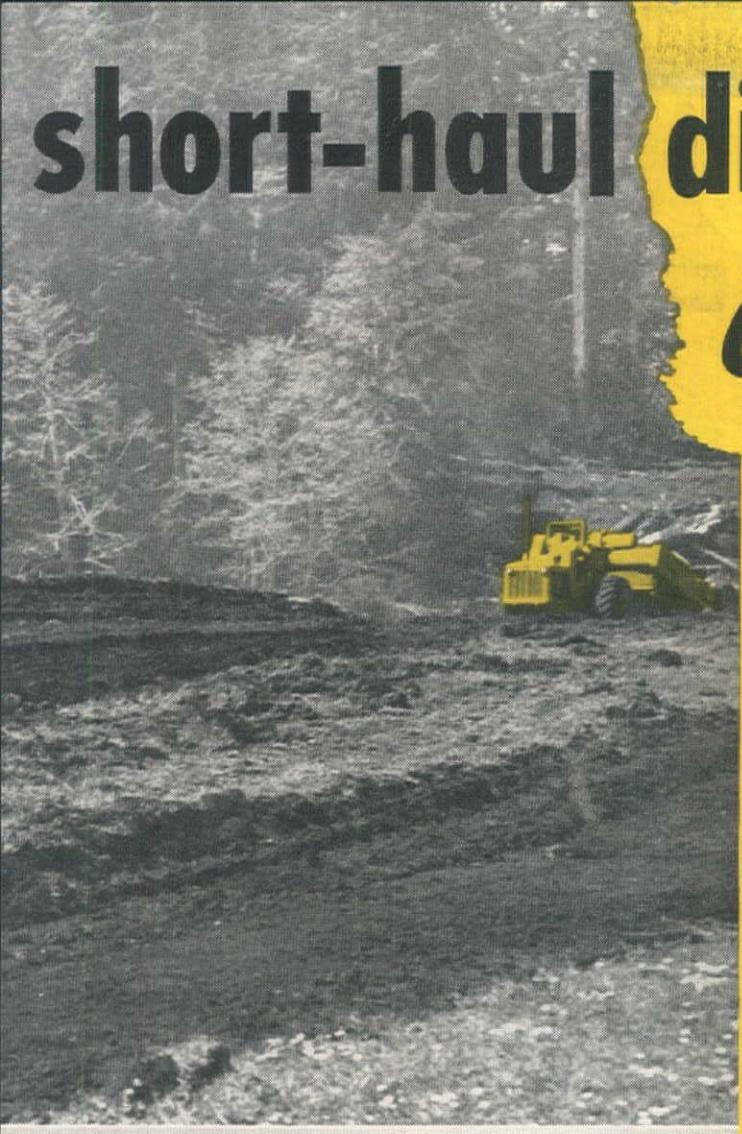
TOURNAROCKERS**



TOURNAHOPPERS**

MORE YARDS PER HOUR WITH RUBBER-TIRED POWER

short-haul dirtmoving on Oregon Hwy.



While loads average 11 pay yards, Contractor Jarl estimates that his new C Tournapulls often pack in 12 pay yards of loam.



Tournapull, Carryall—Trademark Reg. U. S. Pat. Off. R159 W

ON 5½ miles of new roadbed for U.S. 101, near Tillamook, Oregon, Contractor Vernie Jarl of Gresham tackled approximately ½ million yards of sand, gravel, hardpan, clay, and loamy topsoil that turns to muck when it rains. Material is never dry because the Tillamook area has heaviest annual rainfall in the country. Yet, Jarl is keeping production on schedule with 3 high-speed C Tournapulls, which are handling 65% of total yardage. Here's a typical performance report:

Make 1100' cycles in 3.2 min.

On short, 550' one-way haul, each hustling "C" delivers a load every 3.2 min. . . . makes 16 trips an hour. Loads average 11 pay yards in clay and loam. That's 176 pay yards an hour for each "C" . . . and 528 yards hourly for the fleet of 3 electric-control Tournapulls.

"These machines move dirt cheaper than my tractor scrapers on hauls of about any length," reports Jarl . . . "and they're a great improvement over previous Tournapulls in dirtmoving ability and ease of operation."

Adds two more electric rigs

Jarl, a LeTourneau equipment user for over 10 years, bought his first electric-control Tournapull in August, 1948 . . . added 2 new "C's" to his fleet last April, when he started the tough Tillamook contract. His mobile, rubber-tired Tournapulls drove to the job from Portland over main highways . . . and made the 77-mile trip through traffic in just 5½ hours road time!

Ability to deliver more yards per hour . . . handle more jobs per year . . . earn more profit per job is the reason why successful dirtmovers everywhere are turning to high-speed, rubber-tired Tournapulls. Ask your nearest LeTourneau Distributor to show you what these new electric-control "C's" can do for you. Call him TODAY.

Send to: **R. G. LeTOURNEAU, Inc., Peoria, Illinois**, or to your local LeT Distributor listed on opposite page, for complete information on new, 30 m.p.h. C Roadster-type Tournapull for use with:

NAME _____

COMPANY _____

STREET _____

CITY _____

Type work to be handled _____

STATE _____

TITLE _____

13.5 cu. yd. Carryall Scraper

17 cu. yd. rear-dump

Tournarocker

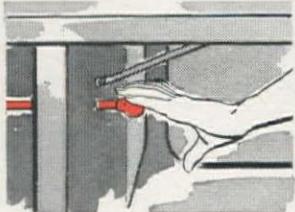
15 cu. yd. bottom-dump

Tournahopper



CHAMPION

the NEW



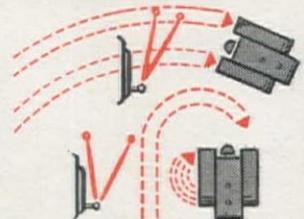
Positive all-weather starting on gasoline, with quick change-over to full diesel operation, all from the seat.



Instant speed change up or down one speed, or stop, without declutching. Planet Power drive does it!



Separate reverse lever for quick change of direction. The tractor moves in the direction the lever is moved.



Planet Power steering puts turns with power on both tracks, feathered turns and pivot turns at your fingertips.

HERE ARE SOME OF THE CHAMPION'S EXCLUSIVE FEATURES

Self load and run with scrapers of 17-yard capacity—and shift gears on-the-go with the rolling load.



Cut waste shifting time out of work cycles; provide the best speed for every operation, 8 speeds in each direction!



Work on grades up to 100%. Its power, ground contact, balance and lubrication are right for licking any grade.



Handle heaviest loads on gradual turns as easily as straightaway because both tracks are powered in the turn!



"There Is Nothing Like The TD-24. It Can Out-Push Any Tractor On The Job."

"Here is the Champion of Crawlers," owners will tell you, "the tractor that will pull down your dirt moving costs."

Contractors and operators who have observed or operated the new International TD-24 diesel crawler are spreading the news. Here is a tractor that out-works and out-performs every other crawler known to the industry!

Operators compete with each other from Florida to Alaska to get "the big red devils," the TD-24's, assigned to them. They'll tell you no other tractor can compare with the TD-24 for ease of operation or work capacity!

of Crawlers **INTERNATIONAL TD-24**

Comfortable to ride, powerful, fast, safe and economical to operate, the TD-24 is revolutionizing ideas of what crawler tractors can or cannot do on the big jobs.

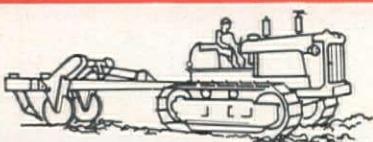
Regardless of what equipment you now use, visit your International Industrial Power Distributor and get a TD-24 demonstration. See for yourself what the TD-24 can mean to your operations in shortened time, reduced costs, extra profits.

INTERNATIONAL HARVESTER COMPANY • Chicago



INTERNATIONAL INDUSTRIAL POWER

Tune in "Harvest of Stars" with James Melton, Sundays, N. B. C.





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NEWHALL

TAFT

They don't know the word "quit"



► This "Caterpillar" Diesel D8800 Engine is one of four used to power a crushing plant for the Harms Brothers, General Contractors, Sacramento, Calif. Production averages 1400 tons of $\frac{3}{4}$ rock in 8 hours. Another D8800, two D13000s and a D17000 complete the reliable, money-saving "Caterpillar" line-up here.

"This is all rock and I don't mean maybe," says Mr. M. O. McEachern about this new road construction on the Feather River Canyon Highway. Owned by the Piombo Const. Co., Belden, Calif., this "Caterpillar" Diesel D13000 Engine powers a Gardner-Denver 365 cu. ft. compressor which supplies air to jackhammers 8 hours per day, 6 days a week.

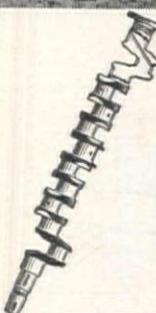


CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL

ENGINES . TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



LOOK UNDER THE HIDE

Subject to thrust and shock, crankshafts must be rugged. "Caterpillar" crankshafts are superior quality steel forgings, accurately machined and balanced. Main bearings are on each side of crankpin journals. Large-radius fillets reduce stress concentrations while end thrust is absorbed on polished thrust surfaces. "Hi-Electro" hardened for maximum service life and Superfinished to within five-millionths of an inch of true surface smoothness, these crankshafts are tops in design and craftsmanship. Look under the hide for quality.

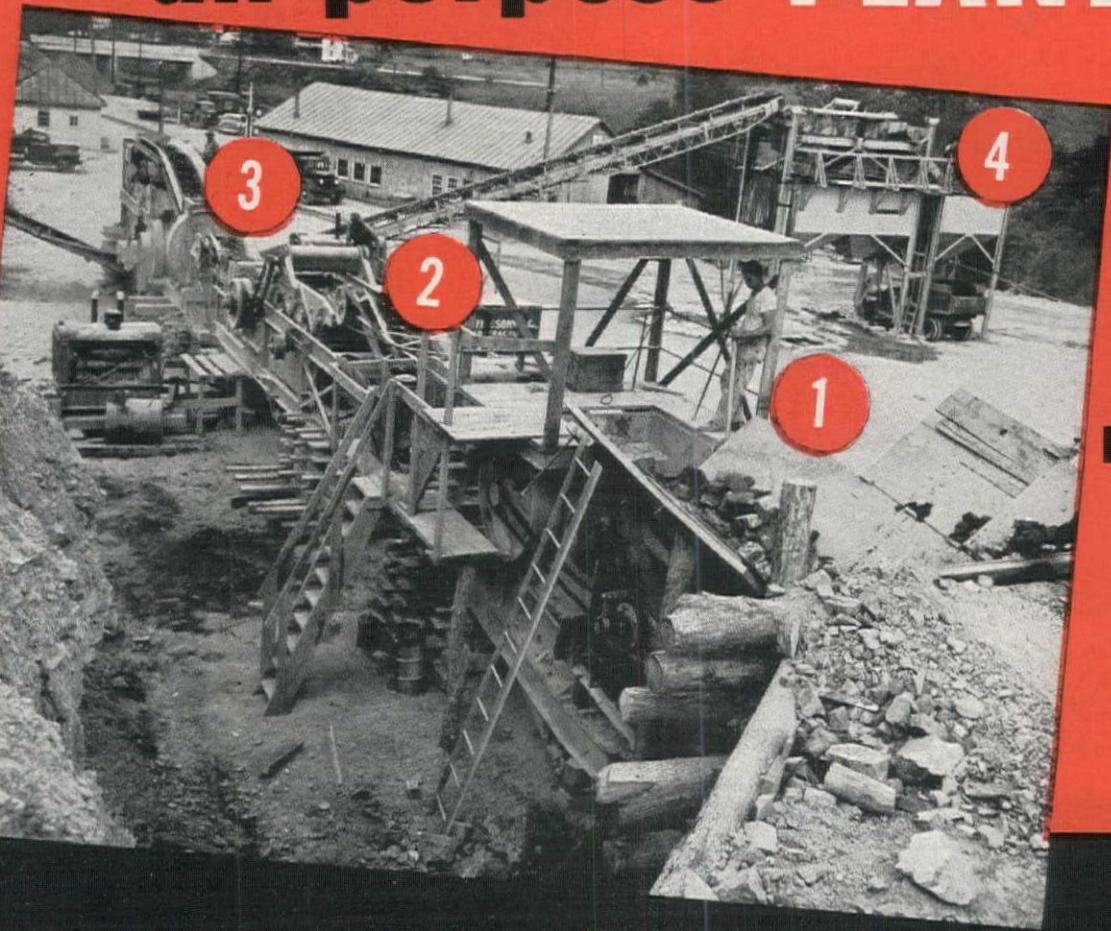
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Name _____

Address _____

PRODUCTION AT ITS BEST— all purpose PLANTS



**MAXIMUM
FLEXIBILITY**

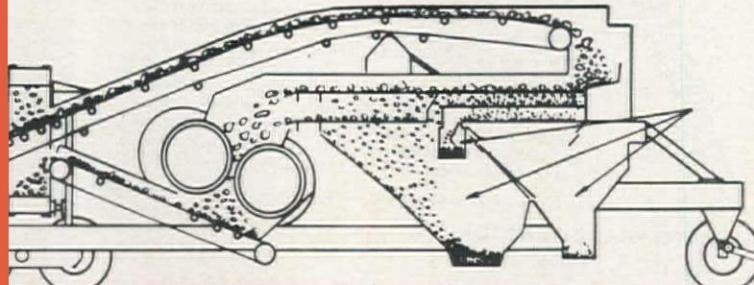
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**MAXIMUM
PRODUCTION**

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**MAXIMUM
ECONOMY**

SPECIFICATION—ANY QUANTITY REQUIREMENT

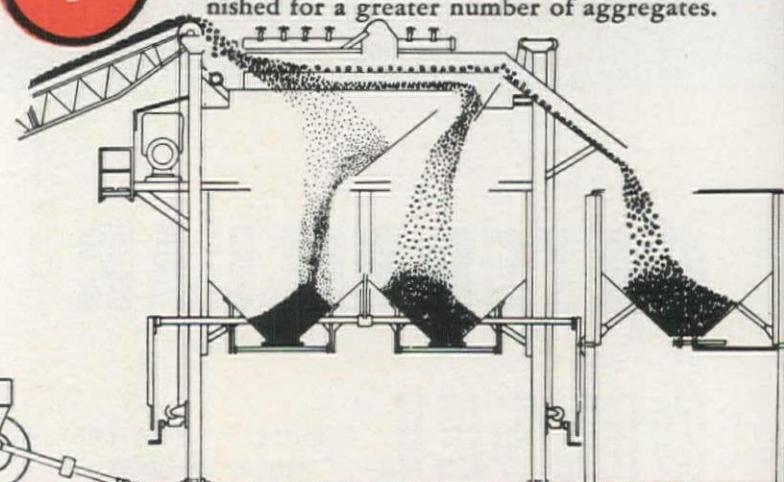
3

SECONDARY CRUSHING UNITS available with four types of crushers—roll, twin jaw, Symons Cone and hammermill—interchangeable to suit your finished product requirements. A complete crushing and screening plant in itself, the Secondary is the heart of the Unitized Plant. The other matched units can be added later.



4

WET OR DRY SCREENING UNITS consist of a 2-compartment bin and double-deck screen. Washing attachments can be added for washed aggregate. Additional bins can be furnished for a greater number of aggregates.



IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U.S.A.

HERE'S BIG VOLUME AGGREGATE Cedarapids UNITIZED

YOU get big volume production for big volume profit when you use the Cedarapids Unitized Plant! With these four flexible basic units combined in a dozen different ways, or used alone, you can meet *any* quarry condition, *any* capacity requirement from 25 to 250 tons per hour, *any* finished product specification from rip rap to agstone ... with big volume efficiency and economy. Write for Bulletin UNIT-2 for complete details.



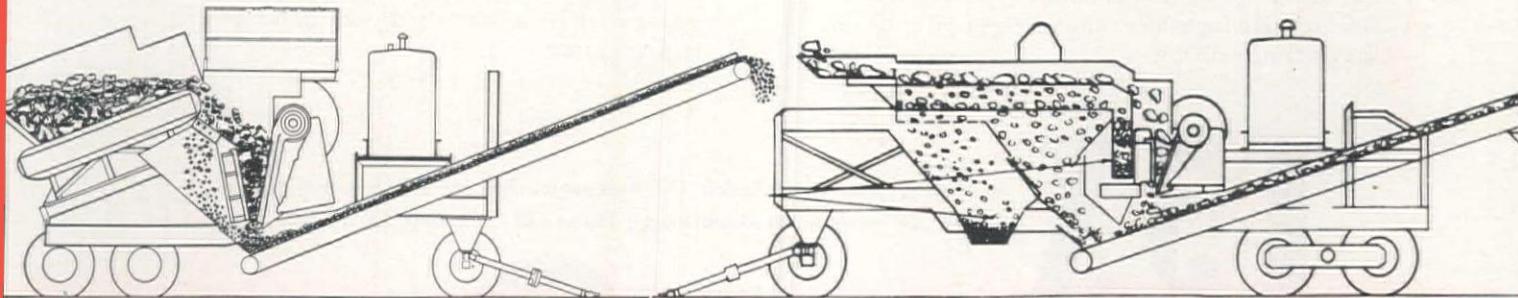
FOUR BASIC UNITS MEET EVERY AGGREGATE

1

PORTRABLE PRIMARY CRUSHING UNITS handle the crushing of raw material, reducing it to a size readily handled by the scalping unit or secondary. Easily moved to meet every job requirement. Available in a size to fit your needs.

2

SCALPING UNITS remove excess fines and crush the material to reduce the circulating load on the secondary. They can also be used for making specialized products, and where oversize is not too large, they can be used for primary crushing. Choice of sizes.



Cedarapids

Built by
IOWA

THE IOWA LINE of Material Handling Equipment Is Distributed by:

HOWARD-COOPER CORP., Seattle, Washington; Portland, Eugene and Central Point, Oregon; HALL-PERRY MACHINERY CO., Butte, Great Falls, Missoula and Billings, Montana; INTERMOUNTAIN EQUIPMENT CO., Boise and Pocatello, Idaho, and Spokane, Washington; WORTHAM MACHINERY CO., Cheyenne, Wyoming; KIMBALL EQUIPMENT CO., Salt Lake City, Utah; 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.

See Your Cedarapids Distributor For Full Details

T5X CUTS MAINTENANCE COSTS ON CONSTRUCTION EQUIPMENT

Contractors operating Diesel and gasoline powered equipment
use the famous purple oil to keep repair costs at a minimum



1. Performance reports from western construction men prove that T5X oil gives far better engine protection. For example, a Seattle contractor started testing T5X two years ago in a 6-125 Waukesha engine on dump-truck service.



2. A recent check on the engine found the crank-case clean and free from sludge. Bearing wear was immeasurable! Top cylinder wall wear was only .003 of an inch! Ring wear was slight! This owner* now considers T5X the superior lubricant for all of his equipment.

*Name available upon request



3. What is this remarkable purple oil? It's a highly refined, 100% paraffin-base oil from highest quality base stock. It's a fully compounded, detergent-type oil with a distinctive purple color developed from an exclusive ingredient which helped give the oil its amazing stability.



4. The powerful combination of additives in T5X enables this great purple oil to do an outstanding job under severe conditions. For T5X reduces oxidation; increases bearing protection; and provides greater cleansing action—along with thorough protection against wear.

T5X

UNION OIL COMPANY

Contact your local Union Oil Representative for full information on
T5X. Or write Sales Department, Union Oil Company, Los Angeles 14.

76
OF CALIFORNIA

LORAIN gives you **MORE** in a MOTO-CRANE

MORE KNOW-HOW	Over 30 years of accumulated experience since Thew-Lorain built the world's first "truck-crane" in 1918.
MORE CAPACITY	From 10 ton to the 45 ton Lorain MC-820, world's largest crane on rubber.
MORE MOBILITY	In the greatest choice of 2-Engine Moto-Cranes (Top Speed 30 MPH) and Single-Engine Self-Propelled (Top Speed 8 MPH).
MORE DRIVING COMBINATIONS	17 choices of 6 and 4 wheel Carriers, with 2, 4 and 6 wheel drive.
MORE CARRIER	Since 1939 Thew-Lorain has designed and built its own Carriers exclusively for use as shovel-crane mountings.
MORE MANEUVERABILITY	Shorter wheelbase for sharper turns; squatly design for more stability; less height.
MORE SELECTION	17 choices of Thew-Lorain rubber-tire mountings, plus 5 interchangeable booms for most machines — present a total of 79 rubber-tire combinations from which to choose the right machine to do your job right.

To get the **most** for your money in rubber-tire shovel-cranes, check Lorain Moto-Cranes before you buy. Check the list at left — and see your Thew-Lorain Distributor for more reasons that make Moto-Cranes the best buy on rubber!

THE THEW SHOVEL CO., LORAIN, OHIO



IT ISN'T A MOTO-CRANE
UNLESS IT'S BUILT BY
THEW - LORAIN



When your job calls for rubber,
see your Thew-Lorain Distributor
first . . . for the best on rubber!

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

J. D. COGGINS CO.
1717 No. 2nd, Albuquerque, New Mexico

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

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

GENERAL EQUIPMENT CO.
Reno, Nevada

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, Colorado

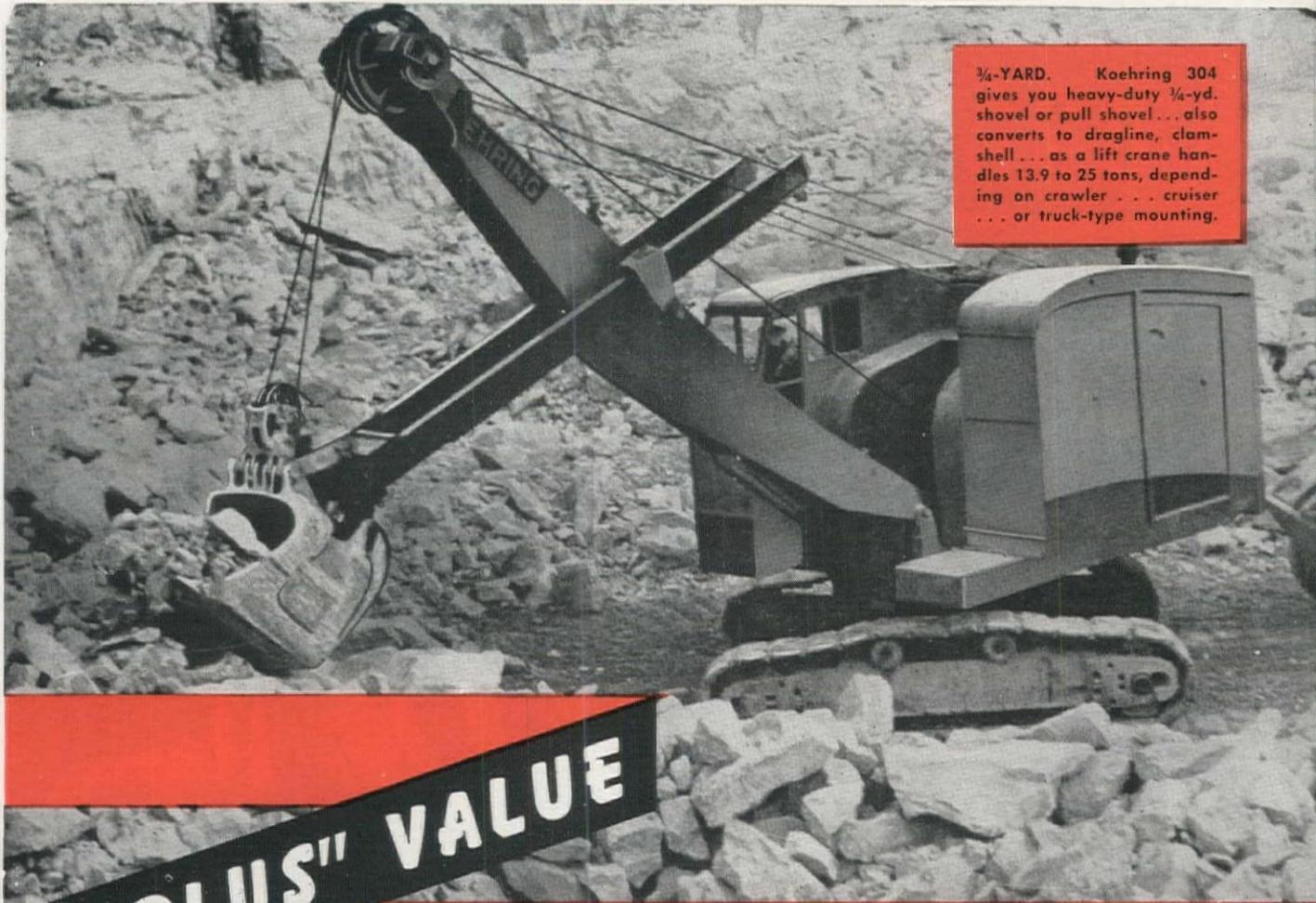
MOUNTAIN TRACTOR CO.
Missoula and Kalispell, Mont.

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, Graybull, Casper and Rock Springs, Wyo.



3/4-YARD. Koehring 304 gives you heavy-duty $\frac{3}{4}$ -yd. shovel or pull shovel... also converts to dragline, clamshell... as a lift crane handles 13.9 to 25 tons, depending on crawler... cruiser... or truck-type mounting.

"PLUS" VALUE

in KOEHRING EXCAVATORS



1/2-YARD. 205 shovel, pull shovel, dragline, clamshell, $7\frac{3}{4}$ to 10 ton crane... on crawlers or rubber tire mount.



1 1/2-YARD. 605 handles full complement of standard excavator attachments... including the 36 ton crane.



2 1/2-YARD. Check the big 1005 for $2\frac{1}{2}$ -yd. shovel work... dragline, $7\frac{1}{2}$ ton crane.

- HAVE you ever noticed how many old-time Koehrings are still operating profitably, day after day in your territory? There's an important "plus" value for you in this long-life characteristic of the Koehring excavator line. When you buy a Koehring, you get more than an excavator... you get *insurance* that your machine can keep working and earning on heavy, 3-shift schedules during periods of rush deadlines, war crises, and other emergencies that can occur during the life-time of your excavator.

- This heavy-duty "plus" in Koehring excavators assures less downtime, less maintenance costs and a higher percentage of operating efficiency. They have a good reputation among owners and operators for steady output... steady income. This also has an important bearing on re-sale price anytime during life-time of the machine. You will never have an "orphan" on your hands, with Koehring behind your machine. So... before you invest in excavators, investigate Koehring "profit insurance."

CK-917



SEE YOUR KOEHRING DISTRIBUTOR FOR COMPLETE FACTS

Bay Cities Equipment, Inc., Oakland
 Columbia Equipment Co., Portland, Boise
 Harron, Rickard & McCone Co.
 of Southern California, Los Angeles
 Kimball Equipment Co., Salt Lake City
 Western Machinery Co., Spokane

McKelvy Machinery Co., Denver
 Moore Equipment Co., Stockton
 Neil B. McGinnis Co., Phoenix
 Pacific Hoist & Derrick Co., Seattle
 The Harry Cornelius Co., Albuquerque
 San Joaquin Tractor Co., Bakersfield

KOEHRING HEAVY-DUTY EXCAVATORS

JOHNSON

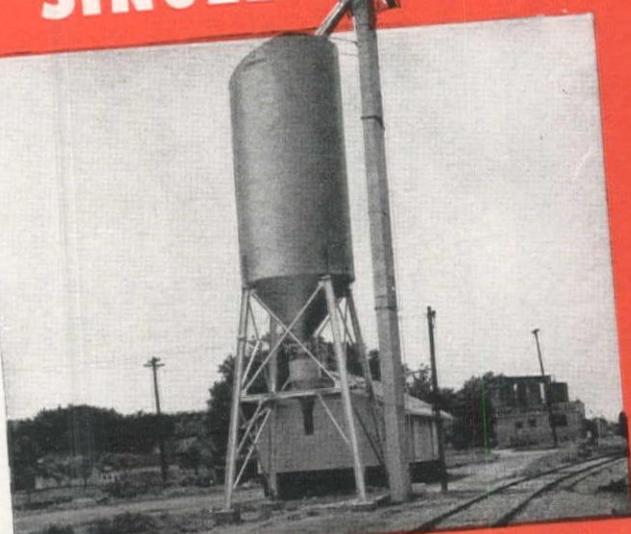
BIG STORAGE

SINGLE SILOS

Johnson all-welded portable single silo cement handling plant provides 254, 373, and 492-bbl. capacities . . . has gasoline or electric-driver screw conveyor and bucket elevator . . . box-car or truck receiving hoppers . . . electric bin signals . . . aeration diffusers. Takes one or two 1,000 lb. capacity batchers. Adding a second silo at ground level nearly triples storage capacity. Write . . . and let us give you all the facts.

Cramer Machinery Company . . .
Edward R. Bacon Company . . .
Harron, Rickard & McCone Co. of So. Calif. . .
McKelvy Machinery Company . . .
Neil B. McGinnis Company . . .
Bow Lake Equipment Company, Inc. . .
The Harry Cornelius Company . . .
Western Machinery Company . . .
Western Machinery Company . . .
San Joaquin Tractor Company . . .

Portland
San Francisco
Los Angeles
Denver
Phoenix
Seattle
Albuquerque
Spokane
Salt Lake City
Bakersfield



PARSONS

RUBBER-TIRED UTILITY-SIZE MODEL 80

TRENCHMOBILE

This fast-traveling, one-man Trenchmobile makes quick work of small trenching jobs, off-street connections, etc. . . . gets there fast, at road speeds up to 18.9 m.p.h. Works fast . . . digs up to 13.22 ft. per min. . . . 48" deep . . . 5" and 8" wide. Let us explain to you the features of this mobile, rubber-tired Model 80 Trenchmobile and show you savings on utility trenching work. Ask about 4 larger Trenchliners.*

*Trademark Reg. U. S. Pat. Off.

Bay Cities Equipment, Inc. . . .
Columbia Equipment Co. . . .
Harron, Rickard & McCone Co. of So. Calif. . . .
Kimball Equipment Company . . .
McKelvy Machinery Company . . .
Moore Equipment Company . . .
Neil B. McGinnis Company . . .
Pacific Hoist & Derrick Company . . .
The Harry Cornelius Company . . .
Western Machinery Company . . .
San Joaquin Tractor Company . . .

Oakland
Portland, Boise
Los Angeles
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Phoenix
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Bakersfield



KWIK-MIX

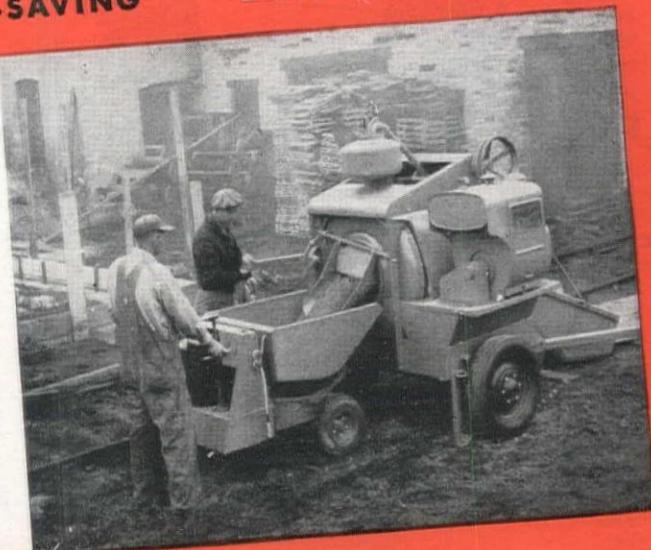
FULLY-POWERED LABOR-SAVING

MOTO-BUG

Power does all the heavy work with easy-handling Moto-Bug (shown here with 6-S Dandie). Speeds 1 1/2 to 4 m.p.h. both forward and reverse. Quickly pays for itself in more material hauled per load. Has 1200 lb. (10 cu. ft.) maximum capacity . . . standard-make 4 h.p. air-cooled engine . . . easy steering direct to dual rear wheel. Optional equipment: dual drive wheels . . . riding step . . . platform body with stake pockets.

Bay Cities Equipment, Inc. . . .
Columbia Equipment Company . . .
Harron, Rickard & McCone Co. of So. Calif. . . .
Kimball Equipment Company . . .
McKelvy Machinery Company . . .
Moore Equipment Company . . .
Neil B. McGinnis Company . . .
Pacific Hoist & Derrick Company . . .
The Harry Cornelius Company . . .
Western Machinery Company . . .
San Joaquin Tractor Company . . .

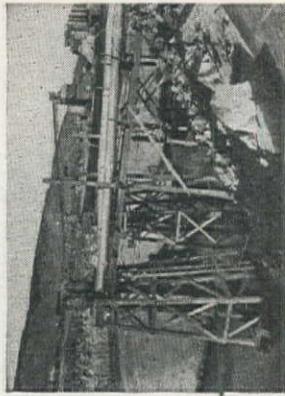
Oakland
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Los Angeles
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Denver
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Phoenix
Seattle
Albuquerque
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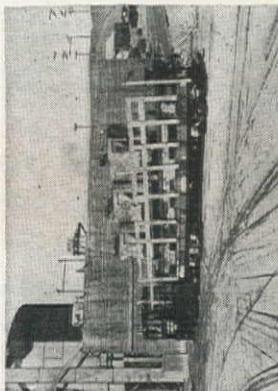
pushing the SWIFT COLUMBIA aside

Electrically 000

McNary Dam Contractors depend on General Electric equipment to make a success of "the toughest river diversion ever undertaken."

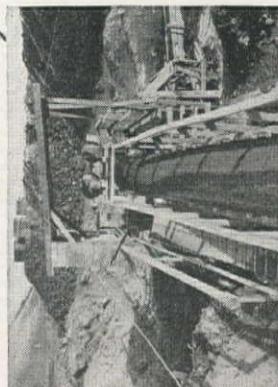


1. This GE powered shovel handles 5 cubic yards of rock excavation with every bite. Operating from the 2400-volt ac-c system, it responds instantly to the operator's touch; is easy to maintain despite rough usage.

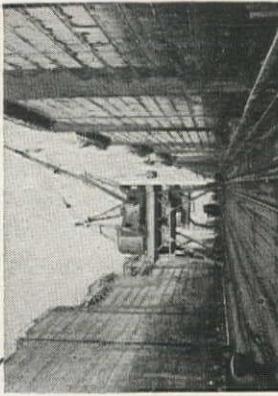


3. Four 25-ton G-E industrial locomotives (dinkies) move concrete—three 4-yard buckets at a time—from batch plant along a 675-foot wooden trestle at just the speed demanded by the schedule.

4. Two 25-ton G-E industrial locomotives (dinkies) move aggregate from stockpiles to batch plant on belt conveyors like this. G-E motors drive and G-E controls direct these links in the concreting operations at McNary.



5. Deep-well pumps keep leakage from flooding the construction area. The same large Tri-Clad vertical motors driving these pumps have done yeoman service for the contractors on many previous jobs.



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

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

Electrified Construction

BETTER PRODUCT
LOWER COST

GENERAL ELECTRIC



it's made of
sheet aluminum . . .
it's worth many times
its weight in gold



This little plate, on the truck mixer that supplies your job, guarantees its capacity to thoroughly *mix* and *agitate* as well as to deliver a full rated load.

This means that it has the proper drum design, accurate water control and speed of revolution, and the full specified amount of *free mixing space* proved necessary to produce quality concrete.

It is one simple, sure protection which the \$250,000,000 ready-mixed concrete industry offers architects, engineers and other users against questionable concrete delivered by non-standard truck mixers.

Insist upon this rating plate on the truck mixers that supply your job.



The Bureau rating plate is available to any manufacturer who meets its quality standards and requirements.

Affiliated with The National Ready Mixed Concrete Association

BLAW-KNOX DIVISION
Pittsburgh, Pa.

CHAIN BELT COMPANY
Milwaukee, Wis.

CONCRETE TRANSPORT MIXER CO.
St. Louis, Mo.

THE JAEGER MACHINE COMPANY
Columbus, Ohio
WORTHINGTON PUMP & MACHINERY CORP.
Dunellen, N. J.
THE T. L. SMITH COMPANY
Milwaukee, Wis.

Truck Mixer
Manufacturers
Bureau

**extra service for your equipment when
“WEAR-RESISTED”
with AIRCO hardfacing alloys**



Because of the hardness and other desirable characteristics of these alloys, they provide high resistance to all types of wear—abrasion . . . impact . . . heat . . . corrosion. One application often adds 2 to 25 times longer service life to *worn or new* parts . . . big dividends in savings of “down-time” and replacements.

There is an Airco alloy available for oxyacetylene flame or electric arc application to meet all types of wear conditions.

1. Severe abrasion and medium impact
2. Shattering impact and abrasion
3. Severe impact and abrasion
4. Sliding abrasion and impact
5. Extreme earth abrasion
6. Corrosion and heat

Constant research is developing new alloys to meet special wear problems as they occur.

If you have parts or tools subject to any type of wear, it will pay you to investigate the savings you can make in maintenance and replacement costs by using Airco Hardfacing Alloys.

For further information about Airco's complete line of “wear-resistant” alloys, write your nearest Airco office or Authorized Dealer for a free copy of the Hardfacing Alloys Catalog.

More news about
AIRCO products

**FOR SEVERE IMPACT
AND RESISTANCE TO ABRASION**
Airco No. 388 Electrode

A shielded arc electrode sufficiently high in alloy content to produce a deposit bearing approximately 9% chrome and 0.9% carbon. This alloy content results in a weld metal deposit which is essentially martensitic.

Operators will find that the exceptionally fine arc action of Airco No. 388 increases both the speed and quality of their work.

**FOR RESISTANCE TO
EXTREME EARTH ABRASION**
Airco Tungtube
Nos. 8, 10, 20, 30 and 40

These are fabricated rods of tungsten carbide particles encased in a steel sheath. The various Tungtube numbers indicate the screen size of the tungsten carbide particles contained within the tube. With its extreme hardness tungsten carbide ranks second only to the diamond in earth cutting efficiency. It is accepted as the standard means of cutting non-metallic substances; such as, coal, shale, and granite. It is recommended for core bits, fishtail bits, road plows, coal cutter knives, plow shares and similar equipment subjected to extreme earth abrasion.

**CORROSION — ACID RESISTANT
ALLOYS FOR WELDING HARDER
GRADES OF ALUMINUM BRONZE**
Airco Nos. 100, 116, 120, 125
and 130 Electrodes

For joining aluminum bronze or other metals and combinations of dissimilar metals—and for overlays on bearing surfaces, machine parts, dies, etc. The deposits made with these electrodes are corrosion and acid-resistant and will also retard wear from abrasion and impact.



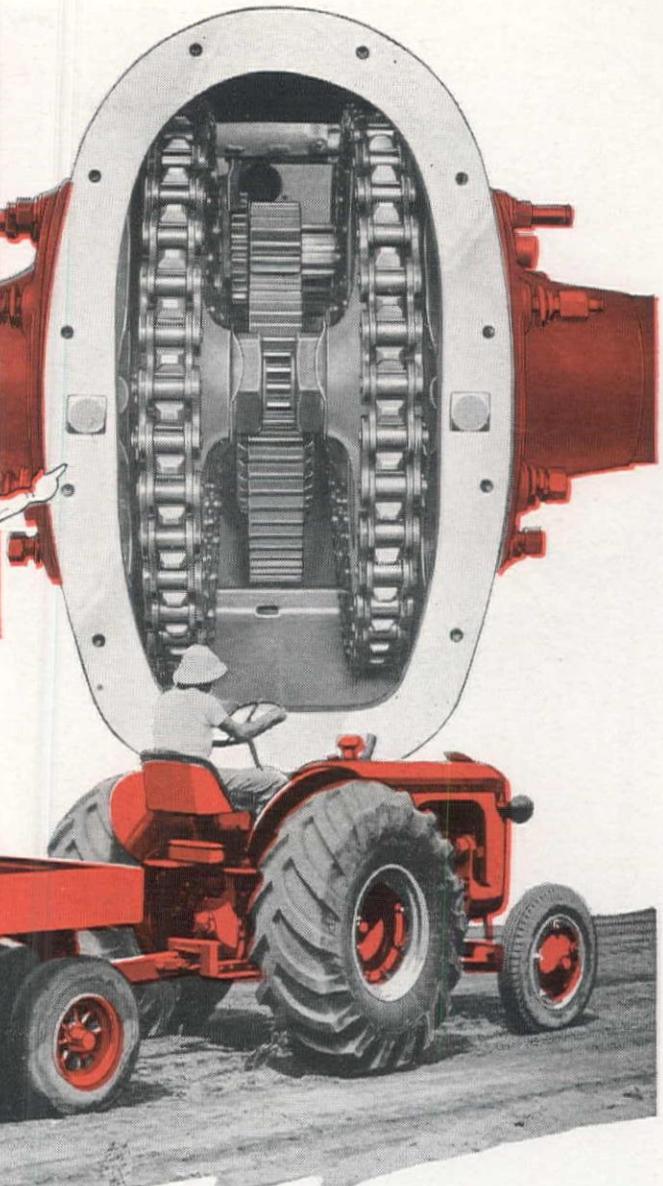
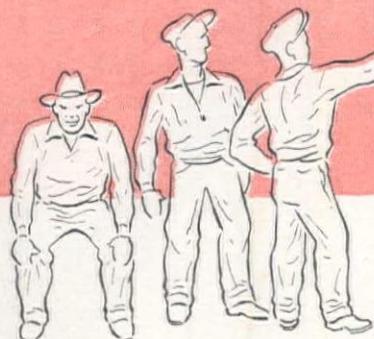
AIR REDUCTION PACIFIC COMPANY

A Division of Air Reduction Company, Incorporated
SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE
Bakersfield • Fresno • Emeryville • Sacramento • Tacoma

WCN

HIDDEN STRENGTH

IN THE FINAL DRIVE



HEAVY-DUTY STEERING GEAR

Worm and wheel type—corrects for wear by turning wheel. Tapered roller bearings. Housed in transmission case—assures lubrication with warm oil. Many other extra-strength features.

State Tractor & Equipment Co.	Phoenix, Arizona
Brown-Bevis Equipment Co.	Los Angeles, California
Coast Equipment Company	San Francisco, California
Mitchell's	Bakersfield, California
Liberty Truck & Parts Co.	Denver, Colorado
Western Equipment Co., Boise and Idaho Falls, Idaho and Spokane, Washington	
Hilton's Inc.	Las Vegas, New Mexico
Growers Supply & Equipment Co.	Fresno, California
Electric Tool & Supply Co.	San Bernardino, California
Growers Tractor & Implement Co.	Sacramento, California
Nelson Equipment Co.	Portland, Oregon - Seattle, Washington
Robison Machinery Co.	Salt Lake City, Utah
Worham Machinery Co., Cheyenne, Sheridan and Greybull, Wyoming - Billings, Mont.	

CASE INDUSTRIAL TRACTORS

There are no gears in the final drive of the Case "LAI" industrial tractor—no single-tooth loading, no hard-to-lubricate line contacts. Instead, heavy-duty roller chains divide the load among many teeth, provide cylindrical bearing areas cushioned with oil. With rear cover off, as shown, access for adjustment is easy.

Differential, too, is more lightly loaded, better lubricated, because it is on the faster-turning shaft ahead of the final drive. Similar designs are used on the next-smaller Models "DI" and "SI." All sizes have extra-strong front axles as regular equipment, to carry mounted equipment without added cost or alterations. All have heavy-duty, Case-built engines known for their remarkably low maintenance, consistent fuel economy, and steady pulling power over a wide speed range. Ask your Case industrial dealer about the size that fits your work. J. I. Case Co., Racine, Wis.



CASE



Power shovels of the Piombo Construction Co., Inc., put wire rope to work widening highway on the Black Point Cutoff, California

Tiger Brand Wire Rope is manufactured from raw ore to finished product under the strict quality controls of United States Steel. To help you get all the stamina engineered into American Tiger Brand, the services of a Field Specialist are available without charge. Contact your Tiger Brand distributor or write Columbia Steel Company, Room 1422, Russ Bldg., San Francisco 4.

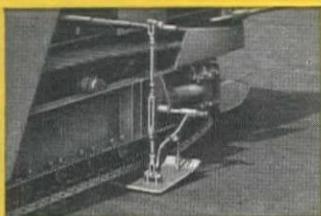


U·S·S TIGER BRAND Wire Rope

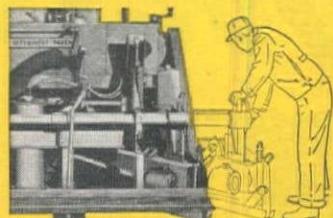
UNITED STATES STEEL



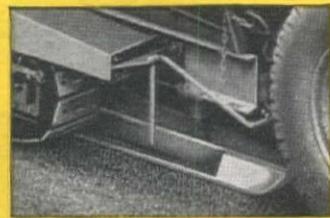
Here's why you want a Jaeger Model BP-5



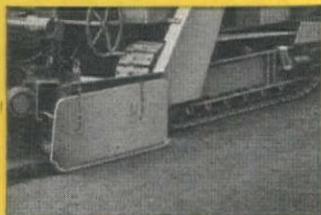
1. AUTOMATIC MATCHING of any adjacent course, curb, gutter or other grade line.



2. TWIRL A WHEEL TO CHANGE WIDTH: Lays any width 5' 8" to 12' 6", without adding parts.



3. SMOOTHEST RIDING SURFACES: 12' longitudinal floating runners equalize screed level.



4. NO PREMATURE SEALING: Weight and traction are on the hard subgrade or completed course —never on the newly-laid surface.



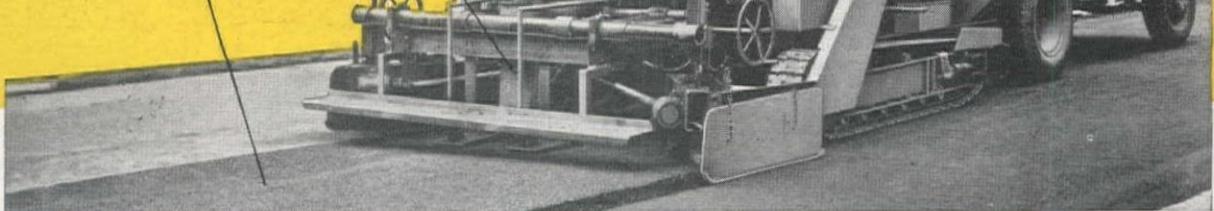
5. MORE UNIFORM MAT: Fast-oscillating, bevel-toothed screeds, tilttable as needed, work material to a uniform density not possible with tamping.



6. LAYS FLUSH TO CURBS and blends perfect-sealing joints between lanes.

7. BURN-PROOF SCREED HEAT with modern hot air system (up to 500°).

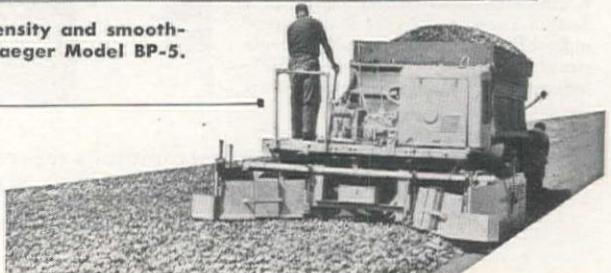
8. EVERY TYPE OF MATERIAL: Hot or cold, laid in thicknesses up to 6" as fast as trucks can deliver to the big 6-ton hopper.



For ability to lay all types of bituminous pavements to uniform density and smoothness, under varied conditions, no other machine approaches the Jaeger Model BP-5.

and its low cost team-mate

JAEGER PAVER-TYPE AGGREGATE SPREADER — the first self-propelled spreader that accurately lays all base and surface aggregates, plant-mixed stabilized soil or free-flowing bituminous mixtures up to 10" thickness, in 8' to 12 1/2' widths. Ask for catalogs.

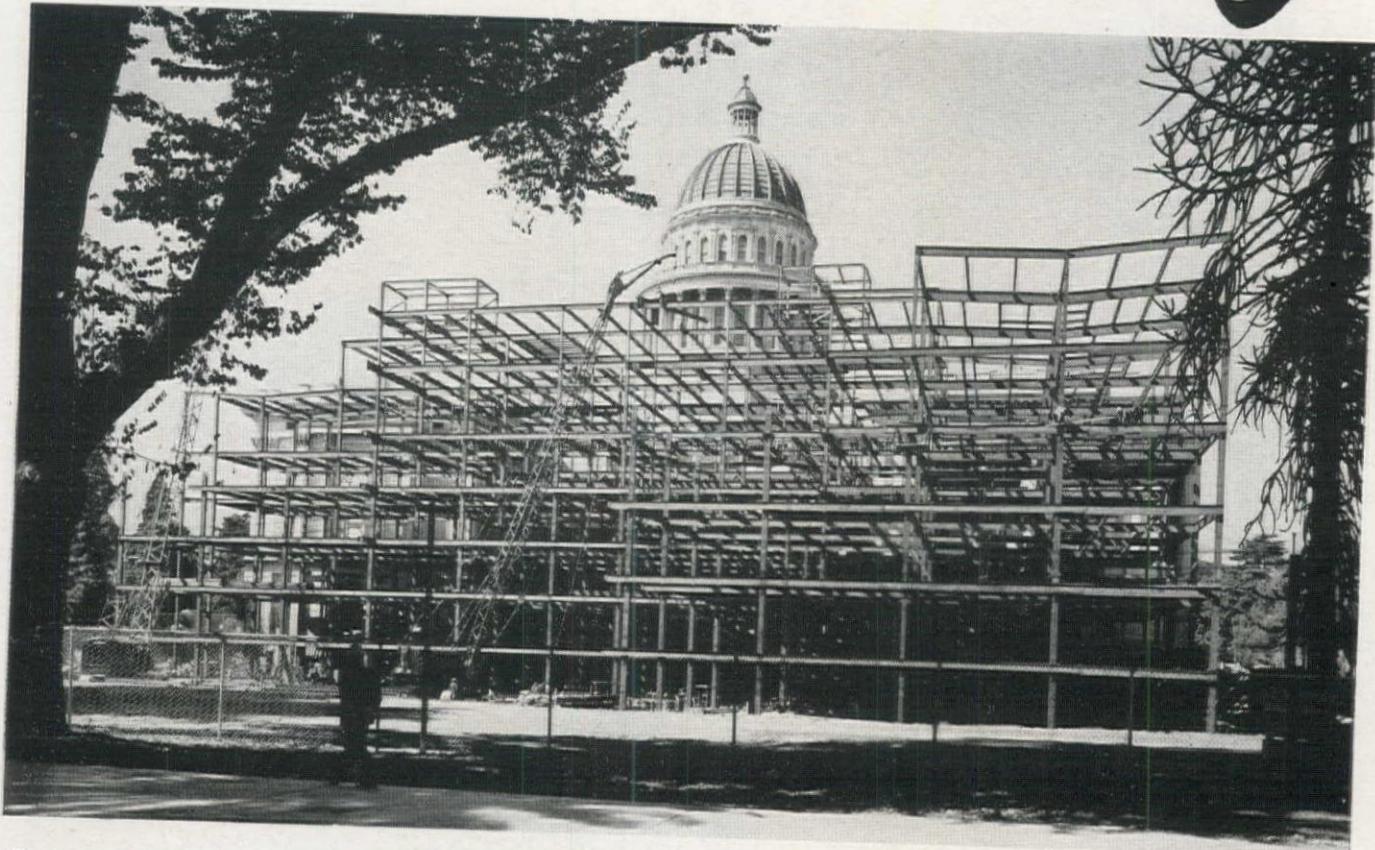


Sold, Rented, Serviced by:

EDWARD R. BACON CO. San Francisco 10
 SMITH BOOTH USHER CO. Los Angeles 54
 A. H. COX & CO. Seattle 4 and Wenatchee
 NELSON EQUIPMENT CO. Portland 14
 ANDREWS EQUIPMENT SERVICE Spokane 9
 WESTERN MACHINERY CO. Salt Lake City and Denver 2

CENTRAL MACHINERY CO. Great Falls and Havre
 TRACTOR & EQUIPMENT CO. Sidney, Miles City, Glasgow
 WORTHAM MACHINERY CO. Cheyenne and Billings
 J. D. COGGINS & CO. Albuquerque
 SCHRIVER MACHINERY CO. Phoenix
 IDAHO MACHINERY CO. Boise

Steel for building



The framework for the new addition to the California State Capitol at Sacramento was fabricated and erected by Bethlehem Pacific. Over 2200 tons of structural steel were used.



Administration Building for the new Seattle-Tacoma International Airport at Bow Lake. This reinforced concrete structure contains 950 tons of Bethlehem Pacific steel reinforcing bars.

These two important buildings represent totally different approaches to problems of engineering and construction, yet they have one important material in common—steel. No matter what basic type of construction you select,

Bethlehem Pacific can furnish all of the steel building materials required for the job.

This company operates three complete steel-making plants, three bolt-and-nut plants, and four fabricating works to serve the West.



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

BETHLEHEM PACIFIC

a Profit-Winning Combination

MACK TRUCKS

plus the BALANCED BOGIE

YOU GET THEM *All* WITH
THE *Balanced Bogie*

POWER DIVIDER: Positive traction
regardless of terrain

INTER-AXLE DIFFERENTIAL: No
wind-up or overstress of driving parts

RUBBER SHOCK INSULATORS:
No spring twist...no lubrication

MAXIMUM FLEXIBILITY: No chassis
distortion

SELF STEERING: No tire scuffing

UNIFORM TIRE LOADING: Longer
tire life

UNIFORM BRAKING: Better control
No weight transfer between axles
No bogie hopping, rearaxle or toe-stubbing

SIMPLICITY OF DESIGN: Achieves
minimum maintenance



- Mack six-wheel trucks incorporate Mack's famed Balanced Bogie — give you a profit-winning combination under the most adverse hauling conditions. Here is no makeshift assembly — but a bogie that is a component and integral part of the complete truck unit.

No other trucks — for operation on or off the highway — offer you all the outstanding advantages you get with the Balanced Bogie in Mack six-wheelers.

Check them for yourself. They're your assurance of trouble-free, uninterrupted schedules; lower costs and increased profits. For the full story, see your nearest Mack branch or distributor.

Be Profit-Wise

modernize with

Mack



outlasts them all

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

Barber-Greene



the best roads need not cost the most . . .

When it comes to a choice of road-surfacing methods, the Barber-Greene Travel Plant offers distinct cost-saving advantages. It produces a properly proportioned asphalt mix—the correct amount of bitumen for every cubic yard of aggregate—plus thorough mixing. And you pay no premium for this performance—for volumetric measurement and controlled, twin pugmill mixing are standard Barber-Greene Travel Plant features.

Travel Plant work is a speedy one-pass operation. The aggregate windrow is picked up and continuously discharged as a ready-to-spread mix. Traffic can be maintained during the mixing process.

The B-G Mixer can be used separately in central plant set-ups; and the B-G Bucket Loader can be used independently in cost-saving loading and light excavating jobs. Write for full information.

FOR SALE BY:

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

HT4 TRAXCAVATOR works at CAPACITY

WHEREVER THERE'S
TRACTOR "HEADROOM"



Low ceilings do not obstruct the Hydraulic HT4 TRAXCAVATOR'S performance. This one, excavating and carrying heaped loads in low position for topside clearance, suggests many a profitable HT4 material-moving use — in overpass and underpass construction and maintenance.

Wherever its compact "Caterpillar" Diesel Tractor team-mate can enter without bumping the operator's head, there the HT4 Hydraulic TRAXCAVATOR does its stuff at full capacity.

It digs hard material, crowds its bucket heaping full, with traction-harnessed engine power and hydraulic down pressure. It lifts the load smoothly to any height desired, for clearing low overhead obstructions. It carries at your choice of 5 practical speeds, from slow creep to brisk sprint. It dumps from any lift point.

For the Model HT4 TRACKSON TRAXCAVATOR is mounted on a "Caterpillar" Diesel D4

Tractor, and is operated by the dependable, constant-power "Caterpillar" hydraulic system. The valve has 4 positions — raise, lower, hold and float. Lifting arm cylinders are double-acting — so are bucket control cylinders. That enables exerting down pressure; gives complete bucket control.

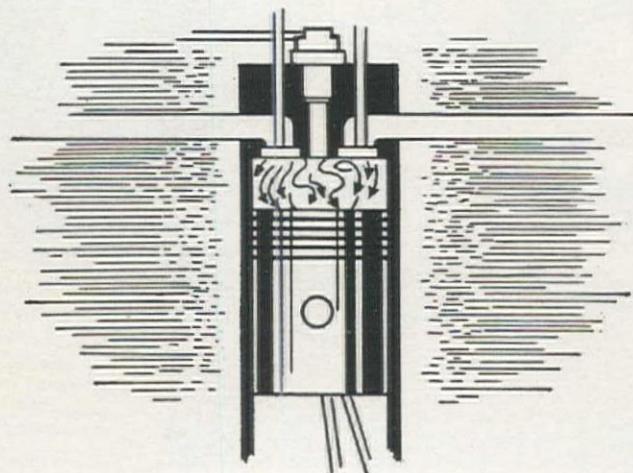
Every practical operating feature asked for is built into the HT4 — the hydraulic companion of the world-famous line of cable-controlled TRAXCAVATORS. Sold and serviced by your TRACKSON "Caterpillar" dealer! See him for complete information or write TRACKSON COMPANY, Dept. WC-30, Milwaukee 1, Wis.

HT4
Hydraulic

TRAXCAVATOR®

*The Original
Tractor
Excavator*

makes diesels start easily, run smoothly



Associated Motor Diesel Fuel

Every quality you want most in fuel for your high speed diesels, you'll find in Associated Motor Diesel Fuel.

This is an outstandingly *clean* oil of minimum ash and sulphur content, totally distilled from selected crude and specially treated for diesel quality.

Its pour point and flash point are carefully and accurately controlled. You can

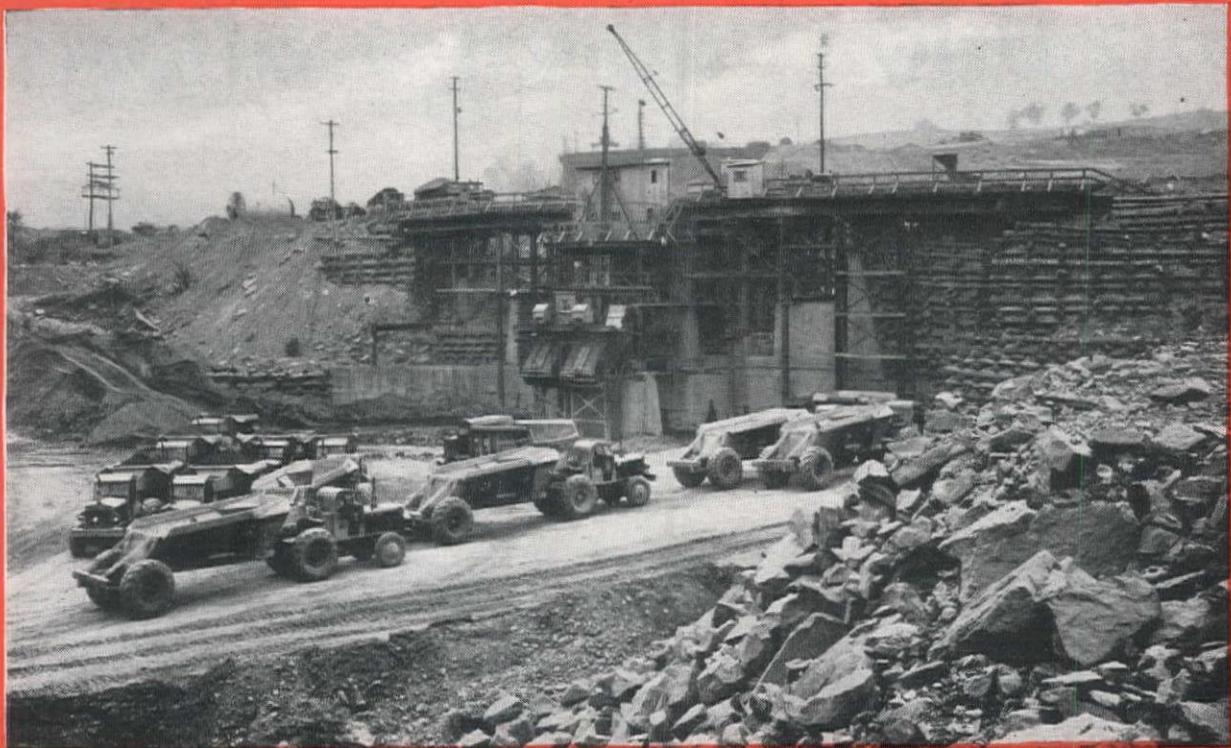
depend upon free flow. Its complete burning means cleaner engines and more power.

Associated Motor Diesel's viscosity is right for dependable lubrication of fuel pump and injection valves, and its excellent ignition characteristics insure easy starting and smooth idling. Order a trial supply of Associated Motor Diesel Fuel now, and let its performance prove its quality.



Associated products and skilled lubrication counsel are as near as your telephone





Good Diesels keep good company

GM Series 71 Diesels power a fleet of 50 Euclid bottom-dumps working for S. A. Healy Co. on construction of 200-ft. high Neversink Dam.

Today the list of contractors who operate equipment powered by General Motors Series 71 Diesels reads like a "Who's Who" of the industry.

Big operators like S. A. Healy Co., who have the \$25 million contract for New York City Board of Water Supply's half-mile dam across Neversink River Valley, have found what these powerful, efficient Diesels can do.

These modern 2-cycle Diesel engines pack more power in less space—they do their work easily and fast. With power at every downstroke, they deliver high

torque that gives them quick get-away and smooth, steady up-grade pull even with a punishing load.

At the same time, these engines are clean in design, easy and economical to service. There's no high-pressure fuel tubing. Injector, pump and fuel-metering mechanism for each cylinder are all in single, easily changed units.

Any machine with GM Diesel power is a better machine—sturdy, dependable, economical. So whatever equipment you buy, it will pay you to specify a GM Diesel engine.

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

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

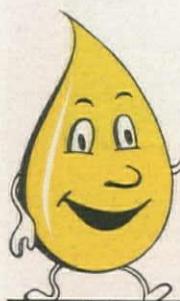
Capitol Tractor & Equipment Co.
SACRAMENTO, CALIF.

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



DIESEL
POWER

The one-package answer to 90% of your grease lubrication problems...



Lubricates
wheel
bearings...



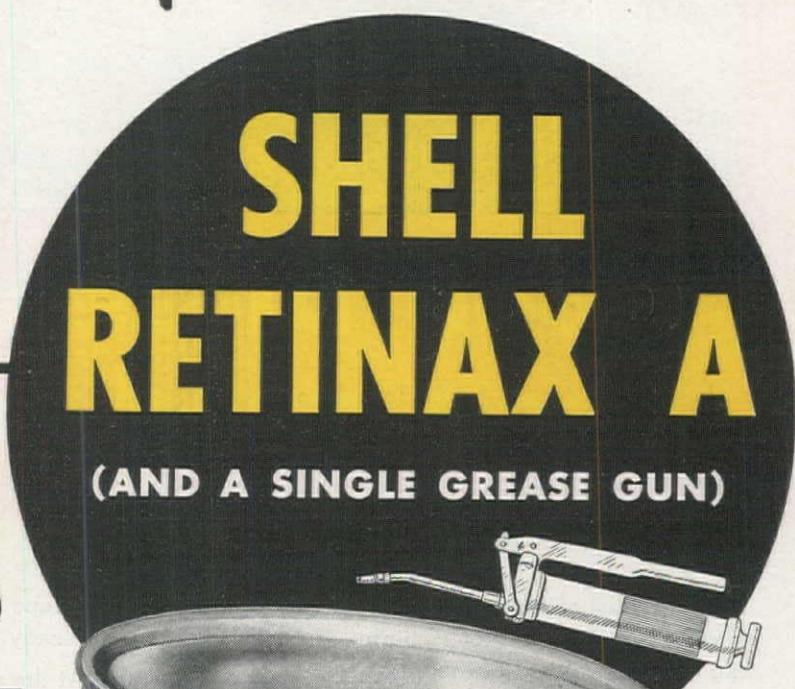
...universal
joints



...water
pumps



...and all
chassis
points



For passenger
cars, trucks and
certain types
of tractors.
Available only
from Shell



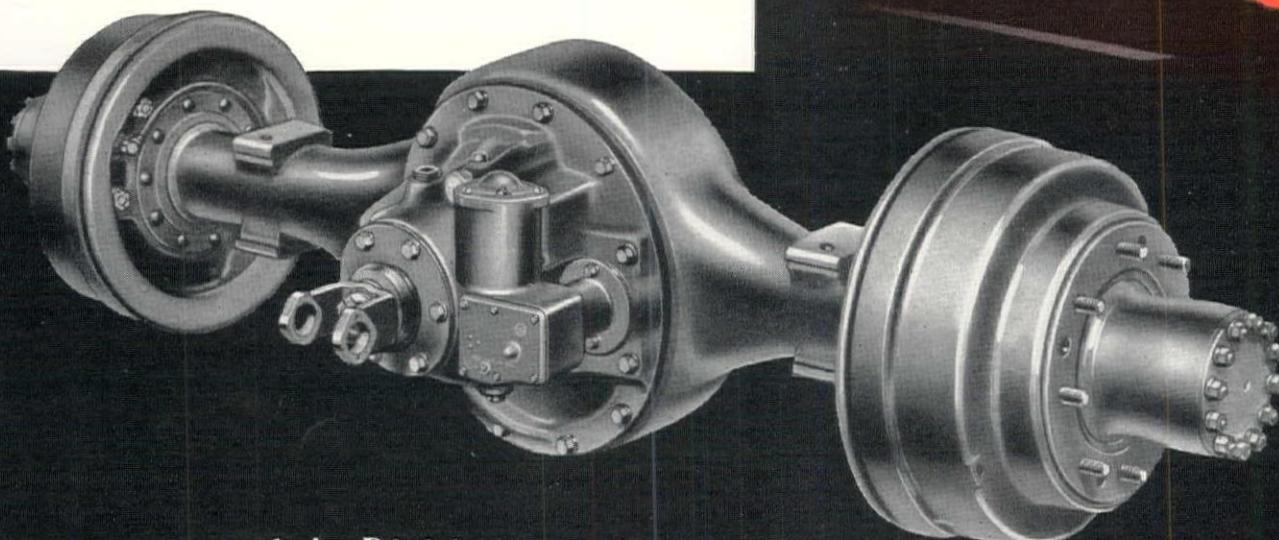
EATON

2-Speed Truck

AXLES

**cut down Stress
and Wear on Vital Truck Parts**

Eaton 2-Speed Axles double the conventional number of gear ratios, enabling drivers to use the right gear ratio for every operating condition—starting out under full load, climbing grades, highballing, quick shifting in traffic. As a result, vital truck parts are not overstressed, engines are permitted to run at most efficient speeds, minimizing engine wear. Furthermore, Eaton Axles last longer, because planetary gearing better distributes gear-tooth loads, reducing stress and wear on the axle itself. Ask your truck dealer to explain how Eaton 2-Speed Axles more than pay for themselves.



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



**protect your
profits with
CP time-cutting
equipment**



wherever air is needed

Supplying ample compressed air for any location, the CP Portable Air Compressor has a gradual speed regulator that adapts engine speed to air demands to hold fuel consumption to a minimum. Available in gasoline-driven models of 60, 105, 160, 210 and 315 c.f.m. actual capacity, and in Diesel-driven models of 105, 160, 210, 315 and 500 c.f.m.

for fast cuts in hard wood

Helical gearing, high blade speed and a powerful motor give the rugged CP Hi-Speed Electric Saws plenty of reserve power. Available in three sizes: $7\frac{1}{2}$ ", $8\frac{1}{4}$ " and $9\frac{1}{2}$ " blades. Special blades can be furnished for cutting metal, ceramic or concrete products.

for every demolition job

In the world's largest line of demolition equipment, there is a CP tool exactly suited for every type of demolition work. Five sizes include the light CP-111 (25 lb. class), the general utility CP-115 (60 lb. class), and the heavy-hitting CP-117 (80 lb. class) illustrated, for which no job is too tough!

air tools for construction jobs

The wide range of CP air-powered drills, wrenches and other construction equipment enables the contractor to secure just the right CP tool for any particular job. CP Corner Drills speed erection work; heavy-duty CP-365 Wrench easily runs nuts up to $1\frac{1}{4}$ " bolt size.



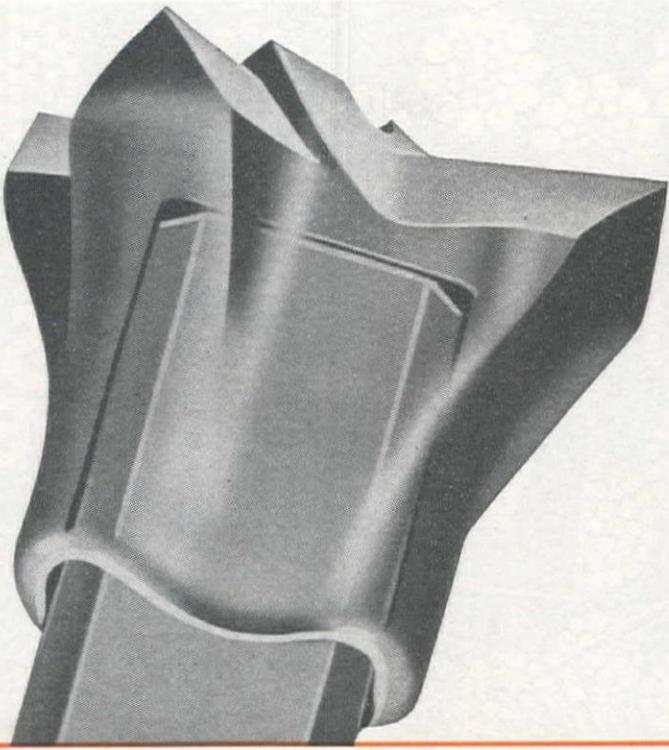
**CHICAGO PNEUMATIC
TOOL COMPANY**

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

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

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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.



New TIMKEN® one-use rock bit with new "Spiralock" union offers 7 great advantages

1 STAYS ON MORE DEPENDABLY. New "Spiralock" union*—formed by square socket that spirals slightly as it recedes—has proved superior under actual on-the-job conditions.



2 EASIER TO GET ON AND OFF. A few blows of the drill and it's on. A few blows of a hammer and it's off. Smooth socket contours assure easy detachability.

3 MADE OF TIMKEN ELECTRIC FURNACE STEEL. Fast cutting. Long lasting. Uniform quality.

4 NON-RIFLING. The "X" cutting edge prevents rifling in any ground.

5 CROWNED CHISEL PILOT. Makes for easier starting and "collaring"—faster penetration.

6 SIMPLIFIES PREPARATION OF DRILL STEELS. Due to "Spiralock" union, steels last much longer, are easier to prepare and recondition. Square steel ends simplify fitting. They may be machined or forged.

7 ANY STEELS CAN BE USED. Existing drill steels of any size and section can be adapted quickly and easily.

THE superiority of the new Timken® one-use "Spiralock" rock bit has been proved under actual on-the-job conditions. It offers advantages no other one-use bit can equal.

This revolutionary bit is designed for jobs where bit reconditioning is impractical or undesirable. It is available in a variety of types and sizes.

To get the best bit for your job, use our Rock Bit Engineering Service. Timken and Timken *alone* offers all three types of bits—the famous threaded multi-use and threaded carbide insert bits as well as the new one-use "Spiralock" bit. And Timken has been solving rock bit problems for 17 years.

Write to The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

*PATENT PENDING

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.
YOUR BEST BET FOR THE BEST BIT
...FOR EVERY JOB



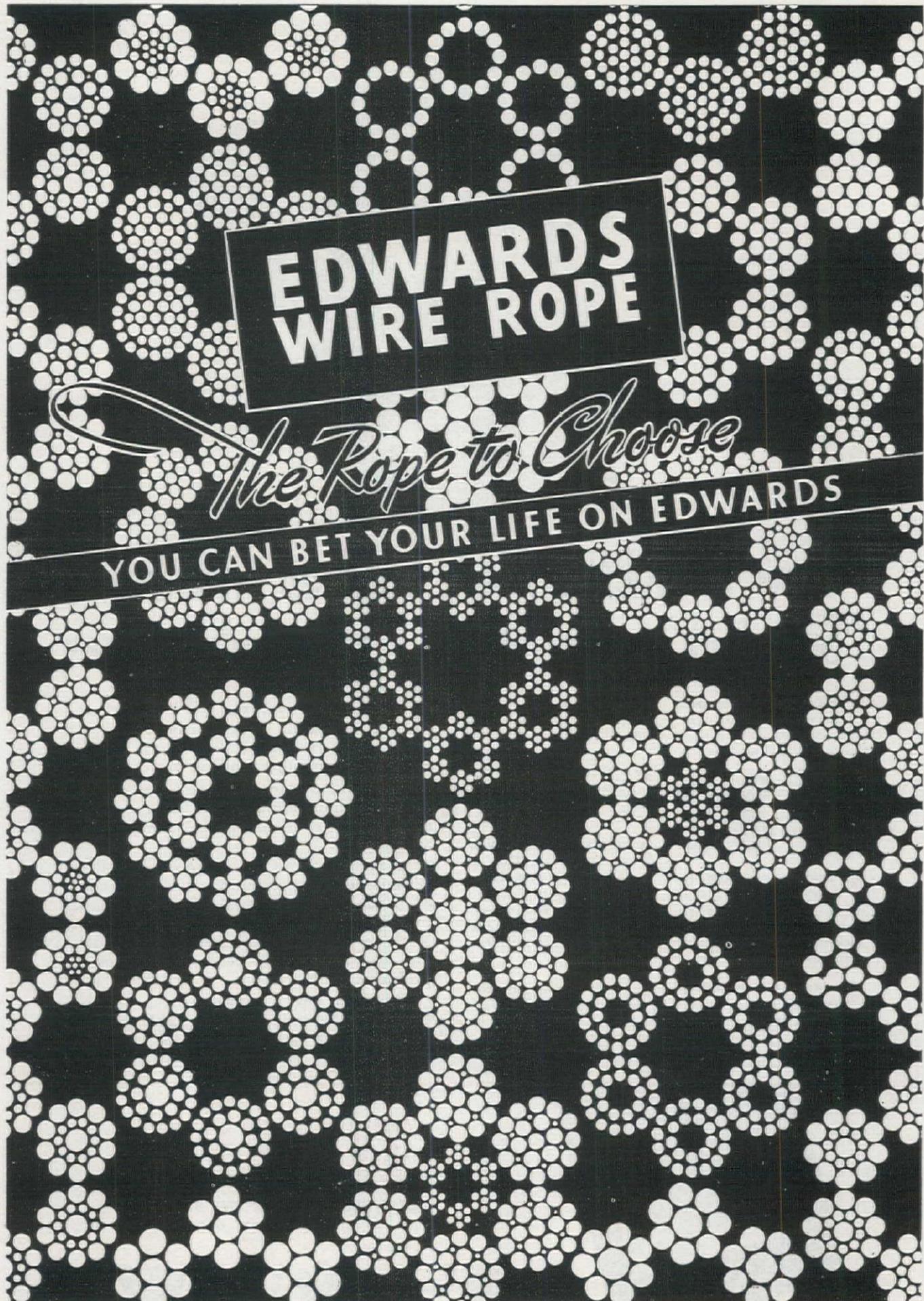
1
Timken threaded multi-use rock bit.



2
Timken threaded carbide insert rock bit.



3
Timken one-use "Spiralock" rock bit.



EDWARDS
WIRE ROPE

The Rope to Choose

YOU CAN BET YOUR LIFE ON EDWARDS

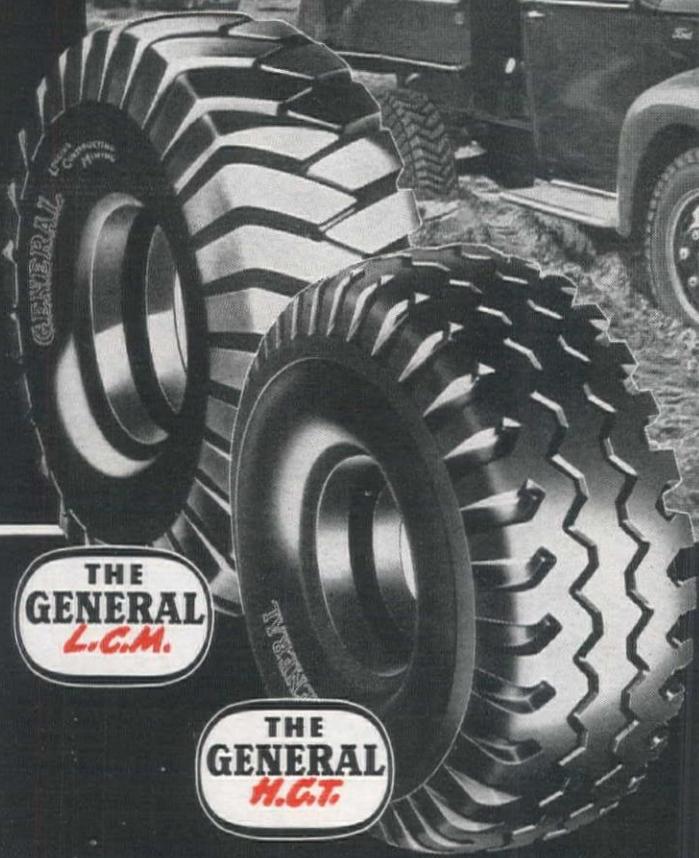
E. H. EDWARDS COMPANY — SEATTLE • PORTLAND • SAN FRANCISCO • LOS ANGELES • HOUSTON

OVER SHARP ROCKS, MUD, GRAVEL, SAND...OUT AND OVER THE HIGHWAYS

GENERAL

do all jobs

better, safer, faster
at Lower Cost



THE
GENERAL
L.C.M.

THE
GENERAL
H.C.T.

For more profit in every on and off-the-road job depend on this dual-purpose General Truck Tire team. The General L. C. M. for most work off-the-road. The General H. C. T. for most work on-the-road.

THE GENERAL TIRE & RUBBER CO.
AKRON, OHIO



The General L. C. M.—broad tread lugs resist cutting, prevent slipping and sliding in tough off-the-road work.



The General H. C. T.—fine-rolling ribs of rubber for safe traction in high speed over-the-road hauling.

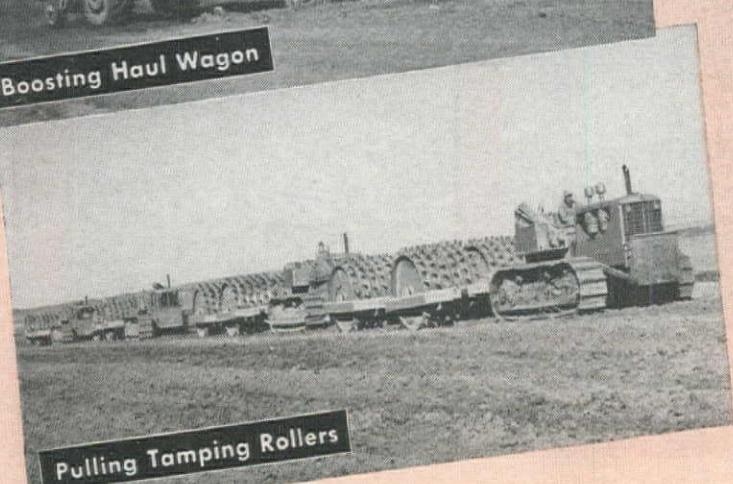


General Tractor Grader Tire with maximum traction from high, long-wearing, self-cleaning tread ribs. No side slip.

55 Allis-Chalmers Tractors and Motor Graders

SETTING SERVICE

42 HD-19 Hydraulic Torque Converter Tractors



12 Model AD Motor Graders

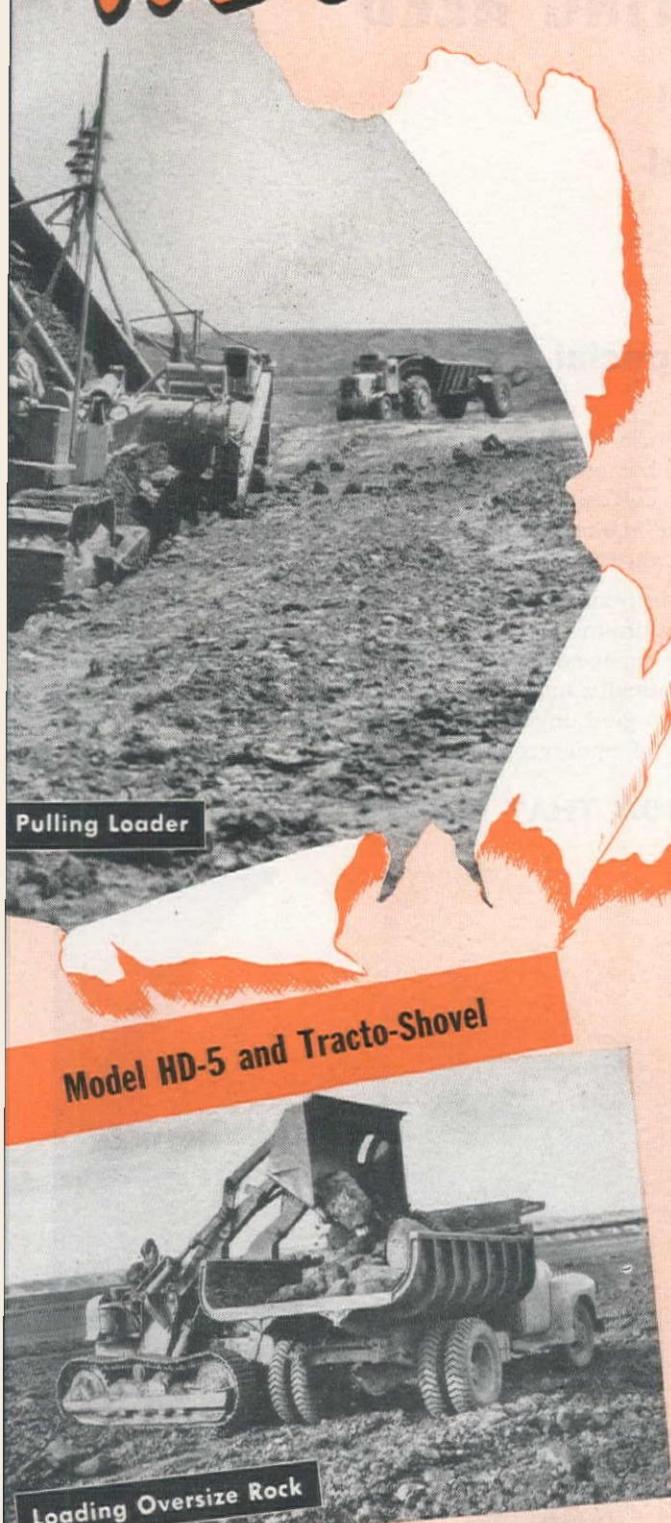


"SEEING IS BELIEVING"
Ask your Allis-Chalmers
Dealer for a demonstration

RECORD

for **PETER KIEWIT SONS' CO.**
and
MORRISON-KNUDSEN CO.

on their 18½-million-yard Garrison Dam job
in North Dakota, World's Largest Rolled-
Earth Fill Dam.



Pulling Loader

Model HD-5 and Tracto-Shovel

Loading Oversize Rock

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Lewiston—Fred M. Viles and
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Missoula—Mountain Tractor Company
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BILLINGS—Seitz Machinery Company, Inc.

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Elko—C. W. Paul Hardware
and Machinery
Reno—Moore Equipment Company, Inc.

OREGON

Eugene, Roseburg and North Bend—
Farm and Industrial Equipment Co.
The Dalles—Dielschneider Equip.
Oreg. Ltd.

LA GRANDE—Oregon Tractor Company
MEDFORD—Tractor Sales and Service, Inc.

KLAMATH FALLS—West Hitchcock Corp.
PORTLAND—Wood Tractor Company

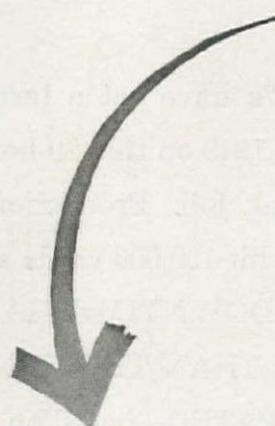
UTAH
Salt Lake City—Cate Equipment Co., Inc.

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

WYOMING
Casper—Studer Tractor & Equipment Co.

BARRETT* PROTECTIVE PRODUCTS

COVER EVERY PIPE-COATING NEED



BARRETT* PIPELINE ENAMEL

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

After more than 20 years' use under the most widely varying conditions, Barrett* Pipeline Enamel has conclusively demonstrated its ability to protect pipe lines against corrosion. When used properly, the need for constant inspection by line walkers is practically eliminated, as far as leaks from corrosion are concerned.

Barrett Pipeline Enamel is reinforced with inert flake minerals which provide toughness and maximum resistance to underground stress effects. It is non-absorbent, and is impermeable by soil waters. Like other Barrett coal-tar enamels, it is practically unaffected by soil composition or bacteria. It can be depended upon to give uniformly satisfactory service under the most punishing conditions of underground service.

HERE'S PROTECTION THAT PROTECTS!



This line was protected in 1927 with Barrett Pipeline Enamel. When taken up for relocation 16 years later, the steel was found to be free from corrosion.

Note how clearly visible the original mill knurl marks are in this untouched enlargement.

✓ Memo: FOR CORROSION ENGINEERS

Barrett coal-tar materials for special uses are all dependable, durable and economical. Eternium* Paint for exposed metal work. CA-50 Heavy Duty Cold Application coating for concrete and metal exposed to extremely corrosive conditions. Marine Enamel for ships, barges and off-shore service vessels. Service Cement and Pipeline Fabric for field joints — no torching required. Asbestos Pipeline Felt for soil stress shield. Tank Bottom Compound for sour crude storage. 34 YB Paint for exposure to salt water spray conditions.



THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

*Reg. U. S. Pat. Off.

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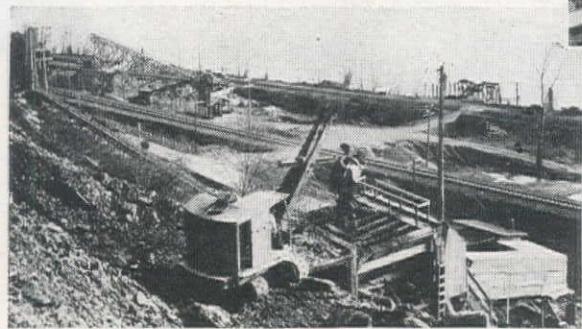
TELSMITH

Gyrasphere
CRUSHERS



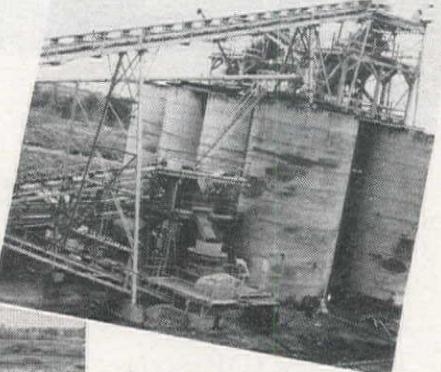
CALIFORNIA

Arrow Rock Co., Roscoe. Two 36" Gyrasphe-
res handle final reduction.



OREGON

Plant at Oregon City of
Warren Northwest, Inc., of
Portland, Oregon.



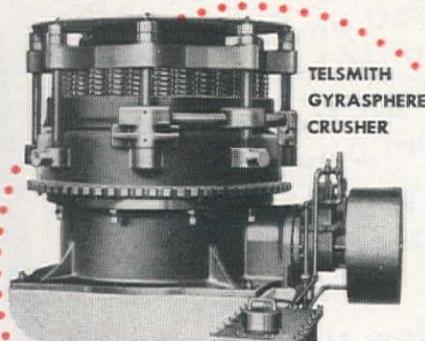
WASHINGTON

Crushing-washing plant,
Howard Smith, Vancouver.



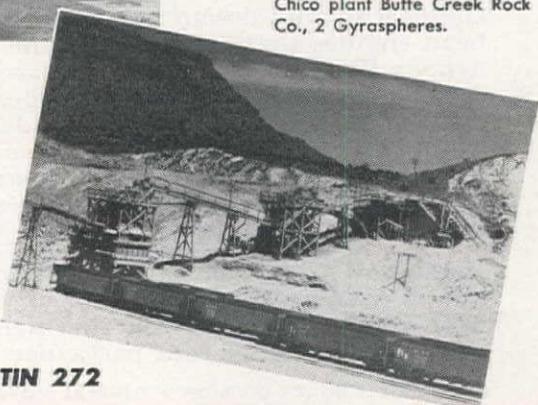
CALIFORNIA

Chico plant Butte Creek Rock
Co., 2 Gyrasphe-
res.



MONTANA

Plant of Helena Sand &
Gravel Co., Helena.



SEND FOR BULLETIN 272

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

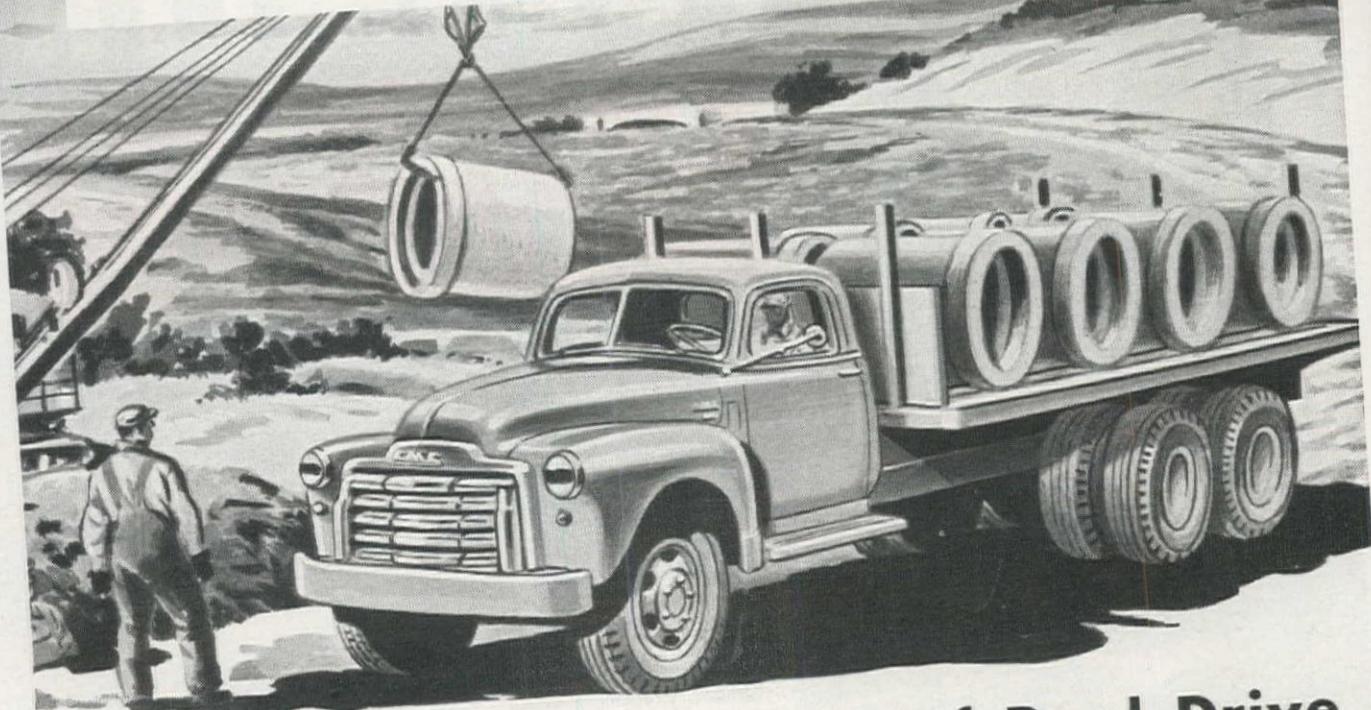
Mines Engineering & Equipment Co.
369 Pine St., San Francisco 4, Calif.

Garlinghouse Bros.
2416 E. 16th St., Los Angeles 21, Calif.

Lee Redman Equipment Co.
Phoenix, Arizona

Acme Machinery Co. Clyde Equipment Co. General Machinery Co. The Sawtooth Co. Gordon Russell, Ltd.
Salt Lake City 1, Utah Portland 9, Ore. Seattle 4, Wash. Spokane 1, Wash. Boise, Idaho Vancouver, B.C.

New "MIDDLE-WEIGHT" GMC SIX-WHEELERS



Bringing the Advantages of Dual Drive Design to Many More Truck Operators

Here's welcome news for contractors, road builders and other truck users who need trucks combining great tractive ability with low gross vehicle weight.

These new GMC series "400" and "620" 6-wheeler answer every requirement of these vocations. In the bargain they give you the plus values of GMC engineering and design . . . in powerful valve-in-head engines that are basically the same as "the Army's Workhorse" . . . in modern, wide-vision, extra comfort cabs . . . in rugged, truck-built chassis that include such outstanding features as wholly new, high efficiency dual drive axles, bumper bar grilles, recirculating ball bearing steering, Syncro-Mesh transmissions, frames of 11.1 and 16.03 section modulus.

These new GMCs offer a long-desired lower cost way of hauling big loads, on or off the roads. Let your GMC dealer give you the highly acceptable facts and figures for your particular job.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

GMC
GASOLINE • DIESEL
TRUCKS

24,000 and 32,000
pounds GVW

248 and 270 Engines
of 110 and 120 h. p.

360 and 426 Engines
of 150 and 177 h. p.

All-New Rugged
Dual Drive Rear Axles

Four- and Five-
Speed Syncro-Mesh
Transmissions

New Heavy Duty
Hydraulic and Air Brakes

Only Adams Motor Graders

give you this exclusive combination of advantages

1 8 Overlapping Forward Speeds

- 1 Wide Range of Blade Positions Without Mechanical Adjustments
- 2 ... Save Time in Adapting Machine to Needed Cuts.
- 3 Positive-Action Mechanical Controls ... Dependable, Accurate Adjustments—Because They're Geared ... Easy, Natural Steering.
- 4 Ample Operating Clearances ... Quick, Easy Adaptation to Work
- 5 ... Operator Comfort, Convenience, Efficiency.
- Fast, Easy Servicing Plus World-Wide Dealer Service
- ... Saves Time and Money.

4 Average-Work Speeds

for Ditching, Scarifying, Bank Work, Oil Mixing, Spreading, Maintenance, etc.

2 Intermediate Speeds

for Climbing Heavy Grades and for Plowing, Blading and Bucking Snow.

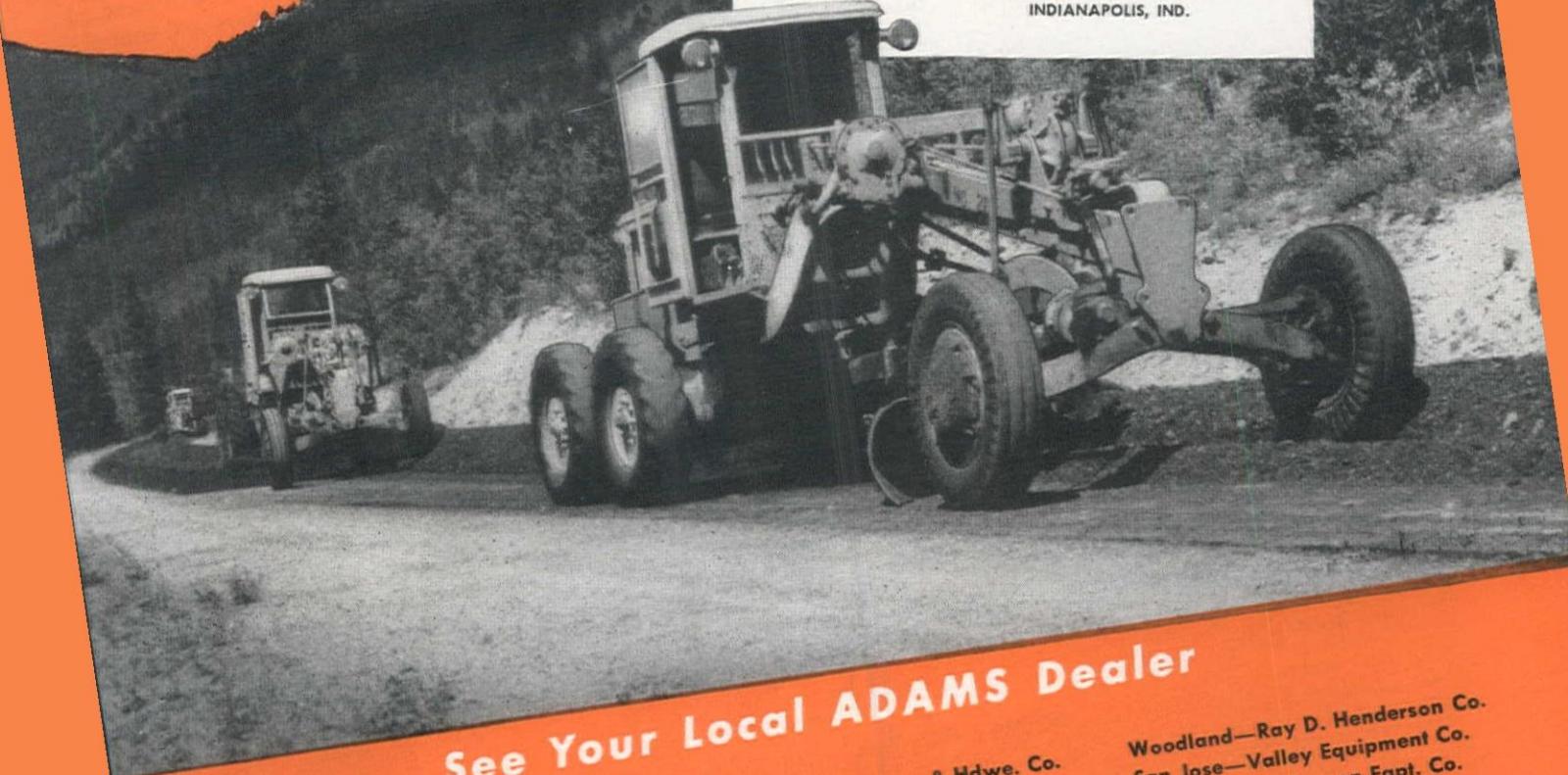
2 Transport Speeds

In Adams Motor Graders you get 2 more forward speeds than in several machines of comparable size and power—8 speeds instead of 6.

These additional 2 speeds give you an extra working speed and a higher "high"—as much as 25 mph. You get an exactly *right* speed for accomplishing each grading operation at the fastest practical rate . . . plus 30 to 50% faster job-to-job transport.

Let your local dealer show you how 8 forward speeds and other Adams advantages help you to speed operations, increase efficiency, reduce costs.

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



See Your Local **ADAMS** Dealer

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Bakersfield—Kern County Eqpt. Co., Inc.
Eureka—Tony Gosselin
Fresno—Allied Equipment Company
Los Angeles—Crook Company
Merced—Scarborough-Hunt, Inc.

DISTRIBUTORS ALSO IN Seattle and Spokane, Washington . . . Portland, Eugene, Roseburg, Albany, Klamath Falls and Central Point, Oregon . . . Denver, Colorado . . . Phoenix, Arizona . . . Billings, Great Falls, Missoula and Kalispell, Montana . . . Boise and Pocatello, Idaho . . . Reno and Las Vegas, Nevada . . . Salt Lake City, Utah . . . Albuquerque, New Mexico . . . Fairbanks, Alaska.

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Oakland—Bay Cities Equipment, Inc.
Redding—Sullivan & Crowe Eqpt. Co.
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Sacramento—Sacramento Valley Trac. Co.
Salinas—Farmers Mercantile Company
San Diego—Southern Eqpt. & Supply Co.

Woodland—Ray D. Henderson Co.
San Jose—Valley Equipment Co.
Santa Maria—Hanson Eqpt. Co.
Santa Rosa—Stevenson Eqpt. Co.
Stockton—Thompson-Sage, Inc.
Stratford—Orton's Eqpt. Co.
Visalia—Exeter Mercantile Co.

The New SEAMAN MIXER



THE SEAMAN
SELF-PROPELLED
PULVI-MIXER

Close-coupled, short turning radius; single or dual transmission gives 3 to 7 mixing forward speeds plus road-gear and reverse. Wide visibility for operator. All controls in instant reach.



THE SEAMAN SELF-PROPELLED TRAV-L-PLANT

All the advantages of Self-Propelled Pulvi-Mixer plus spray bar, pump, pump tachometer and tachometer wheel for accurate, no-migrating, no-evaporating admixture of bitumen or water most efficiently just ahead of rotor. Single or dual transmission, like Self-Propelled Mixer gives mixing speeds to match all conditions.

THE SEAMAN
PULL-TYPE
PULVI-MIXER

Here selective speed transmission controls rotor-speed to obtain best mixing despite variables in speed of towing tractors. Can easily be equipped with spray bar, pump and tachometer wheel for bitumen or water taken from transfer or tank truck.

**THE PRIMARY
EQUIPMENT FOR
ALL MAJOR
BITUMINOUS,
SOIL-CEMENT AND
ALL SOIL-STABILIZED**

Projects!

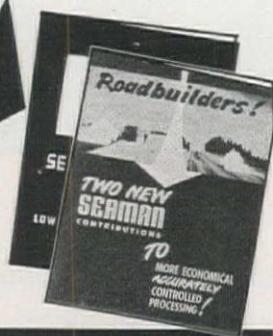
Yes, — large *projects* that have been handled by states, municipalities, counties and contractors such as these, — where *all* mixing was SEAMAN-produced: Andrew Scherer, contractor, N. C. (soil-cement); Davis Construction Co., contractor, N. Y. (bituminous); Standard Concrete Pipe Co., Cal. (Soil-cement); Cascade County, Montana (re-claiming oil mat); City of Birmingham, Mich. (asphalt); State of North Carolina . . . check with any or all of them about high production and fine quality mixing by the SEAMAN.

In short, the SEAMAN brings "plant-mix quality at *lowest* road-mix cost."

These new quality-mixing records are due to selective speed transmissions that match mixing speeds exactly to materials.

TWO NEW BULLETINS!

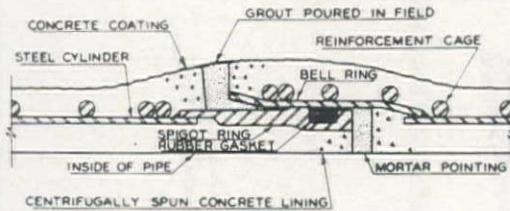
One on the Seaman Self-Propelled Mixer and Trav-L-Plant—the other on the Seaman Pull-Type Mixer. Yours on request. Complete details. Send for them now.



SEAMAN MOTORS, INC.

285 NORTH 25TH STREET, MILWAUKEE 3, WISCONSIN

CONSIDER THESE ADVANTAGES OF AMERICAN CONCRETE CYLINDER PIPE — for main water transmission lines



Manufactured in diameters of 14" through 42" in nominal laying lengths of 30', and for operating pressures from 100 psi upward.

This composite, modified prestressed pipe —

- ✓ Combines the physical strength and characteristics of steel with protective features and permanency of well-made concrete.
- ✓ Will, under normal bedding and backfill conditions, successfully withstand external or trench loads up to 10 ft. of cover or more. Excessive loads are safely provided for by special bedding or backfill.
- ✓ Has ample strength for the occasional concentrated loading which is sometimes met in practice.
- ✓ Will remain water tight under conditions of foundation settlement or soil movement within the limits generally met in water works practice.
- ✓ Has a long life with freedom from corrosion or deterioration. Concrete encasement protects steel cylinder and reinforcement from electrolytic action and deleterious ground water.
- ✓ Has a conservative design basis and assumed unit stress which provide ample factor of safety for all normal conditions of service including surge and water hammer.
- ✓ Will safely withstand sudden and extreme increases of pressure, or other disturbances, which might tend to burst or shatter ordinary types of pressure pipe having less elasticity.
- ✓ Has ample strength to withstand all normal handling conditions.

The economies of American Concrete Cylinder Pipe are reflected in initial cost, ease of installation, sustained capacity, and trouble-free service. These, together with the above design features, mean substantial savings in the cost of delivered water. Complete information is available upon request.

American
PIPE AND CONSTRUCTION CO.

CONCRETE PIPE FOR MAIN WATER SUPPLY LINES,
STORM AND SANITARY SEWERS, SUBAQUEOUS PIPE LINES
P. O. Box 3428, Terminal Annex, Los Angeles 54, Calif.
Main Offices and Plant—4635 Firestone Boulevard, South Gate,
California • District Sales Offices and Plants — Oakland — San
Diego — Portland, Oregon

**COMBINES strength of STEEL
with the protection and
permanency of CONCRETE**

Cutaway illustration shows spigot end of 24" diameter American Concrete Cylinder Pipe. The round rubber gasket, upon closure, is compressed in the spigot groove in the manner shown by the above diagram. Note cement-concrete protection, inside and out.

Which One is You?

type one



Do you drill holes all over the lot? A few in this cut—a few for that footing? Then you'll choose the lightweight LCM—the ideal wagon drill for use where moves are frequent.

type two

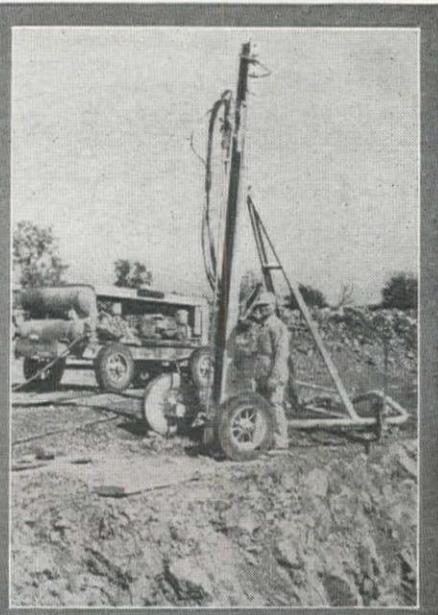


Do your jobs call for fast drilling? Big footage on every shift? Then you'll want the universal URM—for the last word in wagon drill efficiency and performance.

type three



Do you run into a lot of heavy rock excavation—with cuts up to 40 feet deep? Then the Gardner-Denver WD is the wagon drill for you. It's specially designed for deeper holes.



LCM FEATURES:

- Lightweight—easy to move
- Positive feeding pressure
- Convenient feed and drill controls
- Highly maneuverable
- Equipped for 6-foot steel changes

URM FEATURES:

- Simple, responsive controls
- Maintains correct bit pressure
- Positive, effortless blowing
- Adjustable wheels and mast
- Handles 6-foot steel changes

WD FEATURES:

- Extra powerful blowing
- Air motor feed
- Power operated mast
- Speeds line drilling and broaching
- For 10 or 15-foot steel changes

Whether your drilling pattern fits Type 1, 2 or 3—choose a Gardner-Denver Wagon Drill for faster, easier drilling. Write for Bulletin WD-1.



GARDNER-DENVER Since 1859

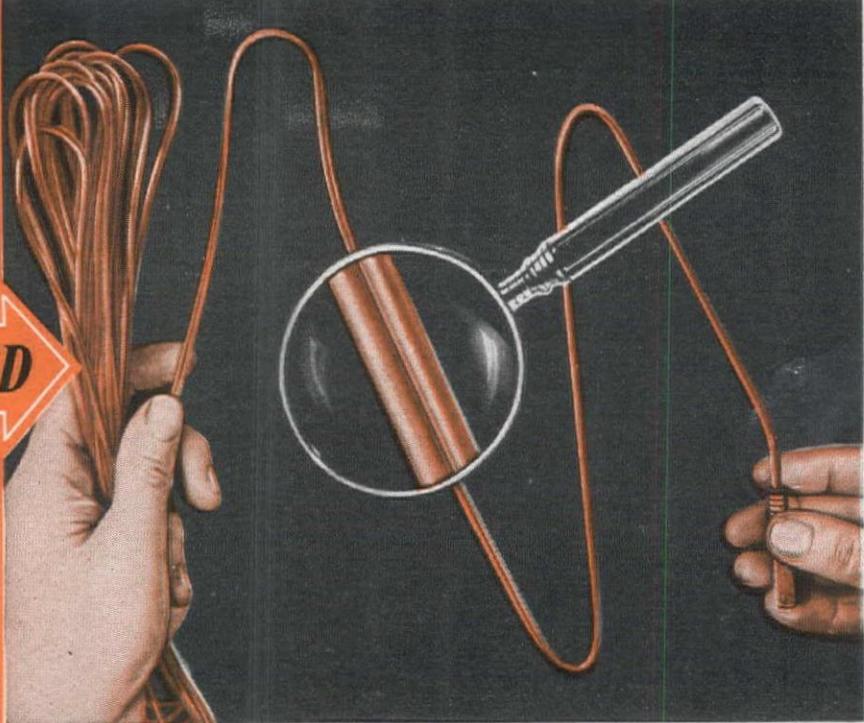
Gardner-Denver Company, Quincy, Illinois

WESTERN BRANCH OFFICES:

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

Announcing

the New
ATLAS
PLASTIC-INSULATED
blasting cap
wiring



*Designed for roughest field conditions...
to meet the most exacting demands of blasters*

Hundreds of good plastic insulating compounds were tried and rejected by Atlas Research before the new Atlas plastic-covered wire was developed. Our wire had to measure up to the most rigid demands of men who use electric blasting caps under every conceivable condition.

If you're one of our many customers who have already tried the new Atlas plastic-covered leg wires or connecting wire, you'll agree that this wire comes up to the highest expectations—and more! Here's why:

- 1 *It's really tough—and truly waterproof!* Thick plastic covering, made to withstand rough handling in jagged bore holes. Fully waterproof. Extremely high insulating value.
- 2 *Less kinking and snarling!* With minimum care, it folds or reels out without tangles or kinks—saves time and tempers in hooking up.
- 3 *Flexible at 20° below zero!* Made to withstand Arctic or Tropic weather.
- 4 *Easy on eyes and hands!* No eye-strain to see the brilliant orange or yellow wire, even in dull light. No rough edges when duplex wire is separated into single strands.
- 5 *Stands up to rigid tests!* Compare it with other wire for these outstanding properties; and also for high tensile and compression strength; resistance to deterioration from weather, rodents, vermin.

Now available in duplex on all Atlas Manasite electric blasting caps with wires 30 feet long or more. Two single plastic-covered wires on shorter lengths.

Another outstanding contribution to explosives progress by the makers of ROCKMASTER, the original split-second delay blasting system.

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

Offices in Principal Cities

ATLAS

EXPLOSIVES

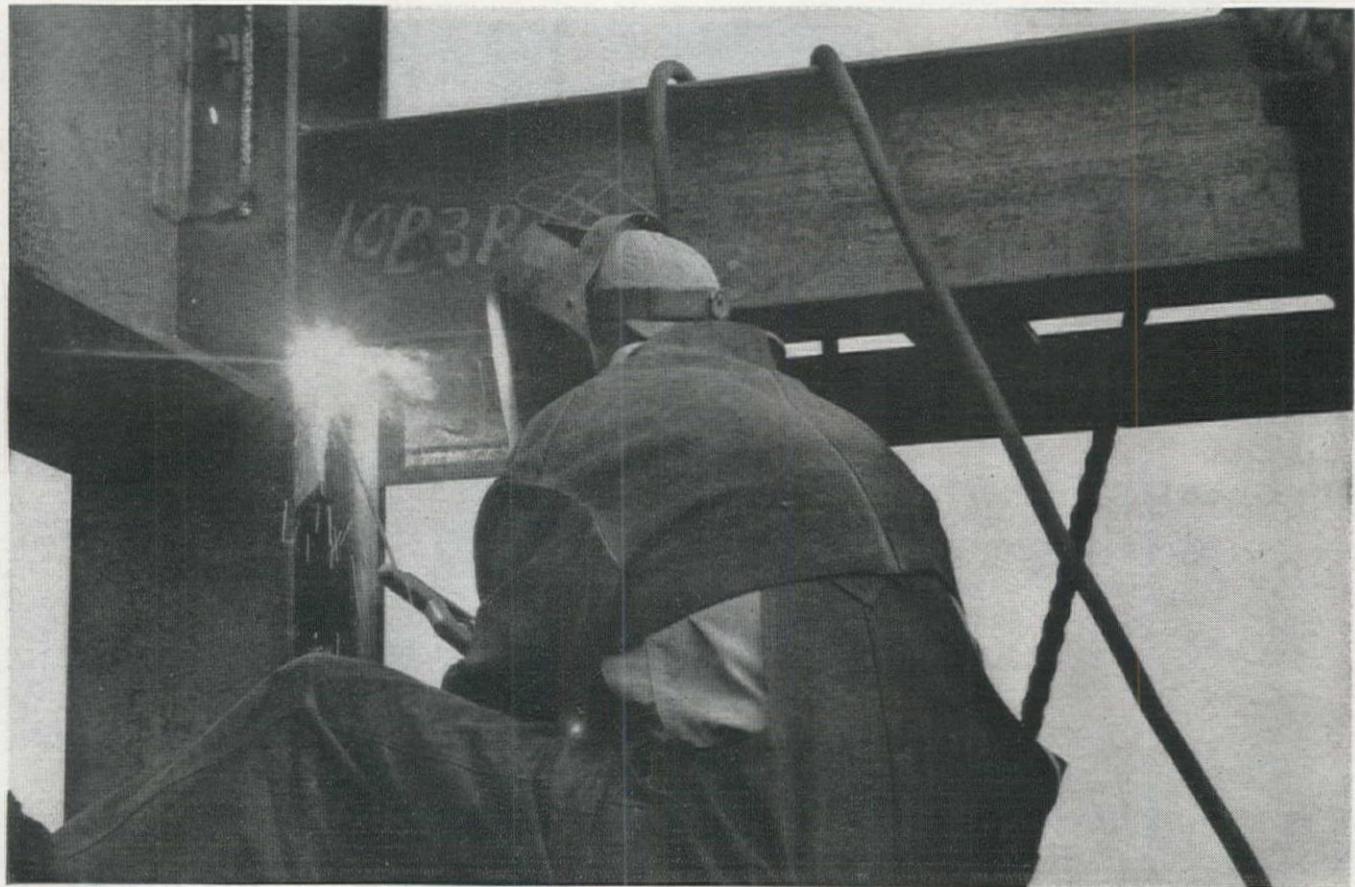
"Everything for Blasting"

SAN FRANCISCO 4, CAL.

ATLAS POWDER COMPANY



SEATTLE 1, WASH.



HEARD THE LATEST ABOUT "FLEETWELD 5"?

**The world's favorite
electrode is back
in the limelight again!**

Have you used "Fleetweld 5" lately? . . . or talked to any of the thousands of welders who are using this 21-year-old world's leading electrode?

Do so and you'll discover:

This star performer is still tops for *bead shape, lack of slag interference and penetration . . .* the qualities that have made it the

leader for these many years in class E-6010 welding.

But the stellar attraction today is a *plus value . . . its*

New smoothness of operation

"Fleetweld 5" now has a smoother, more unidirectional arc. For every inch of rod, the *arc is confined*, directed right into the joint. *Burn-off is uniform* at all times. The arc is easier to handle at all currents and in all positions. Hence, it is easier to get *smooth,*

uniform beads . . . every inch of the way. This uniformity gives improved weld metal too!

These new advantages for the veteran of the shielded arc process have been made possible by Lincoln's development of a new "uniformity control" in manufacturing.

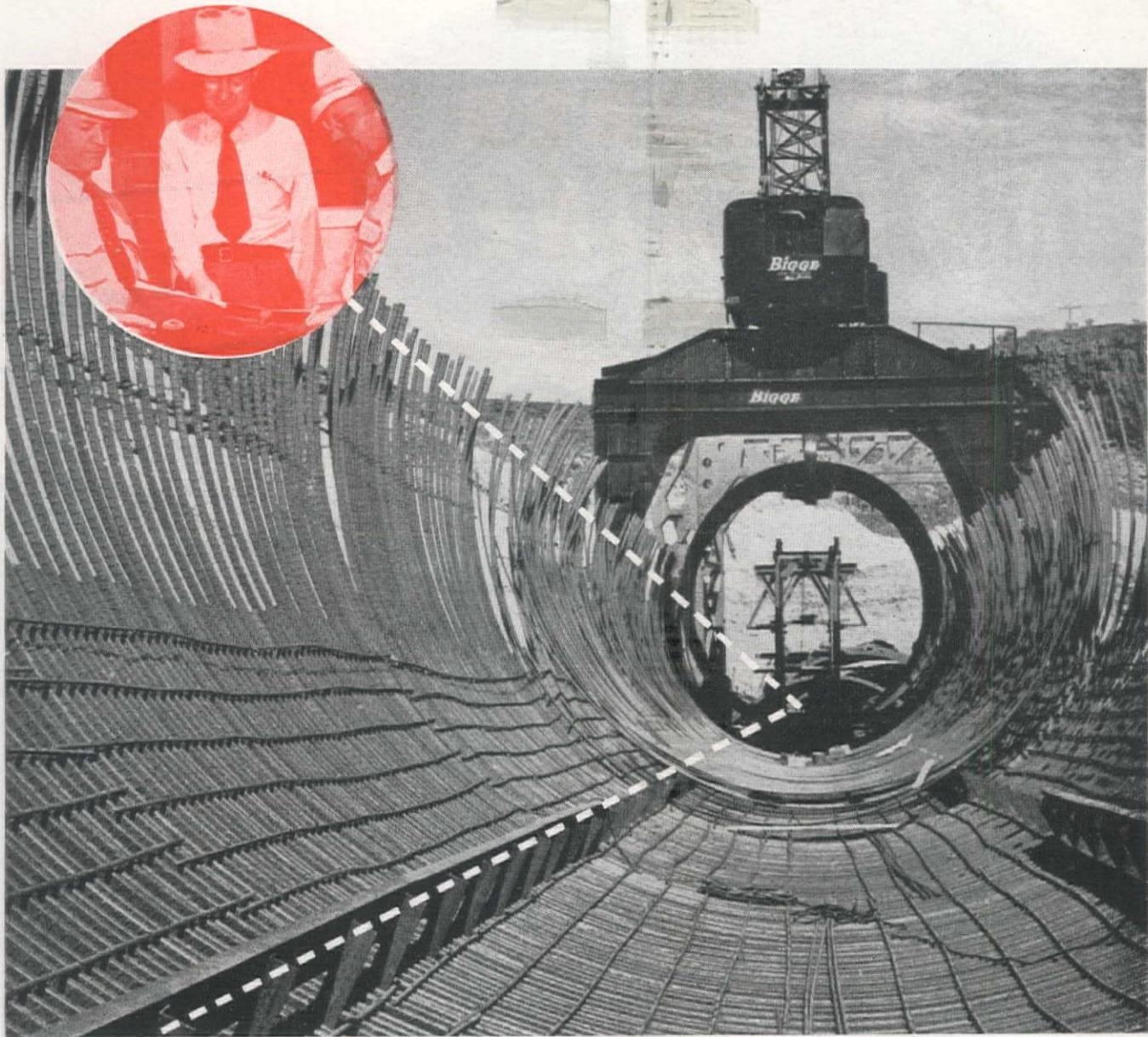
Users everywhere are enthusiastic about *every inch, every rod, every shipment* of "Fleetweld 5". Try it and see how it gives you the answer to every problem in E-6010 welding!

**GET
THE FACTS**

Send for free Lincoln Welding for Mild Steel. Write
THE LINCOLN ELECTRIC COMPANY
Dept. 391, Cleveland 1, Ohio

Sales Offices and Field Service Shops in All Principal Cities





"From 105° to 16° below...G. P. keeps us going"

That's the statement of George Mann, project manager for Winston, Utah, principal contractor on the 2.3 mile Soap Lake Siphon job of the Columbia River Reclamation project. According to George, the outstanding performance of specially recommended lubricants plus conscientious, on-the-job service by General Petroleum lube engineers enabled them to sustain a year-round schedule in difficult terrain and extreme weather conditions ranging from 105° to 16° below zero.

Work on this stretch of the Siphon, a \$7,614,729 contract, began in March, 1949. Plans call

for completion of the job in two years and seven months. When completed it will be part of an 800 mile network of siphons, feeder canals and main canals to conserve and distribute irrigation water over more than a million acres.

Lubricated and fueled 100% by General Petroleum, this job provides a true test of product and lube engineering skill. Among the many specialized greases and oils used to lick unusual problems, was a new steel form oil compounded especially for the job to simplify stripping of forms and improve the concrete work.

Take Advantage of This G. P. Service

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



GENERAL PETROLEUM CORPORATION

Using nature's gift to better mankind

THE HUBER MAINTAINER

A 6000 LB.

with Calcium Chloride
in Rear Tires

42 1/2 H.P.



SERVES AS A Grader, Berm Leveler, Road

Planer, Bulldozer, Lift Loader, Snow Plow,

Highway Mower, Broom, Patch Roller

THE HUBER MFG. CO.
Marion, Ohio
Since 1863

LEE & THATRO EQUIPMENT CO.....	Los Angeles 21, California
JENKINS & ALBRIGHT.....	Reno, Nevada
CONTRACTORS' EQUIPMENT & SUPPLY CO...Albuquerque, New Mexico	
FEENAUGHTY MACHINERY CO.....	Portland 14, Oregon
FEENAUGHTY MACHINERY CO.....	Boise, Idaho
FEENAUGHTY MACHINERY CO.....	Spokane 2, Washington

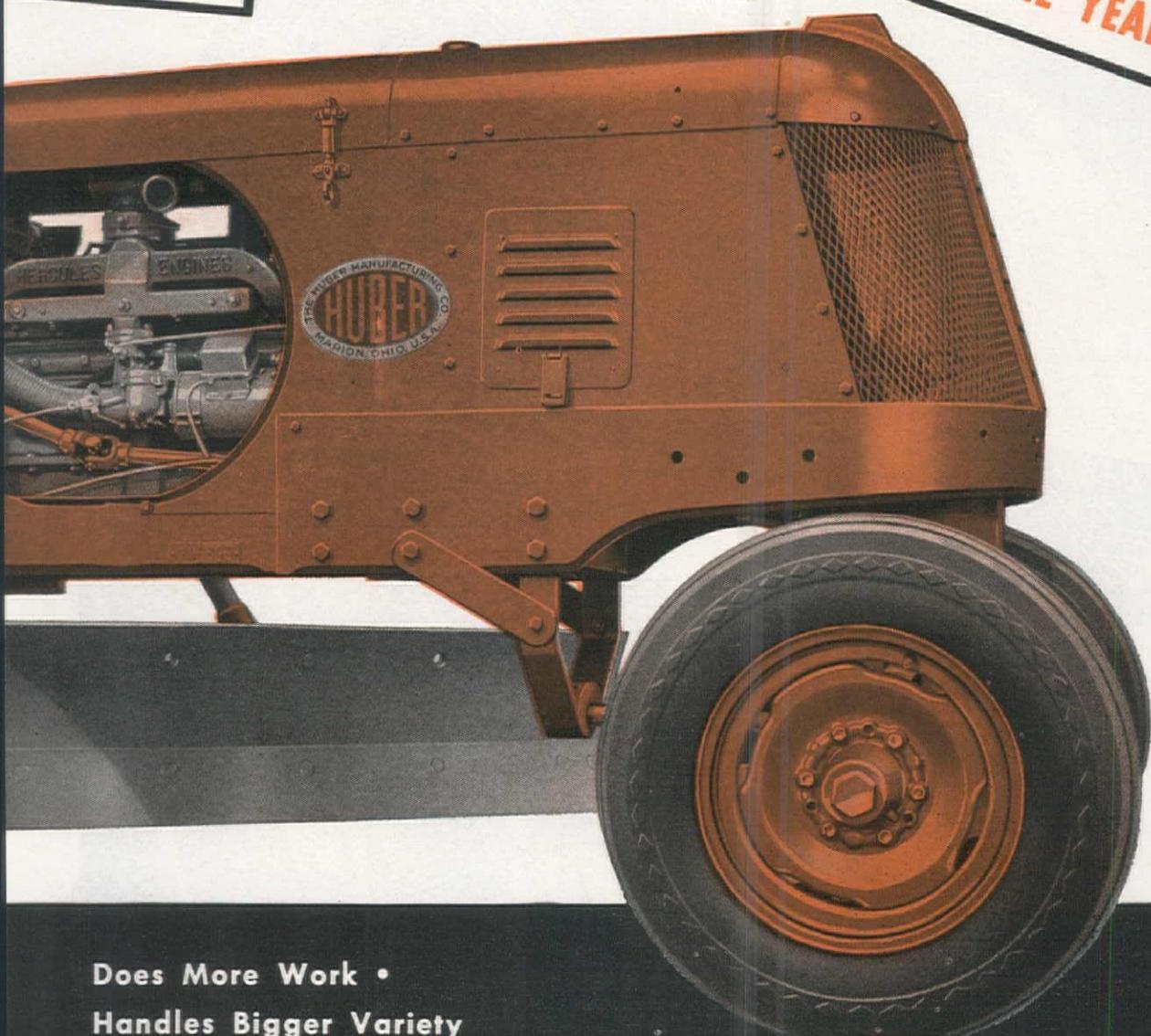
A BIG MACHINE
GRADER

solution

9 MACHINES in ONE

with HUBER attachments

BUSY EVERY MONTH
OF THE YEAR



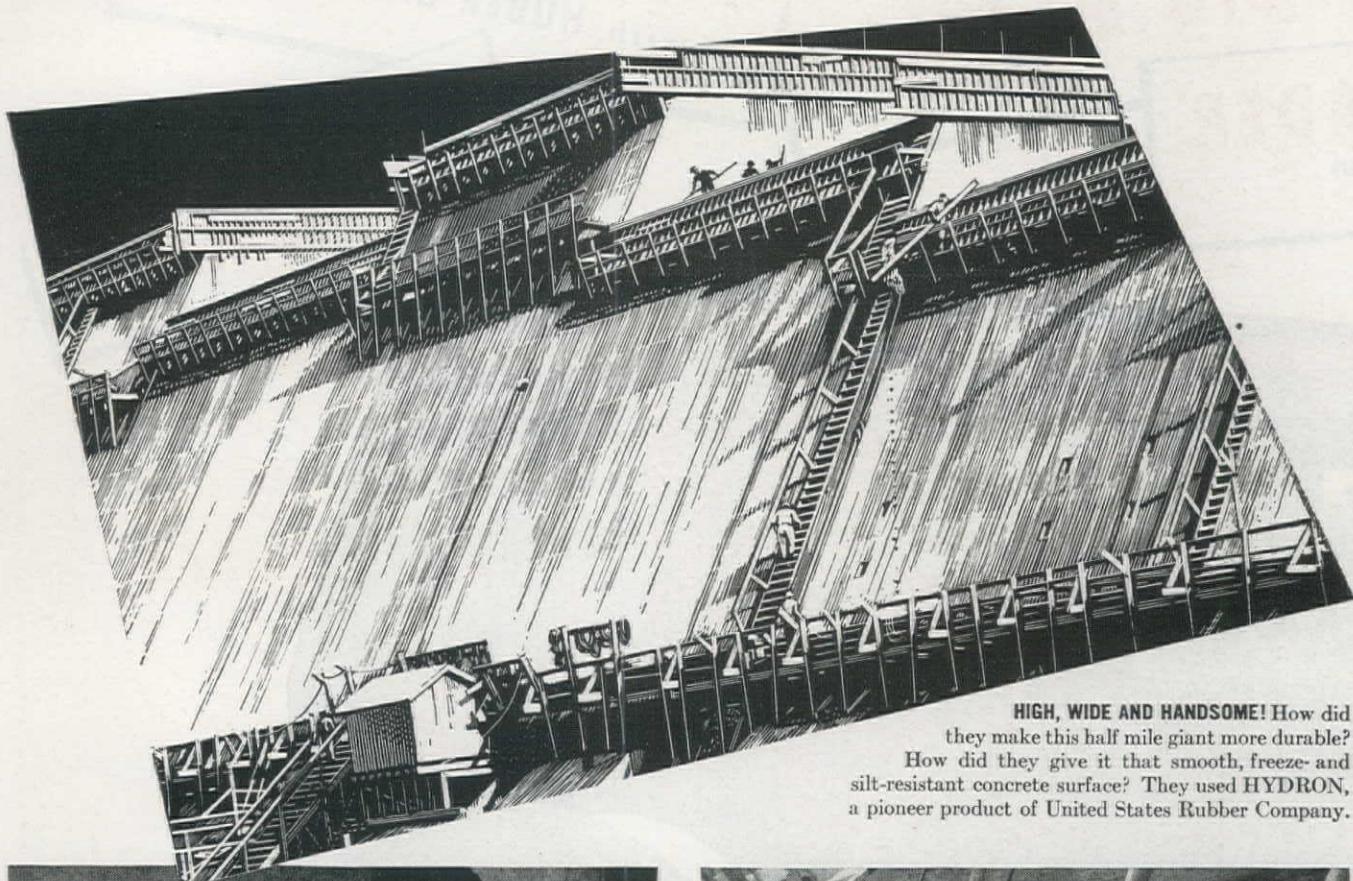
Does More Work •
Handles Bigger Variety
of Jobs • Costs Less to Buy •
Less Costly to Operate •
Gets around Like a Truck

HUBER

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

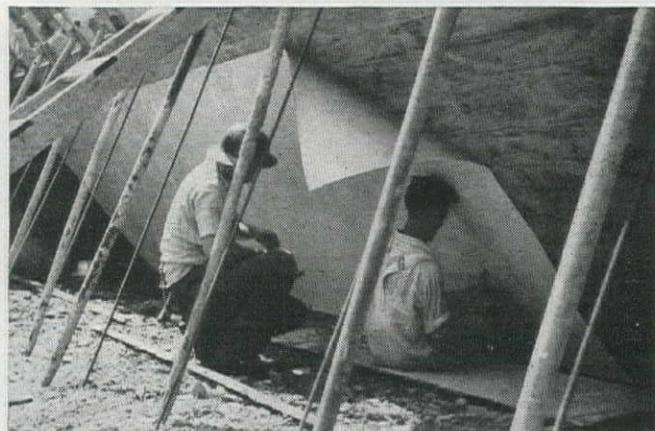
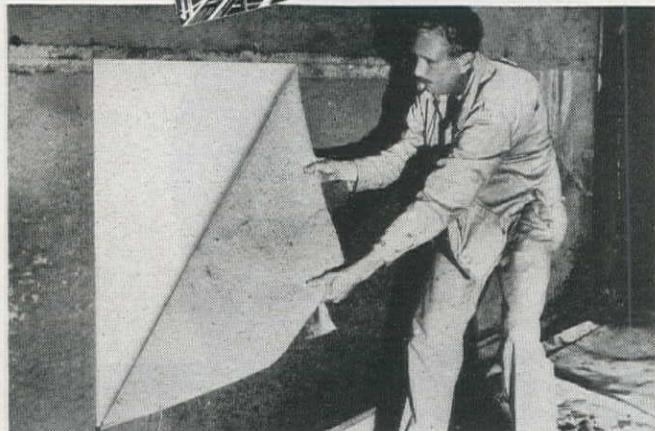
SECRET OF A GIANT'S STRENGTH

Giant Norfork Dam built with Hydron Form Linings for stronger, pit-free concrete surfaces



HIGH, WIDE AND HANDSOME! How did

they make this half mile giant more durable? How did they give it that smooth, freeze- and silt-resistant concrete surface? They used HYDRON, a pioneer product of United States Rubber Company.



LEARN THE SECRET of Hydron! It's a flexible absorptive form lining only 0.08 of an inch thick. It absorbs excess water and eliminates trapped air. Concrete laid against Hydron is smoother—lasts longer.

HOW IT'S DONE! Hydron is mounted to wooden forms by *rapid fire staple guns*; to metal frames, with special adhesive. Comes in a flat box, 4 x 6 ft. Easy to handle, easy to cut or trim for any giant job!

Engineers and contractors who have used Hydron Form Linings report that Hydron adds *years* to the serviceable life of concrete. Yet, the *total* cost, including a satisfactory profit, is only 12¢ to 16¢ per square foot. For more information write Mechanical Goods Division,

A DEVELOPMENT OF

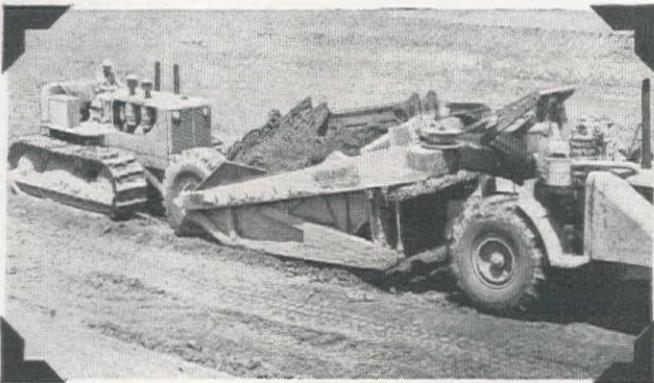
U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER, NEW YORK 20, N. Y.

STANDARD ENGINEER'S REPORT

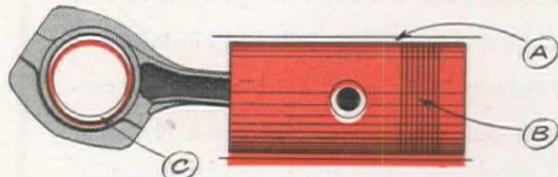
LUBRICANT	RPM Delo Oil
UNITS	148 Diesel engines
CONDITIONS	Heavy-duty-service 24-hour operation
PERIOD	13½ months
JOB	L. A. Airport Extension

Engine-cleaning oil cuts "down time" in half!



LUBRICATED WITH RPM DELO OILS, more than 100 heavy-duty engines like these were pushed to full capacity around the clock. They finished the greatest earth-moving project in the West 150 days ahead of schedule! RPM DELO Supercharged Oil kept parts lacquer-free and reduced wear so that time out for repairs was reduced 50% under that necessary when using ordinary heavy-duty oils.

How RPM DELO Oils reduce wear, corrosion, oxidation in Tractor, Truck, and other Heavy-Duty Engines



- A. Contains special additives that provide metal-adhesion qualities . . . keep oil on parts whether hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer . . . prevents ring-sticking. Detergent keeps parts clean . . . helps prevent scuffing of metal.
- C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.



HEAVY-DUTY DIESEL AND GASOLINE EQUIPMENT, owned by 8 contractors, moved over 12,000,000 cubic yards of earth on this cut and fill job—an extension to the Los Angeles Airport—in 13½ months! General Contractors are N. M. Ball & Sons, Berkeley; Harms Bros.,

Sacramento; H. Earl Parker, Inc., Marysville; Sub-contractors, Lewis & Queen, Fresno; Louis Biasotti & Son, Stockton; Baker Bros., Chico; Gunner Corp., Pasadena; and Far West Construction Co. All used Standard Oil Company of California products 100%.

REMARKS: RPM DELO Oils are designed to meet every heavy-duty engine need: RPM DELO Heavy Duty, RPM DELO Special, RPM DELO Supercharged-1 and RPM DELO Supercharged-2 Lubricating Oil.



STANDARD TECHNICAL SERVICE checked this product performance. 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.

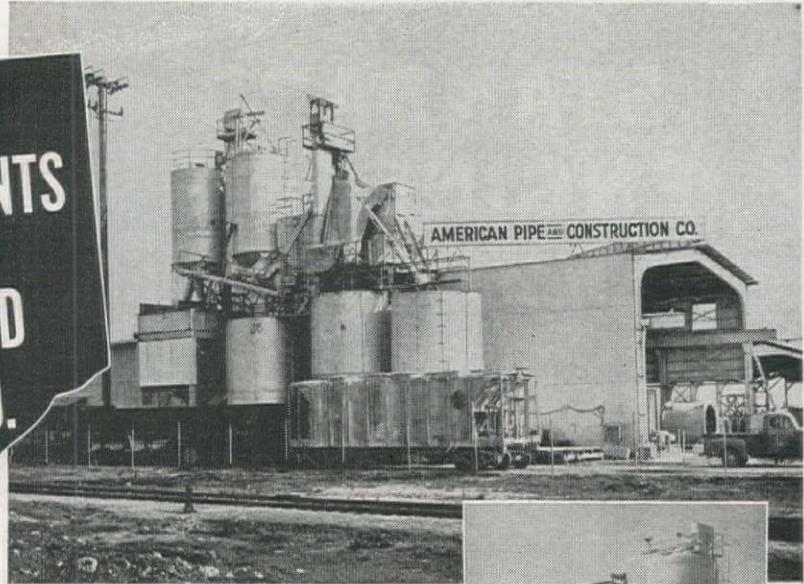
Trademark "RPM DELO" Reg. U. S. Pat. Off.

STANDARD OIL COMPANY OF CALIFORNIA

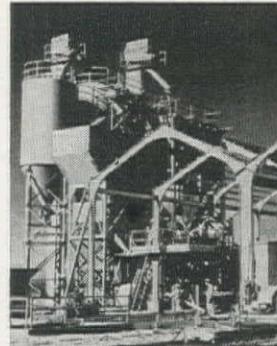
A "FLEET" OF NOBLE BATCHING PLANTS Prove Profitable for AMERICAN PIPE AND CONSTRUCTION CO.

Early in 1947 American Pipe and Construction Co. set up its first NOBLE batching plant in Oakland. This consists of a CA154 weigh batcher and 2-2000 cu. ft. silos. There followed 2 installations at Pittsburg, Calif., one of which is supplying centrifugal spun cement lined and coated 62½" steel pipe for 21 miles of the Hetchy-Hetchy Aqueduct.

The fourth plant—a semi-automatic CA154 with 2-2000 cu. ft. silos—is in Coachella Valley batching for 127,000 feet of reinforced concrete pipe ranging in size from 12" to 84". The fifth, and latest addition to the "fleet" is a NOBLE CA83 semi-automatic plant with 1000 cu. ft. cement silo at Portland, Oregon.

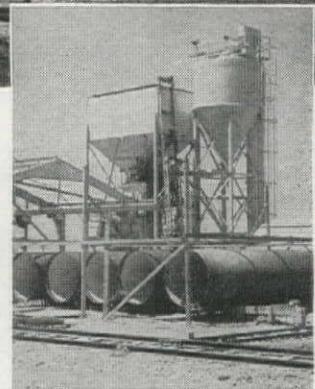


The CA154 Oakland plant.

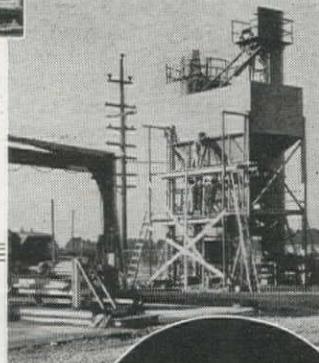


Another CA154 at Mecca,
Coachella Valley.

Portland plant in process
of erection.



One of two A. P. & C. Co. plants
in Pittsburg, Calif.



5 Reasons why

Here are five good reasons why American Pipe and Construction Co. choose NOBLE plants for their operations:

1. NOBLE plants, engineered from standard, job-proved units, fit the company's exact needs, yet sell at stock model prices.
2. Plants are quickly and easily erected.
3. They weigh batch to within .2 of 1% accuracy.
4. They are one-man operated.
5. NOBLE bulk cement silos save sack handling and prevent loss from deterioration and bursting sacks.

Investigate all
the advantages
NOBLE offers you. Wire,
write or phone NOBLE
engineers **NOW.**
No obligation.

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

Los Angeles Office: 411 WEST FIFTH STREET • PHONE MUTUAL 8314

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.

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Seattle 99, Washington

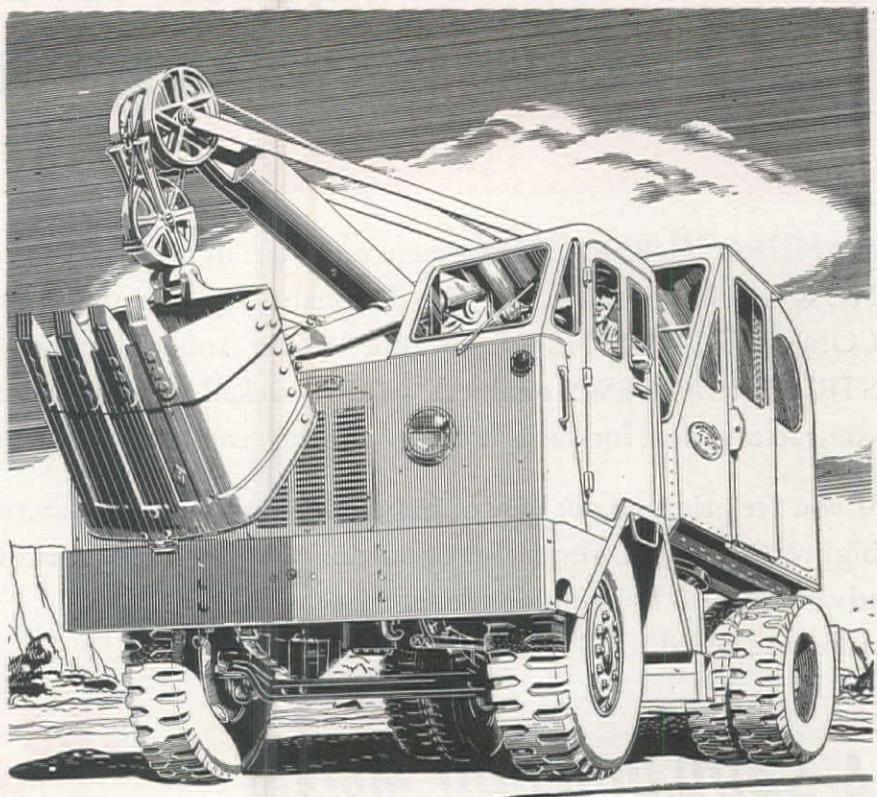
● **ARIZONA EQUIPMENT SALES, INC.**

733 N. 19th Avenue
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● **CONTRACTORS' EQUIP. & SUPPLY CO.**

P. O. Box 456
Albuquerque, New Mexico
and
P. O. Box 2039, El Paso Texas

● **JAMES CASHMAN**
107 N. Main Street
Las Vegas, Nevada



Any MICHIGAN owner will tell you

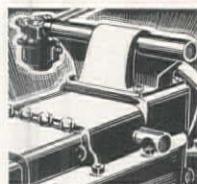
—why he bought a Michigan Truck Excavator. It could have been Michigan's famous mobility . . . the heavy duty Michigan truck chassis . . . high yardage through air controlled clutches . . . cast steel turntable base . . . hook rollers . . .

But why not let a Michigan owner tell you in his own words. Your local Michigan dealer welcomes the opportunity to show you the most complete line of $\frac{3}{8}$ and $\frac{1}{2}$ yard excavators available. It will pay you to get in touch with him today.

MICHIGAN
POWER SHOVEL COMPANY
430 Second Street
Benton Harbor, Michigan, U.S.A.



EASY STEERING
Heavy duty worm and roller steering gear, 20-inch steering wheel, minimize steering fatigue and help you thread through traffic easier, get around on the job faster.



EASY SHIFTING
Smooth meshing gears, no "fighting" the shift-lever or clutch pedal. Auxiliary transmission provides multiple speed range for every highway condition, for tough off-the-road travel.



POSITIVE TRACTION
Big, traction-tread tires easily pull you through deep sand, mud or heavy snow without delays. Their high-flotation takes you over soft ground with far less chance of bogging down.



COMFORTABLE CAB
Operators like it! Plenty of leg and elbow room for big men. Wide angle visibility through big, rubber-set windshield and windows. Familiar, automotive-type controls.



Make Our JUNE HIGHWAY ISSUE YOUR WESTERN "ROAD SHOW"

MANUFACTURERS of equipment or materials for highway construction or maintenance, plan NOW to tell your sales story with dominating space in the Annual Highway Issue of WESTERN CONSTRUCTION NEWS, out June 15. The Annual Highway Issue, like all WESTERN CONSTRUCTION NEWS numbers, will be packed with the kind of solid information successful contractors, and forward-looking highway engineers want and read.

If you are bringing out new or improved equipment or materials for building and maintaining highways, here's a wonderful opportunity to introduce them to your Western trade. Take full advantage of it by using dominant space with color and bleed.

A \$400,000,000 Market For Equipment and Materials

Already States, Counties and the Federal government have earmarked more than \$400,000,000 for new construction and maintenance of highways and bridges in the Western half of the U. S.—the area covered by WESTERN CONSTRUCTION NEWS. Nine states in this area have increased gas taxes to assure adequate funds for highway needs. It's a big market for equipment and materials. Cash in on it NOW!

12,500 ABC Net Paid Circulation

Your advertising in WESTERN CONSTRUCTION NEWS goes to over 12,500 men with buying power in the field of construction. These are the men you want to reach; the men who have the power and influence to make or break a sale. They will read this issue with special interest.

*The West
IS DIFFERENT*

Highways here are used to a far greater extent for trucking operations. There are no navigable rivers with their barge routes; no Great Lakes, or intricate railroad networks in the West, so the highways carry tremendous and ever-increasing tonnage of truck traffic.

Industry produces raw materials which demand movement of bigger loads. Take logging, mining, petroleum, for example. Then, too, distances are long and mountain grades frequent and severe. Growing population stimulates movement of more materials, and greater truck and passenger car traffic.

This all adds up to more highways, heavier foundations, thicker pavements, stronger bridges, and so on. How the West is coping with this problem, what the thinking is for future betterment, will be thoroughly and competently covered in our June issue. It will be MUST reading for the men who design and build the West's highways—our 12,500 paid readers (your best prospects).

Cash in on This Market Now!
FIRST FORMS CLOSE ON MAY 10
FINAL FORMS CLOSE ON MAY 20

JOIN THE 63 ALERT ADVERTISERS ALREADY SCHEDULED IN ANNUAL HIGHWAY ISSUE

As of February 1st, 63 alert, sales-minded advertisers already have scheduled space for our June Annual Highways Issue—more than half have reserved full pages or spreads. Join them NOW... back your Western distributors and salesmen with advertising space in this big, interest-packed highways number. Mail your reservation TODAY.

NO INCREASE IN RATES

You pay no extra premium for this special highways number. Our regular published rates apply to all space—

ADVERTISING RATES

(Based On Total Space Used in 12-Month Period)

Full Page Space	24 pages or more	\$215.00 per page
12 to 23 pages	235.00 per page	
6 to 11 pages	255.00 per page	
3 to 5 pages	270.00 per page	
Less than 3 pages	300.00 per page	

Fractional Space	1 time	6 time	12 time
2/3 page	\$200.00	\$180.00	\$170.00
1/2 page	150.00	135.00	127.50
1/3 page	100.00	100.00	90.00
1/4 page	75.00	75.00	67.50
1/6 page	50.00	50.00	50.00

Color Charges	1 page	2 pages facing
Red, orange or yellow	\$65.00	\$95.00
Other colors	70.00	105.00
Metallic colors	75.00	110.00

Bleed Borders	Bleed top, bottom or outside	20% extra	15% extra
Gutter bleed		No charge	No charge

Inserts	Inserts billed at earned black and white page rate. No extra charge for backup either single leaf or spread (4-page form).
Composition—No charge.	

Preferred Positions (Non-cancellable).	10% premium
Page facing second cover	20% premium
Page facing contents page	20% premium
Page facing first editorial	20% premium
Page facing first reading	20% premium
Any guaranteed regular position (other than preferred)	10% premium

NOTE: Island 1/2-page positions (45/8" x 7 1/2") cost 20% extra.	
Write for availability of cover positions and rates.	

Let Our District Manager Arrange An Appointment With You

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Weston Road, Georgetown, Conn.
Telephone Georgetown 3744

CLEVELAND

RICHARD C. BURNS, Mgr.
7708 Deerfield Drive, Cleveland 29, Ohio
Telephone Tuxedo 5-1848

CHICAGO

A. C. PETERSEN, Mgr.
3423 Prairie Ave., Brookfield, Ill.
Telephone Brookfield 532

SAN FRANCISCO

R. C. WILLIAMS, Mgr.
609 Mission St., San Francisco 5, Calif.
Telephone YUkon 2-4343

LOS ANGELES

CLARENCE G. BEARDSLEE, Mgr.
3757 Wilshire Blvd., Los Angeles 5, Calif.
Telephone DUnkirk 4-9462

**WESTERN
CONSTRUCTION
NEWS** WITH WHICH IS COMBINED
WESTERN HIGHWAYS BUILDER

609 Mission Street
San Francisco 5, Calif.
YUkon 2-4343

MECHANICAL REQUIREMENTS

Space May Be Used in Any of the Following Forms:

Bleed full page (trim size)	8 1/4 in. wide x 11 1/4 in. deep
Requires a plate size of	8 1/2 in. wide x 11 1/2 in. deep
Standard full page	7 in. wide x 10 in. deep
Two-thirds page	4 5/8 in. wide x 10 in. deep
Half page	7 in. wide x 4 1/8 in. deep
or	3 7/8 in. wide x 10 in. deep
or	4 5/8 in. wide x 7 1/2 in. deep
Third page	2 1/2 in. wide x 10 in. deep
or	4 5/8 in. wide x 5 in. deep
Quarter page	7 in. wide x 2 7/8 in. deep
or	3 7/8 in. wide x 4 1/8 in. deep
or	4 1/2 in. wide x 3 7/8 in. deep
Sixth page	2 1/4 in. wide x 4 1/2 in. deep
or	7 in. wide x 1 7/8 in. deep
Eighth page	3 7/16 in. wide x 2 7/8 in. deep

Inserts

Should be shipped untrimmed measuring 8 3/4" by 12" to trim to magazine size 8 1/4" by 11 1/4", allowing 3/8" for gutter bleed. If backup required, ship to us c/o Ben Franklin Press, Inc., 500 Sansome Street, San Francisco 11. If no backup required, ship to us c/o William S. Millerick Co., 545 Sansome Street, San Francisco 11. Stock preferably not heavier than our cover stock.

Halftone Screens

110- or 120-line preferred.

Closing Dates

First forms close for Western Construction News on 10th of month preceding issue date. Final forms close on 20th preceding issue date.

For Western Industry first forms close on 5th of month preceding issue date, final forms on the 12th preceding issue date.

Plates

Plates should be shipped mounted, and with proper mortise. All plates not called for in 14 months will be destroyed.

MARKET & MEDIA DATA UNITS AVAILABLE
Send for your copy—No obligation of course

**Yes I Want Complete Information!
MAIL THIS COUPON TODAY**

Western Construction News, Yes I want

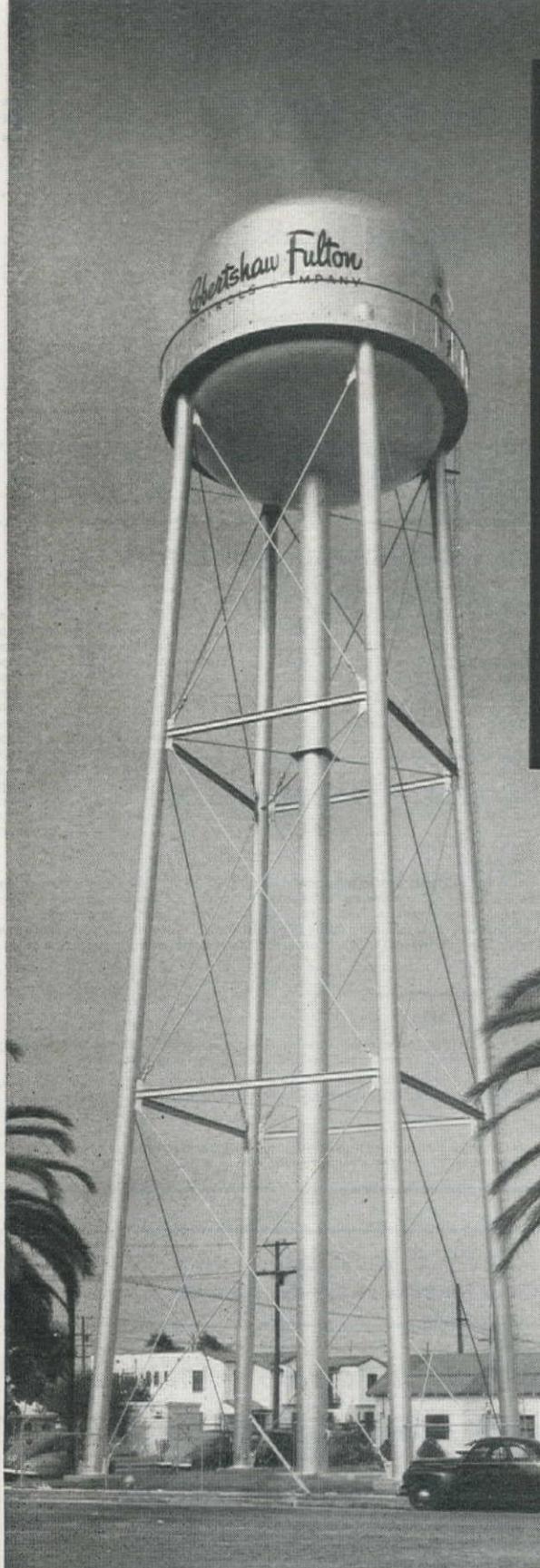
Your 1949 Highway Issue.
 Additional information and your
district manager to see me.

NAME..... TITLE.....

COMPANY.....

STREET.....

CITY..... ZONE..... STATE.....



Make plans now for
FIRE PROTECTION
with a Horton Elevated Tank*

When you install a Horton elevated tank and an automatic sprinkler system, you have a defense against fire that won't fail—day or night. The water that is held in reserve in the tank stands ready to put out any fire that starts before it has a chance to gain headway. The force of gravity maintains adequate water pressure in the system at all times.

An automatic sprinkler system and an elevated water tank often means big savings on insurance premiums, too. For example, the 75,000 gal. tank at the left is the secondary water supply for the sprinkler system of the Grayson Controls Division of the Robertshaw-Fulton Company at Lynwood, California. They save \$18,000 annually on insurance premiums.

If you are interested in protecting your plant and reducing your premiums, start planning for fire protection with a dependable Horton elevated tank. Write the nearest office for information or quotations.

**Some other
installations of
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March 15, 1950

Vol. 25, No. 3

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Measuring the Quantities

ENGINEERS make up estimates of construction costs for a project by taking the number of units of work—cubic yards of concrete, board feet of lumber or pounds of reinforcing steel—and multiplying these by a unit price. Contractors go through the same process in making up bids. It is reasonable to assume that contractors have more accurate and timely information on the complex elements which go to make up the figure of price per unit. But the amount of the physical quantities involved is a simple matter of measurement, which is a fundamental of engineering skill. Contractors occasionally find appreciable discrepancies between their figures, based on the plans and observed field conditions, and the quantities in the engineer's estimate.

If an ultimate check with the quantities shown in the "final payment" indicated the estimate to be at wide variance, the result could be charged to: (1) improper calculations of physical dimensions, (2) changes in plans based on field conditions unknown at the time plans were drawn, or (3) an intentional inflation of the quantities as a means of insuring that bids would cover final costs. The first represents inferior engineering skill. The second is a situation admittedly unforeseen and reflects inadequate investigations at the site, providing problems for engineer and contractor alike. The last would seem to be an act of caution on the part of the engineer which does not represent a realistic prediction as to quantities of work to be done, and is misleading to bidders unfamiliar with such practice. A cumulative effect of these three factors could place an engineer's estimate outside the limits of reasonable variation from final results.

Contractors may be inclined to be more thorough and precise in their approach to both quantities and prices, for the results expressed in the bid will determine whether the contract is secured and the resulting profit from the job. The engineering estimator, on the other hand, should have the urge to demonstrate his professional skill and accuracy. He should take enough interest in his work to check each estimate against the quantities in the final payment, and study results for any evidence of repeating discrepancies. In fact, engineering executives would do well to require a frequent report on these comparisons to check the adequacy of the design and the estimating talents in the organization. If the same check were instituted by contractors the results would sharpen the processes of estimating and bidding.

The General Contract

THE QUESTION of separate versus general contracts has reappeared recently with increasing pressure from the specialty contractors demanding direct contracts from public awarding agencies. It is only natural that the specialty contractor would like to secure a separate and direct contract in the interest of achieving a feeling of equality of standing in the industry and possibly to escape from repeating an unpleasant experience in some past dealing with a "general". The former is a natural and understandable desire but it must be weighed against the question of final cost of the project. The latter is a matter for intra-industry contractual

relations, which should be handled at the association level.

The basic consideration involves the advantages of centralized control by a general contractor as the coordinator of all construction activity, as compared to decentralization. Proper coordination means economy in time and effort, which points to reduction in costs. The situation emphasizes the advantages of "unified command," and all that it implies. Thoughtful observation of the overlapping operations and the complicated time schedules involving the many crews and trades on a construction job points up the advantages in unified and coordinated direction. Delays and confusion caused by separate contracts will cause general contractors to bid accordingly. Further, the award of separate contracts tends to impose a heavy burden of responsibility for supervision and direction on the engineers, which the average organization is not in position to assume. Lastly, responsibility for the condition and quality of the completed structure is a serious responsibility for any public official. Insurance of performance and final warranty in meeting specifications is best secured by the centralization of authority and control over all operations. Award of a general contract represents the best method devised by the construction industry to accomplish this objective.

"Helicoptering" a Dam

USE OF THE AIRPLANE by Western contractors as a means of covering long distances of this region in getting from job to job has come to be quite generally accepted. However, the use of the other member of the family—the helicopter—to transport equipment and materials for an entire job in a most inaccessible location represents a new "first" for the British Columbia dam project described in this issue. An area only fifteen feet square, cut out of solid rock and used for 1,000 landings and takeoffs without mishap, indicates the success of the program. Although the job was small the idea sets up a new concept for construction transportation, and the West maintains its lead in new and novel techniques.

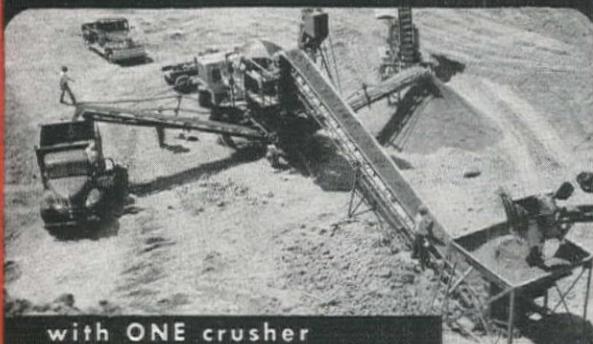
"Scrap It and Relocate"

IF A SECTION of paved highway has demonstrated adequacy of foundation and reasonable maintenance costs, should this investment in public funds be written off just because the particular mileage is not quite up to modern standards of refinements as to curvature and sight distance? Although the section may not be overloaded as to traffic and may have an upkeep record which indicates years of future service, it is quite possible that some study which involves the application of modern highway standards might show it had outlived its usefulness. Under these conditions there is too much tendency to "scrap it and relocate." Such a decision gratifies the engineering urge to plan, design and construct. But does it stand up under an analysis based on just common horse-sense in spending highway funds? Possibly the severest curves could be eased, and minor changes would result in extending sight distances at a fraction of the cost required for a new location. It might even be necessary to post the section for reduced speed, in the interest of safety. But this inexpensive treatment applied to some miles of existing highway might release funds that could be used for more worthwhile improvements. The discarding of old, but adequate highway mileage, merely because it lacks the final degree of meeting modern standards may be poor economy, and rather poor highway engineering.

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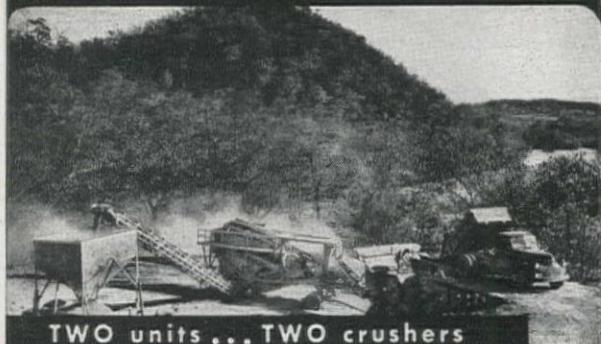


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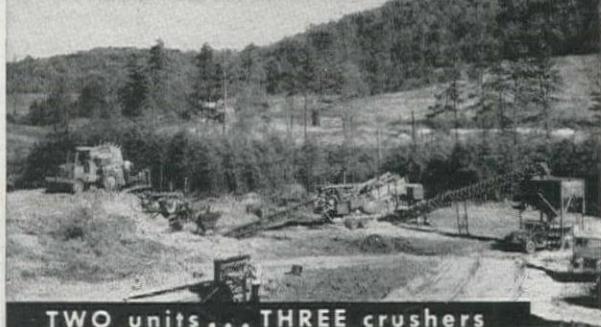


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MARCH 15 • 1950

Precast Concrete Bridge Deck Slabs

Precasting of deck as well as beams proven practical by Bureau of Public Roads on construction of 250-ft. bridge in Washington — Study indicates that almost all cast-in-place concrete could have been eliminated

PRECASTING of the deck slabs for the Baker River Bridge in the Mt. Baker National Forest, Wash., is a second step in the program of reducing the amount of cast-in-place concrete on bridge projects which has been carried forward by the Portland Office of the Bureau of Public Roads, based on the success achieved on precasting stringers for the Turnagain Arm job in Alaska. The Baker River project is a 250-ft. structure, consisting of eight 25-ft. spans supported on treated timber piles. The width of the bridge is 26 ft. and the precast concrete deck is covered with an asphalt wearing-surface. Design and erection of the precast concrete

elements are reviewed in this article.

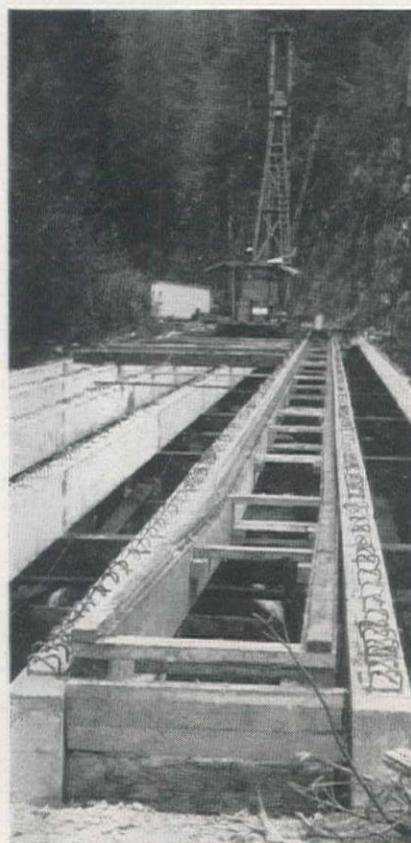
The first project built under the direction of the Portland office which made use of precasting was the Turnagain Arm bridge. On this bridge, consisting of 180 trestle spans, each 25 ft. long, the stringers were precast. Use of precasting on U. S. forest highway projects had been considered for a number of years, but prior to the recent advance in construction costs the competitive types of bridge construction reduced the economy to be achieved by precasting. Present cost of construction has brought precasting into the picture for short span construction, with special advantages in field operations.

Practically all bridges built by the Bureau of Public Roads on forest highways are in remote locations where problems of getting in equipment and handling of heavy members complicate field work. As a result, it is necessary that the design provide weights for precast members which do not exceed a limit readily handled by available equipment. Any greater weights for individual pieces would offset the advantages with higher erection costs. Although a fixed weight limit might vary from one project to another, a figure of 5 tons is assumed to be a reasonable maximum for precast members.

On the Turnagain Arm project, normal design would have called for treated timber stringers, with either a laminated timber or a reinforced concrete deck. Market conditions indicated that the treated timber in large enough quantity, of structural grade, might not be available without considerable delay, and the price might be high. As a result, the Bureau of Public Roads called for bids on alternate designs using: (1) standard treated timber stringers and laminated deck, and (2) precast concrete stringers and poured-in-place concrete deck. The bids on the two designs were practically equal and, since the concrete deck provided a 24-ft. width, as compared to 22 ft. for the timber structure, the contract was awarded for the precast concrete design.

Successful competition of precast concrete stringers on the Turnagain Arm project resulted in a decision to make preliminary studies to determine the

BEAMS were erected by a pile-driver equipped with a swinging boom. Timber stringers between beams provided runway for small car which carried beams out to the pile-driver.



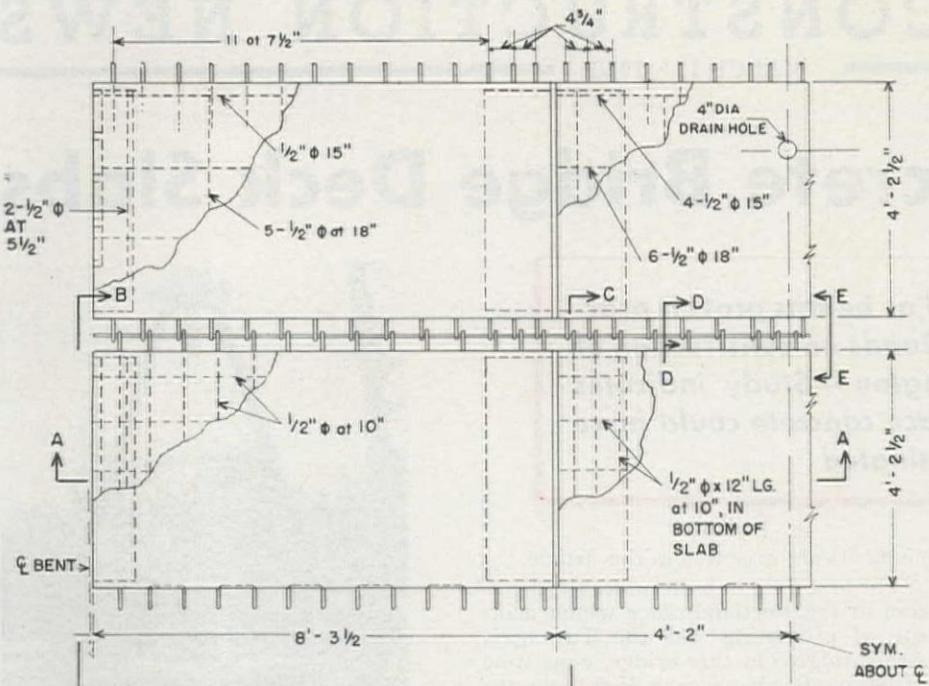
PLACING the first panels of the deck. As erection proceeded, the crane-truck was run onto the newly-set panels. Unloading panels at the site required four working days; erection required another four working days.

feasibility of extending the precasting to include the deck. After some study of the details involved, it became obvious that it would be entirely practical and apparently economical to precast the slab units as well as the beams. Basic elements in the design of these slabs and beams are shown in the accompanying drawing.

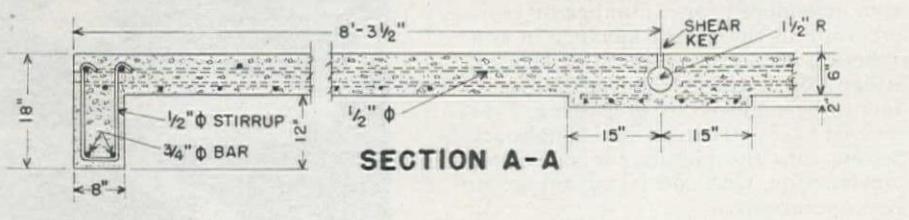
Special design provisions

Slab units are simple spans both for dead and live load. Under live load some continuity between slabs will develop, but the effect is indeterminate and no account of it is taken in the structural design. To provide for the transfer of wheel loads at the unsupported ends of slab units, without the use of diaphragms or beams, the edges are increased in thickness and shear keys provided as indicated. Maximum effectiveness of load transfer through the shear keys requires that the grout used in filling keys be pre-shrunk, insuring that no looseness will develop.

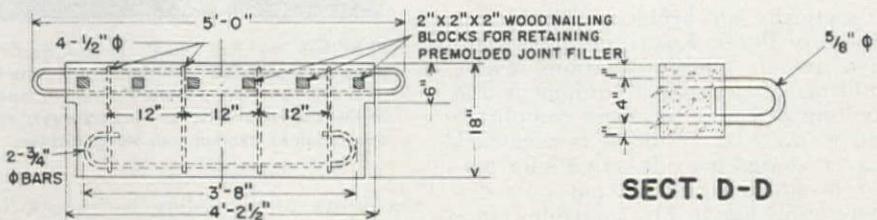
The design calls for simple rectangular beams for dead load, and T-beams for live load. To insure effectiveness of the T-beam action for live load, shear keys are provided both in the top of the beams and in the sides of slabs. In



PLAN OF PRECAST DECK SLAB PANELS

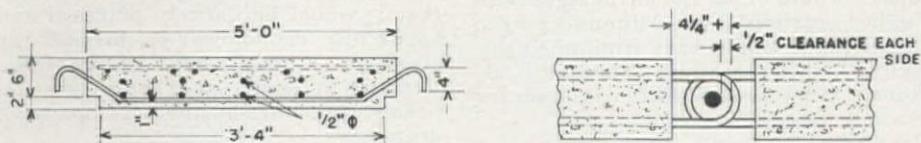


SECTION A-A



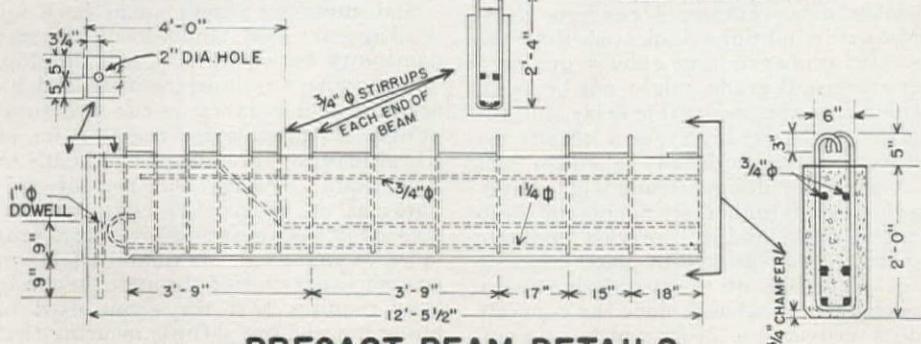
VIEW B-B

SECT. D-D



SECTION C-C

SECTION E-E



PRECAST BEAM DETAILS

BASIC ELEMENTS of the precast panels and beams are represented in the drawings above. Slab units are simple spans both for dead and live load. Note shear keys (Section A-A) which provide for transfer of wheel loads at unsupported ends of slab units. Rectangular beams are designed for dead load; T-beams for live load.

addition, the special provisions require that after the poured-in-place concrete over beams and between slabs has been poured, it shall be reworked just prior to initial set. This provision makes use of a well-known method of eliminating any separation through shrinkage of the poured-in-place concrete from the precast slabs and beams, and in effect makes slab and beams monolithic for live loads. Pre-shrinking has been used extensively in the repair of dams and other concrete structures, and tests show that bond between the old and new concrete is practically equal to that of the original concrete.

Precasting and erection

The site selected by the contractor for casting the units was in Burlington, 4 mi. from a transit-mix concrete plant and about 50 mi. from the bridge site. The casting yard was laid out with a width of platform which allowed the delivery chute from the transit mixer to reach half way across.

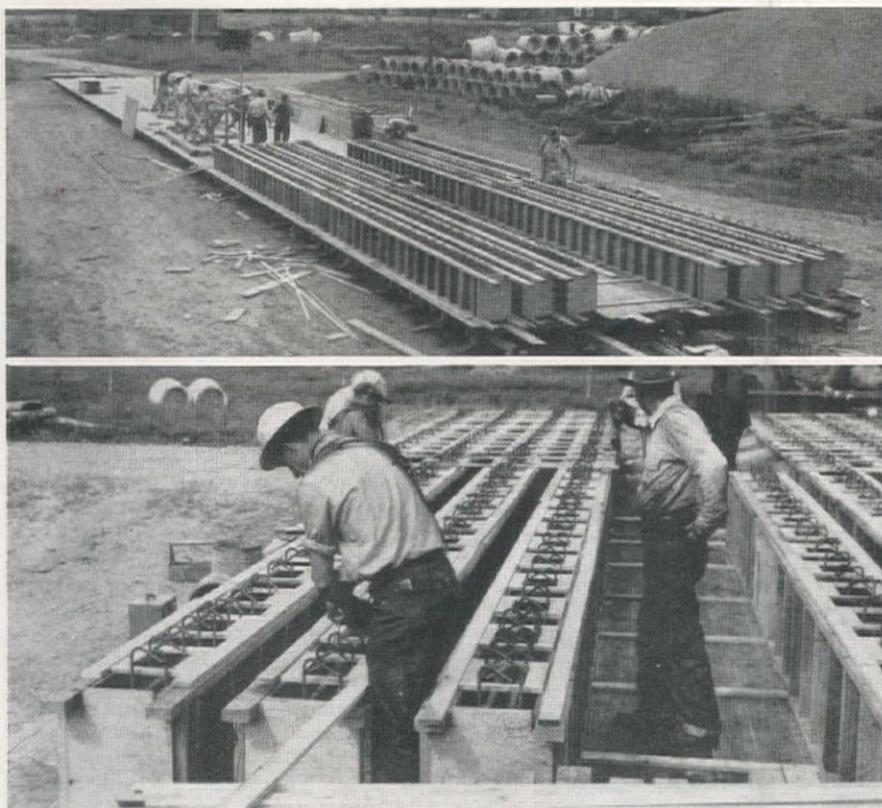
Erection of beams was carried out with a pile-driver equipped with a swinging boom. As each panel was placed, timber stringers were put in between two of the concrete beams. A small car with four flanged metal wheels was run over these timber stringers and carried the beams out to the driver. Slab panels were then placed by means of the crane truck (see illustration). As erection of slab panels proceeded the truck was run onto the newly-set panels, as the design permitted a load of 5 tons on the bridge before the concrete over the beams and between the slabs was placed.

Placing of beams required only three days, and another day and a half was spent in lining them up to exact positions. Placing of prefabricated forms for diaphragms required four days after all beams were in place, and the deck slabs were set in eight days elapsed time. Of this eight days, only four working days were required for the placing of slabs, the other days being consumed in unloading from the hauling vehicles. Forming of curb, placing of curb concrete and the concrete between deck slabs required only about another four days.

Although the total elapsed time is more than the sum of the amounts given above, due to preparatory operations and other delays inherent in construction work, it is conservatively estimated that the entire superstructure could easily have been erected complete in 30 days. The contractor had ample contract time and did not attempt to complete the project in a minimum time. Further, his operations were somewhat restricted by lack of adequate storage space at the site.

Specifications permitted the steam-curing of all precast members, but the process was not used by the contractor. This aid would permit use of a minimum amount of form-work and could be used to advantage where precast units are constructed in a regular concrete casting plant equipped for steam-curing.

Three bids were received for this job, and they were very close together. The low bidders' prices on items in the superstructure were as follows:



PRECASTING YARD was 50 mi. from the bridge site and 4 mi. from a transit-mix concrete plant. The yard was laid out with a width of platform which allowed the delivery chute from the transit mixer to reach halfway across. Beam forms above are nearly ready for the pour to begin.

Class "A" Concrete	
(Precast) per cu. yd.	\$65.00
Class "Y" Concrete	
(Poured in place), per cu. yd.	72.00
Reinforcing Steel, per lb.	0.115
Steel Handrail, per lin. ft.	6.75

At these prices the total cost of superstructure per ft., including railing, was \$129. At present bid prices it is believed that the superstructure would not cost more than \$100 per ft. This cost for superstructure is almost the same as that on another forest highway project constructed in this same area at the same time on which eight 31-ft. spans and four 19-ft. spans were constructed with treated timber stringers and reinforced concrete deck.

Maximum economy with precast design will be secured on the larger size projects where the precasting can be done on a "production line" basis. On long trestles, such as are common in the flatter parts of the middle west and southern sections of the United States, a precast design will show a maximum advantage over cast-in-place construction. A precast design is particularly well suited to the replacement of existing structures when a minimum interruption in the use of the structure is imperative.

General observations

Some conclusions by engineering personnel in charge of the Baker River Bridge are indicated in the concluding paragraphs.

As a result of close observation of all phases of the construction of the Baker River Bridge, there appeared to be no reason why the design could not be

altered to eliminate the use of almost all cast-in-place concrete, including curbs and diaphragms. The only cast-in-place concrete would then be that required for the fastening of slabs, beams, and curbs together, and no form work would be required. For such a design the quantity of cast-in-place concrete required would be 2.176 cu. yd. per 25-ft. span.

Use of precast diaphragms would eliminate the highest unit cost concrete in the design used on the Baker River Project. In addition, it would result in an appreciable reduction in erection time. On the basis of an estimated 30 days to erect the superstructure of a bridge equal in size to the Baker River Project (10 spans), a saving of four days, or 13%, would result from the use of the precast diaphragms.

Although precast curbs would not result in any appreciable saving in erection time, the unit cost of the curb should be less than a cast-in-place curb and, in addition, it would eliminate all cast-in-place concrete except the very minor amount required for "welding" the structure into a monolithic unit.

No detailed study has been made for spans longer than 25 ft. However, preliminary studies indicate that a span of 40 ft. can be designed with plain rectangular beams which will be within the desired 5-ton limit. Since the weight of slab units is nearly constant for any span length, the design problem for long spans is confined to the beams. In order to design beams for maximum length and minimum weight, any or all of the following design features can be employed: (1) Use light-weight aggregates, (2) decrease spacing between

beams, (3) use rectangular beam section at areas of high shear, and decrease web thickness as permitted by shear, (4) use a special mix of high strength concrete and higher unit stresses, and (5) use special shear reinforcement near supports.

W. H. Lynch is Division Engineer, Bureau of Public Roads, Portland, Ore. R. B. McMinn, Senior Highway Bridge Engineer in the Portland office, was in charge of both the Turnagain Arm and Baker River Bridge projects.

For the American Pile Driving Co. of Everett, Wash., contractor for the Baker River job, A. C. Ruddell was in charge of operations, with C. S. McCumby, job superintendent. Bid price was \$49,112.

Changed Secondary Road Base Cuts Montana Costs

A SAVING of about \$500,000 annually on construction of secondary roads in Montana may result from changes made in the method for base construction, according to C. E. Stahl, State Highway Engineer of Montana. The changed method applies to the graveled roads of the state's secondary highway system which carry a relatively light traffic load.

Heretofore, on construction of these roads, the Montana Highway Department has been placing a select borrow base consisting of a local gravel deposit. This varied in thickness as the stability of the soils varied. On this base, 4 or 5 in. of crushed gravel was placed and, if necessary, clay binder was added. Since much of the area in Montana is semi-arid, the moisture used to effect the binding action of the clay is soon pulled out of the surface and subsequently the suction from tires removes the binder entirely. This has resulted in a loose mass of gravel floating on the surface, making these roads difficult to maintain.

In the future, the select borrow base will be eliminated. Instead, 4 or 5 in. of gravel will be placed directly on the natural graded roadbed. Excess gravel that does not become consolidated with the natural soil will be windrowed alongside the road. As further consolidation of the gravel and the natural soil on the roadbed takes place during rainy weather and under the action of traffic, the windrows will gradually be moved toward the center of the roadway. Later, if it is evident that a binder is needed, a blade grader will move small amounts of clay from the shoulders to mix with any loose gravel on the roadway.

This method will be used only on graveled roads subjected to light travel. Should these roads develop enough traffic to justify oiling, the original gravel will help to stabilize a new and sounder base. On graveled roads of the secondary highway system which carry heavier traffic loads, oiling will be continued as the initial construction method.

According to Stahl, difficulties of maintenance experienced by county forces will be eliminated by the new method. The counties should be able to maintain the new type of surface with their present equipment.



Helicopter Delivers Material For Small Dam at Rough Site

A single helicopter, making a total of 1,000 round trips, carried all necessary equipment and material to a site in rough terrain for construction of a dam near Vancouver, B. C.

of Burrard Inlet and the City of Vancouver. The lake, situated at an elevation of 3,000 ft., discharges through a narrow gorge 40 ft. wide and 30 ft. deep. The dam was placed in this gorge to increase the capacity of the lake.

Palisade Lake, until recently, was accessible only by a 12½-mi. trail from the Capilano Intake. Two years ago, the British Columbia Electrical Co. constructed a transmission line through the upper Capilano Valley. A rough jeep road was built parallel to the transmission line and this road brought Palisade Lake within 7 mi. of motor transportation. This 7 mi., however, traverses rough terrain over canyons and through dense forest and, in the last 3,000 ft., climbs about 1,400 ft. Without a large expenditure of money and labor, this trail was passable only for men on foot. Under these circumstances, transportation of materials to the dam site presented a baffling problem.

A difficult design problem

Design of the dam had to take into account three limiting factors—(1) the site was readily accessible only by air; (2) the dam was to be unattended for long periods of time, and (3) the structure would be subjected to severe ice loads.

To avoid the ice loads, the dam was designed with a sloping upstream face which would allow the ice to ride up in-

stead of exerting a horizontal force. This eliminated the flat-slab design and left the choice of either a sloping slab with buttresses or a rock-fill type. The limited accessibility necessitated use of the material at the site as much as possible, which was rock. Another factor favoring use of a rock-fill structure was the possibility of damage to a thin reinforced concrete structure from the severe winter temperatures at the site. These factors indicated that a non-overflow rock-filled dam would be the most suitable and economical.

Because considerable rock-fill was required for the dam, it was convenient to locate the spillway just east of the gorge and to use the excavated material for the dam structure. The east bank of the canyon was solid rock and there was no danger that the spillway on this side would interfere with access to tunnels containing control valves.

The required spillway excavation was estimated to be about 1,500 cu. yd., which would increase to 2,200 cu. yd. as loose fill for the dam. To use this 2,200 cu. yd., the dam was designed 10 ft. wide at the crest, with a 2 to 1 downstream slope and 1¼ to 1 upstream slope. The upstream slope of 1¼ to 1 was chosen because it would be more or less the natural slope of the dumped fill, and any flattening of the slope would increase the amount of concrete required for the upstream seal wall.

An upstream seal wall was decided upon in preference to a center core wall for several reasons. First, no form work would be necessary; second, a center core wall would necessitate very careful placing of the adjacent rock, and third, it would be easily accessible for inspection and repairs. To minimize the possibility of settlement it was decided to sluice the fill thoroughly to wash out the smaller particles as the fill was being placed.

Site reconnaissance on foot

Construction of the dam had been delayed during the war years, and it was not until 1948 that plans were made to attempt transporting the necessary material and equipment to the dam site by air. The possibility of using a helicopter was investigated then. Arrangements were made with a local firm that operated a Bell Model 47D1 helicopter, and the pilot was escorted to the dam site on foot so that he could choose a suitable landing spot. Several considerations were important in deciding on the land-

ONE of the most interesting construction jobs completed in British Columbia during the past year was the erection of a small dam by the Greater Vancouver Water District. All necessary material and equipment for the structure was transported to the dam site by a single helicopter. Details contained in this description of the project were supplied by G. M. Gilbert, engineer and superintendent of the Greater Vancouver Water District at Vancouver, B. C.

The dam was constructed to provide storage at Palisade Lake on the east fork of the Capilano River, about 15 mi. north

THE HELICOPTER lifts from its small landing spot near the dam site. Sacks in the foreground contain one cubic foot of gravel, two sacks representing the plane's maximum load.





THE HELICOPTER on its landing field at the dam site. The landing spot, originally 10 by 12 ft., was later enlarged by blasting to approximately 15 ft. square at the pilot's request. Visible are the nearly completed dam, foreground, and the cut for the spillway, background.

ing spot. (1) The landing field had to be as close as possible to the dam site to facilitate handling of materials. (2) Due to varying winds, the landing spot required good approaches from two directions. (3) Any field selected would have to be blasted out of solid rock, and therefore should be as level as possible to start with.

A suitable site was located, and men were put to work drilling, blasting and levelling. The original landing spot was approximately 10 by 12 ft., and was located about 20 ft. to the west of the gorge directly in line with the center line of the dam. This was actually the only place available. The ground to the south of the landing strip slopes steeply into the lake, and to the north the ground slopes steeply and then falls away over a sheer cliff. To the west of the strip, the ground was blasted level for some 30 ft. up to a cliff.

Another landing strip was prepared on the transmission line road, 7 mi. by trail and 5 air-miles from Palisade Lake. All supplies were trucked up the road to this landing strip and flown from there to the job by the helicopter.

First flight successful

Several flights were made during the fall of 1948 transporting lumber, sand, men and supplies to determine the feasibility of this method. After air-freighting some 33,000 lb. of material into the dam site with no mishaps, the engineers decided that all was in readiness for the following year and after making caches of the material, operations ceased in November.

In July, 1949, operations were resumed. Three men were flown in to erect a camp. The caches were found to be in good order, so two tents and a cook shack were erected in one week. After the first few days of flying, the pilot complained that the landing area was

too small so several days were spent in blasting more rock and enlarging the landing area to approximately 15 ft. square. Three forced-landing fields along the route of flight were located in the river bed.

Maximum of 400 lb. per flight

Although the helicopter was capable of lifting a maximum load of 400 lb., this weight had to be distributed evenly about the helicopter in order not to impair its stability. Thus, the maximum load that could be carried was 200 lb., this load being balanced by another load of 200 lb. on the opposite side of the helicopter. The first large item to be flown in was a hoist with a donkey engine. This unit weighed 1,600 lb. complete, but by stripping the engine of all small parts, including pan, cylinder head, flywheel, manifold, etc., and reducing the hoist to its barest components, the complete assembly was flown to the site in three trips. Even the skids for the donkey went by air. The skids consisted of two pieces of 6 x 6-in. timber, each 14 ft. long, representing the longest piece of material that it was safe to tie on to the helicopter.

The largest single piece transported was the bottom half of the bowl of a 5-cu. ft. concrete mixer. This item, of heavy cast construction, weighed 410 lb., and although it was 4 ft. in diameter, was only 14 in. high. A special frame was made, and after taking off the regular carriers and by digging a hole in the middle of the lower landing field, the bowl was suspended directly below the axis of the rotor blades and thus directly below the center of gravity of the air-

craft. A similar hole was blasted in the center of the landing field at the dam site, and when the helicopter came in to land, four men were ready. As the helicopter hovered over the field, the men guided it down so that the bowl sat in the depression in the field.

Another large item was 300 ft. of 3/4-in. steel cable for the skyline. This also weighed 400 lb., but by rolling the cable in two coils with about 6 ft. of slack between coils, it was possible to put one coil on each side of the helicopter. Then, with the 6 ft. of slack passing under the helicopter, the flight was made successfully.

The actual construction of the dam consisted of five main operations.

(1) Removing the accumulated logs and rubble from the dam site.

Rubble had accumulated to a depth of 10 ft. in some places across the entire 120-ft. width of the gorge. This was cleared by using the skyline and two skips for the dirt and small rock, the larger rock being removed by chains and chokers. At the upstream toe of the dam, a section of decomposed granite was encountered, which appeared solid but crumbled when struck with a pick. The soft rock was dug out and replaced by concrete keyed well into the solid rock.

(2) Clearing trees and stripping overburden from the spillway site.

The spillway was located to the east of the gorge and parallel to it. This necessitated clearing this area of brush and trees that were 4 in. to 3 ft. in diameter. A one-man power saw was used. Overburden varied in depth from 6 in. to 4 ft., and consisted of light topsoil down to a very heavy hardpan interspersed with small rock. The skyline and skips were used to remove this overburden, dumps being made well away from the spillway area. Later, a flume was installed, and



PLACING reinforcing steel on the upstream face of the dam. Completed face consists of concrete with a minimum thickness of 6 in., placed wet and without the use of forms.

with a fire pump supplying water, the rubble was washed away as it was shoveled into the flume.

(3) Drilling and blasting spillways.

The spillway was designed 25 ft. wide and 160 ft. long. Deepest cut for the spillway was 16 ft. through solid rock. Portable gasoline jackhammers were flown in for drilling the rock. Holes were drilled to a depth of 6 ft. for blasting. Good breakage occurred with holes 2 and 3 ft. apart. This spacing also resulted in a size of broken rock that was easy to muck out. Here again, the skyline and skips were used to transport the rock from the spillway and place it on the dam. Approximately 1,700 cu. yd. of rock was removed from the spillway area. A reinforced concrete weir was placed across the mouth of the spillway to obtain an accurate level for the lake.

(4) Placing rock for the dam structure.

After the rubble was removed from the site for the dam structure, the floor of the cut was sluiced clean. Only the blasted rock was used for the dam structure, and all rock was placed by hand to prevent large voids and subsequent settlement. Rock sizes varied from pieces weighing from 2 up to 5 tons. The top layer of rock on all faces was riprapped for a depth of 18 in.

(5) Placing the concrete face.

The front of the dam and the crest were faced with concrete to a minimum thickness of 6 in. One-half-inch deformed reinforcing steel was placed on 6½-in. centers both vertically and horizontally. Previous to this operation, the walls and bottom of the cut had been blasted to provide a minimum key for the facing to a depth of 18 in. The reinforcing steel was placed so as to be 2½ in. from the completed concrete face. No forms were required for the concrete work. The first layer of concrete was placed fairly wet, and was tamped

well into the rocks to provide a good key. Then, 5 to 6 in. of 1:2:3-mix concrete was applied and float-finished. White waterproof cement was brushed on to seal pores in the concrete.

Total airlift for the job amounted to about 340,000 lb., and consisted of the following items:

Aggregate, 86 cu. yd.	225,000 lb.
Cement	48,000 lb.
Reinforcing steel	6,000 lb.
Lumber	22,000 lb.
Food	6,000 lb.
Donkey and skyline cable	3,000 lb.
Tools and equipment	30,000 lb.

A total of 264 flying hours was logged by the helicopter. A total of 1,000 trips was completed. No accidents of any consequence occurred in spite of adverse flying conditions. Downdrafts from the mountains and very turbulent air were two of the chief problems. One set of tail rotor blades was broken in one of the early landings at the lake due to a projecting stump and a tail-low landing.

During two months of 1948, a total of 35,000 lb. of material was transported at a cost per pound of 10.85 cents (47½ hr. of flying time at \$80.00 per hour). During four months of 1949, a total of 305,000 lb. of material was transported at a cost per pound of only 5.5 cents (279½ flying hours at \$60.00 per hour).

THE OKLAHOMA State Highway Commission has submitted a \$10,760,000 secondary highway program to Public Roads Administration for approval.

This is the commission's first step to build all secondary roads in the state since the 1949 legislature divorced county commissioners from building farm-to-market roads and conferred sole authority on the commission.

The program, which will not be ready for contract stage until after July 1, includes 36 projects involving 243 mi. of construction, exclusive of bridges.

Stabilize Sand Slopes

USE OF A hardy grass known as Volga mammoth wild rye, a species imported from central Asia, to bring about permanent stabilization of sand adjacent to the S. P. & S. railway relocation near Plymouth, Wash., west of McNary Dam, has been undertaken by the Army Engineers in cooperation with the Soil Conservation Service, according to Col. William Whipple, Walla Walla District Engineer.

Planting of approximately 40 ac. in three blow-sand areas was completed recently. Another 50 ac., in the vicinity of Berrian, is scheduled for planting next year.

Volga mammoth wild rye (*elymus giganteus*) has large tough foliage that grows in dry areas, such as in the vicinity of McNary where the normal precipitation is 8 in. annually. Once this grass is established, neither livestock nor rabbits will eat it. Also, since it grows in winter, the grass contains enough natural moisture that it is not subject to burning, which makes it ideal for use along a railroad right-of-way.

Experiments conducted by the Soil Conservation Service on inland sand dunes near Washtucna, Wash., showed that the grass is promising for stabilizing inland sand. The Bureau of Reclamation has used the species on a small scale to protect irrigation canals.

The Corps of Engineers obtained 936,000 plants from nurseries at Pullman and Ephrata, Wash., where the species has been developed by the Soil Conservation Service, for this first large scale field acreage. The plants were set 2 ft. apart each way and from 8 to 12 in. deep in the sand. Two plants were used to each hill. The entire area had to be sprinkled thoroughly first, as the sand must be moist when the planting takes place. Planting is done when the temperature is under 55 deg.

Two strains of the Volga wild rye were used, one on areas more subject to drying out and the other on areas more adapted to deeper deposits. There must be at least 2 ft. of sand in order for the plants to be effective. The planting began in scar areas where the blow starts and was continued to the deposit areas.

The Volga wild rye forms large clumps, due to rapid multiplication of stems from underground sprouts. These underground root sprouts spread through the soil and create new clumps.

A 60% survival of the plants set out by the engineers will be sufficient for stabilization of the drifting sand. If the growth is less, or there are open spots, replanting will take place during the fall of 1950.

Adoption of the wild rye grass was decided upon because of its permanency over other stabilization methods such as mulching, graveling, oiling, fences, brush litter or other wind resisting material. The other methods are more costly and require maintenance, whereas the Volga wild rye, once established, is permanent.

Planned to Make Irrigation Water Delivery Less Expensive— Rehabilitation Program of the USBR

Guided by the findings of a two-year survey of the conditions of federal reclamation projects, the Bureau of Reclamation has embarked on an ambitious \$32,000,000 program of betterment and rehabilitation work

THE BUREAU of Reclamation will celebrate its 50th anniversary in June, 1952. During its long history, it has constructed 175 dams of all sizes, and thousands of miles of irrigation canals and laterals in the seventeen Western States. The first projects that it constructed began the delivery of water as early as 1905.

In the early days of Federal reclamation, all construction was financed from the Reclamation Fund, a fund supported by revenues from the sale of public lands, royalties from oil and minerals extracted from public lands, and repayments of construction charges from the farmers on irrigation projects. Never very large, it was important that the Reclamation Fund be expended economically. Simplicity of design, and use of economical materials led to the predominate use of wooden structures in irrigation systems and some use of sand-cement mixes for parts of masonry structures not subject to major loads.

After 20 to 30 years of use, the canal structures constructed of wood began to fail in service from decay. Sand-cement concrete began to weather badly. Gates and valves became worn and hard to operate. In the mid-1930's the physical condition of the project works and the low financial resources of the farmers led to an extensive program of rehabilitation of the older projects with the aid of the Civilian Conservation Corps.

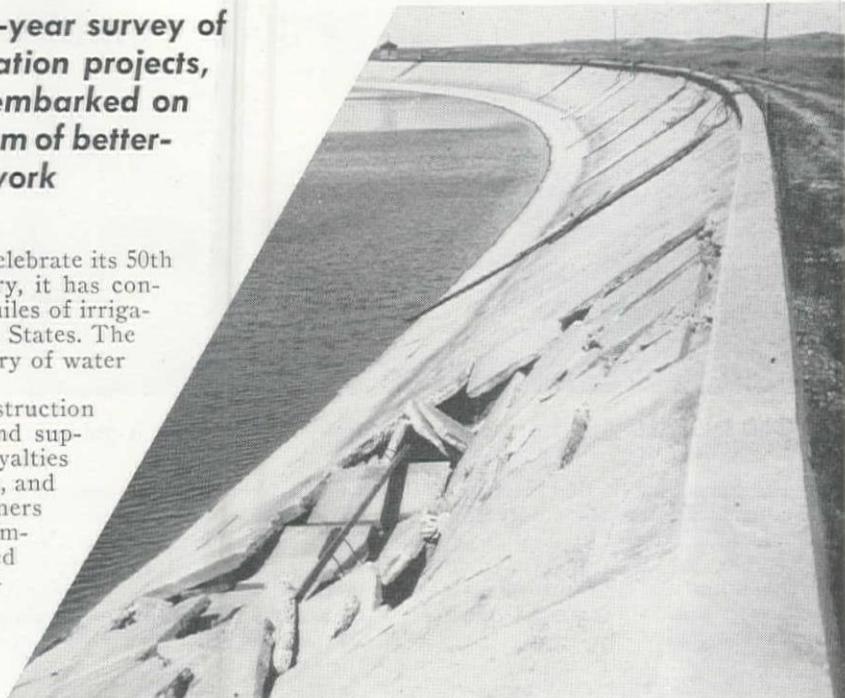
By 1941 the canal systems of the older Federal projects were once again in fair shape. With the advent of World War II, the rehabilitation program was suspended. By 1945, many Federal reclamation projects had almost returned to the unsatisfactory status of ten years previous. Delivery of water was becoming increasingly expensive and in some cases almost physically impossible. There was evident need for action.

Financing the needed work

To determine that course of action, the Bureau undertook in 1946 a two-year survey of all its projects, examining their exact physical condition and the need for rehabilitation and betterment work. This survey covered all projects built by the Bureau, including those turned over to the water users, and was made at a cost slightly in excess of \$100,000. It covered 87 projects or divisions of projects, and was divided into five principal parts.

The results of the survey showed an urgent need for rehabilitation and betterment work to cost nearly \$56,000,000. The accompanying table shows the estimated cost of the work by regions and categories.

The field examination revealed that many of the canal facilities constructed by the Bureau in previous years were



Many canals in the West are in urgent need of rehabilitation or replacement.

urgently in need of rehabilitation or replacement. The lining of canals to eliminate seepage and erosion and the replacement of old wooden structures with concrete were high on the list. Restoring of drains to their original line and grade, placing of riprap along river channels, graveling of canal banks and access roads, replacement of flumes, overhaul of pumps and installation of measuring devices were some of the other more important of the classes of needed work on the irrigation systems. The need for miscellaneous repairs to dams ranked high in importance.

By
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GOLZE'**
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After determining the scope of the work, the next problem was to consider the best method of financing the improvements. From discussions with the water users it was decided that approximately \$6,000,000 of the estimated cost could be raised by direct assessment over a five-year period. Further discussions with the water users showed that about \$29,000,000 could be paid for by them if it could be arranged on a deferred basis. The final \$21,000,000 of estimated cost

represented work for which the water users indicated they had no apparent means to finance.

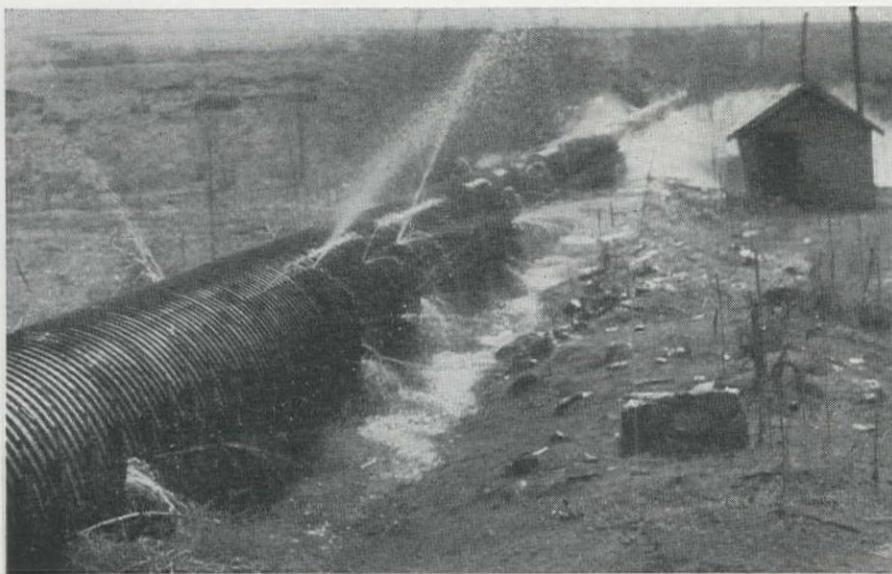
Because so much of the work had to be done without delay, the Bureau undertook to secure Congressional authority, and funds to finance the \$29,000,000 program for which there was a showing that the water users would be able to repay. While the basic Reclamation Act provides for current financing of operation and maintenance of reclamation projects which includes rehabilitation and betterment work, it does not contain authority for deferred financing which is essential to undertaking a major rehabilitation and betterment program.

To get such a program started, the results of the 1946 and 1947 survey were laid before the Appropriation Committee of the 80th Congress and an initial appropriation of \$1,500,000 was made with the understanding that the Bureau would secure basic authorizing legislation before the next fiscal year.

Legislation to accomplish this purpose was introduced early in the 81st Congress, and in October, 1949, the President approved Public Law 335 "To provide for the return of rehabilitation and betterment costs of Federal Reclamation Projects."

This Act, which is a supplement to the Federal Reclamation Laws, contains several unusual provisions. It provides that:

- (1) Repayment of expenditures shall be made only in accordance with the water users' ability to repay.
- (2) In determining their ability to



AN OLD INSTALLATION of wood stave pipe. Precious water is going to waste.

pay, the Secretary of the Interior shall give consideration to the outstanding repayment obligations and shall, as far as practicable, provide for repayment of the rehabilitation and betterment costs concurrent with the original construction cost.

(3) If concurrent repayment is not feasible, the Secretary may approve any other schedule of repayment.

(4) The determination of the Secretary of the Interior must lie before the Committee on Interior and Insular Affairs of the Senate and the Committee on Public Lands of the House for sixty days before it becomes effective.

(5) Rehabilitation and betterment is defined as meaning maintenance, including replacements, which cannot be financed currently but shall not include construction.

(6) Rehabilitation and betterment work may be performed by contract or by force account or by contract entered into with the water users organizations whereby such organizations shall perform the work.

(7) In carrying out the latter provision the Secretary of the Interior is not bound by any other law and shall require only such reasonable terms and conditions as are deemed appropriate for the protection of the United States.

The two most outstanding features of the above law are (4) and (6).

Projects in three categories

In carrying out the provisions for submission of the repayment determinations to the Congress, the Bureau has divided its projects into three categories. Into the first category they have placed those project districts for which amendatory repayment contracts have been approved by the 81st Congress under authority of Section 7 of the Reclamation Project Act of 1939 and which already includes provisions for repayment of rehabilitation and betterment costs. Project districts in good financial standing with reference to meeting their current operation and maintenance and construction charge obligations accruing under existing repayment contracts

were placed in the second category. Project districts in financial difficulties where scheduled payments under existing repayment contracts have not been met and where amendatory repayment contract negotiations are in progress or scheduled for early attention comprised the third category.

The Bureau considers that contracts in the first category are in legal compliance with the requirements of Public Law 335, thus permitting the immediate allotment of funds and the construction work to proceed. Six Bureau project contracts which are in this class are the Belle Fourche Irrigation District, South Dakota; Vale-Oregon Irrigation District, Oregon; Bitter Root Irrigation District, Montana; the Deaver and Willow Irrigation Districts, Wyoming, and Prosser Irrigation District, Washington.

With respect to the second category, it is expected that repayments of rehabilitation and betterment expenditures will occur concurrently with repayments of existing contract commitments, although in some cases, repayment at the end of the present schedule may be necessary.

In either event the total repayment requirement of the water users must be within their ability to pay, but no diffi-

culty in arranging a reasonable repayment plan is foreseen. Before work under this category can start the repayment scheme must be before the committees of Congress for sixty days.

With respect to the third category, the Bureau proposes, subject to Congressional approval, that the irrigation districts concerned assume the obligation for return of the estimated rehabilitation and betterment program costs with annual installments scheduled in accordance with its ability to pay. Such installments would commence the first year following the last installment under its existing repayment contracts.

The second major provision of the new law is the one that permits the use or expenditure of Government funds by irrigation districts or water users associations. It is customary under Government procedures that when a private or public agency performs work for a Government agency, the agency doing the work does so at its own expense, and is later reimbursed by the Government agency which ordered the work. Under this special Act of Congress, however, it is permissible for the Bureau of Reclamation to advance funds to the water users' organization operating the reclamation project and to have it do the work either with its own forces or by contract.

Because the transfer of Government funds to an organization such as an irrigation district, for expenditure, in effect makes that organization an agent for the Government, it is necessary that it operate under somewhat the same rules and regulations which apply to Government agencies.

The Commissioner of Reclamation has promulgated rules governing the transfer of rehabilitation and betterment funds to water users organizations. These rules provide that the funds will be advanced or reimbursed quarterly. It requires the organization to maintain a separate account for the funds being expended on the rehabilitation and betterment program and provides that the accounts shall be subject to audit at any time by the United States. It further requires that a work program must be prepared in the form and manner required by the Bureau of Reclamation and that cost reports against this program be furnished monthly.

The most important element of the

Total Estimated Cost of Rehabilitation and Betterment Program

Survey of 1946-1947

Regions	Dams and Reservoirs	Canals and Laterals	Drainage	Recreation, Fish and Wildlife	Facilities and Equipment	Total All Features
I Pacific Northwest	\$ 716,228	\$ 2,554,499	\$ 140,281	\$ —	\$ 181,800	\$ 3,592,808
II California and Southern Oregon	67,339	294,370	129,300	1,550	58,860	551,419
III Pacific Southwest	1,193,485	14,649,678	1,169,600	—	100,075	17,112,838
IV Western Colorado, Utah and Nevada	579,470	4,358,398	949,070	2,232	163,614	6,052,784
V Texas and New Mexico	1,933,145	5,288,022	450,890	71,410	274,094	8,017,561
VI Upper Missouri Basin	4,215,805	3,006,730	1,304,135	—	326,570	8,853,240
VII Lower Missouri Basin	1,081,695	10,382,841	203,360	1,200	130,530	11,799,626
Grand Totals	\$9,787,167	\$40,534,538	\$4,346,636	\$76,392	\$1,235,543	\$55,980,276

Commission's rules are those which require the programming of work. It requires the work to be scheduled over the estimated life of the job, showing the time each job begins and the time it is completed. A job is defined as a principal project feature such as a dam, reservoir, canal, lateral, etc. All work performed by the water users organization is subject to on-site inspection. The Chief Engineer of the Bureau retains technical responsibility for important engineering work, and may, if he believes it necessary, design such work, award contracts for it, and supervise the field performance. Finally, the Commissioner has ruled that no new employees are to be added to the Bureau of Reclamation supervisory or clerical staff because of this program except such field inspectors and workmen as may be necessary.

The funds appropriated for the fiscal year 1949, which are good only until June 30, 1950, were sufficient to initiate the program but were inadequate to continue it. For the 1950 fiscal year, \$2,500,000 was appropriated by Congress. It is available until expended. The estimate for 1951 included in the President's budget is \$5,000,000 for that year, which, if appropriated, would raise to \$9,000,000 the total appropriated for the program.

Early on the program

Recent surveys have revised the total estimated cost of the program, which was originally set at \$29,160,000, to \$32,636,000. After fiscal year 1951 there will remain \$23,636,000 worth of work still to be performed.

The program proposed to Congress for fiscal year 1951, which begins on July 1, 1950, is typical of the type of work being conducted under this activity. By the end of 1951 it is expected that work will have been completed on six projects or divisions of projects out of the 51 for which work has been listed. During 1951, subject to compliance with the requirements of the law, there will be an active program on 14 projects, briefly described as follows:

Salt River Project, Arizona—Placement of canal lining, pipe lines, reconstruction of structures, and rehabilitation of existing wells.

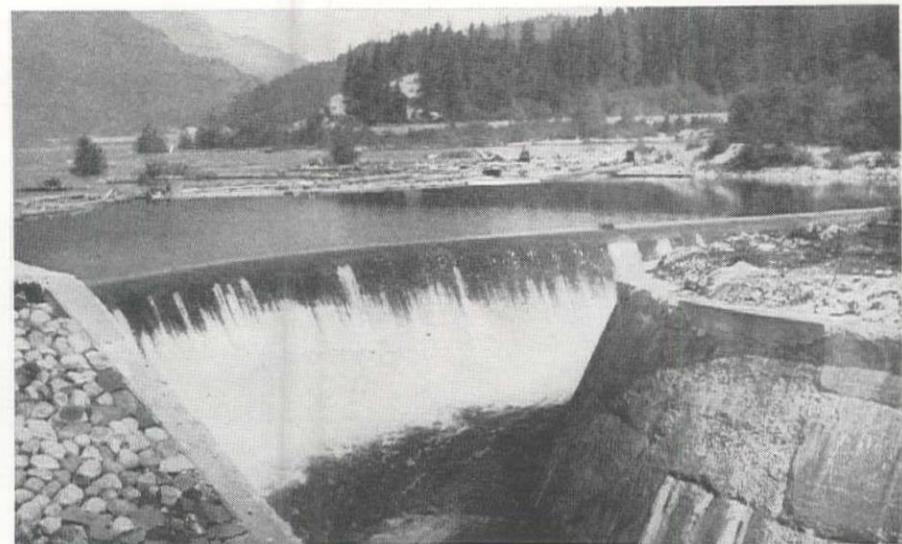
Yuma Project, Arizona—Replacement of structures, engineering investigations and designs for the new Boundary Pumping Plant.

Boise Project, Idaho—Rehabilitation of Black Canyon diversion dam, including scaling and sandblasting of downstream face of the dam, grouting contraction and construction joints, placing reinforcing steel, and placing of new concrete face on dam.

Milk River Project, Montana—Rehabilitation of flumes and siphons and construction of drains.

Sun River Project, Montana—Construction of drains.

North Platte Project, Nebraska-Wyoming—Rehabilitation work at Pathfinder Dam, including repair and replacement of tunnel walkways, and operating equipment. Seepage loss measurements will be continued on the main canal, sections of which will



THE REPAIR of dams ranks high in importance on the rehabilitation program.

be lined and a number of major control structures will be rehabilitated or replaced on the Fort Laramie Canal.

Rio Grande Project, New Mexico-Texas

—Replacement of wooden structures with concrete and steel structures including 35 canal bridges, 78 lateral bridges, 40 drain bridges, 5 canal turnouts, 54 lateral turnouts, 14 flumes, 20 water measuring devices on canal turnouts, and 215 water measuring devices on lateral turnouts.

Belle Fourche Project, South Dakota

—Rehabilitation of outlet works at the Belle Fourche Dam, rehabilitation of canal structures, construction of canal bank roads, rehabilitation of drainage ditches, improvement of the spillway under the North Canal, and rehabilitation of four wastewater.

Yakima Project, Washington

—Rehabilitation of the spillways and outlet works at Tieton Dam, Keechelus Dam, Kachess Dam, Bumping Lake Dam, and repair of the Spring Creek Pumping Plant.

Riverton Project, Wyoming

—Ripraping at Pilot Butte Dam, replacement of structures and replacement of lining in the Wyoming Canal, extension of lining and replacement of structures on the Pilot Canal and laterals, and on drains.

Shoshone Project, Wyoming

—Replacement of wooden and concrete structures affected by alkali soils, realignment of canals and laterals, construction of drains, and construction of storage and shop facilities.

Okanogan Project, Washington

—Rehabilitation and betterment at Conconully Dam, consisting of lining the 6-ft. by 6-ft. outlet tunnel and correction of leakage in the control gate access shaft.

Grand Valley Project, Colorado

—Betterment of Tunnel No. 3 and replacement of deteriorated flumes and siphons in the distribution system of the Gravity Division.

Ogden River Project, Utah

—Improvement of the Ogden-Brigham Canal and South Ogden Highline Canal.

Also, 5.4 mi. of the concrete lined Ogden-Brigham Canal will be given a concrete cover.

At the rate indicated by the President's appropriations it will take until about 1956 to complete the extensive program of rehabilitation and betterment. At the end of that period, barring unforeseen circumstances, all structures and canals on the Federal projects should be in excellent operating condition with maintenance costs at the lowest possible level.

Systematic maintenance

The primary question of concern to the Bureau of Reclamation, however, is the need for developing a feasible plan to overcome the erratic maintenance practice of past years with their peaking requirements for financing. One proposal is to establish a reserve fund within the Reclamation Fund for rehabilitation of irrigation features as they become obsolescent or worn out. New repayment contracts being executed between the United States and water users' organizations are providing for accumulation of reserve funds to the extent permitted by law and the ability of the water users to finance.

Any good utility system accumulates a replacement reserve as a matter of standard practice. Such a reserve is being maintained to some extent for the power systems of the Bureau of Reclamation, but it has not been possible to maintain a reserve for irrigation systems. This is due in part to a failure of the water users to fully appreciate the value of such reserve and, second, to restrictions in state laws which prevent the associations which are operating Government systems from accumulating such reserves in their own treasuries.

With the experience of the past 15 years in operating deteriorated irrigation (below normal) systems, the water users' organizations have the basis on which to plan a replacement reserve program which will spread its costs systematically over the years, with a reasonable burden on each year, eliminating peak requirements for financing.



Friant-Kern Canal Trimmed and Concrete-Lined at— Record Speeds With Improved Jumbos

TRIMMING and lining of 143,000 ft. of 4,500-ft. and 3,500-sec. ft. canal in less than six months is the record achieved recently by Peter Kiewit Sons' Co. on the Friant-Kern Canal. This company was awarded a contract on January 31, 1949, for 27 mi. of the canal, starting at a point east of Lindsay, Calif., and extending south to White River. To accomplish this volume of work in such a short time, the contractor developed new methods and procedures, and organized a hard-driving, efficient crew that was always out to better their last record.

The canal section in this 27 mi. has a bottom width of 36 ft., a depth of 17.5 ft., side slopes of $1\frac{1}{4}$ to 1, and a width at top of canal lining of 80 ft. The capacity of the canal opposite Lindsay is 4,500 sec. ft.; it decreases to 3,500 sec. ft. at Tule River some 10 mi. south of Lindsay without a material change in cross section. The reason for the same



By

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cross section and smaller capacity is accounted for by a change in slope, 4-in. drop per mile in the reach from

Demonstrating the value of numerous improved features, the jumbos of Peter Kiewit Sons' Co. trimmed and lined as much as 1,694 ft. of the big Friant-Kern Canal in one working day

Lindsay to Tule River and only 3-in. drop per mile south of Tule River.

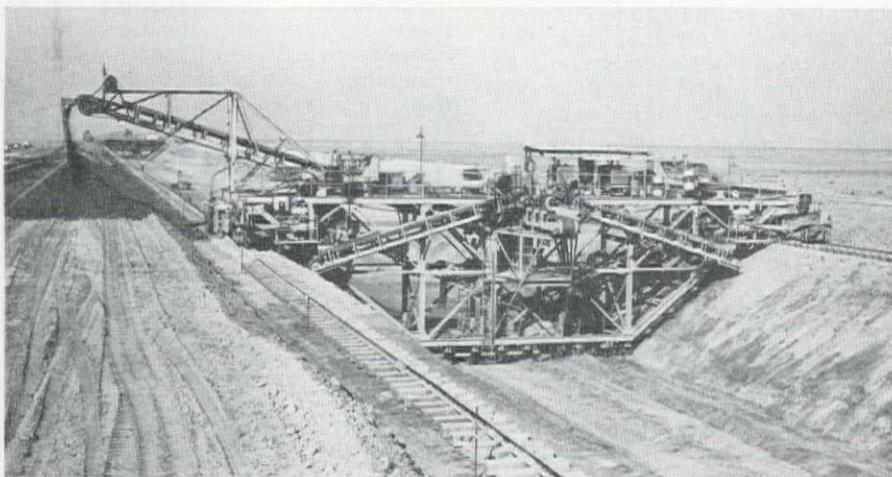
Peter Kiewit Sons' Company's contract on this section of canal covered all phases of the work, including excavation, embankments, structures, and canal lining. This article will deal only with the feature of canal lining, including machine trimming of the canal immediately ahead of the concrete lining operations.

Canal lining and trimming machines were originally constructed by Guntert and Zimmerman Machinery Co. of Stockton, Calif., for use on the first 45 mi. of the Friant-Kern Canal downstream from Friant Dam. (*Western Construction News*, April, 1948—page 81.) This section of the canal was completed during the fall of 1948. The machines were dismantled early in 1949 into units that could be hauled by truck and were delivered to a site in the canal just east of Lindsay. Here they were completely rebuilt by the contractor, and numerous new features were added by Guntert and Zimmerman.

The canal trimming jumbo was not changed materially but was completely overhauled. The machine had seen very rough going in the upper reach of the canal. Caterpillar D-13000 Diesel engines and electric generator sets were overhauled. All sprockets, buckets, bearings, chains, and tracks on the trimmer were replaced. New belt conveyors were installed.

The canal lining jumbo was more thoroughly rebuilt. Formerly, concrete

LINING MACHINE, top of page, was fed concrete by a new method. Trimming machine, below, was given a fully automatic electrical control device for maintaining proper grade.

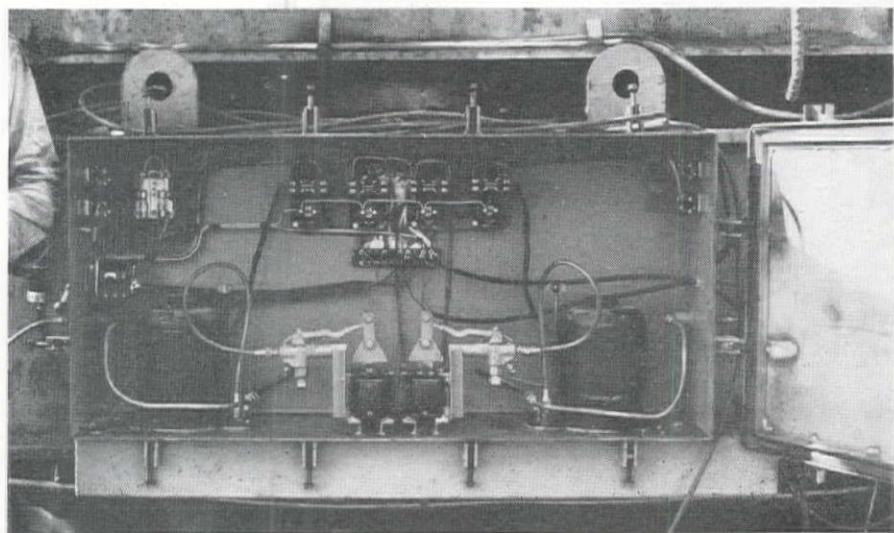


was placed in a hopper on the right side of the machine, using the usual bottom dump bucket on a boom from the paver. Under the new setup, two pavers were placed end to end on the right side of the canal with belt conveyors replacing the boom and bucket formerly used. These two belt conveyors were placed parallel to the right bank of the canal and dumped into a hopper which was mounted on a rubber-tired trailer drawn by the lead paver. This trailer also carried the lower end of another belt conveyor which transported the concrete from the canal bank to the center of the canal lining jumbo. At the top of this belt conveyor was another hopper mounted on a car which could move back and forth on the canal lining jumbo to take care of minor deviations in alignment as the lead paver moved down the canal bank.

Underneath this hopper on the lining jumbo was another hopper on an electrically-driven car on steel rails which moved from the center to each side of the canal to drop concrete into a continuous hopper at the bottom of the jumbo. Less travel was required by the car starting at the canal centerline than formerly was required when it started at the right side of the machine. These continuous hoppers were built into the framework of the jumbo, following the full canal section from one side to the other. Electric tube vibrators were placed at the bottom of these hoppers and were turned on and off by an operator stationed on the back of the machine where he could see the fresh concrete behind the lining jumbo.

A trial run was made on June 30, 1949, to see how the new equipment would function. Minor mechanical adjustments were made over the Fourth of July weekend, and canal lining operations were resumed on July 5. Progress was 900 ft. per day by the end of the fourth day. Maximum production was 1,694 ft. in one day.

The contractor sub-let to Joseph Blasco the hauling of dry aggregates



AUTOMATIC electrical controls actuating hydraulic jacks on the lining jumbo raised or lowered one side of the machine to maintain proper thickness of the concrete lining.

and cement in batch trucks from a central batching plant near the center of the job. Each batch contained 1.33 cu. yd. of concrete and Ford trucks used by the subcontractor hauled three or five batches. The canal lining is $3\frac{1}{2}$ in. thick, and each foot of canal requires the placing of 1 cu. yd. of concrete. It is obvious, therefore, that hauling of dry batches was a major operation as a day's run involved from 2,500 to 3,000 tons of material. A maximum of 39 batch trucks were used. The prime contractor did not permit the rate of lining to be determined by the delivery of dry batches to the pavers; instead, it was required that batch trucks be at the mixers when needed.

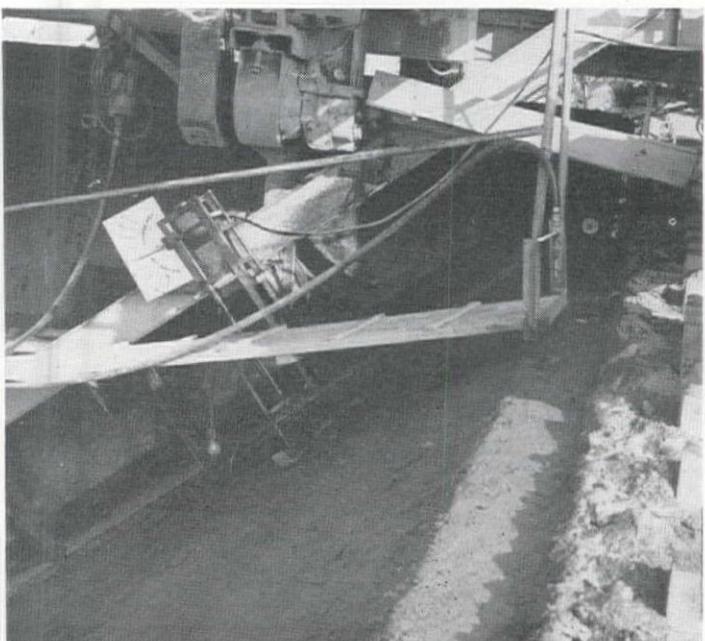
The usual method of keeping the canal trimming machine at proper grade has been to keep four pointers on the machine opposite piano wires set accu-

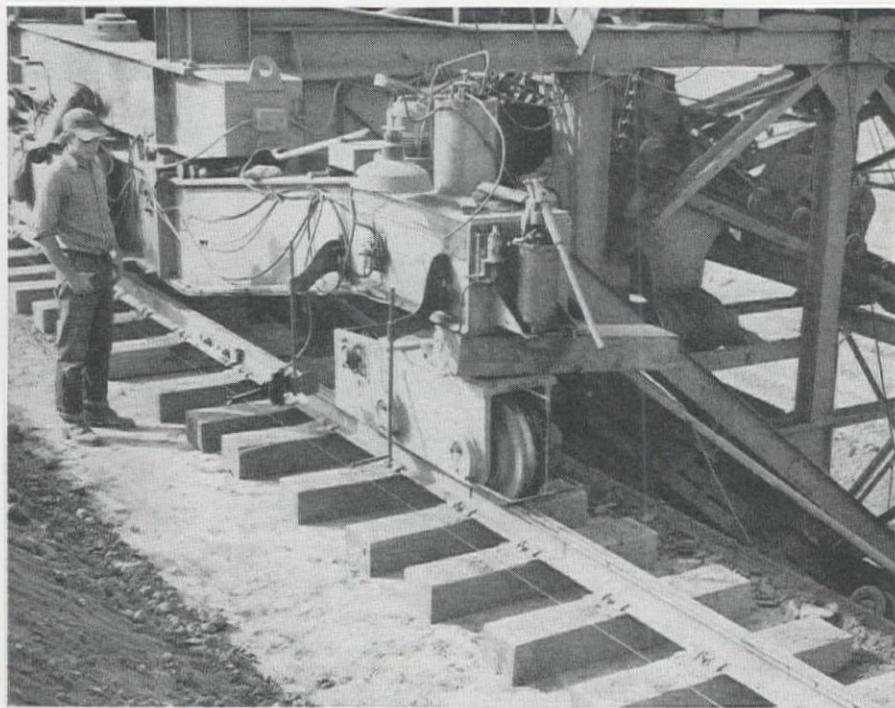
rately to grade. These wires are placed over brackets on steel pins, the latter being placed at 48-ft. intervals. Turnbuckles are used to draw the piano wire taut. Two pointers on each side of the trimming jumbo are kept opposite the wire by an operator on each side who raises or lowers the entire machine by means of electrically-operated hydraulic jacks.

Automatic electrical control

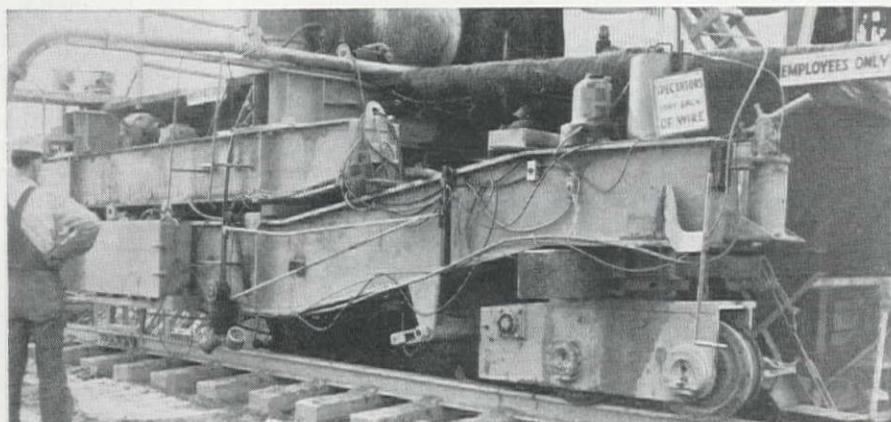
A new method employed during the latter part of the job consisted of a fully automatic electrical control device. A wooden forked stick extended horizontally from the side of the machine in such manner that the piano grade wire was between the prongs of the fork. If the machine moved downward, it brought into contact a limit switch at the rear of the forked stick. This set in motion the electric motors on the hydraulic jacks and the machine was raised until the limit switch contact was broken. This device was so sensitive that a slight pressure applied by hand on the

SMALL rubber-tired dolly, left, and ski arrangement, right, registered concrete thickness on dials. Limit switches for the automatic electrical controls were actuated by points on ski indicator shaft.





TRIMMING JUMBO, above. Man is looking at forked stick running along grade wire which actuates the automatic control of concrete thickness. LINING JUMBO, below, with pendulum and horizontal bar to keep the rear of the machine level with the front.



grade wire was sufficient to actuate the jacks.

Specifications issued by the Bureau of Reclamation provided that the contractor be paid for concrete to neat lines of the structure. There is a further provision on canal lining that a 10% variation in thickness will be permitted. This variation may be minus if the concrete placed during a shift does not fall below the quantity required for $3\frac{1}{2}$ -in. thickness as determined by yield measurement. This means that the thickness may be as little as $3\frac{1}{8}$ in. in isolated cases, but the total concrete placed during a day must equal the amount required for an average $3\frac{1}{2}$ -in. thickness. Naturally, with such small tolerances and with the contractor paying for concrete in excess of an average of $3\frac{1}{2}$ -in. thickness, there existed a real urgency to keep the thickness of lining as near $3\frac{1}{2}$ in. as possible. In other words, overrun must be controlled.

Bureau of Reclamation inspectors on the job made thickness determinations behind the concrete lining jumbo. This was accomplished by removing the concrete to subgrade with a small steel

trowel and measuring the concrete thickness as placed. These records were taken almost continually and were tabulated where they could be observed by inspectors and contractor's personnel. In addition, concrete yield determinations were made at regular intervals throughout the day. With this information, the inspector on the job computed overrun percentages at intervals during the day. With thickness measurements and overrun determinations available, it was possible to maintain the required thickness and at the same time keep overrun at a reasonable figure.

The contractor desired to improve upon the control of the concrete lining machine. The general procedure has been to run to the piano wires, using pointers on the canal lining jumbo as on the trimming machine. One operator was on each side of the canal lining machine to operate the hydraulic jacks to raise or lower the machine as required to stay on the wires. The elevation of the machine above or below the grade wires was modified as indicated by thickness measurements and overrun determinations.

As a further aid, the contractor installed near the top of the canal bank on one side a steel sled or ski, and on the other a small four-wheeled, rubber-tired dolly. These two machines ran on the canal subgrade, and by a system of levers they indicated on a large circular dial the concrete thickness of the canal lining. The ski arrangement proved better than the small rubber-tired dolly as the latter had a tendency to pick up on its tires the wet subgrade material.

Near the end of the job, a further improvement was made by adopting full automatic control on one side of the machine. This was accomplished by limit switches actuated by points on a shaft from the ski thickness indicator just described. These switches went to a system of automatic electric controls which operated the hydraulic jacks at the forward trucks to raise or lower the machine to maintain the desired thickness. Since hydraulic jacks are situated on both forward and rear trucks of the canal lining jumbo, it became necessary to keep the rear trucks level with those in front. This was accomplished by a 10-ft. horizontal pointer kept in that position by a 400-lb. vertical pendulum. The end of the horizontal pointer was between two electrical limit switches. If the pointer touched one of the limit switches, it actuated the pumps on the hydraulic jacks and raised or lowered the machine until contact was broken.

Changes made to control the trimming and lining machines represented definite advances and improved operation of both machines. They resulted in a better job for the Bureau of Reclamation and in reduced overrun for the contractor. Keith Wasson, Superintendent for Peter Kiewit Sons' Co.; Jim Bett, in charge of trimming and lining operations for the contractor, and Mr. Zimmerman of Gunter and Zimmerman Machinery Co. were largely responsible for the improvements to the machines.

R. K. Durant is Construction Engineer for the Bureau of Reclamation, Speed S. Leonard is Field Engineer, and J. A. Fraps is Division Engineer of Division IV at Lindsay.

KEITH WASSON





Destructive Floods in Southern Nebraska Will Be Curtailed by— Construction of Harlan County Dam

THE DISASTROUS flood of 1935 in the Republican River Basin of south-central Nebraska took 105 lives and destroyed property valued at more than \$9,000,000. Since that time, destructive floods have become almost an annual occurrence in the basin. Harlan County Dam, currently under construction on the Republican River near Alma, Neb., was designed to provide the much needed flood control, not only on the lower Republican but also on the Kansas River all the way to the Kansas Citys. In addition, the dam and its reservoir will provide water supply for the irrigation of 90,000 ac. of land along the river bottom in Nebraska and Kansas. The project, launched with a ground-breaking ceremony in June, 1946, is one of the key units of the Missouri Basin comprehensive river development plan known as the Pick-Sloan plan.

Harlan Construction Co., a joint-venture firm composed of six California contracting companies and one from Colorado, has currently brought construction of the dam and reservoir to

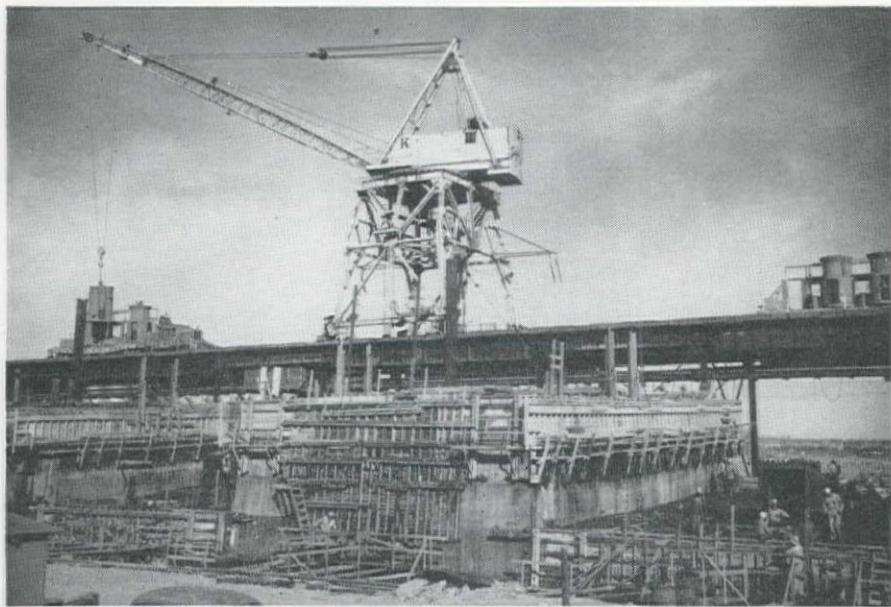
approximately 60% of completion under terms of a \$19,432,386 contract. Mark C. Walker & Son of Santa Ana, Calif., held an initial \$1,052,510 contract for preliminary work, now completed. Upon winter's arrival, current work on the project is confined to placing of rip-rap on the upstream face of the dam. However, with the completion date scheduled as January of 1952, a total of about 7,400,000 cu. yd. of earth, or 71% of the required yardage, has been placed in the main earthfill embankment, and a total of 270,500 cu. yd. of concrete has been poured in the center-type concrete spillway, representing more than half of the required concrete work.

The dam is located approximately 236 mi. above the point at which the Republican and Smoky Hill Rivers join to form the Kansas River. The reservoir will have a gross capacity of 850,000 ac. ft., of which 500,000 ac. ft. is allocated to flood control, 150,000 ac. ft. to irrigation, and 200,000 ac. ft. to conservation and silting. It will control the runoff from a drainage area of 20,750 sq. mi., or about 83% of the total area of the Republican River Basin. Designed to control all floods of record, the project will afford direct protection to 138,000 ac. along the Republican River and, in addition, lessen the flood hazards for 150,000 and 583,000 ac. along the Kansas and Missouri

SPILLWAY AREA, top of page, is viewed from the batching plant. Two converted shipyard-type Colby cranes combine to handle concrete. Loading operations at the borrow pit, below. Earth is cut from the pit's wall by a Euclid loader equipped with a vertical cutting blade.



HARLAN CONSTRUCTION CO. is a joint-venture firm composed of the following companies: Guy F. Atkinson Co., South San Francisco; Bressi-Bevanda Constructors, Inc., Los Angeles; A. Teichert & Son, Inc., Sacramento; Charles L. Harvey, San Francisco; W. E. Kier Construction Co., Los Angeles; Trepte Construction Co., San Diego, and Gordon Construction Co., Denver.



POURING CONCRETE for the spillway monoliths. Top, one of the cranes unloads a bucket of concrete from a flatcar, which travels on two sets of railroad rails within the widespread rails for the big cranes. Note use of steel forms for monoliths in view at bottom.

Rivers, respectively. At maximum operating pool level the reservoir will have a 22,800 ac. area, a 15-mi. length, and an 118-mi. shore line. The conservation pool, extending upstream slightly less than 12 mi., has a 58-mi. shore line and a 13,700-ac. surface area.

Designed for economy

The Republican River Valley at the project site is about 2 mi. wide; the river channel, located near the middle of the valley, is approximately 250 ft. wide. The flood plain occupies the south half of the valley, lying mostly on the right bank of the river. The left side of the valley is occupied by a broad terrace, generally 35 to 60 ft. above the flood plain. Bedrock beneath the left terrace is approximately at stream bed elevation, affording a favorable site for an overflow type of spillway structure with relatively short approach and outlet channels.

The plan proven by numerous studies to be the most economical method of de-

veloping the site was adopted for construction. This plan consists of rolled-fill embankment sections for the flood plain, terrace, and river channel areas, a concrete overflow spillway section and stilling basin located on the terrace adjacent to the river channel, and adjoining concrete bulkheads tying to the rolled-fill embankment sections.

The embankment will have a total length of approximately 10,600 ft., a maximum height of approximately 110 ft. in the channel section, and average heights in the terrace and flood plain sections of 85 and 100 ft., respectively. On the 30-ft. wide top of the embankment, a 22-ft. paved roadway is to be constructed.

The concrete structure, including the overflow spillway and bulkhead sections, will be approximately 1,300 ft. long with a maximum height of 156 ft. from the bottom of the concrete to the top of the dam. The spillway is an ogee-type overflow structure controlled by eighteen

Tainter gates, each 40 ft. wide by 30 ft. high. A highway bridge with a 22-ft. roadway and sidewalks is to be supported on the gate piers.

Flood control storage will be released through nine sluices, 5 ft. wide by 8 ft. high. Irrigation releases will be made through a combination of the flood control sluices, a 2.8-ft. circular sluice in the right bulkhead section, and a 5.5-ft. circular sluice in the left bulkhead section. The energy of the water discharged by the spillway will be dissipated by a 150-ft. long concrete stilling basin with two rows of 8-ft. high baffle piers and a control sill 15 ft. high and 110 ft. wide.

Innovations on the job

Foundation conditions added to the design problems and necessitated exhaustive sampling and laboratory tests. Special sampling procedures were devised that will prove valuable in the construction of similar structures in the future.

In addition to sampling and laboratory work, several other unique practices were evolved on this project, such as the exacting controls used in the batching plant. The plant is a conventional Johnson plant with several features added. For instance, the temperatures of the aggregates are controlled to within one-half of one per cent. A complete refrigeration system for cooling the aggregates was installed. It consists of commercial air conditioning equipment along with compressors and necessary duct work. The same ducts are used to heat the aggregates when that becomes necessary. All techniques for these exacting controls of aggregate temperatures were worked out on this project.

Another interesting adaptation was devised by B. V. Reany, project engineer. In obtaining earth for the fill a standard Euclid loader was equipped with a 12-ft. cutting blade mounted vertically. When the borrow pit was opened, the loader operated from the center cut, cutting from the wall of the pit. In addition to increasing production by taking a long narrow slice, this method also had the advantage of giving a uniform mixture of earth. Both 15-cu. yd. Euclid wagons and 30-cu. yd. Peterbilt wagons were used in this loading operation, and dirt production was exceptionally high.

Harlan County Dam is being constructed under direct supervision of Col. Paul D. Berrigan, Kansas City District Engineer. Capt. Gordon A. Schraeder is the Area Engineer on the job. Project manager for the contractor is Howard Atkinson. Use by the contractor of all new equipment has contributed substantially to the construction progress on this \$49-million project.

DURING 1949 British Columbia lead Canada in hydroelectric power installations. During the year the province added 228,300 hp.—almost half the Canadian total of 479,000 hp. The province now ranks third behind Ontario and Quebec in that order with just over a million horsepower capacity. Canada's total is 11,622,668.

Record Speed on Sewer Installation Made Possible by— Pipe Plant Located at the Job Site

Continuous use of forms for reinforced concrete pipe which is fabricated at a plant near the job has enabled Stockton Construction Co. to beat schedules on sewer construction at Fresno

A GOOD JOB LAYOUT, pipe production at the site, and a fast haul to the trench are enabling the Stockton Construction Co., Stockton, Calif., to do a fast job on their \$497,000 contract for the City of Fresno sewer interceptor. The contract calls for 24,000 ft. of 48-in. concrete pipe, running from Orange and California Streets on the southwest side of town to the main 60-in. outfall at First and Church Avenues. High interest on the job is centered in the field where the pipe plant is set up and producing 15 lengths per shift of reinforced concrete pipe in 12-ft. sections.

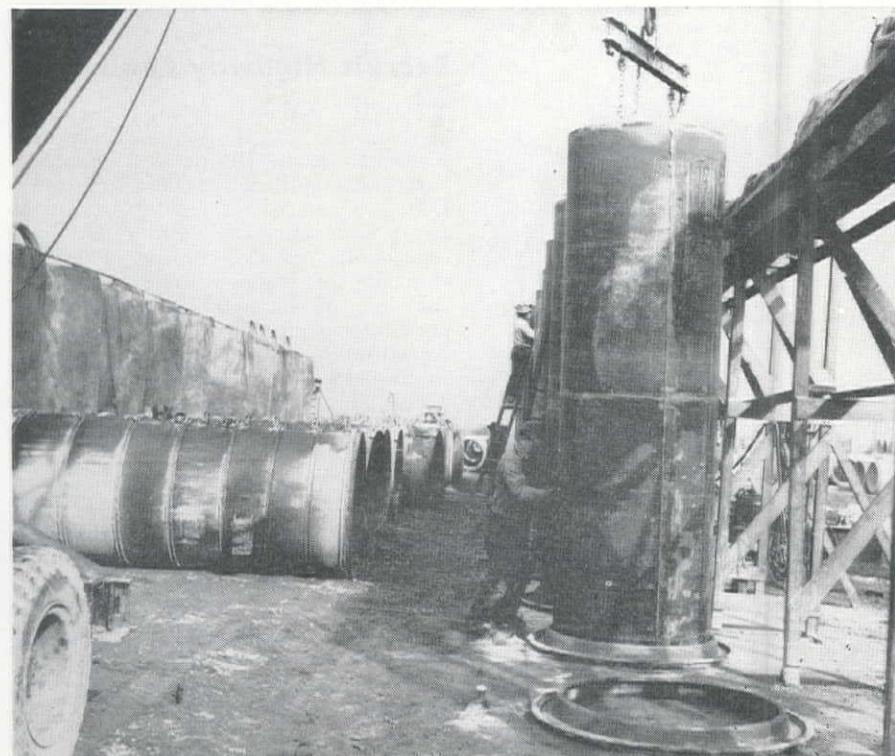
Field plant

All materials for the pipe are fabricated in the field. Steel cages are wound, welded, and deformed at the plant. Transit-mix concrete is poured on 24-hour cycles, and the pipe is steamed and stockpiled within sight of the open trench. With the entire job set up as an industrial operation, handicaps that otherwise would cost much time have had no serious effect on a production schedule that has seen (1) the heaviest

recorded rain in half a century for the month of January, and (2) open trenching and closed trench jacking in hardpan so hard that occasionally it had to be shot.

Spools of wire for the steel reinforcing cages are shipped to the winding shop in "1/0" and "000" sizes. The custom-built machine for winding the cages was ordered especially for the contractor from Guntert & Zimmerman, mechanical engineers of Stockton, who are well known for their slipforms used on the large canals in the California Central Valley Project. The rig has several new features that shorten greatly the man-hours for each cage. As the wire rolls off the spools onto a revolving drum form (size 1/0 is used for the spiral) a feeder travels the length of the drum form and spaces the wire automatically for each revolution of the drum. At either end of the cycle, the chain drive that powers the feeder can be reversed. Time is saved again, since the cages can be started at either end of the drum and it is not necessary for the operator to swing the feeder back to the original starting point.

PIPE PRODUCTION at the field plant. At right, an inside steel form is being set up on an end form. Outside forms are lying on the ground to the left. Pipe sections under canvas at far left are getting a rapid steam cure. Pouring schedule each day is the same.



CHRIS REID, left, is superintending operations for Stockton Construction Co. B. A. "TEX" TAGGART is construction engineer in charge of field operations for the City of Fresno.

After the spiral has been wound to the drum, four lengths of pre-cut "000" wire are inserted for lateral reinforcement. Four keyways in the drum form receive the laterals and hold them in place while the machine operator tack-welds the entire cage. This completes the machine work on the cage. The operator then collapses the drum form, swings the end frame off the drum axle, and removes the cage.

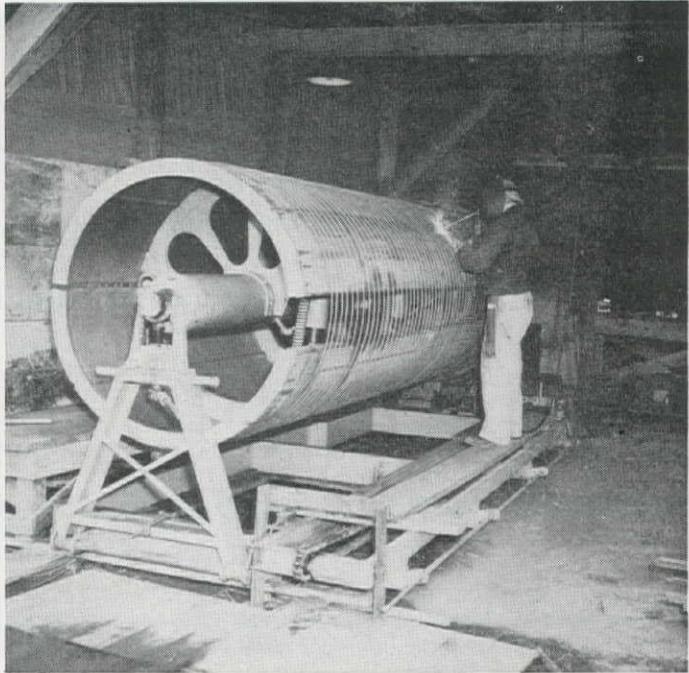
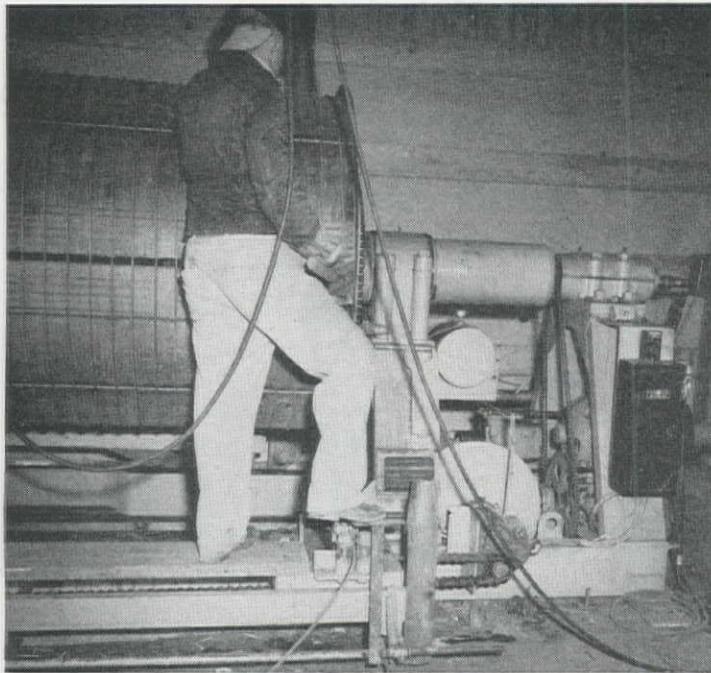
To deform the circular cross-section into an ellipse, the contractor devised a press from various pieces of steel sections and pipe. At a turn of the valve, compressed air operates two cylinders at the top of the press and a steel plate flattens the cage to just the right deformation. The finished cages are then stockpiled until needed.

Pipe plant operations

Each day the pouring schedule in the pipe plant is the same. At 1:30 p. m., transit-mix concrete from a local firm starts arriving, one truck every 15 minutes, and by 4:30 p. m., all forms for the day have been poured. After the forms have been vibrated, a canvas sack steam jacket is slipped over each pipe, and the steam curing begins.

The first operation on the following morning is to remove the sacks, strip the forms, and then replace the sacks for the remainder of the curing. While the first pour is curing, the forms are oiled and set up for the second pour, exactly like the first. On the third morning, the steam is turned off on the first pour, and by 8:45 a. m., the pipe has been stockpiled by a fork lift truck. The same morning, forms are stripped on the second pour.

High production in the field plant results from the continuous use of the cylindrical forms, alternating between the two rows of end forms. On each afternoon, one row of pipe is being poured and the other is curing. On each morning, one row is curing and the other being stockpiled. Thus, the forms



are on a one-day cycle and the concrete cycle is two days. Once in the stockpile, the inside of the aging pipe is sprayed with a curing compound. As long as there is no rain during the actual pour, the pipe plant operates under all conditions.

The use of two high speed air vibrators on each form has been largely responsible for an excellent surface on both the inside and outside of the pipe. The smooth finish, free from air pockets, has been the source of favorable comment from pipe manufacturers and recognized concrete pipe authorities

A PRESS devised by the contractor flattens the circular reinforcing steel cage into just the right ellipsoidal cross-section.



SPECIAL MACHINE with automatic spacer wraps spiral reinforcing steel cage for the concrete pipe. Foot control, left, leaves welder's hands free for tacking lateral rod to spiral. An end frame swings off the drum axle when the cage is shaped and the drum form collapses.

throughout the United States.

Practically in the pipe plant's front yard, trenching, laying, jointing, and backfilling are going on at the scheduled rate. Superintendent Chris Reid has rigged up a Ross lumber carrier to handle and haul pipe sections between the stockpile and trench. Plenty of times the going was hard and the ground too much like sandstone for the veteran Buckeye trencher. A stretch of hardpan was so bad that 300 ft. of it had to be shot. Other times, heavy rains on un-solidified sand made the trench bear watching. The reinforced concrete pipe had to be jacked 80 ft. under two irrigation canals, 332 ft. under fifteen railroad tracks, and 150 ft. under U. S. Highway 99.

The difficult soil conditions encountered made each of the jacking operations a special job in itself. On one occasion, the tunnel had to be blasted in advance of the pipe, and at another point, the loose, running sand required extreme caution in not only the jacking, but also the shoring and bracing of the pit. Line and grade were well held as a result of constant checking and a potentially difficult feature was turned into a successful operation.

The contract is being performed for the City of Fresno under the direction of A. Segel, City Engineer. B. A. "Tex" Taggart is Construction Engineer, in charge of field operations. Fred M. Ashley is Commissioner of Public Works.

Part of a master plan

The Stockton Construction Co. contract is a part of the over-all plan of the installation of trunk and interceptor sewers under a bond issue in the amount of \$2,650,000, which was authorized by bond election held in April, 1947. Three

previous contracts have been completed and are known as the West Avenue sewer, East Avenue industrial sewer, and the California Avenue industrial interceptor sewer. The total of these three previous installations amounts to \$107,140. Plans are under way for the fifth section of trunk sewers, which is intended to reach and serve newly annexed and developed areas north and east of the city. The cost of this section will be in excess of \$500,000.

The bond issue also covered one section of the over-all storm drainage system, involving approximately two miles of 60-in. to 72-in. pipe, the plans for which have been held up temporarily pending the further study of the over-all storm sewer system for the entire metropolitan area.

Recruit Highway Engineers

A HIGHWAY engineering recruitment booklet has been published by the American Road Builders' Association, International Building, Washington 4, D. C., as part of that group's effort to assist Federal, state, county and local road units in overcoming a serious shortage of highway engineers. The shortage of such trained and skilled personnel is cited widely as one of the key stumbling blocks to carrying out the expanded highway program the nation needs. The 44-page booklet, prepared by the Advancement of Highway Engineering Committee of ARBA, is designed to acquaint college students and others about to enter college of the possibilities and scope of highway engineering.

A "STRAW VOTE" is being conducted among the citizens of Coronado, Calif., to determine whether they want a \$10,000,000 tube built under San Diego Bay to replace the present ferry system. Questionnaires were mailed to each of the 2,500 residences in Coronado.

A Younger Western Contractor Has Some Successes and Many Problems

ONE of the West's younger contractors, Eugene Alves of Pittsburg, Calif., owes his start in construction to a track-type tractor and rollover scraper which he purchased back in 1936 to help with ranch chores and assist in the operation of a gravel deposit on his property. In order to keep his tractor-scraper combination going, Alves took on some small jobs such as excavating for driveways and leveling a school yard so that a lawn might be planted. A few years later, to keep up with the demand for earthmoving jobs, which he had started only as a sideline, Alves found it necessary to buy a tractor and bulldozer.

A lack of available equipment during the war years delayed further expansion to some extent, but the die had been cast, and starting in 1945 Contractor Alves' growth has been both rapid and extensive. Now holder of a California Class "A" General Engineering License and a member of the Associated General Contractors, Alves owns a fleet of fully equipped tractors, motor graders and other earthmoving machinery and ranching has taken a back seat, although he still runs a herd of 100 head of cattle and operates his gravel pit.

The first big step

Alves' first big step into contracting came in 1944 when he started operations at the Shell Oil Co. and Shell Chemical Corp. plants in Pittsburg. This work, consisting of excavating, grading, building levees and leveling for settling pits, he still continues. In 1945, among other projects, he completed construction of ten earthfill dams for farms involving 50,000 cu. yd. of earth, and in the following year, with the help of a Trax-cavator-equipped Caterpillar tractor, helped on construction of several important subdivisions.

EUGENE ALVES, a rancher in 1943, and now a full-fledged contractor.



Starting with a tractor and scraper originally used for ranch work, Eugene Alves has gradually taken on more difficult jobs, but not without running into some pitfalls

The year 1947 marked his first public work with bond—jobs for the Housing Authority for Contra Costa County and a job at a Pittsburg school. In 1948, Alves' construction efforts were featured by Sonoma County and Civil Aeronautics Administration Airport work and the Antioch Fairgrounds in Contra Costa County. Last year, in addition to a land leveling operation at Knightsen, Calif., he was employed on the Buchanan Field Airport job for Contra Costa County and Civil Aeronautics Administration and a highway and bridge job in Shasta County. His early 1950 jobs, recently awarded, include an airport job for the Twelfth Naval District at Monterey, and a state highway job in San Mateo County near Half Moon Bay for the California Division of Highways.

A try at bridge building

In a recent interview the young contractor was asked about his most interesting job. He replied, "A man's first bridge job always keeps him thinking, and the one we just finished for Ernest Breuning, County Engineer of Shasta County, put me in the bridge business in a hurry." The \$164,000 contract took less than five months last summer, and had some interesting problems for a first bridge job. The 115-ft. bridge is of steel stringer and reinforced concrete deck slab construction. Each bent is supported on six steel H-beam piles, 50 ft. long, encased in concrete and connected with web walls above grade.

Alves is proud of his first bridge, and

now that the job is complete, the surprises he had in connection with the contract can be chalked up to experience. To other young contractors contemplating their first bridges, Alves advises, "Watch that water!" When looking over the job for the first time in January, 1949, he saw very little water in the stream bed or on surrounding slopes. In talking to the natives in the area, he learned that there was very little runoff the year around. Thus, it was a surprise to find out first-hand, the following May, that this particular stream had more water during summer than in the winter. This water came from a local irrigation district near the site. The site was kept dry by building two small cofferdams and keeping one 4-in. and two 2-in. pumps at work on a 24-hr. schedule. Electric power was available on the site to run both the pumps and small tools used on the form work.

Bidding the bridge job

To bid the job, Alves rechecked conditions at the site for the entire morning of the bid-opening day. The bid was given a minor adjustment for the additional water, then turned in. At the time of bidding, he was concerned most with the pile-driving operations. Although Judson-Pacific-Murphy Corp., Emeryville, subcontracted the structural steel, and the piles were driven by Lord and Bishop, Sacramento, the steel work required a lot of thought at the beginning of the job. The gravel bed of the stream was a headache, since it might contain rocks big enough to deflect the piles, in addition to carrying lots of ground water.

Grading proved to be much as expected, except that near stream bed there was heavy gravel, carrying 6 to 10-in. rocks, bound with a sticky clay. It took more power than is usual to load the scrapers, but dirt was moved on schedule.

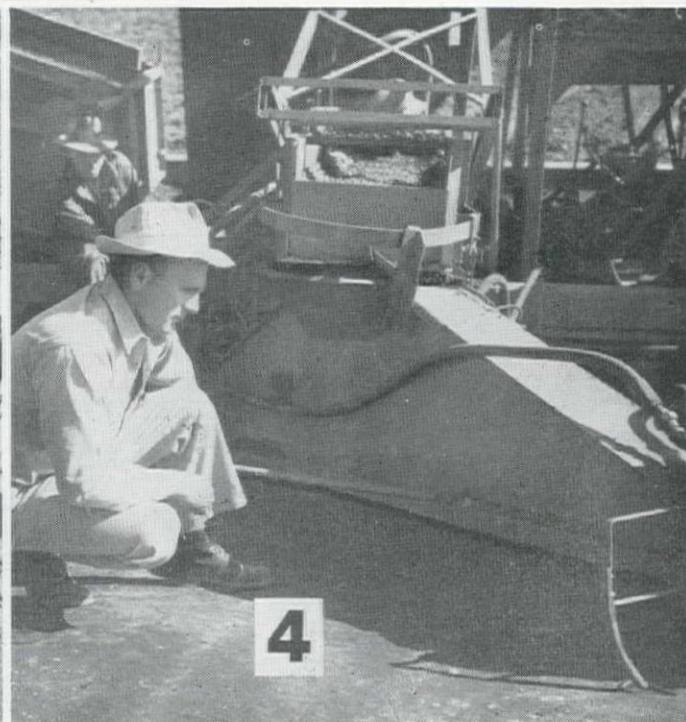
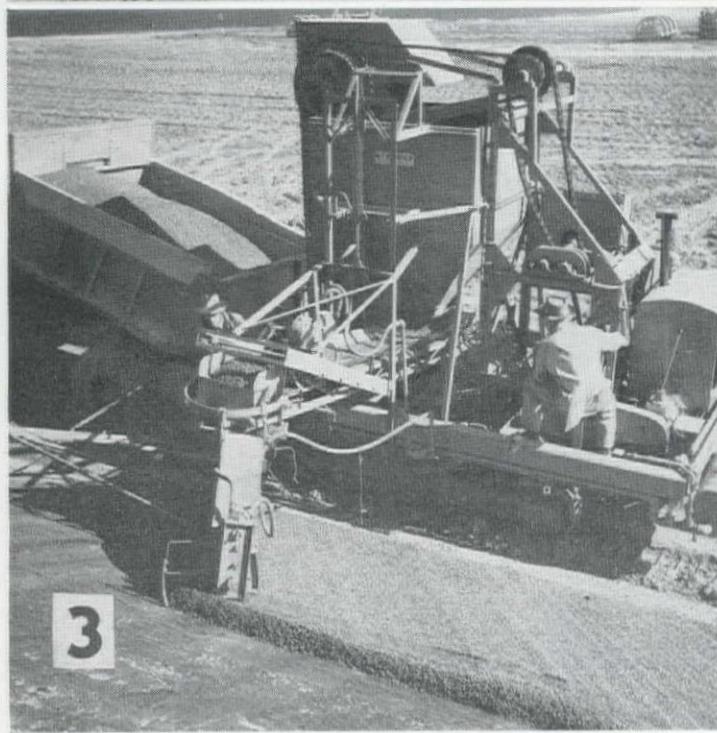
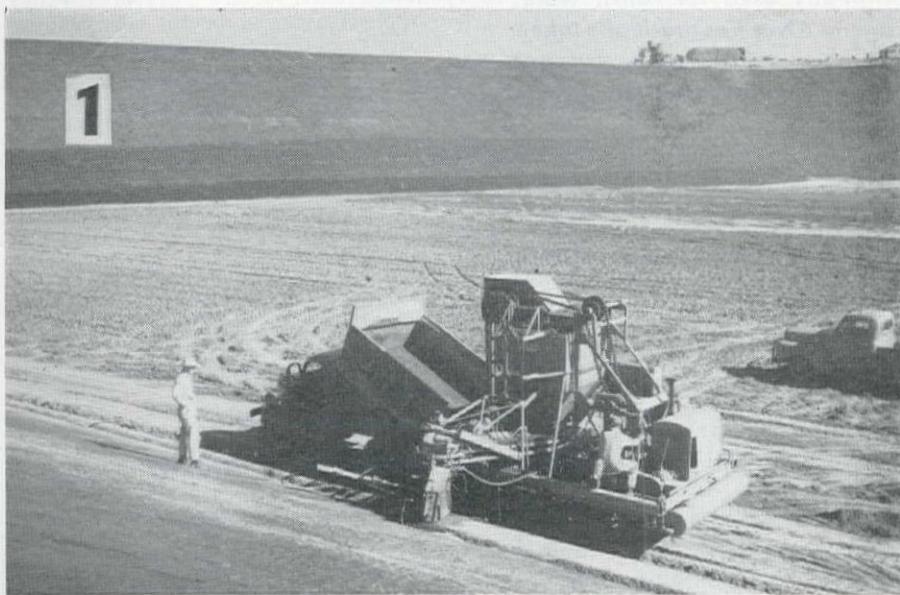
Some words of caution

To other contractors about to bid their first bridge jobs, Alves says to watch out for unexpected ground water at a different season, even if there is no hint of it when bidding the job. Be particularly careful, he warns, to consider the problems of concrete footings if they are in a gravel stream bed.

Now and then, when he watches his big Diesel-powered machinery in action, Alves finds his thoughts straying back to that old tractor and rollover scraper whose spare-time operations put him right into the contracting business, along with others who are engaged in the tremendous job of building the West.

THE JANUARY contract letting of the Oklahoma State Highway Commission established an all-time high in the number of bids received according to H. E. Bailey, State Highway Director. On 28 projects 160 bids were offered. A county gravel road project of less than 5 mi. received 17 bids, while a primary roadbed job drew 16.

Machine Spreads Layers of Concrete on Steep Slopes



SPREADING a 3-in. layer of porous concrete up the 1:2 slopes of the Baldwin Hills reservoir was the unusual problem solved by the development of an ingenious machine by the M. F. Kemper Construction Co., contractor for placing the reservoir lining. This project is being built by the Los Angeles Water Department, and the features of the multi-layer lining were reviewed in detail in *Western Construction News* (Feb. 15, 1950, page 61). The spreading of this layer of pea-gravel concrete on the bottom of the reservoir was carried out by usual methods, but the placing of the material on the slopes presented a real construction problem. The accompanying pictures illustrate the general design of the special machine developed by the contractor, and its method of use.

1—The self-propelled unit mounted on crawler treads pushes a truck loaded with premixed concrete as it dumps into a hopper on the front end of the machine. The extent of the side-slope area to be covered with this layer is indicated in the photograph. On the far side of the reservoir, a batching plant and 34-E mixer set-up proportions and mixes the $\frac{1}{4}$ -in. gravel with $1\frac{1}{2}$ sacks of cement per cu. yd. This plant produces 300 cu. yd. per shift to be placed by the spreader.

2—Built on an old set of crawlers from a trencher, the super-structure was assembled and mounted at the shops of the contractor. As shown, the machine is laying an 8-ft. lift on the slope at a forward speed of about 10 ft. per min.

3—Concrete from the truck is delivered and elevated by bucket conveyor to the upper hopper. The flow from this hopper is controlled through a clamgate to a conveyor belt which deposits into the spreader unit. In the foreground, this spreader, which can be adjusted for slope and angle, delivers the concrete by screw conveyor running the entire length of the spreader. This spreader

provides a strike-off over the 8-ft. lift as the machine moves forward. The hopper at the top of the machine provides enough storage for continuous operation while trucks are changing.

4—Bruce Kemper, job superintendent for the contractor, checks the adjustment of the concrete spreader and the feed from the conveyor belt. The operator is responsible for the rate of feed, the elevation of the spreader box and the contact of the lift with the concrete placed on the previous lift.

As described in the previous article, this layer of porous concrete is covered with a 10-ft. depth of compacted earthfill. After the 8-ft. lift of concrete is spread up the slope, the compacted earth is extended up to the same level and then the spreader places another 8-ft. lift of concrete. As this procedure continues, the compacted earth provides the runway for the next pass of the machine. This sequence follows to the top of the reservoir slope.

Conveyor Assembly Made Into Unit for Erection

SAVING three weeks' valuable production time and several thousand dollars in construction costs was the recent net result of an ingenious idea tried by MacMen Inc., Los Angeles equipment setting firm, when assigned the job of assembling and erecting lattice-work conveyors for the newly organized Torrance Sand and Gravel Co. in California.

Ignoring the procedure of using the help of a crane to assemble the conveyors piece by piece high on erect pinions, MacMen crews conceived the plan of assembling the openwork shafts first on the ground and then raising the completed but flimsy structures into position. An estimated three-quarters of the crane time which would normally have been used was saved, as well as about one-half the labor.

Key to success of the operation was the method used to rig the crane cables when raising the assembled conveyors. This had to be done so that the weak 120-ft. long shafts would not warp or break while in the air. The lifting force had to be controlled carefully so that it would be spread evenly over the entire length of the shaft during the lift upward into position.

Mixing Detergent Oils In Crankcase Dangerous

MIXING various brands of detergent-type oils in the crankcase of your tractor may cause a chemical reaction that could be harmful to the engine, warns M. G. Huber, Oregon State College engineer. Before switching from one brand to another, drain the present oil before refilling with a different brand, the specialist suggests.

Huber has other suggestions for tractor users, which he says will postpone costly repairs or the day when the present tractor must be traded-in for another. Tips include use of a non-foaming oil in

the air cleaner. Use the correct weight, and detergent oils are not recommended. Set up a regular cleaning schedule especially where the tractor is being operated in dusty conditions. Tractors should always be permitted to come up to their operating temperature, Huber continues, before being loaded or driven.

Although not recommended for use in the air cleaner, detergent-type oils are recommended for crankcase use in tractors. Their washing action helps keep

the rings clear of carbon. The use of this type oil is more important for Diesel engines than in conventional gasoline burning equipment.

Oil filters recommended by the manufacturer should be used because some "will fit" oil filters may offer more resistance to the oil flow. Under no conditions, the specialist warns, should clay type filters be used with detergent type oils. Clay reacts chemically with the detergent and removes it.

Asphalt Pumped by Pressure Under Lining to Sub-Seal Concrete Canal

TO SUB-SEAL an old concrete lining in a power canal near Riverton, Wyo., asphalt was pumped under pressure through holes drilled in the 23-year old concrete. This work, carried on late last fall by the Bureau of Reclamation, was the first extensive job of asphaltic sub-sealing of this type.

The canal has a bottom width of 12 ft. and 1:1 side slopes. It had been lined with lightly reinforced concrete having an average thickness of about 3 in., and during 23 years of service had become badly cracked. At least one wash-out had occurred and others were threatening before the present improvement was carried out.

Following the turning out of the water, staggered holes were drilled at 8-ft. centers in both directions through the lining on the bottom and side slopes of the canal. Asphalt was then forced under the slab (see illustrations) at a temperature of about 400 deg. and a 12-lb. pressure. The material was air-blown asphalt, with a 50-60 penetration and a 135-150 softening point. A 600-gal. insulated pressure distributor was used to provide a short length of pumping hose. This distributor was supplied by insulated tank truck which hauled 30 mi. from the tank car. This tank car was kept heated to about 450 deg.

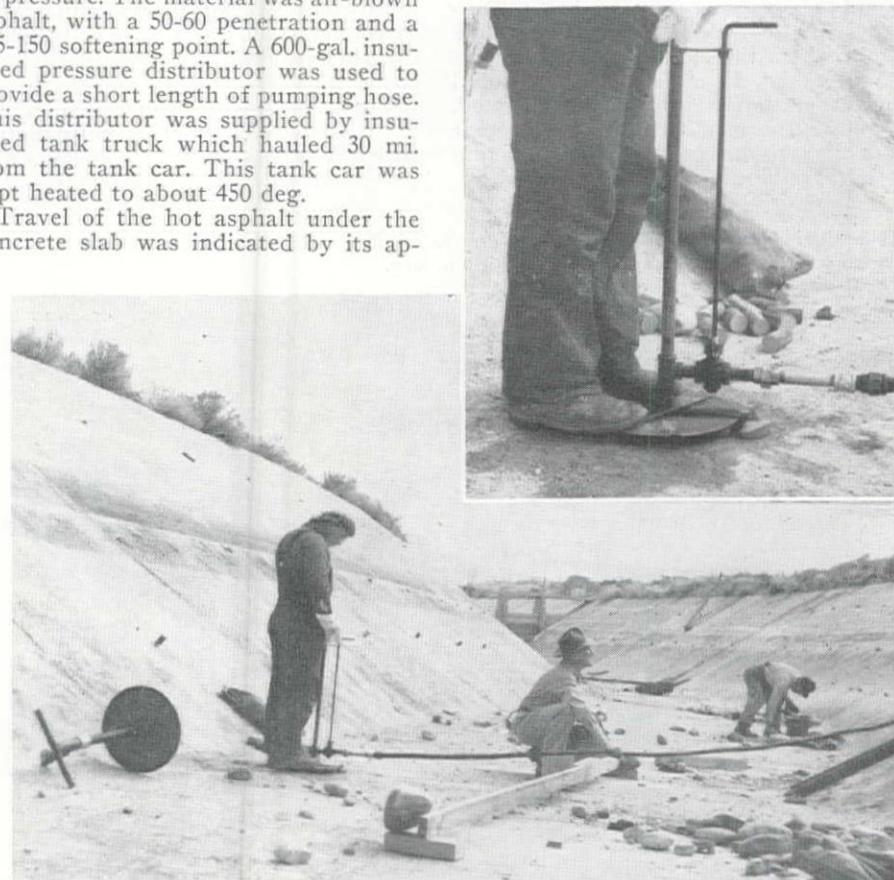
Travel of the hot asphalt under the concrete slab was indicated by its ap-

pearance at adjacent holes, which were plugged as the asphalt appeared. Distances were frequently as much as 25 ft. on the slopes and some travel up to 40 ft. was indicated.

More asphalt was used than was originally estimated and the average amounted to 3 gal. per sq. yd. of lining treated. Obviously larger voids existed under the lining than were anticipated.

The work was carried out by the Operating and Maintenance forces of the Bureau of Reclamation under the direction of Tom A. Clark, construction engineer.

Plans call for a similar operation to be carried out this spring on the Roza project near Yakima, Wash., where bids have been called for similar treatment of 2,200 lin. ft. of large canal which has developed serious leakage. It is estimated that about 135 tons of asphalt will be used for this sub-sealing job.



Another Major Development of the Columbia River Is Outlined in This— Preview—Chief Joseph Dam Project

WITH an ultimate cost estimated at \$234,000,000, the Chief Joseph Dam and power project now entering a stage of accelerating construction represents one of the major units in the development of the Columbia River, being carried out by the Corps of Engineers. Preliminary designs for the straight, gravity, overflow type of concrete structure have recently been approved by a board of consulting engineers. Plans call for a dam 220 ft. high and 1,484 ft. long creating a reservoir which will extend 51 mi. upstream to the tailrace of Grand Coulee Dam. The Chief Joseph Dam project is being carried out under the direction of Col. E. C. Itschner, District Engineer, Seattle District. General features of the development are outlined in the following.

History

When Congress ordered the initial investigation of all major rivers in 1927 the Chief Joseph Dam site (originally known as Foster Creek) on the Columbia River was one of the sites recommended in the original report. This report was submitted to Congress in 1932. In 1942 Congress asked for a separate report on Chief Joseph Dam, which was submitted in 1945. As a result of this report the project was authorized by Congress in an Act dated July 24, 1946.

Following this authorization, initial funds were appropriated for the project and the Corps of Engineers began planning and collecting engineering data from which the exact location and size of the dam, as well as the potential power output, could be determined. Funds authorized by Congress were not sufficient to finance a major planning program, therefore activity was con-

centrated on those features of the work which could be first placed under construction and which would most effectively advance the completion date of the project. Excellent progress was made and, utilizing the \$2,500,000 made available by Congress in June of 1949, major preliminary construction contracts were awarded. This work included construction of a bridge across the Okanogan River near Brewster and three foundation exploration contracts at the dam site. The Okanogan River bridge now under construction by Willett & Sons of Wenatchee, is approximately 35% complete. The bridge is being constructed at the site of the county bridge which burned last June. The new bridge will be 457 ft. long, approximately 60 ft. above the stream bed and will be of steel and concrete construction.

Initial contracts

For construction during the fiscal year 1950, Congress appropriated \$5,000,000. The initial contract to be awarded from these funds was for construction of a bridge crossing the Columbia River approximately one mile east of Bridgeport, Wash. Awarded to the Guy F. Atkinson Co., the new bridge will have three main spans totaling 1,146 ft. in length and rising 125 ft. above stream bed. It will be of steel and concrete construction with a 26-ft. roadway and 3-ft. sidewalks on either side. The substructure will

consist of six concrete piers and two concrete abutments. One main pier will be in the main river channel, extending to granite bedrock some 30 ft. below minimum water elevation and exposed to high velocities.

Site problems

From Grand Coulee Dam to the mouth of the Okanogan River, a distance of about 65 river miles, the Columbia River occupies the entire bottom width of a canyon with no flood plain. Foster Creek Rapids are formed by a bed of granite which extends across the stream and outcrops in midchannel near the foot of the rapids and also along the south bank. At this point, the north bank consists of cliffs more than 300 ft. high. About a mile downstream, the granite outcrops in low cliffs along the south bank and continues to slope up for several hundred feet. The same rock continues under the river bed with very little overburden. However, it does not rise at the north bank but continues level for about 900 ft. and then rises gently to an outcrop some 4,000 ft. from the bank. The north bank is composed of a highly pervious layer of sand and gravel overlaid by a thick bed of hard, impervious glacial till, covered by a surface layer of sand with occasional small boulders.

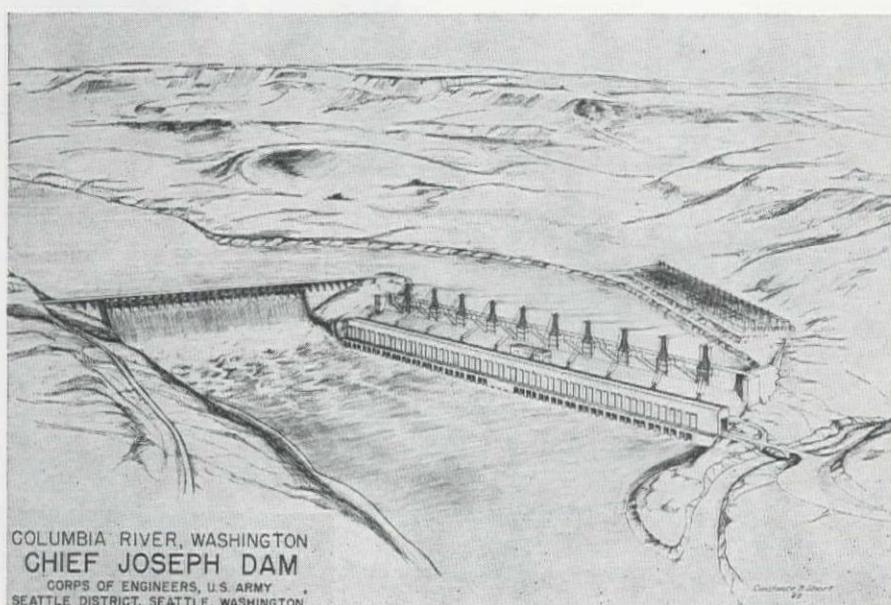
An extensive program of seismic exploration, core drilling, trenching, tunnelling and test pitting, and a survey of rock outcrops supplied much detailed information which resulted in the selection of a location $\frac{1}{2}$ mi. upstream from Foster Creek. At this site, the rock is of excellent quality and is highly satisfactory as a foundation material.

The north abutment presents the only foundation problem. The safety of the north abutment of the dam will require some form of treatment which will greatly increase the length of the path of seepage water. An upstream blanket has been recommended for controlling the flow of water through the pervious material. Additional study will be required before a final and detailed design is adopted.

Access route

Economic studies determined that access by highway can be obtained more economically than by rail. Accordingly an access highway will be constructed to connect the project with rail facilities near Brewster. The access highway will connect with existing county roads and U. S. Highway No. 97, about 3 mi. east of Brewster. Space is available adjacent

THE COMPLETED DAM will be a straight, gravity, overflow type, 220 ft. high and 1,484 ft. long. Powerhouse on the left bank will be almost 2,000 ft. long.



to the Great Northern Railroad right-of-way at this point for rail siding and terminal facilities. The highway will cross the Okanogan River and follow the general course of the Columbia past the area which is under investigation as the most promising source of aggregate. It will cross the Columbia River on the new bridge now being constructed, to the south bank below the dam and about $\frac{3}{4}$ mi. upstream from Bridgeport.

General layout for construction

Several sites along the access highway capable of producing aggregate for the entire job have been located and investigated. Further investigations are proceeding at present in an effort to locate the best source of aggregate with the shortest hauling distance.

Within the proposed construction area at the dam site there will be ample space available on the north bank for storage yards, carpenter and machine shops, aggregate stock piles and the main concrete mixing plant. On the south bank above Foster Creek, prior to the start of work on the powerhouse and intake channel, there is space for shops, storehouses, and activities such as form building and cofferdam construction.

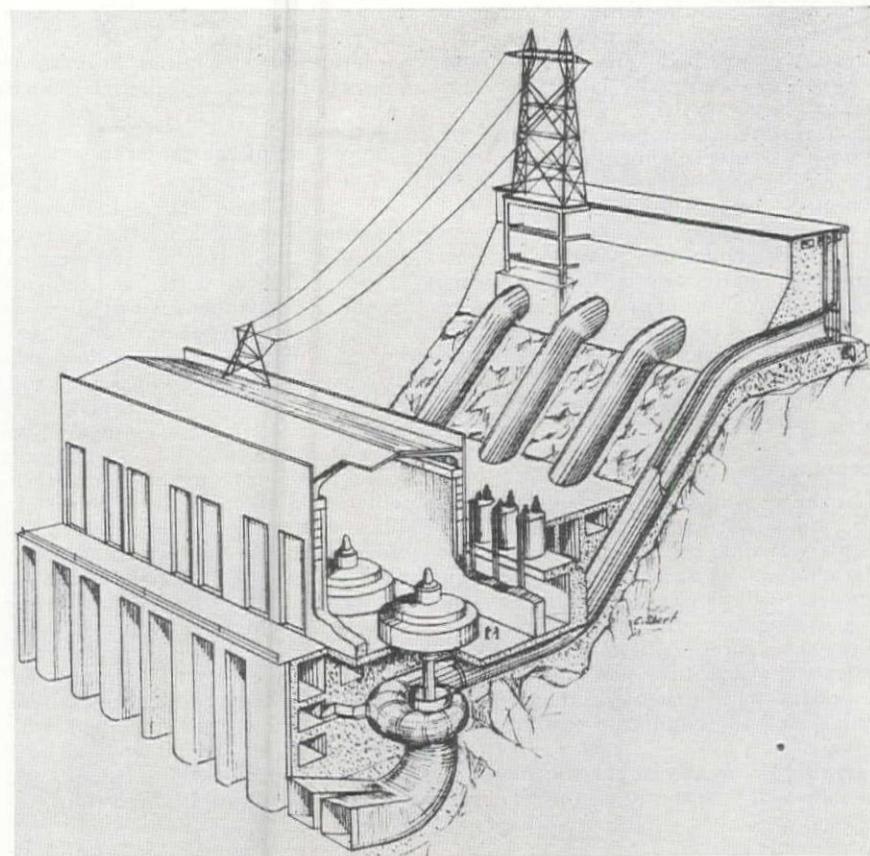
Housing

The Government is not planning to operate any concessions or construct a Government village at Chief Joseph Dam. Contracts will be awarded for construction of 40 permanent houses, 70 temporary houses, and dormitories for 70 single men at the edge of the town of Bridgeport to house Government personnel; also an administration building, shop, and the necessary utilities. Upon completion of the dam, the houses will be sold to permanent residents of the town of Bridgeport.

Handling the river

The river at the dam site is deep and swift-flowing. The design of the cofferdams will generally be left to the discretion of the contractor and either steel piling or timber cribs may be used. Of the twelve months in the year, two to four must be allotted to the annual flood. Three months have been allotted to building the first cofferdam, pumping out and plugging leaks. During the first

FIRST STAGE of construction, up for contract this spring, will bring the right half of the dam to one-fifth ultimate height. Contract will include excavation and cofferdams.



POWERHOUSE will be the longest single such structure in the world. Its 27 generators will have a rating making it the second largest hydroelectric power plant in the world.

period of construction about 2,000 ft. of cofferdam will be placed. It is impractical from the standpoint of economy to build the cofferdam high enough to withstand floods experienced, on an average, two years out of three without overtopping. The constriction of the channel by the first cofferdam will result in creating a head on the upstream side and high velocities (up to 20 or 30 ft. per second) in the restricted channel. At the Chief Joseph site there is no practical way of diverting the river from its present channel. Diversion tunnels, which have been used on some jobs, would involve costly excavation through solid rock. Therefore, the work must be arranged so that the river can continue to flow in its present channel throughout construction of the dam.

Preliminary designs for the dam have recently been approved, in general, by a board of engineering consultants including W. H. McAlpin, of the office of Chief of Engineers, Washington, D. C.; Joel D. Justin, Philadelphia; Julian Hinds, Los Angeles; Barry Dibble, Redlands, California; Dr. Arthur Casagrande, Professor at Harvard University; and Leroy F. Harza, of Chicago.

The board met in Seattle last December 13 and 14 to discuss the various phases of construction with Colonel Itschner and his engineering staff and their recommendations indicate that construction can get under way immediately.

First construction stage

The initial contract will involve the excavation of more than 3,500,000 cu. yd. of material for the powerhouse intake canal. The canal will be about 40 ft. deep, 3,600 ft. long, and average 1,000 ft. wide. The bed of the canal will be about 160 ft. above present river bed.

The powerhouse will be constructed on the left bank (see sketch) at an angle to the axis of the dam. As ultimately developed, it will contain 27 generating units, and will be almost 2,000 ft. long, the longest single powerhouse structure in the world. The vertical shaft, Francis-type turbines will have a capacity of about 100,000 hp. each at the rated head of 165 ft. The generators will have a rating of 64,000 kw. each, a total for 27 units of 1,728,000 kw., the second largest hydroelectric power plant in the world exceeded only by Grand Coulee.

In the first stage of construction, half

of the dam extending from the north, or right, bank to approximately the middle of the river will be brought up to about one-fifth of its ultimate height (see accompanying sketch). This contract, which is scheduled for award during the spring of 1950, will include excavation of the right bank and construction of the first-stage cofferdam. The cofferdam will have a total length of about 2,000 ft. and a height of about 60 ft. Actual construction of the cofferdam will begin during the low water period of 1950 and closure is expected to be complete during February, 1951. Concrete work within the cofferdam is scheduled to start during April, 1951 and be completed by October, 1951.

Second stage

In the second stage, starting in June, 1952, the south half of the low dam will be placed while the flow of the river is carried over the north half and through temporary sluices built into this section. Also during this period the substructure of the powerhouse will be started. Plans indicate that by May, 1953, concrete will be poured within the second stage cofferdam and the cofferdam ready for removal.

During the next year the south half of the dam will be brought up to full eleva-

tion with the dam complete, except for closure, by September, 1954. The substructure for the initial 20 units of the powerhouse will be well under construction.

Completion of the project

Two seasons will be required to raise the spillway and abutments above the elevations reached in the cofferdams. Work on the abutments and piers can be prosecuted when work has been stopped in the spillway because of high water. The installation of tainter gates and hoisting machinery will follow as soon as pier construction will permit and will run concurrently with this work. The bridge will be started about one month later than the installation of the tainter gates. The first six temporary sluices will be closed in February and March, 1955, and the remaining sluices will be closed after the highwater season. Two weeks or less will be required to fill the reservoir from surplus flow after all sluices are closed on/about October 1, 1955.

The completed structure will include a total of 27 generating units. The last seven units will be installed between 1960 and 1970. The spillway, with a flood capacity of 1,250,000 cu. ft. per sec., will be controlled by 19 forty-foot tainter

gates. Present plans indicate that construction of the dam will be completed and the first three generating units will go on the line in 1956. The cost of the project is estimated at \$234,000,000 for the initial 20 generating units. Peak construction employment is forecast for the summer of 1953 with approximately 3,500 contractor employees on the job.

Personnel

All construction is under the direction of Colonel E. C. Itschner, District Engineer for the Seattle District, Corps of Engineers.

Engineers who are closely associated with construction of the Chief Joseph Dam project are Franklin S. Brown, chief of the engineering division; Raymond F. Bracelin, chief of the Chief Joseph Dam branch of the engineering division, and Charles H. Wagner, resident engineer at Chief Joseph Dam.

MORRISON-KNUDSEN Co., Inc., has announced an extra dividend of 90 cents per share of common stock, payable Jan. 20. The firm completed a total of more than \$120,000,000 of construction during 1949, more than two-thirds of it in continental United States and Alaska.

Steel Baffle Fences Constructed in Reno Settling Reservoir

DURING the severe winter of 1948-49, trouble developed in the settling reservoir which supplies water for the city of Reno, Nevada. Baffle fences designed to provide a longer detention period for the waters passing through the reservoir were completely destroyed by ice.

These fences consisted of 2 by 6-in. and 1 by 12-in. boards fastened to wood posts which were set in concrete. During the extremely cold weather, a layer of ice up to 14 in. thick formed in the reservoir and became anchored to the fences. Due to an operating condition arising during this period, excess water was allowed to enter the reservoir with

By NEIL W. PLATH
Superintendent of Construction
Sierra Pacific Power Co.

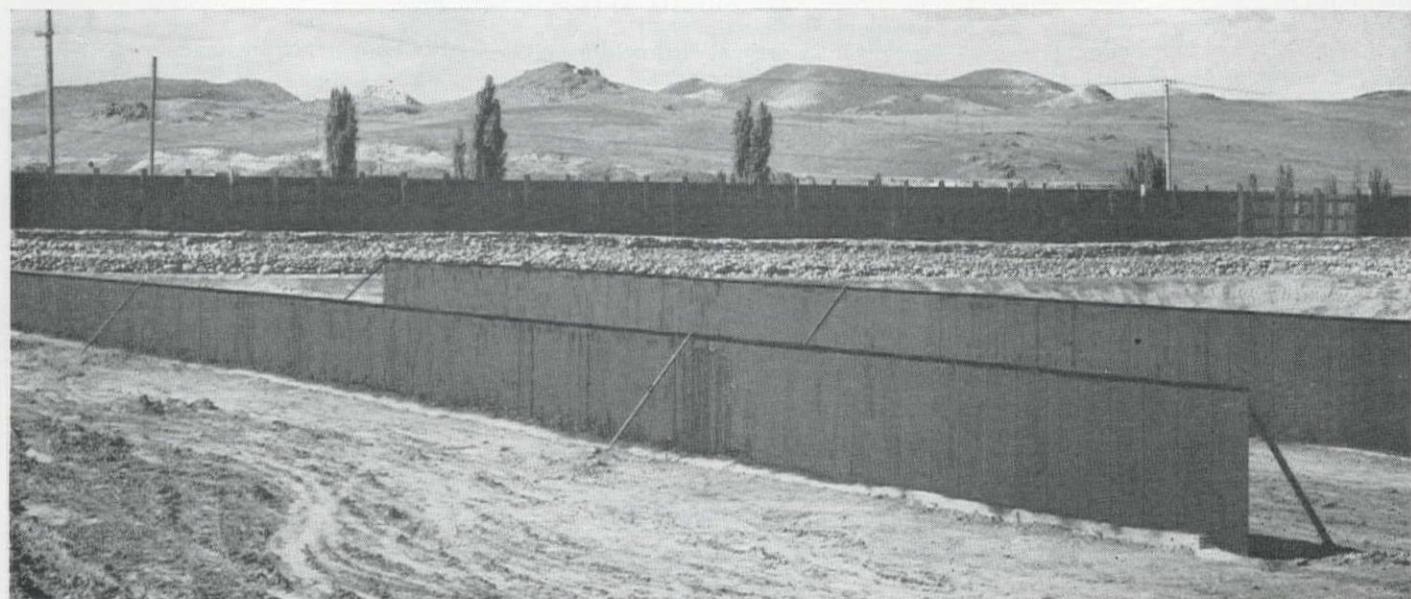
the result that the ice cap raised, lifting out the baffle fences and wrecking them.

In studying the replacement of the fences, it was decided to change them completely, and the best material from the standpoint of long life appeared to be steel. Two baffle fences of Armco Interlocking Steel Sheet were installed, with the individual sheets being anchored in 10 to 14 in. of concrete. In the bottom of every fourth sheet a hole was punched and a reinforcing rod anchor dowel was placed through the

hole. The top of each fence was stiffened and held to grade with a 2 by 2 by $\frac{1}{4}$ -in. angle iron bolted to the sheeting sections. Wind braces consisting of 3 by 3 by $\frac{1}{4}$ -in. angle irons were set in concrete and fastened to the fences at 30-ft. intervals.

The interlocking joints were filled with an asphaltic mastic compound and the entire installation was painted with flume paint upon completion. Rusting of the sheeting will be kept at a minimum by an inspection and touch-up once a year.

Regulation of inflowing water has been adjusted, and damage from a floating ice cap is unlikely to occur again.



Arizona Has Developed and Tested an Effective Method for— Measuring the Adequacy of Highways

HOW ADEQUATE is any section of highway to carry the volume of traffic it is required to handle? The answer to this question provides the basis for Arizona's "Highway Sufficiency Rating System," which was put into operation in 1946 and is used to establish the order of priority for highway reconstruction and other improvements. As an indication of the effectiveness of this system, there has not been one protest filed with the Arizona Highway Commission during the past four years over the distribution of FAS funds. Such a statement represents a marked improvement over conditions in the state during previous years.

Essence of the system

In devising any modern system of rating highways, it is well to find new terms to fit the system to get away from any traditions that might be attached to the old terminology. Arizona decided to look at a highway from a standpoint of just how adequate or sufficient it was to carry its volume of traffic indicated by the traffic flow map. This system, termed "sufficiency rating," provides a method by which each section of roadway is assigned a certain number of points, depending on its actual present condition as determined in the field. The average length of construction projects in Arizona—sections built under one contract in any one year—is approximately five miles; so this average length was selected for the study.

The problem then arose as to what rating should be assigned a perfect road, carrying the proper amount of traffic safely and without congestion. Under this ideal condition a road was assigned a rating of 100 points. These points were divided into three major categories as follows:

1. Condition	35 points
2. Safety	30 points
3. Service	35 points
Total	100 points

This breakdown gets away from the general engineering phraseology of alignment, profile, grade, sight distance, etc., although all are considered in this system and none is overlooked.

In rating a section of highway, it is of prime importance that each element be small enough to assure uniform treatment and also to confine the element of personal judgment to a limited range of values.

1—The *condition* of the road is considered to be a composite of the following:

Structural adequacy	17 points
Anticipated remaining life	13 points
Maintenance economy	5 points

Condition Total 35 points

Roads were rated on the following observed values for structural adequacy.

ONE of the outstanding papers delivered at the California Institute on Street and Highway Problems, held in Los Angeles, January 30 to February 1, was presented by William E. Willey, Engineer of Economics and Statistics, Arizona State Highway Department. The conference, more popularly called the "Road School," was the second annual meeting sponsored by the University of California Institute of Transportation and Traffic Engineering. The system reviewed by Mr. Willey has been in operation for about four years in Arizona and has proved to be a successful basis for planning improvement programs on the state highway system, including secondary roads. The features of this system of rating should be of interest to county engineers of the Western States, who are faced with the same general problem.—*Editor.*

Excellent	16-17 points
Good	12-15 points
Fair	8-11 points
Poor	0-7 points

Anticipated remaining life is based on experience tables of similar road types with one point given for each year of expected remaining life up to 13 points. In this element the actual present age is the determining factor. For example, a mixed bituminous road built in 1940 is rated at 8 points, anticipating its retirement in 1956 at the end of a 15-yr. life span. A concrete road built in 1940, with a 25-yr. expectancy, is estimated to have a remaining life of 18 years and receives the full credit of 13 points. A bituminous surface treatment is figured to last 8 years under good conditions and light traffic, and points are assigned accordingly. **Maintenance economy** is rated from 0 to 5 points, depending upon evidence of expenditures greater or less than average. In general, roads with a high maintenance cost may have a poor subgrade and a low structural adequacy rating. Therefore, maintenance, in effect, is assigned a total of 22 points out of a possible 100.

2—**Safety**, with an assignment of 30 points, is subdivided into the following elements:

Roadway width, or marginal friction	8 points
Surface width, or medial friction	7 points
Sight distance, or intersectional friction	10 points
Consistency	5 points

Safety Total 30 points

Roadway width is measured and computed against the standard width for the

class of road involved, as determined by the traffic volume and type of terrain. For example, a 28-ft. road, where 28 ft. is the standard width for a traffic volume of from 50 to 300 vehicles per day, is rated a full credit of 8 points. However, if the standard is 40 ft., based on a traffic volume of from 1,000 to 3,000 vehicles per day, the road rates 2 points out of the possible 8. In cities and urban areas the terms marginal (edge of road) friction, medial (opposing traffic) friction, and intersectional friction are used in place of regular widths. **Consistency** in both of the above cases is defined as the absence of abrupt surprises, such as narrow bridge structures or so-called death curves.

3—**Service** to the road user comprises the dispatch and ease with which a given trip can be made. The 35 points assigned this section are divided as 20 for dispatch and 15 for ease. These are further classified as follows:

Alignment	12 points
Passing opportunity	8 points
Surface width	5 points
Sway in cross-section	5 points
Roughness of texture	5 points

Service Total 35 points

Each roadway section is compared to the standards for the particular section. For example, a road with alignment ample for 50 m.p.h. traffic in mountainous country and carrying less than 1,000 vehicles per day is fully sufficient (12 points), whereas in the flat country or open desert it would be rated only 9 points, the difference being that in the open country the standard design speed for this example is 70 m.p.h. The rating assigned to any section for **passing opportunity** is a function of the congestion of the roadway or the number of times that a driver is unable, for any reason, to pass the car just ahead. The actual **surface width** of the road as compared to the standard is the basis of determining a point value under **service** just the same as under **safety**. For each foot under the **standard width**, a one point deduction is made.

Sway in cross section accounts for assigning a point value to settlements or heaves in the subgrade and irregularities in cross-section or superelevation. In general, this includes any feature of the roadway that makes driving difficult and requires the driver constantly to hold the steering wheel with a determined grip. **Roughness in texture** takes into consideration such things as a rocky surface, multiple corrugations, and irregular bridge decks. These items account for most of the tension in driving a vehicle, other than those associated with **safety**, such as a narrow roadway or a poor alignment.

Adjusted rating

In Arizona, rating cards are kept on file from year to year, and should any

question arise about the merits of the rating for any one road section, the card can be withdrawn, and the basic elements studied and evaluated in detail. After each section is rated, a correction is applied to give a greater priority (lower sufficiency) to exceptionally heavily traveled roads, and just the reverse to roads carrying a low volume of traffic. The basic rating thus adjusted is called the "Adjusted Sufficiency Rating." The adjustment is made in proportion to the amount of deviation from the average traffic volume on the Federal-aid system. These corrections are applied without bias from a set of graphs made for the purpose.

Special considerations

It is apparent that certain sections, although adequate in general, may be so extremely deficient in either *safety* or *condition* that special consideration is required. In order to identify these particular sections, special lists covering critical structural conditions and dangerous sections with low safety ratings are tabulated.

A separate bridge list is included; however, it does not show all bridges in the state but only those with overall ratings lower than the adjacent sections of the roadway. This is done since a low rating bridge will be included in any program to raise the standards of low rating approaches or adjacent sections of low rating roadways.

Examining relationships

After all sections of the various highways were rated in the initial study, a graph was made showing the relationship between the number of miles in each rating group and the total miles in the system. From an examination of this chart, it was determined that the slope of the curve became constant at 60 points, designating this as the critical rating position. That is, any section with a rating of 60 points or below was carefully analyzed for improvement while those above 60 could wait until the following year for further consideration.

The entire rating and priority method serves as an effective means of programming funds for improvement of existing roads. It shows all sections on an impartial list, based on a uniform method of comparing each section with a known standard. This method does not give any information about the necessity for construction of new routes where none now exists. There is a method of doing this, however, based on an economic study of the need for a new route, including cost of construction, maintenance and depreciation. Depreciation is balanced against the benefits derived by the motorist in time saved, distances shortened, and, particularly to commercial vehicles, lessened cost of operation.

Chart shows progress

A chart giving the number of miles at or below any rating was prepared for comparison purposes. There were 2,456 mi. on the Federal-aid system on Jan. 1, 1949, and 264 mi. with a rating of 50 points or below, and 564 mi. with a rating of 60 points or below. To show the bene-

ficial improvement to the highway system during the past year, the following table compares the ratings for 1949 against those derived in 1947 and 1948:

As of Jan. 1	Mileage at or below		
	50 points	60 points	
1947	282	650	
1948	264	564	
1949	195	601	

The average traffic adjusted rating for the entire Federal-aid system as of Jan. 1, 1949, was 74.0 points. The average for 1947 and 1948 for comparison purposes was computed as follows:

	1947	1948	1949
Adjusted to traffic	69.5	73.7	74.0
Change		+4.2	+0.3

This table shows that the present policy of planning and programming the state's network of highways is a sound one and that improvements are being made at a rate faster than the roads are wearing out. Highway administrators, either state, county, or city, can thus determine if the highway or street system is being improved—and how fast—or if it is lying dormant from year to year or perhaps even sliding backward.

Results tabulated mechanically

There were 560 sections investigated and rated on the primary system, and 217 on the secondary system. The information for each section was punched on IBM cards, which were sorted and tabulated mechanically in order of ascending adjusted sufficiency rating, without regard to route numbers, geographical location within the state, or political influence. By this procedure the state engineer and highway commissioners were provided with a check list of all highway sections arranged in order of sufficiency. Their problem then was to investigate each one on the list with a low rating and to decide how many sections could be built.

Some sections were included in the construction program that had a relatively high point value. These, however, were part of a definite plan, since where there is a gravel section lying between two paved sections, it is the policy to improve the entire state system up to a surfaced standard at the earliest possible date by paving gaps in the existing system. It is also the policy of the state to provide access roads to recreation areas and national parks and monuments so as to open these facilities to the convenient use of the citizens of Arizona and the general public. As a matter of good business as well as sound engineering, any section of roadway that has a high maintenance cost will be rebuilt even if the overall rating is relatively high.

Application to counties

To make the use of the rating information more convenient, a state map was drawn with a width of black showing the sufficiency of each section, together with a band of red showing the deficiency of each section. After this method was used to rate the state primary and secondary highway systems, identical thinking was applied to the

county FAS roads. The only change made was in the grouping of traffic volumes more nearly to fit the lower figures usually found on county roads. The standards were the same in both cases, and traffic volume is the only single element that changes the roadway width, sight distance, design, and speed. Traffic groupings called for the following roadway widths on two-lane rural highways:

Traffic (Vehicles per day)	Roadway	Surface
Under 100	20 ft.	20 ft.
100 to 400	26 ft.	22 ft.
400 to 1,000	34 ft.	24 ft.
1,000 to 3,000	40 ft.	24 ft.

Since traffic route averages varied widely among the fourteen counties, six traffic adjustment charts were drawn, covering 75 to 1,110 vehicles per day. From this experience, a further consolidation of charts will be possible in the analysis for 1950.

To use the report to best advantage, and as a check list of the most urgent road construction needs, the counties need only pick out the sections with low numerical ratings and set them aside for a more detailed discussion. This discussion will involve the maintenance cost of the section in its present poor condition compared to the cost of new construction and the county's ability to pay. The matter of administrative policy will enter the picture, since some counties emphasize farm-to-market routes; others stress city-to-recreation areas, whereas still others seem to concentrate on bridge structures. In any event, the numerical sufficiency tabulation serves as an effective check list to assure that critical sections are not completely overlooked.

System not infallible

The system, like many another good idea, is not completely infallible. Low traffic volume roads might be bad, have a very low overall rating, and appear at the top of the list compared to all other sections within a county. It would be known, however, from personal knowledge of the situation, that other sections with a higher traffic volume were in more urgent need of attention and necessary adjustments could be made. This situation is unusual, since about 95% of all roadway sections would appear in the proper place on the list.

In the Arizona report, no attempt was made to compare one county's roads against those of another. This stand was taken because each county FAS road system is an administrative and financial unit within itself, with little or no connection with other counties. Within a single county, however, the average route point ratings provide an effective means of comparing various routes as to sufficiency and needed improvements.

The Federal-Aid Act of 1944 and revisions in 1948 established what type of Federal-Aid funds would be available to the states. First, there was the primary money for the primary highway system of each state. In general, this type of assistance is known as Federal-Aid. The second grant, for the Federal-Aid Sec-

Concluded on page 99

Special Air-Tamper Developed for Difficult Earthfill Compaction Job

TO SOLVE a difficult compaction problem involving the earthfill placed near the control tower of the Baldwin Hills reservoir, M. F. Kemper Construction Co. developed an air-tamper which was handled by crane and consolidated from 90 to 120 cu. yd. of fill material per shift. The Baldwin Hills reservoir is being built by the Los Angeles Water Department, and includes an unusual

waterproof lining which was reviewed in detail in *Western Construction News* (Feb. 15, 1950—page 61).

About 2,000 cu. yd. of the earthfill had to be placed and compacted so near the concrete control tower that tamping rollers could not be used. At the start of this work, the material was brought in by trucks or scrapers, spread in 6-in. loose layers and compacted by an 8-man crew using 90-lb. paving breakers, with 6-in. square plates. The compacting of these layers to required 4-in. depth was too slow and expensive by this method.

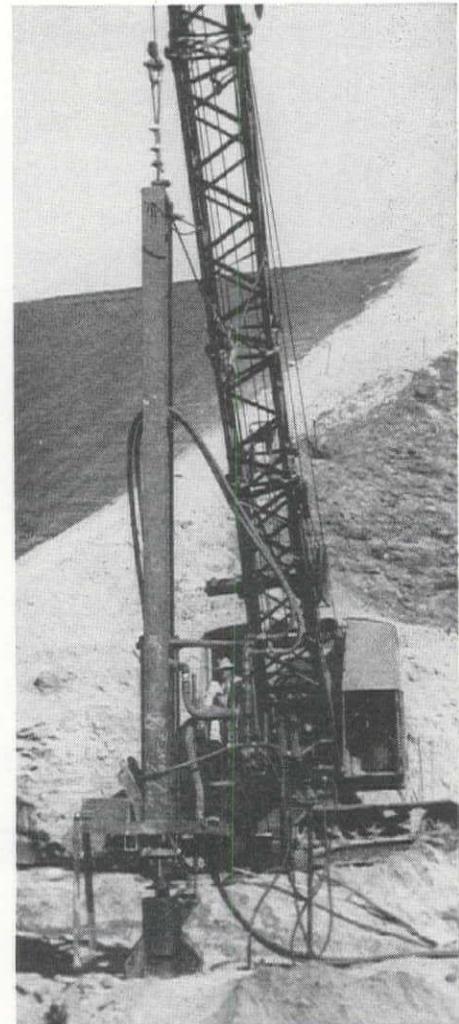
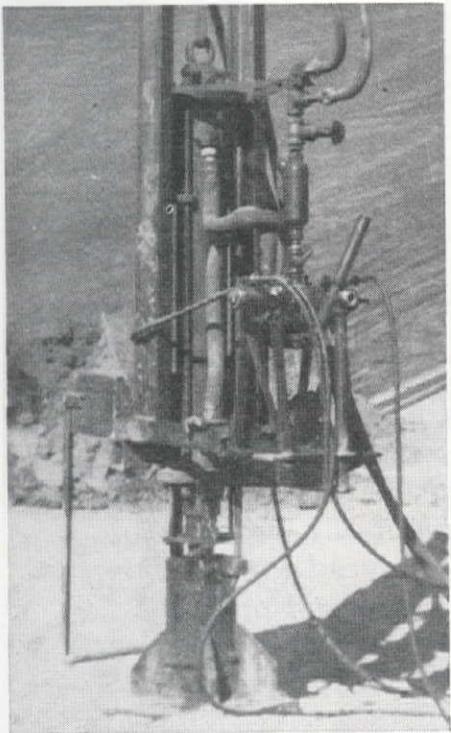
Based on ideas provided by the Kemper organization, the Emsco Concrete Cutting Corp. of Los Angeles designed and built the double-acting valve chest and cylinder assembly shown in the accompanying photograph. The contractor developed the procedure for using this unusual piece of equipment in the field.

The machine weighs about 3,000 lb. and is handled by a $\frac{3}{4}$ -yd. crane, as shown. Supplied by air from a 210-cfm. compressor, the unit delivered 25 to 30 blows per minute on a 14 x 20-in. steel-plate head. Control valves are located in the air line at some distance from the machine to place the operator in a safe position.

The unit is able to compact an 18-in. lift containing 90 to 120 cu. yd. of loose earth to a 9-in. compacted depth in a single pass. The compaction obtained by this method is reported to be equal, or better than the density obtained on any area of the reservoir lining.

Bruce Kemper was superintendent for the M. F. Kemper Construction Co. on this project.

A CLOSE-UP of the tamping assembly.



THE AIR-TAMPER, weighing about 3,000 lb., was handled by a $\frac{3}{4}$ -yd. crane, above. Completed portion of the multi-layer asphaltic lining of the Baldwin Hills Reservoir is visible at left. Control tower, so located to make tamping of earthfill in the vicinity a difficult job, is out of picture at right.

Program of Maintenance Dredging Rehabilitates Morro Bay Navy Base

THE NAVY amphibious training base constructed during the war at Morro Bay on the Pacific Coast about 135 mi. north of Santa Barbara, Calif., is undergoing a program of maintenance dredging and rehabilitation to make it useful for civilian and pleasure craft purposes. The project is being carried out by the Corps of Engineers, Los Angeles District.

The bay, which has always been a scenic point in California, was until 1942 little more than a large and shallow lagoon connected to the sea by a narrow channel passing by the side of an extremely prominent and lone rock, called Morro Rock. The Navy program, instituted in 1942, called for construction of two rock protected jetties, each 2,000 ft. long; development of the entrance channel to a width of 350 ft., a length of

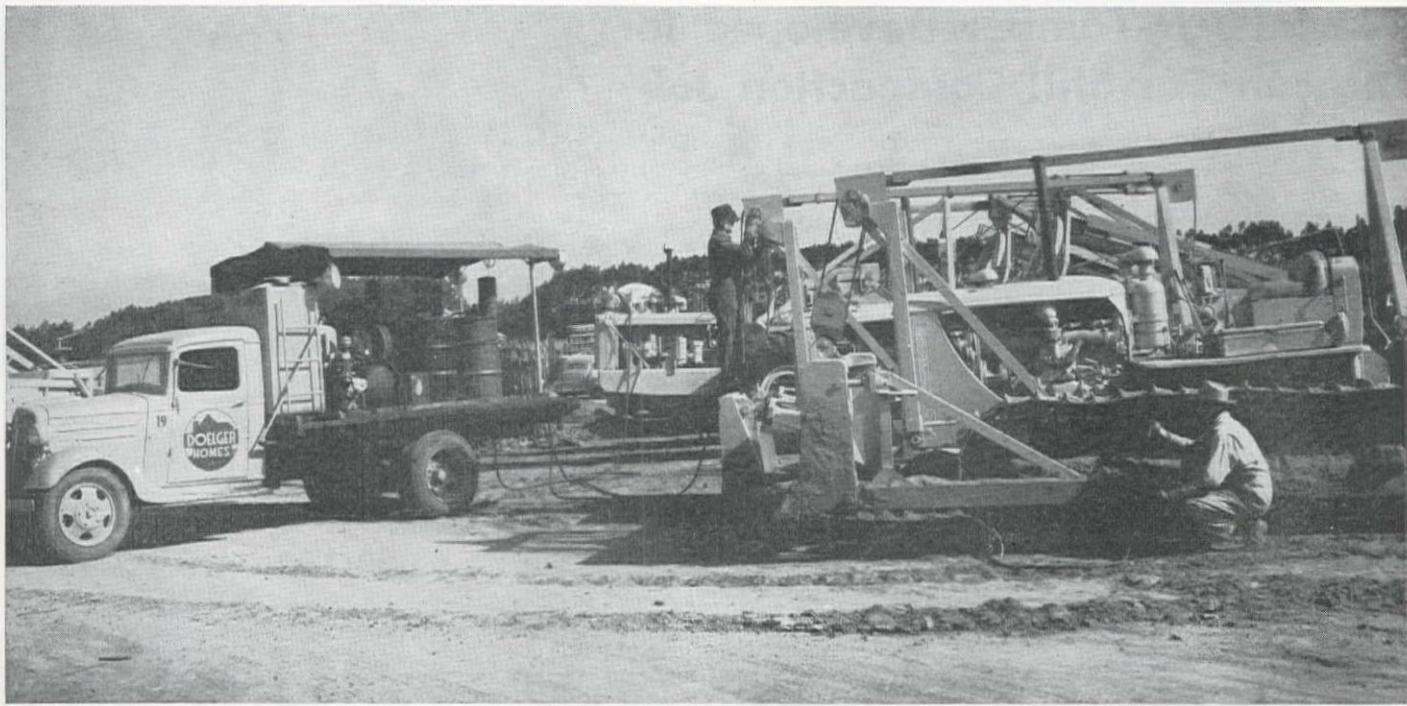
2,500 ft., and a depth of 18 ft. below mean low tide; a "Navy channel," 3,500 ft.

long, 18 ft. deep, and varying in width from 400 to 700 ft.; and the "Morro Channel," running south along the natural shoreline from the Navy channel for a distance of 6,500 ft. long, being 150 ft. wide and 12 ft. deep, designed espe-

Concluded on page 94



VIEW of the dredge at work, right. The dredged channel will extend for 2½ mi. Some dredged material is visible at lower right.



A Four-Point Program to Simplify the Contractor's Problem of— Maintenance of Track-Type Tractors

THREE IS nothing complicated or mysterious involved in setting up a program whereby the contractor may insure the proper maintenance of track-type tractors. The problem may appear enormous when the many "must" jobs of lubrication, adjustment and cleaning are considered. But after the overall problem is carefully analyzed, and a suitable maintenance program put into practice—with all phases of the program carried out faithfully, on schedule—a seemingly complex task becomes comparatively simple and the contractor's machinery may generally be found on the job, rather than in the shop.

The problem of track-type tractor maintenance may be divided into four steps—(1) Organization, (2) Know-how, (3) Proper Equipment, (4) Records.

Small things lead to failures

Before discussing each of these divisions, and what they involve, it might be well to stress that in the case of track-type tractor maintenance, as with so many other things, it is the small things that often lead to mechanical failures caused by faulty maintenance—the small adjustment that wasn't made when needed because the matter was forgotten or delayed in the desire to maintain production...the lubricant fitting that was consistently missed when the machine was oiled...the air cleaner that was not serviced frequently enough to keep abrasive dust from swirling into the engine. Manufacturers of heavy machinery strive constantly to simplify maintenance of their products, for the simpler the machine is to lubricate and keep in adjustment, the less chance there

Keeping your tractors "on the job" becomes a comparatively simple task if the problem of maintenance is carefully analyzed with consideration given to four important points



By

H. D. WELCH
Western Division
Service Manager
Caterpillar
Tractor Co.
San Leandro, Calif.

is for human error. Ingenious seals and filters to keep abrasives out of the engine and other working parts are constantly being improved, both to give greater efficiency and to enable them to operate for longer periods without servicing or adding lubricant. Adjustments for normal wear are being eliminated where possible by using self-adjusting seals and packings, and using materials that run longer with less wear. Despite the many improved constructions that have been adopted, good maintenance of modern heavy machines still requires conscientious attention to recommended lubricants, to intervals, and to any and all points to be serviced.

In addition, there are breathers to inspect and service, compartments to drain, oil levels to check, and miscellaneous jobs such as clearing the radiator of accumulated trash. If the tractor

is equipped with special guards and allied equipment, maintenance of these items must be added to the list. Three different types of lubricant are used, of varying weights to meet climatic conditions. Careful study has indicated that ten-hour intervals are most convenient for normal servicing of heavy track-type tractors. This period covers most one and two shift operations, and is easily worked into a 24-hr. schedule. Hence, lubricant periods of 10, 20, 60, 120, and 240 hr. allow easy maintenance planning. Most gear compartments are drained and refilled at 900 hr., or about every two months on a 20-hr. day, 5-day week schedule, and less frequently with shorter hours. Under severe dust conditions, or when the tractors are operating in deep mud and water, normal service periods must be modified to fit.

However, the four-point maintenance program introduced above can be worked out to fit the individual operation, and it will simplify the problem—provided, of course, that every step is performed faithfully and properly.

Point No. 1—Organization

Organization means, in particular, fixing responsibility for getting the job done. Some maintenance chores are regularly handled by the machine operator. A regular maintenance crew may be provided for the periodic greasing and

changing of oil. A field mechanic may be charged with making running adjustments and inspections. Who does what? Who checks the oil? Who adjusts the flywheel clutch? Who orders supplies? The responsibility for each and every maintenance job should be assigned specifically. Every individual who has anything at all to do with the tractor should have not only oral instructions, but also *written* instructions covering his share of the job. Of course these instructions must be clear and well defined, with no man's job overlapping the others. Unless this is done the owner will probably continue to get good alibis instead of good maintenance.

Point No. 2—Know-how

Maintaining an intricate, precision-built machine like the modern track-type tractor requires a dependable maintenance man who is careful to lubricate all points involved, who has studied his job, and is careful to keep abrasive matter from entering the machine since he realizes the damage to be incurred as a result of carelessness. The other side of the picture will show excessive downtime and expensive parts replacement incidental to irresponsible, haphazard maintenance. For instance, a volume compressor is capable of exerting a pressure of 3,500 p.s.i.—several times as much pressure as some types of seals will take without rupturing. An excess of grease will sometimes cause as much damage as too little lubricant, not to mention the unnecessary waste. In the wrong hands, this tool can wreak havoc.

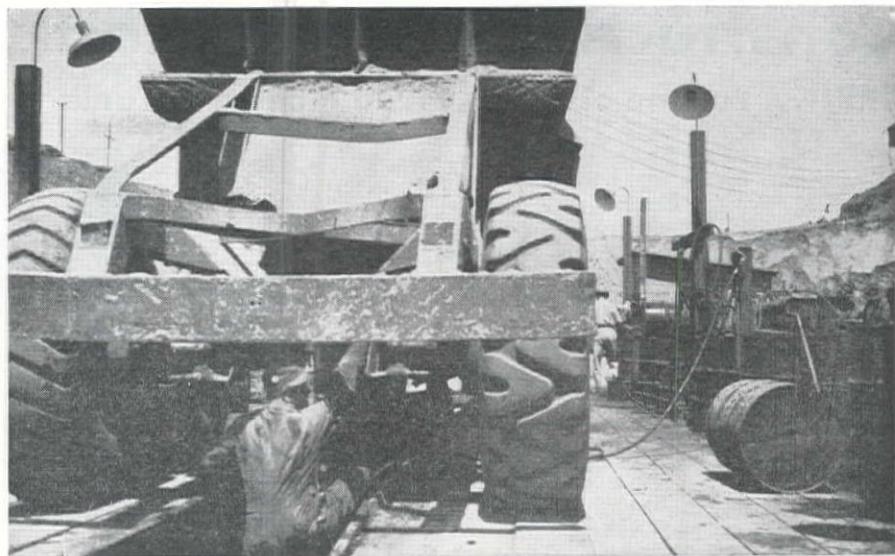
Assuming that the man performing the maintenance is intelligent and conscientious, he should be encouraged continually to learn not only the *how* of maintenance, but also the *why*. The more he knows about the exact function that occurs behind each grease fitting and inside each oil compartment, the greater the chance that he will avoid trouble.

Much of what he needs to know, especially the *how* of proper maintenance, can be obtained from the instruction book furnished by the manufacturer. This book he should know practically by heart. In order that he be able to learn the *why* he should have access to the manufacturer's literature showing the internal design and arrangement. He should be encouraged to attend any meetings held for the mechanics, or any other gatherings which might serve to give him greater interest in and knowledge of his job.

It is especially important that the maintenance man be present when new machines are delivered on the job, as frequently manufacturers make changes in design that require new or different maintenance technique. The dealer's man who makes the delivery will be glad to point out or describe the changes. Machine maintenance is no longer just an odd job that can be entrusted to the "strong back and weak mind" type employee. It has cost some owners a lot of money to find this out.

Point No. 3—Proper Equipment

Machine manufacturers commonly furnish minimum requirements for main-



THE FOUR-POINT program will also guarantee adequate maintenance of heavy rolling equipment. Above, a lubrication rack along the route of haul for servicing trucks.

taining the machine as standard equipment. This practice provides such items as hand grease guns, volume compressors, oil cans, and an assortment of wrenches, and most of this equipment is intended to be kept with the machine in the tool box provided. Where tractors must operate singly or in areas remote from organized maintenance facilities it is important that this equipment be kept complete and in good operating condition, with the proper type and weight of lubricant in each applicator. If the operator is expected to make minor running adjustments, tighten loose cap screws, and do the "between shift" lubricating, he is not greatly encouraged to do a good job unless the necessary equipment is complete and in good working order.

A good job of maintenance can be carried on with only the tool box equipment furnished with the machine, but general practice today with most fleet operators is to provide centralized maintenance facilities, either mobilized to perform maintenance in the field, or stationary at some point convenient to all machines to be serviced. In either case the important thing is that the equipment be correct for the job and kept in good condition. Faulty or incomplete maintenance equipment adds to the possibility of faulty maintenance.

Point 4—Records

Assuming now that we have entrusted maintenance to a qualified and well-informed man who has been given specific instructions as to the exact boundaries of his duties and responsibilities—and he has been equipped with the proper tools and supplies for the job—we have one more step to take to assure a complete, first class job of maintenance. This is to set up a system of record keeping, to eliminate guesswork about what was done, when, and who did it.

The chief advantages of keeping maintenance records are two in number. First, they eliminate the fallibility of human memory. If the manufacturer recommends that a certain bearing be lubricated every 20 hr., there was a good reason for establishing this period and

for best results the bearing should receive attention as recommended—not after 30, 40, or more hours. Unless there is some record readily available giving the time for the next servicing, the life of this bearing begins to depend upon guesswork.

Fixing responsibility

Secondly, records fix responsibility. If a man is required to leave a written record of what he has or hasn't done, he is much more likely to do his job conscientiously, for there can be no escaping retribution if the record indicates that he failed in his responsibility. Also, where several men must share the responsibility, as where tractors are working two or three shifts, the written record avoids conflict between shift crews as to which shift was supposed to do the job.

The records should be simple. Much help in making up the necessary forms can be gained from the manufacturer's instruction book for maintaining the machine. This book contains a lubrication chart and from this chart and other maintenance information a division can be made of the various tasks, as to whether they will be done by the machine operator, the maintenance crew, or the job mechanic. Give each man his own record sheet, which lists each operation he is required to perform, and give the proper interval. Provide space for him to record the hour meter hours, if the machine is equipped with an hour meter, or the date when he did the job.

The boiled down recipe

The recipe for simplifying maintenance, boiled down to its essentials, is accordingly a matter of *who*, *why*, *what with*, and *when*. *Who* has the definite and unescapable responsibility? *Why* does he do each job in a certain manner, using certain equipment and supplies? *What* has he been provided with in the way of tools and supplies? *When* does he do it? Get these four points worked out to fit your operation, and mechanical failures due to faulty maintenance will become a rarity, and your repair costs and downtime will hit new record lows.

Construction Design Chart

CXVII... Volume of Partly Filled Pipes and Tanks

NO DOUBT many readers have, at some time or another, had the job of computing the calibrations for a tank measuring stick. When a specific tank is involved, this is not a complicated problem unless the tank has dished ends. There are also innumerable times when it is necessary to obtain an approximation of the quantity of fluid in a partially filled tank or pipe. The accompanying chart has been designed to cover a large range of variations rather than to give a high degree of precision for a specific tank.

The chart requires for a solution, two lines intersecting on the "SUPPORT." One solution line should be drawn between the (A) scales, and one between values on the (B) scales. I have drawn solution lines on the chart for the following assumed conditions:

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



Tank diameter, $D = 5$ ft.

Length = 10 ft.

Depth of fluid, $d = 25$ in.

$$\text{Then, } \frac{d}{D} = \frac{25}{60} = 0.417$$

The first solution line has been drawn between the values $D = 5$ ft., and $\frac{d}{D} = 0.417$, on the (A) scales. The second solution line was then drawn through the intersection on the "SUPPORT," from a length = 10 ft. On the volume scale, the following values will be noted:

$$\begin{aligned} \text{Volume} &= 78 \text{ cu. ft.} \\ &= 582 \text{ gal.} \end{aligned}$$

Referring to the table on page 192 of Handbook of Water Control,¹ for the nearest value of $\frac{d}{D} = 0.42$, a value will be

$$\text{noted of } \frac{\text{area}}{D^2} = 0.313$$

We would then have

$$\begin{aligned} \text{Area} &= 0.313 \times 5^2 = 7.82 \text{ sq. ft.} \\ \text{Volume} &= 7.82 \times 10 = 78.2 \text{ cu. ft.} \\ &= 78.2 \times 7.48 = 585 \text{ gal.} \end{aligned}$$

When the solution comes outside the range of the volume scale, an easily divisible portion of the length may conveniently be used. Thus, as an example, let us assume a tank having a diameter of 10 ft., 6 in. is to be used to store 25,000 gal. of oil. It is desired to approximate the length of tank required. A solution line would first be drawn on the chart for a diameter of 10 ft., 6 in., and a value of $\frac{d}{D} = 1.0$ since it will be filled to capacity.

Since 25,000 gal. is off the range of the volume scale, we could then use a value of

$$\frac{25,000}{20} = 1,250 \text{ gal.}$$

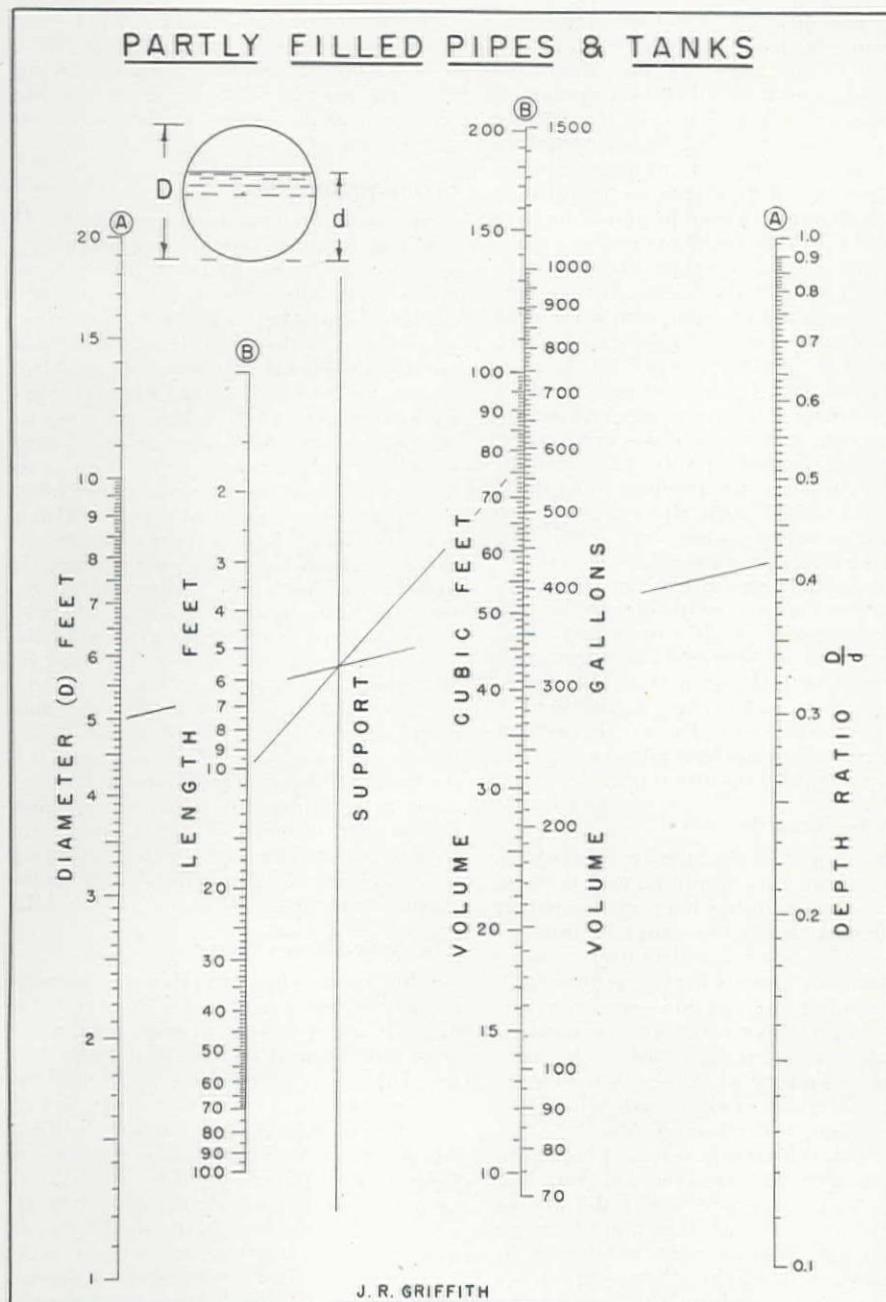
or one-twentieth the volume given. The use of this value will indicate a length of about 1.9 ft. Thus, for a capacity of 25,000 gal., the length obtained from the chart would be multiplied by the factor 20.

Required length = $20 \times 1.9 = 38$ ft.

As a check on this value, a tank with a 10 ft., 6 in. diameter has a sectional area of 86.59 sq. ft. Such a tank, for a capacity of 25,000 gal., would require

$$\text{Length} = \frac{25,000}{86.59 \times 7.48} = 38.60 \text{ ft.}$$

¹Armco Drainage & Metal Products, Inc.



NEW STATE MAPS of electric facilities for Arizona, Colorado and Wyoming have been published by the Federal Power Commission. The maps show the location, capacity and ownership of the important generating stations, both hydroelectric and fuel-electric, as well as the location, ownership, nominal voltage, length, conductor size and material, and capacity of high voltage lines of 22,000 volts or more. The maps show both existing facilities and those under construction. Copies may be purchased from the Publications Section, Federal Power Commission, Washington 25, D. C., for \$1.00 each.

Portrait of a Reclamation Leader

William Wallace, the "Mr. Reclamation" of Utah, has devoted 40 active years of service in behalf of water development and conservation in the West, with some notable achievements

WILLIAM R. Wallace, known in reclamation circles throughout the West as Utah's "Uncle Billy" is distinguished for several reasons. Among them are his forty years of devoted service in behalf of water development and conservation in the arid West, and his unceasing curiosity about new ideas and things even at age 84.

He is one of those rare individuals who, having acquired financial independence at a comparatively early age, was able to retire from active business and divert his efforts and enthusiasm to a public service avocation—reclamation. And he is still going strong. During his 40th year in active reclamation work he participated in numerous water conferences and reached a long-sought objective—the signing of a compact dividing waters of the Colorado River among the Upper Basin States and the formulation of an over-all storage program for the upper division of the basin.

Another goal he hopes to see achieved is an agreement among all seven states of the basin on a comprehensive plan of basin development from headwaters to the Pacific which will put every drop of that river system's water to beneficial use. And he wants that development to take place concurrently in all the states.

He definitely does not belong to the school that thinks reclamation is approaching a static maturity. He believes that the West will ultimately be as densely populated as any section of the United States and that there are sufficient water resources to maintain such a development. He is convinced that California's water needs will be met by diversion of Columbia Basin supplies.

"It is," he comments, "feasible from an engineering standpoint and it will be economically feasible. It will cost billions but it will be worth more billions."

Into reclamation, 1910

Wallace's career in reclamation started in 1910 when Governor William Spry of Utah called in six individuals whom he deemed to be public spirited citizens. Reclamation works in the state up to that time had been of a "pick and shovel" variety and Governor Spry charged the group with the responsibility of promoting the conservation and development of the state's mountain streams, more than half of which were going to waste. Out of this grew the Utah Conservation Co., which operated for ten years with small results. In 1920 the legislature created the Utah Water Storage Commission, a bi-partisan group of six Republicans and six Democrats. Wallace, because of his demonstrated willingness to devote time and effort to the work, was named chairman.

By O. N. MALMQUIST

Salt Lake City, Utah

He continued in that position throughout the 20-year life of the commission.

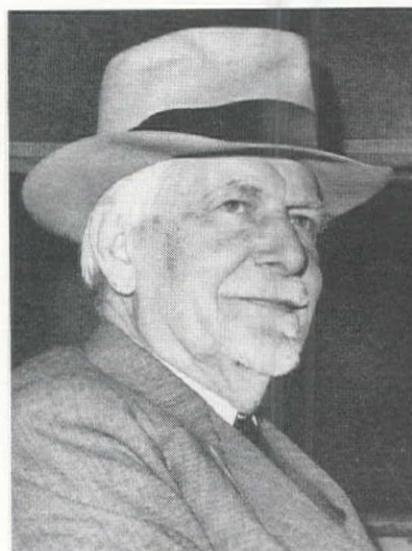
In 1941 the water storage commission was eliminated during a general reorganization of the state government but was succeeded six years later by the Utah Water and Power Board, of which Wallace is chairman. It was provided with operating funds and \$1,000,000 was appropriated as the start for a revolving construction fund. The particular function of the board is to take care of projects too small for Bureau of Reclamation attention on the same terms as the reclamation law provided. To date it has financed 25 small projects interest-free and with repayment periods ranging from 10 to 25 years.

This program is close to "Uncle Billy's" heart, but he realizes that it is under pressure and is hopeful that the next legislature can work out some changes in the law that will obviate the complaints of free enterprisers. As he puts it, the bankers feel the projects should pay a banker's interest; private engineers feel that the engineering should not be done by a governmental agency; and construction people feel that the work should be contracted.

Squaring with realities

Although he is a "capitalist," Wallace does not take the conventional "capitalistic" view of what constitutes economic feasibility in a reclamation project. He believes there is the same basic justification for liberalizing the reclamation law

WILLIAM R. WALLACE



now as there was in increasing the repayment period from 10 to 20 years and then to 40 years in past years. He insists that projects of the future cannot be built without liberalization and that it would be a national error to stop reclamation. Therefore the terms should be liberalized to square with the realities of the period.

Interest in Colorado River

Wallace has perhaps been more closely associated with the planning, negotiations and controversies involving the Colorado River than any other individual. He was a member of the "Committee of Fourteen" from the time it was created, and he followed closely the long negotiations leading up to the Colorado River Compact and passage of the Boulder Canyon Project Act. There have been few constructive agreements or disruptive controversies since in which he has not played some part. He was an advocate of the Mexican treaty, which placed him in conflict with some water interests in his own and surrounding states. But even his critics concede, willingly or reluctantly, that no one has given longer, more consistent or more disinterested (from the standpoint of financial gain) service to the cause of reclamation than Wallace. During the long years of his official connection with the work he has never held a salaried position and he has paid his own expenses.

An unceasing curiosity

The most striking characteristic of the man is his ability to maintain an unflagging interest in things for the pleasure of widening his knowledge at an age when most people are willing to live in the past. This urge was exemplified recently while he was in San Francisco visiting a son. He learned through a newspaper editor friend that a group of nuclear scientists were going to hold a seminar on atomic energy at Berkeley for newspaper writers. He promptly changed his schedule, got an invitation to attend and spent ten to twelve hours per day for the next three days absorbing information on that subject.

Several years ago a group of civic leaders of Utah presented Wallace with a bronze replica of a Ute Indian on a horse, symbolizing the first citizen of the state. He regards that as compensation for his years of service in his non-profit avocation.

MORE EFFICIENT and economical use of brick and tile in construction will be the first aim of the new million-and-a-quarter dollar research program of the Structural Clay Products Research Foundation, according to Robert B. Taylor, its Director. The Foundation has recently been formed by brick and tile manufacturers in the United States and Canada for the purpose of improving the quality and lowering the cost of structures built with clay products.

Western Association Officers—1950

American Society of Civil Engineers

Intermountain



SOUTH

George T. South, 1950 president of the Intermountain Section, ASCE, is Chief of Irrigation Operations Division of the Bureau of Reclamation, Region 4. Cleve H. Milligan is the new first vice-president; Robert E. Simpson is second vice-president. C. E. Painter carries over as secretary-treasurer.

Los Angeles

Robert R. Shoemaker, Chief Engineer of the Harbor Department, City of Long Beach, Calif., is the new president of the Los Angeles Section, ASCE. Vice-presidents are Paul Baumann and Linne C. Larson. Homer W. Jorgensen is the secretary and Ralph C. Durke is treasurer.

Arizona

John Girard is the newly elected president of the Arizona Section, ASCE, with headquarters in Phoenix. He succeeds J. A. Baumgartner. Vice-presidents are J. A. Rau and P. F. Glendening. Dario Travaini is the secretary-treasurer.



GIRARD

CUSHMAN

Oregon

Robert E. Cushman, recently retired as Sales and Production Engineer in the Creosoting Dept. of Pope & Talbot, Inc., Portland, is the new president of the Oregon Section, ASCE, with headquarters in Portland. Guy H. Taylor is first vice-president and Tom Smithson is second vice-president. Kenneth G. Tower is treasurer and H. Loren Thompson, secretary.

Tacoma

John S. Abel, of Tacoma, Wash., is the elected president of the Tacoma Section, ASCE. Other new officers are N. E. Olson, C. C. McDonald, and W. T. Robertson.

San Diego

J. F. Jorgensen has been elected president of the San Diego Section, ASCE. Vice-presidents are G. E. Arnold and E. A. Lawrence. R. H. Wilken is secretary, and R. K. Fogg is treasurer.

San Francisco

Glenn B. Woodruff, partner in the San Francisco firm of Woodruff and Sampson, is the newly elected president of the San

Francisco Section, ASCE. He succeeds Austin W. Earl, Clement T. Wiskocil and John S. Longwell are vice-presidents, and Robert D. Dewell is retained as secretary-treasurer.

Sacramento

R. M. Gillis, Assistant California State Highway Engineer, is the new president of the Sacramento Section, ASCE. John O. Miller is first vice-president, and J. S. Barish is second vice-president. The secretary-treasurer is M. A. Koontz.



GILLIS

WILEY

Wyoming

John E. Wiley, Public Relations and Safety Engineer, Wyoming State Highway Dept., is president of the Wyoming Section, ASCE. James P. Steele is vice-president. The secretary-treasurer is N. D. Morgan, Jr.

New Mexico

Rufus N. Carter, of Albuquerque, is the newly elected president of the New Mexico Section, ASCE. Don Johnstone is first vice-president and G. C. Lassiter is second vice-president. Eugene Zwoyer is secretary-treasurer.

Spokane



JANSSEN

Allen S. Janssen, Dean of the College of Engineering, University of Idaho at Moscow, has been elected president of the Spokane Section, ASCE. He succeeds L. Vaughn Downs. First vice-president is William A. Hill and second vice-president is Emmett B. Moore. J. Byron Barber is the secretary-treasurer.

Oklahoma

Walter C. Burnham is the newly elected president of the Oklahoma Section, ASCE. David B. Benham is vice-president and J. E. Lother is secretary-treasurer.

Columbia Sub-Section

B. Loyal Smith, Walla Walla County Engineer, Walla Walla, Wash., is president of the Columbia Sub-Section, ASCE.

Montana

Henry H. Helland, Chief Engineer for Canyon Constructors, Canyon Ferry Dam,

Montana, is the new president of the Montana Section, ASCE. E. K. Dalakow and E. R. Dodge are vice-presidents, and J. A. Maierle is secretary-treasurer.

Seattle



TEUFEL

Colorado



MARSHALL

George I. Teufel of Teufel Construction Co. is president, Seattle Section of the ASCE. Samuel De Moss is vice-president; James H. Reid is treasurer and Robert O. Sylvester is secretary.

Associated General Contractors

Arizona Chapter

D. W. Kelley, president of the Arizona Sand and Rock Co., Phoenix, is president of the Arizona Chapter, A.G.C. He succeeds W. E. Orr, Jr. L. G. Vinson is vice-president and R. M. Makemson is treasurer. Joseph P. Condrey was reappointed executive secretary.

Intermountain Branch

Perce Young, Salt Lake City contractor, is the new president of the Intermountain Branch, A.G.C., succeeding Carl Nelson. George Putnam is vice-president and G. M. Paulson is secretary-treasurer. Allan E. Mecham is retained as manager-counsel.

Idaho Chapter

Duffy Reed, Twin Falls contractor, was elected president of the Idaho Chapter, A.G.C. Other newly elected officers include C. B. Lauch, vice-president, and L. D. Robbins, treasurer.

Mountain Pacific Chapter

C. V. Wilder, president of the C. V. Wilder Co., Bellingham, is president of the Mountain Pacific Chapter, A.G.C., with headquarters in Seattle. Tom Youell is vice-president and Don Cooney treasurer.

Montana Building Chapter

William R. Lowe, of the Riedesel Construction Co., Billings, is president of the Montana Building Chapter, A.G.C. The vice-president is E. J. Decker, of the Mc-

Kinnon-Decker Co., Helena. **Frank Messmer**, of the Haggerty-Messmer Co., Bozeman, is the treasurer. **J. Edward Hergert** is secretary-manager.

Montana Contractors' Association, Inc.

George Nilson of the Nilson-Smith Construction Co., Great Falls, is president of the Montana Contractors' Association, Inc., a chapter of A.G.C. **Edward O'Neil** is vice-president, and **Bert Lalonde** is treasurer. The secretary-manager is **J. Edward Hergert**.

Seattle Chapter



MORTENSEN

Cliff Mortensen, partner in the Nelse Mortensen Construction Co. of Seattle, was elected president of the Seattle Chapter, A.G.C. **Walter W. Harfst** is first vice-president and **Elmer Edwards** is second vice-president. Other newly installed officers are **Ingalls Hall**, secretary, and **W. D. Brown**, treasurer. **E. B. Hickok** continues as the chapter's manager.

Spokane Chapter

Nels A. Degerstrom, general manager of the N. A. Degerstrom Construction Co., was re-elected for the third term as president of the Spokane Chapter, A.G.C. **John M. Clifton** and **George Seebeck** are vice-presidents, and **Verne Warren** is secretary.

Eastern Washington Builders' Chapter

Henry George, contractor of Spokane, is the president of the Eastern Washington Builders' Chapter, A.G.C. He succeeds **Robert W. Meighan**. Other new officers include **Verne Johnson**, **J. L. Hazen**, **Walter Varnum**, and **Arthur Bengal**.

Amarillo Chapter

Russell A. Ramey, of the Ramey-Mathis Construction Co., is president of The Associated General Contractors of Amarillo, Texas. He succeeds **Walter Wirtz**. Other new officers include **Forrest Hill**, vice-president and **Maynard Hamilton**, secretary-treasurer.

Austin Chapter

Leslie F. Crockett, of the Leslie F. Crockett Construction Co., is president of the Austin, Texas, Chapter of the A.G.C. He succeeds **Rex Kitchens**. **John Broad** is vice-president and **J. M. Odom** is secretary-treasurer.

Colorado Building Chapter

James R. Howell, Denver contractor, is the newly elected president of the Colorado Building Chapter, A.G.C. He succeeds **George G. Folsom**, Jr. **Gerald H. Phipps** is vice-president, **David A. Olson** is secretary, and **N. R. Petry** is treasurer. The executive secretary is **Don S. MacDougall**.

Jefferson County, Texas

G. Sargl, Beaumont contractor, is the new president of The Associated General Contractors of Jefferson County, Texas. **A. L. Hays** is vice-president, and **Jack King** is treasurer. **A. E. Wenham** is secretary.

New Mexico Builders

J. R. Brennand, of the R. E. McKee Construction Co., Santa Fe, is president of The

Associated Building Contractors of New Mexico. **R. B. Clough** is vice-president, and **S. E. Whittemore** is secretary-treasurer.

Mid-Continent Chapter

Ray L. Smith, El Dorado, Kansas, contractor, is president of the Mid-Continent Pipe Line Chapter, A.G.C., with headquarters in Dallas, Texas. Vice-presidents are **L. H. Favrot** and **E. G. Morrison**. **N. A. Saigh** is treasurer and **Richard A. Gump** is executive secretary.

South Dakota Constructors

H. F. Emme, of Rapid City, is the new president of the Highway Construction Industry of South Dakota, A.G.C. **P. A. Bradbury** is vice-president, and **J. L. Materi** is secretary-treasurer. Executive secretary is **W. S. Hannan**.

Dallas Chapter

H. H. Meers, of the Meers Construction Co., is the new president of the Dallas Chapter, A.G.C. Other officers include **Thomas J. Hayman**, vice-president, and **W. R. Benson**, secretary-treasurer.

Kansas Chapter

Charles R. Bennett, of the Bennett Construction Co., Topeka, is the newly elected president of the Kansas Chapter Builders Division, A.G.C. **Martin Dondlinger** is vice-president and **W. H. Douglas** is treasurer.

Colorado Contractors Association, Inc.

Morris E. Adelstein, of the Northwestern Engineering Co., Denver, is president of the Colorado Contractors Association, Inc., with headquarters in Denver. **Dan G. Bell** is first vice-president and **Walter Steinwald** second vice-president. **C. M. Hanes** is secretary-treasurer.

ADELSTEIN

San Diego Chapter

B. O. Larsen, San Diego contractor, is the new president of the San Diego Chapter, A.G.C., and **Walter H. Barber** is vice-president. The chapter manager is **M. A. Mathias**.

Northern California Chapter

George C. Loorz is the new president of the Northern California Chapter, A.G.C. **Harold O. Parish** is vice-president and **Gordon H. Ball** is treasurer. The chapter's manager is **Winfield H. Arata**.

Other Groups



Nevada Chapter

Earl E. Games, Reno contractor, is the newly elected president of the Nevada

Chapter, A.G.C. He succeeds **A. D. Drumm, Jr.** **Walker J. Boudwin** is first vice-president and **F. R. Smith** is second vice-president. **C. V. Isbell** is treasurer. The secretary-manager is **Edward L. Pine**.

Tacoma



WARTER

George Warter of Warter Construction Co. is the 1950 president of the Tacoma Chapter, A.G.C. **Lige Dickson** is vice-president and **P. F. Stevens** is secretary-treasurer.

Southern California Chapter

Donald E. Reed, of the Stanton Reed Co., Los Angeles, is the newly elected president of the Southern California Chapter, A.G.C. Other officers for the year include **R. V. Edwards**, **B. M. Laulhere, Jr.**, and **Claude A. Fisher**, vice-presidents. **Spencer Webb** was elected treasurer. **W. D. (Don) Shaw** is manager.



REED

JACOBSEN

Portland Chapter

Karl F. Jacobsen, of Jacobsen & Brittan, Inc., is president of the Portland Chapter, A.G.C. He succeeds **Ray H. Northcutt**, of the Guy F. Atkinson Co. **Henry A. Kuckenberg** is vice-president, and **Herb G. Palmberg** is second vice-president. **Frank Lyons** is secretary-treasurer, and **A. H. "Bill" Harding** is manager.

Other Groups

Structural Engineers of California

Harry W. Bolin, Principal Structural Engineer, California Division of Architecture, Los Angeles, is the newly elected president of the Structural Engineers Association of California. **Ernest D. Francis** is vice-president and **George E. Brandow** is secretary-treasurer.

Structural Engineers of So. California

Ernest Hillman, partner in the firm of Hillman and Nowell, Los Angeles, is the newly elected president of the Structural Engineers Association of Southern California.

fornia. Donald F. Shugart is vice-president, and R. J. Short is secretary-treasurer.

Structural Engineers of No. California



ANDERSON

Arthur W. Anderson, partner in the firm of Corlett & Anderson, architects and engineers of Oakland, Calif., is the new president of the Structural Engineers Association of Northern California. He is one of the few men in California licensed as Structural Engineer, Civil Engineer, and Architect. John E. Rinne is vice-president, and William W. Brewer is secretary. Franklin P. Ulrich is treasurer.

Consulting Engineers of California

Harold B. Hammill, San Francisco civil engineer, is the newly elected president of the Consulting Engineers Association of California. He succeeds Mark Falk.

Structural Engineers of Central California

William H. Petersen, of the California State Division of Architecture, is the new president of the Structural Engineers Association of Central California. W. S. Wasmann is vice-president, and O. T. Illerich is secretary-treasurer.



PETERSEN



CORENBAUM

Professional Engineers of Oregon

J. A. Corenbaum is the new president of the Professional Engineers of Oregon, with headquarters in Portland. H. S. Johnson is vice-president and R. C. Shoemaker is treasurer. L. E. Chaffin is secretary.

Wyoming Contractors

J. P. Steele, president of the J. P. Steele Construction Co., Laramie, Wyo., is president of the newly-organized Wyoming State Contractors' Association. K. C. Bellows is vice-president.

Spokane Construction Council

Eric Plath, Spokane contractor, is the newly elected president of the Spokane Construction Council. He succeeds Verne Johnson. R. B. Moran is vice-president and Sheldon Kaiser is treasurer.

Seattle Construction Council

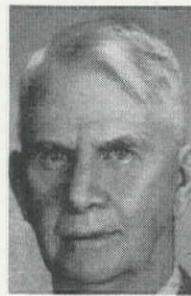
Ralph Lane is the newly elected president of the Seattle Construction Council. Vice-presidents are Vance Tjossem and Oscar Sundberg. Edward B. Scriven is secretary and R. M. Black is treasurer.

Arizona Building Contractors

Louis Karpe is president of the Arizona Building Contractors, with headquarters in

Phoenix. Alfred Manning is general manager. Vice-presidents are Dan Mardian and I. G. Holmes. S. W. Schammel is treasurer and John Murphy is executive secretary.

New Mexico Engineers



BAIL

E. B. Bail is president of the New Mexico Society of Professional Engineers with headquarters in Albuquerque. First vice-president is Wally K. Wagner, and second vice-president is Don H. Wilson. Thomas T. Castonguay is secretary-treasurer.

Rogue Valley, Oregon Engineers

John F. Porter, City Manager of Grants Pass, Ore., is president of the Rogue Valley Section, Professional Engineers of Oregon. The organization was formerly the Professional Engineers' Club of Southern Oregon. Vernon Thorpe is vice-president, and Warren H. Baker is secretary-treasurer.

Seattle Engineers Club

Beverly A. Travis is the newly elected president of the Seattle Engineers Club. E. J. Allen is vice-president, Evans K. Blackford is secretary, and W. G. Carr is treasurer.

Modesto Engineers Club

Keith Tabbert is president of the Modesto, Calif., Engineers' Club. Other officers are Larry Adams, vice-president, and E. B. Gregg, secretary-treasurer.

British Columbia Engineers

Thomas Ingledow, Vice-president and Chief Engineer of the British Columbia Electric Railway Co., Vancouver, B. C., has been elected president of the British Columbia Association of Professional Engineers.

Idaho Society of Engineers

A. S. Janssen, Dean of Engineering, University of Idaho, is president of the Idaho Society of Engineers, with headquarters in Boise. H. R. Flint is vice-president, James

Dredging at Morro Bay

..... Concluded from page 87

cially for small craft and pleasure boats. This dredging and jetty work was performed by the Army Engineers on a force account basis because no contractors were available during that particular phase of the war.

The dredged material from the several channels, totaling about 2,000,000 cu. yd., was deposited partly on the connecting dike from shore to Morro Rock, and partly on a sand spit to the south of the entrance channel, projecting out into the bay.

The jetties were constructed of stone quarried from the sides of Morro Rock itself. About 1,500,000 tons of the stone was required. It was found to be hard and durable, weighing about 154 lb. to the cu. ft. The side slopes of the jetties are 1½:1. They have a crest width of 18 ft., and protrude 16 ft. above mean low tide. The north jetty, which is subject to more severe storms and heavy

L. Morris is secretary, and Archie Biladeau is treasurer.

Phoenix Engineers' Club

R. J. McKnight, of the Central Arizona Light and Power Co., is president of the Phoenix Engineers' Club. P. P. Oxley is vice-president and H. G. Windes is secretary-treasurer.

Associated Engineers of Spokane



HEINECK

Building Industry

William C. Tait is the newly elected chairman of the Building Industry Conference Board, with headquarters in San Francisco. Charles J. Nicholas is vice-chairman and William E. Hague is honorary secretary.

Ventura Engineers Club



DAVIES

Henry Davies is the president of the San Buenaventura Engineers' Club in California. Marvin Sturgeon is the new vice-president and V. M. Cape-rius is secretary-treasurer.

Bay Counties Civil Engineers

Henry H. Gambs is the 1950 president of the Bay Counties Civil Engineers and Land Surveyors' Association, Inc., East Bay Chapter, Berkeley, Calif. F. E. Bryan is vice-president, and Theodore V. Tronoff is secretary-treasurer.

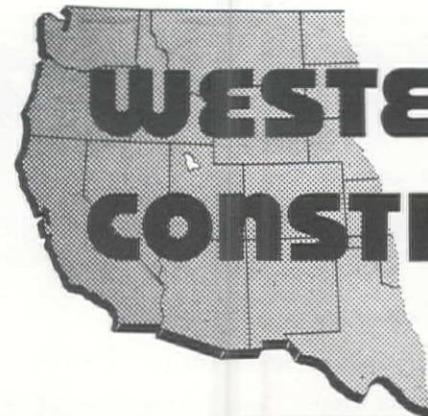
Bay

seas, is protected by a concrete blanket penetrating about 3 ft. into the structure, and covering the entire length to 4 ft. above mean low tide on the seaward side and to 1 ft. above mean low tide on the bay side.

The contract presently being completed by Standard Dredging Corp. of Los Angeles involves 830,000 cu. yd. of maintenance dredging.

Plans are under way for extensive development of the bay for both commercial and recreational use. The local Harbor Commission plans an extensive dredging program in the upper bay, so as to reduce movement of sand from the shores in that area to the dredged channels and turning basin. Fish processing plants, oil storage depots, the only small-boat basin between Monterey and Santa Barbara, and recreational developments by the State Park Commission are other activities of the harbor program.

NEWS OF



WESTERN CONSTRUCTION

MARCH 15, 1950

Senate Surprises—Approves Central Arizona Project

By ARNOLD KRUCKMAN
Washington Editor

BRIDGE CANYON DAM bill, S. 75, was enacted by the Senate, according to program, Feb. 21st. The vote, 55 ayes and 28 nays, was startling, and is considered overwhelming. It has upset all calculations of the opponents, who conceded the bill would pass in the Senate, but who confidently expected a much narrower margin in the voting. It was their expectation and plan that the Senate action would satisfy the proponents, and that the bill would be shelved by the Public Lands Committee of the House. This program was calculated to hold the bill off the floor of the House until the newly-appointed Federal Water Resources Board, headed by Morris Cook, makes its report on December 31st of this year. The President has asked this Board, with the aid of General Pick, Chief of Engineers, to investigate and study the resources of the Colorado to determine where may be found another 2,000,000 ac. ft. of water annually for the collective needs of the Lower Basin States.

But the character of the Senate vote has encouraged the Arizona delegation to feel that the bill may be enacted in the House; and if it passes the House, it will probably be approved by the President. The Senate vote revealed that the measure now is strictly partisan and Administration legislation. Forty-one Democrat Senators voted for it out of a total of 54 Democrats in the Senate. Fourteen Republican Senators also cast their votes favorably, chiefly those from states in which such legislation is overwhelmingly popular. On the other hand only 5 Democrats voted against it, while 23 of the Republicans out of 42 in the Senate solidly lined up in opposition. Thirteen Senators did not vote, of which number 12 were paired, meaning the Senator in favor agreed with the Senator opposed to abstain from voting because one or the other could not be present.

Upper Basin States Senators solidly voted with Arizona regardless of party lines. In Washington and Oregon the

vote was split on party lines, as it was in Nevada where Malone, Republican, voted against the measure, and McCarran voted for it. Montana, Idaho, the Dakotas, Kansas, Nebraska, Oklahoma, Iowa, Minnesota, New York, Tennessee, West Virginia, Illinois, Rhode Island, Indiana, Wisconsin, Connecticut, were outstanding in the parade, led by the solid South, that gave votes to Arizona. Enumeration of these forces is important because they have what is considered a decisive influence on the vote expected in the House. It is predicated by those competent to judge that the pressures being exerted by many Senators on the House members of their state delegations will swing a similar large vote in support of Arizona when

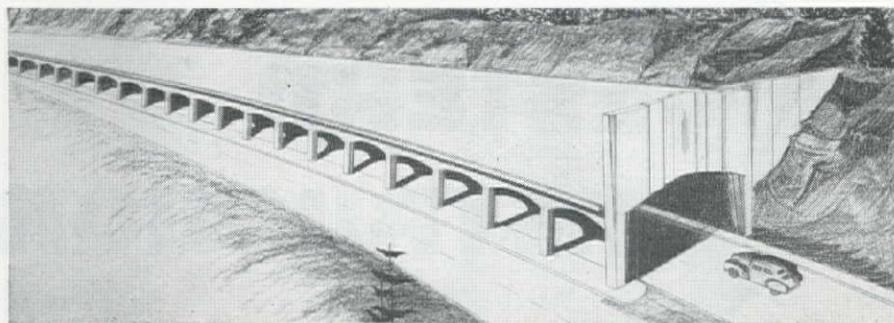
the bill goes on the floor for debate and balloting.

In the Lands Committee of the House, the subcommittee functioning in relation to Bridge Canyon project is headed by Representative John R. Murdock, Democrat of Arizona, highly respected in the Congress, a veteran, and wise in all the ways of the machinery of Congress. Until the Senate cast its surprising vote, the majority of the Lands Committee was committed to the plan of shelving the bill until the Water Resources Board and General Pick made the report ordered by the President. But it is now expected that some decisive action will come out of the Committee within a month. There is strong foreboding among the Californians that the Committee will report out the bill, with recommendations favorable to Arizona. Even if the bill is reported without recommendations, the fat will be in the fire. The whole fight of the Californians now is to keep the bill in Committee. Both Arizona and California are spending

HUNGRY HORSE SNOWBOUND "CONCRETE SPECIAL" TO RESUME WORK

THE 750-FT. railroad at Hungry Horse Dam, Montana, has been snowbound most of the winter (see cut), but is scheduled to resume operation next month. This view, from inside the concrete mixing plant, shows one of the three diesel-powered hopper cars used to transport buckets of concrete to the cableways. How an estimated 1,000,000 cu. yd. of concrete will be placed during 1950 will be discussed next month.





WASHINGTON CONSTRUCTING PRECAST CONCRETE HIGHWAY SNOWSHEDS

TO KEEP State Highway No. 2 in King and Kittitas Counties from being blocked by snow slides, Washington is constructing two precast concrete snowsheds totalling 0.34 mi. With the present 2-lane highway being expanded to 4 lanes, traffic will use outside lanes during snowshed erection, inside lanes during heavy snow periods.

money on any activity that may win support. Congress has never seen such a barrage of leaflets, printed arguments, placards, and publicity novelties, poured upon Congress itself as well as upon correspondents.

The fifteen days of debate in the Senate brought out the fact that all sides lean upon the thought that the Bridge Canyon Act, when it becomes law, will make it possible to take the differences between Arizona and California into Federal court. Hitherto the issue between the states could not be adjudicated by the Supreme Court. The Court itself so ruled. And it was emphasized the authorization of the funds for the construction of the irrigation works in

Arizona cannot be turned into actual appropriations by Congress until the Supreme Court has made its ruling. This spells that the actual beginning of the work on the project is still open to question, and, at best, is still rather remote.

The chief immediate effect of the law would be to make possible the adjudication of the basic issue between Arizona and California, over the waters allocated to California, which issue likewise affects all the other five states in the Colorado basin. This is obviously one reason why the other states have supported the Bridge Canyon bill. It affords a means of clarifying a situation that has long troubled the old Spanish Southwest.

Use of Surplus Northwest Water in Water-Deficient Areas Investigated

DETERMINING what surplus water, if any, might be available in the Northwest for export to water-deficient areas throughout the West is the first objective of the Bureau of Reclamation's United Western Investigation, according to S. P. McCasland, Engineer-in-Charge. The investigation is now concerned with estimating the amount of water which may be available in the Columbia River and other streams of the Northwest, including those of northern California, after a supply for all possible future demands of the Northwest has been reserved. The study constitutes a preliminary reconnaissance to ascertain the justification for a more detailed investigation in connection with the diversion and multiple exchange of surplus and waste waters from the Northwest to areas with a deficient supply.

The reconnaissance was initiated because of the badly unbalanced distribution of supply and demand throughout the West. It is estimated, for example, that the entire supply afforded by the Colorado River is estimated at less than 5% of the water which now flows to the ocean in north coastal streams.

The reconnaissance, initiated last year through a special Project Planning Office established in Salt Lake City, is to be completed in 1952. In keeping with Congressional policy governing investi-

gations of land and water resources, all states affected by the study will be invited to review the Bureau's reconnaissance report on the United Western Investigation and make comments on it, which comments, together with those of other Federal agencies, will be transmitted to the Congress.

In determining future water needs, a summary is being made of all the lands which might ever be irrigated under future conditions. A similar estimate is being made for industrial, municipal, and all other foreseeable water uses which might arise under conditions of ultimate development. Being considered as available for export are only the waters which would remain after a supply had been reserved for these present and potential local demands.

The study also will include making costs estimates of the various ways in which any surplus water in the Northwest might be transported to the areas where it would be used, and such costs will be compared with the benefits which would accrue as a result of the new water made available in the areas of deficiency. If these comparisons are favorable, it is expected that detailed investigations and plans will follow.

Investigation will be made of the means by which the plan could compensate for any disadvantage to existing or

future power production which might result from the export of water otherwise utilizable for power. Exploration will be made of the possibility of using steam power for such means.

The feasibility of exchange which might permit greater upstream utilization of the water resources of the Colorado and other rivers is an important phase of the study. An example is a possible multiple exchange of water whereby imported water would replace or expand present uses in southern California, thereby releasing some of the Colorado River water now used in that area and making it available for possible use in other Colorado River Basin states.

County Water Project Reported Unfavorably

THE COUNTY of San Luis Obispo, California, has been informed by the Bureau of Reclamation that the Bureau's investigation of a proposed county-wide reclamation project has lead to the conclusion the project is not economically feasible. Accordingly, Regional Director Richard L. Boke announced the Bureau will not exercise its priority to acquire the existing Federally-owned Pozo Dam and appurtenant works on the upper Salinas River. The principal units studied, in addition to Pozo Dam, were the proposed Cantera Reservoir on Salinas River near Santa Margarita and the proposed Jack Creek Reservoir on Jack Creek near Templeton, along with necessary pipelines and tunnels. Pozo Dam and reservoir, a pipeline, pumping plant and tunnel were constructed in 1941 by the War Department to supply water to the Army's Camp San Luis Obispo. These works now supply the greater portion of the municipal water supply of the City of San Luis Obispo.

MacMen Is New Firm Name

TRANSFER of all construction contracts currently held by MacIsaac and Menke Co., general contractors of Los Angeles, to the firm of MacMen, Inc., has been announced by Donald MacIsaac and A. F. Menke, co-owners of both concerns.

A million-dollar paint factory being built for Pittsburgh Plate Glass Co. in Torrance, Calif., a sewage disposal plant in Colton, and a reservoir for the City of Monterey Park are among the current MacIsaac and Menke Co. contracts that have been transferred to MacMen, Inc.

A COMPLETE library of all U. S. Geological Survey publications and maps is available for consultation at Room 702, U. S. Appraisers Building, Washington and Sansome Sts., San Francisco, Calif. The library contains files of U. S. G. S. Water Supply Papers, Geologic Bulletins, Professional Papers, Annual Reports, a few unpublished manuscripts concerning water development, and Topographic Maps (quadrange sheets).



"PRODUCTION UP... COSTS DOWN"

GEORGE E. PHELPS



PHELPS—WUNDERLICH—JAMES
PHONE SULLIVAN 138
P. O. BOX 298
ENGLEWOOD, COLORADO
(a joint corporation venture)

December 1, 1949

John Austin, Incorporated
707 First National Bank Building
Denver 2, Colorado

ATTENTION: Mr. John Austin

Dear Sir:

We have had one of your Austin 6-C Overshot Loaders in operation on our Cherry Creek Dam Job for the past three months and have found it to be a very efficient machine. Its jobs have been many and in each case it has proven to be a rugged, high-production loader.

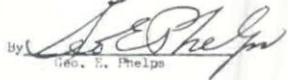
We use this machine principally in loading blanket material and sand into Euclid bottom-dump wagons. Our production records are far beyond any expectations as we found that this machine would average 300 yards in a normal working hour, and at times reached a production rate of 350 cubic yards an hour, this operation being in blanket material and sand.

Maintenance costs are found to be at a minimum, with fuel consumption being about the same as for normal dozing operations. The fact that this loader does its own loading, cleaning, sweeping, etc., and is a one-man operation, has taken a large slice from our former loading costs. The Austin Overshot Loader has a definite place in our future operations.

We whole-heartedly recommend the Austin Overshot Loader for use in any operation similar to those in which it has proven itself on Cherry Creek Dam.

Very truly yours,

PHELPS—WUNDERLICH—JAMES

By 
Geo. E. Phelps

GEP:gkl

**300 CUBIC YARDS
PER HOUR**

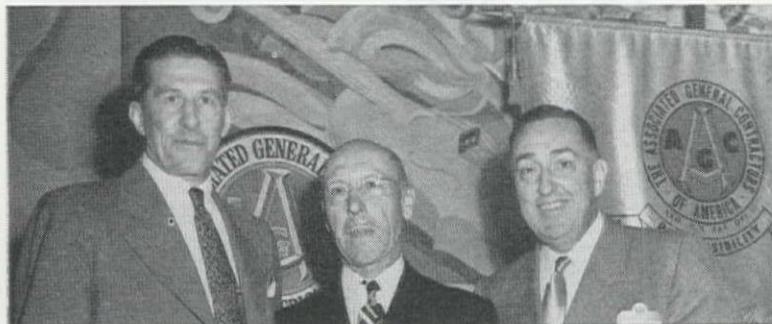
**NOTE: Rated Production
on this 1 1/2 yd. unit is
225 yds. per hour**



WRITE FOR FOLDER

John Austin, Inc.
DENVER 2, COLORADO
Dept. WCN

1950 Officers of the National A.G.C.



TOP LEFT—Officers of A.G.C. for 1950 are, left to right: *G. W. Maxon*, Dayton, Ohio, vice-president; *Adolph Teichert, Jr.*, Sacramento, Calif., past president, and *Walter L. Couse*, Detroit, Mich., president. **TOP RIGHT**—*D. A. Harmon*, left, Oklahoma City, new chairman, and *H. C. Turner, Jr.*, New York City, vice-chairman, Building Contractor's Division. **BOTTOM LEFT**—

John MacLeod, left, Paramount, Calif., new chairman of the Heavy Construction and Railroad Contractor's Division, with *Colonel W. D. Luplow*, South Pacific Division Engineer, Corps of Engineers. **BOTTOM RIGHT**—*N. K. Dickerson, Jr.*, left, of Monroe, N.C., is new chairman of Highway Contractor's Division, and *M. C. Miller*, right, MacPherson, Kansas, new vice-chairman.

These Resolutions Were Adopted by National A.G.C.

STANDARD GOVERNMENT CONSTRUCTION CONTRACT—The provision in the standard federal construction contract form giving the contracting officer the right to decide all disputed questions of fact, subject to appeal to the head of the department whose decision shall be final and conclusive, is causing mounting confusion and hardship to the general contracting industry.

This provision denies the contractor the right of recourse to the courts, and subjects the government to the possibility of extra costs because of contingencies to protect against uncertainties.

A.G.C. recommends that the standard federal construction contract form carry a provision giving both parties to the contract the right to carry the dispute to a court of competent jurisdiction or board of arbitration. This will be of benefit both to the industry and to the government.

FURNISHING OF MATERIALS—A.G.C. reiterates its recommendation to all construction contract awarding agencies that general contractors be required to furnish all materials for projects for the reasons that this permits better coordination of the work and economies in purchases.

UNEMPLOYMENT COMPENSATION—A.G.C. recommends that the administration of unemployment compensation funds be placed under full control of the state government so that effective steps can be taken to prevent abuses.

WAGE RATE DIFFERENTIALS—A.G.C. recommends that the customary differentials in wage rates and working conditions between highway and heavy construction and building construction be maintained as conducive to maximum economy in these types of construction.

VALLEY AUTHORITIES—A.G.C. reaffirms actions previously taken which condemn proposals for the establishment of authorities patterned after the Tennessee

Valley Authority because they establish forms of government contrary to the principles of free competitive enterprise.

MAXIMUM EFFICIENCY IN CONSTRUCTION—A.G.C. endorses the following:

Efficient operation of the construction industry is essential to growth and development of this nation, which is the keystone of freedom throughout the world.

Maximum competition is prevailing in the general contracting industry, and can be expected to continue. This is welcomed, because healthy, competitive conditions assure the public of full value for its investment in construction.

In order to maintain conditions in which the industry can best serve the public interest, the following steps are recommended:

1. Private and public construction contracts should be awarded to responsible general contractors so that full advantage can be taken of free and open competition, and so that funds can be expended most economically.

2. One all-inclusive general contract should be awarded for construction of each project, or its major portions, so that advantage can be taken of the efficiency which can be achieved when complete responsibility and coordination is centralized in one competent organization.

3. Governmental agencies should adopt procedures which do not disrupt established industry practices, or hamper its operations.

4. Governmental agencies should adopt policies that do not upset established relationships between employers and workmen which are in accord with prevailing laws.

The more than 5,500 members of the association extend their co-operation to their workmen, to other organizations in the construction industry, to investors in construction, and to governmental agencies in working toward the objectives of fair treatment to all, and a constant increase in the industry's ability to serve the public interest.

Arizona Highways

... Concluded from page 86

ondary system, is referred to as the FAS system. The third major break-down was for Federal-Aid in urban areas.

Once the FAS funds are divided between the state and counties, it then becomes the responsibility of each to provide local funds to match the Federal grant. In Arizona these funds are divided on a 50-50 basis, a system based on factual data and engineering needs. The State FAS system comprises some 1,311 mi., whereas the county FAS system totals 1,335 mi., almost identical. The Arizona Highway Adjusted Sufficiency Rating for all state FAS roads, which is a criterion of their needs, was 74.9 points as of 1949. The average point rating for the Arizona counties for the same period was 73.47, or only about 1½ points off the state average. These comparisons bear out the wisdom of the 50-50 system currently being used.

Each year in April, the Arizona Highway Department takes the initial step in allocation of FAS funds to the counties. The boards of supervisors advise the highway department as to the priority of projects each county would like improved with Federal aid. They generally ask for aid on more projects than there are funds available. Their requests contain the name of the highway, FAS number, termini, length, class of improvement contemplated, and estimated cost. The department studies these requests, gives first consideration to the project which the board of supervisors has given highest priority. If there are no other economic or engineering factors entering into the problem, the projects are approved in order of priority until the total amount of funds allotted to all counties is reached. The matching is on the basis of about 70% Federal aid funds to 30% county funds. The counties also are required to bear the cost of preliminary engineering, furnish rights of way, and assume full maintenance responsibility, as is customary.

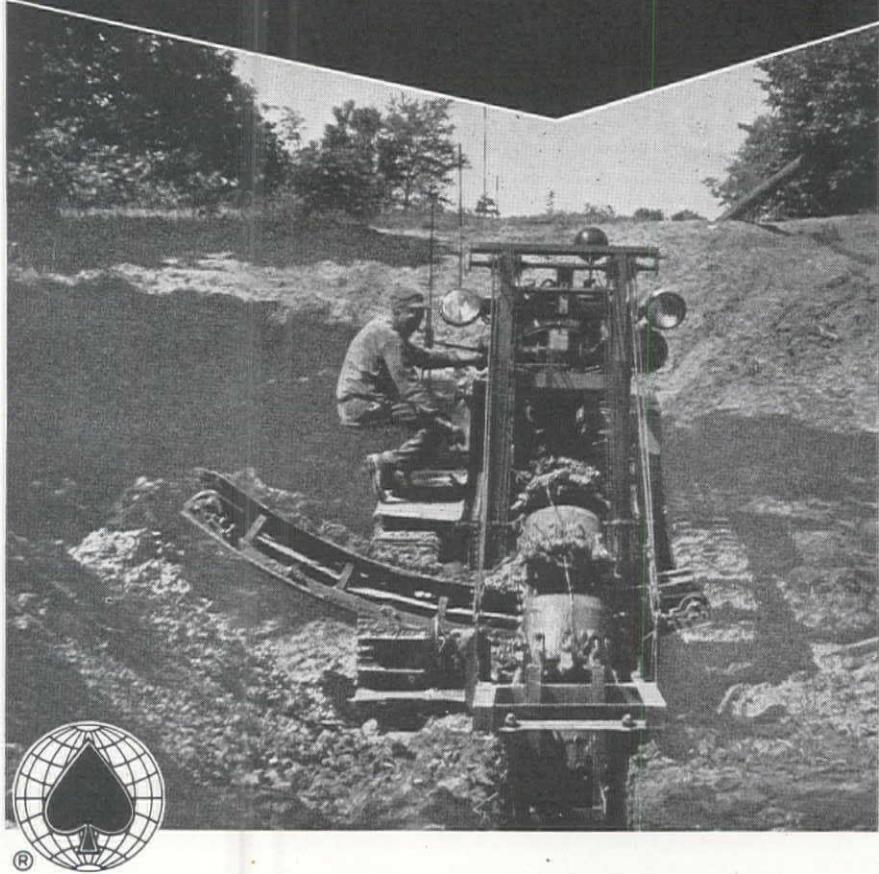
Snake River Power Project Permit Issued Idaho Firm

ISSUANCE of a 3-yr. preliminary permit to Idaho Power Co. of Boise for investigation of the proposed development of a hydroelectric project on the Snake River in southwestern Idaho has been authorized by the Federal Power Commission. The preliminary permit gives the company priority of application for a license but does not authorize construction or give any assurance that a license will be issued.

The proposed project, to be located in Ada, Canyon and Owyhee counties, would include a reinforced concrete and earth-filled dam about 8 mi. north of Murphy; a reservoir approximately 12 mi. long with a surface area of approximately 950 ac.; and a powerhouse containing three 13,500-hp. hydroelectric generating units.

Power developed at the proposed project would be distributed on or through the company's interconnected system.

RUGGED CLEVELANDS EAT UP THE TOUGHEST TRENCHING JOBS



Whether it's swamp mud, hard rocky ground or rough hilly terrain, CLEVELANDS give you that extra power to cut right through and keep your crews on schedule. CLEVELANDS sturdy all-welded design and unit-type construction mean high production under the most punishing field conditions, with less down-time, lower operating and maintenance cost. These full-crawler easy-handling wheel-type machines offer new profits on your trenching jobs—drainage, irrigation, sewers, pipe and power lines and services and building foundations. See your local distributor today.

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Provocative Discussions Feature Second California "Road School"

JARRING the usual atmosphere of thoughtful technical discussions at highway conferences, California State Senator Randolph Collier, co-author of the Collier-Burns Highway Act of 1947, provided a stimulating start to the talks before the second California Institute on Street and Highway Problems at Los Angeles. Senator Collier stated that although most of the counties in the state were cooperating to their utmost, a few isolated cases had failed to recognize important points contained in the 1947 Act. The intent of this law favored a heavy increase in new construction, and sharp decreases in maintenance and new equipment expenditures. These three items stand among the most discussed and troublesome problems facing Western county engineers since the war, and were recognized as such in the 1947 Act.

Collier made two statements that received immediate acceptance by those who attended the meeting, an activity of the Institute of Transportation and Traffic Engineering. He urged the creation of a "new breed" of highway engineers, men who could hold their own in

executive as well as technical fields, and he cited the University of California institute for their successful efforts in this line. He also stated that no county could hope to hold men with executive and technical qualifications while paying them substandard salaries, and urged a statewide minimum for road commissioners of \$7,500.

New studies planned

Collier concluded his thought-provoking address by condemning the miscellaneous pot-hole patching being done in many counties, and stated that construction priorities on road work should be kept free of politics. He informed the group that truck taxes were next on the agenda of his legislative committee, and following that, a study of the freeway system throughout the state.

The opening session of the meeting, far-removed from the grass-roots attitude of road and street work, also featured R. M. Gillis, Assistant California State Highway Engineer; R. H. Baldock, Oregon State Highway Engineer and past president of the A.A.S.H.O.;

Carl E. Fritts, Highway Division Director, Automotive Safety Foundation; and Harmer E. Davis, Director of the sponsoring Institute, who reported upon the accomplishments and enlargements of the Institute of Transportation and Traffic Engineering since its last meeting in 1949.

Attendants at the well-organized sessions drew important conclusions from the impressive array of city and county engineer speakers. The entire meeting was tailored to suit the most widespread need in the state, and the greatest bulk of information available was on planning and administration, rather than technical construction data.

Among the engineers and county road commissioners who had strong observations on road administration were Howard L. Way, San Bernardino; E. A. Burt, Los Angeles; Wallace B. Boggs, Alameda; Julius B. Manthey, San Joaquin; and William E. Willey, Arizona State Highway Department. Willey, who has lately received national recognition for papers on design of mountain highways and the Bureau of Public Roads' survey of truck speeds on grades, delivered a paper on the "Arizona Method for Numerical Rating of County Roads." This paper is appearing on page 85 of *Western Construction News* in article form.

Administration and the law

As a logical result in counties' acute awareness of administration, the law in relation to roads was up for discussion. Legal requirements were heavily stressed by road commissioners Manthey and Boggs, who quoted sections of the Streets and Highways Code and urged the engineers present to have a complete understanding of the intent of the law. Boggs, in his paper on the Basic Laws Affecting County Road Administration, also informed the group on the present standing of the celebrated Hard vs. Plumas County taxpayer's suit (*Western Construction News*, Sept. 15, 1949—page 91).

The case was one in which the term "competent engineer," interpreted to mean a registered civil engineer by the Attorney General, was held to mean any person who appeared qualified before the county board of supervisors to act as road commissioner. This decision was upheld by the appellate court, and an appeal is now pending in the State Supreme Court.

One of the contested issues of interest in this case was the ruling on the \$3,000 county day labor limitation, in which the county was required to draw plans and advertise for bids on any project exceeding \$3,000. This decision was rescinded in the appellate ruling, and at present the counties' practice is as it has been for many years; that is, the road commissioner can take bids or follow the alternate procedure of performing work in excess of \$3,000 by day labor, if so desired by the board of supervisors. This alternate procedure is covered by section 1075 of the Streets and Highways Code; however, it is possible that

Concluded on page 103

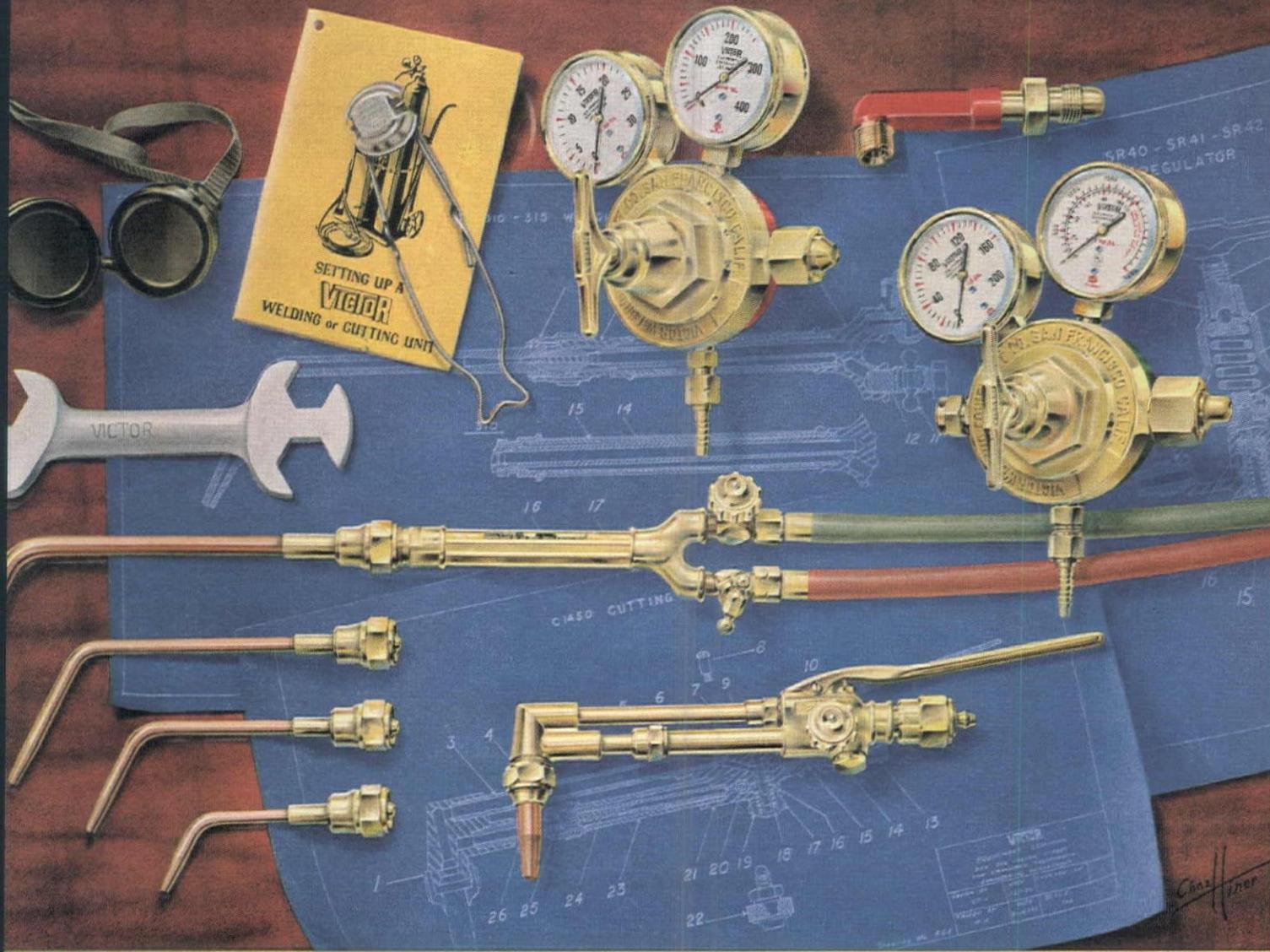
Crushing Plant at Prehistoric Lake

AT HOLLADAY, 15 mi. southeast of Salt Lake City, Utah, the Big Cottonwood Sand & Gravel Co. is operating a crushing plant on a steep hillside which at one time was part of the shoreline of prehistoric Lake Bonneville. From this hillside, a mixture of silt-free gravel and small boulders washed down from nearby Big Cottonwood Canyon is fed to the crusher to form six sizes of material from sand to 1½-in. stone.

Two International power units, a UD-18A and a UD-9 (125 and 53 hp. respec-

tively), operate the plant. The UD-18A provides power for operating a 40-kva. generator, a Pioneer 10 x 24 jaw crusher, three belts and a reciprocating feeder. The material to be crushed is bulldozed to the reciprocating feeder and then conveyed by belt to the jaw crusher. From the jaw crusher, the material is conveyed to the screen and finally, the over-size material is conveyed on a third belt to a Pioneer 18 x 24 roll crusher operated by the UD-9 unit. The plant is pictured below.





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The sandy type soil in place ready for processing by the P&H Soil Stabilizer.



The P&H Soil Stabilizer processing at a rate of 500 lineal feet, 24-foot highway per hour.



U. S. Highway 281 after completion.

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The Road School

...Continued from page 100

another court decision may be called for in order to confirm the interpretation of the Code.

Ignorance is no ...

In addition, Boggs delivered a brief resume of the Vehicle Code, Government Code, and Labor Code as they pertained to county road work. He concluded with a reference to Chapter 6 of the Government Code, on the liability of officers and employees for damage to persons or property, including that which is incurred from negligence of subordinates. He stated that the counties may insure against such liabilities, and properly charge the cost of insurance against public funds. Boggs stated that the old adage, "Ignorance of the law is no excuse," is particularly applicable to public officials, and urged that advice from the district attorney or county counsel be sought whenever questions on legality of action may arise.

Robert L. Ryan, Ventura County Surveyor and President of the County Engineers Association, presided at the construction and maintenance session, which featured the latest development in road knowledge. Clyde Jones, Assistant Engineer, San Joaquin County, discussed the minimum requirements for a county or city testing laboratory, and the application of results. Horace N. Bosworth, Architect with the California Division of Highways, discussed weed control and trash disposal. Howard Loy, Assistant Manager of the Asphalt Department, General Petroleum Corp., stated the conditions for the successful oiling of low cost roads and streets.

Among the city engineers, managers,

planners, and traffic experts, participating in the program, were Clayton W. Paige, Burbank; M. H. Irvine, Riverside; E. W. Blom, Santa Rosa; John G. Marr, Oakland; James Reading, San Diego; D. Jackson Faustman, Sacramento; W. M. Jarrett, Alhambra; and Jesse Gilkerson, Long Beach. Those from Los Angeles were Herbert H. Cox,

Ralph T. Dorsey, William E. Lauer, and Hugo Winter.

R. M. Gillis is Chairman of the Road School Committee, in charge of the meeting. Vice-chairmen are Clayton W. Paige and Howard L. Way. Harmer E. Davis, Director of the Institute of Transportation and Traffic Engineering, is General Secretary.

"Why the Lag in Estimates" ... An Answer

Editor, *Western Construction News*

The question "Why the Lag in Estimates?" on the editorial page of the February 15, 1950 issue calls for an answer and an explanation. I believe there are good legitimate reasons why in times of rapidly changing costs there are differences between engineers' estimates and contractors' bid prices.

The principal reason for a spread between the engineer's estimates on a project and the actual bid figures is a matter of time. The engineer's estimate is submitted at the time he presents the completed plans and specifications and the owner's financial program is usually based on that estimate. In the case of municipal work where bonds must be voted and sold before bids can be taken, six months to a year may pass before the actual bids are received. Where conditions in the construction industry are steady this lapse of time is inconsequential, but in periods when costs are fluctuating as in the years immediately following the War or the present, not even the most alert engineering office can anticipate bid prices six months in advance.

Contractors' bid prices for a project are prepared right down to the day of bidding and reflect not only the condi-

tions existing at that time in the industry, but also the conditions in each bidder's organization. The bids are also made under competitive pressure. In times of rising costs and increasing activity this pressure is not so apparent, but in today's market it has a definitely important bearing on bid prices.

Engineers' estimates are not subject to the competitive pressure, nor are they expected to reflect conditions on the bidding date. An engineer's estimate submitted at the time the plans and specifications are completed should be a reasonably close estimate of the construction costs at that time. If the estimate is to be used for comparison of prices at the time bids are received it should be revised to that date.

I believe that engineers by and large do take pride in having their estimates in close agreement with current bidding. However, they are customarily not engaged primarily because of their estimating abilities. And after all, considering the spread in bids on specific projects, is it not true that the engineer's estimate is generally closer than most of the contractors' bids?

DON HULL McCREERY,
President, Quinton Engineers, Ltd., Los Angeles, Cal.

PERSONALLY SPEAKING

C. E. Stahl, State Highway Engineer of Montana since April 7, 1949, resigned that post Feb. 24. **George Poore**, Helena, Mont., Assistant State Highway Engineer, has been named acting state highway engineer pending a permanent appointment. Stahl, formerly construction engineer with the Omaha District, Corps of Engineers, did not disclose any plans for the future.

Clarence C. Davis has been appointed Resident Engineer at Detroit Dam, Ore., on the North Santiam River, according to **Col. Donald S. Burns**, Portland District Engineer, Corps of Engineers. Davis succeeds **Lt. Col. John W. Miles**, who has been transferred to Okinawa. With the Portland District since 1940, Davis engaged in the construction planning of Detroit and Lookout Point Dams.

Ike P. Taylor, Chief Engineer of the Alaska Road Commission, has announced his retirement. He became

Chief Engineer in 1932, following 9 years service as assistant, and prior to this was construction engineer with the Alaska Railroad. Taylor is succeeded by **A. F. Ghiglione**, who first served with the Commission in 1929. Ghiglione has been Assistant Chief Engineer since April, 1948.

John L. Savage, engineering consultant of Denver, Colo., and internationally known for his work as chief designing engineer for the Bureau of Reclamation and as consultant to many foreign governments on reclamation problems, has been retained by the Special Bridge Committee of the California Assembly to investigate reclamation features of the Reber Plan. The Reber Plan, described in detail in past issues of *Western Construction News*, is a large-scale project proposed for development of San Francisco Bay. Earth dams across each arm of the bay would create fresh water lakes. The dam across the southern arm of the bay would be utilized also

as a traffic and railroad crossing, and would obviate the necessity for construction of another bridge to relieve traffic congestion on the present Bay Bridge.

Stanley B. Freeborn, Assistant Dean, College of Agriculture, University of California at Berkeley, has received Presidential reappointment to serve on the 11-man Water Pollution Control Advisory Board. It was announced by **Oscar Ewing**, Federal Security Administrator. Freeborn is one of six non-Government members receiving reappointment.

H. F. Bahmeier, Construction Engineer on the Davis Dam project since April, 1946, has been transferred to the Bureau of Reclamation's Delta District, Central Valley project, California. He is succeeded by **Jean R. Walton**, Field Engineer at Davis Dam since construction began nearly four years ago and recently appointed as Acting Construc-

tion Engineer. In his new position, Bahmeier will direct the Bureau's construction work on the American River development. Delta District Manager, Carl H. Kadie, Jr., said Bahmeier will work closely with the Corps of Engineers, now engaged in building Folsom Dam on the American River, 20 mi. east of Sacramento. He has already taken charge of the Bureau's preconstruction work, in progress since enactment last October of Federal legislation adding the American River Division to the Central Valley project.

N. W. Haner, consulting engineer of Portland, Ore., announces a change of organization and address, to N. W. Haner & Associates, 220 S.W. Alder St., Portland. The associates are Carl R. Skooglund and Sully A. Ross.

A. W. Simonds, head of the special section devoted to technical problems at the office of the Chief Engineer of the Bureau of Reclamation at Denver, has been sent to New Zealand on an emergency assignment requested by the New Zealand Government. He will work with New Zealand engineers on the foundations of Maraeti Dam, one of a series which is being built by that government for power purposes.

Winfred M. Fritz, Mechanical Engineer with the structures design section of the Portland District, Corps of Engineers, has been rewarded for superior accomplishment, according to Col. Donald S. Burns, District Engineer. Fritz was cited by the Office of the Chief of Engineers, Washington, D. C., for suggesting and designing an automatically-controlled weir for fishways in use at McNary Dam, in place of the manually operated type now used at Bonneville Dam. The weir will save an estimated \$10,000 a year in operating costs for McNary.

F. N. HVEEM, left, Staff Engineer, and ROBERT N. CARMANY, Associate Testing Engineer for the California Division of Highways, are pictured at the recent Street and Highway Problems meeting in Los Angeles. The meeting, sponsored by the California Institute of Transportation and Traffic Engineering, cited the two men for their recent award by the Highway Research Board and co-authorship of the paper—"The Factors Underlying the Rational Design of Pavements." The Board, in reviewing over 100 papers, voted that of the California engineers as outstanding.



Julius Irion, Maricopa County Engineer, Phoenix, Ariz., is reported to have submitted a verbal resignation to the board of supervisors, effective as soon as he can be replaced. He has served as county engineer intermittently since 1935.

Brice Covington, of Kingman, Ariz., has been elected chairman of the Arizona State Highway Commission. He succeeds Dewey Farr.

John F. O'Connell, Director of Industrial Relations, Bechtel Corp., San Francisco, has been elected Vice-chairman of the Labor Committee, National Constructors Association. O'Connell will be in charge of labor negotiations for the Western States. The Association is composed of leading national contractors and engineering firms specializing in refinery, chemical, and heavy industrial construction. J. F. Pritchard, Kansas City, was elected President, and E. D. Hockstra, Cleveland, was renamed Chairman of the Labor Committee.

Randolph M. Martin, transportation engineer with the British Columbia Electric Co., has been appointed assistant city engineer by the City of Vancouver. B. C. Duncan A. MacKinnon, former assistant city engineer, moves up to the position of deputy city engineer. John Oliver remains as city engineer.

Fred Gloor is the new engineer for Clark County, Wash. He was formerly with the Washington State Highway Department as a district maintenance engineer. Since last fall, he was engaged in private engineering practice. He replaces Stephen C. Jayne, resigned.

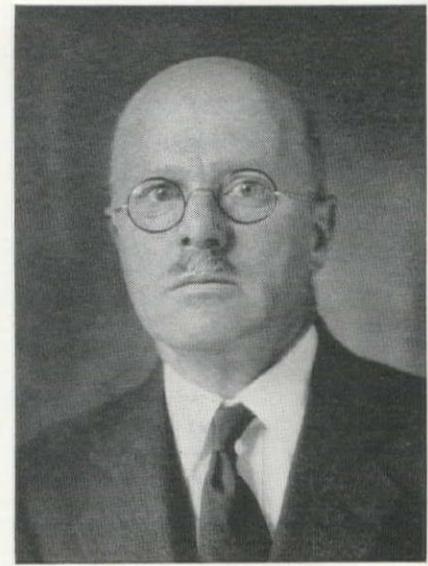
L. W. Irwin, formerly project manager for Arundel Corp. and L. E. Dixon Co. on the Toketee Falls Project on the North Umpqua River in Oregon, is now director of research and development for the American Pipe and Construction Co., Los Angeles.

H. T. Miard, who has been with the B.C. provincial public works department since 1947, has been named divisional engineer for the Nelson, B. C., district to succeed O. P. Roberts, who has been named divisional engineer at New Westminster. R. G. Harvey was named to succeed Miard as district engineer.

OBITUARIES . . .

Dr. Laurence I. Hewes, 74, chief since 1920 of the Western headquarters branch of the Bureau of Public Roads, with offices in San Francisco, died of a heart condition March 2. Dr. Hewes joined the staff of BPR in 1911 and had remained with the agency since then.

In his position as chief of the Western headquarters, he had general supervision of road construction in eleven Western states and Alaska. He was the



DR. LAURENCE I. HEWES

author of several books on mathematics and highway engineering, including "American Highway Practice," a standard college textbook in wide use. He was a member of the American Society of Civil Engineers, the California Academy of Sciences, Sigma Xi and the American Association for the Advancement of Science. On Feb. 14 of this year, Dr. Hewes received a gold medal from the Department of Commerce for exceptional service. A complete review of Hewes' professional career was presented in *Western Construction News*, August, 1948, page 101.

Clarence E. Seage, 61, partner in the San Francisco consulting firm of Seage and Tudor, died of a heart attack on Feb. 6. He was stricken in an ambulance traveling on the San Francisco-Oakland Bay Bridge, one of the large structures he helped build. In addition to the Bay Bridge, he had worked on design and construction of Hell Gate Bridge, New York, buildings for the Golden Gate Exposition, 1939, McNary Dam on the Columbia River, and the proposed bridge across the Columbia at The Dalles, Ore.

Lester Newton, 55, superintendent of the Chandler Sand and Gravel Co., was killed Feb. 17 at Lomita, Calif., when he was buried in a slide at a sand pit.

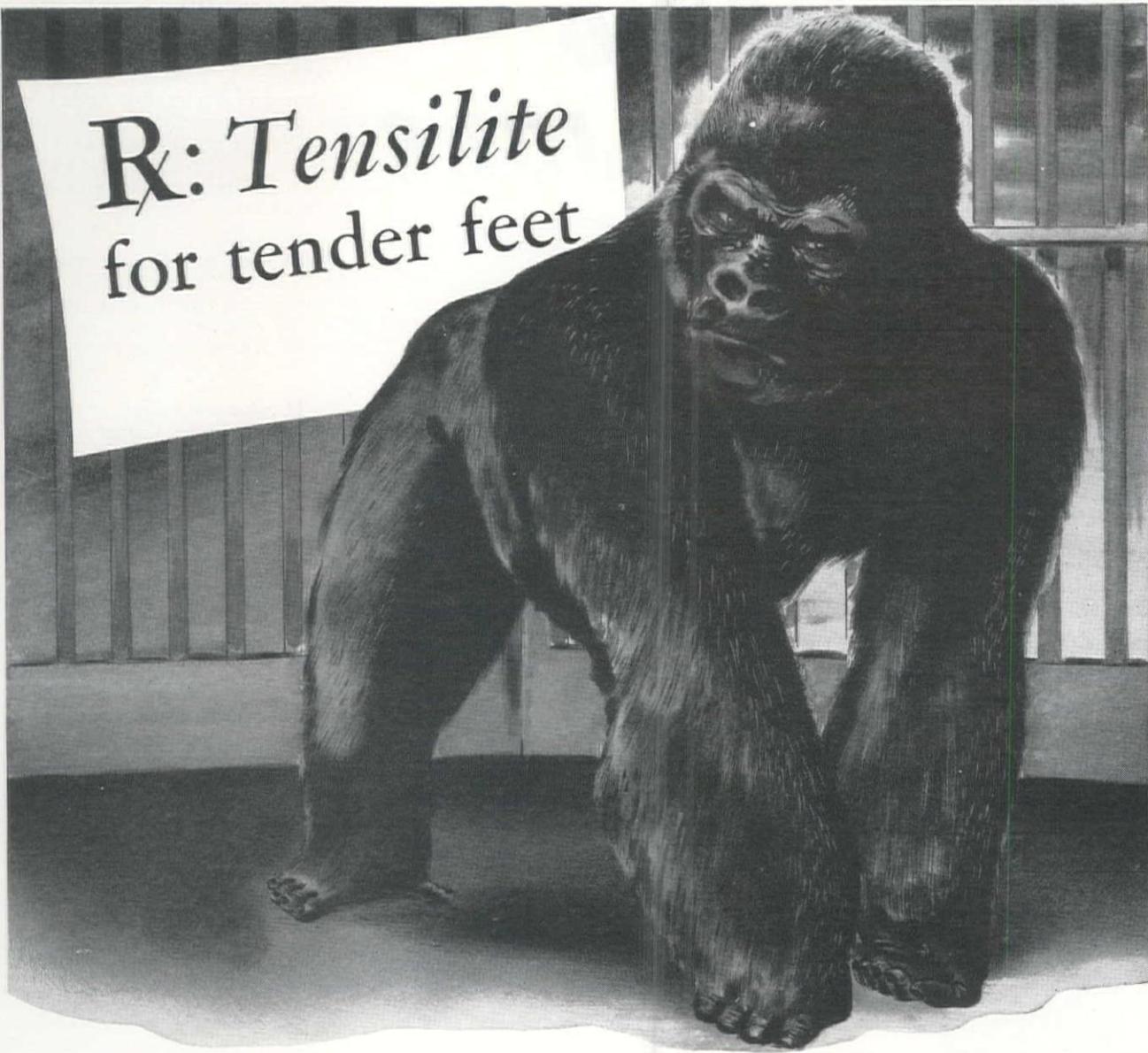
Ray Taylor, 58, superintendent with the Smith Bros. & Wilson Contracting Co., Kelowna, B. C., died recently. He had been in Kelowna two years.

William Price, 69, water superintendent of Longmont, Colo., died Feb. 3.

Arthur L. Aarhaus, 51, civil engineer and County Commissioner of Grays Harbor, Wash., died Feb. 1.

Oliver Playfair Roberts, 61, district engineer at New Westminster, B. C., for the British Columbia Department of Public Works, died recently.

Rx: Tensilite for tender feet



"BUSHMAN", the 550 pound giant Gorilla, feature attraction of one of our largest zoos, is a tough character. When he's in a playful mood his enthusiasm is boundless. He likes to swing from the rafters and spring across his cage. Suddenly, grinding stops on the concrete floor tore Bushman's feet and he lost his spirited enthusiasm.

PIONEER RUBBER MILLS and zoo officials are now taking care of Bushman's feet. Type "S" Tensilite Chute Lining has been installed as flooring in his cage. Just as it cushions the shocks of so many of industry's problem-child materials, so does it eliminate the destructive abrasion on Bushman's feet.

Certain definite characteristics of Tensilite — PIONEER'S tough resilient, abrasion-resisting rubber compound — meet perfectly the requirements of a host of applications. For example, in chute lining for gravel handling, Tensilite

outlasts steel 5 to 1 (some users report 10, and 15 to 1); it cuts fatigue by its sound-deadening qualities.

Tensilite is available in two types to meet specific operating conditions. Type "S" is famous for its abrasive-resistant qualities in handling heavy, destructive materials, as well as emery-like "fines." **Tensilite** Type "M" was especially developed for use under conditions involving excessive heat, oil or continuous exposure to strong sunlight and oxidation.

Wherever Tensilite has been recommended and used, it has cut operational costs and saved many a maintenance dollar. If the materials you handle include any or all of the life-shortening characteristics mentioned, Tensilite can be your answer to lower cost materials handling. Your PIONEER distributor is ready to make money-saving recommendations based on your problems. PIONEER RUBBER MILLS' engineering service stands behind his advice.

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SUPERVISING THE JOBS

E. E. "Andy" Anderson is superintendent and **Leonard A. Runkle** is project manager for Leonard & Slate Oregon, Ltd., contractors on railroad and highway relocation work in connection with Lookout Point Dam. The \$2,064,000 contract is on the Middle Fork of the Willamette River. **Harry Mitchell** is grading superintendent and **Ray S. Schrader** is concrete superintendent. **E. W. "Browny" Yoder** is crusher superintendent, and the office manager is **George W. Mardorf**.

Hugo Festich is job superintendent and **Foy Pickering** is general superintendent for the Fisher Contracting Co. on a \$579,000 contract for construction of the Queen Creek Tunnel, Arizona. The 1,240-ft. tunnel is located on the Superior-Miami highway.

James Stratton is superintendent for **W. O. Gray**, Lynwood, Calif., contractor, on a \$100,000 Bank of America building, Colorado Ave., Pasadena.

T. D. Kinnikin is general superintendent for the Fluor Corp., Ltd., Los Angeles, on construction of an absorption and hydrogen-sulphide removal plant near Cuyama, Calif., a part of the new oil refinery being built in the Cuyama Valley. **J. N. Prospall** is job superintendent and **Harry Christman** assistant

superintendent. **Dewey Bunch** and **Leo Cain** are carpenter foremen, and **Jack Rose** is in charge of the millwork. **James Mauldin** and **William Mauldin** are foremen of the operating engineers.

Bob Carl is superintendent for West & Douglas, Pasadena, Calif., contractors on new buildings for Woodrow Wilson High School at Long Beach. **Charles Barnes** is carpenter foreman on the \$600,000 contract.

Alfred Cantor is general superintendent for Ben C. Gerwick, Inc., & George Pollock Co., contractors on the \$1,576,000 land section, outfall sewer, being built by the East Bay Municipal Utility District in Oakland, Calif. Assistant superintendents are **John Ford, Jr.**, **Walter Harcourt-Palmer**, and **Stanley McCoy**. **Otto C. Bohl** is resident engineer on the project, which will probably be completed in July, 1950.

Elof Gustafson is project manager and **Maurice McClure** is tunnel engineer for Stolte, Inc.-Fred J. Early Co., Inc.-Duncanson-Harrelson Co., joint venturers on the East Bay Municipal Utility District sewer project. The \$4,380,000 contract covers sections 5 and 6, tunnel outfall, and is located near the San Francisco-Oakland Bay Bridge approach on the Oakland side. **Fred Weiss** is office

KEY PERSONNEL for Morrison-Knudsen Co., Inc., on construction of a portion of the Wellton-Mohawk Canal near Yuma, Ariz., are, left to right—**REX MAYFIELD**, excavation superintendent, swing shift; **BUD SNOWBALL**, excavation superintendent, day shift; **REUBEN ANDERSON**, master mechanic; **EVERETT CHRISTMAN**, project manager; **E. W. WEATHERMAN**, office manager, and **VERN SWANSON**, paymaster. **JACK BINDER**, project engineer, and **M. BOWMAN**, excavation superintendent, are on the job but not in the picture.



engineer and **Dave Allen** is office manager.

William J. Rowland is job superintendent and **Archie Edmonds** is grading foreman for Fredrickson Brothers, on the \$239,500 grading and surfacing job in Napa County, Calif. The contract includes plantmix surfacing of 3.1 mi. of highway.

John Iben is job superintendent for the Packard Contracting Co. on the St. Johns-Sanders highway in Arizona. The \$205,700 contract covers 14½ mi. **Herman W. Kuntz** is office manager.

J. H. Romish is job superintendent for the C. H. Ellis Construction Co. on the construction of gymnasium building for the Idaho State College, Pocatello, Idaho. **Jack Schwaller** is foreman on the \$981,500 contract.

Harry Rheutan is superintendent for City Electric Co. on the \$47,000 contract for lighting Philips Field, Pocatello, Idaho. Rheutan is also acting as project manager for the City Electric Co. and Morrison-Knudsen, Inc., joint venturers on a \$145,000 contract for transmission line construction from Anderson Ranch to Mountain Home, in Idaho.

Emmett R. Steeple is superintendent for the Utah Construction Co. on the \$3,070,000 construction of Union Pacific Railroad relocation in connection with McNary Dam, Ore. The job also involves relocation of the Oregon-Washington state highway between Sand Station and the Walla Walla River. **Lawrence Smith** is office manager and **Wallace Hunt** is field engineer.

On highway construction between Redlands and Beaumont, Calif., **Jack Kasler** is project manager and **Frank Muren** is superintendent of structures for Fredericksen & Kasler, Sacramento. **Jeff Kasler** is assisting Muren. **Mel Stover** is the job engineer. **Win Ransdell** is master mechanic, **William O. Loy** is grading foreman, and **M. E. Burke** is office manager.

Milo Lubanko is superintendent for Basich Brothers Construction Co., San Gabriel, Calif., on the Calabasas road job in Ventura County. **Jack Gardner** is master mechanic, and **Mike Mishovich** is office manager.

On the reconditioning of the Imperial County jail at El Centro, Calif., **E. C. Gereaux** is superintendent for L. Sanders Co. of San Diego. **George Livermore** is steel foreman and **Victor Cox** is carpenter foreman.

C. A. Burrell, for many years a general superintendent for J. B. Donaldson Co. of Phoenix, Ariz., and who was superintendent on the early construc-

tion of the San Gabriel Mission high school building at San Gabriel, Calif., for the Curlett Construction Co. of Long Beach, is now engineer for the architects, Lawrence D. Viole of Hollywood, on the high school structures.

Ben Greenwood, formerly superintendent on the construction of the St. Mary's Rectory at Phoenix, Ariz., is now superintending construction of additions to the building of the Associated Telephone Co. at Yuma, Ariz., for the Del E. Webb Construction Co.

J. A. Randall, recently returned from a trip to Arabia, is now office manager for Macco-Puget Sound at Boise, Idaho, in connection with construction of tunnels as the first major work on the Lucky Peak Dam project. Randall is employed by Macco Corp.

J. J. Rose is the superintendent for Puget Sound Bridge & Dredging Co., Seattle, Wash., on the \$1,034,305 contract for dredging 815,000 cu. yd. of material in Wrangell Narrows, Alaska. J. C. Greely is manager of the dredging division for Puget Sound and M. S. Gordon is chief engineer.

Don Ross is the superintendent for Roland T. Reynolds, Anaheim, and Thomas Construction Co., Fresno (joint venturers) on the construction of 2.2 mi. of California state highway near Niland. The job includes four bridges and seven box culverts. Don Winnifred is carpenter foreman and George Borovich is concrete foreman.

Norman McCarg is general superintendent for E. L. Yaeger Co., Riverside, Calif., on the construction of reinforced concrete structures along 27 mi. of highway between Niland and Durman, Calif. L. E. Anderson is structures superintendent, Bud Wilder is equipment superintendent. Carpenter foremen include Andy Doyle, Dale Henry, Bob Arnold and Al Thomas.

S. Shuldburg is superintendent for L. W. Odell of Marino, Calif., on the construction of new headquarters for the Los Angeles County Flood Control District in Los Angeles, a \$500,000 project.

M. J. Allred is superintendent for W. R. Skousen, Mesa, Ariz., on the \$192,770 improvement of a 13.8-mi. sector of the Safford-Clinton highway in Arizona. John T. Skousen is purchasing agent, Kenneth Scott is master mechanic, and Joe Krulyac is foreman.

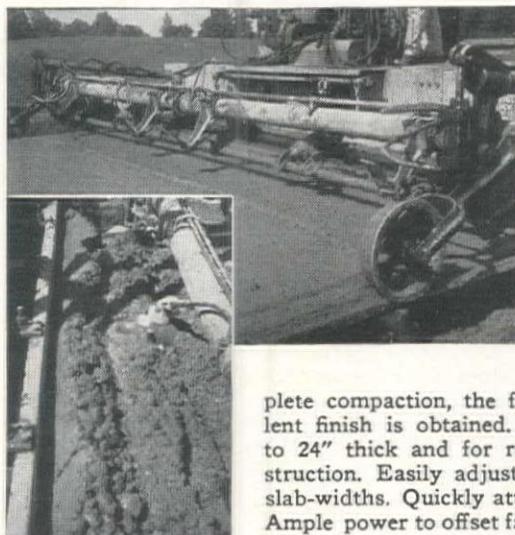
Ray J. Curtis is superintendent for W. T. Bookout Construction Co., Las Vegas, N. Mex., on the \$496,229 reconstruction of 7 mi. of U. S. Highway 85 between Raton and Springer in New Mexico. Carl Willhoite is foreman on the job.

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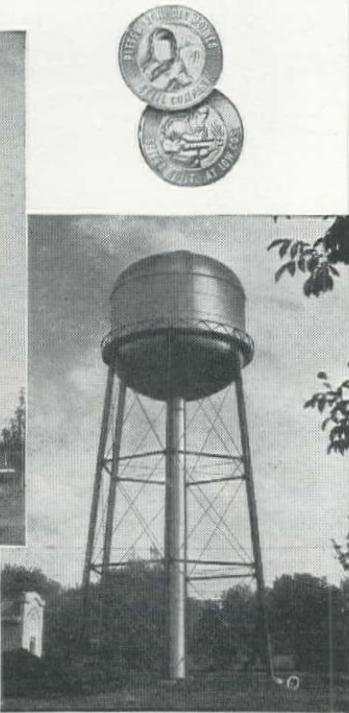
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Contracts . . .

Summary of Bids and Contracts For Major Projects in the West

Arizona

Elmer W. Duhamel Construction Co., 2250 E. Wash., Phoenix, was low bidder at \$1,285,000 for construction of a new Y.M.C.A. building in Phoenix.

Phoenix-Tempe Stone Co., 13th Ave. and Buchanan, Phoenix, was low bidder at \$193,000 before the Arizona Highway Department for rehabilitation of 10 mi. of the Topock-Kingman highway.

California

Spencer Webb Co., 4719 Melrose, Los Angeles, was awarded a \$377,000 contract by the California Division of Highways to build a reinforced concrete bridge and approaches on the Hollywood Parkway at Hill St., in Los Angeles.

Hawley & Ramlose, 325 No. 5th St., Montebello, Calif., is apparent low bidder at \$236,000 before the Sacramento District, Corps of Engineers, for abutment excavation, access road, and fences on the Folsom Dam Project, American River, near Sacramento.

Harvey A. Nichols Co., 926 E. Slauson, Los Angeles, was awarded a \$447,000 contract by the California Division of Architecture for alterations and improvements on the State Office Building in Los Angeles.

Morrison-Knudsen Co., Inc., 1 Montgomery St., San Francisco, is low bidder before the San Francisco Department of Public Works for paving runways and other paving, grading, and electrical work at San Francisco Airport. The bid was \$2,595,000.

Judson-Pacific-Murphy Corp., 4300 Eastshore Hwy., Emeryville, was awarded a \$407,000 contract by the San Francisco District, Corps of Engineers, for construction of superstructure of the Fruitvale Ave. railroad bridge in the Oakland Harbor.

Carl M. Halvorson, Inc., 218 Builders' Exchange Bldg., Portland, and H. Halvorson, Inc., Spokane, were awarded a \$4,750,000 contract by the Bureau of Reclamation for construction of Tecolote tunnel and access road for the Santa Barbara Project, Calif., about 10 mi. east of the city of Santa Barbara.

James H. McFarland, 101 Tara St., San Francisco, was low bidder at \$263,000 before the Bureau of Reclamation for schedule 1 of the 42-mi. Madison to Rio Vista section of the Central Valley Project west side transmission lines. The work includes construction of foundations and erection of 191 double-circuit steel towers. George E. Miller, Long Beach, bid low at \$124,000 for installation of insulators and conductors, on schedule 2.

Concrete Conduit Co., 899 So. LaCadena Ave., Colton, Calif., was low bidder at \$264,000 before the Bureau of Reclamation for construction of laterals 88.4W and 90.4W, Lindmore Irrigation District, Friant-Kern Canal distribution systems in the California Central Valley Project.

Colorado

Mead & Mount, Denver N. Blvd., Denver, was awarded the contract for a new 6-story J. C. Penney building in Denver. Cost of the project is \$1,500,000.

Peter Kiewit Sons' Co., 1024 Omaha Natl. Bank Bldg., Omaha, Neb., was low bidder at \$325,000 before the Bureau of Reclamation for construction of a section of the Olympus Siphon, Estes Park-Foothills power aqueduct, Colorado-Big Thompson Project in Colorado.

Idaho

Stanley & Ehlen, Boise, has been awarded a \$140,000 contract by the Idaho Bureau of Highways for construction of 10 mi. of road on U. S. 20 in Canyon County.

Quinn-Robbins Co., Inc., Boise, has been awarded a \$168,000 contract by the Idaho Bureau of Highways for 4 mi. of roadwork between Mountain Home and Tollgate.

Fluor Corporation, Ltd., 2500 Atlantic Blvd., Los Angeles, has been selected by the U. S. Atomic Energy Commission for construction work on the materials testing reactor to be built at the Reactor Testing Station near Arco, Idaho. The contract now being discussed with Fluor includes over 50% of the construc-

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tion cost, and is estimated to be \$20,000,000. The balance of the work will be let on competitive bidding. Work will begin on the project before final completion of plans and specifications, and designs will be revised during construction to take advantage of the latest research results in the reactor field. Because of this, a negotiated form of contract, rather than competitive bidding, was used.

Kansas

Kaw Paving Co., Inc., Topeka, Kansas, was awarded a \$89,000 contract by the Kansas State Highway Commission for 7 mi. of asphalt surface at Woodson.

George Bennett Construction Co., 1520 Central Ave., Kansas City, Kansas, was awarded a \$214,000 contract by the Kansas City District, Corps of Engineers, for construction of levee unit 500-R, along the right bank of the Missouri River near White Cloud, Kansas.

Montana

Cahill-Mooney Construction Co., Butte, Mont., was awarded a \$925,000 contract by the Silver Bow county commissioners for construction on the Butte Civic Auditorium. Work has been started.

Morrison-Knudsen Co., Inc., Boise, was awarded a \$370,000 contract by the Bureau of Public Roads to rebuild 10 mi. of road in Glacier Park near Logan Pass on the Sun Highway. Bids were opened by the Bureau in November, 1949.

Nevada

Nevada Constructors, Inc., Reno, Nev., was awarded a \$130,000 contract by the Nevada State Highway Department for construction of route section FAS 664 in Mineral County, from 22 mi. south of Hawthorne to U. S. Naval Ammunition Depot Boundary.

New Mexico

W. T. Bookout Construction Co., Las Vegas, N. Mex., was awarded a \$496,000 contract by the New Mexico State Highway Department for construction of 7 mi. of the Raton-Springer highway, U. S. 85, in Colfax County.

Fulton & Hamilton Construction Co., Roswell, N. Mex., was awarded a \$296,000 contract by the New Mexico State Highway Department for construction of 3 mi. highway on U. S. 85, in the city of Las Vegas.

North Dakota

Swingen Construction Co., Grand Forks, N. Dak., was awarded a \$117,000 contract by the North Dakota State Highway Department for construction of structures at the junction of state routes 25 and 28, Mercer County.

Oregon

Willamette Iron & Steel Co., 2860 N.W. Front Ave., Portland, Ore., was low bidder before the Portland District, Corps of Engineers, for furnishing and installing outlet gates and appurtenances for Detroit Dam, North Santiam River, Oregon. The bid was \$357,000.

Willamette Iron & Steel Co., 2860 N.W. Front, Portland, submitted the low bid of \$330,000 before the Walla Walla District, Corps of Engineers, for furnishing two 350-ton traveling cranes for the powerhouse at McNary Dam, on the Columbia River in Oregon.

Peter Kiewit Sons' Co., Longview, Wash., was low bidder before the Oregon State Highway Commission for construction of 6.7 mi. of the Barkley Springs-Algoma section of The Dalles-California highway. The bid was \$854,000.

E. C. Swaggart, Eugene, was low bidder before the Oregon State Highway Commission for surfacing 8.4 mi. of the Thomas Creek-Lyons section of the Albany-Lyons secondary highway. The bid was \$118,000.

L. H. Hoffman, 715 S.W. Columbia, Portland, was awarded construction of a new \$2,250,000 12-story apartment building in Portland, being built for the Portland Tower Corp.

Porter W. Yett, 6500 N.E. Ainsworth, Portland, was low bidder at \$113,000 before the Oregon State Highway Commission for paving 9.3 mi. of the Halsey-Crawfordsville section of the Halsey-Sweet Home highway in Linn County.

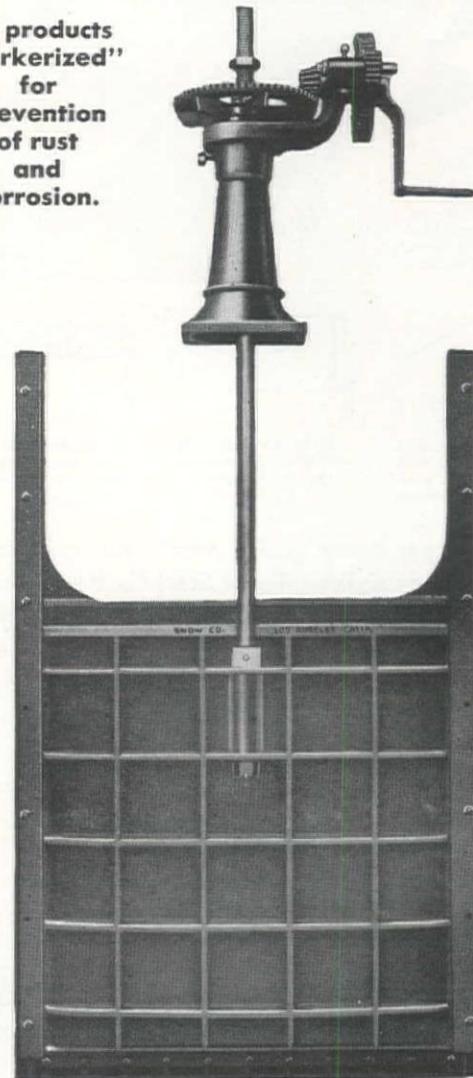
Utah Construction Co., 1 Montgomery St., San Francisco, has been awarded a \$3,070,000 contract by the Walla Walla District, Corps of Engineers, for construction of 11.4 mi. of Union Pacific railroad relocation along the Columbia River between Sand,

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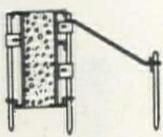
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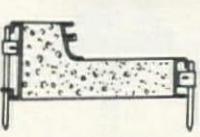
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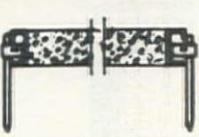
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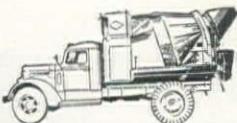


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**CONCRETE
BUCKETS**

HI-BOY TRUKMIXER
with revolutionary
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**BULK CEMENT
PLANTS**

Ore., and the Walla Walla River, Wash. Relocation of 10 mi. of state highways 395 and 730 is included in the contract.

Ross B. Hammond Co., 1241 N. Williams, Portland, Ore., was low bidder at \$770,000 for construction of the Sacred Heart Hospital in Eugene.

American Bridge Co., Frick Bldg., Pittsburgh, Pa., was awarded a \$432,000 contract for three bridge spans and an underpass by the Portland District, Corps of Engineers. The work is in connection with relocation made necessary by Lookout Point reservoir, in the Willamette River Basin.

Utah

Wunderlich-Curlett, 820 W. Esther St., Long Beach, Calif., was low bidder at \$7,898,000 before the Corps of Engineers, San Francisco, for construction of a Veterans Administration Hospital, Salt Lake City, Utah.

W. W. Clyde & Co., Springville, Utah, was awarded a \$67,000 contract by the State Road Commission of Utah for construction of two concrete bridges on U. S. 50 and 6, across Sager's and Pinto Washes in Grand County.

LeGrand Johnson, 595 E. 1st St., Logan, Utah, was awarded a \$67,000 contract by the State Road Commission of Utah for widening an existing concrete bridge on U. S. 91 across the Logan River, Cache County.

Washington

Gibbons & Reed Co., 259 W. 3d South St., Salt Lake City, was awarded a \$1,548,000 contract by the Spokane, Portland, and Seattle Railway for construction of 11.6 mi. of line between Yellepit and Finley, Wash. The job is part of the relocation made necessary by McNary Dam reservoir.

J. A. Terteling & Sons, Boise, was low bidder before the Bureau of Reclamation with a \$464,000 bid for construction of an irrigation system and laterals near Ephrata, Wash.

Lease & Leigland, 1501 N. 35th, Seattle, was low bidder before the Seattle District, Corps of Engineers, for construction of Project P-40. The bid totaled \$481,000. Location and nature of the project were classed as restricted information, disclosed only to the bidders.

Henry Hagman, Cashmere, Wash., was awarded a \$548,000 contract by the Washington Highway Department for construction of a steel bridge and approaches at Metaline Falls, Pend Oreille County.

General Construction Co., 3840 Iowa, Seattle, was awarded a \$2,265,000 contract by the Seattle District, Corps of Engineers, for the excavation of 3,500,000 cu. yd. for an intake channel and relocation of state highway No. 10 at Chief Joseph Dam on the Columbia River.

Henrik Valle Co., 407 3rd W., Seattle, was awarded the contract for a five-story addition to the Frederick & Nelson building in Seattle. The entire expansion project will cost \$6,500,000.

General Construction Co., 3840 Iowa, Seattle, was awarded a \$310,000 contract by the Seattle First National Bank for construction of a new branch at 6th and Denny streets.

Western Construction Co., Sioux City, Iowa, was low bidder at \$1,650,000 before the Bureau of Reclamation for construction of 13 mi. of the East Low Canal, part of the irrigation system in the Columbia Basin reclamation project.

Strong & MacDonald, Inc., Tacoma, was awarded a \$241,000 contract by the Bureau of Public Roads for grading 3 mi. of the Heart-of-the-Hills highway in Olympic National Park.

Wyoming

Spiegelburg Building and Lumber Co., Laramie, Wyo., submitted the low bid of \$1,305,000 before the University of Wyoming for construction of a war memorial field house and stadium in Laramie.

Alaska

William A. Smith Contracting Co., Inc., Kansas City, and **Brown & Root, Inc.**, Houston, acting as joint venturers, were awarded a \$6,845,000 contract by the Department of the Interior for rehabilitation of the Alaska Railroad. The project involves 144 mi. bank widening and 101 mi. track laying of the Alaska Railroad system, and is to be completed by Jan. 1, 1952. Bids for the work were opened April, 1949.

Puget Sound Bridge & Dredging Co., 2929 16th S.W., Seattle, has been awarded the \$1,034,000 contract by the North Pacific Division, Corps of Engineers, for dredging in Wrangell Narrows, Alaska.

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IN THE ROCKIES—The Colorado Fuel and Iron Corp.
Continental Oil Bldg., Denver, Colo.

ON THE WEST COAST—The California Wire Cloth Corp.
1080—19th Ave., Oakland 6, Cal.



TRANSPORTATION



LOGGING



MINING



PETROLEUM



MANUFACTURING

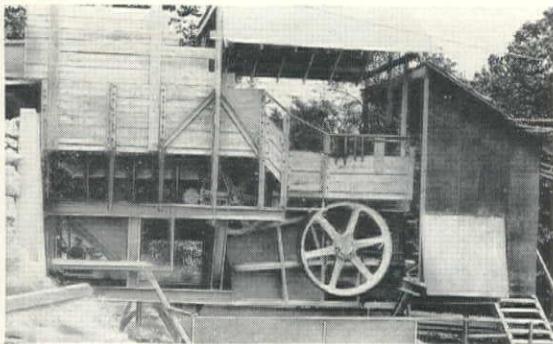


MARINE



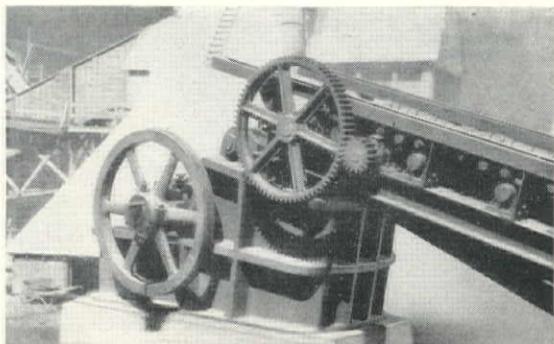
CONSTRUCTION

Producing Aggregate on the Job with a Traylor "H" Jaw Crusher Cuts Costs ... Keeps Work Moving on Schedule



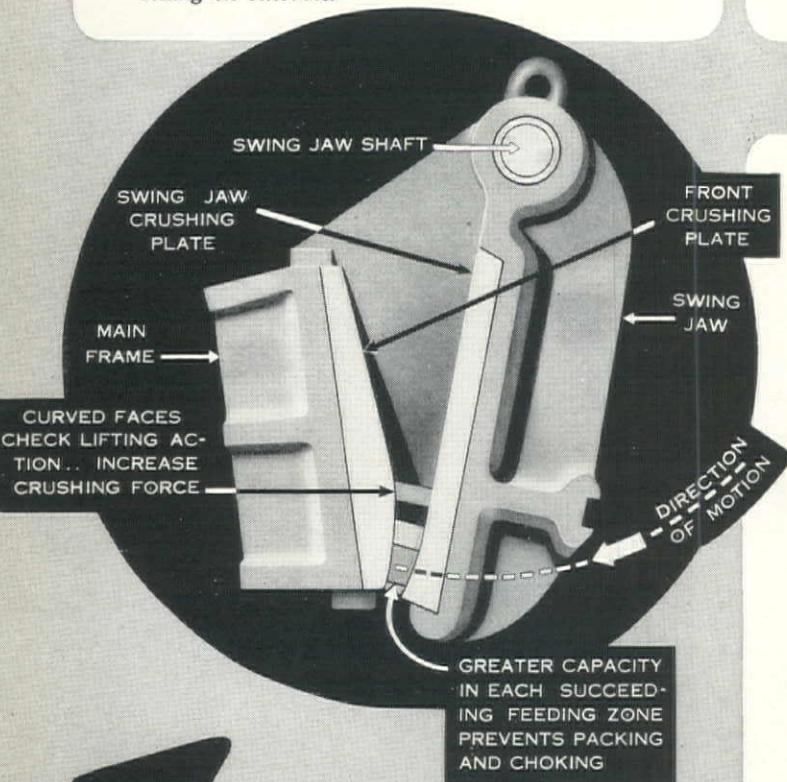
It pays to be in *close* control of your aggregate supply on any big project that must be completed *on time* to show a profit.

With a Traylor "H" Jaw Crusher reducing aggregate on the site, you can rest assured that ample quantities of the *right* size will always be on hand at the *right* time to keep concreting operations rolling on schedule.



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Power is applied as a *direct* crushing force by the Curved Jaw Plates of a Traylor "H" Jaw Crusher. Power is not wasted lifting and churning material. Choking and packing is eliminated by the increased capacity of each succeeding feeding zone in the crushing area. Taylor Curved Jaw plates insure continuous, trouble-free production of a finer product amazingly free from slabs and fines . . . at less cost per ton. For more complete details on these advanced primary crushers write today for Bulletin # 3105.

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TRADE WINDS

News of Men Who Sell to the Construction West

Distributors and Factory Branches

JACK WILLIAMS has been appointed to the sales staff of *La-Plant-Choate Sales and Service*, Oakland, Calif. He will headquarter at the Oakland office of the Cedar Rapids, Iowa, firm. Williams was formerly with R. G. LeTourneau, as District Representative from 1944-1947 and then as Western Sales Manager.



WILLIAMS

Stow Manufacturing Co., manufacturer of truck pump shafts, concrete vibrators, and flexible shaft machines, has appointed the *Norwest Co.* of Seattle as distributor for Montana, Northern Idaho, and Washington.

☆ ☆ ☆

A. G. CROWLEY, Regional Manager of *Northwest Engineering Co.*, announces the appointment of JAMES W. SAVAGE to the sales staff at the firm's Los Angeles branch offices. He is a graduate engineer from the University of Minnesota.

☆ ☆ ☆

R. P. HAMMAT was recently appointed manager of the Fresno Branch of the *J. T. Jenkins Co.*, distributor for *Kenworth Motor Truck Co.* Hammat is well known in the San Joaquin Valley, having worked that territory for the Goodyear Tire & Rubber Co. for the past 18 years.

☆ ☆ ☆

Standard Machinery Co. of San Francisco was recently appointed Northern California distributor for the *Whiteman Manufacturing Co.* of Los Angeles. The firm will be exclusive distributor for the Whiteman Power Buggy in the area.

☆ ☆ ☆

FRED SIME, District Manager of the *Macwhyte Rope Co.* San Francisco office, has announced the appointment of GEORGE T. WILLIAMS to its sales staff. Williams will cover the territory from Stockton to the Oregon border.

☆ ☆ ☆

HARRY W. BOOTH, formerly a contractor of Los Angeles, Calif., has succeeded to the business of the *San Diego Tractor and Equipment Co.* at San Diego, Calif.

☆ ☆ ☆

Coast Equipment Co. of San Francisco has been appointed Northern California distributor for the *Joy Manufacturing Co.* of Pittsburgh, Pa. The Coast line of products, including compressors and air tools,

was formerly marketed under the name of *Sullivan Machinery Co.*, before Sullivan was consolidated with the *Joy Mfg. Co.*

☆ ☆ ☆

Shriver Machinery Co., Phoenix, Ariz., now has E. M. MICHELS as salesman in the Tucson territory.

☆ ☆ ☆

KEITH PARKS is now a salesman for the *Western Equipment Co.*, Spokane, Wash. He is covering the Spokane area and the territory north of Spokane in Eastern Washington and Northern Idaho. K. E. AHERN is now Branch Manager of the firm and MELVIN P. OLSON is Office Manager.

☆ ☆ ☆

According to R. H. WEIGEL, District Manager for the *Independent Pneumatic Tool Co.*, at Seattle, Wash., FRANK ENGLISH has been named sales and service engineer for the firm and will cover Washington and part of Oregon in the vicinity of Pendleton for Thor Universal Electric Tools.

☆ ☆ ☆

C. H. Grant Co., with offices and warehouse in Berkeley, Calif., has been appointed distributor for the *Marion Power Shovel Co.* of Marion, Ohio. The firm will



C. H. GRANT, left, owner of C. H. Grant Co., Berkeley, is congratulated by E. R. DALEY upon appointment of his firm as distributor for Marion Power Shovel Co. Daley is District Manager for Marion.

represent Marion in Northern California, including Monterey, Kings, and Tulare counties, and in the northern and central parts of Nevada.

☆ ☆ ☆

C. L. STOCKER has assumed sales and engineering responsibilities for the *Lincoln Electric Co.*, Cleveland, Ohio, in the San Francisco area. Stocker has been active in various parts of the country in the develop-

ment of welding for the past twenty years. He started with Lincoln in 1930 and has been district manager of the Seattle area since 1943. A. L. PATNIK has been given the responsibility for Lincoln engineering in the Seattle District. He has been with Lincoln since his graduation from Ohio State University in 1940.

☆ ☆ ☆



SHIELDS

☆ ☆ ☆

Fairbanks, Morse & Co., Chicago, Ill., announces the appointment of J. C. ELMBURG as Branch Manager at Portland, Ore. Elmburg has been Manager of the Atlanta Branch for the past three years, and succeeds HOWARD OXSEN, who is returning to San Francisco to Manager of Diesel engine sales in that area. GEORGE A. HAWKINS, formerly Manager of the Minneapolis sub-branch, succeeds Elmburg in Atlanta.

☆ ☆ ☆

Rosco Manufacturing Co., Minneapolis, Minn., announces the appointment of *Four Wheel Drive Pacific Co.*, San Francisco, as distributor in the northern portion of California. The Rosco line includes bituminous distributors, street flushers, maintenance units, road and street brooms, etc.

☆ ☆ ☆

The Rix Co. of San Francisco announces the appointment of CHARLES SMITH to its sales staff. Smith will cover the Stockton and Sacramento area and will headquarter at the San Francisco office.

☆ ☆ ☆

W. F. CAREY, Regional Manager of the *J. I. Case Co.*, with offices in Oakland, Calif., announces the appointment of NOBLE W. NELSON as Industrial Representative for California, Arizona and Nevada. Nelson has been in the industrial field in the Los Angeles area for the past ten years. He will work out of the Los Angeles and Oakland branches of the firm.

☆ ☆ ☆

Taylor & Spotswood Co., Northern California distributor for Supergrate and Superweld open steel floor grating, announces the addition of C. W. TRIPP to the engineering staff in the grating division. Formerly associated with the Supergrate factory in Los Angeles, Tripp will assist in estimating, detailing, and specifying to meet job requirements.

☆ ☆ ☆

R. M. TAYLOR, JR., Sales Manager for the *Edward F. Hale Co.*, Hayward, Calif., exclusive Northern California distributor for the *Huber Mfg. Co.*, Marion, Ohio, announces that Hale is now showing the newly-designed and tested Huber compac-

tion roller, which replaces standard rolls with heavy steel ribs and scallops.

☆ ☆ ☆

J. E. HALL, Sales Manager for the *Cook Bros. Equipment Co.*, Los Angeles, has announced the appointment of his company as exclusive national distributor for Challenge Truck Mixers.

☆ ☆ ☆

Permanente Cement Co., Oakland, Calif., has announced that its Portland, Ore., distribution plant will supply cement to the construction industry throughout Oregon. The plant has a bulk storage capacity of 72,000 bbl., and has a packhouse equipped with automatic bag packers with a daily capacity of 48,000 sacks. Complete docking facilities are available for the company's two bulk cement carrying ships, equipped with pneumatic unloading ma-

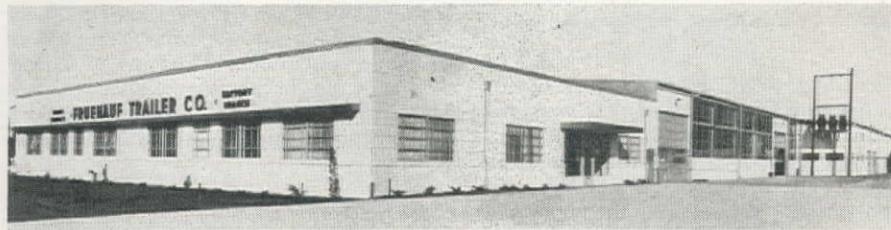
TRADE WINDS

chinery. The Portland plant was originally acquired under a lease arrangement as transfer point for 750,000 bbl. of cement used in McNary Dam. In addition to filling local requirements, the Portland plant will handle the forwarding of 1,250,000 bbl. of cement for construction of Detroit Dam, in central Oregon.

☆ ☆ ☆

Coleman Motors Corp., Littleton, Colo., has elected officers as follows: HOWARD H. AGEE, president; E. L. MARTIN, first vice-president; WILLIAM C. RAMSEY, secretary-treasurer. These new officers hold similar offices in the *American Road Equipment Co.*, Omaha, Nebr., *American-Cole-*

TRUEHAUF TRAILER CO. recently occupied two new factory branch buildings located at Oakland and Seattle. Each building is of concrete and steel construction, represents an investment of about \$500,000, and has more than 50,000 sq. ft. under roof with accommodations for over 30 limit-length trailers in the service department simultaneously. New equipment is designed to improve service and maintenance for any make of truck trailer.



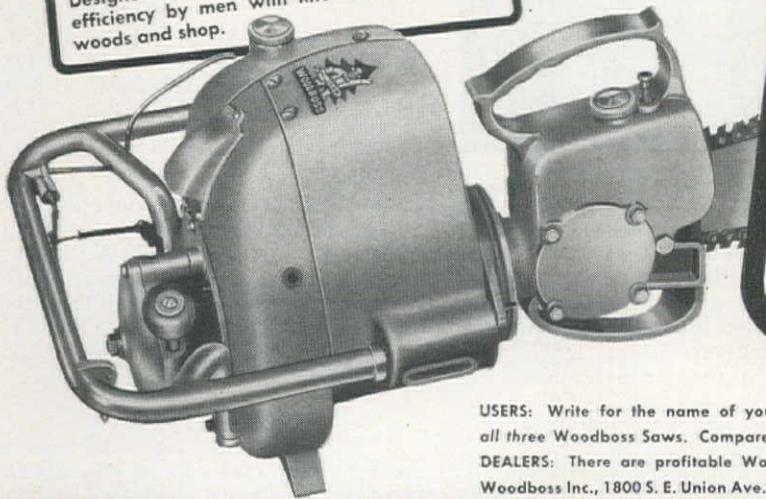
Woods-Tested! Ready to Go!

THE SENSATIONAL NEW ADDITION TO THE WOODBOSS LINE
OF LIGHTWEIGHT POWER CHAIN SAWS

WOODBOSS

Redhead
ONE-TWO MAN CHAIN SAW

Designed and built for toughness, economy, efficiency by men with know-how gained in woods and shop.



REDHOT features of the new WOODBOSS REDHEAD!

Now there are three champion lightweight, right-price power chain saws... all in one family! User-approved ONE-MAN WOODBOSS. Handy, multi-purpose ELECTROBOSS. Power-packed WOODBOSS REDHEAD for both one and two man felling and bucking with any bar up to 60 inches. And every REDHEAD feature is backed by WOODBOSS reputation for building tough, lightweight, easy-to-run saws that stand up to the job:

- Weight with 20" guide bar and chain, 33 lbs.
- Full 5-HP at 3800 RPM.
- One- or two-man operation.
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- Automatic clutch.
- Power pump chain oiler with manual control.
- Full 360° swivel guide bar.
- Single cylinder motor.
- Anti-friction bearings throughout.
- Magnesium sand castings for light weight and toughness.
- Kickproof recoil starter.
- Snap-on outer end handle.

See! Try! Buy! New Woodboss Redhead!

USERS: Write for the name of your nearest dealer and complete details on all three Woodboss Saws. Compare Woodboss prices. You'll find they're right!

DEALERS: There are profitable Woodboss territories open. Write Dept. WC-30, Woodboss Inc., 1800 S. E. Union Ave., Portland.



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man Co., Omaha, and *American-Coleman Export Corp.*, Chicago. The latter two organizations will continue to serve as sales promotion agents for Coleman Motors Corp. and the American Road Equipment Company.

☆ ☆ ☆

The Balzer Machinery Co., Portland, announces the appointment of HARRY T. SHULER to its sales staff. Shuler is a civil engineer and has been connected with the building and construction trade for some time.

☆ ☆ ☆

HOLLIS I. CONNER has been appointed Assistant Manager of the Export Division of the *Hyster Co.*, Portland, Ore., manufacturer of industrial trucks and tractor tools. He will serve as head of Hyster's Peoria, Ill., export department, and as contact man between headquarters in Portland and the firm's two eastern plants.

☆ ☆ ☆

Mobilhomes Corp. of Oxnard, Calif., another branch of the *Mobilhomes Corp. of America* at Bakersfield, has broken ground at Oxnard for the new plant. The firm's principals include T. C. McMILLAN, President, ROBERT McMILLAN, in charge of production, and ART KENSLER, in charge of design.

☆ ☆ ☆

J. E. EHLERT, District Manager of *Euclid Road Machinery Co.* in the New England territory, has been transferred to the Southern California district. He will

be associated with Euclid's Pacific Coast Branch, representing the firm in the south, including the counties of San Luis Obispo, Kern, and San Bernardino, in addition to Clark and Lincoln counties in Nevada. A. E. SORENSEN continues as Manager of the Euclid Branch at Emeryville, Calif.

☆ ☆ ☆

Appointment of ALEXANDER CROMWELL as Vice-president of *Soule' Steel Co.*, San Francisco, is announced by EDWARD L. SOULE', President. Cromwell, who has been Vice-president of *Johns-Manville Corp.* since 1937, will also be a member of the Soule' board of directors. He will directly manage the company's coast-wide steel building products business.

☆ ☆ ☆

GEORGE SOLNAR, Manager of the *Clay Brick and Tile Association of Northern California*, announces the affiliation of the association with the *Structural Clay Products Institute*. The association, with headquarters in San Francisco, has taken this step to provide better structural data service and cooperation to contractors and engineers in the specifications and usage of clay brick and tile.

☆ ☆ ☆

L. W. RODOLF, District Manager of the San Francisco office of the *Gardner-Denver Co.*, was recently in Honolulu on a business trip.

☆ ☆ ☆

GEORGE SMALL, Advertising Manager of *International Harvester Co.*, Chicago, Ill., made a recent business trip to the San Francisco Bay area. While here he made headquarters at the Oakland branch office.

☆ ☆ ☆

Expanding to new and larger quarters, the Los Angeles office of *Goodall Rubber Co.* is now located at 2939 East Eleventh St. in the heart of the Los Angeles industrial section. Adequate off-street parking, larger warehousing facilities plus better loading and shipping facilities will speed customer deliveries from the new location, according to FRANK WHITNEY, manager. Goodall manufactures and retails all types of hose used in the construction industry, as well as other industrial rubber products.

☆ ☆ ☆

Judson Pacific-Murphy Corp. has announced the election of J. PHILIP MURPHY as President of the firm, succeeding PAUL GILLESPIE, who retires after 30 years of service. Murphy spent five years with Judson Pacific-Murphy as Vice-president, and is second Vice-president of the American Institute of Steel Construction. He is also a representative on the California Contractors State License Board.

☆ ☆ ☆

T. W. "TED" MARX has joined the Republic Rubber Division, *Lee Rubber & Tire Corp.*, as Sales Representative in the

Presenting the **FIRST** and **ONLY**

controlled power
completely safe
semi-silent
Powder-Actuated Fastening Tool!

The **DRIVE-IT** 



**DO IT WITH
DRIVE-IT!**



Installing acoustical
ceilings, door bucks,
wooden sleepers, metal
lathing



Hanging lighting fixtures,
heating and
ventilating ducts, etc.



Plant maintenance,
hanging shelving,
signs, etc.

exclusive features of the
DRIVE-IT "300"

Controlled Power
with one powder charge
3-Way Safety • Most of the BANG is out!
Flangeless Drive-pins Permanent,
Adjustable Safety Pad
Fires with a "Twist of the Wrist"



You bet I'm interested... Send me the story!

NAME _____

COMPANY _____

STREET AND NO. _____

CITY AND STATE _____

POWDER POWER TOOL CORPORATION, 0707 S. W. WOODS STREET, PORTLAND 1, OREGON

Pacific Northwest. G. L. SMITH, Sales Manager, announces that Marx will headquarter in Portland, and cover Oregon, Washington, Northern Idaho, and a portion of Montana. Marx was formerly associated with the Aluminum Builders Supply at Springfield, Ore.

☆ ☆ ☆

HIRAM HASCALL, Sales Manager of *D. W. Onan & Sons*, manufacturer of electric generating plants, has appointed FRANK GERNAND as Direct Factory Sales Representative, covering the entire West Coast and Alaska. Gernand will maintain headquarters at Portland, Ore.

☆ ☆ ☆

CHARLES R. COX has resigned as President of *Carnegie-Illinois Steel Corp.*,

TRADE WINDS

United States Steel subsidiary, to become President of *Kennecott Copper Corp.*, New York. He succeeds in this office the late E. T. STANNARD, who recently died in an airplane accident in Canada.

☆ ☆ ☆

Four Wheel Drive Pacific Co., San Francisco, is now California distributor for the Lull "Traveloaders," according to JOHN BATTES, Vice-president. The Traveloader is now available in the 10,000-lb. capacity, and will later be available in the 3,000 and 30,000-lb. capacity sizes. In addition to the Lull Traveloader, the Los

Angeles office of *Four Wheel Drive Pacific Co.* has taken on the Southern California territory for the *Klauer Manufacturing Co.*, Dubuque, Iowa, manufacturer of sheet metal building materials and snow plows. The distributor's San Francisco office has acquired the Northern California distribution of the *Rosco Manufacturing Co.*, Minneapolis, Minn., line of road machinery.

☆ ☆ ☆

Bay Cities Equipment, Inc., Oakland, Calif., has added three new salesmen to its staff. In the San Francisco Bay area, RAY GOODMAN will cover the Oakland territory, and FRANCIS HEALEY will cover the Peninsula territory. KEN FREDERICKS will headquartered in Eureka and cover the far northern region.

☆ ☆ ☆

IRVING R. KRAMER, General Manager of the *Buran Equipment Co.*, Oakland, Calif., advises that the company has been appointed Northern California distributor for the *John Austin Co.*, manufacturer of power take-off units.

☆ ☆ ☆

Unit Crane & Shovel Corp., Milwaukee, Wis., manufacturer of crawler and mobile cranes and shovels, announces that the State of Nevada is open for exclusive dealer representation.

☆ ☆ ☆

Merrill-Brose Co., San Francisco, announces that the firm is handling the new line of the *Bucyrus Erie* model 22-B transit crane. The 20-ton crane is convertible to a $\frac{3}{4}$ -cu. yd. shovel, dragline, clamshell, or dragshovel.

☆ ☆ ☆

Link-Belt Speeder Corp., Chicago manufacturer of shovel-crane, announces the appointment of the *Nelson Equipment Co.* as distributor for Washington and Oregon contractors, industrial plants, loggers, and highway departments. The Portland and Seattle offices of the *Nelson Co.* will represent Link-Belt in the State of Oregon, except Malheur County, and in the State of Washington, west of the Cascade Mountains, and including the counties of Klickitat and Yakima. The Link-Belt Speeder line includes a complete range of crawler and wheel-mounted Shovel-Cranes, from $\frac{1}{2}$ -cu. yd. to 3-cu. yd., and in lifting capacities of 6 to 60 tons.

☆ ☆ ☆

JIM WOODFORD, with the *George M. Philpott Co.*, San Francisco distributor of compressors, bearings, and pumps, was recently appointed Sales Manager of the Bearings Department, according to GEORGE PHILPOTT, President. Woodford, with the company for five years, is well known throughout the Northern California area, and will divide his time between the San Francisco office and branch office in Oakland.

☆ ☆ ☆

GUERNIE HOWERTON has returned to the *George M. Philpott Co.*, San Francisco distributor of compressors, bearings, and pumps, as Assistant Branch Manager of the Oakland office. Howerton is considered

Continued on page 118



HOW MUCH DO YOU SPEND On "Throw-Away" Sheeting?

On temporary jobs, sheeting that cannot be salvaged is just an added cost. You can save this extra expense by using Armco Steel Sheeting.

This durable sheeting can be easily pulled and re-used time and again. A convenient hole in each section simplifies pulling. And the sheeting units are nestable for easy handling and storage between jobs. You save time and money.

Both interlocking and flange type Armco Sheeting have small displacement for fast, easy driving. You get low cost, effective earth retention—either temporary or permanent. Write for complete information.

ARMCO DRAINAGE & METAL PRODUCTS, INC.

CALCO, NORTH PACIFIC, HARDESTY DIVISION
Berkeley • Los Angeles • Seattle • Spokane
Portland • Salt Lake City • Denver

ARMCO STEEL SHEETING

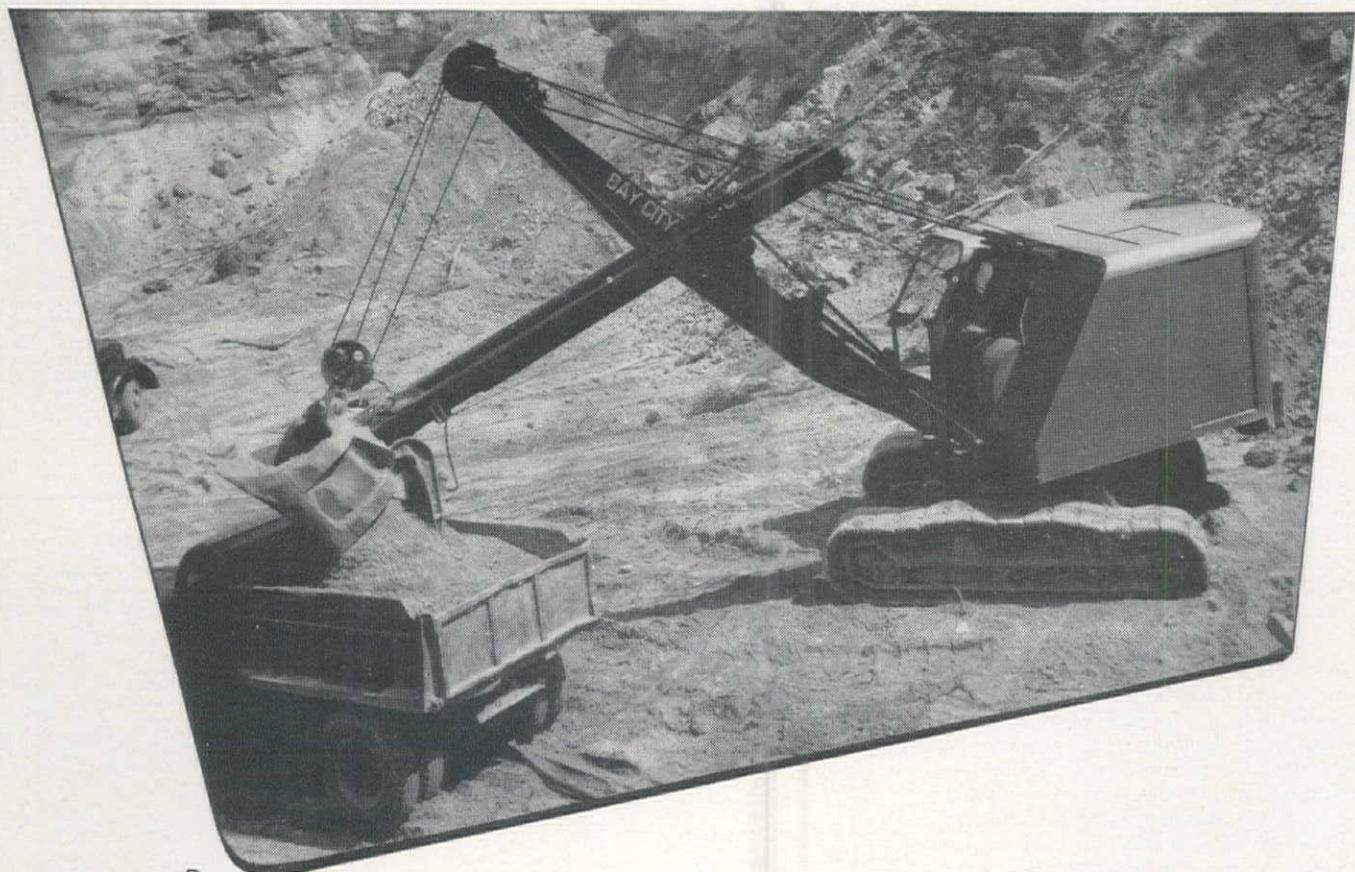


What do you get when you buy a $\frac{3}{4}$ yard shovel?

to get the
most for your money
make your own
comparison →

A few essential specifications of the heavy-duty 45 are listed here so you can compare them with other $\frac{3}{4}$ yard shovels. Make your own comparison and you will buy BAY CITY for the biggest value in excavating and material handling equipment. Let's get acquainted — Write for catalog today. BAY CITY SHOVELS INC., Bay City, Michigan

	BAY CITY MODEL 45	Other $\frac{3}{4}$ Yd. Shovels
WEIGHT	45,000 lbs.	
POWER	81 HP @ 1200	
ENGINE DISPLACEMENT	517 Cu. In.	
SHOVEL BOOM	19'-0"	
CROWD	One-piece Chain	
DIGGING RADIUS 45°	28'-1"	
CRANE BOOM (STD)	35' Pin-connected	
CRANE CAPACITY, 10' RAD.	27,300 lbs.	
BASES	Cast alloy steel	
GEARS	Helical Cut	
CLUTCHES	Mechanical power	
CRAWLER LENGTH	12' 6"	



BAY CITY



SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHHELLS

one of the best "bearing men" in the business, and his many friends will be glad to hear of the new affiliation.

☆ ☆ ☆

E. E. Richter & Son announces its appointment as Northern California distributor for the *Clark Equipment Co.* of Buchanan, Mich. The Clark line includes front and rear axles, transmissions, brakes, and differential and bevel gears.

☆ ☆ ☆

M. C. Lehmkuhl, District Manager of *Chicago Pneumatic Tool Co.*, New York, N. Y., announces three new distributors in Northern California. For the San Francisco Bay area, the *Bay Equipment Co.* of Richmond is appointed distributor. *Beeby Machinery Co.* of Sacramento will cover the Sacramento region, and the *Contractors Equipment & Supply Co.* of Fresno will cover the Fresno territory.

☆ ☆ ☆

E. R. Sternberg, Vice-president of the *Sterling Motors Corp.*, heavy duty truck manufacturer of Milwaukee, Wis., was a recent visitor to the Pacific Coast. His itinerary included Portland, Seattle, San Francisco, and Los Angeles.

☆ ☆ ☆

News of the Manufacturers

P. H. McMANUS has been appointed general sales manager of *Templeton, Kenly and Company*, Chicago manufacturer of Simplex Jacks. A veteran of 31 years service with the firm, McManus has been particularly active as salesman, district sales manager and assistant general sales manager. During recent years, he has devoted a major part of his time to field sales work with the many industrial distributors of Simplex Jacks from coast to coast.

☆ ☆ ☆

CARL G. NAYLOR, founder and president of the *Naylor Pipe Co.*, Chicago, died on Feb. 13 at the age of 70. He was instrumental in developing the first spiral-welded pipe and the equipment required in its production.

☆ ☆ ☆

JOHN S. THOMPSON and *ROBERT H. MADDAN, JR.*, have been named assistant managers of sales for the Central Sales Division of *Columbia Steel Co.*, United States Steel Corp. subsidiary. Thompson joined the Central Sales staff of Columbia Steel in 1932. Madden entered Columbia Steel Co. in 1933, serving in various departments of the Pittsburg Works, wire rope mill, and warehouse, before being attached to the Central Sales Division.

☆ ☆ ☆

JAMES F. McCARTNEY has been appointed General Sales Manager of the *Duff-Norton Manufacturing Co.*, Pittsburgh, Pa. McCartney will be in charge of all industrial, mining, and railroad sales of Duff-Norton jacks. Since 1948, he has

Tunnel . . .

California—Santa Barbara County—U.S.B.R.—Concrete-Lined

Carl M. Halvorson, Inc., and *H. Halvorson*, Portland, Ore., submitted the low bid at \$4,750,455 to the Bureau of Reclamation for all the work on the Tecolote Tunnel and access roads on the Santa Barbara Project. The work is situated about 10 mi. west of Santa Barbara. Completion time is 1,400 calendar days. The award was on Schedule 3. Two other schedules were bid, both for smaller portions of the project. Unit bids were submitted as follows:

(1) Carl M. Halvorson and H. Halvorson	\$4,750,455	(4) Arundel Corp. and L. E. Dixon Co.	\$5,374,380
(2) The Shea Co. and Morrison-Knudsen Co., Inc.	4,926,388	(5) Frazier-Davis Construction Co.	5,849,156
(3) Peter Kiewit Sons' Co.	4,930,668	(6) Shofner, Gordon & Hinman and Gafe-Callahan Construction Co.	6,295,979
		(7) Engineers' estimate	4,169,525
		(1) (2) (3) (4) (5) (6) (7)	700.00 207.00 225.00 500.00 700.00 500.00 350.00
85,000 cu. yd. excav., common, for rdwys. and rdwy. borrow	.60 .89 .33 1.00 1.15 2.00 .65		
1,000 cu. yd. excav., rock, for rdwys.	2.50 3.45 4.30 5.00 4.25 4.20 3.00		
300 cu. yd. excav., com., in open cut	2.00 .89 .80 7.50 2.50 6.00 2.50		
500 cu. yd. excav., rock, in open cut	3.00 3.45 4.70 7.50 7.00 6.00 5.00		
73,300 cu. yd. excav., all classes, in tunnel	44.00 39.27 48.00 46.00 59.00 49.00 34.00		
1,000 cu. yd. excav., all classes, for shaft and gate chamber	50.00 47.95 60.00 60.00 66.00 65.00 50.00		
3,000 cu. yd. excav., com., for struct.	2.00 2.76 2.20 4.00 3.50 2.50 2.50		
3,300 cu. yd. backfill	1.00 1.11 1.70 3.00 .90 1.10 1.25		
1,600 cu. yd. compacting backfill	2.00 3.62 2.40 3.50 2.50 3.90 3.00		
7,000 cu. yd. compacting emb. in bridge appr.	.50 1.38 .55 2.00 1.30 .95 .60		
1,000 cu. yd. sand road surf.	3.00 2.49 .90 2.50 3.50 .95 2.00		
700 cu. yd. gravel road surf.	5.00 5.25 4.00 6.00 5.00 1.75 3.50		
1,020,000 lb. furn. and install, perm. steel tunnel supports	.15 .25 .15 .40 .19 .35 .15		
732 M.b.m. furn. and erect, perm. timbering in tunnel	230.00 300.00 225.00 250.00 300.00 400.00 250.00		
25,000 lin. ft. drilling feeder or pilot holes	1.00 1.38 2.00 1.50 1.50 3.75 1.50		
15,000 lin. ft. drilling grout holes not more than 10 ft. deep	1.50 2.07 2.00 2.00 1.00 2.35 1.75		
15,000 lb. furn. and place grout pipe and conn.	.80 .69 1.50 1.00 .40 .95 .80		
30,000 cu. ft. pressure grouting	1.00 4.25 4.00 5.00 1.50 5.00 2.50		
5,000 bbl. furn. and handle Type I cement for grouting	4.50 6.42 3.50 6.00 7.00 7.50 5.00		
20,000 lb. furn. and install, weep pipes in tunnel lining	.80 1.38 1.50 1.00 2.00 .95 .50		
5,000 lin. ft. drilling weep holes	1.00 2.07 2.00 1.50 1.00 1.10 2.50		
20,480 cu. yd. concr. in tunnel lining	42.00 50.78 30.00 40.00 30.00 62.50 45.00		
525 cu. yd. conc. in shaft and gate chamb.	70.00 82.56 75.00 75.00 100.00 125.00 65.00		
45 cu. yd. conc. in structs.	90.00 82.56 75.00 75.00 125.00 350.00 75.00		
95,000 lb. furn. and pl. reinf. bars	.12 .145 .12 .14 .17 .18 .15		
200 lb. place metal water stops in joints	1.00 2.13 2.00 1.00 1.50 1.75 .40		
1,450 lin. ft. furn. and lay 18-in. dia. corr. metal pipe	4.50 4.82 2.95 6.00 2.50 5.50 4.00		
80 lin. ft. furn. and lay 24-in. dia. corr. metal pipe	6.00 7.02 4.70 8.00 6.50 8.70 6.00		
60 lin. ft. furn. and lay 30-in. dia. corr. metal pipe	8.00 8.82 5.85 10.00 8.50 12.00 7.50		
108 lin. ft. furn. and lay 60-in. dia. corr. metal pipe	25.00 27.71 14.85 30.00 32.00 36.00 22.50		
80 lin. ft. furn. and lay 72-in. dia. corr. metal pipe	30.00 34.04 17.85 35.00 40.00 46.00 27.00		
21 M.b.m. furn. and erect, timber in bridge	300.00 300.00 290.00 450.00 350.00 580.00 275.00		
3 cattle guards furn. and construct.	600.00 690.00 430.00 750.00 350.00 940.00 400.00		
50,000 lb. install, metalwork	.10 .25 .20 .22 .17 .30 .25		

Highway and Street . . .

Wyoming—Weston County—State—Grade and Surf.

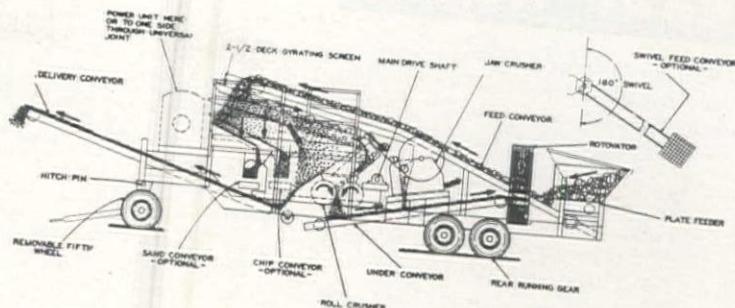
J. F. England Construction Co., Rapid City, South Dakota, was awarded a \$247,945 contract by the Wyoming State Highway Department for the grading, draining, selected material surfacing, 7 reinforced concrete culverts and miscellaneous work on approx. 7.6 mi. of the Newcastle-Lusk Road. Unit bids were submitted as follows:

(1) J. F. England Construction Co.	\$247,945	(2) Big Horn Construction Co.	\$270,318
(2) J. H. & N. M. Monaghan & Associates	253,833	(3) Taggart Construction Co.	270,509
(3) Boatright-Smith Co.	256,076	(4) S. Birch & Sons Construction Co.	270,852
(4) Sharrock & Purcell	257,858	(5) Northwestern Engineering Co.	281,103
(5) Cal M. Tebbs Construction Co.	258,629	(6) Leach Brothers	284,020
(6) H. F. Emma Construction Co.	261,195	(7) Platte Valley Construction Co.	285,681
(7) Knisely-Moore Co.	263,072	(8) Inland Construction Co.	325,453
(8) Lichly Construction Co. & Brasil & Whitehead	268,375	(9) Engineers' Estimate	285,950

SECTION I.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
340,000 cu. yd. excavation	.138 .136 .18 .145 .175 .165 .19						
63,500 cu. yd. selected matl. surf. (Type 2)	.31 .35 .34 .31 .31 .34 .36						
605,500 cu. yd. sta. overhaul	.01 .01 .01 .01 .01 .01 .01						
227,200 cu. yd. mi. haul	.11 .12 .11 .13 .12 .11 .14						
1,400 hr. sheepfoot roller operation	7.00 10.00 9.00 10.00 9.50 6.00 10.00						
180 hr. pneumatic tired roller operation	4.00 6.50 6.00 7.00 6.00 5.75 6.00						
110 hr. smooth steel roller operation	10.00 6.50 7.50 10.00 7.00 7.50 7.00						
5,600 M. gal. watering	2.50 2.00 2.00 2.00 1.80 1.80 2.25						
1,368 lin. ft. 18-in. std. R.C.P.	4.00 4.25 3.80 4.75 3.90 4.00 4.50						
432 lin. ft. 24-in. std. R.C.P.	5.50 6.00 5.50 6.25 5.35 5.00 6.25						
168 lin. ft. 30-in. std. R.C.P.	7.00 9.00 8.50 9.00 8.60 7.00 9.25						
120 lin. ft. 42-in. C.M.P.	9.00 11.00 10.00 9.00 9.50 11.00 10.75						
310 lin. ft. 48-in. C.M.P.	10.40 12.50 11.50 11.00 11.30 12.50 12.50						
116 lin. ft. 66-in. C.M.P.	18.60 20.00 20.00 13.00 19.25 15.00 22.50						
72 lin. ft. 72-in. C.M.P.	25.00 26.00 22.00 20.00 20.70 25.00 26.00						

(Continued on next page)

**Follow this
Flow of Material
to PROFIT**



**880 JUNIOR GRAVELMASTER
CONDENSED SPECIFICATIONS**

- 1024 or 1036 Roller Bearing Jaw Crusher.
- 2416 Roller Bearing Star Gear Drive Roll Crusher.
- 3' x 10' Roller Bearing 2 1/2-Deck Inclined Gyrating Screen.
- 6'-2" x 19' Rotovator.
- 24" Wide Conveyors. Sealed-for-life bearings.
- Plant Mounted Power or Side Drive through Universal joint.
- Countershaft for Main Drive permits choice of 1000 to 1600 RPM plant-mounted power units.
- Maximum use of V-Belt drives.
- Sand removal standard. Conveyor optional.
- Chip removal standard. Conveyor optional.
- Overall height—12'-6".
- Passes state weight limitations.

CAPACITY—60—90 yards per hour—1" based on 25% crushing with 1024 jaw crusher. For more than 25% crush, the 1036 is recommended.

**MORE FOR YOUR MONEY
WITH UNIVERSAL "STREAM-FLO" ENGINEERING**

UNIVERSAL'S "Scalping Deck" method of screening assures more effective screening, faster material flow. The heavy top "scalping deck" protects the finish deck from materials too large for the rolls and permits the lower screening area to be fully utilized. The screen is mounted at an incline giving faster separation for higher capacity, better gradation for meeting the most exacting specifications. No screenable material is carried over to choke the crushers. Material too large for the rolls is scalped to the jaw crusher. Only sized material goes to the rolls. This means greater capacity, less jaw and roll wear, lower horsepower requirements.

Only UNIVERSAL offers the superior advantages of "Stream-Flo" Engineering to give you more for your money in performance, in economy... in more tons per hour at less cost per ton. With all their extra value you don't pay a premium for a UNIVERSAL Gravelmaster. Made in 4 sizes with capacities up to 200 yards of -1" per hour. Investigate now. Write for complete details.

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Phone 7105

4700 W. Division St., CHICAGO 51, ILLINOIS
Phone SPaulding 2-9300

Nevada Equipment Service, Inc. Reno, Nevada
The Harry Cornelius Co., Albuquerque, New Mexico
J. K. Wheeler Machinery Co., Salt Lake City 1, Utah
Cheyenne Truck Equip. Co. Cheyenne, Wyoming

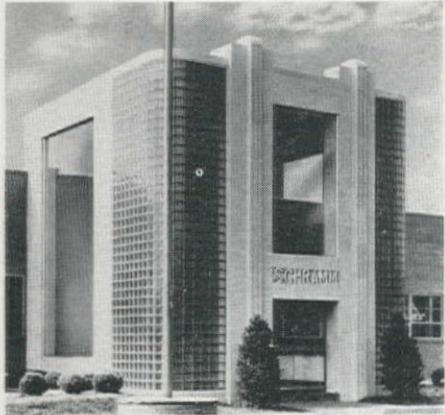
State Tractor & Equipment Co. Phoenix, Arizona
Industrial Equipment Co. Los Angeles 11, Calif.
Moore Equipment Co., Inc., Stockton & Fresno, Calif.
Bay Cities Equipment, Inc. Oakland 7, Calif.

TRADE WINDS

been Eastern District Sales Manager for the company. Before joining Duff-Norton, he spent several years with the *Pressed Steel Car Co.*

☆ ☆ ☆

Schramm, Inc., West Chester, Pa., manufacturer of air compressors, is celebrating its fiftieth anniversary this year. Starting with a modest little machine shop in Phila-



delphia in 1900, Schramm compressors are now built in a large, modern factory covering a 17 acre area. CHRIS D. SCHRAMM, the founder, originally dedicated his business to servicing and selling gas engines. The firm developed the first complete portable engine-driven compressor in 1908. There followed in rapid succession many new ideas and improvements in compressor design that have made Schramm, Inc., a recognized leader in the portable compressor field. The cut shows the main entrance to the Schramm plant at West Chester.

☆ ☆ ☆

R. G. LeTourneau, Inc., Peoria, Ill., has a new advertising manager in the appointment of JOE H. SERKOWICH, named to succeed EUGENE E. WEYENETH. Weyeneth, with LeTourneau since 1939, has resigned to accept a position with the McGraw-Hill Publishing Company. Serkowich joined LeTourneau in March, 1948, as Assistant Advertising Manager, after many years' experience in the industrial advertising and heavy machinery field. He was in the advertising department of *Caterpillar Tractor Co.* from 1936 to 1941, and after the war was with *Hosler Advertising, Inc.*, from 1946 to 1948, serving industrial accounts.

☆ ☆ ☆

LEE A. GINZEL, secretary and advertising director of the *Baker Manufacturing Co.*, Springfield, Ill., died Jan. 17. He had been associated with the company since its incorporation 41 years ago.

☆ ☆ ☆

Yeomans Brothers Co., Chicago manufacturer of pumps and sewage treatment equipment, has appointed SPAULDING NORRIS to the position of Assistant Sales Manager of the Pump Division. He was formerly associated with *William A. Da Lee, Inc.*, Yeoman's representative in Detroit, Mich.

400 cu. yd. excav. for pipe culverts	1.00	1.50	1.00	1.50	1.75	1.50	1.75
1,215 cu. yd. struct. excav.	2.00	2.50	2.00	2.00	3.25	5.00	2.50
938.6 cu. yd. Class B concrete	47.50	43.50	40.00	44.00	44.00	50.50	45.00
90,070 lb. reinforcing steel	.111	.12	.115	.14	.12	.115	.13
810 hr. mechanical tamping	3.50	5.50	5.00	5.00	4.85	5.00	6.00
130 cu. yd. Class 1 riprap	16.00	8.00	12.00	14.00	10.00	15.00	15.00
50 cu. yd. Class 2 riprap	10.00	5.00	8.00	13.00	7.25	12.00	13.00
15 cu. yd. grouted riprap	30.00	20.00	15.00	16.00	17.00	25.00	20.00
73,000 lin. ft. std. r/w fence	.25	.35	.21	.23	.19	.23	.23
114 each brace panels	18.30	17.00	15.00	18.00	15.00	15.00	15.00
52 each end panels	22.90	21.25	19.00	23.00	19.00	19.00	17.00
35 each r/w markers	9.00	8.00	10.00	12.00	7.00	10.00	10.00
1.8 each providing and maint. field testing lab. bldg.	400.00	500.00	500.00	300.00	450.00	450.00	600.00
600 cu. yd. special backfill	1.00	1.50	1.00	2.00	2.50	2.00	2.00

SECTION II.

36,000 cu. yd. excavation	.138	.136	.18	.145	.175	.165	.19
6,100 cu. yd. selected matl. surf. (Type 2)	.31	.35	.34	.31	.31	.34	.36
47,500 cu. yd. sta. overhaul	.01	.01	.01	.01	.01	.01	.01
31,700 cu. yd. mi. haul	.11	.12	.11	.13	.12	.11	.14
140 hr. sheepfoot roller operation	7.00	10.00	9.00	10.00	9.50	6.00	10.00
20 hr. pneumatic tired roller operation	4.00	6.50	6.00	7.00	6.00	5.75	6.00
15 hr. smooth steel roller operation	10.00	6.50	7.50	10.00	7.00	7.50	7.00
560 M. gal. watering	2.50	2.00	2.00	1.80	1.80	2.25	
256 lin. ft. 18-in. std. R.C.P.	4.00	4.25	3.80	4.75	3.90	4.00	4.50
92 lin. ft. 36-in. std. R.C.P.	9.00	12.00	11.00	11.00	10.90	9.40	11.75
78 lin. ft. 84-in. C.M.P.	35.00	35.00	29.00	26.00	27.65	32.50	34.00
100 cu. yd. excav. for pipe culverts	1.00	1.50	1.00	1.50	1.75	1.50	1.75
60 hr. mechanical tamping	3.50	5.50	5.00	5.00	4.85	5.00	6.00
8,100 lin. ft. std. r/w fence	.25	.235	.21	.23	.19	.23	.23
16 each brace panels	18.30	17.00	15.00	18.00	15.00	15.00	15.00
8 each end panels	22.90	21.25	19.00	23.00	19.00	19.00	17.00
3 each r/w markers	9.00	8.00	10.00	12.00	7.00	10.00	10.00
.2 each prov. and maint. field testing lab. bldg.	400.00	500.00	500.00	300.00	450.00	450.00	600.00

Washington—Adams County—State—Grade & Surf.

Harold T. Mast, Colfax, Wash., with a bid of \$351,292, was low before the Washington Department of Highways for the grading, draining and bituminous surfacing of 7.56 mi. of Primary State Highway No. 11 from Paha to Ritzville. Unit bids were submitted as follows:

(1) Harold T. Mast	\$351,292	(5) Colonial Construction Co.	\$459,393
(2) C. & E. Construction Co.	398,603	— J. D. Shotwell Co.	533,516
(3) Roy L. Bair & Co.	406,818	— Erickson Paving Co.	536,670
(4) C. E. Oneal	425,978		

	(1)	(2)	(3)	(4)	(5)
89,370 cu. yd. com. excav. incl. haul of 600 ft.	.70	.65	.30	.29	.85
98,600 cu. yd. solid rock excav. incl. haul of 600 ft.	.70	.65	1.06	1.35	.85
130 cu. yd. com. trench excav. incl. haul of 600 ft.	2.00	1.00	2.00	2.00	1.00
4,000 cu. yd. strip, borrh. and surf. pits. incl. haul of 600 ft.	.10	.10	.30	.22	.20
112,650 cu. yd. sta. overhaul	.01	.02	.01	.01	.02
1,130.91 M. cu. yd. sta. overhaul	5.00	8.00	5.00	5.00	5.00
1,015 cu. yd. structure excav.	2.00	3.00	4.00	2.00	4.00
68 days mechanical tamper	20.00	35.00	40.00	10.00	35.00
10,450 lin. ft. slope treatment class A	.10	.13	.10	.10	.10
399.2 (sta. 100-ft.) finishing roadway	10.00	8.00	10.00	10.00	10.00
3,048 M. gal. water in place	2.00	3.50	4.00	3.00	3.00
30,180 ton cr. stone surf. top course in place	1.20	1.45	1.35	1.50	1.65
27,210 ton cr. stone surf. base course in place	1.00	1.20	1.30	1.25	1.58
6,000 ton cr. stone surf. top course in stockpile	1.10	1.00	1.00	1.20	1.30
6,000 ton cr. cover stone in stockpile	1.10	1.00	1.00	1.25	1.35
60,850 ton ballast in place	.90	1.05	1.25	1.20	1.45
Mineral Aggregate for Non-skid Single Seal Treatment, Schedule A, in Stockpile					
4,000 ton coarse cr. screen, 5/8-in. - 1/4-in. in stockpile	1.10	1.50	1.35	1.50	1.35
2,000 ton fine cr. screen, 1/4-in. to 0-in. in stockpile	1.00	1.50	1.35	1.50	1.35
Light Bituminous Surface Treatment Method A					
7.6 mi. preparation, construction, finishing	200.00	230.00	200.00	250.00	200.00
244 ton asphalt cement MC-3 in place	40.00	44.55	42.00	39.25	42.00
2,120 cu. yd. placing cr. cover stone from stockpile	1.50	1.45	1.35	1.35	1.35
Miscellaneous Items					
359 cu. yd. concrete Class A in place	50.00	98.00	57.00	65.00	50.00
56,060 lb. steel reinforcing bars in place	.10	.15	.13	.12	.12
72 lin. ft. conc. or V.C. dr. pipe 6-in. diam. in place	1.00	1.00	1.50	1.00	1.50
1,596 lin. ft. std. reinf. conc. culv. pipe 18-in. diam. in place	3.40	3.80	5.00	3.50	4.20
1,464 lin. ft. std. reinf. conc. culv. pipe 24-in. diam. in place	5.00	5.00	6.00	4.75	5.50
276 lin. ft. std. reinf. conc. culv. pipe 36-in. diam. in place	9.00	9.00	12.00	9.80	10.00
2,145 lin. ft. std. bm. gd. rl. No. T, No. 1 or 2, Des. 6 in place	2.50	2.55	3.00	2.45	2.40
58 only reinf. conc. right-of-way markers in place	4.00	5.00	5.00	5.00	5.00
10 only reinf. conc. spot posts in place	4.00	10.00	8.00	10.00	10.00
100 lin. ft. relaying water pipe 3/4-in. diam.	.25	1.00	1.00	1.50	1.00
30 lin. ft. relaying conc. pipe 18-in. diam.	1.50	1.50	3.00	2.00	3.00
48 lin. ft. relaying conc. pipe 24-in. diam.	2.00	2.00	4.00	2.00	3.00
68 only, removing concrete headers	10.00	10.00	15.00	5.00	25.00
637 lin. ft. removing cable guard rail	.25	1.00	.30	.20	1.00

California—Napa County—State—Grade & Surf.

Fredrickson Bros., Emeryville, with a bid of \$239,505, was low bidder before the California Division of Highways for the grading, draining and surfacing with plantmix surfacing on crusher run base of 3.1 mi. between Foster Road and Union Station. Unit bids were submitted as follows:

(1) Fredrickson Bros.	\$239,505	(5) J. R. Armstrong	\$276,242			
(2) Rice Bros., Inc.	239,917	— Harms Bros.	283,150			
(3) C. M. Syar	240,056	— Chittenden & Chittenden	283,683			
(4) Parish Bros.	257,448	— Brown-Ely Co. & E. A. Forde	287,007			
(5) Granite Construction Co.	258,822	— Oilfields Trucking Co. & Phoenix Construction Co.	288,779			
(6) Mumm & Perkins	265,038	— A. Teichert & Son, Inc.	288,798			
— A. G. Raisch Co.	267,852	— J. Henry Harris	297,522			
— Eugene G. Alves	268,372	— McGillivray Construction Co.	315,968			
— Lee J. Immel	274,347	(1) (2) (3) (4) (5) (6)				
930 cu. yd. removing concrete	2.00	2.00	2.90	3.00	2.00	2.50
Lump sum, clearing and grubbing	\$2,000	\$12,261	\$5,325	\$6,700	\$10,000	\$5,700
20,400 cu. yd. roadway excavation	.35	.27	.33	.40	.45	.55
66,000 sq. yd. compacting original ground	.04	.055	.03	.04	.04	.05
1,400 cu. yd. structure excavation	2.50	2.00	2.35	2.90	2.50	2.00
450 cu. yd. ditch and channel excav.	1.50	1.50	1.20	1.30	2.50	1.00
600,000 sta. yd. overhaul	.006	.004	.005	.005	.004	.01
750 sq. yd. cultivating areas	.07	.15	.23	.25	.20	.30
49,000 cu. yd. imported subbase material	.90	.91	.75	.80	.90	1.00
Lump sum, dev. wat. supp. and furn. wat. equip.	\$1,250	\$1,500	\$3,500	\$3,700	\$3,000	\$2,500

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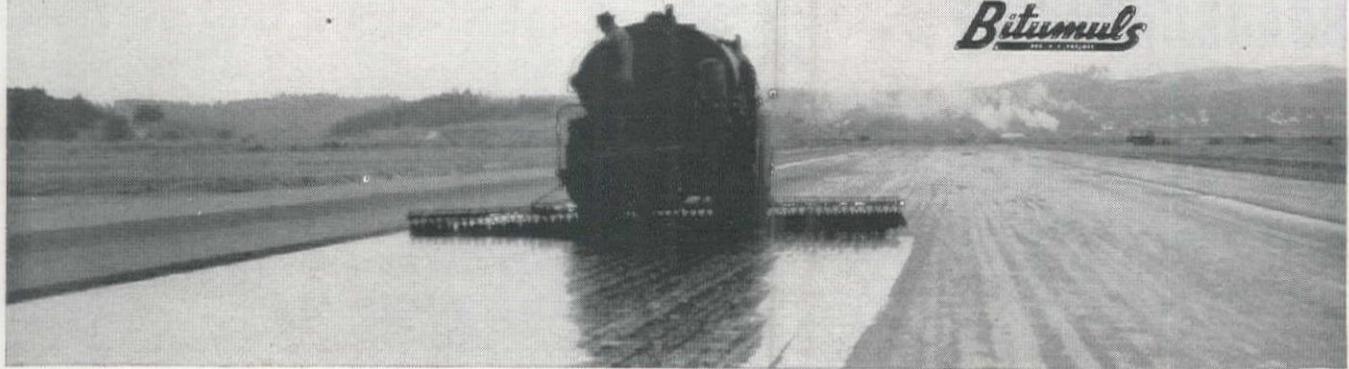
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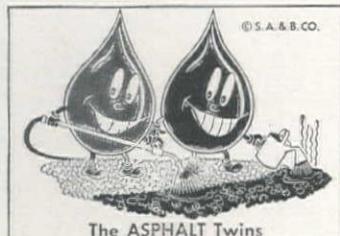
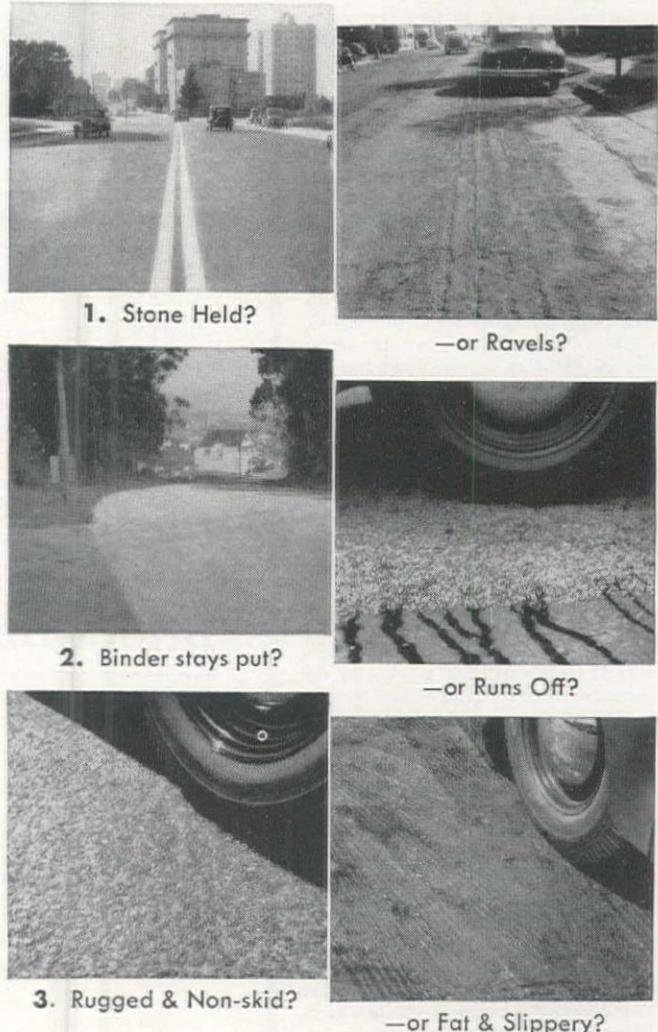
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Multiple Taxes Entitle Car Owners to Adequate Roads

The deficiency in highways is enormous. Estimates of this deficit range as follows: \$11 Billion by U.S. Bureau of Public Roads; \$20 Billion by Joint Economic Committee of Congress; \$30 Billion by American Association of State Highway Officials and \$60 Billion by the American Road Builders Association.

This confronts Road Builders with a challenge to become better Road Salesmen concentrating on the job of selling all citizens on insisting that legislators appropriate monies to wipe out the road deficit.

Point out to them that the visible and hidden taxes they pay on motor vehicles, gasoline, etc., entitles them to adequate all-weather roads. Also, considering what's at stake, they can be built relatively cheap by contract—the American way of giving the "undiverted" highway dollar highest possible purchasing power.



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4,900 M. gal. applying water	1.40	1.05	1.00	1.00	1.25	1.20
163 sta. finishing roadway	12.00	12.00	9.40	15.00	10.00	10.00
28,000 ton crusher run base	2.10	2.00	2.20	2.45	2.30	2.15
92 ton liq. asph. SC-1 (pr. ct. & pen. tr.)	30.00	22.15	23.40	28.00	30.00	26.50
71 ton asphaltic emuls. (sl. ct. & pt. bin.)	32.00	26.70	29.00	32.00	30.00	35.00
410 ton screenings	5.00	5.05	4.90	5.00	5.00	6.00
600 ton paving asph. (P.M.S.)	20.00	17.21	16.00	22.50	18.00	20.00
12,000 ton mineral aggr. (P.M.S.)	4.50	4.45	4.50	4.65	4.75	4.90
162 cu. yd. Class "A" P.C.C. (structures)	46.00	52.50	88.00	46.50	60.00	55.00
38 cu. yd. Class "B" P.C.C. (curbs)	30.00	42.00	40.00	29.00	42.00	40.00
19,000 lb. bar reinforcing steel	.10	.126	.09	.085	.11	.09
45 cu. yd. broken conc. riprap	12.00	9.50	6.00	16.00	6.00	10.00
167 ea. right-of-way monuments	4.50	5.25	4.00	4.50	5.00	5.00
620 lin. ft. metal plate guard railing	3.50	3.10	2.90	3.75	3.00	4.00
70 ea. install metal culv. markers & clear. markers	4.00	3.75	2.35	3.00	5.00	3.50
6.1 mi. new property fence	\$1,230	\$1,100	\$1,200	\$1,250	\$1,200	\$1,200
2 ea. horizontal reflector units	5.00	10.50	6.00	7.50	20.00	10.00
700 lin. ft. 12-in. reinf. conc. pipe (std. str.)	2.25	1.80	2.20	1.90	2.00	3.00
96 lin. ft. 12-in. reinf. conc. pipe (3,000 D.)	2.65	2.25	2.65	2.50	2.50	3.50
444 lin. ft. 18-in. reinf. conc. pipe (std. str.)	3.65	3.00	3.40	3.05	3.00	3.50
88 lin. ft. 18-in. reinf. conc. pipe (3,000 D.)	4.25	3.45	4.00	4.00	4.00	4.50
136 lin. ft. 24-in. reinf. conc. pipe (std. str.)	5.75	4.60	5.55	5.15	5.00	5.00
284 lin. ft. 30-in. reinf. conc. pipe (3,000 D.)	8.80	7.55	9.40	8.35	9.00	10.00
228 lin. ft. 42-in. reinf. conc. pipe (std. str.)	12.00	11.00	13.00	12.40	12.00	13.50
30 lin. ft. 15-in. C.M.P. (16 gauge)	3.25	3.70	3.50	2.70	3.00	2.50
21 ton sand (pen. tr. and backfill)	5.00	4.00	4.70	5.00	5.00	6.00
Lump sum, removing existing buildings	200.00	450.00	250.00	575.00	400.00	950.00

New Mexico—Grant and Hidalgo Counties—State—Grade & Surf.

Skousen-Hise Contracting Co., Albuquerque, with a bid of \$507,849, was awarded a contract by the New Mexico State Highway Department for the grading, draining and bituminous surfacing of 10.3 mi. of the Lordsburg-Deming Road. Unit bids were submitted as follows:

(1) Skousen-Hise Contracting Co.	\$507,849	(5) Lee Moor Construction Co.	\$572,825
(2) W. T. Bookout Construction Co.	513,401	— Allison & Haney	581,992
(3) Brown Contracting Co.	525,690	— Sharp & Fellows	604,594
(4) Armstrong & Armstrong	546,614	(6) Engineers' Estimate	602,627

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, removal of old structures	\$2,500	\$1,887	\$11,000	\$3,500	\$3,500	\$6,500
Lump sum, removal of obstructions	100.00	50.00	100.00	25.00	25.00	100.00
182,500 cu. yd. excavation—unclassified	.20	.23	.21	.25	.24	.25
270 cu. yd. excavation for strcts.	2.00	2.00	2.00	2.25	2.00	1.50
1,975 cu. yd. excavation for pipe culverts	2.00	1.50	2.00	.30	1.00	1.50
271,780 sta. yd. overhaul	.01	.02	.02	.02	.02	.02
74,000 ½ mi. yd. overhaul	.06	.0675	.07	.04	.06	.06
674,290 ton mi. haul	.055	.055	.04	.02	.06	.08
4,422 hr. mechanical tamping	4.00	3.00	2.00	3.75	4.00	5.00
1,513 hr. rolling—sheepfoot roller	4.00	2.00	4.00	3.50	4.00	5.00
497 hr. rolling—steel tired roller	6.00	5.00	7.00	5.50	6.00	5.00
1,579 hr. rolling—pneumatic tired roller	3.50	2.00	4.00	3.50	3.00	5.00
36,190 ton ballast	.52	.42	.71	.64	.55	.60
48,100 ton leveling course	.57	.52	.85	.83	.70	.65
6,200 M. gal. watering	2.00	2.15	.50	2.00	1.50	3.00
500 cu. yd. Class "AE-AR" concrete	45.00	40.00	35.00	46.00	42.00	50.00
71,620 lb. reinforcing steel	.10	.10	.10	.105	.10	.13
272 lin. ft. stand. reinf. conc. pipe—24-in. diam.	4.00	4.00	3.45	4.25	5.00	3.50
24,980 lin. ft. stand. reinf. conc. pipe—30-in. diam.	4.70	4.80	4.65	5.65	5.60	5.00
6,480 lin. ft. stand. reinf. conc. pipe—36-in. diam.	5.60	6.40	5.50	6.50	6.70	6.50
67,350 lin. ft. galvanized barbed wire fence	.11	.19	.13	.13	.14	.13
2 each, gates—Texas type	10.00	10.00	10.00	7.00	10.00	10.00
44 each, bracing	5.00	5.00	5.00	5.50	6.00	5.00
38 each, treat. timb. warn posts reflect (6-in. diam.)	7.00	6.00	6.00	6.50	8.00	7.00
61 each, right-of-way markers	6.00	6.00	6.00	5.50	6.00	5.00
10.0 mi. obliterating old road	300.00	110.00	100.00	150.00	200.00	200.00
3,106 bbl. cutback asphalt—Type RC-2	5.80	4.85	5.80	6.25	6.00	6.50
10,051 ton hot plant asphaltic surfacing	4.25	5.40	5.50	4.30	5.05	5.50
3,460 bbl. 85-100 asphalt (for hot plant asph. surf.)	5.80	4.75	6.80	7.00	6.75	6.50
10,279 mi. asphalt processed base	500.00	500.00	600.00	500.00	400.00	500.00

Bridge and Grade Separation . . .

California—Los Angeles County—State—Concrete Box Girder

Spencer Webb Co., Los Angeles, with a bid of \$377,131, was low bidder before the California Division of Highways for construction of a reinforced concrete girder bridge for an overcrossing over the Hollywood Freeway and an outlet ramp at Hill St. in Los Angeles. Unit bids were submitted as follows:

(1) Spencer Webb Co.	\$377,131	(5) J. E. Haddock, Ltd.	\$437,750
(2) Guy F. Atkinson Co.	396,208	— Frank T. Hickey, Inc. & Byers and Sons	447,266
(3) Charles MacClosky Co.	410,843	— Griffith Co.	460,861
(4) Erickson, Phillips & Weisberg	412,838	— Oberg Bros.	471,802
(5) Charles J. Rounds & Lars Oberg	422,799	— C. Bongiovanni	476,769
(6) C. B. Tuttle Co.	422,805	— Normal I. Fadel	524,936
(7) W. J. Disteli & R. J. Daum Construction Co.	427,912		
	(1)	(2)	(3)
1,200 cu. yd. removing concrete	2.50	2.50	2.25
120,000 cu. yd. roadway excavation	.50	.55	.65
6,450 cu. yd. structure excavation (bridge)	1.10	1.80	1.75
3,500 cu. yd. structure backfill (bridge)	2.00	1.60	2.00
267 ton mineral aggregate (P.M.S.)	5.00	5.00	5.00
13 ton paving asphalt (P.M.S.)	15.00	25.00	20.00
5,240 cu. yd. Class "A" P.C.C. (structure)	38.00	39.00	41.00
4 cu. yd. Class "C" P.C.C. backfill	20.00	25.00	30.00
164 lin. ft. rubber waterstops	2.00	2.00	4.00
29,500 lb. miscl. iron and steel	.25	.25	.26
108 sq. yd. membr. waterproofing	2.50	4.00	5.00
1,053,000 lb. bar reinforcing steel	.073	.073	.067
696 lin. ft. steel railing	7.00	6.00	6.00
512 lin. ft. remov. and salv. metal plate guard rail	1.00	.50	1.50
70 lin. ft. 6-in. cast iron soil pipe	3.50	3.00	5.00
Lump sum, electrical equipment	\$2,000	\$1,852	\$1,300
30 lin. ft. 6-in. std. str. vitr. clay pipe (san. sew.)	3.50	10.00	7.00
630 lin. ft. 8-in. std. str. vitr. clay pipe (san. sew.)	3.50	6.00	4.50
450 lin. ft. 8-in. extra str. vitr. clay pipe (san. sew.)	7.00	12.00	9.00
1 ea. terminal manhole "Q" (sanitary sewer)	200.00	400.00	200.00
4 ea. manhole "B" (sanitary sewer)	225.00	500.00	200.00
1 ea. junction chamber "F" (sanitary sewer)	275.00	500.00	250.00

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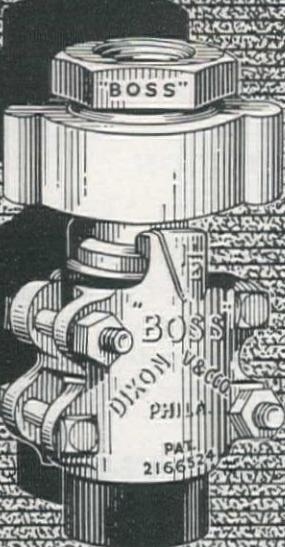
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Irrigation . . .

Wyoming—Fremont County—U.S.B.R.—Buried Membrane

Sharrock & Pursel, Casper, was low before the Bureau of Reclamation for construction of buried asphaltic membrane lining between Stations 883 plus 00 and 1606 plus 00 of the Wyoming Canal on the Riverton Project. Units bids were submitted as follows:

(1) Sharrock & Pursel	\$48,850	— James M. Pope	\$57,828
(2) Woodward Construction Co.	48,950	— Inland Construction Co.	64,900
(3) Brasel & Whitehead	49,350	— Taggart Construction Co.	73,562
(4) Morrison-Knudsen Co., Inc.	55,240	(5) Engineers' estimate	61,630
— W. E. Barling, Inc.	55,975		
		(1) (2) (3) (4) (5)	
138,000 sq. yd. rolling		.03 .03 .04 .03 .06	
25 M gal. sprinkling of subgrade		10.00 20.00 18.00 10.00 10.00	
870 ton furn. catalytically blown asphalt		40.00 43.00 34.00 41.00 42.00	
138,000 sq. yd. applying catalytically blown asphalt		.07 .05 .10 .11 .12	

California—Kern County—U.S.B.R.—Earthwk., Conc. Lining & Struct.

Peter Kiewit Sons' Co., Porterville, Calif., with a total bid of \$3,176,814, was low before the Bureau of Reclamation at Friant, Calif., for earthwork, concrete lining and structures of the Friant-Kern Canal. The work is situated near Delano. The bidding was on two schedules. Schedule No. 1 covered the work from Station 6076 plus 15 to Station 6441 plus 90 and Station 6549 plus 55 to Station 6996 plus 10. Schedule No. 1 is from Station 6976 plus 15 to Station 6995 plus 10. Unit bids were submitted as follows:

	Sched. No. 1	Sched. No. 2	Total
(1) Peter Kiewit Sons' Co.	\$2,859,250	\$317,563	\$3,176,814
(2) Western Contracting Corp.	2,778,615	399,765	3,178,380
(3) Ashbach-Steenberg Co., Inc.	3,169,096	451,894	3,620,991
(4) A. Teichert & Son	3,279,026	438,120	3,717,146
(5) Parish Brothers	3,374,878	433,068	3,817,946
— Clyde W. Wood, Inc.		396,721	
— L. A. and R. S. Crow		389,104	
— John Delphia		436,475	
— George E. France, Inc.		457,421	
— M.J.B. Construction Co.		499,366	
(6) Engineer's Estimate	3,506,769	581,461	4,088,230

SCHEDULE No. 1

	(1)	(2)	(3)	(4)	(5)	(6)
2,242,500 cu. yd. excavation for canal	.14	.125	.157	.17	.235	.18
9,500 cu. yd. excav. for drainage channels and dikes	.20	.27	.18	.75	.25	.24
1,620,000 sta. cu. yd. overhaul, 500 ft. to 1,600 ft. haul	.02	.01	.02	.015	.015	.02
415,000 sta. cu. yd. overhaul, over 1,600 ft. haul	.01	.01	.02	.01	.015	.015
610,500 cu. yd. compacting embankments	.20	.19	.215	.17	.27	.30
136 acre clearing orchards and vineyards	50.00	65.00	30.25	150.00	75.00	100.00
70 acre grubbing orchards and vineyards	60.00	65.00	30.20	100.00	100.00	90.00
52,000 cu. yd. excavation for structures	.55	1.50	.85	1.00	.88	.90
768,725 sq. yd. trimming earth founda. for conc. lining	.24	.25	.29	.40	.36	.40
5,555 cu. yd. riprap	7.00	6.00	9.08	6.00	6.00	5.50
35,675 cu. yd. backfill	.55	.45	.44	.50	.40	.50
17,000 cu. yd. backfill at top of canal lining	1.00	.55	.72	.70	.70	.60
15,100 cu. yd. compacting backfill	2.50	3.50	3.52	3.00	3.35	3.00
6,020 cu. yd. concrete in structures	50.00	52.00	48.64	50.00	46.00	50.00
4,280 cu. yd. concrete in bridge	53.00	61.00	48.15	50.00	48.00	60.00
205 cu. yd. concrete in paving slabs	37.00	26.00	48.64	30.00	20.00	35.00
74,200 cu. yd. concrete in unrein. conc. canal lining	10.40	9.00	12.16	13.00	12.50	12.00
128,560 bbl. furnishing and handling cement	3.10	3.00	3.63	3.50	3.25	4.25
80,000 lb. placing reinf. bars furn. by the Govt.	.04	.04	.05	.03	.052	.06
1,709,000 lb. turn. and placing reinf. bars	.09	.08	.084	.075	.085	.10
1,000 sq. ft. furn. and placing 1/2-in. elastic filler matl. in joints	1.50	1.35	1.50	1.50	1.75	1.50
1,500 sq. ft. furn. and placing 1-in. elastic filler matl. in joints	2.25	2.40	2.41	2.50	3.00	2.25
4,480 lin. ft. placing rubber water stops in joints	1.50	1.45	1.59	1.50	1.50	1.50
12,300 lb. furn. and placing metal water stops in joints	.46	.40	.43	.30	.40	.30
23 M.B.M. furn. and erecting timber in structs.	270.00	200.00	250.00	300.00	300.00	225.00
147 M.B.M. erect. timber, furn. by Govt. in structs.	120.00	125.00	172.50	200.00	145.00	100.00
8 cattle guard const. cattle guards	200.00	115.00	131.00	250.00	325.00	175.00
11 mi. erecting barbed-wire right-of-way fence	400.00	580.00	484.00	500.00	575.00	500.00
2 mi. erect. comb. barbed-wire and woven-wire right-of-way fence	500.00	730.00	484.00	600.00	600.00	600.00
675 lin. ft. furn. and erecting chain-link fence	1.50	1.55	1.63	2.50	2.00	3.00
70 gate furn. and install metal fence gates in right-of-way fence	30.00	45.00	36.06	40.00	50.00	40.00
4,500 lin. ft. furn. mats. and const. graded sand and gravel drains without sewer pipe	1.80	1.35	1.55	1.50	1.75	1.50
6,600 lin. ft. furn. mats. and const. graded sand and gravel drains with 6-in. sewer pipe	2.40	1.70	2.20	2.00	2.50	2.50
20 box furn. mats. and install underdr. outlet boxes	25.00	25.00	56.87	50.00	50.00	50.00
50 cu. yd. furn. mats. and const. reverse filters	12.00	16.50	11.62	15.00	15.00	10.00
100 lin. ft. furn. and placing 4-in. and 6-in. sewer pipe in reverse filters and in outlets and vents	3.00	1.80	1.45	2.00	2.50	2.00
62 lin. ft. furn. and install 8-in. corr. metal pipe down drains	12.00	2.05	2.29	2.00	10.00	2.25
60 lin. ft. furn. and lay 15-in. diam. corr. metl. pipe	4.00	4.70	4.45	3.00	3.00	3.10
144 lin. ft. furn. and lay 18-in. diam. corr. metl. pipe	5.00	4.90	4.80	4.00	3.50	3.70
375 lin. ft. furn. and lay 24-in. diam. corr. metl. pipe	6.00	5.80	6.10	5.00	5.00	5.40
60 lin. ft. furn. and lay 30-in. diam. corr. metl. pipe	7.00	6.40	7.33	6.00	7.00	7.00
152 lin. ft. furn. and lay 36-in. diam. corr. metl. pipe	9.00	8.30	10.47	9.00	10.00	10.00
350 lin. ft. remov., salv. and stock-piling metal pipe, all sizes	2.00	1.35	1.45	1.00	2.50	1.25
2,245 lin. ft. lay. metl. pipe 6-in. to 12-in. diam., incl.	1.50	1.45	1.21	1.50	1.00	1.25
2,150 lin. ft. laying metal pipe 14-in. and 16-in. diam.	1.75	1.45	1.69	1.80	1.50	1.75
135 lin. ft. laying 14-in., 16-in. and 18-in. diam. pre-cast-concrete pipe	2.00	2.05	3.13	3.00	2.50	2.00
115 lin. ft. laying 24-in. diam. precast-conc. pipe	4.00	2.30	3.51	4.00	3.00	3.00
140 lin. ft. install. 30-in. diam. precast-conc. st'd pipe 6 gate & hoist furn. and install. 3-ft. 0-in. by 3-ft. 0-in. slide gates and gate hoists in structs.	11.00	2.70	6.66	8.00	6.00	8.00
45,600 lb. installing radial gates	.06	.16	.16	.15	.10	.10

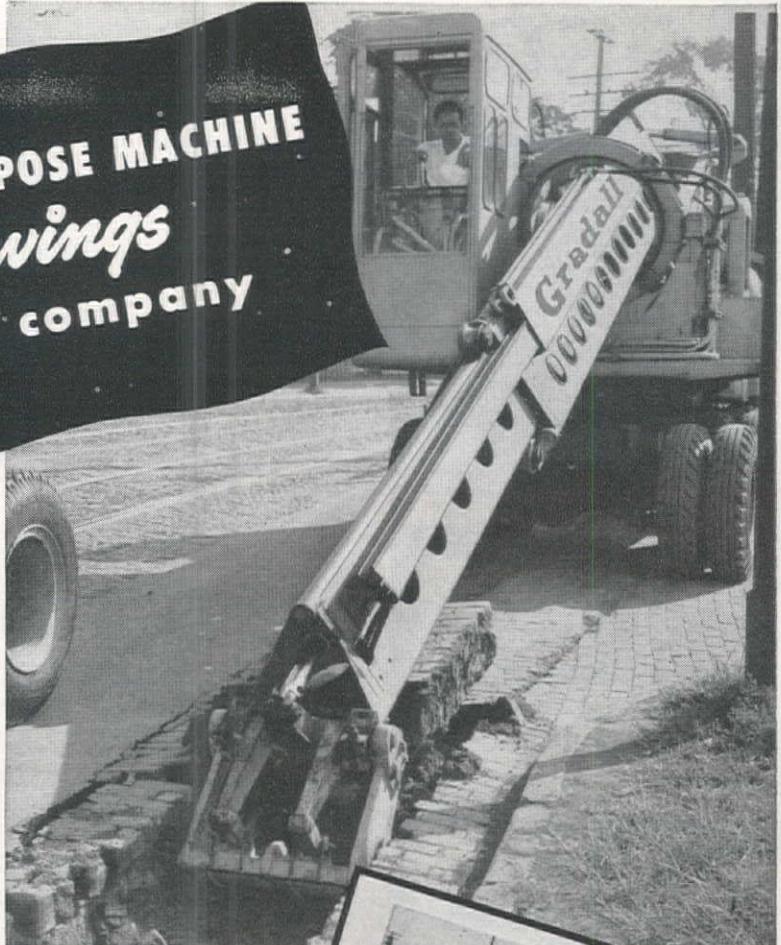
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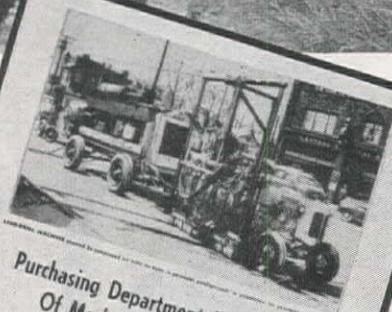


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11,800 lb. installing radial-gate hoists and oper. mech.	.08	.16	.16	.17	.20	.14
110,300 lb. installing misc. metalwork	.11	.16	.24	.20	.20	.20
160 lin. ft. erecting and dismantling metal railing	2.40	2.15	2.66	2.00	4.00	2.00
190 lin. ft. furn. and install. elect. metal conduit, $\frac{3}{4}$ -in. and less in diam.	1.50	2.50	1.27	2.00	2.00	1.25
180 lin. ft. furn. and install. elect. metal conduit, $\frac{1}{2}$ -in. in diam.	2.00	2.60	1.88	2.50	2.60	1.75
20 lin. ft. furn. and install. elect. metal conduit, $\frac{2}{3}$ -in. in diam.	2.50	2.85	3.71	4.00	4.00	2.50
180 lb. furn. and install. elect. condcts. and gd. wires	2.00	1.50	2.14	2.00	2.25	1.75
1,950 lin. ft. furn. and driving steel bearing piles	4.00	5.40	4.24	4.00	5.00	4.00
86,000 lb. erecting struct. steel	.05	.04	.04	.05	.08	.07

SCHEDULE No. 2

	(1)	(2)	(3)	(4)	(5)	(6)
160,000 cu. yd. excavation for canal	.15	.11	.175	.20	.17	.20
634,000 cu. yd. excav., borrow, for reservoir dikes and embkts.	.15	.12	.175	.20	.17	.30
100 cu. yd. excav. for drainage channels and dikes	1.00	.27	.36	.75	1.25	.24
702,000 cu. yd. compacting embkts.	.07	.19	.194	.15	.215	.25
48,000 sq. yd. scarifying, moistening and compacting canal bottom	.05	.18	.06	.10	.14	.10
8,000 cu. yd. excavation for struts	.55	1.50	.85	1.00	1.08	1.00
700 cu. yd. riprap	7.00	6.00	9.08	7.00	6.00	5.50
3,825 cu. yd. backfill	.55	.45	.45	.70	.40	.50
2,700 cu. yd. compacting backfill	2.50	3.50	3.52	3.00	3.35	3.00
1,025 cu. yd. concrete in structures	50.00	52.00	57.11	60.00	46.00	60.00
355 cu. yd. concrete in bridges	53.00	61.00	48.15	60.00	48.00	60.00
225 cu. yd. concrete in paving slabs	37.00	26.00	57.11	30.00	20.00	35.00
2,300 bbl. furn. and handling cement	3.10	3.00	2.63	3.50	3.25	4.25
235,000 lb. furn. and placing reinf. bars	.09	.08	.084	.075	.085	.32
325 sq. ft. furn. and placing $\frac{1}{2}$ -in. elastic filler matl. in joints	1.50	1.35	1.50	1.50	1.75	1.50
80 sq. ft. furn. and placing 1-in. elastic matl. in jts.	2.25	2.40	2.41	2.50	3.00	2.25
670 lin. ft. placing rubber water stops in joints	1.50	1.45	1.59	1.50	1.50	1.50
3 M.B.M. furn. and erecting timber in struts	270.00	200.00	442.00	300.00	350.00	225.00
1 mi. erecting barbed-wire right-of-way fence	400.00	580.00	484.00	500.00	575.00	500.00
1 mi. erecting comb. barbed-wire and woven-wire right-of-way fence	500.00	730.00	484.00	600.00	600.00	600.00
100 lin. ft. furn. and erecting chain-link fence	1.50	1.55	1.75	3.00	2.00	3.00
4 gate furn. and install. metal fence gates in right-of-way fence	30.00	45.00	36.30	40.00	50.00	40.00
100 lin. ft. furn. matl. and const. graded sand and gravel drains with 6-in. sewer pipe	2.40	1.70	2.20	3.00	3.50	2.50
90 lin. ft. furn. and laying 36-in. diam. corr. metal pipe	9.00	8.30	10.22	9.00	10.00	10.00
1 gate & hoist furn. and install. 4-ft. 0-in. by 4-ft. 0-in. slide gates and gate hoists in struts	\$1,100	\$1,150	991.00	\$1,000	\$1,000	\$1,650
2 gate & hoist furn. and install. 4-ft. 6-in. by 4-ft. 6-in. slide gates and gate hoists in struts	\$1,300	\$1,350	\$1,163	\$1,100	\$1,300	\$2,000
3 gate & hoist furn. and install. 5-ft. 0-in. by 5-ft. 0-in. sluice gates and gate hoists in struts	\$2,500	\$1,825	\$3,606	\$3,000	\$3,500	\$2,400
45,000 lb. installing radial gates	.06	.22	.157	.15	.10	.10
13,500 lb. installing radial-gate hoists and oper. mech.	.08	.22	.157	.17	.20	.14
13,700 lb. installing misc. metalwork	.11	.16	.24	.20	.20	.25
150 lin. ft. furn. and install. elect. metal conduit, $\frac{3}{4}$ -in. and less in diam.	1.50	2.50	1.27	2.00	2.00	1.25
170 lin. ft. furn. and install. elect. metal conduit, $\frac{1}{2}$ -in. diam.	2.00	2.60	1.88	2.50	2.60	1.75
10 lin. ft. furn. and install. elect. metal conduits, $\frac{2}{3}$ -in. in diam.	2.50	2.85	3.71	5.00	4.00	2.50
110 lb. furn. and install elect. conductors and ground wires	2.00	1.50	2.14	2.00	2.25	1.75

Water Supply . . .

California—San Diego County—City—Pipe Installation

N. P. Van Valkenburgh Co., South Gate, was low bidder before the City of San Diego Water Department on two schedules for installation of Section II of the Kearny Mesa Pipeline from Linda Vista to Bayview Reservoir. Schedule I-A is for installation of steel cylinder pipe, mortar coated and lined, with rubber gasket joints, including valves and special fittings. Schedule II-A is for installation of welded steel pipe, mortar coated and lined with welded joints, including valves and special fittings. Furnishing and delivering of the pipe to trenchside was bid under another schedule. Unit bids were submitted as follows:

	Schedule I-A	Schedule II-A
(1) N. P. Van Valkenburgh Co.	\$142,332	\$157,042
(2) S. B. Lazarevich	145,381	No bid
(3) A.B.C. Construction Co.	145,789	161,013
(4) Walter H. Barber and H. B. Breeden	146,169	No bid
(5) Charles J. Dorfman	148,640	159,671
Kemper Construction Co.	153,824	No bid
Alton B. Carter	154,447	166,825
Carroll & Foster	158,728	184,956
Haddock-Engineers, Ltd.	163,108	172,743
Cannell and Losch	172,036	No bid
Artukovich Bros.	191,038	No bid
P. & J. Artukovich	210,719	212,878

NOTE: L. T. & I. = Loading, Transporting and Installing.

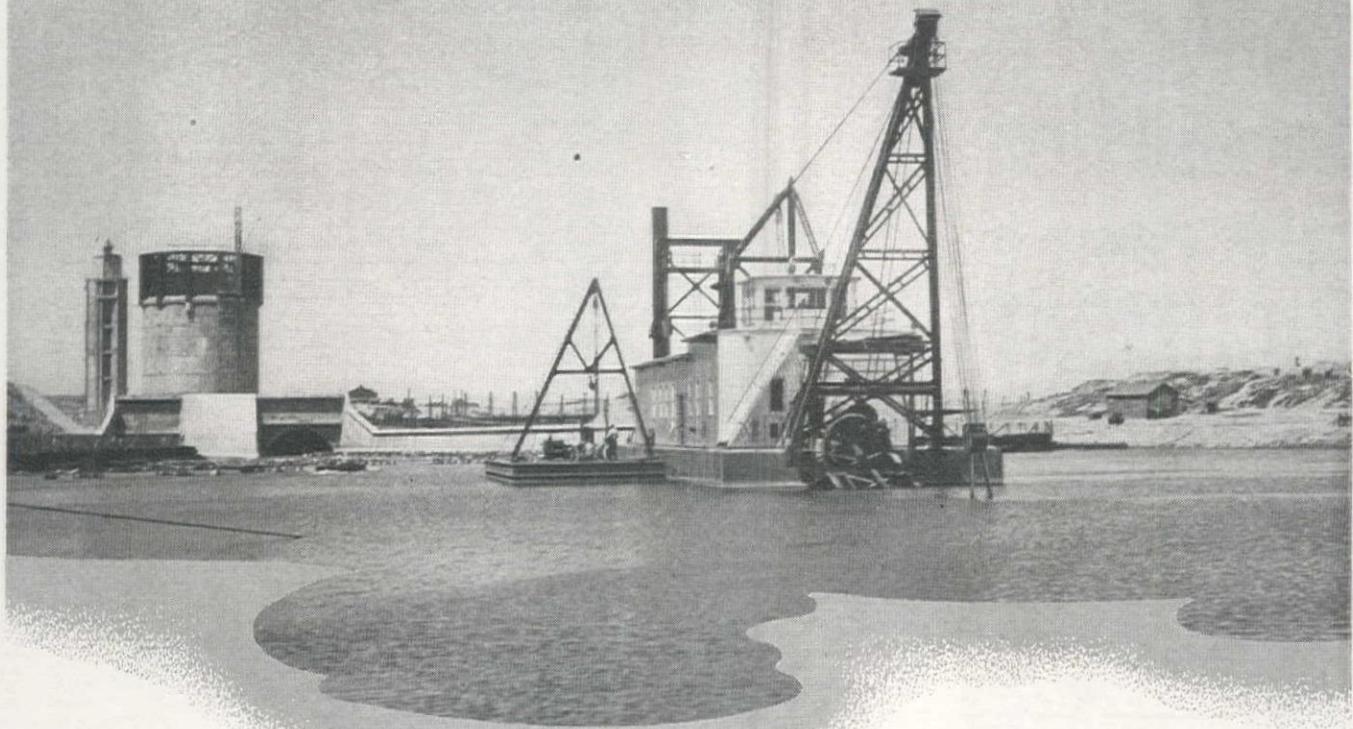
SCHEDULE I-A

	(1)	(2)	(3)	(4)	(5)
31,000 cu. yd. Class 1 trench excavation	1.60	1.60	.85	1.50	1.20
14,400 cu. yd. backfill of Class 1 excav.	.75	.70	.75	.80	1.10
10,000 cu. yd. sand backfill	2.40	2.25	2.25	2.40	2.50
180 cu. yd. Class 2 excavation	5.00	4.00	6.00	4.00	4.70
26,827 ft. handling and installing 30-in. steel cyl. pipe	1.20	1.22	2.00	1.18	1.45
4 ea. furn., install. and removing test bulkheads	100.00	300.00	150.00	100.00	180.00
20 hr. cutting and welding	10.00	10.00	10.00	7.00	5.50
20 ea. field welded joint	10.00	20.00	20.00	30.00	18.00
5 ea. L. T. & I. 4-in. blowoff assembly	50.00	33.00	70.00	65.00	25.00
7 ea. L. T. & I. 4-in. flanged air valve	50.00	28.00	30.00	45.00	14.00
3 ea. L. T. & I. 2-in. air valve	10.00	10.00	25.00	25.00	10.00
4 ea. L. T. & I. 6-in. gate valve and blind flange	30.00	25.00	30.00	25.00	18.00
2 ea. L. T. & I. 4-in. gate valve and blind flange	30.00	23.00	20.00	17.00	14.00
1 ea. L. T. & I. 30-in. flanged 300-lb. plug valve	100.00	150.00	125.00	110.00	120.00
1 ea. L. T. & I. 30-in. hub-end 120-lb. plug valve	100.00	175.00	125.00	110.00	115.00
4 ea. L. T. & I. 16-in. flanged vert. gate valve	50.00	75.00	75.00	65.00	85.00
5 ea. L. T. & I. 12-in. flanged gate valve	50.00	45.00	50.00	50.00	62.00
3 ea. L. T. & I. 8-in. flanged gate valve	15.00	27.00	35.00	40.00	25.00

(Continued on next page)

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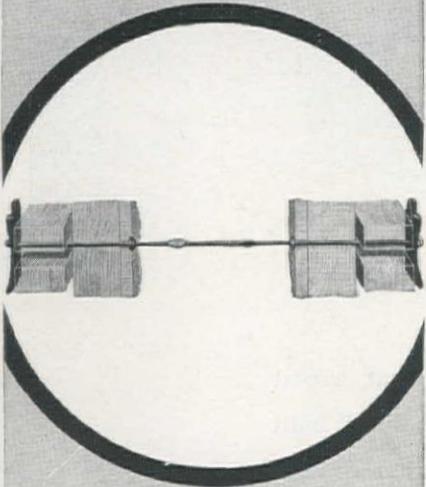


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2 ea. L. T. & I. 16-in. pressure reducing valve	40.00	80.00	90.00	80.00	85.00
1 ea. L. T. & I. 12-in. pressure reducing valve	25.00	55.00	75.00	60.00	62.00
2 ea. L. T. & I. 8-in. pressure reducing valve	15.00	31.00	60.00	45.00	25.00
2 ea. L. T. & I. $\frac{1}{4}$ -in. gauge connection	20.00	10.00	25.00	25.00	12.00
5 ea. L. T. & I. 1-in. bronze corporation cock	5.00	25.00	10.00	10.00	18.00
1 ea. handling and installing 6-in. flanged riser pipe	10.00	32.00	30.00	25.00	20.00
10 ft. handling and installing 12-in. flanged pipe	3.00	*50.00	2.50	7.00	17.00
1,000 lb. installing misc. steel fittings	.25	.25	.20	.25	.50
140 ft. furn. and instal. and grouting 42-in. x $\frac{1}{4}$ -in. encasement	40.00	61.00	40.00	48.00	52.00
28 ft. furn. and instal. and grouting 42-in. x $\frac{1}{4}$ -in. encasement	20.00	41.00	30.00	25.00	28.00
Lump sum, handling and instal. 30-in. x 16-in. x 16-in. x $\frac{1}{4}$ -in. wye	200.00	263.00	200.00	200.00	130.00
Lump sum, handling and instal. 30-in. x 16-in. x 16-in. x $\frac{1}{4}$ -in. wye	200.00	263.00	200.00	200.00	130.00
1,000 lb. furn. and instal. misc. steel work	.30	.32	.40	.45	.50
1,000 lb. L. T. & I. valves, fittings, etc.	.25	.25	.25	.25	.25
7 ea. L. T. & I. 22-in. C.I. manhole frame and cover	10.00	10.00	20.00	12.50	22.00
1,100 lb. furn. and instal. ladder rungs	.40	.34	.35	.45	.70
110 cu. yd. reinf. concr. in chambers, etc.	50.00	67.00	70.00	67.00	72.00
110 cu. yd. reinf. concr. in anchors, etc.	20.00	26.00	35.00	30.00	30.00
10 cu. ft. misc. concr. removed and replaced	10.00	3.00	3.50	2.50	5.00
13,000 lb. furn. and plac. reinf. steel	.12	.17	.15	.13	.15
4 ea. L. T. & I. 12-in. C.I. blind flange	10.00	5.00	15.00	7.50	5.00
5 ea. L. T. & I. 8-in. C.I. blind flange	10.00	5.00	10.00	6.00	5.00
415 sq. yd. cutting and replacing asphalt pavement	3.00	.75	5.00	5.60	3.30
570 sq. yd. cutting and replacing asphalt pavement	5.00	1.00	6.00	6.60	4.00
12 ft. furn. and instal. 36-in. concr. culvert pipe	20.00	16.00	15.00	15.00	9.50
4 ft. furn. and instal. 42-in. concr. culvert pipe	25.00	17.00	20.00	15.00	15.00
36 ft. furn. and instal. 24-in. concr. culvert pipe	15.00	11.00	10.00	8.50	5.00

SCHEDULE II-A

	(1)	(3)	(5)
30,700 cu. yd. Class 1 trench excavation	1.60	.85	1.20
14,400 cu. yd. backfill of Class 1 excavation	.75	.75	1.10
9,900 cu. yd. sand backfill	2.40	2.25	2.50
180 cu. yd. Class 2 excavation	5.00	6.00	4.70
26,827 ft. handling and installing 30-in. welded steel pipe	1.75	2.55	1.85
4 ea. furnishing, installing and removing bulkheads	100.00	150.00	180.00
20 hr. cutting and welding in field	10.00	10.00	5.50
4 ea. circumferential field cut	100.00	150.00	200.00
4 ea. butt streg joint, welded outside	100.00	150.00	110.00
5 ea. L. T. & I. 24-in. blowoff assembly	50.00	70.00	25.00
7 ea. L. T. & I. 4-in. flanged air valve	50.00	30.00	14.00
3 ea. L. T. & I. 2-in. air valve complete	10.00	25.00	10.00
4 ea. L. T. & I. 6-in. gate valve and flange	30.00	30.00	18.00
2 ea. L. T. & I. 4-in. gate valve and flange	30.00	20.00	14.00
1 ea. L. T. & I. 30-in. flanged 300-lb. plug valve	100.00	125.00	120.00
1 ea. L. T. & I. 30-in. hub-end 120-lb. plug valve	100.00	125.00	115.00
4 ea. L. T. & I. 16-in. flanged vertical gate valve	50.00	75.00	85.00
5 ea. L. T. & I. 12-in. flanged gate valve	25.00	50.00	62.00
3 ea. L. T. & I. 8-in. flanged gate valve	15.00	35.00	25.00
2 ea. L. T. & I. 16-in. pressure reducing valve	40.00	90.00	85.00
1 ea. L. T. & I. 12-in. pressure reducing valve	25.00	75.00	62.00
2 ea. L. T. & I. 8-in. pressure reducing valve	15.00	60.00	25.00
2 ea. L. T. & I. $\frac{1}{4}$ -in. gauge connection	20.00	25.00	12.00
5 ea. L. T. & I. 1-in. bronze corporation cock	5.00	10.00	18.00
1 ea. handling and installing 6-in. flanged riser pipe	10.00	30.00	20.00
10 ft. handling and installing 12-in. flanged pipe	3.00	2.50	17.00
1,000 lb. installing misc. steel pipe fittings	.25	.20	.50
140 ft. furnishing, installing and grouting 42-in. x $\frac{1}{4}$ -in. encasement	40.00	40.00	52.00
28 ft. furnishing, installing and grouting 42-in. x $\frac{1}{4}$ -in. encasement	20.00	30.00	28.00
Lump sum, handling and installing 30-in. x 16-in. x 16-in. x $\frac{1}{4}$ -in. wye	200.00	200.00	130.00
1,000 lb. furn. and instal. misc. steel work	.30	.40	.50
1,000 lb. L. T. & I. valves, fittings, etc.	.25	.25	.25
7 ea. L. T. & I. 22-in. C.I. manhole frame and cover	10.00	20.00	22.00
1,100 lb. furn. and instal. ladder rungs	.40	.35	.70
110 cu. yd. reinf. conc. in place in chambers, etc.	50.00	70.00	72.00
110 cu. yd. reinf. conc. in anchors, piers, etc.	20.00	35.00	30.00
10 cu. ft. misc. conc. removed and replaced	10.00	3.50	5.00
13,000 lb. furn. and placing reinf. steel	.12	.15	.15
4 ea. L. T. & I. 12-in. C.I. blind flange	10.00	15.00	5.00
5 ea. L. T. & I. 8-in. C.I. blind flange	10.00	10.00	5.00
415 sq. yd. cutting existing 2-in. - 3-in. pavm't and replacing	3.00	5.00	3.30
570 sq. yd. cutting existing 4-in. and replacing pavement	5.00	6.00	4.00
12 ft. furn. and instal. 36-in. reinf. conc. culvert pipe	20.00	15.00	9.50
4 ft. furn. and instal. 42-in. reinf. conc. culvert pipe	25.00	20.00	15.00
36 ft. furn. and instal. 24-in. reinf. conc. culvert pipe	15.00	10.00	5.00
2 ea. handling and installing 31 $\frac{1}{4}$ -in. flexible coupling	100.00	75.00	15.00

California—Los Angeles County—City—Water Mains

Steve P. Rados, Inc., Los Angeles, with a bid of \$334,765, was awarded a contract by the City of Long Beach Water Department for the construction of 36-in. prestressed concrete water mains in Long Beach. The bids were presented for both prestressed and not prestressed SCC pipe. Although Pipeline Construction Co. presented the lower bid for the work, the substitute 30-in. check valve offered by that firm under Item 10 did not comply with the specifications. Unit bids were submitted as follows:

	Using Prestressed Pipe	Not Using Prestressed Pipe	
	(1)	(2)	(3)
(1) Steve P. Rados, Inc.	\$334,765	\$352,089	
(2) Pipeline Construction Co.	334,695	348,108	
(3) G. E. Kerns	343,725	354,902	
11,177 ft. 36-in. SCC prestressed pipe	24.35	25.10	25.20
11,177 ft. 36-in. SCC pipe not prestressed	25.90	26.30	26.20
363 ft. 30-in. SCC modified prestressed	20.00	23.03	25.00
Lump sum, 30-in. steel flanged pipe	\$1,900	\$1,140	\$1,600
Lump sum, 6-in. galvanized steel pipe	615.00	\$1,000	800.00
6 30-in. vert. gate valves BE	\$3,500	\$2,744	\$3,000
2 30-in. vert. gate valves F1	\$3,600	\$3,003	\$3,300
1 30-in. horiz. gate valve BE	\$3,490	\$2,895	\$3,400
2 20-in. vert. gate valves BE	\$1,640	\$1,235	\$2,000
1 30-in. single gate check valve	\$2,730	\$2,323	\$2,600
5 30-in. gate jumpers; BE valve	\$4,000	\$2,934	\$3,500
1 30-in. gate jumper; F1 check valve	\$3,320	\$3,243	\$3,000
Lump sum, flow meter equipment	\$9,700	\$6,654	\$9,000
1 flow meter housing	590.00	350.00	500.00
... cu. yd. overexcavation, rock	15.00	7.50	8.00
... cu. yd. overexcavation, soft material	5.00	5.00	8.00
... cu. yd. overexcavation, change grade	5.00	5.00	8.00
... cu. yd. Class C conc. found. slab	20.00	30.00	30.00
... cu. yd. select material mat refill	5.00	5.00	8.00
... cu. yd. rock mat refill	5.00	6.00	8.00
... cu. yd. thrust collars—concrete	40.00	40.00	50.00
80 cu. yd. Class C anchor blocks	15.00	25.00	25.00
6 cu. yd. Class A pedestals	40.00	40.00	40.00
34 cu. yd. 2 vaults, tube, check valve	100.00	125.00	125.00

BARNEGAT BAY BRIDGE

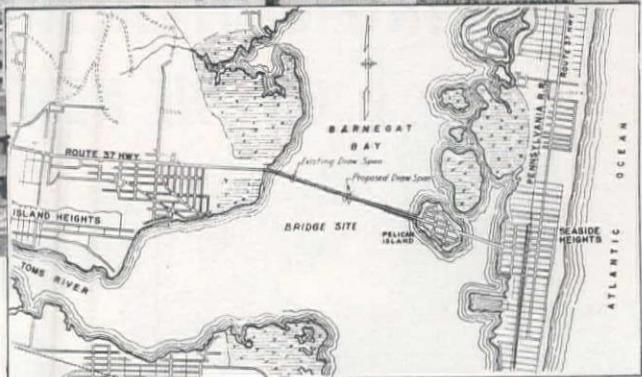
—A **LINK-BELT
SPEEDER**

6 USED BY
OLE HANSEN & SONS
ON MILE-LONG SPAN

JOB!



Above: A K-370 and a K-25 operating on barge erecting steel on approach to bascule span.



Location of new bridge across Barneget Bay, Ocean County, New Jersey.

Outstanding suitability of Link-Belt Speeder Shovel-Cranes on large construction projects is well illustrated in the performance of 6 machines, on the Barneget Bay Bridge. Ole Hansen & Sons, general contractors, have used only Link-Belt Speeders for the past 16 years, and now own ten.

Building 68 piers, including coffer dams, placing 19,000 yards of concrete, setting 10 million pounds of steel, and driving 104,000 lineal feet of timber pilings, were all done with Link-Belt Speeder cranes.

Power, speed, easy control, low operating costs, all show Link-Belt Speeders to be money-makers on every type of construction.

11,763

LINK-BELT SPEEDER



LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA

LINK-BELT SPEEDER CORPORATION

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

Hansen's fleet of Link-Belt Speeders includes HC-90 truck-mounted Shovel-Cranes, as shown here, loading 20 ton plate girder 89 ft. long, on trailer for transporting to bridge site.

Crawler or wheel-mounted, the versatile Link-Belt Speeder is a machine of many uses, giving many opportunities for turning a good profit.

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.

301

1950 GMC Truck Line

Manufacturer: GMC Truck and Coach Division of General Motors Corp., Pontiac, Mich.

Equipment: The GMC line, featuring stepped-up horsepower in light and medium duty engines together with a number of cab, engine and chassis advancements.

Features claimed: New model series are being introduced in the 1½ and 2½-ton ranges and two new 6-wheeler series in the 24,000-32,000 gross vehicle weight range. There are two new, lighter Diesel tractor series of 45,000 and 55,000 lb. combination weights, as well as lightweight options in the big 900 Diesel series. GMC's power picture for 1950 shows an increase in horsepower in the 228-, 248- and 270-cu. in. engines. The horsepower of the 228 is being

stepped up from 94½ to 96, that of the 248 from 100 to 110, and the 270 from 104 to 120. The greater horsepower is being achieved through redesigning the intake manifold, installation of new high lift cams, a larger carburetor throat, and a change in the valve timing and angle of the exhaust valve seats. Leading the parade of new model series is the new 280 series with a gross vehicle weight of 11,000 lb. With the GVW of GMC's 300 series increased to 14,000 lb., this new series will provide an expanded selection of models in the 1½-ton range. To increase the selection of models in the 2½-ton range, a new 470 series is being introduced with a gross vehicle rating of 20,000 lb.

302

Compaction Roller

Manufacturer: Huber Mfg. Co., Marion, Ohio.

Equipment: Roller with a per lineal inch compaction of 5,387 lb. that compacts 4,100 sq. ft. an hour at an average speed of 2 m.p.h.

Features claimed: The real rolls of the roller have a series of five scalloped ribs at the outer circumference. Each rib consists



of twelve 4-in. high scallops and the ribs are staggered from one row to another in such a manner that there is a high point every 3½ in. The ribs are 2 in. wide and are spaced 2½ in. apart. The slope of the scallops on one roll is opposite to that on the other roll. Front roll scallops are similar except with less height. The staggered arrangement provides a kneading action that produces better compaction with a minimum of lateral displacement of the soil.

303

Tractor Cable Controls

Manufacturer: Kay-Brunner Steel Products, Inc., Los Angeles, Calif.

Equipment: Power control units, designed for every crawler tractor and for every cable control use.

Features claimed: The line includes 3 models—double drum, for tractors of 50 hp. up; double drum for tractors up to 50 hp., and single drum for tractors up to 50 hp. A special unit for logging and extra heavy duty work features extra heavy duty clutch and cone and special drum and control guards for added protection. Gear ratios are from 5 to 1 up to 12 to 1. Any unit can be dis-assembled or assembled in the field, without block-and-tackle or hoist.

304

All-Angle Head Drill

Manufacturer: Cummins Portable Tools, Chicago, Ill.

Equipment: A 360-deg. Angle Head attachment for ½-in. capacity drills.

Features claimed: The angle head is quickly removable in order to convert the tool into a conventional ½-in. drill. Designed for use with the Cummins Model 200 ½-in. Standard Duty Drill, the head

ALLIS-CHALMERS SPECIFIES...

Velvetouch ALL-METAL STEERING CLUTCH FACINGS ON THE NEW HD-19



Like other leading manufacturers of heavy duty tractors and earthmoving equipment, Allis-Chalmers specifies Velvetouch for dependable power control. Because the powdered metals, used in making Velvetouch clutch facings and brake linings, are scientifically processed to minimize chattering and slipping... insure smooth, positive action. Genuine Velvetouch lasts longer, too... for it's all-metal... can't rot in oil or "burn" like conventional material. Send for descriptive literature today.

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1374 East 51st St., Cleveland 3, Ohio

FOR BRAKE AND CLUTCH USE **Velvetouch**

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LOS ANGELES..... 1110 S. Hope St.
PHILADELPHIA..... 97 E. Montana St.
PORTLAND..... 636 N. W. 16th Ave.
SAN FRANCISCO..... 424 Bryant St.
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1101 Vermont Ave., N. W.

WORLD'S LARGEST MANUFACTURERS OF ALL-METAL CLUTCH FACINGS AND BRAKE LININGS

will fit any make of $\frac{1}{2}$ -in. capacity drill equipped with Model 33B Jacobs chuck. The attachment is presented as ideal for drilling in hard-to-get-at "tight spots."

305

Crushing and Screening Plant

Manufacturer: Iowa Mfg. Co., Cedar Rapids, Iowa.

Equipment: New line of plants designed to produce low cost gravel for road maintenance and small concrete structure jobs.

Features claimed: The Hawkeye Plant is entirely portable. Depending on local conditions, it produces from 50 to 75 tons of



accurately sized material per hour. It is an all-in-one unit made up of standard Cedar-rapids parts consisting of hopper-feeder and feed conveyor; bucket elevator and return conveyor; sand and delivery conveyors, and a choice of four sizes of either plain or roller bearing jaw crushers.

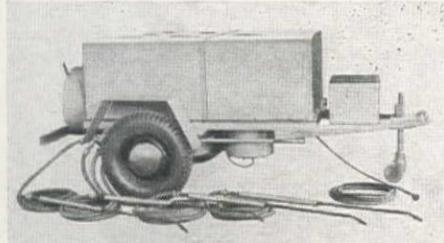
306

Steam Cleaner

Manufacturer: Homestead Valve Mfg. Co., Coraopolis, Pa.

Equipment: Cleaner with 300 gal. per hour capacity that will operate from one to four cleaning guns.

Features claimed: The Super-Duty Hy-pressure Jenny is said to clean grease, grime and dirt from machinery and equip-



ment 60 times faster than hand methods. Full operating pressure is reached within two minutes from a cold start. In less than 2 min., it can be changed over for use as a heat generator, with heat output equivalent to a 25-hp. boiler. Made in trailer-mounted, portable and stationary models.

307

$\frac{3}{4}$ -Yd. Shovel

Manufacturer: The Thew Shovel Co., Lorain, Ohio.

Equipment: The Lorain TL-25—a new machine with interchangeable component assembly.

Features claimed: The turntable design of the Lorain TL-25 is such that it is comprised of several major components. Each of these components is built on its own separate assembly line as an integral unit, complete with all sub-assemblies and parts installed. Such major components are installed on the turntable as complete assem-



CONTRACTS WILL BE A'LETTING!

Yes, Spring is approaching and its arrival will

be marked by contract letting and acceleration of jobs under way. Since profitable operations today are more dependent than ever before upon efficient tools, alert contractors will be giving thought to the purchase of essential new equipment.

In this connection you should have a copy of the new Owen Catalog. It not only illustrates and describes the comprehensive line of Owen Buckets and Grapples but contains many photos of equipment applications that will be interesting and helpful. Write today for your copy.

GET THIS NEW CATALOG OF

Owen Buckets and Grapples

An illustration of a hand holding a red catalog. The catalog cover features the text "Owen Buckets and Grapples" and a small image of a construction site. The catalog is shown at an angle, with the hand gripping the bottom edge.

OWEN BUCKET CO., LTD.

BERKELEY, CALIFORNIA

Dealers: Los Angeles, Spokane, Seattle
Portland, Salt Lake City, Honolulu

bles and may be removed as such, and replaced with new complete assemblies, either temporarily to keep the machine going or as replacement units. Interchangeable front end boom equipment is provided for a Shovel Boom and Crane Boom.

308

Low Temperature Welding Rod

Manufacturer: The Al-Rod Co., San Bernardino, Calif.

Equipment: A no-flux welding rod that will fill a much needed spot in the trade to weld any aluminum or alloy.

Features claimed: Recent tests at qualified laboratories have established the qualities of Al-Rod. The test showed a tensile strength of 75,260 lb. per sq. in., and a bending moment of 65%. With this high strength in the Al-Rod, the parent metal failed during the tests using sheet aluminum alloy. In no case did a weld bond fail. The fusion point of Al-Rod was set at 720 deg. F., and the proper working temperature at 730 to 750 deg. F. Corrosion tests were made which showed no corrosion. This is partially due to the no-flux feature of the rod as no acids are introduced into the weld. Split pipes or leaks in galvanizing are easily welded with the new rod. The Al-Rod firm is now trying to organize a sales organization to market the product.

309

Baby Bulldozer

Manufacturer: Mead Specialties Co., Chicago, Ill.

Equipment: The "Mighty Mouse" Bulldozer, weighing 800 lb. with a thrust of 800 lb.

Features claimed: Described as ideal for

grading, excavating, backfilling, snow removal, towing, pushing, etc., this midget bulldozer unit works in close quarters as well as in open areas, saving expensive hand labor. Some of the specifications are as follows: Width at treads, 36 in.; width of lifting yoke, 38½ in.; length, without yoke and scoop, 60 in.; height at seat, 26 in.; width of treads, 7 in.; bearing area on ground, 532 sq. in.; speed range, ½ to 6 mph., and turning radius, pivots on either track within 8-ft. circle. Operating controls are beside the seat, under the driver's hands.

310

1950 Ford Truck Models

Manufacturer: Ford Motor Co., Dearborn, Mich.

Equipment: New line of 175 models, representing the largest selection of trucks in Ford's history.

Features claimed: Featured in the models are 21 engineering, design and manufacturing advancements contributing to more efficient, economical performance and lower maintenance costs. Special attention has been paid to engineering improvements contributing to longer life. The 1950 models are powered by the 226-cu. in., 95 hp., 6-cylinder Ford truck engine; the 239-cu. in., 100-hp., V-8; the 337-cu. in., 145-hp., V-8 and a recently-developed 254-cu. in., 110-hp. six. This engine used in the F-6 series is the most powerful 6-cylinder engine ever built by Ford. A new 4-speed synchromesh transmission that eliminates double clutching is standard equipment on the 254 and an extra heavy-duty clutch is included. Outstanding features of the 1950 models include 15 x 5-in. rear brakes with aluminum shoes. They have a double cylinder and self-energizing hydraulic action. Gross

vehicle weight ratings for the 1950 line range from 4,700 to the 22,000 lb. of the F-8 truck and 39,000 lb. when used with tractor and trailer.

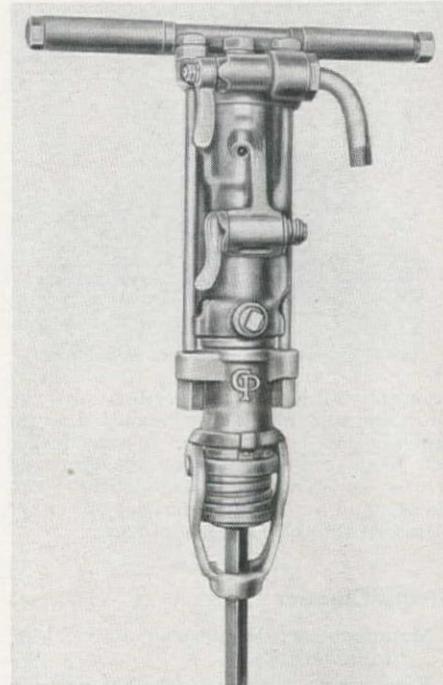
311

Sinker Drill

Manufacturer: Chicago Pneumatic Tool Co., New York City.

Equipment: The CP-59 recommended for holes up to 25 ft. and offered as an outstanding drill in the 55-lb. class.

Features claimed: Featuring a new four-in-one backhead, the CP-59 embodies many



new features aimed at top performance with minimum upkeep. Changeovers to either plain dry, blower dry, wet or air-water operation are quickly made by simply removing a plug and changing water or air valve assemblies. A newly-designed valve, a new highly efficient lubrication system, replaceable bronze chuck nut and cylinder bushing liner are other features.

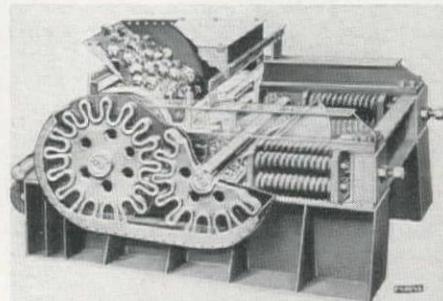
312

Twin and Triple Roll Crushers

Manufacturer: Pioneer Engineering Works, Minneapolis, Minn.

Equipment: Improvements in Pioneer crushers.

Features claimed: Improvements in Pioneer's new line of twin and triple roll



crushers consist of deeper mounting sills with less obstruction from cross members to provide more clearance for conveyors, a deeper top frame, separately cast star gears and driving gears and cast steel hubs for the roll shells, making the new line the

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strongest ever built. Twin roll crushers are now available in sizes 54 x 24, 40 x 22, 30 x 18 and 24 x 16. Two sizes of the triple roll are available: 40 x 22 and 30 x 18, the latter just recently added to the line.

313

Hole Digging Unit

Manufacturer: "Par-X" Placer Equipment Co., Benicia, Calif.

Equipment: Truck-mounted unit for digging small or large holes to 90-ft. depth.

Features claimed: This unique digging unit (see cut) uses different size buckets



for digging larger or smaller holes. Standard size hole is 28 to 30 in. square. Being truck-mounted, the unit is readily movable over highways, rough terrain, through timber, etc. The digging process is very effective under most conditions, and will operate satisfactorily in water unless extreme caving occurs. In areas where water table can be reached effectively, a large size hole makes an excellent water well.

314

Engine Block Repair Process

Manufacturer: The C. F. C. Co., Madisonville, Ky.

Equipment: New process for repairing broken and cracked cast iron engine blocks and heads which does not employ a weld or sealing compound.

Features claimed: The fully-patented process uses the same material as originally in the block or head. Repairs are guaranteed against breaking or cracking again in the same place. The process has been proven in the last five years without a recorded failure.

315

Replaceable Shovel Teeth

Manufacturer: Baer Steel Products, Inc., Auburn, Wash.

Equipment: Teeth which lock rigidly to their adapters for longer wear.

Features claimed: The patented triple-locking design of the teeth distributes digging stresses over a larger locking area, so that the teeth remain tighter and there is less adapter wear. The locking feature con-



38-foot glued laminated beams support roof structure of freight terminal.

Glued Laminated Beams



Cambered and tapered beams provide primary structural members for roof of this gymnasium. The Architects: Johnson, Bain, Brady & Grainger, Seattle, Washington.

...a common sense answer for moderate spans... at low costs

Unobstructed floor space in moderate spans is provided by glued laminated beams engineered and manufactured by Timber

Structures, Inc. These "shop grown" members are formed of kiln dried structural quality material welded under pressure with permanently bonding glues. They are stronger than sawn timbers of equal size, and will not shrink, twist or warp.

Achieve Beautiful Architectural Effects

When left exposed, glued laminated beams serve not only as structural members, but also help carry out the decorative theme of the architect and engineer. Surface may be planed, sanded or adzed; finish may be paint, stain or hand rubbed.

Camber may be incorporated as desired when the beam is being formed. By tapering the cambered beam, primary structural members are obtained for supporting the entire roof structure.

Detailed information on glued laminated beams and other structural members may be obtained by consulting the nearest Timber Structures office, or fill in and mail the coupon below.

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sists of two heavy tongues, one at the top and the other at the bottom of the point shoe, where they are received by mating slots at the base of the adapter horn. Tongues and slots, horn and shoe are wedged solidly together by a tapered pin driven through the assembly and securely locked by bending its malleable tip into a special recess. The new steel, Fibraloy, used in the teeth castings, is "the toughest steel known."

316

Liquid-Cooled Compressor

Manufacturer: Le Roi Co., Milwaukee, Wis.

Equipment: The Le Roi 105 Liquid-Cooled "Airmaster."

Features claimed: In this liquid-cooled design, Le Roi employs the one-piece engine-compressor block construction, with common crankshaft, cooling system and lubrication systems. The "Airmaster" has about 30% fewer parts than the conventional air-cooled 105 compressor. The new unit weighs only 1,990 lb. and develops 105 cu. ft. per min. at a speed of 1,100 r.p.m. It is the only 105 compressor to offer replaceable wet sleeve liners in both engine and compressor.

317

Steamboat Ratchet Pulling Jack

Manufacturer: Templeton, Kenly & Co., Chicago, Ill.

Equipment: Jack of 20-ton capacity for use in the marine, construction and engineering fields.

Features claimed: The new model is built with a 2-in. screw and is available in three

barrel lengths of 24, 30 or 36 in. It is equipped with lock-link hook-ends for a secure, safer grip, with other operating features similar to those of other models in the complete Simplex line of Steamboat Ratchet

ful wartime "blockbusters" explosive, whose use in industrial blasting caps was pioneered by Olin.

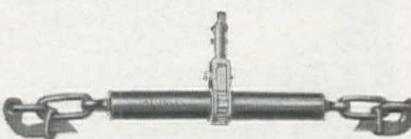
319

Mobile Hoist

Manufacturer: Lathers Mfg. Co., Madison, Wis.

Equipment: A completely portable hoist which can be towed at speeds of 60 m.p.h.

Features claimed: The hoist itself is 18 ft. in height and the boom will reach out 10



Jacks. These include the spring-operated plunger which firmly engages the pawl or dog with the ratchet wheel. Reversing the jack quickly slackens the chains or cable for release. The jack is designed to step up efficiency on both repair and maintenance jobs requiring heavy tonnage pulling.

318

Electric Blasting Caps

Manufacturer: Explosives Division, Olin Industries, Inc., New York.

Equipment: New line of fractional-second delay blasting caps.

Features claimed: Instead of firing one large charge of explosives at one time and setting up one large shock wave, it is possible with the use of the new fractional-second blasting caps to break up a large charge into smaller portions and fire each portion at fractional-second intervals. The new caps are accurately timed, are of one-piece, all-metal construction and are supplied in 10 periods of delay. Caps are identified with their respective delay number, and are supplied with plastic covered wires and plastic shunts. The new Western Minimac caps are ventless and waterproofed. Base charge of the caps is RDX, the power-



to 12 ft. from the "A" frame. It can be moved with heavy loads suspended in air. No blocks are necessary. A patented "hook-up" feature makes possible use of the entire weight of the truck or tractor for counterbalance. Lifting capacity of the Cradle Boom Handi-Hoist is rated at 6,000. Boom can be set at any angle desired. Can be attached to any make tractor or Willys Jeep.

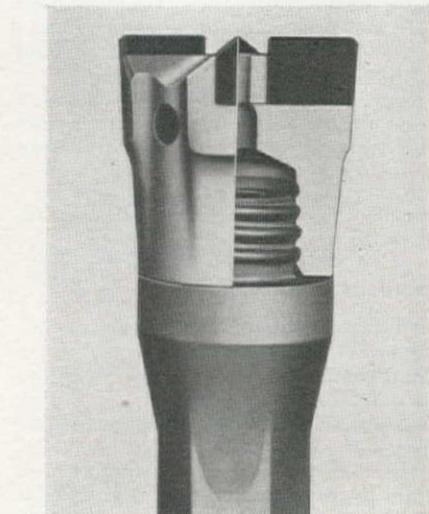
320

Attachment for Bits

Manufacturer: Ingersoll-Rand Co., Philipsburg, N. J.

Equipment: Attachment developed for tungsten carbide bits.

Features claimed: The attachment is of the shoulder type employing a patented 38-deg. reverse-butress thread. It was developed particularly to resist shock and



KEEP IN THE "PAYLINE"... USE "COMMERCIAL" LINER PLATES

THE ORIGINAL SOLID CORNER PLATE



Excavation held to a minimum; excess concrete beyond payline eliminated; cumbersome timber not required.

Made in one piece, with solid square corners, not welded, Commercial plates will fit close, with no openings at corners for earth or grout to slip through.

Commercial plates are made to the exact radius or combination of radii required by each individual job, diameters from 3 3/4' up, and in circular, horse shoe, or egg-shaped tunnels.

*Easy installation by unskilled labor
adaptable to any tunnel job.*

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YOUNGSTOWN, OHIO**

impact while still preventing slippage, excessive thread wear, or loss of drilling speed. The form, pitch and size of the thread used have been selected so as to give both attachment and bit maximum thread life.

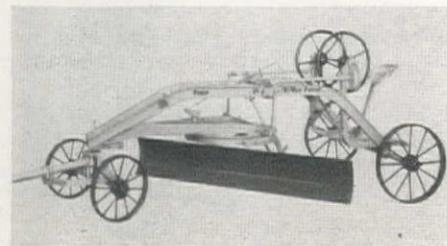
321

Patrol Pull Grader

Manufacturer: Preco, Inc., Los Angeles, Calif.

Equipment: Small pull grader with an 8-ft. blade and a wide range of adjustment.

Features claimed: The Patrol has an adjustable rear axle and tractor pole and may



be pulled by a small track or wheel type tractor, truck or team of horses. The frame is of all-welded construction, gears are totally enclosed and bearings are of the finest dust-proof quality. Recommended especially for building and maintaining rural roads and rights-of-way, ditching erosion control, terracing, etc.

322

Air-Entraining Agent

Manufacturer: Autolene Lubricants Co., Denver, Colo.

Equipment: Protex, an air-entraining

agent that will not settle out and assures uniform results.

Features claimed: Protex is a liquid which, when added to the concrete mix, entrains millions of near-microscopic air bubbles. These air bubbles are equal in volume and size to No. 200 mesh sand and are evenly disbursed throughout the mortar phase of concrete.

323

Self-Priming Jetting Pump

Manufacturer: Sterling Machinery Corp., Kansas City, Mo.

Equipment: Pump that delivers 400 gal. per min. at 150-lb. pressure.

Features claimed: Contractors will welcome this pump as a solution to their pile driving jetting problems. Other uses for the pump are bank washing, hydraulicicing, ponding, caisson work, watering down fills and pavements, and mud pumping during drilling operations. The new Model HP 150 Self-Priming Jetting Pump is primed by engine exhaust, a device which primes the pump rapidly (naturally dependent upon the suction lift). High efficiency is a characteristic of this pump, and the self-priming device will not fail. Sterling Jetting Pumps are available in single-stage and multi-stage models.

324

Bituminous Spray Nozzles

Manufacturer: Rosco Mfg. Co., Minneapolis, Minn.

Equipment: Nozzles for streakless application by Rosco Bituminous Distributors.

Features claimed: The nozzles on the Bituminous Distributors with full-circu-

lating spraybars not only eliminate streaking, but are as nearly clog-proof as possible. They form a spray that definitely produces an even fan-shaped pattern and provides an even distribution of material. Made in three sizes for lighter and heavier applications.

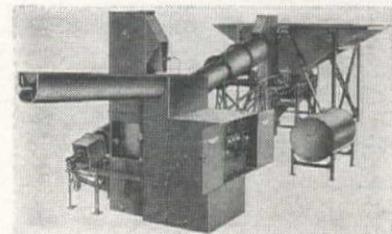
325

Hot-Mix Plant

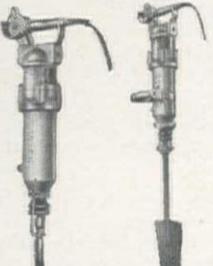
Manufacturer: Wayne Crane Division, American Steel Dredge Co., Fort Wayne, Ind.

Equipment: Continuous, bituminous hot-mix plant with a 20-ton per hour capacity.

Features claimed: The entire plant is built in sections which are easily assembled "on the job" and as easily disassembled



for changing location of plant, the largest single unit weighing 3,000 lb. All functions of the plant are electrically operated from a single control panel. It is designed for one-man control. Positive control of the quality of the mix is the most important feature of the machine. Accurate proportioning and thorough mixing of the bituminous materials are insured by several patented mechanical devices. An individually controlled volumetric-type feeder valve for each raw aggregate bin compart-



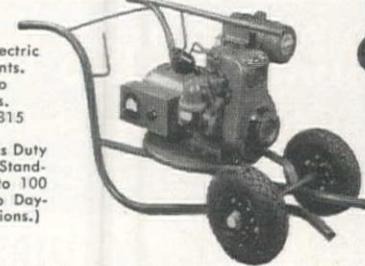
Master Red Seal Power Blow Electric Hammer & Spade
Catalog No. 688

Portable Gas-Electric Generator Plants.
Sizes 500 to 17000 Watts.
Catalog No. 815

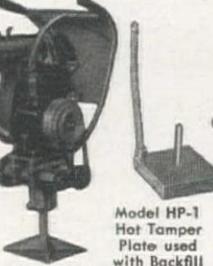
Also Continuous Duty and Emergency Stand-by Plants 20 to 100 KW. (Apply to Dayton for quotations.)



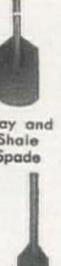
Model 650, D.C. Generator Plant. 500 Watts continuous duty, 650 Watts intermittent duty. Mounted on Model 98 Buggy.



Model 2500, D. C. Generator Plant. 1500 Watts continuous duty, 2000 Watts intermittent duty. Mounted on Model 83 Buggy.



Gasoline Engine Backfill Tamper
Catalog No. 699 Revised



Clay and Shale Spade



Model HP-1 Hot Tamper Plate used with Backfill Tamper



Asphalt Cutter

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MASTER VIBRATOR COMPANY, 110 Davis Ave., Dayton, Ohio



Electric Motor Driven Concrete Vibrator.
Catalog No. 783C



Gasoline Engine Driven Concrete Vibrator
Catalog No. 783C



Concrete Surfacing Attachments



Vibratory Concrete Finishing Screed Sizes 6' to 36'
Catalog No. 942



Gas or Electric Turn-A-Trowell Sizes 34" or 48" Catalog No. 939



Gas or Electric Combination Disc Float and Turn-A-Trowell Catalog No. 939

ment permits accurate proportioning in any specified percentage.

326

Trailer-Mounted Compressors

Manufacturer: Gardner-Denver Co., Quincy, Ill.

Equipment: Compressors designed especially for operating small air tools on miscellaneous service jobs.

Features claimed: Capacities of the compressors are ample for operating paint spray guns, chipping hammers, light paving breakers, etc. The units are furnished complete—the air-cooled compressor, with V-belt drive to gasoline engine, mounted on a sturdy pipe tank-type base. The unit is equipped with semi-pneumatic rubber-tired roller-bearing wheels, drawbar, trailer hitch and stabilizer leg, and can be readily towed behind a car or service truck.

327

Welding and Cutting Outfit

Manufacturer: Air Reduction Sales Co., New York City.

Equipment: The "Flamecraft" outfit, being marketed as a package.

Features claimed: The "Flamecraft" outfit includes oxygen and acetylene cylinders, welding torch, cutting attachment, tips, regulators, hose, goggles, cylinder truck, fluxes, an assortment of welding and hard-facing rods and an instruction folder on the proper handling and operation of the equipment. The outfit should make welding and cutting attractive to a whole new field of small-quantity users, such as garages and small shops. The cylinders are the 60-ft. acetylene and the 122-ft. oxygen which

were announced recently. They are supplied with the "Flamecraft" outfit on a lease basis for a 25-yr. period, the estimated lifetime of the cylinders. Under the lease arrangement, demurrage charges are eliminated and maintenance of the cylinders guaranteed.

328

Tooth Form Sprockets

Manufacturer: Chain Belt Co. of Milwaukee, Milwaukee, Wis.

Equipment: Improved Baldwin-Rex Tooth Forms with longer length and straight working faces.

Features claimed: Four advantages of these sprockets are given as follows: (1) All teeth in arc of contact share in the load for the entire life of the chain; (2) the longer tooth form will handle more pitch elongation thereby lengthening the life of the chain; (3) gap angle is a predetermined variable, designed according to the number of teeth, to assure most efficient chain action, and (4) straight tooth profile permits accurate cutting and finishing of the Improved Tooth Form.

329

Woodworking Machine

Manufacturer: Delta Mfg. Div., Rockwell Mfg. Co., Milwaukee, Wis.

Equipment: An improved machine that utilizes only two instead of the usual three circular movements found in radial type woodworking machines.

Features claimed: Known as "Double Radial action," this exclusive design works at a center pivot position above the saw table. It is claimed that with the Delta

Multiplex, it is possible to locate the motor power unit at any position—even vertically—above the working table. Any kind of rotary cutting tool can be quickly attached to the motor spindle. By using different attachments, over 125 woodworking applications can be done with this machine.

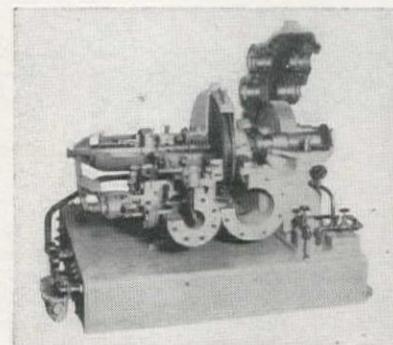
330

Steam Turbines

Manufacturer: Westinghouse Electric Co., Pittsburgh, Pa.

Equipment: Type E industrial steam turbines with close-coupled, integral reduction gears for low-speed applications.

Features claimed: Equipment such as pumps, fans, compressors and generators



can be driven at their proper speeds by these Gearturbines while the turbines operate at their most efficient speed. The new units combine a rugged, compact speed reduction mechanism solidly coupled to the Type E turbine and designed to operate as a single unit. Shipped as a completely assembled unit ready to install.

331

Gear Motor

Manufacturer: Century Electric Co., St. Louis, Mo.

Equipment: A new Century 1½-hp. gear motor extending the firm's present line from ½ to 1½ hp.

Features claimed: Larger ratings up to 400 hp. are available with gear attachments. This Century motor is for operation of single or polyphase alternating or direct current. The range of speeds that may be obtained in these motors is from 25 to 280 rpm. Features are (1) only two moving parts, the armature shaft and the output shaft, (2) only four bearings—two ball and two roller, and (3) rugged gears of the "worm type."

332

Respirators

Manufacturer: American Optical Co., Southbridge, Mass.

Equipment: Line of twin-cartridge respirators specifically developed to provide protection against seven respiratory hazards through a basic face piece and seven interchangeable filters.

Features claimed: The company states the seven filters protect workers against a combination of all dusts, organic vapors, acid gases, combined acid and organic gases, ammonia, combination of organic vapors and all dusts, and metal fumes. The new development gives a user seven respirators in one through the seven interchangeable filter holders. This feature eliminates the expense of stocking seven types of respirators for those who need protection against respiratory hazards.



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Mall VIBRATORS

Contractors who come up with job-winning bids and finish jobs on schedule with a profit, use Mall "Hi-Kik" Concrete Vibrators.

They place a stiffer mix with aggregate up to 8-inches in diameter and enable the contractor to control placing from the estimate to the finished work. Gasoline engine models also operate attachments for *Power Grouting, Pumping, Wire Brushing, Disc Sanding, and Drilling*.

The gasoline engine unit illustrated was recently increased from 3 H.P. to 5 H.P. and the 1½ H.P. unit was stepped up to 2 H.P. at no increase in cost. 3 H.P. Geared Head, 1½ H.P. Short-Coupled Electric and Pneumatic Models, also available.

See your Mall Equipment Dealer TODAY and write Contractors' Equipment Division for new Free Catalog "Mall Vibrators."

5 H.P. Mall "Hi-Kik" Concrete Vibrator available with or without pneumatic wheel barrow mounting.

32 Factory Owned Service Stations from Coast to Coast give quick, dependable repair service. Over 1000 Mall Portable Gasoline Engine, Electric and Pneumatic Power Tools for a million jobs. A Dealer in every town can supply you.

MALL TOOL COMPANY 7735 South Chicago Ave., Chicago 19, Ill.

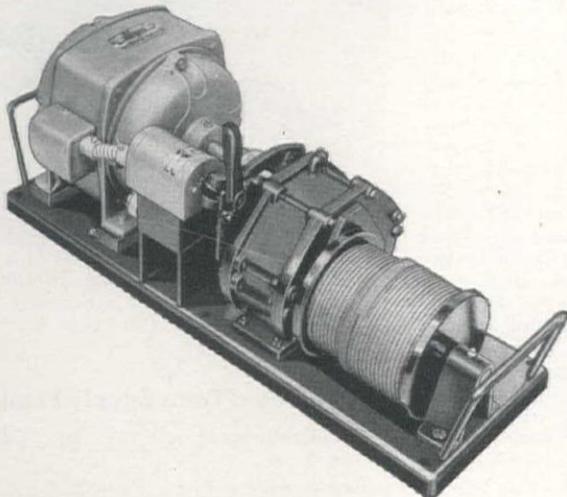
Established 1921

Portable Electric Winch

Manufacturer: St. Anthony Machine Products Co., Minneapolis, Minn.

Equipment: Winch designed to provide mobile lifting power.

Features claimed: Available in a wide selection of models, the Stampco Tugger is powered to furnish a line pull of from 500



to 1,500 lb. at speeds ranging from 55 to 220 ft. a minute. Double reduction spur gears, specially fabricated from high tensile steel, convert the output of a high torque, repulsion-induction motor to a constant speed and power ratio on the drum of the winch. The reducer is coupled to the motor direct and is totally enclosed to permit higher gear efficiency and quiet operation while running in a continuous oil bath.

334

Hydraulic Control Unit

Manufacturer: Kay-Brunner Steel Products, Inc., Los Angeles, Calif.

Equipment: Control unit adaptable to all models of all crawler tractors.

Features claimed: The unit features pump, valves and tank in one unit. It is capable of handling any number of ram-operated attachments simply by adding additional valves. Control valves are provided with a float position, which allows free circulation of fluid to both sides of the ram, without hydraulic lock. Pump capacities are from 25 to 65 g.p.m. at 100 r.p.m.

335

Centrifugal Pumps

Manufacturer: Gorman-Rupp Co., Mansfield, Ohio.

Equipment: A new line of close-coupled and pedestal mounted centrifugal pumps.

Features claimed: Called the "Alta" line, the pumps are designed to give superior performance under varying conditions of pressure and suction lift. Tests have shown that these pumps operate at high efficiencies, with resulting economy in use of power. The pressure at the stuffing box has been relieved by means of balance rings. This prevents rapid wearing out of the pack-

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McKiernan-Terry Pile Hammers are job-proved and time-tested . . . the choice of engineers and contractors on major construction projects throughout the world. Available in a standardized line of 10 double-acting hammers, 5 single-acting hammers and 2 double-acting extractors. Write for free bulletin.

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Manufacturing Engineers

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you dig more with a bigger BAER bucket

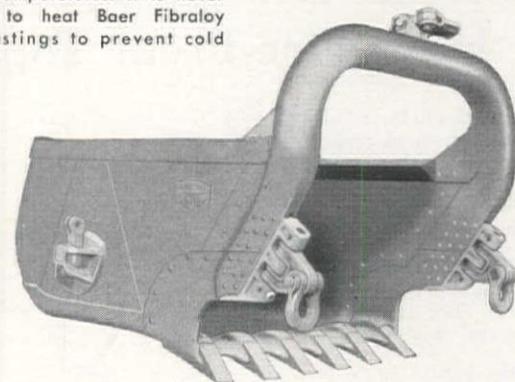
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You may specify up to 15% bigger BAER draglines and dippers because their front castings and teeth are Fibraloy, the toughest cast steel known.

Fibraloy is half again as strong as austenitic manganese steel. Hence the buckets are built lighter—specified larger. In addition, Fibraloy gives Baer buckets and teeth far superior strength and higher wear life.

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State.....

ing rings. In addition, the stainless steel shaft sleeve is not subjected to heavy wear in cases of higher pressures at the stuffing box. All the pumps are built to such dimensions that they may be interchanged on different sizes of electric motors as well as on power frames without alterations of shaft and flange mountings.

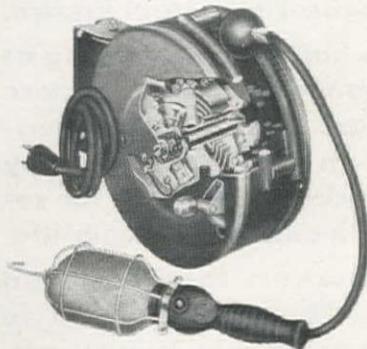
336

Electric Cord Reel

Manufacturer: Aero-Motive Mfg. Co., Kalamazoo, Mich.

Equipment: Unit with oversize bearings and shaft and powerful motor spring.

Features claimed: The unique features of this reel are the external trigger lock and



the design used in getting the cable out of the reel. The cable outlet has a long opening which is equipped with a roller at each end and a heavy side beading which gives greatly increased cable life. The reel is also equipped with a swivel mounting which further reduces cable wear as the

unit will swing when the cable is pulled sideways. A 30-in. plug-in lead is furnished.

337

Grab Arm for Lift Truck

Manufacturer: Gerlinger Carrier Co., Dallas, Ore.

Equipment: Gerlinger Lift Truck with specially engineered hydraulic grab arm.

Features claimed: The grab arm on the lift truck is designed to hold large and small circular material while traveling, and is being used with great success by Bechtel-Price-Conyes, contractors for construction of a 34-in., 506-mi. pipeline between Milpitas and Needles in California, where the lift truck is being used to load 60-ft. sections of the steel pipe on trailers and truck bolsters. There is positive hydraulic pressure on both the forks and the upper grab arm, making it possible to grip the load securely. Where the pipe is laying on the ground, the forks will dig in under as the grab arm comes down to lock the pipe for lifting. The use of chock blocks, cradles, etc., is eliminated. The grab arm can be raised and lowered by conveniently-placed fingertip control.

338

4-Ton Heavyweight Truck

Manufacturer: Dodge Division, Chrysler Corp., Detroit, Mich.

Equipment: New 4-ton truck in 30 basic models.

Features claimed: Designated as the Y and YA models, the new trucks have a nominal rating of 4 tons, gross combination weight of 50,000 lb., and gross vehicle weight of 28,000 lb. A completely new en-

gine that develops 330 lb.-ft. gross torque was specially designed for the new 4-tonner. The 6-cylinder engine delivers 154



gross hp., has a compression ratio of 6.5 to 1, and a displacement of 377 cu. in. Twin carburetors and manifolds assure unusual fuel economy and good fuel distribution. Twin exhaust systems cut down back pressure and boost engine efficiency.

339

Air-Operated Paint Supply Pump

Manufacturer: Gray Co., Inc., Minneapolis, Minn.

Equipment: The Paintmaster, that pumps finishing materials direct from the original containers.

Features claimed: This air-operated unit, a new type of paint supply pump and agitator, delivers a full supply of paint to the spray head at fluid pressures lower than they are now commonly used. For this reason, "overspray" losses are cut sharply. A positive displacement, immersion-type gear pump in the Paintmaster, drive by a rotary air motor, delivers paint directly to the spray head, or pumps it through circulating

White Heating Kettles Have Fire-Proof Tops

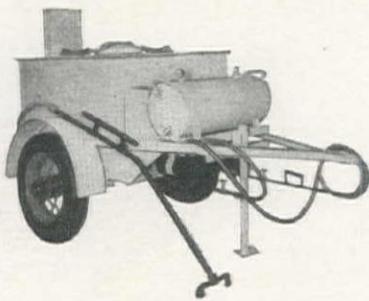
Cut-back and highly inflammable road repair material can be heated safely in White kettles. FIRE-PROOF top reduces fire hazard.

White asphalt and tar kettles are extensively used. They give long life and satisfaction.

Plain kettles or with hand or engine driven spray pumps for patching pavement. Thermometer, barrel hoist, warming hood extra. All oil burning, Semi-elliptic springs, pneumatic tires.

65, 110, 165, 220, 300 gallon capacities.

Model F-10 is oil jacked, to heat elastic joint filler.



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Portable—Stationary

FRONT END LOADERS

for Industrial Tractors

KEROSENE TORCHES

3 to 20 gal. Capacities

Write for Circulars

White Mfg. Co.

Elkhart,

Indiana

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AIR HOSE TAKES A BEATING!—That's why sturdy hose such as Goodall "Subway" with its wrapped duck construction, oil and moisture resistant tube, and tough red jacket lasts longer. It's designed to resist gouging, abrasion, and rough usage. Next time get SUBWAY, the air hose recommended for all pneumatic tools including concrete breakers, rock drills, rivet hammers, chipping hammers, etc. Sizes from $1/2$ " to $1\frac{1}{4}$ " in 50' lengths. Write for literature.

Other Goodall Products: Industrial gloves, Waterproof clothing, Waterproof footwear, all types hose, Conveyor belts and packing.

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supply lines. Since no air pressure is exerted upon the paint itself, aeration is reduced to a negligible amount, thereby eliminating bubbles and pin holes in the finished surface. Two sizes are available. One is a portable, 5-gal. model for both production and maintenance painting. The other is a 55-gal. model for pumping to the spray head, or functioning as the supply source for a circulating paint system.

340

Swivel Conveyor Bucket Loader

Manufacturer: Barber-Greene Co., Aurora, Ill.

Equipment: Materials loader to handle 3 cu. yd. per min.

Features claimed: Designed to extend the advantages of specialized truck loaders,



this unit has the solid plate elevating boom mounted on a tractor-type pneumatic-tired chassis. Essentially a stockpile loader, the unit handles all bulk materials. The loader efficiently loads the highest, longest trucks, with a minimum of spotting effort. A welcome design feature is the power-hydraulic

raising and lowering of the elevating boom which controls the level of the feeding spirals and the follow-up scraper.

341

Two-Way Pack Radio

Manufacturer: Motorola, Inc., Chicago, Ill.

Equipment: A compact 19-lb. radio station that can be hand carried, back carried or used as a semi-fixed installation.

Features claimed: Equipped with a tip-up speaker and an adjustable squelch circuit, the set will broadcast directly over the operator's shoulder when back carried, or to nearby areas when the set is left stationary, yet it remains quiet during standby periods. Used for operation from pack set to pack set, the unit has a nominal range of 2 to 5 mi., and from pack set to mobile unit, a range of 7 to 10 mi. Available in three versions—single frequency transmitter and receiver; two-frequency transmitter and single receiver, and dual transmitter, single receiver.

342

Highway Guard Rail

Manufacturer: United Steel Fabricators, Inc., Wooster, Ohio.

Equipment: Steel beam-type highway guard rail adapted as a protective railing for buildings adjoining public alleys and truck driveways.

Features claimed: The USF Barrier Beam is a deep, beam-type steel guard rail which is taper corrugated longitudinally to form a section with a face approximately 12 in. wide and 3 in. deep. This section depth plus the 7-in. steel mounting frame

assures a minimum clearance of 10 in. from building wall, considered ample for deflecting impact without damage to the building. No fabrication is necessary on the job since the beams are manufactured in easy-to-handle lengths (13 ft.) with slotted mounting holes every 7½ in. To eliminate all possibility of injury to pedestrians, a turned edge "safety-top" is provided.

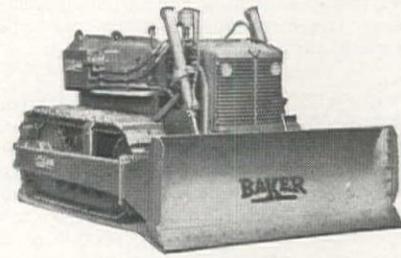
343

Hydraulically-Controlled Bulldozers

Manufacturer: Baker Mfg. Co., Springfield, Ill.

Equipment: A complete new line of Baker bulldozers.

Features claimed: The bulldozers are hydraulically-controlled through twin hydraulic cylinders mounted at the front



of the engine frame. Overhead height of the mounting is less than for the tractor itself. Other significant features are direct lift with a minimum of working and wearing parts; positive down-pressure; sensitive finger-tip control; rolling action blade shape; reliable fully protected front-mounted pump, etc. Available for standard and also wide gauge Allis-Chalmers HD-5 tractors.

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LUBRIPLATE LUBRICANT Saves Gears and Transmissions

So says the AUTOMATIC WASHER COMPANY. "We have used LUBRIPLATE in our washing machine transmissions since 1933. Our laboratory tests as well as field experience indicate that through the use of LUBRIPLATE we reduce the wear on the gears and prolong the life of the transmission. It has been an important factor in the success of our product."

1. LUBRIPLATE reduces friction and wear
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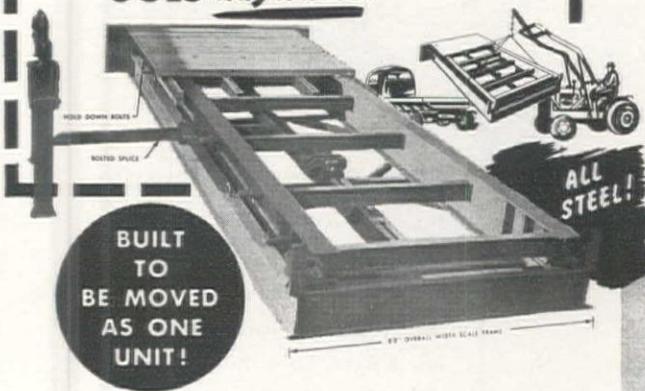
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LUBRICANT!*

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MOVE IT HERE! MOVE IT THERE!...the MURPHY Portable CONTRACTOR'S SCALE GOES Anywhere!



This rugged, all-steel, heavy duty scale is a proven time saver and money saver for contractors, road builders, and material handlers! Scale can be hauled completely assembled by simply removing tip end of transverse lever at bolted splice and tightening hold down bolts (see photo). No dismantling or reassembling! No wasted motion in moving from job to job!

Capacity	Platform
20-Ton	20' x 9'
30-Ton	24' x 9'
40, 50-Ton	34' x 9'
Other capacities and platform sizes built to suit.	

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LITERATURE FROM MANUFACTURERS...

Copies of the bulletins and catalogs described in this column may be had by addressing a request to the Western Construction News, 609 Mission Street, San Francisco 5, California.

344

TRANSITE PIPE INSTALLATION—Johns-Manville, New York City, has published a 115-page installation guide prepared especially for the men on the job who direct and do the actual work of handling and installing Transite Pressure Pipe. The booklet covers the whole job of installation from receiving and handling the pipe to pressure and leakage tests. The subjects range from excavating the trench through various steps of pipe-assembly to backfilling and tamping.

345

TORQUE CONVERTERS—Detroit Diesel Engine Division of General Motors Corp., Detroit, Mich., has published an attractive colored booklet giving complete information concerning what a torque converter is and how it functions; where and how it has been applied; and including an invitation to power machinery users everywhere to use Detroit Diesel facilities in engineering particular applications in any field. A cutaway view of the torque converter shows how this new and better fluid drive is designed in a unit practically no larger or heavier than a standard industrial clutch. The booklet tells how the converter, as used in conjunction with the GM Diesel Engine, gives users of many types of machinery the same smooth flow of power found in steam engines or electric motors

without the disadvantages of either. Its use on tractors, off-the-highway vehicles, cranes, etc., is described. For instance, it is pointed out that available operating records have established that a converter-equipped tractor will average as high as 22% more work done when compared with a machine using mechanical drive.

346

WELDING WALL CHART—Eutectic Welding Alloys Corp., New York City, has printed a two-color giant wall chart measuring 2 by 3 ft. that lists over 100 Eutec Rods and Eutec Trodes with their standard sizes, giving for each rod such technical data as—type of joint for which suitable, metal on which used, bonding temperature, tensile strength, Brinell hardness, degree of color match, electrical conductivity, etc.

347

ARC WELDING MACHINES—The first arc welding machine catalog to include all the machines in the Airco line has been published by Air Reduction Sales Co., New York City. The 36-page catalog is divided into two parts, the first dealing with AC arc welders, the second with DC machines. The descriptive text gives distinctive features, operating data, specifications and other pertinent information about each machine.

348

HOISTS—Two catalogs covering the line of American General Purpose Hoists have been published by American Hoist & Derrick Co., St. Paul, Minn. One catalog describes hoists from 5 to 40 hp.; the other, hoists from 50 to 100 hp.

349

NEW AND RELAYING RAILS—In a bulletin describing the availability of new and relaying rails and listing tables of

weights and data information on track bolts, spikes, splice bars and joints, the L. B. Foster Co., Pittsburgh, Pa., is offering an all-metal 7-in. Rail Ruler. This ruler, available free of charge, gives weight and dimensional data with full range of rail sections from 12 lb. to 100 lb.

350

VIBRATORS—Wyzenbeek & Staff, Chicago, has published a concrete vibrator catalog. Many improvements are shown, such as replaceable rubber tips for vibrator heads, which are optional and interchangeable. Brightly illustrated, the bulletin presents vital operating data on machines and parts, and the text is set up for convenience and clarity of understanding. The catalog contains complete information on both vibrators and contractors grinders.

351

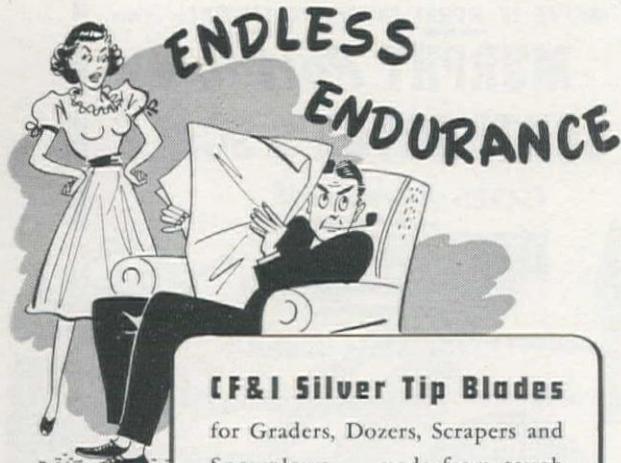
BRIDGE FLOORING SYSTEM—A new structural plate steel bridge flooring system is described in a 4-page technical bulletin published by United Steel Fabricators, Inc., Wooster, Ohio. Along with photographs of a highway bridge in various stages of construction, the bulletin includes a complete engineering description and a drawing which details all component parts. Also listed in the bulletin are design data for H20 loading and complete specifications.

352

SAFETY EQUIPMENT—General Scientific Equipment Co., Philadelphia, Pa., has published a catalog of personal protective equipment and industrial safety devices. It contains 46 pages, fully illustrated.

353

CONCRETE VIBRATORS—Mall Tool Co., Chicago, Ill., has published a



F&I Silver Tip Blades

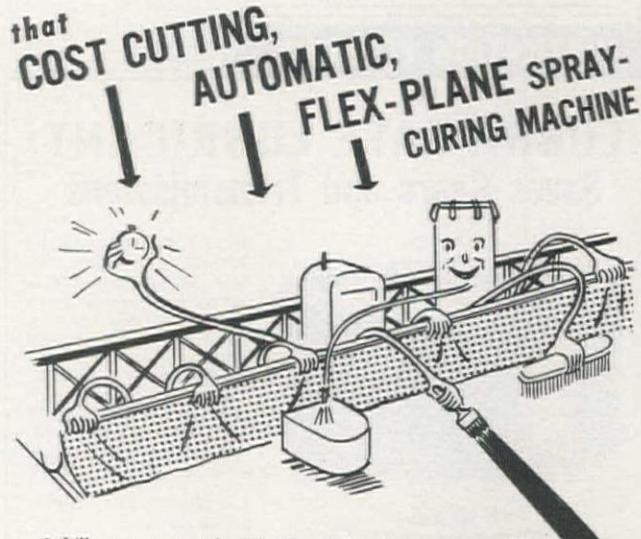
for Graders, Dozers, Scrapers and Snowplows . . . made from tough steel selected for abrasion resistance, they're free from hard and soft spots, last longer, hold their edge, save time and trouble.



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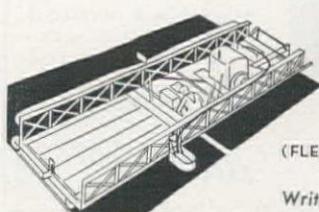
General Offices: Denver, Colorado

Pacific Coast Sales: The California Wire Cloth Corporation, Oakland, Calif.



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catalog describing the full line of Mall Concrete Vibrators. Featured in the catalog are new models of vibrator power units and an entirely new method of connecting flexible shafts in various lengths. Increased horsepower is also announced for several of the power units with no increase in cost.

354

TRUCK-MOUNTED SHOVEL-CRANES—Link-Belt Speeder Corp., Chicago, has published a catalog which contains applications, construction details, customer benefits and specifications of the new HC-51 Truck-Mounted Shovel-Crane. Described as paramount features of the HC-51 are fully hydraulic Speed-o-Matic controls, front drum reversing mechanism for power control load lowering (particularly advantageous for steel erection) and a heavy-duty carrier specifically designed for truck-crane operation.

355

ELECTRODE CATALOG—A 16-page catalog has been announced by Hobart Brothers Co., Troy, Ohio. It contains a description, data on the application, welding procedure, mechanical properties and specifications of electrodes in the Hobart line.

356

CRUSHING AND SCREENING PLANT—Pioneer Engineering Works, Minneapolis, Minn., has published a 20-page booklet covering its complete line of portable combination 2-unit crushing and screening plants. The booklet covers primary and secondary rock and gravel plants, featuring the portability and versatility of the plants to meet the varying conditions for aggregate production. Complete speci-

fications are given, together with a guide to proper selection of equipment. A full cut-away view of two typical plants shows the flow of material through the units and explains the exclusive Pioneer feature of split feed, which greatly increases the screening capacity of the plants.

357

COMPRESSIBILITY CHARTS—Worthington Pump and Machinery Corp., Harrison, N. J., has published a 25-page research bulletin entitled "Compressibility Charts and Their Application to Problems Involving Pressure-Volume-Energy Relation for Real Gases." The Compressibility charts have been constructed using one pound pressure, absolute, as a base rather than one atmosphere used by others for similar charts.

358

WAGON DRILLS—Worthington Pump and Machinery Corp., Construction Equipment Division, Holyoke, Mass., has published a 10-page bulletin describing three models of Worthington wagon drills. They are—the UMW equipped with a 4-in. cylinder bore; UMW-35 equipped with a 3½-in. cylinder bore, and UMW-30 with a 3-in. cylinder bore. The wagon wheel base of each model is 6 ft., 3 in.

359

SIX-CYLINDER DIESELS—Complete specifications for automotive and industrial models of two supercharged, six-cylinder Cummins Diesels, the 275-hp. (maximum) NHS engine and the 300-hp. (maximum) NHRS engine, are contained in two bulletins published by the Cummins

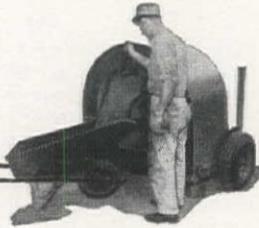
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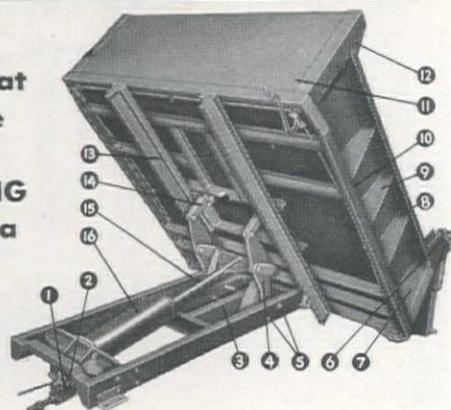
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10. Running Boards 6" wide.
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Engine Co., Columbus, Ind. Five models are shown in each horsepower class for all types of highway, off-highway and industrial and power applications. The bulletins contain installation drawings, photographs and charts on torque, horsepower and fuel consumption, in addition to general specifications for standard equipment.

360

GENERAL PURPOSE MIXER—**Koehring Co.**, Milwaukee, Wis., has published a catalog describing the rubber tire mounted Koehring 16-E Twinbatch, latest development in the Koehring line of mixing equipment. The mixer is described as a versatile, Diesel-powered general purpose unit that can be used on intermediate paving work as well as for many special applications. The 16-E mixes and distributes up to 50 cu. yd. of concrete per hour, according to the catalog.

361

DIESEL ENGINES—An 8-page illustrated booklet—“Cat” Engines on the Construction Job—discusses power requirements for excavators, compressors, electrical equipment, pumps, ditchers, rollers, and movable forms and includes specifications on a complete line of “Caterpillar” Diesel Engines. Published by **Caterpillar Tractor Co.**, Peoria, Ill.

362

CENTRIFUGAL FIRE PUMPS—Two basic types of Underwriters' approved centrifugal fire pumps, together with selection charts, necessary fittings and application data are described in a 24-page booklet available from the Peerless Pump Division of the Food Machinery and Chemical Corp., Los Angeles. Both single stage and

two-stage fire pumps and their methods of drive and application are comprehensively covered, both in illustration and text. In addition, dimension drawings and dimensional data are set forth on both types of pumps. Selection charts cover capacity, heads, horsepower range and r.p.m. of each pump for each type of drive, which can be electric motor, Diesel, gasoline engine or steam turbine.

363

TRUCK MODELS—**Dart Truck Co.**, Kansas City, Mo., has published a series of bulletins on the Dart line of extra heavy duty trucks and trailers. Each bulletin describes and illustrates a specific model. Complete “general” specifications are given for each model, since every Dart truck is engineered and custom built for each specific haulage job.

364

BRONZE AND COPPER BEARINGS AND CASTINGS—The National Bearing Division of American Brake Shoe Co., New York City, has published a 28-page booklet giving physical properties and comparative specifications for 27 different bronze alloys and 5 aluminum and manganese bronzes. It contains an outline of the many applications of bronze. Sizes and weights of rough and machined “Tiger” Bronze bars are tabulated. Babbitt metals, their descriptions and uses, are also discussed and illustrated, and their various physical properties have been charted. Prominent space is devoted to illustrations of bearings and castings as made in the division's plant.

365

INTERCOM SYSTEM—Of special interest to executives in every type of in-

dustry is a booklet, “The New Executone,” published by **Executone, Inc.**, New York City. Outlining the manufacturer's completely new line of intercom equipment, this booklet brings the executive up to date on just what this intercom can do for him, as well as its many new operating features.

366

THE COLORADO RIVER CONTROVERSY—**The Colorado River Board of California** at Los Angeles has published a 24-page booklet entitled “California's Stake in the Colorado River.” Theme of the booklet is that the fundamental conflict between Arizona and California as to the division of water available to the Lower Basin states may be resolved by one of three possible procedures: (1) negotiation, (2) arbitration, or (3) litigation. A quantity of the booklets has been printed for free distribution.

367

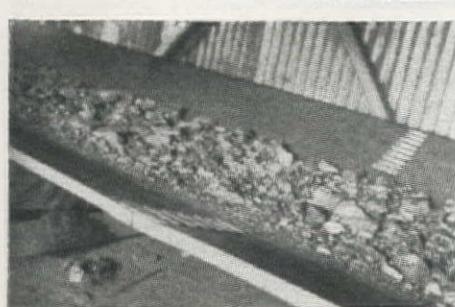
NON-AGITATING CONCRETE EQUIPMENT—**Dumpcrete Division, Maxon Construction Co.**, Dayton, Ohio, has published an 8-page bulletin entitled “Why 23 Big Ready Mix Men use Non-Agitating Equipment.” Each of 23 central ready-mix plants is pictured, together with a statement about the use of this low cost, versatile equipment.

368

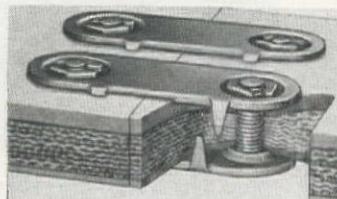
GASOLINE-DRIVEN ELECTRIC PLANTS—“Electricity at your service for any purpose anywhere” is the theme of the 1950 electric plant catalog of **D. W. Onan & Sons, Inc.**, Minneapolis, Minn. The 8-page booklet covers the complete line of Onan gasoline-driven electric plants, ranging from 260 watts to 35,000 watts, in all standard voltages, frequencies and phases.

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369

CORED AND SOLID BARS—The National Bearing Division of American Brake Shoe Co., New York City, has published a 6-page bulletin describing an expanded line of cored and solid "Tiger" Bronze bars in all popular sizes, both rough and machined. The bulletin lists weights and sizes of the bars, and describes the many uses and advantages of this exceptionally wear and shock resistant anti-frictional material.

370

ARC WELDING PROCEDURE—The Hobart Trade School, Troy, Ohio, has made available a 544-page comprehensive and practical textbook on the procedure and practice of arc welding. Clearly written, the 28 chapters of the book are divided into five sections—General Information, Operator Training Course, Carbon Arc Welding and Cutting, Other Welding Processes and Welding Terms and Their Definitions. The textbook is illustrated with 600 photographs of operations, diagrams and charts. Cost of the publication is \$3.00.

371

SINGLE PASS CRUSHING PLANT—A 4-page bulletin describing a new Cedarapids crushing and screening plant has been issued by Iowa Manufacturing Co., Cedar Rapids, Iowa. The simple design features and construction with Cedarapids standard units, which makes possible the plant's low initial cost, are illustrated by means of a diagrammatic flow sheet. The principle of operation is fully described, and complete specifications and dimensions are given.

372

"OILLESS" WOODEN BEARINGS—Paramount Oilless Bearing Co., Worcester, Mass., has published an engineering manual treating the principles and ap-

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lications of "oilless" wooden bearings in modern machine design. The book considers application of wood bearings to the construction and domestic engineering industries in situations where no other type bearing can serve so satisfactorily or efficiently. The manual is being loaned to accredited engineers and machine designers.

373

INDUSTRIAL VACUUM HOSE—Construction of various lines and types of industrial vacuum hose, recommended uses and specifications are fully covered in a catalog published by B. F. Goodrich Co., Akron, Ohio.

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