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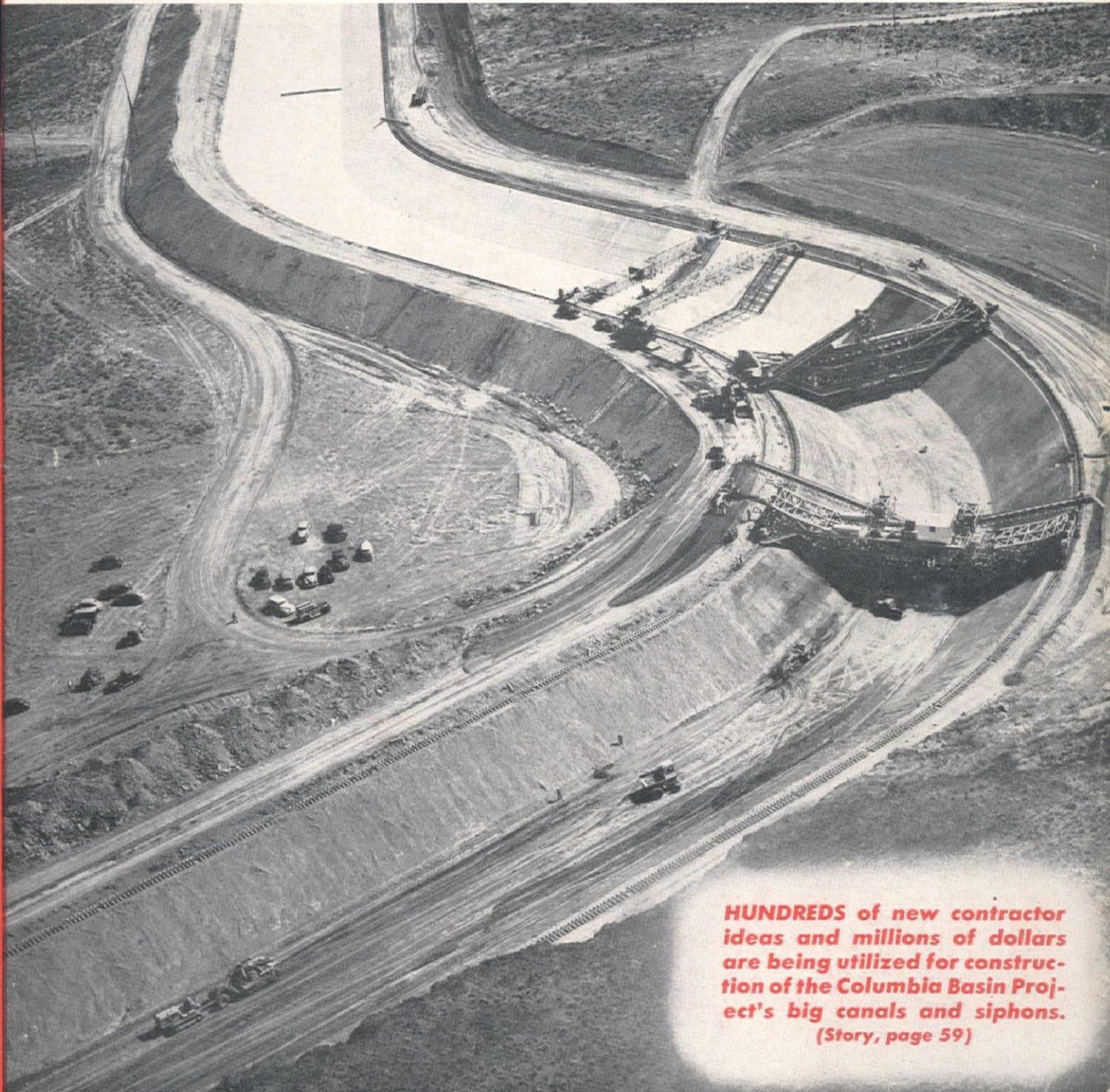
# WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED  
**WESTERN HIGHWAYS BUILDER**

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VOLUME XXIV, No. 7

JULY 15 • 1949

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\$4.00 PER YEAR

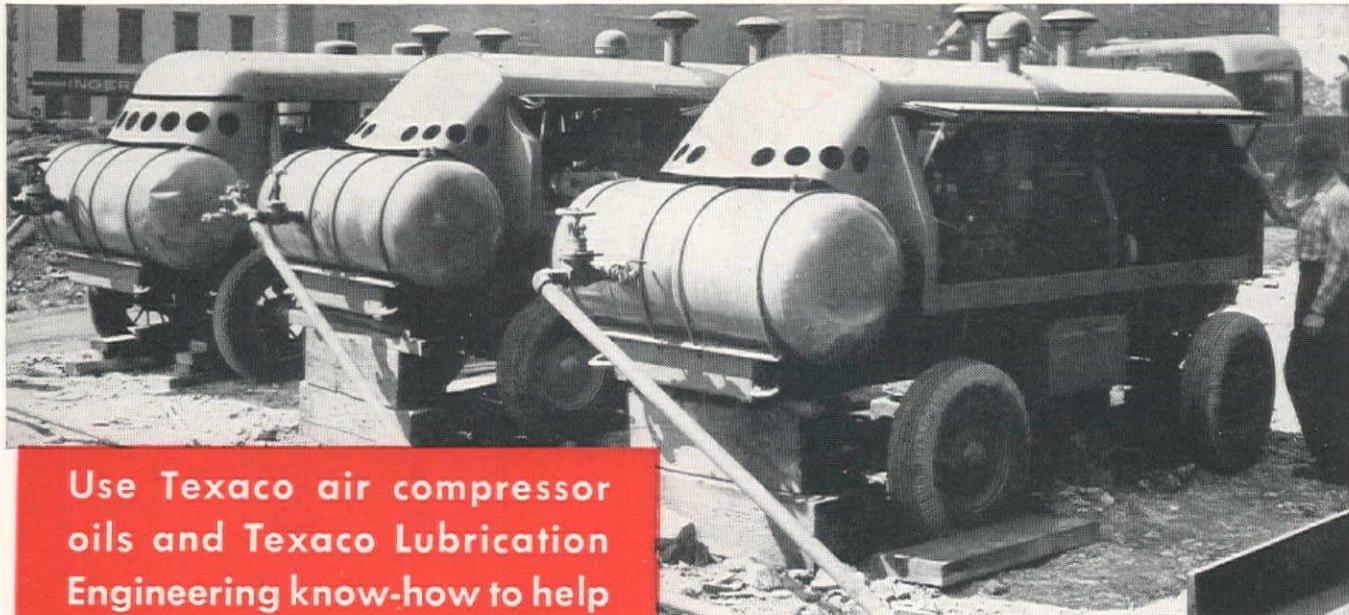


**HUNDREDS** of new contractor  
ideas and millions of dollars  
are being utilized for construc-  
tion of the Columbia Basin Proj-  
ect's big canals and siphons.

(Story, page 59)

# assure maximum compressor efficiency

## Under All Conditions



Use Texaco air compressor oils and Texaco Lubrication Engineering know-how to help improve your compressor operation.

Whatever the type or size of your compressors — whatever your operating conditions — there is a specific Texaco air compressor oil that will assure full volume and pressure, longer compressor life, minimum cost for maintenance.

Texaco has a *complete* line of air compressor oils — straight mineral oils for regular service . . . rust-inhibiting oils where rust is a threat . . . heavy-duty oils for unusually severe service, or where carbon and gum are problems . . . compounded oils where water is present — oils designed to prevent wear and to keep valves clean, rings free, ports

open and air lines clear *under all operating conditions.*

Let a Texaco Lubrication Engineer help you select the Texaco air compressor oils you need to assure best results. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write: The Texas Company, 135 East 42nd Street, New York 17, New York.

**GUARD OPEN GEARS AGAINST WEAR** — Protect your open gears with the recommended grade of Texaco Crater X Fluid. Although it is liquid when applied, it quickly forms a tough, lasting film that cushions shocks, reduces wear, prolongs gear life, assures quieter operation. Easily applied by brushing, spraying or pouring.



## TEXACO Lubricants and Fuels FOR ALL CONTRACTORS' EQUIPMENT

# **NINE NORTHWESTS**

## **on Hungry Horse Dam**

Take a look at these pictures if you  
are figuring on rock work.

Anybody that knows the country around Hungry

Horse knows that there is plenty of tough  
digging for a machine to handle. And, anyone that  
knows the General-Shea-Morrison group of companies  
that are handling this contract, knows that they  
know equipment and buy the best for the  
heart of the job.

Northwest Shovels are real Rock Shovels and have  
been proved on hundreds of jobs like Hungry Horse.

If you have a real Rock Shovel you never have to  
worry about output in the *Key Spots* where the  
profits of a job begin. Plan ahead to have a Northwest  
and get the type of service Northwests are  
giving at Hungry Horse.

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

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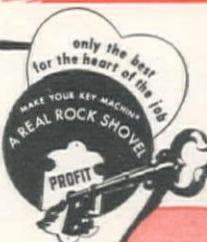
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# BLAW-KNOX

## BATCHING PLANTS

REALLY

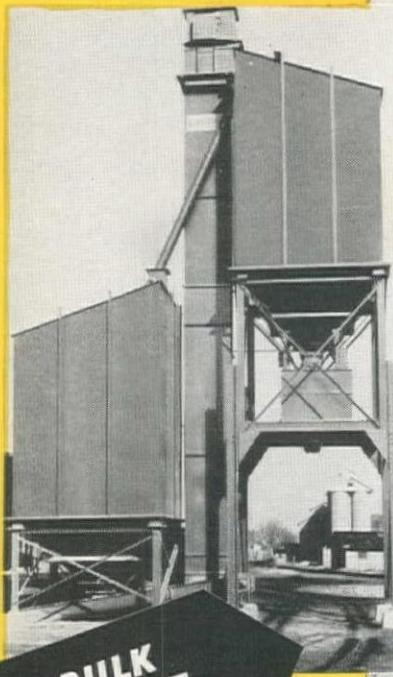
**CUT CONCRETING  
COSTS**

PORTABLE  
AGGREGATE  
BATCHING  
PLANTS

HERE'S a complete line of portable batching and mixing plants that will keep your fleet of trucks moving all the time. Big capacity for aggregates and cement means there's never any waiting for the crane to catch up or for spotting cement cars for unloading. Twin batchers, and choice of manual or automatic controls for Water Weighing Tanks, electrically operated discharge gates on bulk cement plants are only a few of the features that assure fast, accurate batching.

Capacities of aggregate plants range from 100 to 120 tons in two, three or four-compartment styles, bulk cement plants of 300 and 400 barrel sizes with combination arrangements to double these capacities.

The flexibility and portability of Blaw-Knox batching and mixing plants provide the solution to ready mixed concrete operations, central mixing plants or concrete products manufacturing problems. See your nearest Blaw-Knox distributor for details.



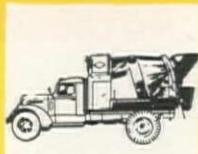
BULK  
CEMENT  
PLANTS



CENTRAL  
MIXING  
PLANTS



TRUCK  
MIXER  
LOADING  
PLANTS



Hi-Boy Trukmixers



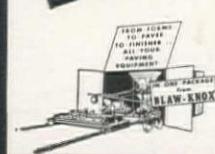
Clamshell Buckets



Concrete Buckets



Steel Street Forms



# BLAW-KNOX

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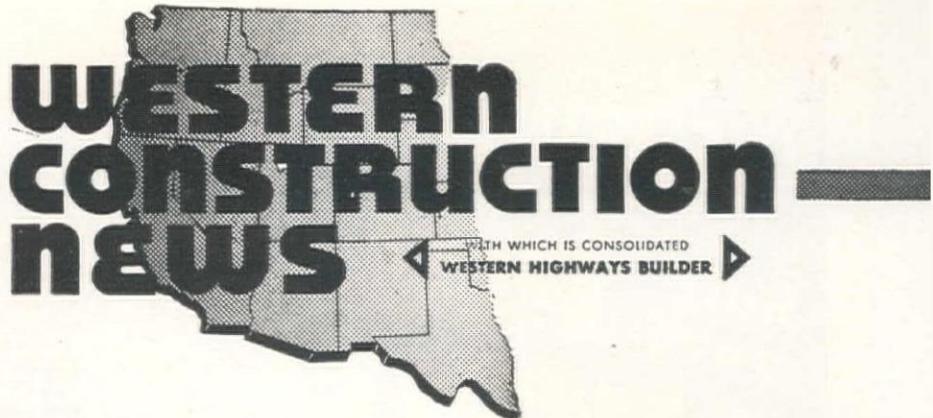
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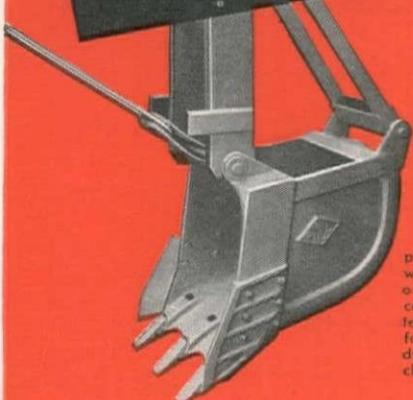
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*Covering Construction in the Western Half of the United States*

# KOEHRING 205

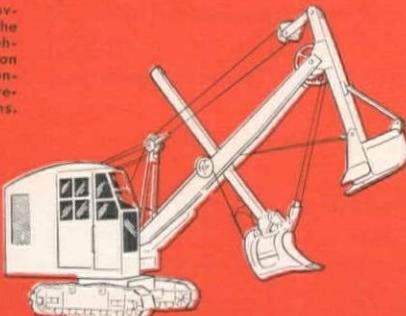
## half yard PULL SHOVEL

### fast • powerful



Husky, half-yard pull shovel dipper is 31" wide. Bottom and lip, one-piece manganese casting . . . side cutters are cast manganese, for extra-long, heavy-duty service. Teeth interchangeable with shovel.

Because both pull shovel and shovel use the same boom, this Koehring combination costs 25% less than conventional units that require two separate booms.



ASK YOUR KOEHRING DISTRIBUTOR ABOUT THE 205 HALF-YARD TODAY

**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**



#### NO WEAVING with this rigid pull shovel front end

Extra strength, extra resistance to side-sway are built into the Koehring half-yard 205 pull shovel. You get a straight, clean ditch every time because here you have a pull shovel mounted on a rugged heavy crowd shovel boom. Front end will not weave . . . pull shovel dipper doesn't turn away from the cut, because wide, shovel-type boom point gives a wide connection to the rigid pull shovel dipper arm. Its long, deep digging reach (15' 3"), powerful half-yard bite, and easy dumping give high output.

Here are other Koehring 205 features that assure you more production at lower cost: independent traction, to travel, swing and operate boom all at the same time . . . double-fulcrum clutch, to reduce manual operating effort . . . dual-purpose boom to handle both pull shovel and crowd shovel. In addition, the 205 also can be converted quickly to dragline, clamshell, crane or pile driver . . . is available on crawlers or pneumatic tires, to suit your needs. Other Koehring pull shovel sizes: 3/4-yard 304, and the big 1 1/2-yard 605.

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

## KOEHRING HEAVY-DUTY SHOVELS

# KWIK-MIX

fast charge . . . fast  
discharge DANDIE

# MIXERS

**16-S** Kwik-Mix Dandie (illustrated) is fast-charging because of extra-wide skip, quick lift, wide neck. It discharges drum in 2½ revolutions. You get thorough, quality mix fast, every batch because the 16-S remixes without increasing batch time, folds aggregate as it mixes. Choice of side or end-discharge. For your smaller jobs, ask about the other DANDIE mixers: 3½-S, 6-S and 11-S.

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# JOHNSON

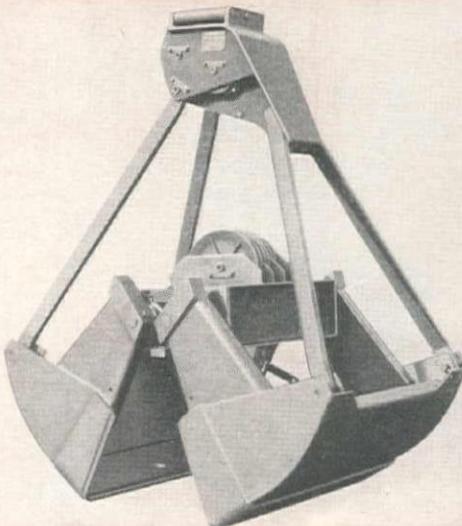
easy-loading and  
smooth operating

# CLAMSHELL

**3/8 TO 2 1/2 YD.** heavy-duty Johnson clamshell buckets give you: FASTER OPERATION, because big needle-bearing-mounted sheaves deliver full power to cutting lips . . . BIGGER LOADS, because all-welded construction lowers center of gravity, lets teeth dig in deep. Three types: heavy-duty digging, wide-rehandling (illustrated) and general purpose. All feature sealed roller bearings sheaves for easy action and long life.

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Salt Lake City



# PARSONS

heavy-duty,  
fast-digging

# TRENCHLINERS\*

**221** ladder-type Trenchliner (illustrated) digs up to 8' 6" deep, 16" to 36" wide. To deliver maximum production for the type of materials and size trench being excavated, you have a selection of digging speeds from 5" to 146" per minute. For job-to-job travel, you get high-traction speeds from 1½ to 3¼ m.p.h. Get complete facts about the 80 Trenchmobile . . . the 200 wheel-type . . . 250 and big 310 ladder Trenchliners.



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# A vastly superior



"Caterpillar" rear-mounted double-drum Cable Control (see sectional view on opposite page).

EVERY construction contractor knows that the efficiency and work capacity of tractor-operated equipment are governed to a vital degree by the efficiency of the mechanism through which it is controlled. Cable control applications are many, and the time-and-wear losses from inferior design and stand-up qualities are too costly to ignore.

"Caterpillar" Cable Controls are designed in four models for standard mounting on "Caterpillar" D6, D7, D8 track-type Tractors and DW10 wheel Tractors—for operating scrapers, bulldozers, rippers, and other equipment. They can also be

readily adapted for mounting on various other makes of tractors.

"Caterpillar" Cable Controls quickly pay for themselves—assure steadier and greater production through better operation, less down time. They are an investment you can't afford to overlook! Why not replace your obsolete controls with these finely engineered units—now? Your "Caterpillar" dealer can give you quick delivery and expert installation. For immediate information, SEND IN THE COUPON.

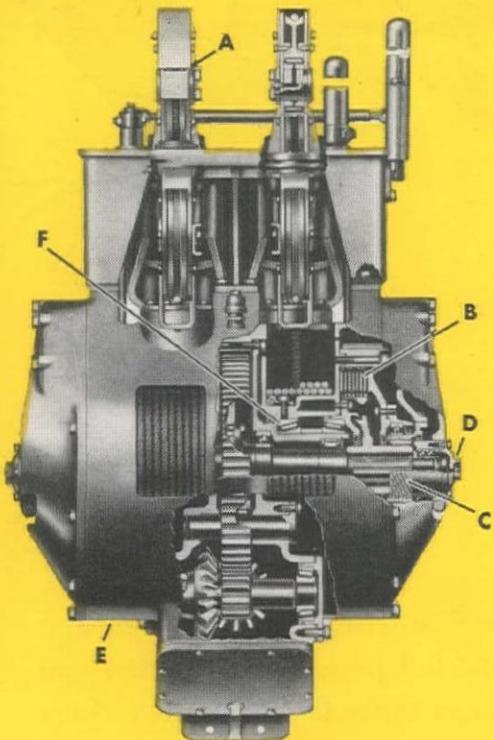
**Caterpillar Tractor Co. • San Leandro, Calif.; Peoria, Ill.**



"Caterpillar" front-mounted single-drum Cable Control. Has same type multiple-disc, metallic faced clutch, synchronized clutch-brake action, and other qualities, as rear-mounted models. Its use for bulldozer operating leaves rear of tractor clear for mounting a winch, crane or other tool.

# cable control

**"CATERPILLAR" DESIGNED IT  
AND BUILDS IT—TO BOOST  
PRODUCTION FOR YOU**



**A** Triple-swivel fair-lead sheave system (exclusively "Caterpillar") accurately spools cable on drum regardless of pulled unit's position; minimizes cable crisscross and flattening, lengthens its life.

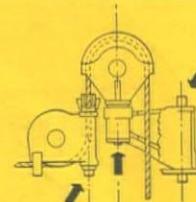
**B** Multiple-disc clutch with metallic facings has 732 square inches of clutching area—which means long clutch life and infrequent adjustment.

**C** Bronze on steel clutch engagement mechanism allows operator to maintain accurate and quick control of blade—result is more production.

**D** Clutch-brake adjustments are easily made from outside of case, yet working parts are heavily protected against brush and trees.

**E** Sturdy steel case holds bearings in rigid adjustment—preventing "clutch drag" in loading or 'dozing' action; minimizing down time—boosting production records.

**F** Anti-friction bearings used throughout—assuring smooth action and long life.



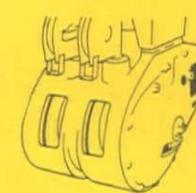
**A**

**B**



**C**

**D**



**E**

**F**

## CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS  
EARTHMOVING EQUIPMENT

CATERPILLAR TRACTOR CO.  
Dept. WN-7, Peoria, Illinois

Please send specification information on "Caterpillar" Cable Controls.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

# Glutton



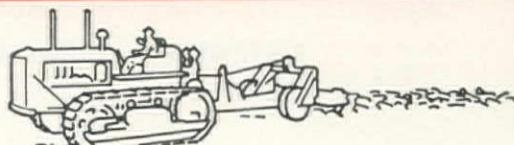
**A Glutton for Punishment**, powered by a diesel engine with matchless lugging ability and stamina—this is the tractor for you to use on heavy, back-breaking jobs. The International Crawler, with broad-gauge stability, balance and geared-to-the-ground traction, is the worker you need. • Its powerful engine takes tough work in stride, with increased torque for heavier lugging when the load demands it.

All-weather starting, advanced-design combustion, full pressure lubrication and other features make it *your obvious choice* among tractors! Compare the operating features and work capacity of the International with any other . . . and you'll insist on an International every time!

**INTERNATIONAL HARVESTER COMPANY**  
**Chicago**

*Listen to James Melton and "Harvest of Stars"*  
*every Sunday, NBC*

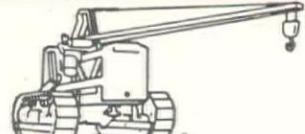
**CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS**





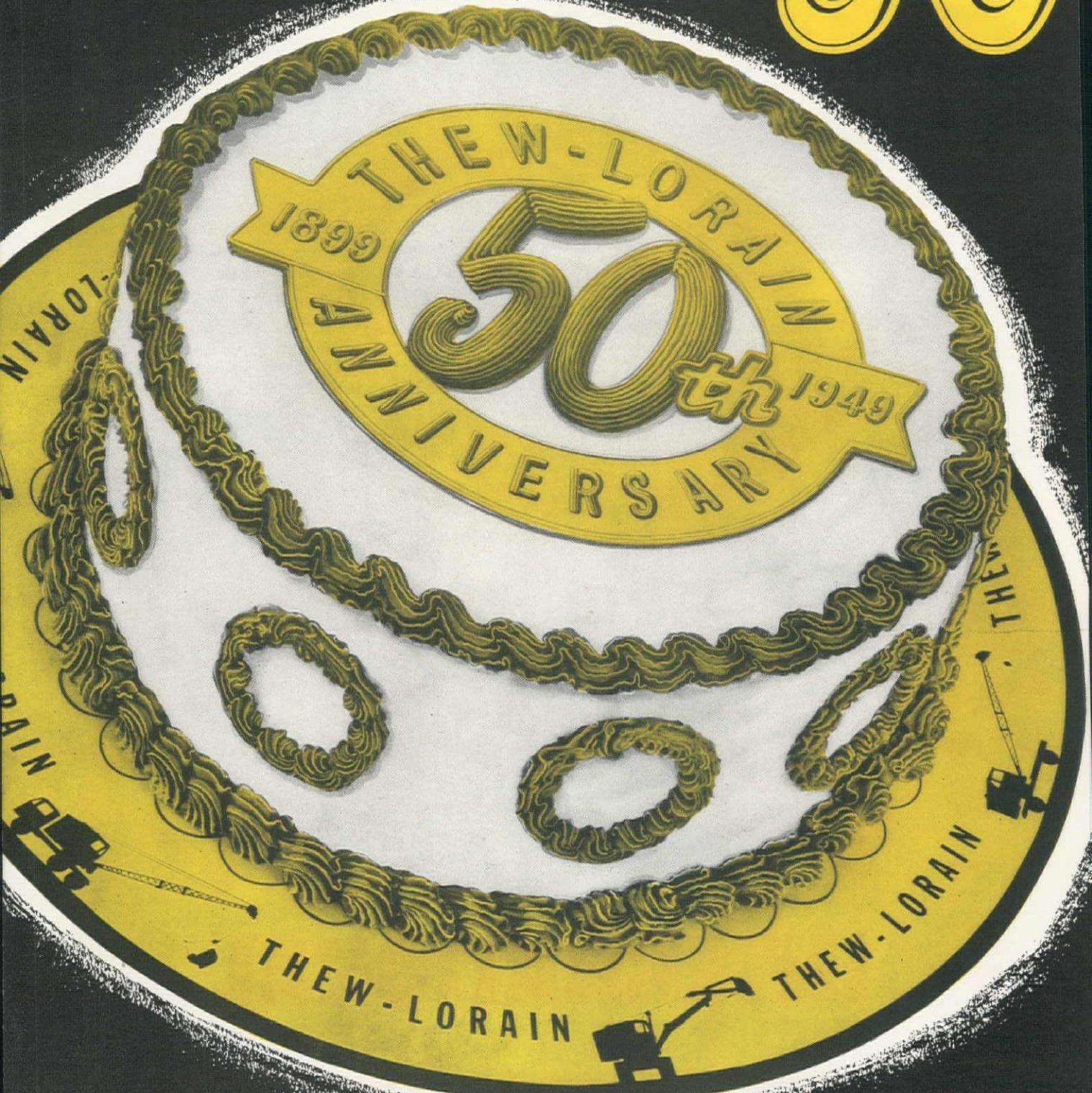
An International TD-14 Diesel Crawler puts these rocks in their place with its hydraulic blade while pioneering a roadway. An all-around workhorse on construction jobs of every kind—a landscape grader, basement excavator as well as versatile road builder—equally useful with blade, ripper or scraper—it will pay its way wherever you put it to work. For full information about this and the 6-cylinder TD-18, write for TD-14 and TD-18 folders.

# INTERNATIONAL INDUSTRIAL POWER



# THEW-LORAIN IS

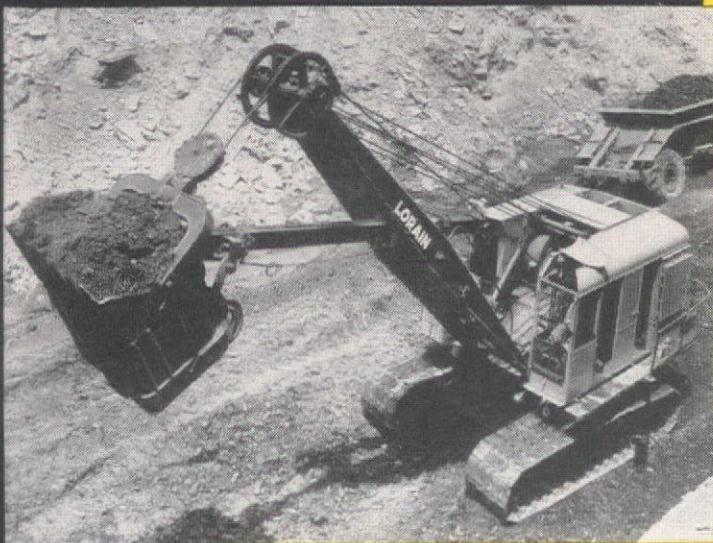
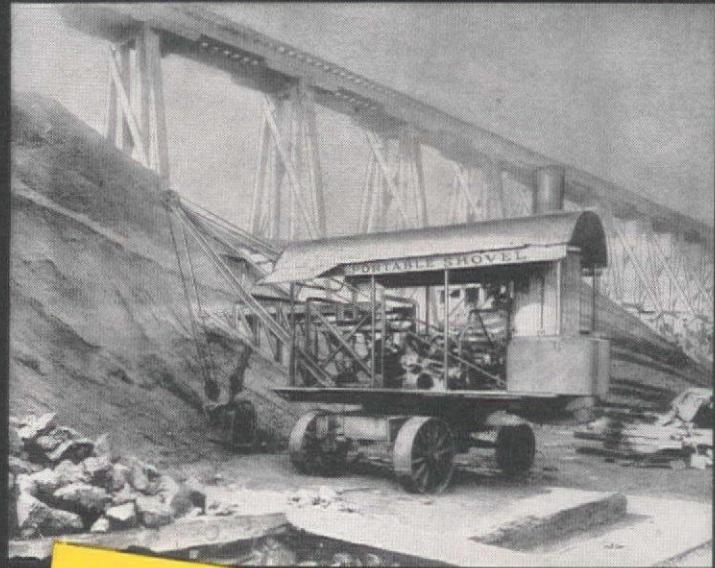
# 50



# YEARS young!

50 years ago—July 17, 1899—an idea became an industry . . . an industry still going strong today as The Thew Shovel Company. Thew alone hasn't made this anniversary possible; it's due largely to you men in the construction and allied industries, and the repeated confidence you've shown in Thew-Lorain products . . . We are old only in our years of experience and "know-how". We're as young as ever in our ideas and efforts to serve you better, today and tomorrow.

THE THEW SHOVEL CO., LORAIN, OHIO



**1899**

This is the first full-revolving shovel as designed and built by Capt. Richard Thew in 1895. After 4 years of operation as a private business, The Thew Shovel Co. was incorporated in 1899.

**TODAY** . . . Thew is the world's largest builder of commercial size shovels, cranes, clam-shells, draglines and hoes, mounted on crawlers or rubber tires. Such machines are identified by the trade mark "Thew-Lorain."

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*Lorain*  
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# GENERAL PETROLEUM reduced our oil

That's the statement of Bert Lee, project superintendent for C. G. Willis and Sons, currently contracting a 6 mile road project on the Cabrillo Freeway north of San Diego.

This job calls for moving and filling 100,000 yards of dirt and is one of the toughest Lee has experienced. A hard-pan layer extends to a depth of twelve feet, then heavy adobe. Equipment must operate on full power eight hours per day, the equivalent of twenty-four hours normal operation. Naturally lubricants must be able to take it. According to Lee, "when a switch was made to General Petroleum's Delvac oil, performance improved and makeup oil was reduced from 15 to 5 gallons per day."

Bert Lee also swears by the G. P. preventive maintenance program. He says that they run equipment hard but service it regularly according to recommendations and get maximum dollar return on the equipment investment.



## 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.

*Bert Lee, Project Super for C. G. Willis and Sons, Los Angeles Contractors, checks up on job progress.*

*A few of the 10 cats, 3 tournapulls, and 4 water wagons working on the job.*



# consumption 65%

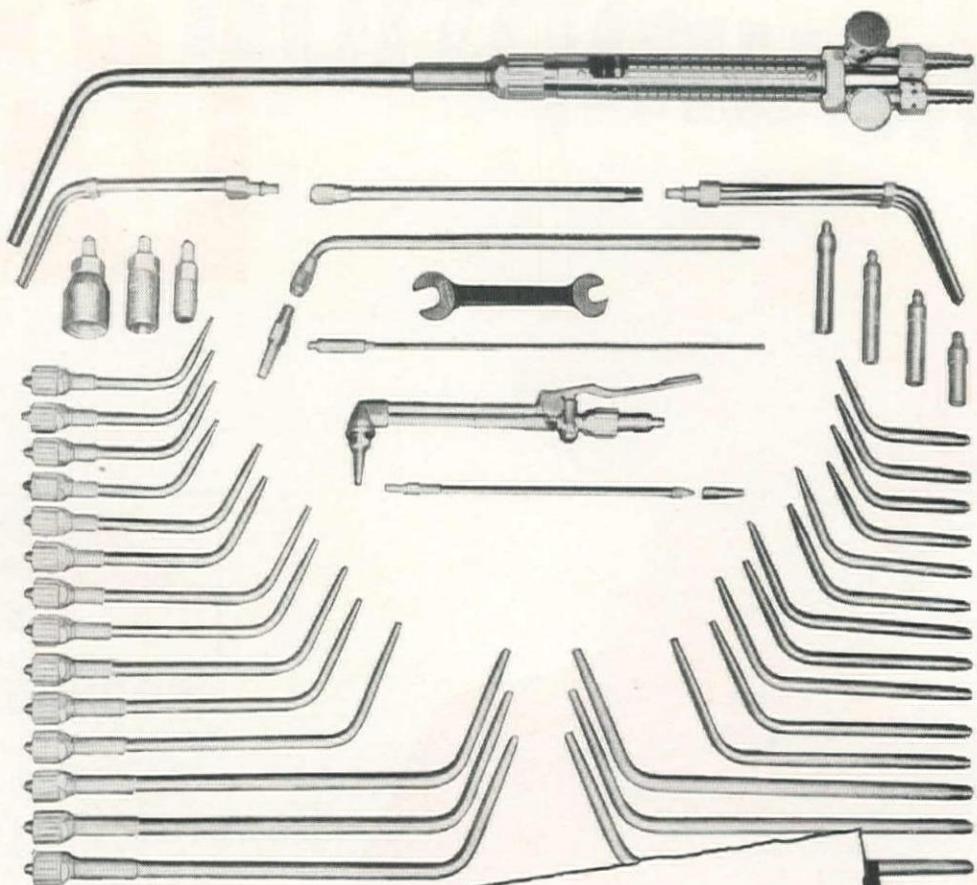


**General Petroleum  
CORPORATION**

SERVING THE WEST  
SINCE THE START OF THE CENTURY

*Left to right are: Pete King, G. P. Representative, Bert Lee, Project Superintendent, and J.D. Morrison, job foreman on the cat spread.*





Here is Airco's **New** Torch for  
**Heavy Duty** welding . . .  
 heating . . . brazing

The new Airco 800 Torch is designed for tough, *heavy-duty* jobs. As shown in the illustration, the torch operates with a complete range of welding tips (with or without individual mixers) as well as heating, brazing and a variety of tips for other uses. No other torch can offer this wide operating range.

The torch head is of durable, long-wearing monel metal; thus fewer torch head replacements, and lower maintenance costs result. The general design of the new Airco 800, plus flexible 1/4" or 5/16" I.D. hose, assures perfect balance and ease of manipulation . . . lowered operator fatigue.



With the addition of a cutting attachment, the Airco 800 is easily converted to handle general shop cutting work.

If you would like more information about this torch, or a **FREE** demonstration right in your own shop, address your nearest Airco Pacific office.



**AIR REDUCTION PACIFIC COMPANY**

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# Proven Performance On The Job!



**T2 TRAXCAVATOR** on road widening job in Walnut Creek, Cal. Smallest size in the TRAXCAVATOR family—powered by "Caterpillar" D2 tractor.



**T4 TRAXCAVATOR** on "Caterpillar"-D4 tractor street grading in Orlando, Fla. Note amount of dirt bucket is pushing ahead and easily handles.



**T6 TRAXCAVATOR** loading "fill" material on Toronto, Ont., Can. project. The power in the "Caterpillar" D6 insures ample digging and loading push.

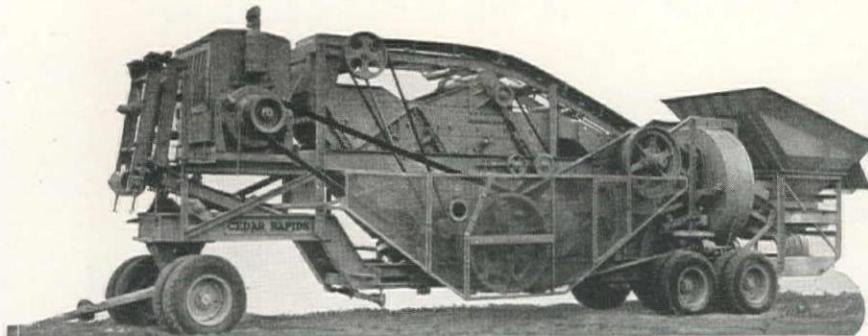


**T7 TRAXCAVATOR** helping to convert Madison, Wis., street into super highway. This biggest TRAXCAVATOR in the line is on a "Caterpillar" D7.

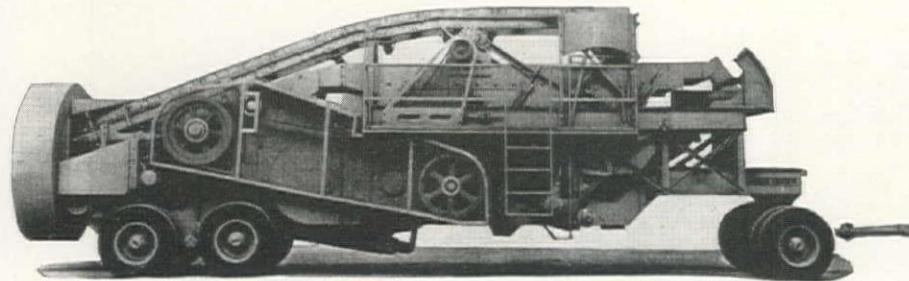
There's a correct size TRAXCAVATOR for every job and purpose. See your TRACKSON—"Caterpillar" dealer for detailed information or write to TRACKSON COMPANY, Dept. WC-79, Milwaukee 1, Wis.

**TRAXCAVATOR**  
REG. U. S. PAT. OFF.  
*The Original Tractor Excavator*

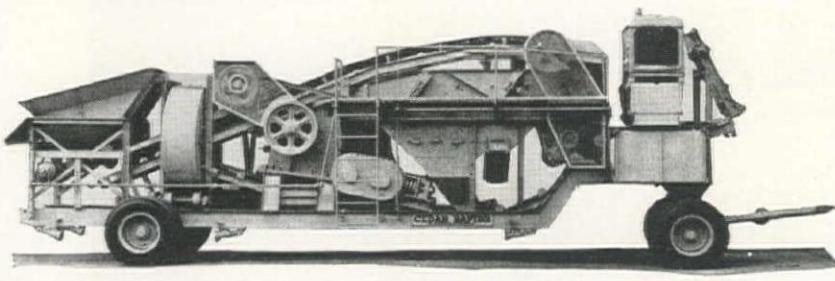
# Here's a complete line of portable plants that will meet your every requirement



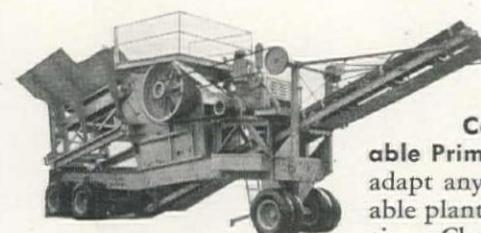
The **Cedarapids Junior Tandem** is one of the most popular portable crushing and screening plant because it will handle most aggregate producing jobs. The 36" x 10' horizontal vibrating screen assures greater capacity and the higher efficiency and closer grading needed for meeting the most exacting specifications. 10" x 24" or 10" x 36" roller bearing jaw crusher and 24" x 16" roller bearing roll crusher provide plenty of capacity for jobs requiring an unusually high percentage of crushing. Operators report production of 110 tons per hour—and more—crushing to  $\frac{5}{8}$ " with 75% crushing.



The **Cedarapids Master Tandem** is the ideal big portable plant for big jobs. It contains all the features that mean big capacity, trouble-free operation and low cost. 10" x 36" roller bearing jaw crusher, 40" x 22" roller bearing roll crusher and 4' x 12' horizontal, double deck vibrating screen assure smooth crushing and screening operations for every pit condition. V-belt and universal drives eliminate troublesome chains and sprockets. No lost time for setting up and taking down between jobs. Production of 150 tons an hour is easy for a Master Tandem.



The **Cedarapids Pitmaster** is the smallest portable tandem plant in the Iowa line. Every feature is designed and built for low operating and maintenance costs as well as exceptionally low first cost. 10" x 16" roller bearing jaw crusher, 16" x 16" roller bearing roll crusher, 30" x 9'5" horizontal double deck vibrating screen assure production of more than 50 tons per hour under average conditions.



**Cedarapids Portable Primary Crushers** will adapt any Cedarapids portable plant for quarry operations. Choice of five sizes of single jaw crushers from 15" x 24" to 32" x 40" and an 18" x 36" twin jaw crusher.

single jaw crushers from 15" x 24" to 32" x 40" and an 18" x 36" twin jaw crusher.



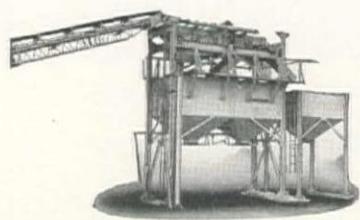
**Cedarapids Secondary Units** are similar to the portable tandem plants but use only one crusher, either a roll, cone, twin jaw or hammermill. Choice of sizes to fit your requirements. Units

with any of the first three types of crushers are complete gravel plants but when used with primary or scalping unit will handle crushed stone too. The hammermill secondary will produce agricultural lime or roadstone or a percentage of both.



**Cedarapids Scalping Units** consist of a single jaw or twin jaw crusher, horizontal, double-deck vibrating screen with conveyors, all mounted on pneumatic tired trucks. May be used for primary crushing when oversize is not too large, or to follow a portable primary in a quarry. Choice of five sizes.

mounted on pneumatic tired trucks. May be used for primary crushing when oversize is not too large, or to follow a portable primary in a quarry. Choice of five sizes.



**Cedarapids Wet or Dry Screening Units** are made up of a two-compartment, welded steel bin with a Cedarapids horizontal double-deck vibrating screen mounted on top. Spray bars can be added for washed aggregate. Choice of 40, 50 or 60 cu. yd. sizes.

## The IOWA LINE of Material Handling Equipment Is Distributed by:

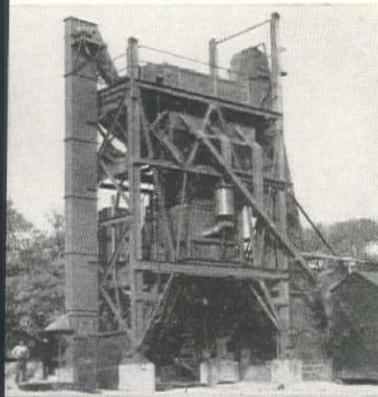
HOWARD-COOPER CORP., Seattle, Washington; Portland, Eugene and Central Point, Oregon; HALL-PERRY MACHINERY CO., Butte, Great Falls, Missoula and Billings, Montana; INTERMOUNTAIN EQUIPMENT CO., Boise and Pocatello, Idaho, and Spokane, Washington; WORTHAM MACHINERY CO., Cheyenne, Wyoming; KIMBALL EQUIPMENT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

**Cedarapids**

Built by  
IOWA

# for low cost construction



Left

**Cedarapids Model "E"**, all-electric, batch type bituminous mixing plant is completely portable and yet will handle 2000, 3000 or 4000 lbs. per batch. Will handle hot or cold mixes. Also offered in 2000, 3000 and 4000-lb. capacities with gasoline or diesel power and with or without wheel equipment.



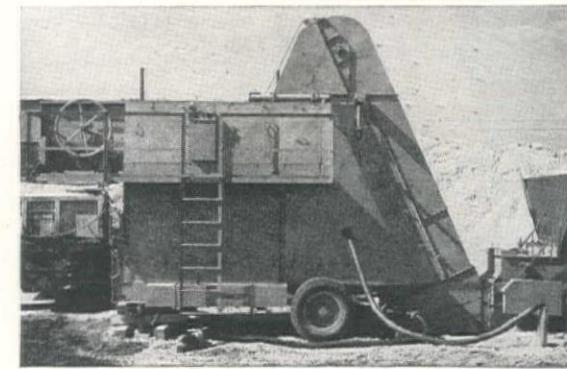
Above

**The Cedarapids Model "A"** is a knock-down type, 1000-lb. batch bituminous mixing plant built to handle medium sized black top jobs at a profit. 2' x 6' Cedarapids-Symons screen, 1000-lb. capacity pug mill, 4' x 16' drier, batcher and elevators are perfectly balanced to make a smooth, reliable plant.



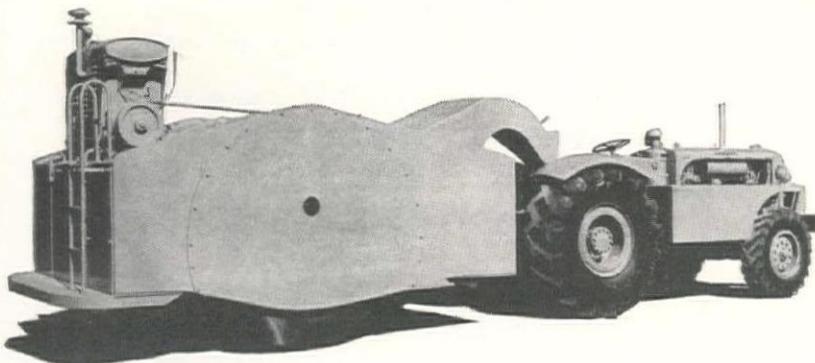
Right

**The Cedarapids Patchmaster** is the handiest, most portable, low-cost volumetric measuring type bituminous mixing plant for small or medium sized jobs requiring 25 to 30 tons per hour. Ground-level charging hopper and truck-high pug mill discharge simplify operation. May be set up as permanent plant or kept on wheels for easy portability.



Left

**The Cedarapids Compactor** is the answer to your compaction problems whether compacting highway subgrades and bases, airport runways or dam fills, stabilizing soil cement or soil and graded aggregate. It combines a heavy rubber-tired roller with a vibrating mechanism. Offered in 25,000 and 60,000 lb. models.



## IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U.S.A.

# Here It Is!

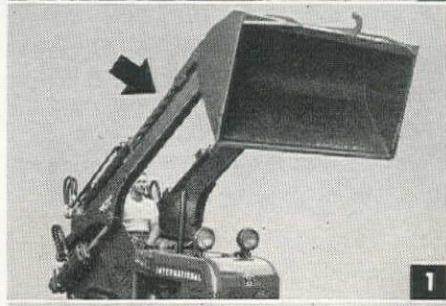
## THE NEW

**BUCYRUS  
ERIE**

## DOZER-SHOVEL

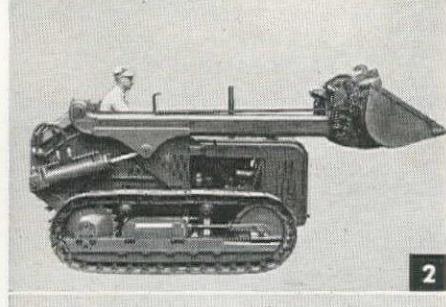
for INTERNATIONAL T-6, T-9,  
TD-6 and TD-9 Crawler Tractors

3/4 and 1 cu. yd. Buckets



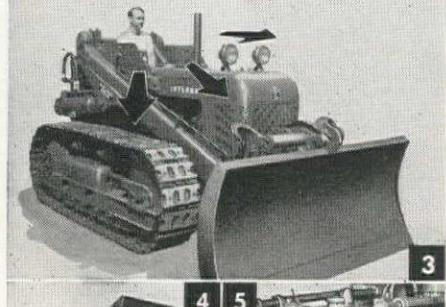
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1



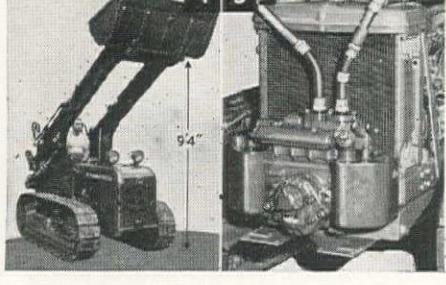
2

2



3

3



94"

4

4

5

5

Now, more than ever, it pays to do your digging, loading, stockpiling, bulldozing and lift-about jobs the Dozer-Shovel way! The new Bucyrus-Erie Dozer-Shovel gives you all the advantages of its pace-setting predecessor plus greater speed, greater simplicity, easier operation and a long list of significant new features thoroughly tested and proved in the field. The new Dozer-Shovel is available with either gravity-dump bucket or hydraulic bucket control for more digging ability, bigger loads, controlled dumping. Looking for fast, economical, high-output performance? Ask about the new Dozer-Shovel!

### 1. HYDRAULIC BUCKET CONTROL

available with new Dozer-Shovel means big payloads, fast or slow dumps at will.

### 2. LOWER OVERHEAD CLEARANCE

and no superstructure enable Dozer-Shovel to work in close quarters.

### 3. FULL VISIBILITY

— Operator has

360°, unobstructed vision in all directions.

4. HIGHER LIFT for easier spotting and loading to trucks.

### 5. IMPROVED HYDRAULIC CON-

TROL with pump, valve and tanks combined in one compact unit.

**BUCYRUS • ERIE COMPANY**

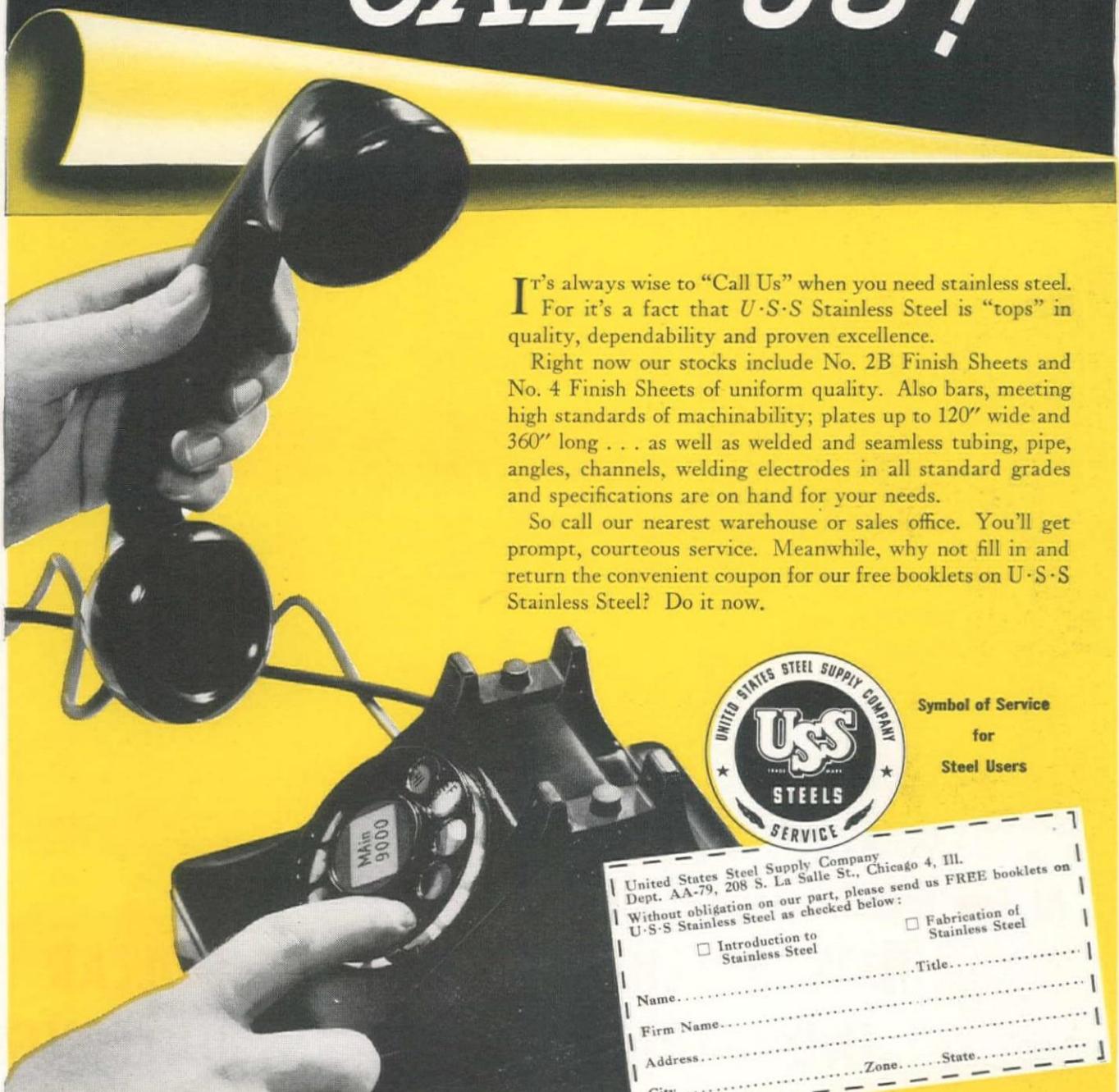
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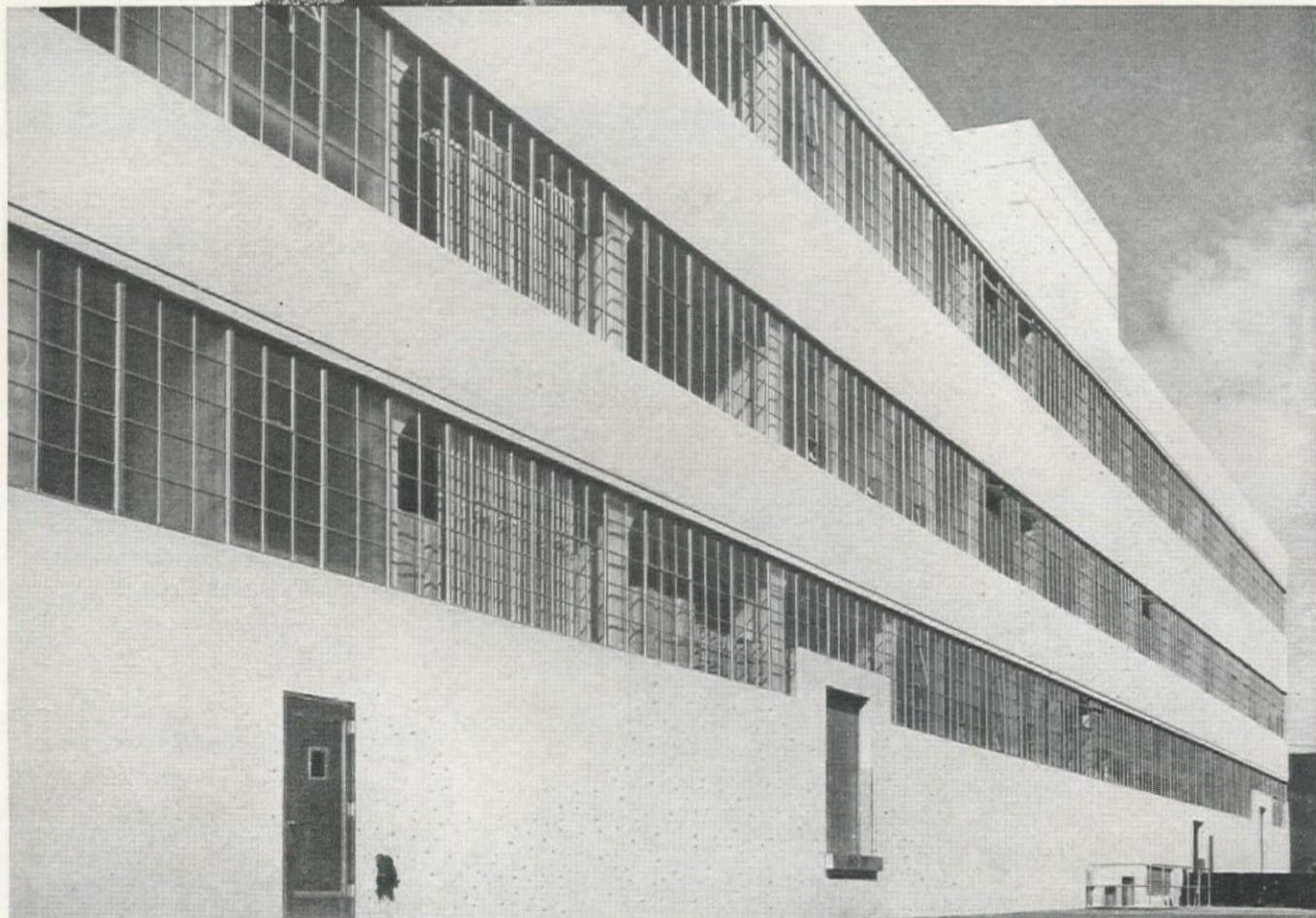
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UNITED STATES STEEL

1849-1949

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At San Francisco, Fuller adds a

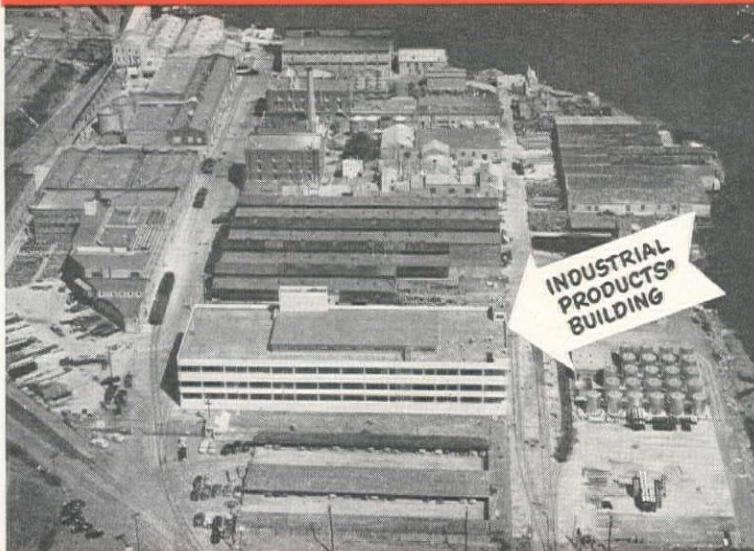
## NEW MILLION-AND-A-HALF DOLLAR INDUSTRIAL PRODUCTS BUILDING

### HIGHLIGHTS:

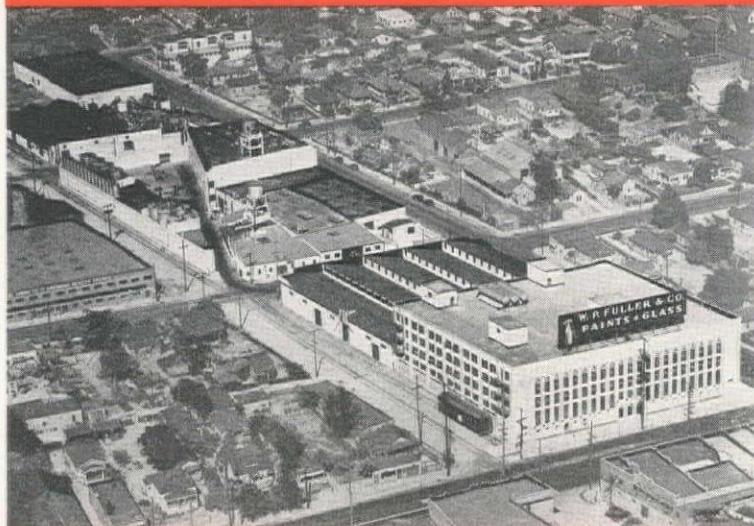
- 95,000 square feet—West's largest Industrial Products Building.
- 200,000 gallon per month capacity—with space to double output.
- 10,000 industrial finishes formulated covering automotive, woods, metals, plastics, leathers and composition surfaces.
- New 360,000 gallon Storage Tank Farm.

Fuller's abiding faith in the industrial West is typified by this signal forward step... Our new Industrial Products building further augments facilities that have made Fuller the leading Western supplier of industrial lacquers, synthetics and varnishes and plant maintenance products... Now, the finest known equipment, spaciously housed and scientifically streamlined, is at the disposal of the West's largest staff of industrial paint chemists and technicians, providing them with unsurpassed research and product control facilities... More than ever, Fuller is in a position to supply the diversified finish and protective coating needs of the West as no one else does—as no one else can.

# Celebrates its Centennial



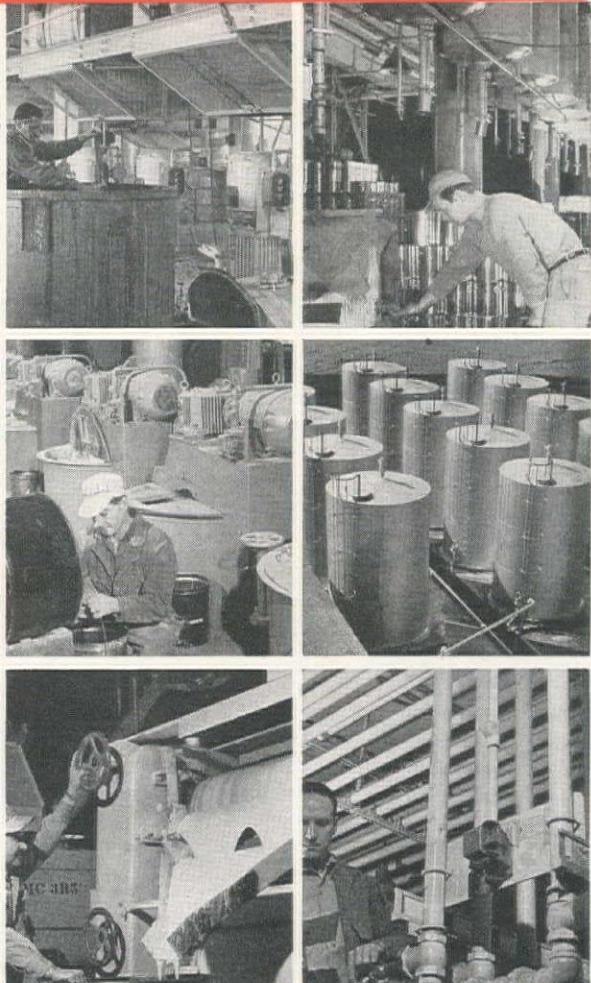
Huge South San Francisco Factory, showing new Industrial Products Building with its own Tank Farm.



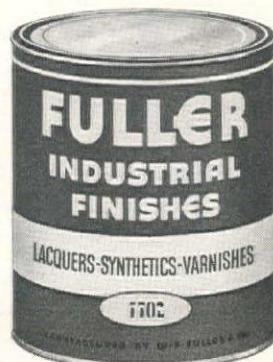
Los Angeles Factory, Laboratory and Warehouses.



Portland Factory. Fuller's tri-city facilities exceed those of any combination of other like Western manufacturers.



Six scenes of some of modern equipment in new Industrial Products building. (Top, left) Battery of 34 500-gallon stationary agitator tanks on second floor. (Top, right) First floor outlets of stationary agitator tanks. (Middle, left) Section of 16 100-gallon paste mixers. (Middle, right) 12 of 24 new 15,000-gallon storage tanks. (Bottom, left) One of six roller mills, grinding white enamel base for synthetic finish. (Bottom, right) Small portion of the 50,000 feet of piping in new building.



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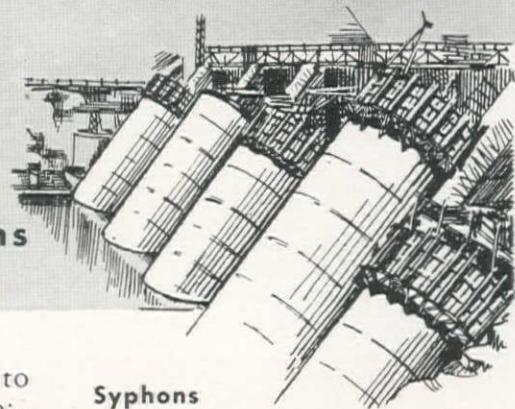


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**A Complete Service for You . . .**

**Job Estimating, Designing, Custom-  
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Vice President Wm. H. (Bill) Schutte, 25-year steel forms veteran, heads Noble's Steel Forms Division.



Phil Farley, service manager. He and his serviceman assure you quick installation and overnight help on service jobs.

Wm. H. (Bill) Schutte, for 25 years designer, builder, and installer of steel forms on big concrete jobs, has joined us to head this new division. Phil Farley is in charge of Service and installations. Farley has had 18 years experience in this field, and his knowledge of the application of steel forms is widely recognized. He has worked on Moffatt Water Tunnel, Shasta Dam, Los Angeles Aqueduct, New York Aqueduct, and other like projects.

The "know-how" of these two experts, plus an able crew of engineers are available to help you on any concrete steel forms problem—from estimating your job through designing, custom-building, installation, and trouble shooting.

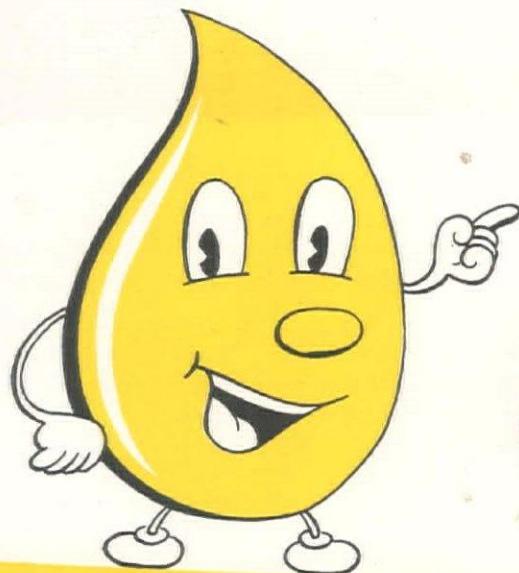
Take advantage of this complete steel forms service N O W. Start your concrete job right by letting us help you estimate it. No obligation. Wire, phone or write Wm. H. (Bill) Schutte, Steel Forms Division, Box 38W.

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CEMENT AND AGGREGATE BATCHING PLANTS . . . BULK CEMENT  
PLANTS . . . AGGREGATE BINS AND CEMENT SILOS . . . STEEL FORMS FOR  
CONCRETE CONSTRUCTION JOBS . . . TUNNEL AND DRILL JUMBOS  
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- DIFFERENTIAL SQUELCH (U.S. Pat. 2,343,115)
- I.D.C. slope filter (Pat. Pending)

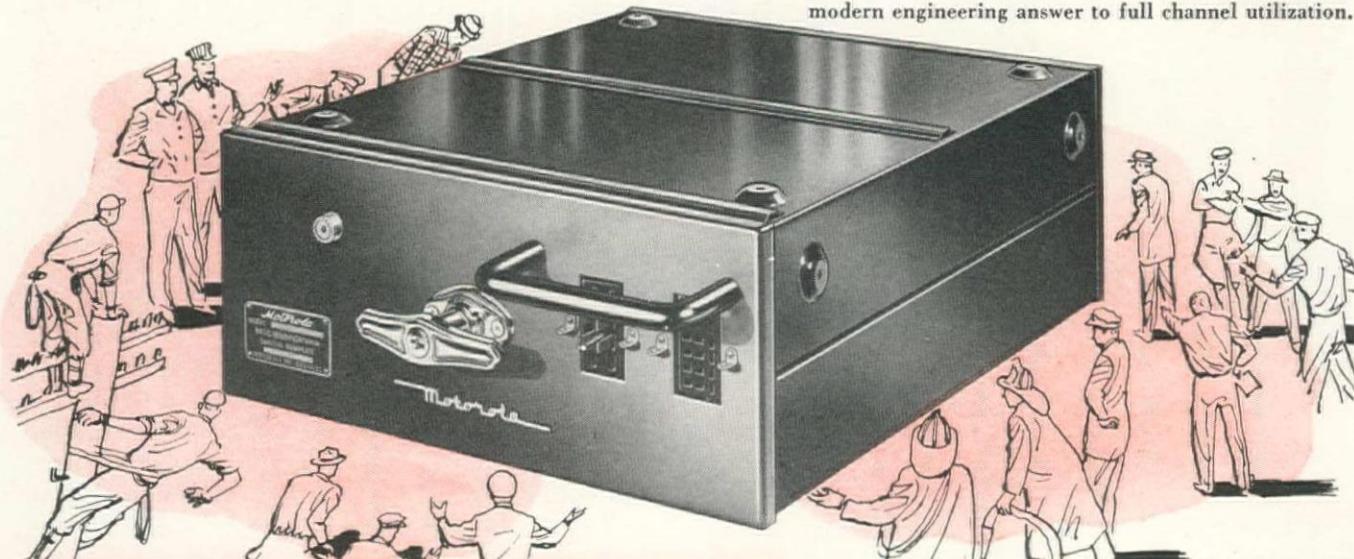
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For extra drive-wheel power and traction in soft ground, sand and gravel, use the deep-ribbed General Non-Directional Cleated with the self-cleaning tread that digs deep, goes straight.

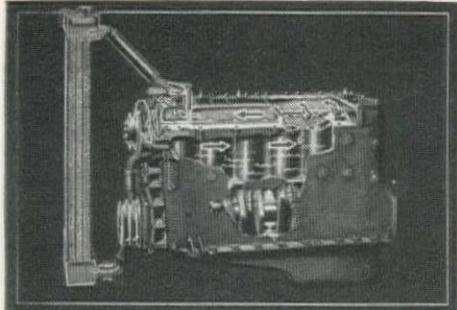


THE GENERAL TIRE & RUBBER CO., AKRON, OHIO

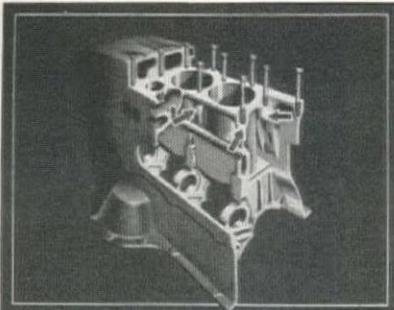
The  
**GENERAL**  
TRUCK TIRE

# HERE IS WHY WHITES SAVE ON TRUCK MAINTENANCE COST

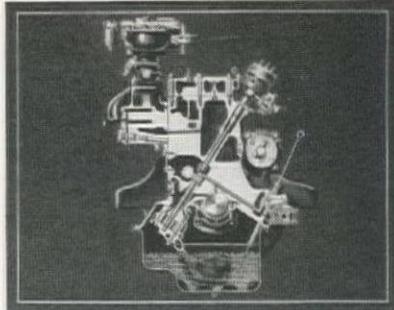
**QUALITY FEATURES** make the big difference in *Truck Earning Power!*



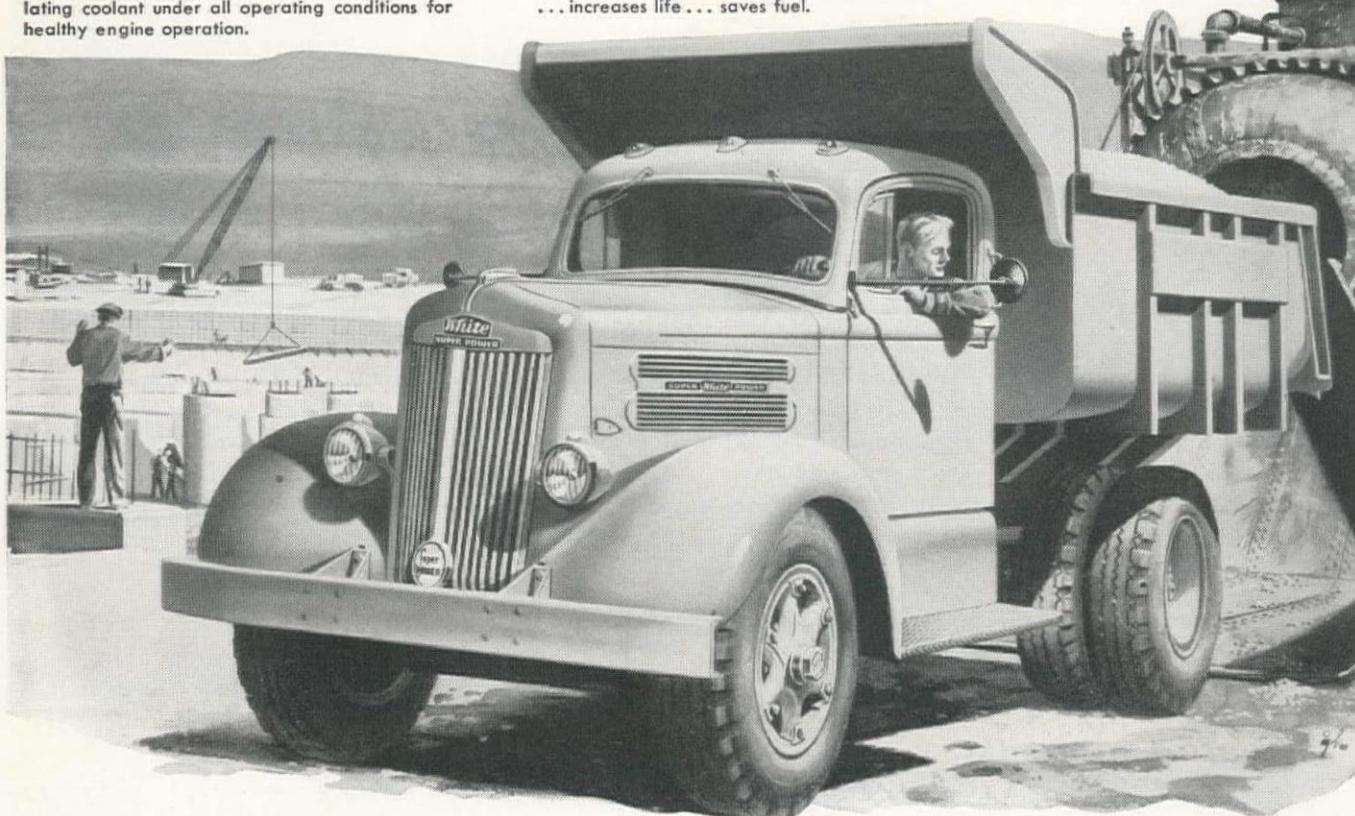
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**HIGH MILEAGE DEPENDABILITY** . . . at low cost per mile . . . makes White Super Power the best investment in motor trucks. Maintenance costs less because of quality features in material and design that are found in no other trucks. On the operating records of thousands of truck owners everywhere . . . in all lines of business . . . White Super Power,

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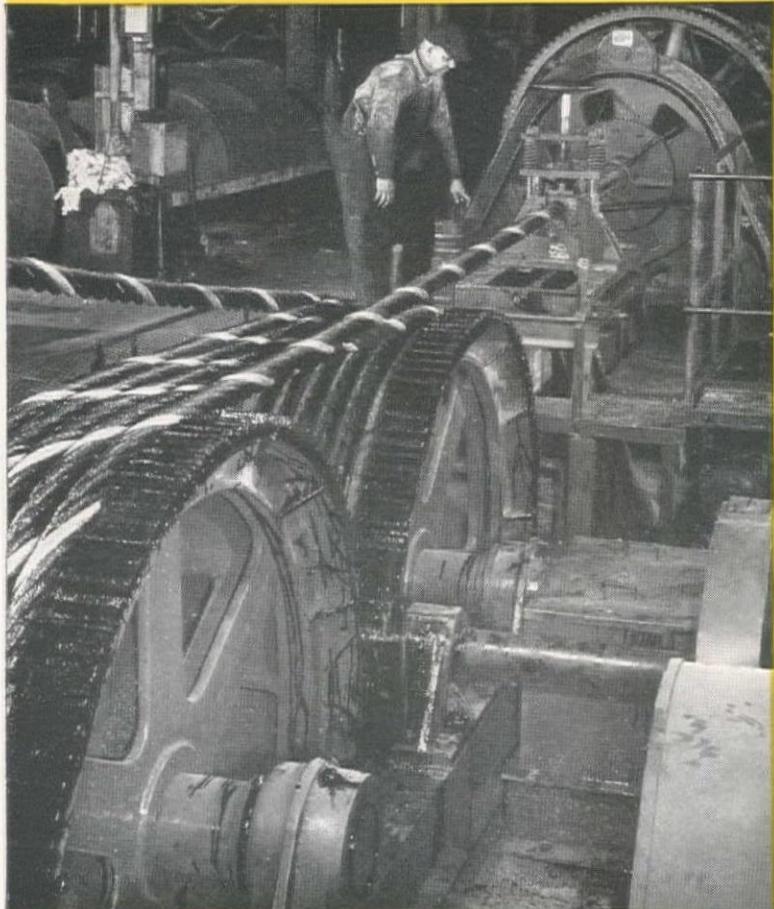
**THE WHITE MOTOR COMPANY**

Cleveland 1, Ohio, U. S. A.

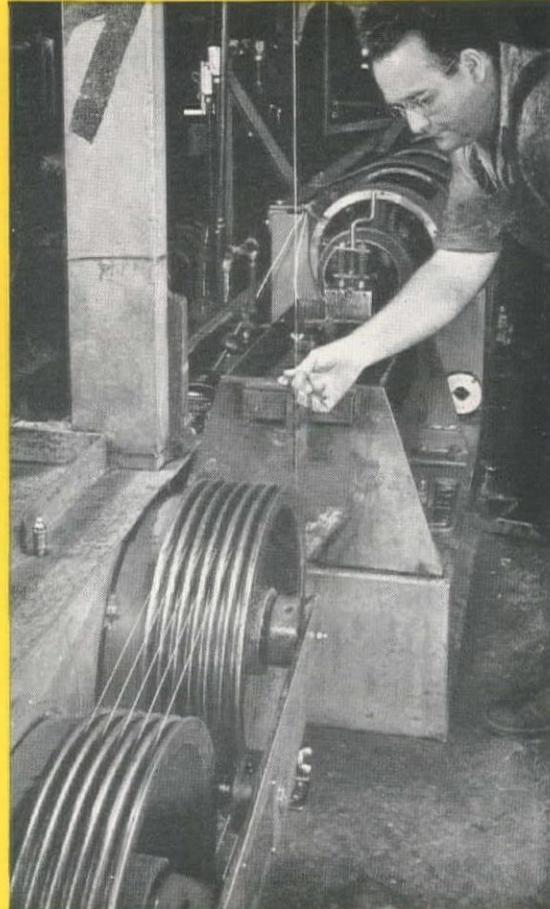
THE WHITE MOTOR COMPANY OF  
CANADA LIMITED  
Factory at Montreal

FOR MORE THAN 45 YEARS THE GREATEST NAME IN TRUCKS

This photograph shows a  $3\frac{1}{8}$ " diameter Monarch Whyte Strand Wire Rope coming off a Macwhyte closing machine. Weight of this rope is approximately 16.65 pounds per foot. It has a strength of approximately 392 tons and is used for the digging line on large dragline excavator with 35 cu. yd. bucket.



In this photograph is a  $\frac{3}{16}$ " diameter Stainless Steel Cord coming off a Macwhyte closing machine. It weighs approximately 0.35 lbs. per 100 feet; has a strength of approximately 270 pounds, and is used for many small cord needs.



Whether you need

## LARGE WIRE ROPE or SMALL WIRE CORD

make your selection from

You will get smoother operation and better service when you use the wire rope designed and manufactured to meet your requirements.

Macwhyte engineers are always glad to suggest the correct Macwhyte rope or cord best suited to your needs.

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*made by*  
**MACWHYTE**

# *get around* to more profits



## with **P&H** *Truck Cranes*

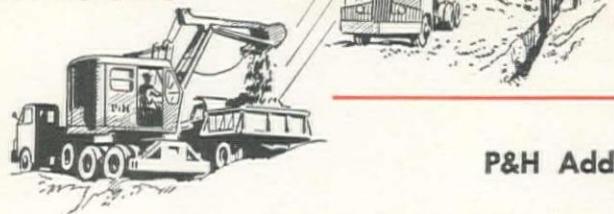
### Faster Traveling • Faster Working Greater Lifting Ability

Think of those extra jobs you can handle with a P&H Truck Crane... and the extra profits it makes possible.

The P&H Truck Crane, wholly built by P&H, truck and all, can handle a lot more on the hook... and with other front end equipment has more digging power at the tooth point.

You have dual power... an engine built for travel and a second engine for sustained hard work.

Ask any P&H Truck Crane owner and you'll understand why it is his biggest money maker. Get the full story. Write for literature today!



### P&H Added Values

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

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

P&H REMOTE CONTROL with this unit you can control all functions (even the horn) by electric push-

buttons — from the operator's position inside the crane cab.

HARNISCHFEGER CORPORATION: SAN FRANCISCO, Calif., 82 Beale Street  
Warehouses Service Stations: SEATTLE, LOS ANGELES, SAN FRANCISCO

PORLAND 14, Oregon, Loggers & Contractors Machinery Co., 240 S.E. Clay St.; WILLOWS, Calif., Willows Motor Sales Co.; BAKERSFIELD, Calif., Kern Tractor & Equipment Co., 24th & N. 99 Highway P. O. Box 1695; NAPA, Calif., Berglund Tractor & Equipment Co., 1016 Soscol Ave.; SALT LAKE CITY, Utah, Western Machinery Co., 748 West 8th, South; BOISE, Idaho, Olson Manufacturing Co., 2223 Fairview Ave.; EL CENTRO, Calif., Faure Tractor & Equipment Co., 1414 Main St.; SEATTLE, Wash., Bow Lake Equipment Co., 16826 Pacific Highway; FRESNO, Calif., Allied Equipment Co., 1824 Santa Clara St.; SAN DIEGO, Calif., Southern Equipment & Supply Co., 2025 South Harbor Drive; SPOKANE 8, Wash. F. M. Viles & Co., Inc., East 124 Trent Ave.; RENO, Nevada, Dennison Tractor & Supply Co., 559 East Fourth St.; SEATTLE 4, Wash., Glenn Carrington & Co., 91 Columbia St.; LOS ANGELES, Calif., Lee & Thattro Equipment Co., Inc., 820 S. Santa Fe Ave.; SACRAMENTO, Calif., Sacramento Valley Tract Co., Broadway at 19th St.

## P&H

### TRUCK CRANES

4490 West National Avenue  
Milwaukee 14, Wisconsin

**HARNISCHFEGER**  
CORPORATION

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



SHOVEL



CLAMSHELL



CRANE



DRAGLINE

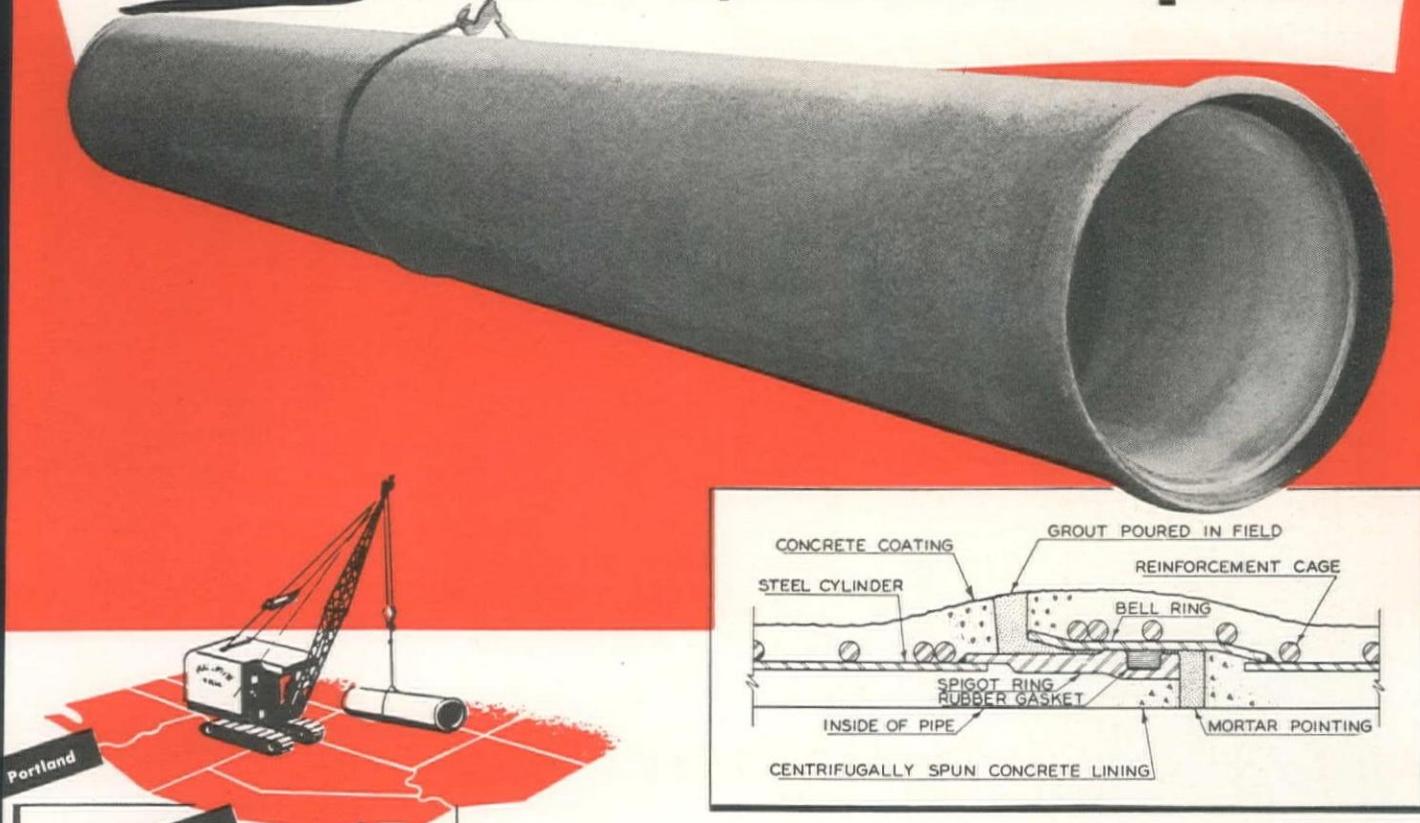


TRENCH HOE



FILE DRIVER

# **NOW Over 700,000 feet of proof!**



## **Three plants to serve you**

### **Typical installations**

- City of Dallas, Oregon—5500' of 16", 150 psi operating pressure—1948
- City of Ellensburg, Washington—37,100' of 18" and 24", 150 psi—1948
- City of Long Beach, Calif.—7165' of 20", 24" and 30", 150 psi—1947-'49
- U. S. Air Force, Muroc Air Base, Muroc, Calif.—20,300' of 14", 150 psi—1947
- U. S. Army, Richland, Washington—Hanford Engineering Works—120,500' of 24", 30" and 42", 150 and 250 psi—1944
- San Diego County Water Authority—128,600' of 14" thru 39", 150 psi to 225 psi—1947-'48
- U. S. Navy, Treasure Island, San Francisco—14,000' of 14", 150 psi—1944
- City of Whittier, Calif.—12,900' of 14", 16", and 24", 150 psi—1948-'49

### **American Concrete Cylinder Pipe helps reduce the cost of delivered water throughout the Pacific States**

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

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

#### **IN PACIFIC NORTHWEST...**

This Company's Portland Plant is now fully equipped to furnish American Concrete Cylinder Pipe to water users in the Pacific Northwest. Inquiries to Box 1898, Piedmont Station, Portland 11, will receive prompt attention.

# **American**

**PIPE AND CONSTRUCTION CO.**

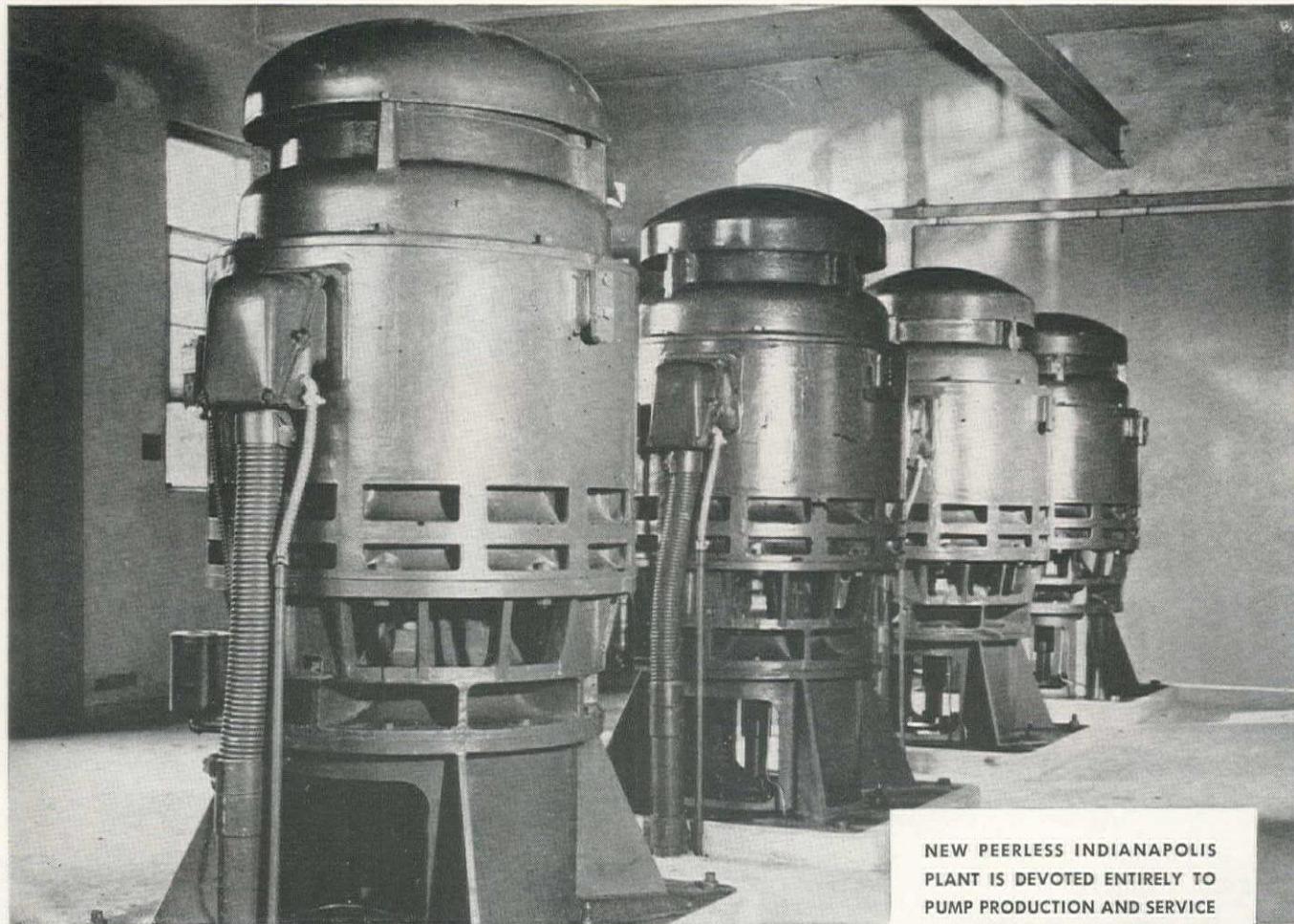
Concrete Pipe for Main Water Supply Lines, Storm and Sanitary Sewers, Subaqueous Pipe Lines

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

Quality pipe line products manufactured and installed by American include: Lock Joint Concrete Cylinder Pipe, American Concrete Cylinder Pipe, Prestressed Lock Joint Concrete Cylinder Pipe, Centrifugal Concrete Pressure Pipe.

MAIN OFFICES AND PLANT—4635 FIRESTONE BOULEVARD, SOUTH GATE, CALIFORNIA  
DISTRICT SALES OFFICES AND PLANTS—OAKLAND—SAN DIEGO—PORTLAND, OREGON

# PEERLESS VERTICAL TURBINE PUMPS



NEW PEERLESS INDIANAPOLIS  
PLANT IS DEVOTED ENTIRELY TO  
PUMP PRODUCTION AND SERVICE



## CUT OVERHEAD Underground

For your next job consider the flexibility and the efficiency of the Peerless vertical turbine pump.

As a deep well pump, for example, a Peerless pump can assure you of an independent source of clean water from your own well—water that will be of constant temperature, of constant chemical analysis. To cut overhead underground, Peerless turbine pumps embody many exclusive engineering advantages, such as patented Double Bearing-Double Seal bowl construction, all contributing to their extended trouble-free pumping life.

As another example, a Peerless vertical turbine pump utilized as a close-coupled pump, assures you of full turbine pump utility and capacity from short or medium

settings. They're ideally suited for installation over pits, sumps or basins or for pumping water from surface sources. The 4 pumps shown above are indicative of this type of service. You can easily visualize their application to condenser cooling, cooling tower service, etc.

Regardless of your requirements, a versatile Peerless vertical turbine pump will squarely meet your pumping demands. Peerless offers widest capacity range, from 15 to 30,000 gpm against heads to 1000 feet. You can have your choice of oil lubricated or water lubricated types and a choice of power drive, direct-connected electric, right angle gear, V or flat belt or combination drives. Write for individual Bulletins describing the applications of Peerless pumps to these services.

Here is one of America's newest pump plants—19 acres of modern manufacturing facilities devoted to precision production of horizontal and vertical pumps, centrally located at Indianapolis. Plan with Peerless for pumps plus fast, complete pump service.



PEERLESS PUMP DIVISION  
FOOD MACHINERY AND CHEMICAL CORPORATION

Los Angeles 31, California

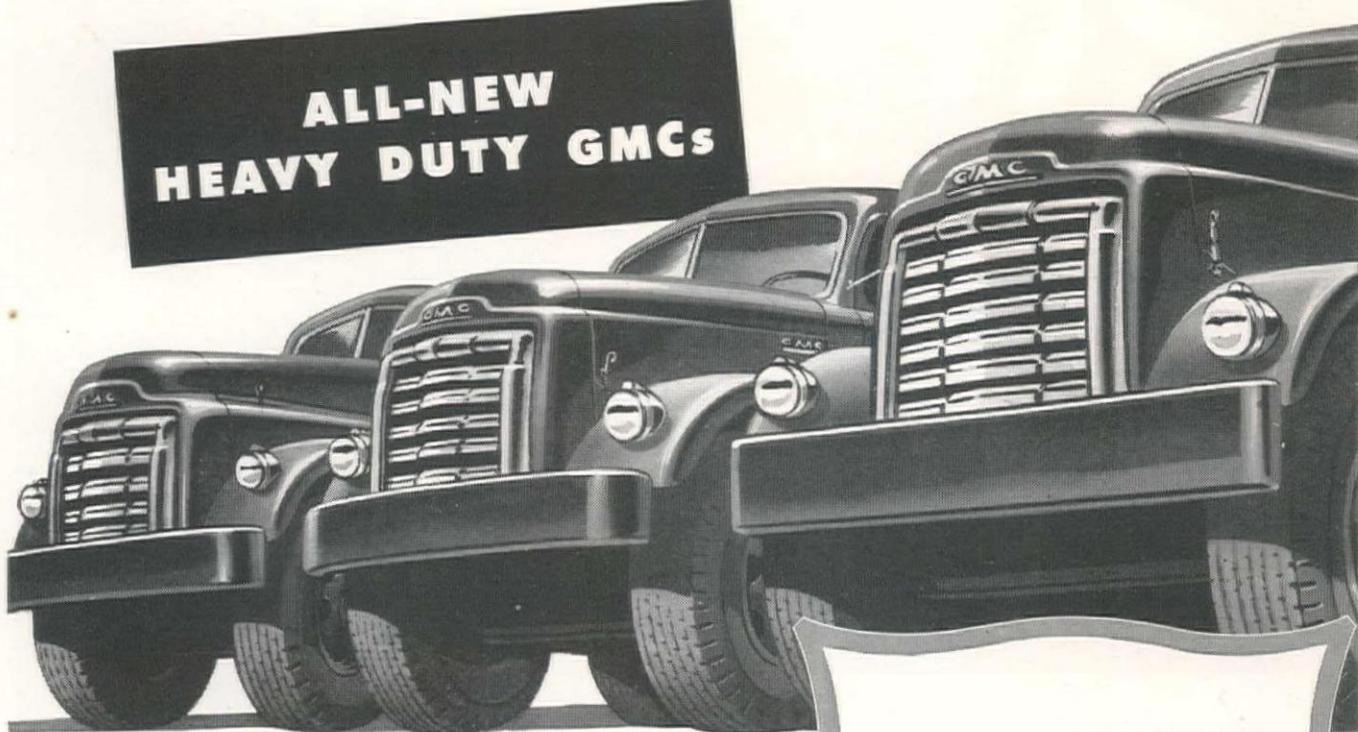
District Offices: New York 5, 37 Wall Street; Chicago 40, 4554 N. Broadway; Atlanta Office: Rutland Building, Decatur, Georgia; Omaha, Nebraska, 4330 Leavenworth Street; Dallas 1, Texas; Fresno, California; Los Angeles 31, Calif.

Indianapolis, Indiana

**Peerless**  
VERTICAL AND HORIZONTAL  
**Pumps**

# Big News FOR HEAVY HAULERS

ALL-NEW  
HEAVY DUTY GMCS



New "H" model heavy duty GMCS are the biggest truck news of the year . . . and for many years!

They comprise the most complete line of all-new, all-improved heavy duty trucks, gasoline and Diesel, ever introduced at one time . . . 61 basic models with weight ratings from 19,000 to more than 90,000 pounds.

They provide more important new features and advancements than any trucks in GMC history . . . exclusive GMC "Bumper-Built" front end . . . the industry's most powerful engines size for size . . . stronger, safer, roomier cabs . . . improved frames, springs, brakes, clutches, and axles.

They benefit by all the advantages of the truck industry's finest engineering skills and manufacturing facilities.

And they are priced to give substantial savings on the original investment . . . by including needed items of equipment which, in general practice, are added to the base price.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

**GMC**  
GASOLINE • DIESEL  
**TRUCKS**

## Packed with **POWER**

Five power-packed gasoline engines, including a big new "707" of 225 horsepower. Two famous GM 2-cycle Diesel engines of 133 and 200 horsepower.

## Built to **"TAKE IT"**

Deeper, stiffer frames . . . heavier, wide-track front axles . . . longer front springs with shock-absorbers standard . . . big, fast-acting brakes.

## Cabs Up to **1½ FT. WIDER**

More leg room and head room . . . wider doors and windows . . . bigger windshields . . . built-in ventilation . . . snubbed seat action . . . complete insulation.

SPEED UP YOUR JOBS...  
MEET YOUR SCHEDULES...  
CUT DOWN YOUR COSTS...

with

# Firestone

OFF-THE-HIGHWAY TIRES



**P**ROFIT is the difference between making time and marking time . . . between going through and going down. You can throttle your downtime, accelerate your production time, and increase your profits with Firestone Tires.

If you need a tire with plenty of reserve pulling power for even the softest going, the Firestone Ground Grip will fill the bill—and it will give you the extra tread life and the extra body life that make your tire dollars go further.

And where you need maximum traction for rock work, strip mining, and other severe operations, get the tire with the toughest, most aggressive tread ever built—Firestone Rock Grip. It will be on the job after other tires are on the scrap pile.

The Firestone Earth Mover is the tire for free-rolling wheels that must move heaping loads over sand and soft earth. It provides maximum flotation and maximum life at minimum cost.

*Listen to the Voice of Firestone every Monday evening over NBC and Americana over NBC Network Television Stations*

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EARTH MOVER GROUND GRIP ROCK GRIP

**When you buy Replacement Tires  
or when you buy New Equipment specify —**

**Firestone**  
OFF-THE-HIGHWAY TIRES

# COFFELT USES ★ *Trailmobile Dolly* ★ ON LUMBER HAUL



Clark Coffelt & Son of Arcata, California are lumber haulers for Addison & Sons Lumber Company of Maple Creek. The haul is 30 miles over county roads with about 7 miles of adverse grade. The truck and trailer make two trips per day over the narrow winding road, hauling from 12,500 to 13,000 board feet of fir on each trip.

Coffelt uses a TRAILMOBILE semi-trailer with roller bed, and a TRAIL-

MOBILE Converter Dolly behind his truck and is well satisfied with the performance of this rig. TRAILMOBILE makes a full line of trailers and dollies for the logging and lumbering industries. The line includes low beds for hauling machinery; tanker trailers for water or fuel; flat beds and roller beds for lumber hauling, logging dollies and converter dollies.

Whenever you need a trailer for any purpose—consult TRAILMOBILE.

THE TRAILMOBILE COMPANY  
BERKELEY, CALIFORNIA



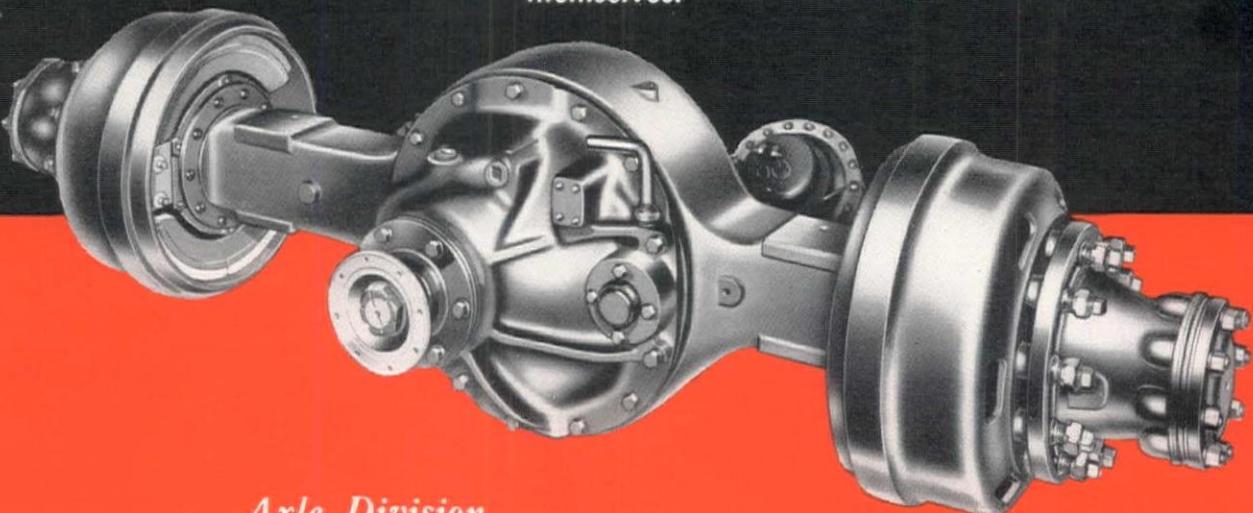
LOS ANGELES • VENTURA • SAN LUIS OBISPO • BERKELEY • SACRAMENTO • SANTA ROSA • FRESNO • SAN JOSE • BAKERSFIELD  
STOCKTON • EUREKA • SAN DIEGO • SEATTLE • SPOKANE • PORTLAND • MEDFORD • SALT LAKE CITY • PHOENIX • HONOLULU

# Cut Down on Your Operating Costs—Demand

## EATON 2-Speed Truck AXLES

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

To cost-conscious truck operators, Eaton 2-Speed Axles mean faster trips, reduced vehicle operating and maintenance expenses. These advantages are possible because Eaton 2-Speed Axles double the conventional number of gear ratios, thus enabling drivers to use the **RIGHT** ratio for every operating condition—starting out under full load, climbing grades, high-balling, quick shifting in traffic. As a result, vital truck parts are not overstressed, engines are permitted to run at efficient speeds, cutting gas and oil consumption and minimizing engine wear. Long life for the axle is assured by rugged construction and exclusive Eaton features. Ask your truck dealer to prove that Eaton 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

**VICTOR Weld**

**FOR: Welding on All Positions; Machinable but Sile Strength D it bonds well. Current: Reverse P or A-C.**

**TYPE VW-83**  
A.W.S. SPEC. CLASS \_\_\_\_\_  
SIZE  $\frac{1}{8}$

**Standard Package: 25 lbs. net**

**VICTOR EQUIPMENT CO. - CHICAGO - SAN FRANCISCO**

**VICTOR Weld**

**FOR: Mild Steel—All Positions Current: Straight, A-C**

**TYPE VW-20**  
A.W.S. SPEC. CLASS \_\_\_\_\_

**Standard Package: 25 lbs. net**

**VICTOR Weld**

**FOR: Machinable W Cast Iron. Core is Commercially Pure Nickel. Eliminate Hard Zone. Current: A-C or Reverse.**

**TYPE VW-2075**  
A.W.S. SPEC. CLASS \_\_\_\_\_

**Standard Package: 25 lbs. net**

**VICTOR Weld**

**FOR: All Position Welding on Copper Alloy 95% Copper. Joining Mild Iron. Current: D-C.**

**TYPE VW-70**  
A.W.S. SPEC. CLASS \_\_\_\_\_  
SIZE  $\frac{1}{8}$

**Standard Package: 25 lbs. net**

**VICTOR EQUIPMENT CO.**

**VICTOR Weld**

**FOR: Hard Surfacing Against Impact and Abrasion Wear. Deposit Work Hardens. All Positions. Current: A-C or Reverse D-C.**

**TYPE VW-94**  
A.W.S. SPEC. CLASS \_\_\_\_\_  
SIZE  $\frac{1}{8}$

**Standard Package: 50 lbs. net**

**VICTOR EQUIPMENT CO. - CHICAGO - SAN FRANCISCO - LOS ANGELES**

**VICTOR Weld**

**FOR: Welding on All Positions; Machinable but Sile Strength D it bonds well. Current: Reverse P or A-C.**

**TYPE VW-1308**  
A.W.S. SPEC. CLASS E 308-15  
SIZE  $\frac{5}{32}$

**Standard Package: 50 lbs. net**

**VICTOR EQUIPMENT CO. - CHICAGO - SAN FRANCISCO - LOS ANGELES**

**VICTOR Weld**

**FOR: High Temperature Pressure Piping of Moly Steel. Also, Tension Welding Low High Tensile Steels. Current: A-C or Reverse D-C.**

**TYPE VW-56**  
A.W.S. SPEC. CLASS E 7011  
SIZE  $\frac{5}{32}$

**Standard Package: 50 lbs. net**

**VICTOR EQUIPMENT CO. - CHICAGO - SAN FRANCISCO - LOS ANGELES**

**VICTOR Weld**

**FOR: High Quality All Position Welding on Reverse D-C**

**STAINLESS STEEL, TYPE VW-1347**  
A.W.S. SPEC. CLASS E 347-15  
SIZE  $\frac{3}{32}$

**Typical Deposit Analysis:**  
C 0.07%  
Cr 19.00%  
Ni 9.00%  
Mn 0.00%

**A.I.S.I. TYPE 347 Lime Coating**

**Standard Package: 25 lbs. net**

**22**

**VICTOR Weld**

**FOR: High Quality Welding on All Positions. For Lap Joint and Edge Welding. Penetration. Current: A-C or Reverse D-C.**

**TYPE VW-26**  
A.W.S. SPEC. CLASS E 6011

**Standard Package: 50 lbs. net**

**VICTOR Weld**

**FOR: Deep Penetration and High Welding Speeds. Pressure Vessels and Structural Steel. Current: Straight, D-C or A-C**

**TYPE VW-24**  
A.W.S. SPEC. CLASS E 6020

**Standard Package: 50 lbs. net**

**VICTOR EQUIPMENT CO. - CHICAGO**

**VICTOR Weld**

**FOR: General Purposing of Malleable Iron. High Tensile Strength. Excellent Appearance. Current: A-C or Reverse D-C.**

**TYPE VW-28**  
A.W.S. SPEC. CLASS E 6012  
SIZE  $\frac{1}{8}$

**Standard Package: 50 lbs. net**

**VICTOR EQUIPMENT CO. - CHICAGO - SAN FRANCISCO - LOS ANGELES**

**VICTOR Weld**

**FOR: Fabrication of Armor Plate and High Tensile Steels of High Hardens. Hydrogen Covering All Positions. Current: A-C or D-C Reverse Polarity.**

**TYPE VW-60**  
A.W.S. SPEC. CLASS \_\_\_\_\_  
SIZE  $\frac{5}{32}$

**Standard Package: 50 lbs. net**

**VICTOR EQUIPMENT CO. - CHICAGO - SAN FRANCISCO**

**For Every Modern Arc Welding Process**

## **USE VICTOR WELD**

**...the new, complete electrode line**

**Order from your VICTOR dealer NOW**

**Watch for VICTOR'S**

**NEW hard-facing electrodes.**

**NEW tungsten carbide products—tubes, inserts and shapes.**

**NEW blasting nozzles.**

**On display soon by your VICTOR dealer**

**VICTOR EQUIPMENT COMPANY**

844 Folsom Street, San Francisco 7

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

# LARGEST COMMERCIAL BLAST USES 1,362,985 LBS. OF "NITRAMON"\*\*

Produces estimated 1,800,000 cu. yds. of rock fill  
for T.V.A.'s South Holston, Tennessee, Dam



## BEFORE

5,254 lineal feet of coyote tunnel were driven into the base of a huge hill of stratified sandstone. Three main adits with a total of 44 cross-cuts were required. Charge was divided into 190 units totaling 55,452 cans of "Nitramon" and 436 "Nitramon" primers, connected by about 4 miles of Primacord. Loading was accomplished in 17 working days.



## DURING

Photo at right, taken just after the blasting switch was thrown, shows the whole burden of this record blast at the height of its lift. Note that the trees in the background are hidden by the crumbling hill.



## AFTER

Nearly two million cubic yards of well broken rock, ready for the shovels.

This is the fifth, and largest, of a series of six coyote tunnel blasts made with "Nitramon" in the same general locality.

1. September 11, 1947.....	316,486 pounds
2. November 8, 1947.....	526,925 pounds
3. March 11, 1948.....	422,563 pounds
4. July 14, 1948.....	844,503 pounds
5. February 5, 1949.....	1,362,985 pounds
6. April 16, 1949.....	501,112 pounds
	3,974,574 pounds

Contractors can improve the safety, economy and efficiency of their quarry operations with

Du Pont "Nitramon." Ask your Du Pont Explosives Representative for full information.

E. I. du Pont de Nemours & Co. (Inc.),  
Hogg Bldg., Seattle, Wash.—Midland  
Savings Bldg., Denver, Colo.—111 Sutter  
St., San Francisco, Calif.

## DU PONT "NITRAMON"

*A Product of Du Pont Explosives Research*

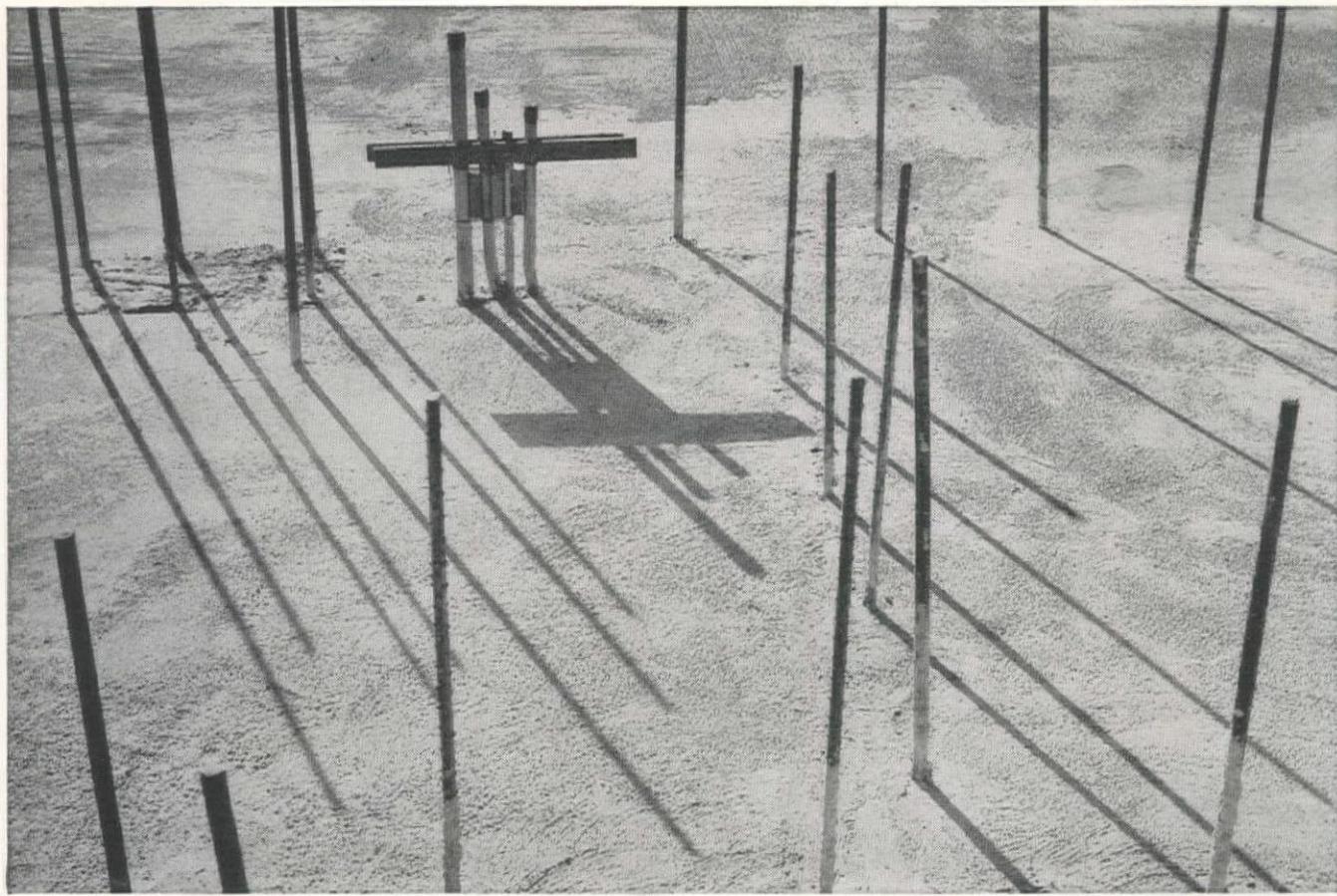
\*Reg. trade-mark for Du Pont nitrocarbonitrile blasting agent.

Listen to "Cavalcade of America"—Monday Evenings—NBC



REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



Homes for the growing West are getting added strength and building speed from versatile steel. Here, reinforcing bars add stamina to the floors in homes built in Hillsdale, San Mateo, California...one of the nation's model residential areas.

## Steel is building the West

*for today—for the future*

New owners of Hillsdale homes can feel the security that comes from U-S-S steel reinforcing bars and mesh... steel sash, flashing, gutters, downspouts and nails. Mrs. Owner, too, will appreciate the beauty of the modern kitchens with their U-S-S stainless steel counters.

Homes and office buildings... bridges and power line towers... all over the West you'll see the signs of steel's contribution. Large or small, these jobs are being helped by steel's fabricating speed and its great strength and durability.

Columbia, as Western producing member of United States Steel, combines its own facilities with those of others in the U-S-S family to supply the West with everything in steel. For information, contact the Columbia Steel Company office nearest you.

**Free Illustrated Booklets:** The many uses of steel in homes... from foundation to roof... are described in two beautifully illustrated booklets—"Let's Build a Home" and "Let's Furnish a Home." They're yours just by dropping a card to Columbia Steel Company, 1422 Russ Building, San Francisco, Calif.



**Only STEEL can give you all 7 of these structural advantages:** Extra toughness and shock resistance • Incombustibility • High strength-weight ratio • Highest modulus of elasticity • Versatility of application • Great durability • Ultimate economy

Help boost steel production—TURN IN YOUR SCRAP

## Columbia Steel Company

San Francisco   Los Angeles   Portland   Seattle   Salt Lake City

UNITED STATES STEEL





### for faster sawing

New CP HI-SPEED UNIVERSAL ELECTRIC SAW cuts 25% to 40% faster. Blades available for cutting through nails, copper, brass, bronze, lead, tile, glass, brick, clay products, concrete, marble, flagstone, asbestos, cement products and composition board. Write for SP-3000.

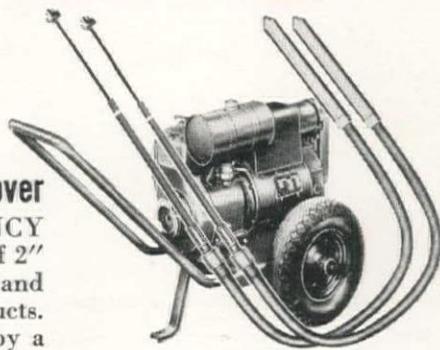


## 4 time-savers that cut contractors' costs



### for the tough jobs

Heavy-duty CP Air Impact Wrench easily runs off — or on — nuts up to 1 1/4" bolt size. For maintenance as well as construction work; just the wrench for tractor treads and similar heavy servicing jobs. Write for Bulletin 812.



### for vibrating concretes of 2" slump and over

Portable CP-220 HIGH FREQUENCY ELECTRIC VIBRATOR for concretes of 2" slump and over; for walls, columns, floor and roof slabs, precast piles and similar products. Two of these vibrators can be powered by a CP-2KW Gasoline-driven Generator. Write for Bulletin 814.



## CHICAGO PNEUMATIC TOOL COMPANY

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

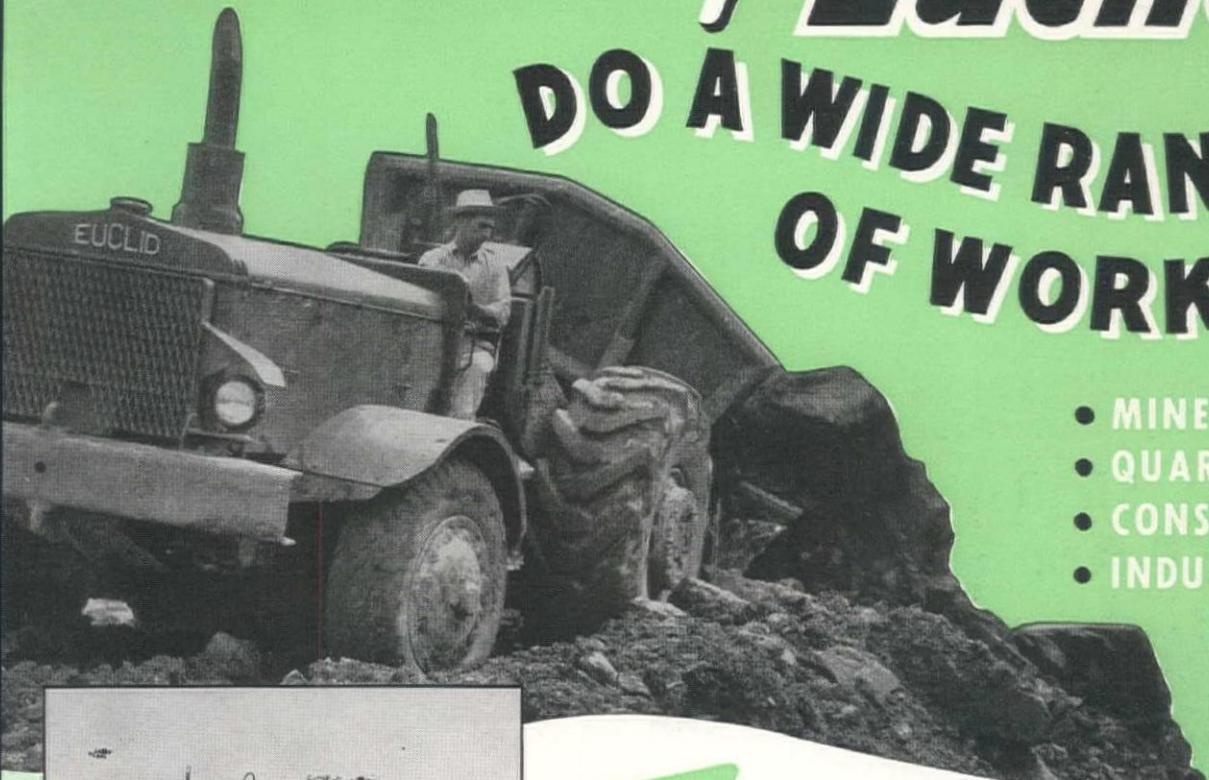
AIR COMPRESSORS • ELECTRIC TOOLS • PNEUMATIC TOOLS • DIESEL ENGINES  
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

### Distributors

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

# Side-Dump *Euclids*

## DO A WIDE RANGE OF WORK



High speed is maintained with a load of 12.8 bank yards of heavy excavation at an airport job in Tennessee.



Low, wide hopper speeds loading and reduces spillage at an open-pit coal mining operation in West Virginia.

- MINES
- QUARRIES
- CONSTRUCTION
- INDUSTRIAL

**T**

HE Side-Dump Euclid is a versatile hauling unit with a wide range of usefulness on the toughest off-the-highway jobs. Its big trailer body assures easy loading and has a capacity of 20 tons... a 200 h.p. diesel engine provides speed and power for high production at low cost.

Euclid twin hydraulic hoists raise the body and its 40,000-lb. payload fast... down-folding gates open automatically when the body is raised... either right or left dumping can be selected by the operator. High dumping angle and smooth interior assure fast, non-stop shedding of loads over the edge of fills and waste banks or in even windrows on the fill.

The Side-Dump Euclid is engineered as a complete unit and is ruggedly constructed for hauling rock, ore, overburden, and other heavy excavation. The big 24.00 x 25 tires on drive and trailer wheels give good flotation and traction on soft fills and difficult haul roads.

Your Euclid Distributor will be glad to discuss the many advantages of Side-Dump Euclids for your off-the-highway hauling jobs... call or write today.

**The EUCLID ROAD MACHINERY CO.**  
CLEVELAND 17, OHIO



# EUCLED

*Move the Earth*



**YOU CAN OPERATE BOTH  
HIGH CYCLE AND STANDARD  
110 VOLT TOOLS**

with this  
**HOMELITE**  
Carryable Gasoline-Engine-  
Driven Generator

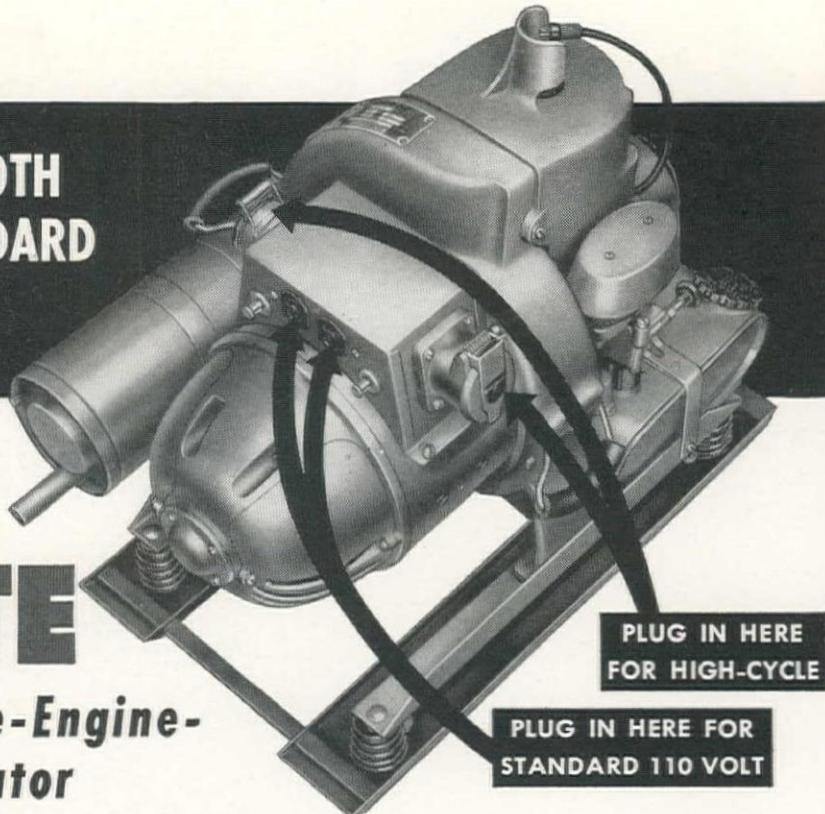
**...A WIDE-OPEN FIELD FOR GREATER SAVINGS**



**HOMELITE PAVING BREAKER**



**HOMELITE CHAIN SAW**



Because they do more work and weigh less . . . because maintenance costs are cut in half . . . high-cycle tools are being used on more and more construction jobs . . . concrete vibrators, grinders, impact wrenches, chain saws, electric paving breakers and an ever-increasing number of others. They are indeed the last word in greater efficiency.

And here is Homelite's answer to those who want to cash in on the advantages of high cycle tool operation. It's a compact gasoline-engine-driven dual-purpose generator . . . the first and only one of its kind . . . a complete power unit you can pick up and carry to operate your high cycle tools *any place you want*.

**NO LOSS ON PAST INVESTMENTS**

Even though you have made substantial investments in standard 110 volt tools, you have nothing to lose. For this Homelite Generator operates *both* high cycle and standard universal tools with equal efficiency.

*Look into this new Homelite Dual Purpose Generator...the Carryable Power Plant of the Future. Send for bulletin...or, better...let us give you a free on-the-job demonstration. Write, today.*

**HOMELITE CORPORATION**

**CARRYABLE PUMPS • GENERATORS • BLOWERS**  
1307 RIVERDALE AVENUE, PORT CHESTER, NEW YORK

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# APLANT-CHOATE MOTOR SCRAPERS

*make earthmoving more profitable!*



THESE are but a few of the outstanding profit-making advantages of the LPC Motor Scraper which let you carry 17½ heaped yards each trip, even in the heaviest materials. Higher speeds mean more trips per hour — per day — per year.

Bigger tires give you *surplus* traction and flotation in any type of material. And you get this better all-around performance with less wear and tear on the tires and with fewer tire replacements.

Add to these advantages the big new constant-mesh transmission — 12-cu. ft. piston type air compressor —

32 amp. generator — new and improved power control unit and controls. All these with the original high production features — double-acting hydraulic steering, four-wheel air brakes, curved offset cutting edge, low wide bowl, positive forced ejection, high apron lift, equal weight distribution, and many others — mean still lower costs per yard.

It will pay you to investigate all the money-making advantages of the Motor Scraper. See your nearest LPC Distributor now. Ask for a demonstration. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa — 1022 77th Ave., Oakland, California.

## Compare..

	LPC Motor Scraper (225 H.P.)	Earthmover "A" (150 H.P.)	Earthmover "B" (200 H.P.)
H.P. per Struck Yard of Capacity	16.1	13.8	14.3
Price per H.P.	\$124.00	\$143.33	\$135.00
Weight per H.P.	204 lbs.	194.6 lbs.	226 lbs.
Hauling Capacity in 3000 lb./yd. Without Tire Overload	13.4 yds.	10.9 yds.	8.44 yds.
Speed M.P.H.	19.3	17.3	16.8

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"Speaking of truck shovels.....  
Why did you buy a MICHIGAN?"



On the road, for example, it's as easy to drive as any ordinary truck. On the job, its control makes a hit with operators. MICHIGAN'S air ram clutches are fast and smooth . . . they take the work out of operating. My operators like those finger-tip air controls—and I know that they've paid off in faster, more efficient operation . . .

And then there's MICHIGAN'S remote control. When you pull onto the job, you're ready to go! There are no draglinks to disconnect, no adjustments to make. You can drive and steer from the turntable cab with the cab in any position. The turntable engine supplies the power.

Take all these easy-handling advantages together and you can see why I advise you to get a MICHIGAN!"

Write for Bulletin 100—  
"On the Job with MICHIGAN"

**MICHIGAN**

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

DID YOU KNOW  
you can buy  
a brand new  
**MICHIGAN**  
TRUCK CRANE  
complete with chassis  
for as little as \$10,250  
F.O.B. factory?

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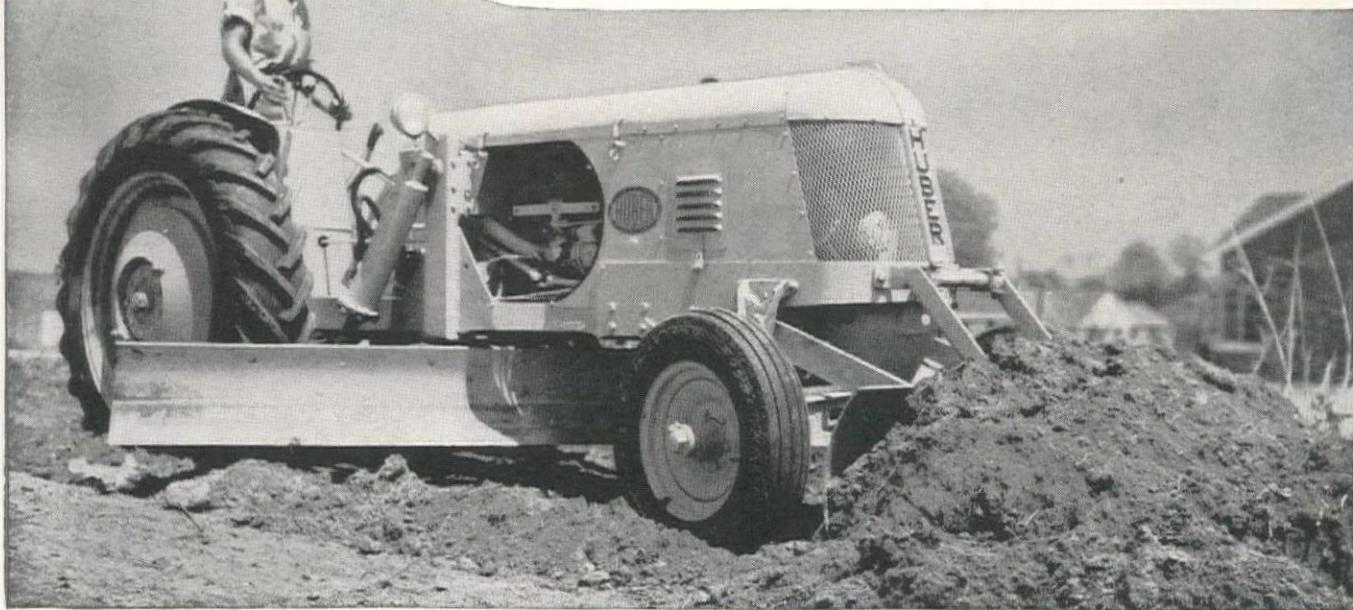
● WILSON EQUIPMENT CO.

P. O. Box 218  
Cheyenne, Wyoming

● MICHIGAN SALES & SERVICE CO.

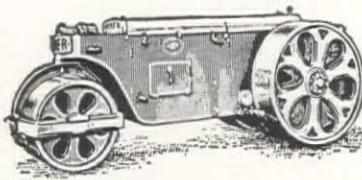
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Seattle 99, Washington

# CONSTRUCTION AND ROAD MAINTENANCE MEN MUST CUT COSTS TOO!

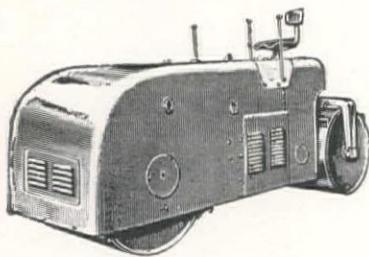


*how?*

## USE THE MAINTAINER On Jobs Now Tying Up Big Equipment



HUBER 3-WHEEL ROLLERS  
5 models—5 to 12 tons



HUBER TANDEM ROLLERS  
6 models—3 to 14 tons

Put the versatile Huber Maintainer to work on your new construction or maintenance program. It will "pay off" by doing cheaper and faster the many odd jobs and maintenance work now tying up heavy equipment. It's a money maker in its own right—ideal for road, street and airport construction and upkeep. With its 32 HP. engine and 18 miles per hour speed the Maintainer really covers the job. With its hydraulically operated attachments it is readily converted to a bulldozer, patch roller, rotary broom, lift loader, snow plow, berm leveler or mower. Ask any Huber owner about the Maintainer—he'll vouch for its dependability, long life and all-round performance.

Other Huber road machinery built to make your construction work more profitable includes: 3-wheel automotive type road rollers, tandem rollers and trench rollers. Write today for descriptive bulletins and name of your Huber dealer.

THE



MFG. COMPANY • MARION, OHIO, U. S. A.

LEE & THATRO EQUIPMENT CO. .... Los Angeles 21, California  
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### ◀ ROLLED THREAD

Made in thread diameters up to and including 1½ in., and in any length.

### ▲ CUT THREAD

Available plain or upset, in thread diameters up to and including 4½ in., and in any length.

Bethlehem Pacific can furnish threaded rods for almost any construction use. Flat or round tie-rods, pipe or tank bands, roof or bridge rods, truss rods and silo rods—these are a few of the many styles manufactured in our three plants.

They come with turnbuckles, clevises, nuts and other accessories; and they are available straight or bent, in single or multiple units, asphaltum-dipped or hot-dip galvanized.

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Bolt and Nut Plants: Seattle, South San Francisco, Los Angeles

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San Francisco  
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*from the*  
*Land of "MIGHT"*

SOARING far above crag and peak, the eagle seeks his nest—so high as to be almost beyond man's reach! And yet, Smith Impulse Turbines, designed for high heads and locations presenting natural barriers, take more than the Gold of Midas from the eagle's realm, by transforming the force of falling water into mechanical energy! Write for Bulletin 147.

S. MORGAN SMITH COMPANY  
YORK, PENNSYLVANIA • U.S.A.

**POWER by SMITH**

# Big...BUT NOT TOO BIG!

New Smith  
6 Yd. Tilter  
is a GIANT  
only in  
Performance  
and Output



You can use this new Smith 6 yard Tilter in your Ready-Mix plant, even if it is only a medium sized plant. Sure, this new mixer is BIG . . . but not too big. It's unusually compact and light in weight. Fits into the same space formerly used by a 4 yard Tilter — but produces 50% more concrete with practically the same labor, power and general overhead costs. Just the right batch for a 4½ yard truck mixer (6½ yard agitator). Assures utmost plant efficiency. Gets agitators out of the yard in a hurry.

Like all Smith Mixers, the new 6 yard Tilter is designed for heavy duty service, with long life and low maintenance cost. It's a triumph in engineering and research, backed by almost a half century of concrete mixer manufacturing experience. Ideal for dams and other big construction projects, as well as Ready-Mix plants.

## THE T. L. SMITH COMPANY

2871 N. 32nd STREET • MILWAUKEE 10, WISCONSIN, U. S. A.



## SMITH-MOBILE AGITATORS

with a long proven record of performance. Designed to load and discharge at record speed . . . even very dry or low slump concrete. No dead weight. Built of the toughest, wear resistant materials. Conform in every way to NRMCA standards.

**NEW BULLETINS AVAILABLE**, just off the press. Bulletin No. 244 describing the new Smith 6 yard Tilter . . . Bulletin No. 243 on Smith 3 yard Tilters . . . Catalog No. 239 on Smith-Mobile Truck Mixers and Agitators. Write for your copies, today.

**CONCRETE MIXER MANUFACTURERS SINCE 1900**



A 5551-1P

# Barber Greene



**more capacity**

**more speed**

**more usefulness**

## THE 545A BUCKET LOADER

Every feature in the rugged Barber-Greene Model 545A Bucket Loader helps you to get more yards moved per hour, more jobs done per day.

For instance: there are primary and secondary transmissions . . . a separate crowding clutch . . . three forward speeds . . . a quick reverse. The 8-foot synchronized spiral feed keeps the hard-lipped buckets filled to capacity. Double-wheel drive through big, heavy-duty tires means positive traction and extra power. And you'll like the three-point chassis mounting . . . the light-handed steering.

Ask your B-G distributor for the whole story . . . you'll want to put a Model 545A on your payroll.



## FAST ON THE ROAD, TOO

It's a great time-saver—fast on the road, fast on the job. Notice how the boom nestles horizontally for transport, and how it reduces overall height. Boom can be tilted onto saddle quickly and easily without using a wrench. Takes only a few minutes to get ready to move.



BARBER • GREENE COMPANY AURORA, ILLINOIS

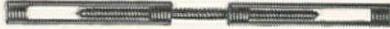
## FOR SALE BY:

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

# Know the **TYSCRU FAMILY**

For Tying  
Concrete Forms in  
Heavy Construction

## Here's the **RICHMOND CONTINUOUS THREADED LAG STUD**

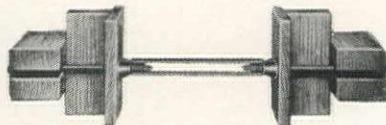
For adjustable and utility anchorage and form holding. Acts as coupling unit with adjustable Tyscrus, externally or internally.

And here's some more  
of the family—

**TYFRAMES**  
**FLEXTYS**  
**CRIMPED TYSCRUS**  
**WELDING TYSCRUS**  
**NUT TYSCRUS**  
**SPANDREL TYSCRUS**  
**TIE-DOWN TYSCRUS**

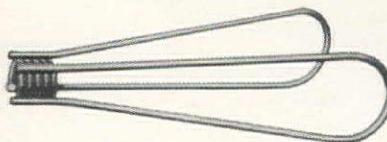
It's a big family—  
with a lot of friends.  
It's a versatile family—  
making new friends  
every day for scores of  
darned good reasons.  
It's an economical family  
—knowing 'em will  
mean important savings  
to you.

## Here's the **RICHMOND TYSCRU**



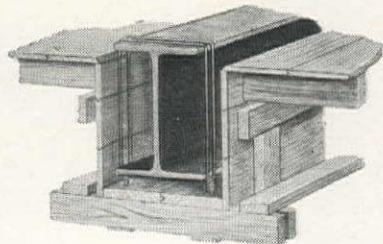
Mighty useful guy to have  
around. Strong, fast, easy  
to work with. Made with 2 or 4  
struts to take loads  
up to 30,000 lbs.

## Here's the **RICHMOND TYLOOP**



For anchorage and tying.  
2 or 4 strut—straight or flared,  
for loads up to 30,000 lbs.

## Here's the **RICHMOND TYHANGER**



For hanging concrete forms  
from structural steel. Four sizes  
for safe loads from 6,000 to  
20,000 lbs. Available in  
other types and sizes  
to meet all conditions  
and requirements.

All are Richmond  
Engineered—for greatest  
efficiency, greatest  
economy, and greatest  
usefulness throughout  
the job. They save  
money and time in  
form-erection and  
stripping—and there's an  
extra saving because  
all working parts (lags,  
washers, cones,  
wrenches, etc.) are  
loaned to you. For  
complete information  
write for our catalog.



MANUFACTURERS of  
ENGINEERED TYING DEVICES,  
ANCHORAGES and ACCESSORIES  
for CONCRETE CONSTRUCTION

### DO IT NOW!

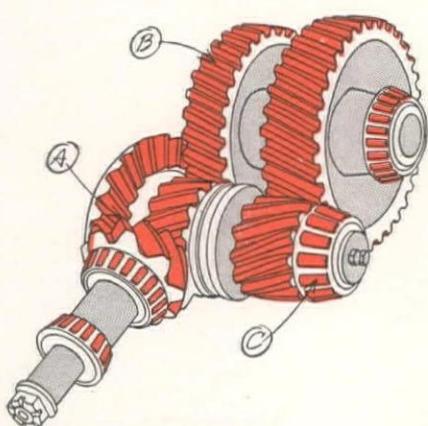
RICHMOND SCREW ANCHOR CO., INC.  
820 Liberty Avenue, Brooklyn 8, N. Y.  
Gentlemen: Please rush me your new Richmond  
Catalog. No cost or obligation to me, of course.

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CITY \_\_\_\_\_ STATE \_\_\_\_\_

# STANDARD ENGINEER'S CASE FILE



## Case 1126—Providing Safe Lubrication for Hypoids



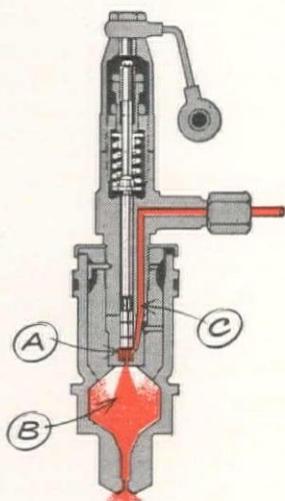
HYPOID-HELICAL, DOUBLE-REDUCTION DRIVE

A commercial transfer truck with RPM Multi-Service Gear Lubricant in its hypoid gears, hauled 10-ton average loads for 165,000 miles without the differential being touched. The truck is still in use every day and the gears are quiet and show no noticeable wear. Recommended for all hypoid gears. Made in four grades: SAE 75, 80, 90, and 140.

- A. Resists rubbing action of hypoid gear teeth . . . compound reacts chemically with metal and forms protective lubricating coating.
- B. Resists extreme temperatures and pressures . . . highly oxidation resistant.
- C. Extremely stable — will not separate . . . provides tough lubricating film on integral bearings and other parts.

Inhibitors in RPM Multi-Service Gear Lubricant resist rusting of parts and prevent foaming.

## Case 1107—Increasing Diesel Engine Efficiency



TYPICAL INJECTION VALVE

Fuel system service stops were reduced 25% on engines working in extra heavy duty service when they were switched to Standard Diesel Fuel. Recommended for all Diesel engines not requiring a high cetane fuel. Available at Standard of California installations throughout the Pacific West.

- A. Completely distilled and 100% clean — will not plug tiny fuel passages.
- B. Vaporizes easily and completely — delivers full power throughout distillation range.
- C. Has sufficient body to lubricate fuel parts and other moving parts in fuel system, but flows freely in cold weather.

For high-speed Diesel engines that require high cetane value fuel and a lower boiling range, use Standard Automotive Diesel Fuel. It is designed particularly for these engines.

Trademarks Reg. U.S. Pat. Office

STANDARD TECHNICAL SERVICE will make your maintenance job easier. If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will gladly give you expert help; or write Standard of California, 225 Bush St., San Francisco 20, Calif.

FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT

**STANDARD  
DIESEL FUEL**

**RPM**  
REG. U. S. PAT. OFF.

It's a fact...

WHEN BUSINESS IS *Shot*  
...profits go *UP!*

If You Use

## DRIVE-IT

The *Safe* Powder-Powered Fastening Tool

MODEL 238  
for heavy fastening

U. S. Pat. No. 1,984,117;  
2,400,878 other foreign  
and domestic patents  
pending

MODEL 222  
for light fastening

IF your business involves attaching steel or wood to concrete, masonry or steel, the DRIVE-IT system of fastening can save you plenty. Reports of 60% to 75% savings in time and 50% to 60% savings in cold cash are common.

Here's the way DRIVE-IT works: a small powder charge "drives" a hardened steel studpin into steel, concrete and other tough materials. It's similar to driving a nail with a hammer except that the powder charge provides the "muscle." Time-wasting drilling is eliminated and the studpin will withstand up to 5,000 lbs. direct pull, depending upon the density of the material.

A choice of over 40 different studpins—threaded or unthreaded, plus varied powered charges are available.

Get the facts on DRIVE-IT *today* and start saving *real money* tomorrow!

POWDER-POWER TOOL CORPORATION  
0707 S. W. Woods St. Portland 1, Oregon

Simple  
as A-B-C

- A  Insert studpin and power load
- B  Screw on barrel
- C  Fire!

AVERAGE TIME

45 seconds



**DRIVE-IT**  
THE MODERN MIRACLE TOOL

## The Mail Bag...

### Cut and Paste

Editor, *Western Construction News*

Here is a SUGGESTION that I think "will go over big" with your subscribers:

Why not print the "Construction Design Charts" by James R. Griffith in such form in *Western Construction News* that they may be cut out and inserted into your \$5.00 book of charts to keep them up to date? (A different binder would be nice as a loose-leaf deal.) At present, the explanation of the charts cannot be put into the book without considerable pasting and cutting.

EARL K. BURDICK  
Civil Engineer

Anaheim, Calif.

This same suggestion has come from several other engineers who regularly use Griffith's *Construction Design Charts* in the book form. To date, a scheme has not been devised so that the charts currently appearing in every issue of *Western Construction News* could be cut out and pasted into the chart book. The difference in the shape and size of the pages in the magazine and the book eliminates the possibility. For now, the glue-pot and scissors are still the best answer.—Ed.

### More Service Dope

Editor, *Western Construction News*

In my job as Master Mechanic, I have to keep well posted on all the newest things in most all types of construction work. I think it would be a fine thing if you were to have more articles on upkeep and maintenance for things that most repair men are not too familiar with, like the very good one on welding machines that appeared some time ago.

Contractors are realizing more and more that good upkeep and repair set-up go a long way in determining whether a job is in red or black ink. So more "how it was done" and service dope would be liked by quite a few of your readers.

C. H. INGERSOLL  
Master Mechanic,  
Marshall, Haas & Royce  
Exeter, Calif.

We agree that most construction magazines do not give enough space to articles on upkeep and maintenance of equipment. *Western Construction News* has published numerous articles within past months on servicing of equipment, and will continue to do so as space permits.—Ed.

### Shovel Operation

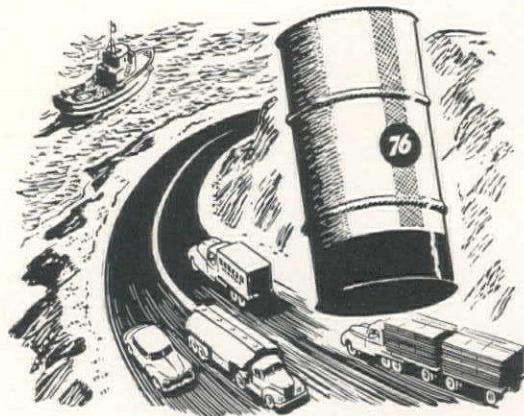
Editor, *Western Construction News*

Would you please let me know of any publishing firm from whom I might obtain technical books on shovel and dragline operation. Have been running these machines for years, but yet have to come

Continued on page 54

# THE COLORFUL STORY OF T5X

## ...THE FAMOUS PURPLE\* OIL!



1. Back in the 1930's a new and improved Diesel engine went on the market. It was an excellent engine, but on regular oils its valves stuck and it loaded up with sludge. Because of this problem, Union Oil scientists went to work and developed an oil with a cleansing agent. They called it D5X. This new oil kept the new Diesel remarkably clean!

2. D5X was the forerunner of our present-day compounded oils and it did much to make possible the development of the dependable, economical, modern Diesel engine. By 1940 more new compounds had been added to the oil and its name was changed to T5X. With the new compounds and a 100% pure, paraffin base, T5X was found to be ideal not only for Diesels but for gasoline and gas powered engines as well!



3. When the war came, the Army set up Specification 2-104-b for heavy-duty lubricating oils—the most demanding set of requirements yet devised for a lubricant. T5X easily exceeded this specification. Throughout the war, T5X did a truly outstanding job in trucks, jeeps, landing craft—in practically all types of military equipment powered by internal combustion engines.

4. Since the war T5X has proved itself under the most severe tests and operating conditions. Its exclusive detergent compound retards sludge to a remarkable degree. A special inhibitor retards oxidation and gives high heat stability. A neutralizing agent combats acidity. Still other additives guard against rust and corrosion. Now thoroughly tried and proved, T5X is available to you as the finest heavy-duty motor oil money can buy!

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

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

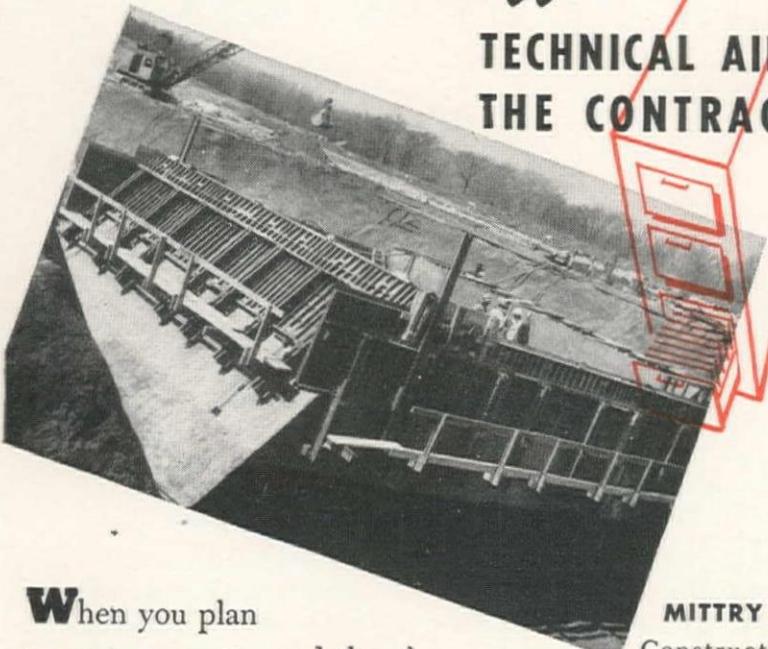


**UNION OIL COMPANY** OF  
CALIFORNIA

# IRVINGTON

offers

TECHNICAL AID TO  
THE CONTRACTOR



When you plan to pour concrete, and there's going to be an unusual form problem—or a new twist on a more or less standard operation—tap Irvington's technical knowledge.

Our files, and the minds of our specially trained and experienced engineers, hold data, results, methods, know-how—and all those intangibles that cut corners, reduce costs, avoid headaches. These are the products of hundreds of jobs, the results of our own experiences and observations, as well as those of contractors who use our forms and report back.

#### MITTRY BROS.

Construction Co. used a series of *standard* *Atlas Speed Forms*, placed *vertically*, for cantilever form construction on the Hulah Dam, in Hulah, Okla. which they are building for the Engineers Corps, U. S. Army. Irvington is gratified to say that its technical staff were called on by Mittry Bros. for consultation on some of the problems involved.

## IRVINGTON FORM & TANK CORP.

IRVINGTON 17

NEW YORK

**WE HAVE A FORM PROBLEM!**

Attach the coupon to your letterhead,  
mail to us, and a member of our  
staff will call on you.

across any technical books or trade magazines on them. Have also been covering *Western Construction News* for almost as many years as have pulley levers and find it very good.

Hoping you can supply me with the requested information, I remain

HOY D. JOHNSON  
Klamath Falls, Ore.

To our knowledge, there are no books devoted to the general topic of operation of shovels and drag lines. However, most manufacturers do have excellent manuals on the care and operation of their particular machines—and these manuals are available free of charge. *Western Construction News* reviews every piece of current literature in the New Literature section appearing every month at the back of the magazine. Copies of the bulletins described in the columns of that section may be obtained by addressing a request to *Western Construction News*.—Ed.

## Choice

Editor, *Western Construction News*

Please find enclosed New Zealand Money Order . . .

I have been receiving *Western Construction News* through the New Zealand Public Works Dept., but have now been transferred to the South Canterbury Catchment Board as an engineer, and as they do not receive many engineering journals, I felt I must keep abreast of current events. Your journal was my choice on American engineering and construction information.

URBAN LEONARD  
Engineer  
South Island, New Zealand

## Doubts

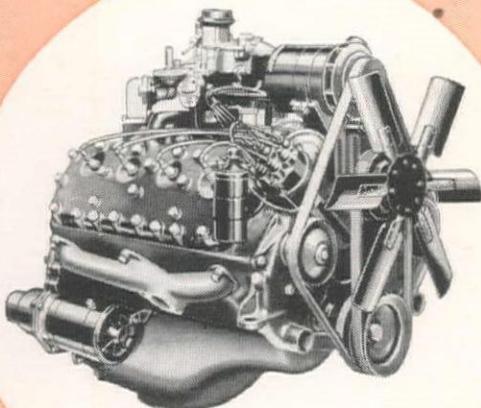
Editor, *Western Construction News*

Your article "Water's Wastin' Away, Arizona and California," which appeared in the April 15, 1949 issue of *Western Construction News*, was received during my absence on a trip to India. While I appreciate your confidence in my ability to serve as the Federal representative and ex-officio chairman of the combined committees there are others better qualified to assume the responsibilities of that position. To be more specific, Harry W. Bashore, in my opinion, would be an ideal man for the job because of his recent successful experience on similar work in the Upper Colorado River Basin with which you are familiar.

The idea expressed in the article has merit but I fear there are political implications that would tend to thwart the efforts of the proposed committee. For that reason I would hesitate to accept an appointment, if offered, even though the two Governors should react favorably to the suggestion, which I doubt they will.

WALKER R. YOUNG  
Retired Chief Engineer,  
Bureau of Reclamation  
Denver, Colo.

# For Power, Pick FORD...



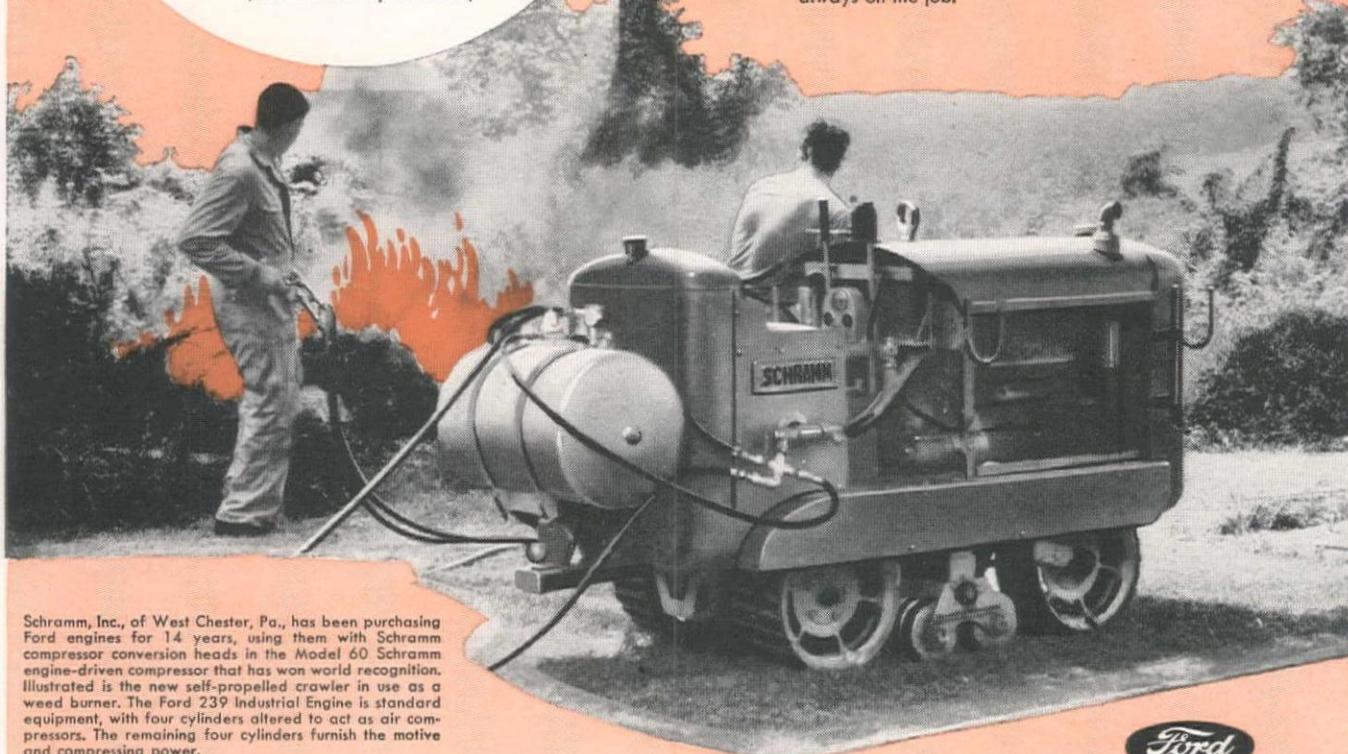
Ford 239 V-8 Industrial Engine  
(239 cu. in. displacement)

## Be Right 3 Ways!

**1** **RIGHT POWER** for your job or equipment. Your choice of five great new models in the Ford Industrial Engine line.

**2** **RIGHT FEATURES**, because Ford Industrial Engines incorporate all the latest advancements of Ford's progressive engineering.

**3** **RIGHT SERVICE**—Ford Dealers provide complete service facilities everywhere, to keep Ford power always on the job.



Schramm, Inc., of West Chester, Pa., has been purchasing Ford engines for 14 years, using them with Schramm compressor conversion heads in the Model 60 Schramm engine-driven compressor that has won world recognition. Illustrated is the new self-propelled crawler in use as a weed burner. The Ford 239 Industrial Engine is standard equipment, with four cylinders altered to act as air compressors. The remaining four cylinders furnish the motive and compressing power.

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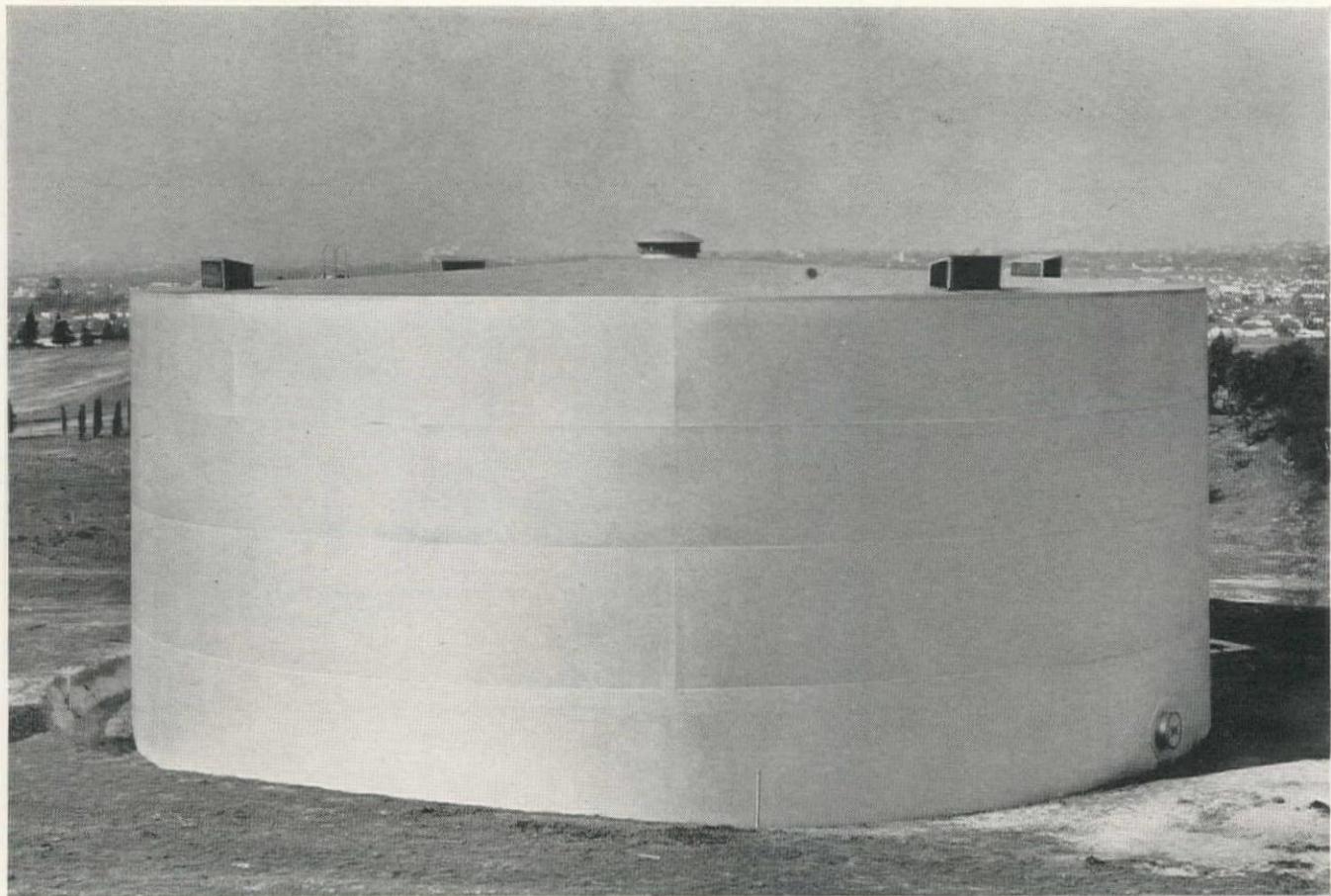
in. and 337 cu. in. Each one completely new, the *right* power for you. Widely used for farm implement power, construction, standby units, material handling, pumping, many other applications. For complete specifications, write direct to . . .



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## Another MODERN STEEL RESERVOIR for the California Water Service Company

RAPIDLY INCREASING WATER requirements in the California Water Service Company's East Los Angeles District were recently met with the new 1,000,000-gal. Horton steel reservoir illustrated above. This brings storage facilities in the district to 7,384,000 gals. Steel reservoirs like this frequently make it possible to increase the effective capacity of a system at a fraction of the total cost of other means. Not only are welded tanks economical to construct, but maintenance costs are lower too. Regular painting keeps the steel in good condition and the welded joints are made water tight and stay that way.

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# WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED

WESTERN HIGHWAYS BUILDER

July 15, 1949

Vol. 24, No. 7

JOHN M. SERVER, JR.	Editor
JOHN J. TIMMER	Managing Editor
RICHARD C. CLARK	Associate Editor
ARNOLD KRUCKMAN	Washington Editor

## Watch Out for Force Account

GEO. H. ATKINSON, President of Guy F. Atkinson Co., contractors, made one of the finest statements we've heard on force account construction, before a sub-committee of the Senate Appropriations Committee on June 3. We pass it on to readers of *Western Construction News* herewith.

"The question as to whether a Government agency should do its work by contract or by the so-called force account method is an old one; but it has been brought to special attention in the case of the Bureau of Reclamation because of the 'force account limitation' placed on the Interior Department's appropriations by Congress.

"The force account system is always insufficient for two general reasons:

"First, all employees are Government employees and there seems to be no real pressure for their working very hard, or for the cutting down of forces once the work is accomplished. This results in 'permanent' additions to the Government payroll; and those on this payroll are constantly seeking additional appropriations to justify their retention.

"Second, the public service simply does not include enough construction management specialists to properly direct the work. The mere fact that a man is a qualified engineer does not make him a construction manager; and the heads of the various construction companies, who have had to fight their way to the top in a very competitive system, are ordinarily far beyond the average Government engineer in ability to manage and run the work involved. Therefore, the system never can be as economical as the competitive contract method.

"Under the old policy of the Reclamation Bureau up until about 1945, only small, isolated work was done by the force account method and no real protest was made. However, at about that time the use of the method started to grow until finally all work at Grand Coulee Dam, Keswick Dam, Anderson Ranch Dam, Yuma, and other locations was scheduled to be done by the force account method. But as a result of the limitations provision in the appropriations, this tendency was halted; the day labor crews have been quite generally disbanded; and the projects involved have been let by contracts on a very competitive basis.

"These remarks are the results of direct observations of the force account activities of the Bureau at both Grand Coulee and Keswick Dams. They are also the summation of the complaints on this account received by AGC's Reclamation Bureau Committee from contractors generally throughout the West. They also reflect my personal experience as head of the Contractors Committee in requesting that the various projects at Grand Coulee be let by contract; the refusal of these requests by the Bureau prior to the date of the limitations provisions; and their subsequent success in letting these same contracts after the provisions had been inserted in the appropriation bill by Congress.

"There is no desire to hamstring the Reclamation Bureau in its legitimate efforts; but the history of its present administration has been that unless the limitation is continued, the tendency will immediately develop for a revival of the force account system on a large scale basis.

"I therefore earnestly request the retention of a limitation in the new Appropriations Bill."

## A Permanent Basis

WHILE WE'RE QUOTING, we'd like to emphasize an editorial issued in June by the Mountain Pacific Chapter of A. G. C. on the organization of the highway department in Washington. The same editorial could apply with equal force in several other Western states, and we've discussed before the desirability of putting highway officials and employees on a permanent "merit" basis, rather than leaving this important function to the whim of each succeeding governor.

The Washington Legislature last Spring enacted a program to increase gasoline taxes by 1½ cents per gallon, raise license fees, and otherwise increase highway funds, which should have resulted in a record-breaking construction program to modernize Washington's faltering highway system. But so far nothing much has happened. According to the Mountain Pacific Chapter:

"The State Highway Department cannot be blamed for this inexcusable procrastination. Plagued by political threats, struggling along without authority and under a temporary appointment with a Department whose morale must be at low ebb, we want to pay tribute to ACTING Director Ray Dinsmore, who has somehow managed to keep the highway department in order. (NOTE: Within recent days W. A. Bugge has been appointed director.—Ed.) Under our system of two party government, politics must be tolerated in some instances. The urgent need for more and better highways however is of such vital concern to the people's safety and the state's economy that political manipulations within the highway department are absolutely unwarranted."

The solution for Washington is proposed by the editorial—and other states should listen too!—as follows:

"In order to eliminate the highway department from party politics in the future there should be created by a Constitutional Amendment, a permanent highway commission, and the same initiative measure should provide, either by a merit system or otherwise some job security for the employees of the Department. At the present time there is not much inducement to offer to a young engineer who may have a desire to make highway engineering his career."

## Sure—Let 'Em Vote

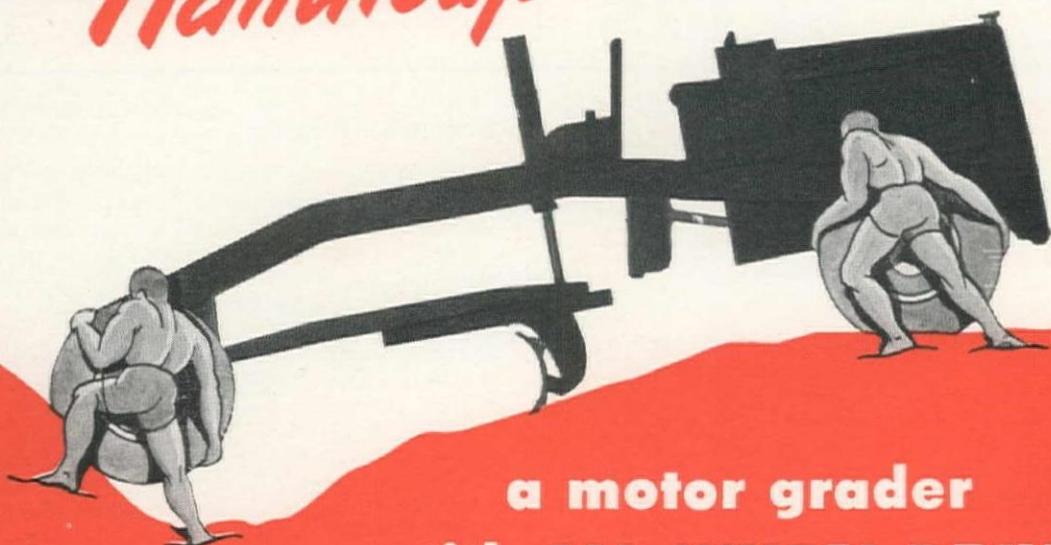
SENATOR HARRY P. CAIN of Washington has proposed in Congress a bill to permit the citizens of the territory to be included in the President's suggested Columbia Valley Authority to vote on whether they wish to have such a super-government created for them (Note we said "created for them," rather than "to create," for these Authorities are not movements of the people, but of government bureaucrats.) We support such an idea.

We cannot see how any local government officials can be for it, since their tax sources are deeply reduced and their authority minimized; we don't see how property owners can be for it, because with so much tax-free property and industry, their taxes must be raised to maintain municipal, county, and state services; we don't see how farmers can be for it, since with control of power and water, the Authority can completely dictate their activities; surely the average citizen cannot support it, since it means an increase in taxes, unbusinesslike administration, unfair competition by government in almost every line of business, and elimination of local control of government, substituting imposed authority by outsiders unfamiliar with local problems, backgrounds, or hopes.

There would be favorable votes, of course, from those who hope for employment in the army of new government aides;

Concluded on page 112

# DON'T *Handicap* YOUR HORSEPOWER!



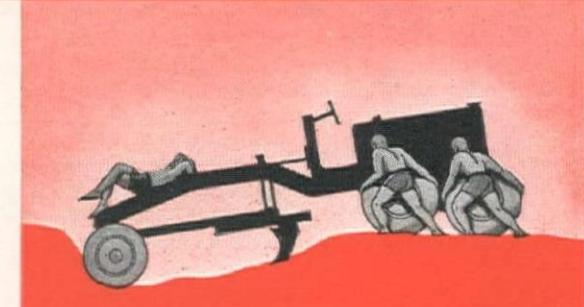
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JULY 15 • 1949

## Millions of Dollars and Hundreds of New Ideas

... Build Columbia Basin Canals and Siphons

**Dollars, and plenty of contractor sense, are combining to build some of the largest siphons and concrete-lined canals in existence through the channeled scablands of the Columbia Basin**

**S**EVEN SIPHONS, of steel and concrete and costing \$13,000,000, are now under construction by contractors in central Washington. They will carry irrigation water from the upper Grand Coulee reservoir to the desert acres of the Columbia Basin. From about 20 to 25 ft. in inside diameter and up to 2½ mi. long, these siphons are believed to be the biggest irrigation pipelines ever built.

### Canals in "channelized scablands"

Most of the Columbia Basin Project's irrigation system, which will carry water to 350,000 ac. by 1956 under the present construction schedule, is open canal. But nature contrived an obstacle course

By  
RALPH B.  
BENNETT  
Ephrata, Wash.



for U. S. Bureau of Reclamation engineers in the terrain to be crossed by the Main canal and the first sections of the East Low and West canals. Here in 41 mi. of canal, the rough topography dic-

tated the design of nearly five miles of siphons.

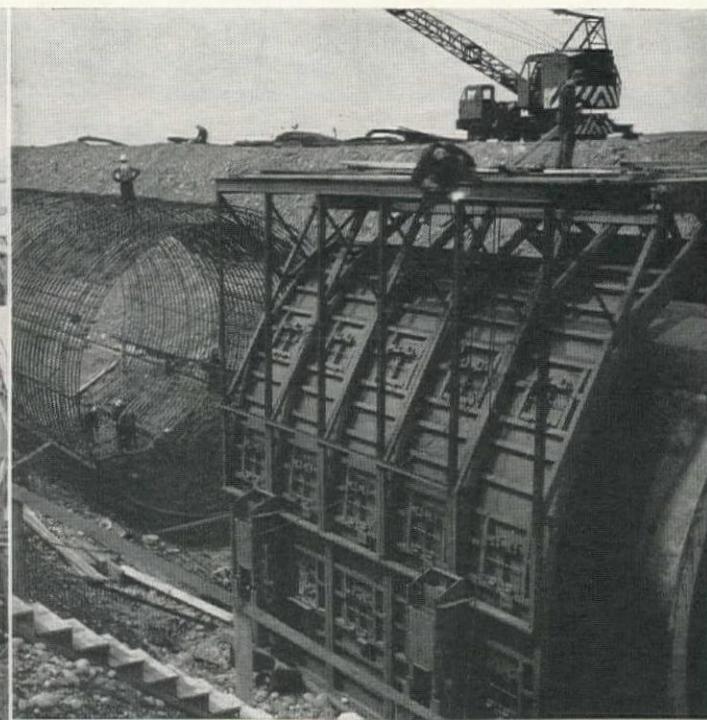
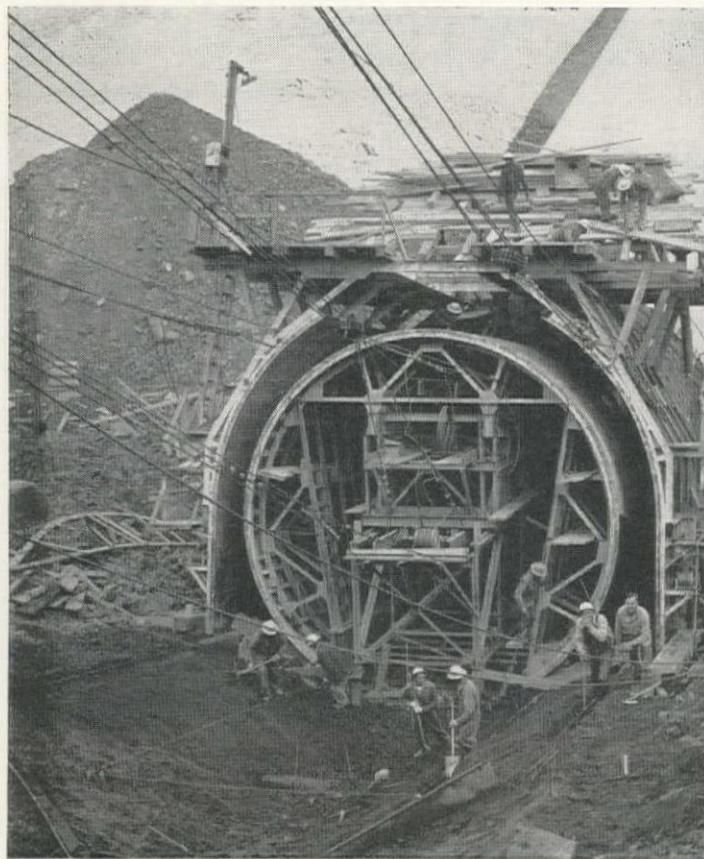
The siphons cross rocky coulees cut in the lava plateau by the Columbia River when it poured over this basin during the ice age. Geologists call the resulting formation "channeled scablands." The most spectacular of the siphons crosses the lower section of the mile-wide Grand Coulee itself.

No less than forty additional siphons with a total length of about 20 mi. are in the design stage for completing the Columbia Basin irrigation system.

### The big build the biggest

But the first seven siphons are the largest called for in the plans. And appropriately, the building of these fell to some of the biggest construction firms in the West.

The principal contractor is a joint venture partnership of the Winston Bros. Company, Azusa, Calif., and the Utah Construction Company, San Francisco. Winston-Utah's work on six of



GOING UP the 30-deg. slope at downstream end of the big Bacon Siphon, left, deadmen anchor cables that pull forms ahead. Slope here is steepest of the steep on the entire project. Forms and reinforcement in the ditch for Dry Coulee Siphon No. 1, above. Note concrete entry ports in the side of the outside form.

the seven siphons accounts for more than \$12,500,000 of the \$15,000,000 in contracts now held by the firm in the Basin project.

T. E. Connolly, Inc., of San Francisco, built the seventh siphon at a cost of about \$450,000 as part of a \$3,500,000 contract involving a two-mile tunnel.

#### Draglines remove the big chunks

Excavation for the siphons is generally about 20 ft. deep and 80 ft. wide. All Winston-Utah excavation is being done by dragline, using a Bucyrus-Erie 54-B 2½-cu. yd. Diesel and a Marion 4161 6-cu. yd. electric, which takes its power from 2300-volt transmission lines built along the canal right-of-way.

After completing excavation, Winston-Utah places concrete pedestals at 6-ft. intervals in the subgrade to support used 60-lb. railroad rails, which carry the circular hoops of reinforcing steel. However, this Winston-Utah practice was not followed by Connolly, who poured tapered 6-in. concrete curbs for the same purpose. Continuous concrete curbs are also placed to carry rails on which the outside form bridge travels.

#### Steel skeleton

Next big construction operation is placement of reinforcing steel. Two sets of flash-welded steel hoops are placed by crane 3 in. from the designed inner and outer faces of the concrete. Steel varies in size from 2-in. square to  $\frac{3}{8}$ -in. round, spaced from 9 to 12 in. apart depending on the head of water pressure or the exterior loads to be imposed. Segmental bars between the hoops give added strength. Longitudinal bars of smaller diameter are spaced evenly at each face of the pipe to hold the hoops

and segmental bars in place.

A wrought iron water stop,  $\frac{1}{4}$  in. thick and 10 in. wide, is welded into a hoop and placed across each joint between 25-ft. barrel sections at the midpoint of the walls. This ring is painted with an asphaltic emulsion. It prevents joints from leaking and allows the monolithic sections to move slightly in expansion and contraction. In curing, the concrete sections shrink apart  $\frac{1}{4}$  in. or less. The steel is placed continuously several pours ahead of the forms.

Fabrication and erection of reinforcing steel was subcontracted by Winston-Utah to Donald V. Libby, of Chino, Calif., and Connolly subcontracted to the Sparling Steel Co. of Seattle.

#### Special concrete forms

Third major operation is concrete placement. This is done in 25-ft. sections, each section being poured consecutively. (By contrast, Morrison-Knudsen and M. H. Hasler are pouring alternate sections in leap-frog style on the \$500,000 siphon they are building near Tracy, Calif., for the Central Valley project's Delta-Mendota canal. There, the skipped sections are left to be poured later, after steel for them has been erected.)

Concrete placement starts at or near the middle of the siphon, with the blow-off section located at the siphon's lowest point. The forms work up both ways from the center toward the ends.

Steel forms for the siphon work were specially built by the Consolidated Western Steel Co. of Los Angeles. Winston-Utah has four sets of inside and outside forms now at work, with another outside form being manufactured for the special requirements of the

Soap Lake siphon. Connolly is now using the inside form built for the Bacon siphon to line the Bacon tunnel.

A bridge, 25 ft. long, 28 ft. high and 36 ft. wide, with a deck 5 ft. above the top of the siphon barrel, supports the outside form and facilitates pouring.

The inner form is collapsible. It is supported and moved by a traveler on a bridge-like structure about 60 ft. long. Two collapsible inside forms on a jumbo were first used by Winston-Utah, but mechanical difficulties and slow operation compelled adoption of the single inside form.

#### Wet versus dry

Winston-Utah generally hauls wet concrete in Dumpercrete trucks to the siphon sites within two miles of their central batch plant at Adrian, Wash. The plant is located on a 10-car siding of the Northern Pacific's Coulee City-Connell branch line. Storage at the plant accommodates up to 2,000 bbl. of cement. The plant is equipped to batch either dry or wet by means of a stripped-down Worthington 34-E dual drum paver.

Connolly dry-batches three miles distant, hauling to a 27-E Koehring paver, which moves with the forms at the site.

#### Conveyor versus crane

A special 70-ft. electric-driven 30-in. belt conveyor designed and built by General Machinery Co., Spokane, is used in each of Winston-Utah's four siphon set-ups. It carries the concrete from a hopper, into which the trucks dump to the top deck of the bridge. From a hopper there, the concrete is carted by buggies to smaller hoppers. Elephant trunks then take it into place through

removable doors in the outside form. As the concrete comes up, the port doors are latched tight and the next upper tier is used. The last concrete is dumped into the upper center and open section of the form. Vibrators are operated between the two forms and through the open invert.

Connolly used a crane instead of a conveyor, bucketing the concrete to a leek hopper. The concrete is poured directly from the main hopper into the forms via elephant trunks without smaller hoppers and without need for concrete buggies.

From three to five hours of continuous pouring time are required to complete each 25-ft. barrel section, which may vary in volume of concrete from 17 to 182 cu. yd. on the different siphons. The invert of the barrel is open for a 60-deg. arc on the inside form, and here sealing-off time varies according to the temperature of the air and the concrete. It is generally possible to concrete a section every 24 to 36 hours. Accordingly, the contractors tried to have two balanced shifts working each day on each siphon set-up, one to move the forms and the other to pour.

In moving the forms, the outside form is opened up by hydraulic jacks. The Winston-Utah bridge then travels forward on rails along the outside curbs under its own power, except on steep sections, where rigging is used.

#### "Invasion pipe" carries air full length of the canals

Power to move the outside form and its bridge is furnished by air motors. Other contractors have used Diesel motive power, but Winston-Utah has an air system involving two central compressor stations and 6-in. "invasion pipe" air lines along the full length of their East Low and West canal sections. Three electrically-driven compressors have a capacity of 4285 cu. ft. per min. The air motors on the form bridge take full advantage of this capacity, needed for the operation of wagon drills in canal excavation. A factor here and in the use of the electric dragline is the low cost of power furnished the contractors by the Grant County Public Utility District.

In moving the inside form, the blocking at each end of the bridge truss is removed and it is moved ahead half its length and again blocked up. The inside form is collapsed by hydraulic jacks. The form is draped over its supporting structure and both are rolled ahead to position for the next section.

All exposed concrete surfaces are sprayed by Winston-Utah with Hunt's process white-pigmented curing compound. All necessary patching is done at the time forms are moved ahead. The finishers are concerned mainly with filling up holes in the concrete left by removal of she-bolts.

Fourth and final operation is the backfill. Bulldozers cover the siphon barrel with previously excavated material to an average depth at the top of 3 ft. The pipe is completely hidden by earth except the blow-off section. The backfill protects the concrete pipe from the effects of weather and, especially, cold.

The severe 1948-49 winter halted Winston-Utah siphon pouring operations from early December until March 21. But Winston-Utah countered cold weather delays with an oil-fired Scotch-type boiler, a veteran of western Washington logging operations, which was used at the batch plant to heat water for the mix. Water heated to a maximum of 160 deg. warmed the mix to a maximum of 90 deg. A faster set reduced the wait before stripping the forms.

The disastrous 1948 flood season in the Pacific Northwest was marked for Winston-Utah by a cloudburst and flash flood which on June 16 filled a completed section of the Dry Coulee No. 1 siphon with about 5,000 cu. yd. of material. The flood drained into the unlined Main canal, which had been excavated by Morrison-Knudsen on a previous contract. It swept down the Main canal for about a mile, and then down about 2,000 ft. of the concrete-lined West canal. It washed out a Northern Pacific railroad fill across the head of the incomplete Dry Coulee siphon and emptied the fill material into the completed sections of siphon barrel.

Removal of the silt and debris from

the barrel was accomplished by a Bagley scraper and hoist and by dozer. The contractors then built a temporary earth dam across the Main canal and cut out a section of the canal bank there to divert any future flood waters during the construction period.

#### Bacon Siphon

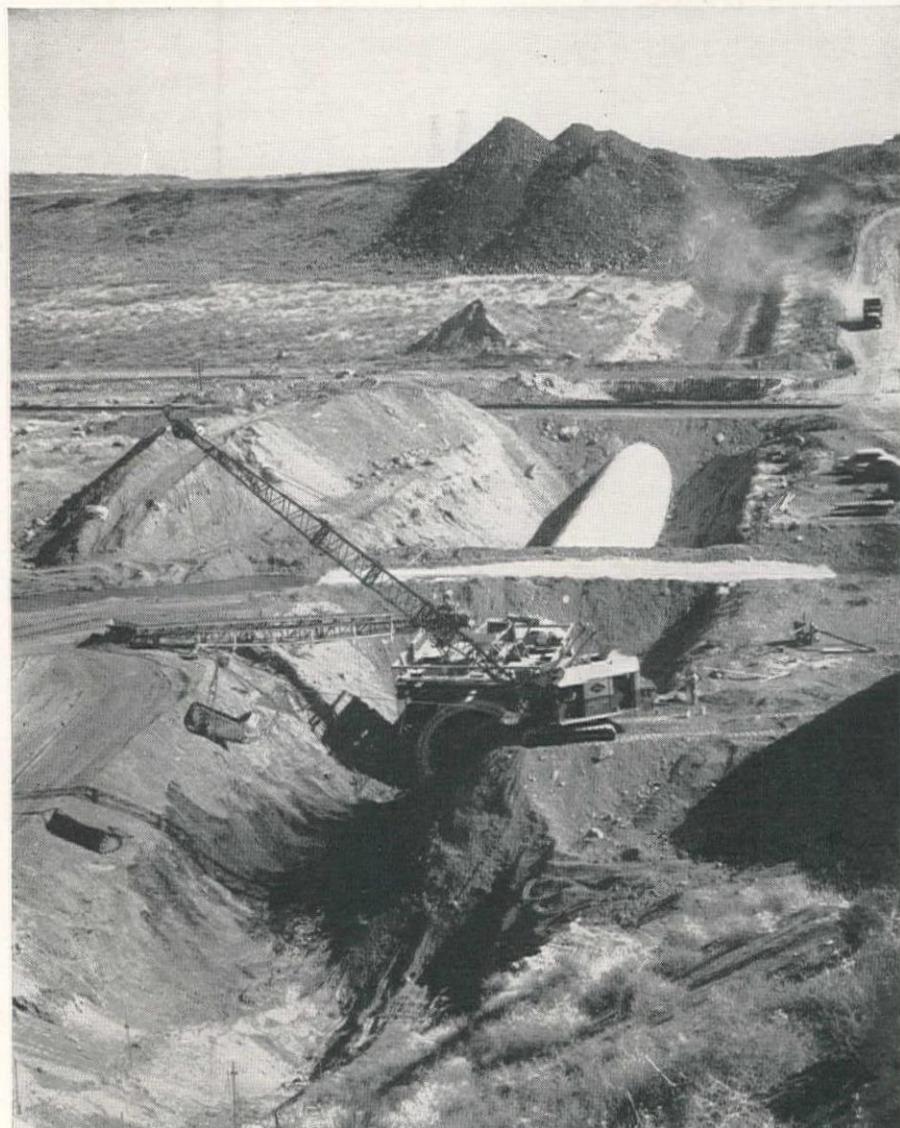
##### ... Slopes steep, capacity record

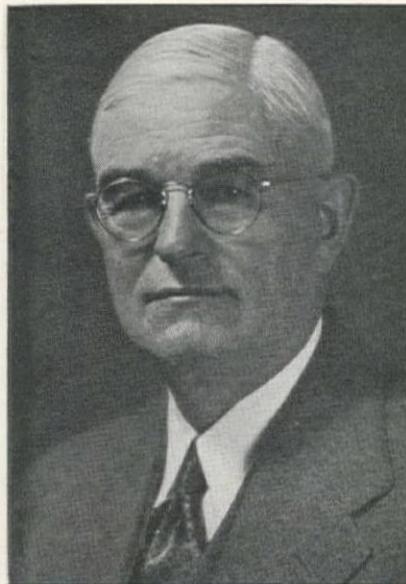
Highlights of the \$450,000 Bacon siphon are its capacity and the steepness of its slope. Located on the Main canal about 4 mi. south of Coulee City, the siphon is a circular tube of reinforced concrete 1,000 ft. long, 23 ft., 13 in. inside diameter and with a shell thickness of 23 in.

The big West canal siphons are larger inside (25 ft.), but on the Main canal a greater velocity of flow accounts for the larger capacity of the Bacon siphon (6,600 cu. ft. per sec., a record for the Columbia Basin project). The difference in water surface elevation between the inlet and outlet ends is 6 ft. Water velocity in the siphon is 15 ft. per sec.

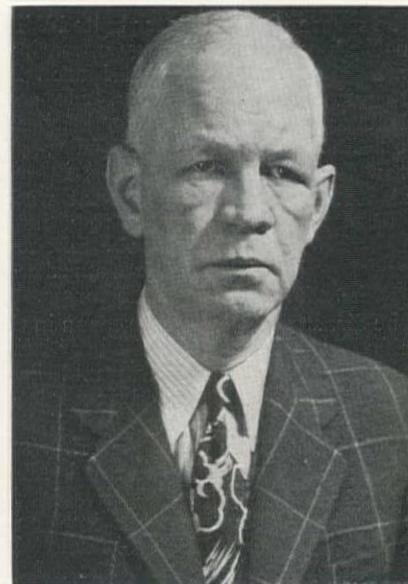
A second siphon, twin to the present

MAIN LINE railroad and Crab Creek, background and foreground, had to be diverted during construction of Crab Creek Siphon No. 2. Winston-Utah efficiently re-used forms for this siphon.





FRANK A. BANKS, of Grand Coulee Dam fame, is District Manager for the Bureau of Reclamation in charge of the Basin Project.



W. C. CHRISTOPHER is the Bureau of Reclamation's assistant supervising engineer for Irrigation Division of the huge Basin Project.



FLOYD S. ARNOLD since early this year has had plenty to keep him busy as Construction Engineer for the Project's Irrigation Division.



H. A. PARKER, as the Bureau's Supervising Engineer of the Irrigation Division, has ten district heads under his supervision.

one, will be built in the future when sufficient land is under irrigation to require it. The ultimate capacity of the twin siphons (13,200 c.f.s.) may be compared with the minimum recorded flow of the Columbia River at Grand Coulee (17,000 c.f.s.) to suggest the amount of water these structures will carry. It will be enough to irrigate 1,029,000 ac.

#### Rigging on steep slopes

The slope of the Bacon siphon is greater than that of any other siphon now under construction in the Basin project. The siphon drops 86 ft. into a rocky coulee with a 30-deg. slope for about 100 ft. on each end. For this reason, the contractor relied entirely on rigging to move his siphon forms.

Each of the 24½-ft. sections in which the siphon was poured contains 159 cu. yd. of concrete and 61,300 lb. of reinforcing steel. A 3- x 4-ft. concrete box culvert carries drainage water down the bottom of the coulee under the siphon barrel at its lowest point.

Construction work by T. E. Connolly, Inc., started on the siphon May 2, 1948,

and the barrel was substantially completed by November 15. It has yet to be covered over with earth, an operation which will involve about 50,000 cu. yd. of backfill. Transitions to the open canal at the north end and to the Bacon tunnel inlet at the south end are to be completed this year.

#### Dry Coulee Siphons

##### ... Rigging, deadmen and shooflies

Winston-Utah was awarded the \$3,165,000 contract for the first 5½-mi. section of the West canal in June, 1946. It includes two siphons. Contractors expect to finish the entire job by late summer, 1949.

First siphon on the West canal is the \$2,000,000 Dry Coulee Siphon No. 1, located 1½ mi. north of Adrian, Wash. The barrel goes beneath a county road and under the tracks of the Northern Pacific railroad's Coulee City to Connell branch line. While the siphon sections under the railroad are being poured, the line is being shooled over a completed portion of the barrel, which is braced internally with temporary timbers at that point.

Second only to the Soap Lake siphon in length (4,550 ft.), the Dry Coulee Siphon No. 1 has the 25-ft. inside diameter characteristic of the West canal siphons. This makes all three of them (Dry Coulee Nos. 1 and 2 and Soap Lake) the largest in the project designs. Common to all three is their 5,100 c.f.s. capacity, sufficient to irrigate 280,000 ac. Reinforced concrete shell thickness is 24 in.

The 25-ft. sections average 182 cu. yd. of concrete in volume. The high-head sections require 80,000 lb. of reinforcing steel, or more than 1½ tons per linear foot.

The drop in the Dry Coulee Siphon No. 1 is 94 ft. to the floor of the coulee. The difference in water surface elevation

between the inlet and outlet ends is 5 ft. Water velocity in the siphon is 10 ft. per sec.

As of May 1, the siphon was 97 per cent complete with 12 of 172 sections left to pour.

#### Deadmen anchor forms

Second siphon on the West canal is Dry Coulee No. 2, located 2,000 ft. west of No. 1. The barrel is identical with No. 1 in all respects except length and reinforcement. No. 2 is only 1,200 ft. long. Because the drop is only 62 ft., with consequently lower head, reinforcing steel is not so heavy.

Although the drop is short, the grade at the ends is steep. The 15-deg. slope is the steepest the Winston-Utah equipment encountered. Extra rigging was necessary to move the forms. Deadmen were poured in the subgrade to anchor the forms while working on the slope. A special deck for the form bridge, similar to the one used on the steep sections of the Bacon siphon, was designed so concrete pouring crews could work on a level floor.

The \$540,000 siphon is 50 per cent complete, with 20 of 39 sections left to pour.

#### Soap Lake Siphon

##### ... Inside forms entirely eliminated

Third siphon on the West canal crosses the mile-wide lower Grand Coulee just north of Soap Lake, about 5 mi. west of the Dry Coulee Siphon No. 2. It is the \$7,800,000 Soap Lake siphon, the most striking feature of the West canal.

Two-and-a-half miles long, the big pipe will sweep down from the basalt cliffs and curve north around the bitter waters of the alkali lake. It will exceed the combined length of the six other siphons now under construction in the project by nearly 900 ft.



ARTHUR W. DAVIDSON is Chief of the Engineering Section and Head of the Design Unit for the Bureau's Irrigation Division.

Different sections of the barrel will be built from two distinct designs. The design for 4,648 ft. of the barrel at either end of the siphon is identical with the other West canal siphons. It will be 24 in. thick reinforced concrete with 25-ft. inside diameter.

But the 231-ft. head on the central portion of the pipe and the resulting high pressure required a different design for the mid-section. This design calls for a plate steel-lined concrete pipe 21 in. thick and 22 ft., 4 in. in inside diameter. The steel-lined section will be 8,264 ft. long, making the total length of the siphon 12,912 ft.

The contract was awarded to Winston-Utah on December 21, 1948. Excavation to an average depth of 25 ft. started in mid-March. Pouring of concrete was started in June.

#### Inside forms eliminated

The concrete pipe portion will be poured in 25-ft. sections exactly as on the other Winston-Utah siphons, and using the same forms. But the steel-lined pipe portion will be poured in 40-ft. sections.

A new outside form for the steel-lined portion is being fabricated by Consolidated Western Steel Co. No inside forms will be needed. The inner  $\frac{1}{4}$ -in. steel liner will be rolled at the site by American Pipe and Steel Co., Los Angeles. It will go into the siphon as circular sections approximately 20 ft. long and then be welded together to form the longer section. The liner will be welded to the reinforcing steel and supported by channel sections on pedestals before and during concreting.

Concrete will be dry-batched at the Adrian plant and mixed at the site. Water is piped in three miles from the city of Soap Lake's municipal system.

A peak payroll of 350 men is expected on the job this summer. Winston-Utah plans to complete it in two seasons.



HAROLD SHEERER is the Bureau's Resident Engineer on the first section of the East Low Canal, West Canal, and Soap Lake Siphon.

Winston-Utah was awarded the \$4,372,000 contract for the first 12.3-mi. section of the East Low canal in December, 1946. It includes three siphons. Contractors expect to finish this portion of the job by late summer, 1949.

#### Crab Creek Siphons

... No leaks, railroad supported

First siphon on the East Low canal is the \$1,500,000 Crab Creek Siphon No. 1, located 2 mi. north of Adrian, Wash.

The siphon starts at the beginning of the East Low canal, where it turns out from the Main canal. The 3,100-ft. long barrel crosses a depression and goes under primary state highway No. 7, which was detoured over a completed section of the siphon during construction of the barrel under the right of way.

Like the other Winston-Utah siphons on the East Low, Crab Creek No. 1 is 19 ft., 4 in. inside diameter, with a shell thickness of 20 in. and a capacity of 4,500 cu. ft. per sec., sufficient to irrigate 252,000 ac.

The 25-ft. sections average 117 cu. yd. of concrete in volume. The high-head sections require 62,000 lb. of reinforcing steel, almost  $1\frac{1}{4}$  tons per linear foot. These requirements apply in general to all three of Winston-Utah's siphons on the first section of the East Low canal.

#### No leaks

Crab Creek No. 1, completed on October 16, 1948, was the first siphon to be finished in the Columbia Basin project. Its 123 25-ft. sections were filled with water last fall to test for leaks. No leaks developed. The water in the siphon dropped about  $\frac{1}{2}$  in. in two months.

Some 4,300,000 gal. were pumped from Crab Creek for the test. The same water will be used to test the Dry Coulee siphons on the West canal. It was left in the siphon during the winter and froze,



E. J. NIEMEN, left, Bureau's Resident Engineer on the Soap Lake Siphon, has gone to Hungry Horse as Field Engineer. F. L. McCUNE remains as Field Engineer on the Bacon Siphon and Tunnel.



ROY HARER is Winston-Utah's General Superintendent on completion of the big \$7,800,000 Soap Lake Siphon.

but the open ends prevented expansion damage to the barrel due to freezing.

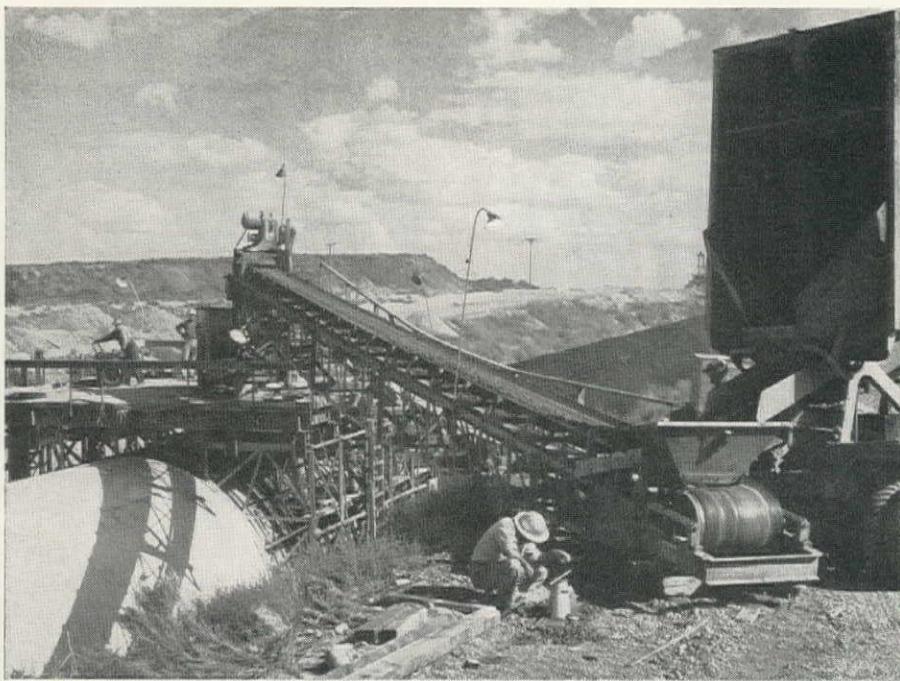
The siphon has been backfilled and covered. Only the transitions remain to be completed this season.

Second siphon on the East Low canal is the \$630,000 Crab Creek Siphon No. 2, located 2,300 ft. south of No. 1. The 1,400-ft. long barrel crosses beneath the channel of Crab Creek and under the Great Northern railroad's main line tracks near Adrian.

Highlight of its construction was the temporary diversion of the railroad and the stream. A 2,800-ft. shoofly was built over an unexcavated portion of the siphon. The portion under the main line was then excavated. The forms used on Crab Creek Siphon No. 1 were brought in and re-assembled. Four special sections were poured with 24-in. walls instead of 20-in. walls for additional strength beneath the track.

Dikes were then built to crowd Crab Creek close to its north bank and seven regular sections poured past the four special ones. Completed sections were backfilled. The main line was rebuilt and service resumed. The railroad diversion lasted only 47 calendar days.

A stream diversion channel was left in



WET CONCRETE is hauled in Dumpcrete trucks by Winston-Utah from a central batch plant to the siphon sites, where it is carried to the forms by a specially-designed belt conveyor.

the backfill. It was grouted to prevent seepage and Crab Creek was re-diverted into the new channel by new dikes. Excavation for the siphon was then completed and normal pouring operations continued.

The siphon barrel is complete, the 48 sections having been finished on April 28.

Third siphon on the East Low canal is the shortest of the seven now under construction. It is the \$350,000 Broken Rock Siphon No. 1, located 12 canal miles south of Crab Creek Siphon No. 2. The siphon is only 780 ft. long.

Excavation for its 22 sections was started and completed this spring. Pouring started April 27. Because this siphon is 12 mi. distant from the Winston-Utah batching plant, concrete will be dry-

batched from the plant and mixed at the site. In other respects, the operation will follow normal procedures.

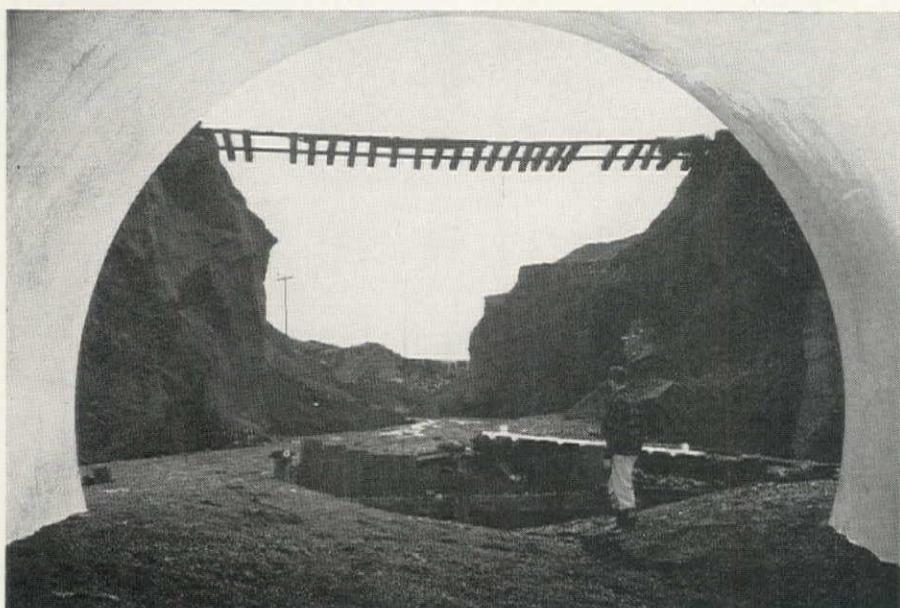
#### More to come

Future siphons in the Columbia Basin project are located principally on the East Low canal.

J. A. Terteling and Sons, Inc., of Boise, Idaho, were low bidders on the 15-mi. second section of the East Low canal when bids were opened April 15. The contract will call for construction of three siphons.

These are the 1,336-ft. Broken Rock No. 2, the 1,684-ft. Black Rock and the 3,445-ft. Rocky Coulee siphons. Terteling's bid of \$8,000,000 for the entire contract included \$2,000,000 for the three siphons. They will have a 4,500-

WASHING OUT a railroad grade to leave tracks and ties hanging in mid-air was a cloudburst last summer which also filled the completed Dry Coulee Siphon No. 1 with silt and debris.



c.f.s. capacity and an inside diameter of 19 ft., 4 in. in common with the three siphons on the first section of the East Low canal.

Designs call for 12 more siphons on the 100 mi. of the East Low canal to the Washtucna coulee and an additional 12 siphons if the canal is built to its full length 30 mi. south of that coulee.

Under long range plans, a 110-mi. East High canal with 12 siphons may eventually be built.

#### Men on the job

Frank A. Banks is district manager for the Bureau of Reclamation in charge of the Columbia Basin project. H. A. Parker is supervising engineer for the irrigation division.

During the greater part of the construction period to date, the key Bureau personnel supervising work on the siphons have been as follows:

Bacon siphon: E. J. Niemen, resident engineer; Fred L. McCune, field engineer; Bruce Cassell, office engineer.

West and East Low canals: Floyd S. Arnold, resident engineer; Harold M. Sheerer, field engineer; Joseph R. Kirk, office engineer.

## THE COVER

GIANT JUMBOS make rapid progress in lining the river-size Main Canal of the Columbia Basin Project. Starting in the foreground and reading upward are the trimming machine of Western Contracting Corporation, which prepares the foundation; the lining machine, which places the concrete; a jumbo for making expansion joints and carrying concrete finishers, and a second traveling form for applying the curing compound. When completed, the man-made channel could carry the average flow of three rivers of size of Washington's Puyallup.

Soap Lake siphon: Harold M. Sheerer, resident engineer; Vern R. Votaw, field engineer; Bruce Cassell, office engineer.

Contractors' key personnel have been as follows:

T. E. Connolly, Inc.: W. D. Connolly, superintendent; R. K. Bunker, comptroller; E. A. Gardner, concrete superintendent.

Winston-Utah: George M. Mann, project manager; Hugh S. Thompson, construction manager; Ray L. Wahl, office manager and purchasing agent; William R. Sell, office engineer; James H. Barton, master mechanic. Albert P. Costner is general superintendent on completion of the East Low and West canals. Roy Harer has been named general superintendent and H. W. Parker, field engineer, for the Soap Lake siphon.

Winston Bros. Company is the controlling partner. R. F. Rasey, vice president in charge of Winston Bros. Company's Los Angeles office, frequently brings top level supervision to the work.



*At San Francisco's Big Airport Job—*

## **Short Schedule Builds a Long Runway**

**Careful time study analyses of imported borrow and crushed aggregate operations saves equipment and keeps production on schedule**

**T**HE SAN FRANCISCO International Airport, covering an area of 3,700 ac. and situated about 10 mi. south of the city, will have, upon completion of its construction, two parallel runways in an east-west direction, two parallel runways in a north-south direction, and a new administration building. It is planned that the airport will be able to handle a high density traffic volume regardless of weather. Facilities such as electronic aids (instrument landing system, radar, ground control approach, direction finder, height finder, etc.); lighting (runway and taxiway lighting, high intensity lighting, stub approach system, etc.); and FIDO (fog, intensive dispersal operation) will be installed, or the present facilities will be extended.

Already existing are the east-west runway, designated as 10L-28R, with a length of 7,750 ft. and a width of 150 ft.; and the north-south runway designated as 18-36, with dimensions of 4,500 x 200 ft. This last runway was deactivated on June 1, 1949.

### **Runways replace water**

One of the largest earthmoving projects of the entire West (see *Western Construction News*, April, 1947), removing 15,500,000 cu. yd. of dirt from the

By  
**ISMAIL ISMEN**  
Engineer\*  
International  
Engineering Co., Inc.  
San Francisco, Calif.



foothills to the bay, was accomplished during the last two years as one of the preliminary stages of the construction at the airport. The present stage consists of paving, drainage, water supply, sewerage, electrical and related works included in the construction of an east-west runway with dimensions of 6,000 x 200 ft., designated as 28L-10R, a north-south runway with dimensions of 6,000 x 200 ft., designated as 11L-19R, and connecting taxiways. Also included are two access roads from the airport to the interchange on U. S. Highway 101, an itinerant parking area for planes, and a parking area for automobiles.

\*Formerly efficiency engineer with Morrison-Knudsen Co., Inc., on construction at the San Francisco Airport.

The extension of the runway 10L-28R up to 9,050 ft., the fourth runway (7,750 x 200 ft., designated as 19L-1R), the new administration building, hangars, and other facilities will be the subject of future contracts.

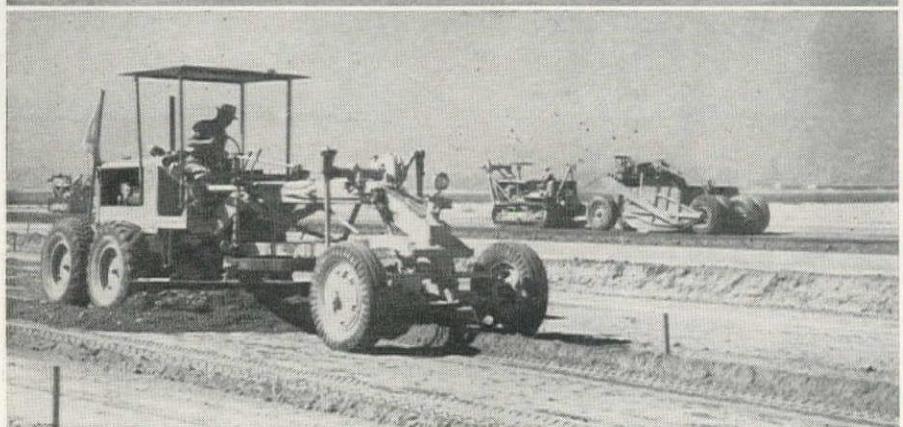
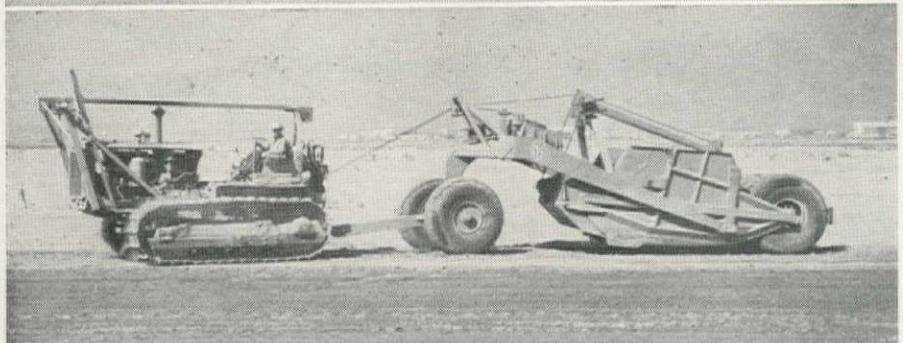
The present contract which started on Oct. 4, 1948, lists 172 items of work, including:

650,000 cu. yd. unclassified excavation  
650,000 tons imported borrow  
1,375,000 st. yd. overhaul  
406,600 tons crushed aggregate base course  
75,400 tons bituminous surface course  
92,000 lin. ft. pipes (reinforced concrete, vitrified clay, corrugated metal and steel pipes ranging from 12 to 48 in. in diameter)  
41,000 lin. ft. electrical ducts (ranging from single 3-in.-duct to a 12-duct bank of 4 in.-ducts)

Structures included are two drainage gates, three drainage pumping plants, one sewage pumping plant and one bridge.

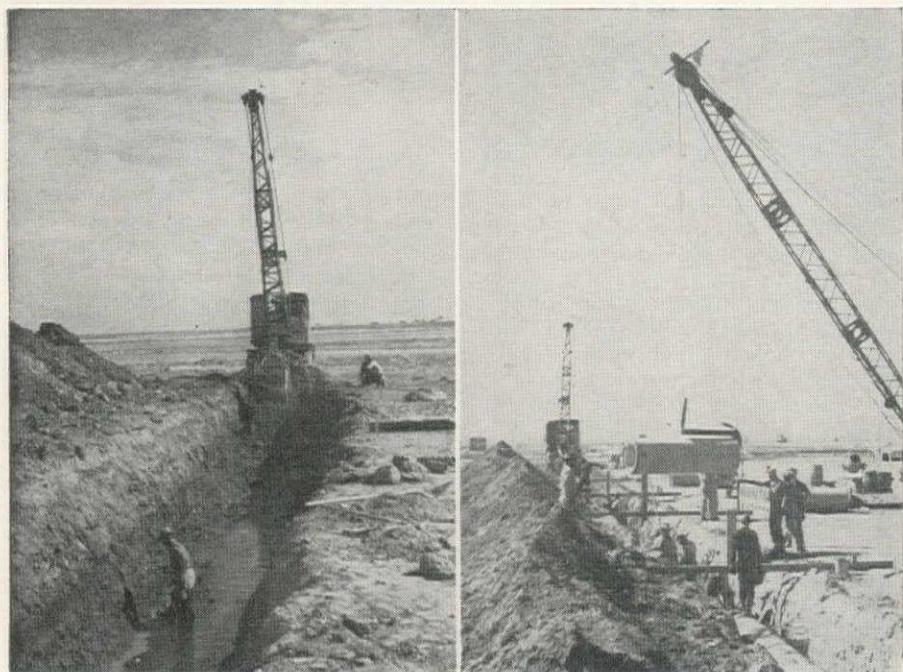
### **Time studies on imported borrow**

Time study analyses of two major items in the present contract, imported borrow and crushed aggregate, were made soon after the start of the operations. From the report of these analyses, production of the two items was charted to completion, and efficiency in the op-



SEQUENCE of operations for placing the runway sections is carefully coordinated. From top to bottom: A Porter Super Compactor solidifies the freshly-placed subgrade; a tractor-scaper team does the rough grading, and fine-grading finishes to specifications.

MORE THAN 12 MI. of pipe of various sizes will keep things dry at the airport. At left, a dragline scoops out a drainage trench; right, a special crane hook lowers 27-in. pipe.



eration much improved. A condensation of the two studies follows:

In the first, production of imported borrow is considered. The material was secured in a borrow pit  $3\frac{1}{2}$  mi. away from the construction site. It was a soil with a liquid limit of not more than 30, a plasticity index of not more than 6, and a clay content of less than 5%. At the time of the study, material was being loaded with one  $2\frac{1}{2}$ -cu. yd. shovel and conveyed by a fleet of twenty 9-cu. yd. dump trucks. One bulldozer and ripper were used to facilitate the work of the shovel. One shift was worked per day, 8 hr. long, with 30 min. out for lunch.

In passing from the pit to the construction site the trucks encountered two stop signs and ten traffic lights; crossed one street car track and one railroad track; and were obliged to stop for weighing.

#### Three trucks eliminated

Time lost was considered under two headings: operational lost time, including such items as time to get started and to close down both at noon and at morning and evening, grading and leveling at loading site, and the operator's personal time; and delays due to the shovel only, such as moving to new digging sites, changing teeth, and mechanical repair. Out of 480 min. of working time per day for the shovel, it was observed that the operational losses amounted to 56.5 min. or 11.77%, while shovel losses amounted to 24 min. or 5%. Thus it was obvious that net working time amounted to only 83.23% of the potential 480 min.

In the operation of the trucks, the loading, hauling and dumping occupied 74.39% of the day's time. Of the remainder, 16.44% was consumed in waiting in the cut, 2.03% was lost in mechanical delays, and 7.14% was operational time loss. In total hours per day, this amounted to 26.27 hr. for waiting time. Since trucks actually worked only about 7.5 hr. per day, the waiting time lost corresponded to 26.27 divided by 7.5, or 3.2 trucks surplus. The recommendation then was that 3 trucks be eliminated, which it was calculated would increase the number of trips by 12%, or from 1.7 per hr. to 1.9 per hr.

#### Time studies on crushed aggregate

The second report covered the handling of crushed rock aggregate from the Brisbane Rock Co. mill,  $7\frac{1}{2}$  mi. away from the construction site. The equipment consisted of one pug mill and 18 to 26 trucks, three with a 5-cu. yd. capacity, the remainder with a capacity of 8 cu. yd. (the number varied with the demand for the trucks on other phases of the contract). The trucks were each weighed after being loaded, and encountered all normal traffic conditions on U. S. 101 on the trip to the discharge point.

Operational time losses were for similar reasons as in the other operation, but the principal delay at the pug mill

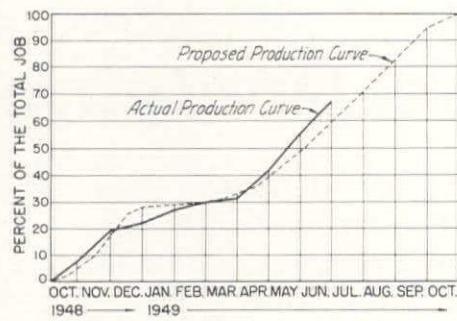
IN AN ORDERLY PROCESSION, equipment places the crushed aggregate base (see drawing below). From top to bottom at right: A spreader box mounted on a tractor drops the aggregate mixture; a grader pushes the material into a uniform layer, and a tandem roller readies the base for the runway course.

was occasioned by its inadequate capacity to produce at the high rate required. Again the various time loss factors were evaluated, and conclusions drawn. Considering an average working day of 192 hr. (8 hr. x 24 trucks = 192 hr.), a waiting time loss of 19.96 hr. was experienced. This divided by 7.5 (average working time per truck per day) yields a surplus of 3 trucks, so that 21 will be adequate to handle the material without wasted time.

The recommendation, therefore, was to use 21 trucks, all of the same capacity, so as not to break the uniformity and therefore efficiency of production, and to use them continuously, without shifting to other hauling purposes, for the same reasons.

#### Actual production follows proposed

The allowable time specified for the accomplishment of the present construction is 450 calendar days. During the first 75 calendar days (in 1948), 22% of the job was finished. A period running from the end of December, 1948, to the beginning of March, 1949, was assumed as a shut-down period, because of the winter months.



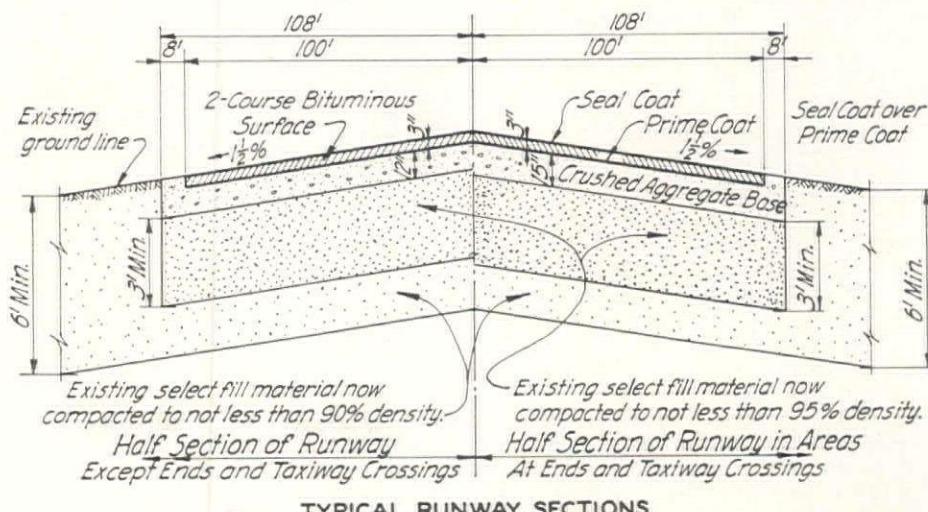
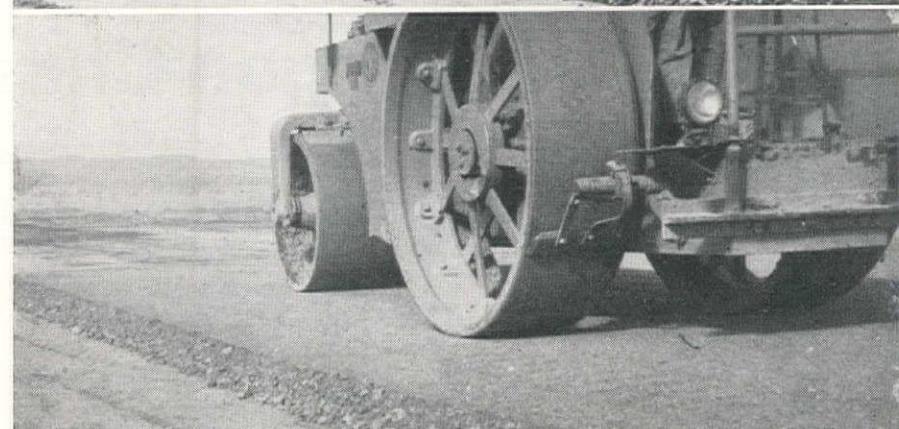
According to the proposed schedule, the whole job under the present contract will be completed at the end of October of this year. Throughout the construction to date, the actual production curve has followed the proposed one very closely, as can be seen from the accompanying sketch.

#### Organization

O. H. Tucker has been the project manager for Morrison-Knudsen Co., Inc. since January, 1949, when he took over from John L. Gregg, who was transferred to a project in Canada, and G. Haensel is superintendent.

The airport development was designed by the Public Utilities Commission of the City of San Francisco, A. O. Olson, chief engineer. B. M. Doolin is manager of the Airport Department for the city, and A. J. Wehner is the construction engineer on the project.

NOTE: Pictures of key personnel on the airport job are included on page 104, this issue.





*Completion Time One-third of Contract Time on—*

## **Hazardous Oregon Channel Dredging**

**W**ITH A CONTRACT TIME of 3½ years, the San Francisco Bridge Co. and Standard Dredging Corp., acting as joint-venturers, completed in less than one year the removal of 920,500 cu. yd. of rock and overburden to a depth of at least 30 ft. below mean lower water in certain areas of the Coos Bay Channel near Marshfield, Oregon. Near Guano Rock at mile one of the channel and along reefs up the channel from mile two to four and a half, the dredging was a ticklish proposition and conditions were hazardous, but the two firms pooled their stock equipment and know-how to complete the \$2,198,950 job in the record time.

### **Equipment in constant danger**

Conditions of the job promised to make it a tough one. Guano Rock lies between the north and south jetties at Coos Bay, and is about 1,000 yd. in from the outer ends of the jetties. The area dredged near Guano Rock was 300 ft. wide and 900 ft. long. Highest spot in the area was -17 ft., and average for the entire area was about -26 ft. Majority of the material to be dredged was in the south half of the channel and consisted of a medium hard standstone with 135 to 140 lb. per cu. ft. dry weight that had slipped from the south toe to almost the center of the north half of the channel.

**Using some non-conventional equipment, two firms pooled their stock of know-how to dredge Oregon's Coos Bay channel in record time despite strong swells and bad weather**



By

**KNOX BORDEN**

General  
Superintendent  
San Francisco Bridge  
Co. and Standard  
Dredging Corp.  
Coos Bay, Ore.

Tides in this area ran to extremes of 11 ft. and the current attained a velocity of 6½ knots. Ground swells and south to southwest storms brought swells of considerable height between the jetties directly over the dredging site, so that equipment was in constant danger. Bid price for the dredging at Guano Rock was \$20 per cu. yd. down to 30 ft. and \$30 per cu. yd. for overdepth of 32 ft.

The lower channel areas were situated around a turn from the Guano Rock area and were protected from the open sea

by a long sandpit. Moderate swells worked in from the channel mouth to the lower end of this area, and a southeast and south wind caused short heavy swells to build up in the channel. The current in this area was very strong, enough so that at times a dredge could not swing against it. Material at this location was not uniform, but consisted of hard sandstone in ledges with boulders imbedded in it or with streaks of very tough clay. Here, the sand overburden was about 2 ft. thick and the rock averaged about 5 ft. below that for the greater part of the channel. Bid price for this dredging was \$1.90 per cu. yd. for all material, including any overdepth from 30 to 31 ft.

The Standard Dredging Corp. sent their steam clamshell dredge *Alabama* up from San Francisco to do the work on Guano Rock. The San Francisco Bridge Co. furnished the hydraulic electric dredge *S. G. Hindes*, to do the lower channel work.

The actual dredging on Guano Rock

was difficult. The weather unpredictable and the tides meeting the ground swells in this area made it almost impossible to hold the dump barge alongside the dredge. Also, the strong currents along with the swells made it necessary to have special moorings and additional equipment on the deck of the dredge.

#### Dredge not quite conventional

The *Alabama* is a steam clamshell dredge with an 85-ft. power-controlled boom. The hull is 65 by 140 ft., 9-ft. draft and a gross tonnage of 737 tons. The bucket used was a Stockton power arm, weighing 17 tons empty, with special extra-long teeth. The dredge has the conventional four anchors with 1 1/4-in. wire but two big towing engines were mounted on the deck also. These engines had 1,600 ft. of 1 1/2-in. wire spooled on each, and they took care of the bow and stern anchors. These two anchors weighed 7 tons each and the rest weighed 5 tons each. All the anchors, except the starboard brest which went under the dump barge, had one to two shots of 2 1/2-in. anchor chain on them. To the ends of the chain was fastened a large crown buoy with a very large pelican, or trip, hook. These hooks were invaluable, since without them, it would have been impossible to cut the get-away time down to a minimum. In heavy weather another small tug was needed to trip the hooks but they paid for themselves many times over. A third small towing winch was mounted on the deck to add to the regular barge holding equipment, along with two extra heavy spring tackles. Log fenders were hung on the working side of the dredge and the largest and heaviest carryall tires were fastened over them. This made a good fender and eliminated most of the pounding from the dump barge.

Due to the hazardous nature of the work it was necessary to have the 450-hp. Diesel tug *Oswell Foss*, tend the dredge at all times for the safety of the dredge and for towing the dump barges to sea for disposal.

The dredge started work on June 6, 1948 and completed the job on Novem-



THE JOB "MASTER MINDS." Left to right: MARK LUND, office manager; HERMAN ROSSEBO, Captain of the S. G. Hines; KNOX BORDEN, General Superintendent of operations; FRANK PETERSON, Captain of the Alabama, and FRANK LAMPSON, Chief Engineer on the S. G. Hines.

ber 13, 1948, completing a job in one summer that was estimated to take two. The estimated quantity of rock to be removed was 25,000 cu. yd., including the overdepth material from -30 to -32 feet.

#### Blasting under the sea

It was evident soon after the job started that little progress would be made without a good deal of blasting. There was little loose material on the rock itself, although quite a little could be picked up around the edges, so blasting operations were started as soon as possible.

The method of blasting is one that has been used by the Hawaiian Dredging Co. Ltd., of Honolulu, for a number of years and by the Construction Battalions in the South Pacific during the war, and is generally called "bulldozing." The idea is to get a grid of powder charges laid out over an area of the channel floor in a uniform manner and then to detonate the charge at one time. The size of the grid and the amount of powder per square is limited only by the area to be blasted, the material to be

THE TEETH of the project. Left, the cutter used on the S. G. Hines was a solid casting, 6-arm reverse helix with 6 pick-point teeth to the arm. Right, the 5-cu. yd. Stockton power-arm bucket on the Alabama with its special extra-long teeth. Hard rock resulted in a lot of tooth-pulling.

shot, and the proximity of habitations.

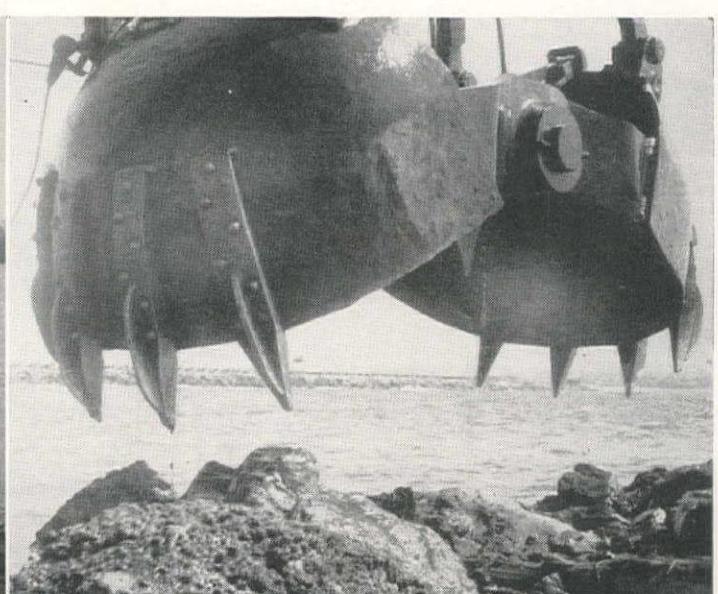
The area to be shot depends upon the contour of the floor and the amount of work the dredge can do from a single setting of the anchors as it is the best policy to move the rig out of the area when blasting. If the rig is about 600 ft. away the blasts will not hurt it, but one freak blast, for which there is no good explanation, went off right beside it. Although this never happened again, it is safer to have the rig out.

The size of the squares, or rectangles, of the grid and the amount of powder depend upon the material and these factors can be determined only by trial and error or previous experience. A rectangle 5 by 6 ft. with 33 lb. of powder at each corner was used on this job, and about 2-ft. penetration was obtained. The blasted material, or sand overburden, must be removed before the charge is laid or the effect of the blast will be nullified.

The largest single blast on this job was 8 tons and while the nearest habitations were only a mile away, no damage was ever reported.

#### Powder chuted overboard

The mechanics of the bulldoze blasting are rather simple. A powder that will detonate by propagation and a suitable barge for laying the charges are the requirements.



The powder used on this job was DuPont's "Hi Velocity" gelatin, 60%, 5 x 16, special density for underwater work. This powder, or a similar 60%, will propagate under 4 ft. or more of water if the charges are within 20 ft. of each other.

The laying barge must be one that will tow well or propel easily if an outboard is used for power, as was done on this job. It must lie rather low in the water and have a deck of surfaced lumber to lay the charges on. Chutes must be built at the proper intervals along the laying edge to let the charges enter the water smoothly and rapidly.

On this job, the only available barge was a steel one, 36 by 45 ft., with about a one-foot freeboard. A second deck of 3 by 12-in. surfaced lumber was built about a foot above it with a drop across it of about 6 in. to the laying edge. At the laying edge, or lip, seven chutes were constructed so the charges would enter the water as soon as possible after leaving the deck. The outer chutes were turned so that the charges would drop over the side of the barge while the remaining chutes dropped them straight off the end. A "Harbor Master," 255-hp., GM Diesel was mounted on the bow, thus giving excellent control for laying the powder close to the desired ranges and lines.

#### Laying the lethal eggs

The charges were made up on another barge and consisted of two sticks of 5 x 16 powder tied tightly together with single-strand tying twine. Five men in an eight hour day could make up ten to fifteen tons of charges. The charges were put on the laying barge and each was tied to a light line, two-strand tying twine or nine-thread line, at 5-ft. intervals. The total length of each line of charges depends on the area to be covered. The longest line on this job was about 500 ft. The charges were carefully stowed in a straight line with the chutes and the first charge was right at the lip ready to drop. There was a man at each chute to start the laying at the signal and also to see that the charges did not get fouled.

The actual laying of the powder took only a short time and, with good head and side ranges, the foreman signalled

the drop to hit the spot every time. Plenty of speed on the course was essential and it was found best to lay the charges into the current. This tended to string them out better and to get a more uniform grid. With such heavy charges it was not necessary to anchor the first charge. On this job, the total amount of powder per blast varied from 3½ to 8 tons, depending upon the area to be covered.

#### Run, and then shoot!

To set off the blast, a small boat was used with a reel of water-proof two-strand wire mounted on its deck. The reel held about 1,000 ft. of wire. A 50-lb. charge with two No. 6 electric caps in it was tied to one end of the wire and the cap wire taped to the conductors. The small boat cruised over one end of the grid and the capped charge was dropped into it. The boat then cruised up wind from the area until about 600 or 700 ft. of wire was let out. Then the plunger detonator was wired on and the charge set off. The one capped charge set off the whole system.

Several grids could have been laid down before a charge was fired, but care would have had to be exercised to see that all craft were clear of the areas. Grids several hundred feet away have been known to detonate. At Guam during the war, there was over 1,300 ft. between two grids. When one was shot the second one went also. It is well to shoot the grid as soon as possible as currents might work the charges out of place, although the powder can stay down at least seventy-two hours without too much danger of it not detonating.

The Corps of Engineers devised a good system of side ranges on the south jetty and head ranges up the channel. They also made up a curve chart that made it possible to locate the dredge bucket to the nearest foot by sextant shots on points on the jetties. This made possible very rapid plotting of the dredge location as well as locating the sounding tug *Kalama*. The tug made all the before

**THE JOB** apparently called for a dipper dredge, but the 24-in. hydraulic electric dredge, the *S. G. Hindes*, belonging to San Francisco Bridge Co., was handed the assignment. The dredge's cutter used 6,150 teeth but completed the job in a hurry.

and after dredging soundings, as well as some progress soundings, using a fathometer that recorded the actual depths along its course.

The Pigeon Reef and lower channel dredging was a different story. The job was originally laid out to be done by drilling and blasting with material to be removed by clamshell or dipper dredge. Officials of the two companies felt that the 24-in. hydraulic electric dredge, *S. G. Hindes*, could do the job, and bid accordingly. The dredge started work July 8, 1948 and completed the original contract February 4, 1949 so their hopes were well founded. The whole job, including some additions, was completed in about seven and a half months and the contract time was about three and a half years.

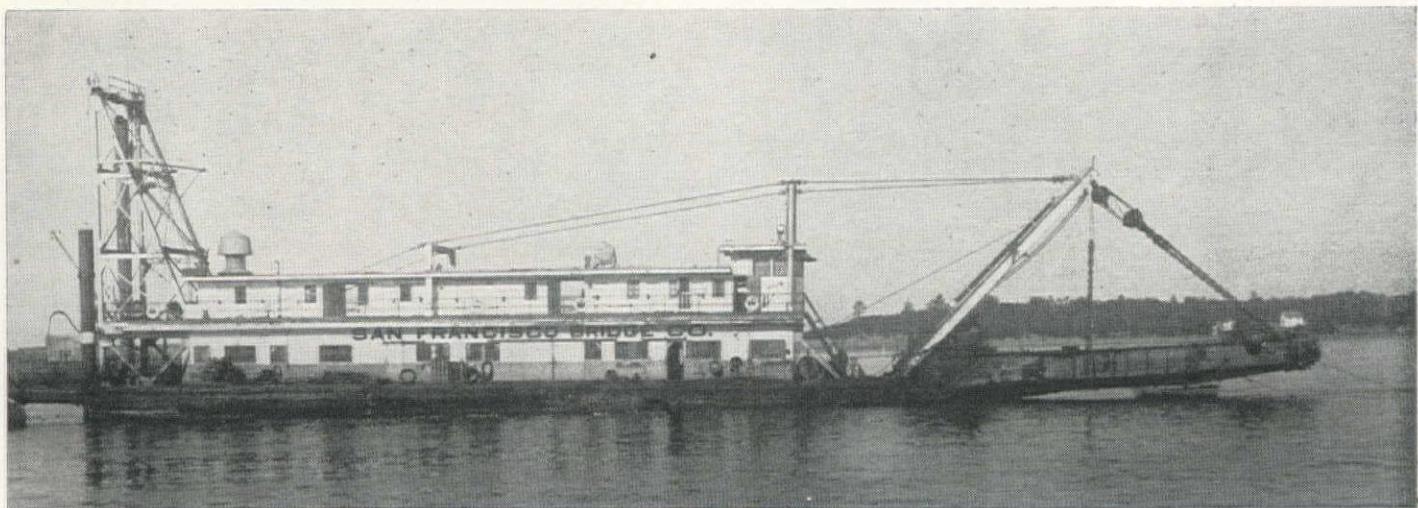
#### Teeth changed often

The estimated quantity overburden to be removed was 550,000 cu. yd., and the amount of rock was estimated to be 370,500 cu. yd., including the overdepth to a -31 feet. About a third of this rock was a shale that weighed about 150 lb. per cu. ft. dry weight, and the remainder was a hard, crystalline sandstone that weighed as much as 158 lb. The greater portion of the harder rock had extremely hard boulders imbedded in it, with now and then a streak of very tough clay. These boulders caused a lot of tooth breakage, and the hard rock wore the teeth down very rapidly. The cutter used was a solid casting, six-arm reverse helix, with six pick point teeth to the arm.

The top record for teeth used on one day was ninety, with an average of about one set in sixteen to twenty hours. Several different types of hardfacing and tempering were tried, but with the constant battering against the boulders and the high abrasive quality of the stone, there was not much that could be done but just change teeth as often as required. About 6,150 teeth were used on the whole job, counting the redrawn and repointed ones. Although the digging was very rough, the cutter required as much as 1,500-hp. at times.

The swells and strong winds bothered the work to some extent. Several storms brought winds up to 70 m.p.h., and it was difficult to keep the pipeline together.

Concluded on page 126





## Strength and Beauty From the Woods

**Strong and durable framing with glued laminated timber is the latest answer to economical utilization of one of the West's greatest natural resources—In No. 1 of two articles, an expert tells of its manifold applications**

THE MODERN answer to the need for strong and durable timber framing is glued laminated construction. Here are combined high quality materials, good workmanship and high technical skills. Now we may have curved wood members with the strength of the arch and the beauty of the rainbow.

Glulam\* timbers may be zoned so that varying stress grades conform to various stress areas in the piece and be curved and tapered to follow changing actions or to better suit requirements of beauty and arrangement. Zoning is handled by lamination for best arrangement and selection of grades. Being shop-grown,

By  
**VERNE KETCHUM**  
Chief Engineer  
Timber Structures, Inc.  
Portland, Ore.



they can be to large sizes and to long lengths. As they grow seasoned, they are dry when assembled and erected into

service and so do not check or split.

Left exposed in places of worship or in recreation shelters, they lend a warmth and soft grace that cannot be matched in steel or stone. They are stronger size-for-size, smaller strength-for-strength, but today are more expensive load-for-load than sawn timbers.

### As girders: adaptability

In the over-all picture, where glulam usage permits omission of ceilings, coverings, decorations, and boxings, a final net saving may emerge and also a finer appearance may result than where construction is used that must be kept under wraps. Glulam timbers are easy to assemble and erect and require the very minimum of hardware and ironwork. Glulam timbers have many advantages but in the words of the Forest Products Laboratory, "No disadvantages."

Glulam timbers make fine long-span and heavy-load girders. Planed smooth and left exposed, they greatly enhance the niche they occupy. They may be

\* Glulam must have correct terms to describe its features and the following are being used by the industry:

(1) **Laminated**—A laminated timber using mechanical fastenings to hold laminations together.

(2) **Glued laminated**—A laminated timber using glue to bond laminations together.

(3) **Glulam**—Abbreviation of glued laminated. This term is now extensively used in the industry.

(4) **Sawn**—Timber in one piece and not

laminated nor glued laminated.

(5) **Timber**—Wood piece before fabrication.

(6) **Member**—Wood piece after fabrication.

(7) **Zone**—Division in depth of glulam timber. Zone must be one full or several full laminations in depth.

In solid timber construction these are one-leaf, two-leaf, three-leaf and multileaf types where members are either one sawn timber or two or more sawn timbers separated by air spaces. They are different from

solid packed laminated or glued laminated members. Each leaf may, however, be a sawn, laminated or glulam timber.

The terms fabricating, fabricator, laminating, laminator, lamination, have self-evident meaning. The following abbreviations will be used:

**FPL**—Forest Products Laboratory.

**TSI**—Timber Structures, Inc.

**NDS**—National Design Specifications.

**PSF**—Pounds Per Square Foot.

**PLF**—Load Per Lineal Foot.

curved, cambered, or tapered to improve appearance, to conform to stress pattern, or to satisfy desired clearances. With moderate vertical curvature they transfer no horizontal thrust to supports if designed to full section modulus (as for a straight horizontal girder).

Glulam girders spaced at 4-ft. centers or wider, left exposed and covered over with plank or laminated decking, make a strong and neat appearing framework. Made to varying depth with the top face sloping up to a ridge at the center and with a curving bottom face, they make fine long-span roof girders. Top slopes provide drainage while the bottom curve adds to appearance and to clearance. The deep center section and shallow ends conform closely to moment pattern and so are economical.

The table below gives comparison of glulam and sawn girders of identical species and grade. Depth of glulam girders should not exceed four times their width without special bracing being installed. Also note that lumber in the center of depth of a glulam girder can be to lower grade with no change in strength.

#### As columns: bonuses

Glulam timbers with their fine appearance and small size make excellent posts and columns. Such members come closer to the eye of the beholder than other parts of a structural frame. Therefore, good or bad wood surfaces are here more noticeable and more important.

In column action (compression with grain), knot dispersion and increased strength for dryness combine to give the greatest bonus for glulam of any type of member. The table below gives comparison of glulam and sawn timbers of identical species and grade. When used as columns, zone grade variation has no merit in columns or in any compression with a grain stressed member.

#### As a truss: curved strength

The bowstring truss used so exten-

Load PLF Size-for-Size				Size Strength-for-Strength			
Girders 20 Feet Long				Girders 20 Feet Long			
Item	Size	Glulam	Sawn	Item	Load PLF	Glulam	Sawn
A.	10" x 12"	670	560	E.	670	10 x 12	10 x 1
B.	10" x 14"	925	770	F.	925	10 x 14	12 x 1
C.	12" x 16"	1480	1230	G.	1480	12 x 16	12 x 1
D.	12" x 18"	1880	1570	H.	1880	12 x 18	12 x 2

#### COLUMN TABLE

Load Values Given in Kips

Load Size-for-Size				Size Strength-for-Strength			
Unsupported Length 16 Feet				Unsupported Length 16 Feet			
Item	Size	Glulam	Sawn	Item	Load	Glulam	Sawn
A.	10" x 10"	108K	88K	E.	108K	10 x 10	10 x 1
B.	12" x 12"	193K	145K	F.	193K	12 x 12	12 x 1
C.	14" x 14"	285K	209K	G.	285K	14 x 14	16 x 1
D.	16" x 16"	387K	281K	H.	387K	16 x 16	18 x 2

sively in timber construction has a curved top chord that is much the best when of glulam construction. Such members are much stiffer and stronger size-for-size than other varieties which use overlapping band sawed segments or laminations with mechanical fastenings. In long span or heavy load bowstring trusses, it is best to glulam both top and bottom chords.

FPL assigns about 38 per cent higher compression with grain working stress for glulam than for sawn timbers. Therefore, upper glulam chords of trusses, like columns, are of superior strength. Also, glulam chords take connectors well, while laminated chords cannot be routed on lamination edges and so connections are restricted to toothed rings or bolts.

Many fine truss jobs have been built with the old style parallel chord, rod and dap, single-leaf arrangement, but with chords of glulam. Here, shrinkage of chords in service is avoided and the major objection to the parallel cord truss is avoided.

It is believed that the American record

for timber bowstring trusses is held by those of the Minneapolis Research Hangar with a span of 232 ft. This framework was designed by the U. S. Navy and detailed and constructed by Timber Structures, Inc.

Many glulam trusses of 160- to 200-ft. span have been constructed and also many thousands of trusses with short and moderate lengths. Spans up to 160 ft. are quite common. In late years there has been a definite trend towards a more extensive use of glulam truss chords.

#### As timberibs: clear sweeps

The light curved glulam timberibs used so extensively as barn rafters make fine wall and roof supports for all manner of moderate size structures such as warehouses, stores, wayside sales offices, theaters, and housing for indoor sports. Of curved roof gothic shape, they are designed as true three-hinged arches and used at rafter spacings of 16- to 48-in. centers. They rise in one clear sweep from floor to ridge and serve as both wall studs and roof rafters. Eave construction is avoided and ribs are so easy to erect that structures rise as if by magic.

To timberibs are added sheathing or wood strips and any one of the many types of roofings popular in the locality where buildings are situated. They best suit buildings with high rise roof contours and widths from 12 to 75 ft.

Glulam timberibs are now laminated by high frequency electric machines in the TSI plant at Portland, Oregon. Bundles of laminations spread with glue are fed into machines where material is curved, put under pressure and passed between electrodes where waterproof glue lines are permanently cured almost in the twinkling of an eye. From the tail end of the machine the curved, planed rafter emerges ready for end trim and shipment.

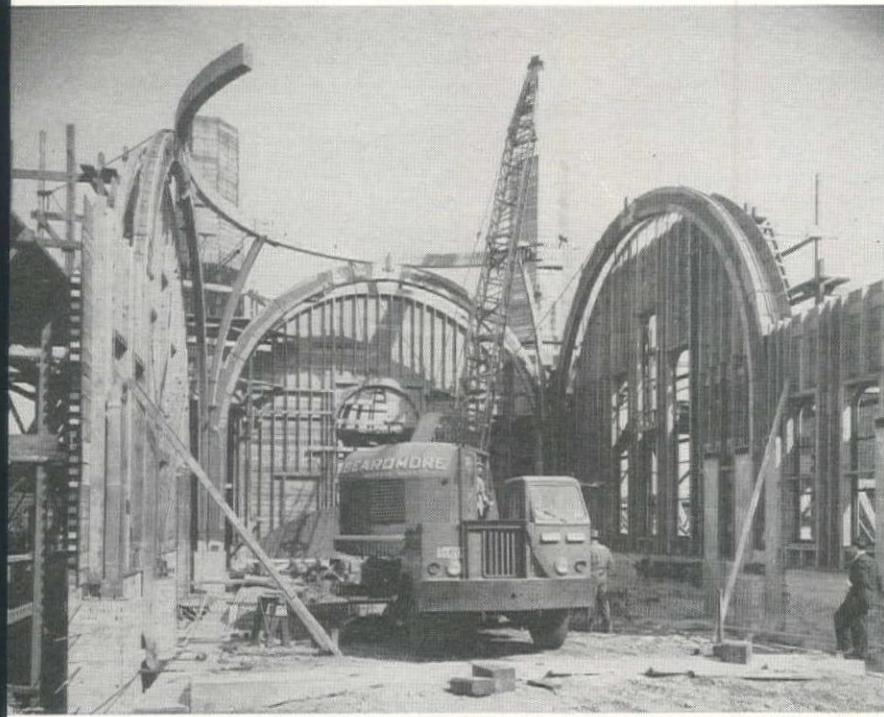
#### As arches: determinate

Two-hinged timber arches serve well for all spans both short and long and serve best for low-rise roofs or bridges. Field splices are often necessary to accommodate transportation or treating facilities. All splices must be designed for moment.

## Timber Literature

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- 103—**Laminating of Structural Wood Products by Gluing**  
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- 104—**Tests of Glued Laminated Wood Beams and Columns and Development of Principles of Design**  
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- 105—**Strength and Design of Glued Laminated Wood Structural Members**  
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- 108—**Are Timber Checks and Splits Serious?**  
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Verne Ketchum (Reprints available from TSI).



UNIQUE DESIGN of the Greek Orthodox Church in Spokane, Wash., was made possible by the use of glued laminated timber for arches, rings and dome base. Frank Toribara, Architect.

Three-hinged arches have the two great advantages of being determinate in engineering analysis and having a natural separation into two halves for easy handling. Hinges are usually square end lightly fastened connections rather than true hinges. Design should be by standard engineering formulas for live and dead loads of wind, snow, and structure, and to shape, span and spacing of arch. High-rise arches are nearly always three-hinged.

Low-rise tied glulam arches are most excellent structural roof supporting members which combine economy, neat appearance, and open effect. They find best use in auditoriums, halls, rinks, gymnasiums and bowling alleys.

Arches may be left exposed, thereby eliminating costly ceilings and coverings. Low position of steel tie rod may handicap some play areas such as basketball, but for other recreational uses the rods are not objectionable.

Clearance may be increased by elevating the center portion of the tie rod above support level. Most economical rise is one-sixth span. Tied arches serve best in 30- to 120-ft. spans and in spacings of 12- to 20-ft. Tied arches are not suitable for concentrated loads nor for the support of ceilings at tie rod level. Tie rods do, however, make fine supports for party decorations and for troughs of fluorescent lighting fixtures.

#### Buttressed arches: room space clear

Buttressed two-hinged arches with glulam arch ribs and concrete buttresses make a fine structural framework for such buildings as halls, bath houses, and sports enclosures. Buttresses are more expensive than tie rods, span-for-span and load-for-load, so buttressed arches cost more than tied arches but interior appearance is greatly enhanced when tie rods are eliminated and room space is

clear from floor to curved roof as well as from wall to wall. Buttresses being cantilevers increase greatly as height becomes greater. They require good foundation soil and locations requiring piling or spread footings would be prohibitive in cost.

Foundation arches which, like a rainbow, arch from ground level to ground level, may fit well some long-span, low-rise arrangements. Clearance is low at the outer ends and often walls are set inward and arch ends left exposed. This type is not too common. Where combination of extensive land area, good soil, room arrangement, and roof con-

tours are adaptable, then foundation arches are excellent, but should any one construction item be unsuitable, then this type is awkward and costly. Horizontal thrust may be carried across the building by steel rods in the floor.

#### Tudor arches: ornamental

Tudor (sometimes termed "boomerang"), glulam three-hinged arches make most excellent timber frames that are high, wide, and handsome. They rise in one sweep from floor to ridge and form a graceful support for side walls and roof slopes.

They are best when planed smooth and left exposed and are most highly suited to moderate spans combined with low- or high-rise roof lines and located in chapels, auditoriums, and in other buildings where both beauty and utility are important. Tudor arches are fairly expensive, but useful and ornamental.

Tudor arches must, due to a large moment at the eave, have a deep heel section. Here, room clearance is at a premium, and the radius of the inside surface curvature must be kept low. Sharp curves require thin laminations and thin laminations take more lumber and increase cost. Designers should allow as great a radius at the heel as clearances permit to the end that arch cost will not become prohibitive. Fabrication shops restrict curvature to following values for various lamination thicknesses in Douglas Fir for Tudor arches:

Lamination Thickness	Minimum Curvature in Inches
1/4"	25
3/16"	36
3/8"	48
1/2"	72
5/8"	92
3/4"	112
1-3/16"	190
1-1/2"	250
1-5/8"	276

#### Timberib Sizes Which Are Standardized for Stock Production

Rafter	Span in Feet	Height	Radius	Length	Cross Section
A	12	7'-0"	7'-4"	10'-0"	1-1/2" x 1-3/4"
B	20	9'-6"	11'-0"	14'-11"	1-1/2" x 3"
C	32	17'-0"	19'-0"	25'-2"	1-9/16" x 4-1/2"
D	36	18'-0"	20'-0"	27'-7"	1-9/16" x 5-1/4"
E	40	20'-0"	22'-0"	30'-9"	1-9/16" x 6"
F	50	25'-0"	28'-0"	38'-3"	1-9/16" x 7-1/8"
G	60	30'-0"	34'-0"	45'-10"	1-9/16" x 8-5/16"

#### These Actual Designs Illustrate the Range of Tudor Arches

Item	Span	Wall Height	Roof Rise	Spac- ing	Wind Load PSF	Roof Load PSF	Base Depth Inches	Haunch Depth Inches	Crown Depth Inches	Width Inches
1	20	4	15	12	15	30	12	18	8	5 1/4
2	25	10	14	12	20	40	9	12	8	5 1/4
3	30	9	16	14	20	22	12	16	10	5 1/4
4	35	10	20	12	20	45	12	16	10	5 1/4
5	40	16	23	13	20	40	12	15	12	7
6	45	19	20	14	20	50	14	26	12	5 1/4
7	50	20	2	16	20	50	40	42	17	11
8	55	18	8	15	20	50	18	27	12	7
9	60	9	9	14	20	50	21	25	12	7
10	65	15	12	16	20	40	14	20	11	7
11	70	24	11	18	20	40	18	30	12	7
12	75	15	10	17	20	50	18	30	12	11
13	80	12	9	8	20	40	20	20	12	9
14	85	24	7	16	20	40	20	33	9	9
15	90	15	12	18	20	50	30	33	11	9

In Tudor arches, as in foundation arches, horizontal thrust may be carried across the building by steel rods in the floor.

#### In water: no adverse effects

During war years, the Government established pilot plants to explore methods of laminating timbers with glue to withstand repeated immersions or long continued soaking in fresh or salt water. Investigations were entirely successful and glues and gluing processes are now available for commercial production of boat and ship parts in Oak, Fir, and Southern Yellow Pine, that will endure under the most severe marine exposure. Now, the ribs, deck beams, and stem-keel-sterndoor assemblies may be of glued laminated wood and again structural timbers may go down to the sea in ships.

Those picturesque windmills in San Francisco that once pumped water for Golden Gate Park and that now stand by for photographers and for emergency use, needed in 1948 a new spar. A glulam member 114 ft. long was fabricated in Portland, Ore., given two applications of hot linseed oil and shipped by rail to the jobsite.

Many large dredge spuds, those legs that anchor dredges to river bottom against the drag of wind and current, have been glulam timbers with waterproof glue lines. Such timbers are up to 30 in. square and 90 ft. long.

Glulam timbers will engage any and all timber fastenings as well or better than sawn timbers. For connectors, bolts, spikes and screws, the high load values allocated to fabricated seasoned and installed seasoned service conditions may be used. Members will not season check along lines of bolt holes, nor will ring routings become out-of-round between fabrication and assembly operations. Opposed-to-grain connections troubles have no being in glulam construction.

Glulam timbers take paint well be-

cause they are already dry when built. Members to be painted should be protected during shipment against moisture and dirt that raise grain and discolor surfaces. Timbers should be given a transparent shop coat of rez or other sealer except when members are to be stained and, for such use, should be wrapped well with heavy paper and left covered until the last possible moment of erection operation.

Glulam timbers, when manufactured for appearance, are actually finished stock like sash and doors, and need care and protection lest appearance be needlessly marred and value reduced.

#### Increasing life expectancy

After erection, any good decorative treatment may be employed, but that treatment is always best which preserves and brings out strongly the natural color and finish of the native wood.

Glulam timbers given fire retardants or preservative salt treatments may be painted but not stained. Those given creosote preservative treatment are difficult to paint and staining is impossible.

Highway departments by long practice have devised ways to apply aluminum paint to creosote preservative timbers. The system is as follows. Use empty cell process to retention of 6 to 8 PCF and then allow installations to stand one year or until surface dries and bleeding stops. If bleeders show up after the first coat, remove the tarry substance with a wire brush and apply a second coat. Of many kinds tried, aluminum paint gives best results.

Glulam timbers used in the dry do not decay nor does the glue line deteriorate, and so long life may be expected. Fire can, however, destroy both the wood and the glue line and, interior glulam construction may, if desired, be given fire retardant treatment. Some good external fire retardant paints are available. Pressure treatments of water-borne, fire-retardant chemicals will injure casein or Urea glue lines, so even interior

timbers should have waterproof glue for such treatment.

Wood of glulam timbers used under wet conditions, either interior or exterior, is subject to decay, and life expectancy will be increased by preservative treatment. Phenol, resorcinol, or Melamine glues in joints are not appreciably affected by cold or hot water oils, or most chemicals that do not damage wood. Tests indicate that timbers using such waterproof glues may be treated with any present day commercial wood-preservative or fire-retardant chemical without injury to glue joint.

Little information is available on the ability of glues to bond lumber that has been treated, although such operation may often be advantageous. Here, too, Casein or Urea glues do not perform well and waterproof glues should be used.

#### Cautions

Water and oil treatments applied to laminations cause surface disturbances, warping, dimension changes, and leave surface deposits that require resurfacing before laminating. Such resurfacing must be light or much of the treatment is removed. Rough lumber is not satisfactory to treat for laminations, so such methods involve two surfacing operations which are a disadvantage. Remember also that redrying operations may be required. Tests do indicate that oil preservatives (such as creosote), if not too heavy on lamination surfaces, will not prevent good bond when waterproof glues are used. Some water-borne preservative and fire-retardant chemicals appear to be compatible with certain glues and adequate bond can be obtained. Some glulam creosote preservative bridges have been constructed in various states. Some test panels of glulam creosote preservative railroad stringers have been installed and are being reported upon for service records. To date, such construction seems entirely successful. It has not been the practice to incise glulam timbers for treatment. Being dry they take treatment without such operation.

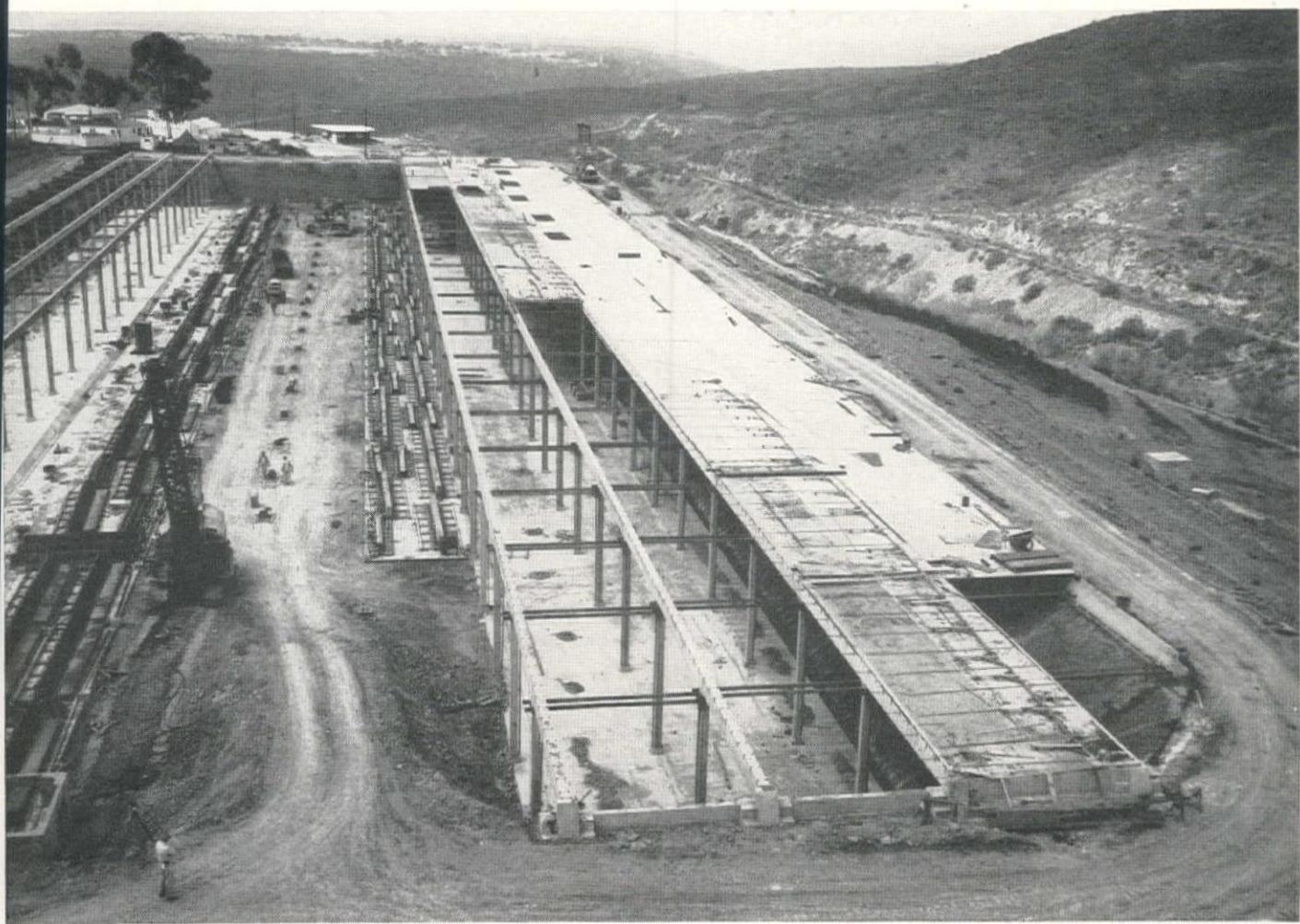
#### Pressure and salt treatments

Creosote pressure treatments have by long experience been proven effective in prolonging life under decay conditions and preventing attack by insects and marine borers. Salt treatments prolong life under decay conditions and prevent attack by insects but have not been proven by experience to be effective protection against marine borers. Creosote and modern salt treatments withstand leaching actions in exposed service conditions or when they are placed in fresh or salt water. Salt treatment surfaces are paintable, while creosote treatments leave a surface which is difficult to paint. The treatment best suited to service conditions encountered should be selected. The laminator, fabricator, or treating company should be consulted for best and latest information.

In specifying treatments, coatings, fabrication, wrapping, inspection and

*Continued on page 120*





## San Diego's New Concrete Reservoir Has— Wafer-thin Roof on Pre-cast Columns

**Placing a concrete roof slab designed only 2 $\frac{1}{4}$  in. thick was the challenge facing the contractor on construction of San Diego's 20,000,000-gal. Alvarado Reservoir**

**D**URING the past eight years, the City of San Diego has been faced with many acute problems in connection with water development, purification and distribution due to the large increase in urban population and the unprecedented demands for water by government agencies and large industrial plants.

In anticipation of the requirement for additional water works facilities, \$6,000,000 bond issue was submitted to and approved by the voters of the city in April, 1945. An additional \$4,500,000 bond issue for similar purposes was approved in November, 1948.

### Elevated tank gets an assist

One of the facilities being financed from bond funds and now under construction is Alvarado Regulating Reservoir, which will provide 20,000,000 gal. of covered, high-level storage to augment that now available at the municipi-

By  
**WILLIAM C. BROWN**  
Resident Engineer  
San Diego Water Department  
San Diego, Calif.



pality's University Heights elevated tank. This reservoir is contiguous to the site of the proposed Alvarado Filtration Plant, and will store the treated water, thereby helping to maintain fairly uniform rates of flow through the plant and the transmission mains supplying it with raw water. Water will be conveyed from the reservoir to distributing points in

the city through a recently constructed 54-in. main.

The Alvarado Reservoir is of the cut-and-fill type and is located on a fairly steep side hill. It is rectangular in plan with one of the long sides entirely in cut, while the opposite side is nearly all in embankment. The floor is 180 ft. by 620 ft., and the roof, 232 ft. by 682 ft. Maximum depth of water will be 20 ft. Outside slopes are 2:1 and inside slopes, 1 $\frac{1}{2}$ :1, except for the long side entirely in cut, where the slope is 1:1.

In June, 1947, a contract was awarded for the main excavation and embankment, and this work was completed in February, 1948, at a total cost of about \$82,000, which figure includes cost of outlet pipe and valves furnished by the city.

The current contract for the reservoir roof and lining was awarded in September, 1948, and includes 111,600 sq. ft. of 4 $\frac{1}{2}$ -in. reinforced concrete floor, 56,300 sq. ft. of 3-in. reinforced gunite on sloping interior walls, 275 pre-cast concrete columns, 286 pre-cast girders, 1,800 lin. ft. of coping wall, 158,000 sq. ft. of reinforced concrete roof slab, and minor items. The bid price based upon estimated quantities is \$260,375.

The roof structure includes both pre-cast and cast-in-place members. The design assumes a live load of 10 lb. per sq. ft. with a concrete strength of 3,000 psi.

Girders are spaced 19.33 ft. apart in rows parallel to the longitudinal axis of the reservoir, and columns are spaced 26.23 ft. apart along the girders. Columns 12 x 12 inches and girders 12 x 25½ inches in cross-section are pre-cast on the reservoir floor in sets sufficient for one longitudinal row. They are erected about eight to ten days after pouring, using a large crawler-type crane.

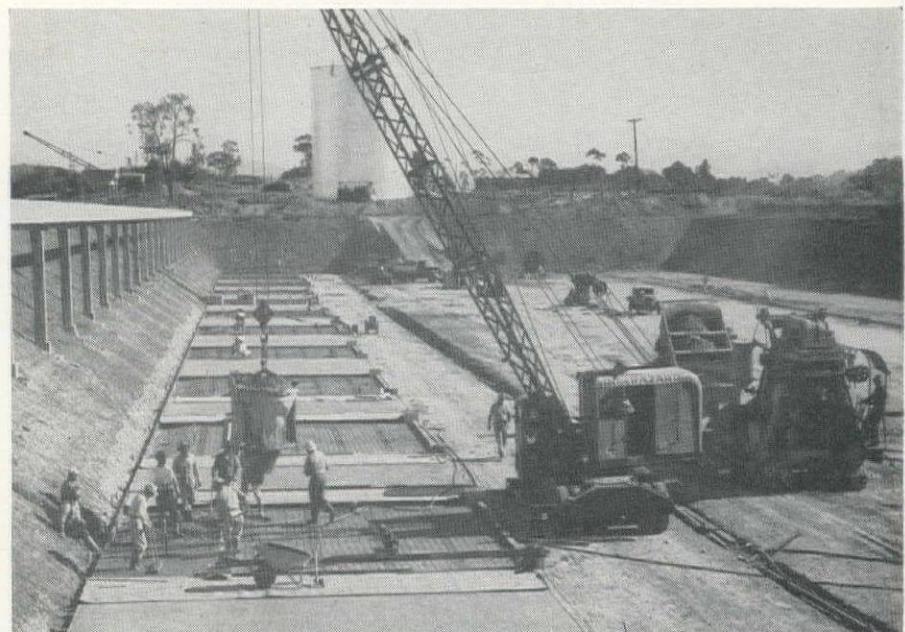
Each column footing is provided with a recess in the top. This recess is filled with grout at the time of placing the column. The top of each column is given a light coat of thin grout just prior to placing the girders.

#### Roof poured in pans

The roof slab, 2½ in. thick and integrally cast joists 31½ in. on centers extending 8 in. below the bottom of the slab, is poured in place using steel pan forms supported by junior I-beams, the ends of which rest upon steel angles bolted to the sides of the concrete girders. In stripping the forms, these angles are removed, permitting dropping the steel pans and supporting I-beams. Forms are stripped seven to ten days after pouring.



ARTHUR VITTUS is superintendent on the Alvarado Reservoir construction for M. H. Golden Construction Co. of San Diego, contractors for the placing of the roof and lining.



PLACING CONCRETE in the 4½-in. thick floor system is accomplished by a mobile crane equipped with a bottom-dump bucket and loading from a portable concrete mixer.

The roof slab is reinforced with 6 x 6-in. No. 6 welded wire mesh. At the time of pouring, the mesh is pulled up to the center of the slab by men using steel hooks. No chairs are used except a few small concrete blocks which support the ¾-in. reinforcing bar in each joist. No stirrups are used in the joists.

The concrete is vibrated by small air-driven high-frequency vibrators, and compacted by means of a roller and an engine-driven vibrating screed. The maximum size aggregate is ¾ in. in slab and joists, and 1½ in. in other parts of the structure.

Concrete in the roof slab is sprayed with curing compound and is then covered with curing blankets. Curing com-

pound alone is used on all other portions of the structure. Paint is not expected to be used on the roof unless future cracking makes it necessary.

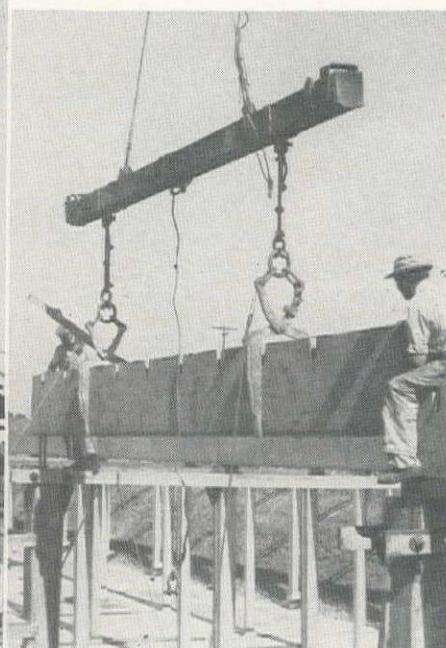
The maximum load permitted on the slab during construction is that due to a man pushing a buggy which is about one-half full of concrete. This load causes no perceptible deflection. No heavy equipment is permitted on the roof.

#### The builders

The excavation and embankment work was performed by Bonadiman-McCain, Inc., Los Angeles. M. H. Golden Construction Co. of San Diego is the contractor for the roof and lining under the present contract. The designs were prepared under the direction of Fred D. Pyle, hydraulic engineer, and Paul Beermann, assistant hydraulic engineer of the San Diego Water Department. G. E. Arnold is Director of the Water Department in charge of all of its activities. Carl R. Rankin is consultant to the department. W. C. Brown is resident engineer in charge of work at the reservoir and filtration plant.



A PRE-CAST COLUMN is lowered into place, left. At right, a girder is guided into position by means of two dowels left projecting from the column tops (visible at left).



#### More Funds Needed for Los Angeles Flood Control Work

TESTIFYING before the House of Representatives' Public Works Committee, M. E. Salsbury, Los Angeles Flood Control District assistant chief engineer, stated that a 4-year authorization of \$75,000,000 in appropriations is needed to assure continuance of the Los Angeles County flood control program. The suggested funds would be ample to complete Whittier Narrows Dam and to finish up all work on the main channel of the Los Angeles River, Tujunga Wash, Compton Creek and the Sawtelle-Westwood Channel, as well as build the Lopez Basin Dam. Construction of the works would be by the Corps of Engineers.

# County Road Upkeep Job Never Ends

**Sandwiching repair of winter-damaged roads between schedules for new construction is a common problem of many county engineers in the West—Here is how Klamath County, Ore., with one-third of its land taxable, operates**

**R**EPAIRING winter damage to roads and highways is now proceeding in full swing in the Oregon counties most affected, but in many cases the water and frost upheaval damage created such a big job that county engineers are still scratching their heads in wonderment. The County Engineer of Klamath County, Ore., Wally M. Hector, now has his crews going strong during the good weather of the construction and maintenance season. There is an abundance of patching, drainage ditch, and seal coat work to keep his 60-man crew well occupied in repairing the Klamath County road system, to mention nothing of the season's new construction program.

## Repairing winter-damaged roads

An unusual feature of last winter's damage was the complete disintegration of the wearing course on one of the county roads about 4 mi. southeast of Klamath Falls, the county seat. Here, the road survived four winters until the last one, when the top layer of  $\frac{1}{2}$ -in. to  $\frac{1}{4}$ -in. rock spalled off completely, and with it went about half of the  $\frac{3}{4}$ -in. rock layer below, leaving exposed the bottom layer of  $1\frac{1}{2}$ -in. rock. This disintegration occurred over practically the entire surface for a one-half mile section of road and happened without any apparent controlling factors such as bad drainage, cracking of pavement, or sub-base failure.

Specifications for this particular section of road call for the road crews to: 1—Spread  $1\frac{1}{2}$ -in. to  $\frac{3}{4}$ -in. rock at the rate of 8.0 cu. yd. per station. 2—Shoot with 0.5 gal. per sq. yd. of SC-6. 3—Cover with  $\frac{3}{4}$ -in. to  $\frac{1}{2}$ -in. at the rate of 4.8 cu. yd. per station. 4—Shoot with 0.35 gal. per sq. yd. of SC-6. 5—Cover with  $\frac{1}{2}$ -in. to  $\frac{1}{4}$ -in. rock at the rate of 2.7 cu. yd. per station. 6—Shoot with 0.25 gal. per sq. yd. of RC-3. 7—Cover with  $\frac{1}{2}$ -in. to  $\frac{1}{4}$ -in. rock at the rate of 2.7 cu. yd. per station.

The final lift of  $\frac{1}{2}$ -in. to  $\frac{1}{4}$ -in. rock has been found to seal the oil mat satisfactorily and give a rougher wearing course than that produced by  $\frac{1}{4}$ -in. minus or concrete sand. A rough surface is highly desirable for traffic driving over icy roads or roads made slippery by light rains that merely loosen road films instead of washing dirt away.

## Hand-patching and long hauls

As early as the weather would permit this year the road department began to hand-patch the most badly broken sections of oil mat roads and gravel roads in the county. This hand patching is

now completed, and the next step is to resurface all these damaged roads. This is where the problems arise, as there are some 20 mi. of resurfacing to be done, scattered all over the county. The lack of suitable rock quarries and gravel pits can become a great handicap, forcing hauls over long distances in order to surface roads. With a county as large as Klamath, it is common to haul rock 20 mi., and often as far as 40 mi. At present the county's portable rock crushing plant, consisting of 1 jaw- and two cone-crushers, is dismantled and being moved to a new location to aid in the repair of heavily-used roads in the suburban residential area southeast of Klamath Falls.

## Experience dictates repair specifications

Much of the new surfacing of the roads will be done using Oregon State Highway specification "B-11," which costs, according to County Engineer Hector, about \$6,500 per mile including a 15-mi. haul for rock. Specification "B-11" calls for the crews to lay on the subgrade: 1—A lift of base rock 3-in. to  $1\frac{1}{2}$ -in. at the rate of 20 cu. yd. per station. 2—Shoot SC-6 at the rate of 0.75 gal. per sq. yd. 3—Cover with  $1\frac{1}{2}$ -in. to  $\frac{3}{4}$ -in. rock at the rate of 9.4 cu. yd. per station. 4—Shoot with 0.5 gal. per sq. yd. of SC-6. 5—Cover with  $\frac{3}{4}$ -in. to  $\frac{1}{2}$ -in. rock at the rate of 5 cu. yd. per station. 6—Shoot with 0.35 gal. per sq. yd. of SC-6. 7—Cover with  $\frac{1}{2}$ -in. to  $\frac{1}{4}$ -in. rock at the rate of 2.7 cu. yd. per station. 8—Seal coat, shoot RG-3 at rate of 0.25 gal. per sq. yd. 9—Cover with  $\frac{1}{2}$ -in. to

$\frac{1}{4}$ -in. rock at the rate of 2.7 cu. yd. per station. Roads built to this specification were tested and found to give the best service on many miles of Klamath County roads, and roads of this type stood up very well during the last winter.

## The county and its road problems

Klamath County ranks fourth largest in Oregon, and has an area of 6,151 sq. mi. It is approximately rectangular in shape, reaching 110 mi. north and south and 72 mi. east and west at the widest part. Conservative estimates place the population at 50,000. The county has the Klamath Indian Reservation, about 40 mi. by 50 mi., three National Forests, and Crater Lake National Park within its boundaries. These, along with other Government-owned lands, leave approximately 31% of the total area of the county as taxable farm and timber lands, and a large part of this remaining land consists of rocky hillsides and other undeveloped areas. The county therefore has a very limited budget from taxes on an assessed valuation of \$39,289,000 and this is reflected in the funds available for road work.

The roads in Klamath County are constructed and maintained by the county's road department, working under the County Court—the real "Boss." At the present time, and for the past few years, the county employed about 60 men, in-

**WALLY M. HECTOR,**  
Klamath County Engineer, besides his many other duties, takes time to serve as President of the Oregon County Engineers Association.



ONE OF 300 bridges requiring maintenance by the 10-man bridge crew of the Klamath County road department, below. Most of the bridges are of timber, a few being of steel.



cluding a 10-man bridge crew. It maintains its own shops and has enough equipment so that it doesn't have to rent any heavy pieces. All of the work, new construction, oiling, and maintenance, is performed by county crews as day work, and no contracts are let.

There are approximately 3,000 mi. of roads in the county, although of these there are only 750 mi. of lawfully established county roads. The Klamath Forest Protective Association maintains about 1,000 mi. of roads that are of great importance to the timber industry for fire protection. The Indian Service has a large road department that maintains about 500 mi. of road. Many of the roads maintained by the Klamath Forest Association would, and perhaps should be, an obligation of the county road department, provided that there were sufficient funds available to do the job. Many of these roads are not only serving the needs for forest fire protection, but serve as farm-to-market roads in certain sections of the county and are used to great advantage by the public at large. Excluding State Highways and Forest Service roads, there are 2,290 mi. of roads in the county that are in the nature of county roads, of which 750 are lawfully established county roads. In addition, there are about 65 mi. of subdivision roads—roads from "no man's land"—that are under maintenance by no governmental agency, and which will in time probably become an obligation of the Klamath County Road Department.

#### Serving the grassroots

The county road system performs an important and wide service. It is the lifeline of the farmer, and serves equally well the county school system. Even if the farmer closes up when the snows

**KLAMATH COUNTY EQUIPMENT**

One D-8, two D-7 and one D-2 Caterpillar tractors.  
Three LP LeTourneau Carryalls.  
One LeTourneau rooter.  
Six motor graders (2 Austin-Western, 3 #12 Caterpillars, 1 Adams).  
Two Link-Belt Speeders with  $\frac{3}{4}$ -yd. buckets.  
One International Front End Loader on 4-wheel tractor.  
One Case tractor with weed mower and post hole digger attachments.  
Two 10-ton, 3-wheel rollers (Hercules and Austin-Western).  
One 1,250-gal. Etnyre Distributor and two 1,000-gal. insulated transport tanks.  
One Cleaver-Brooks 2-tank car heater.  
One Cleaver-Brooks Retort (called "booster").  
Snow Equipment: 4-wheel drive Walters truck (with low-bed trailer for hauling equipment) equipped with V-plow; also V-plows for motor graders, and push plows for trucks.  
One portable rock crushing plant, 1 jaw- and 2 cone-crushers.  
Two air compressors, 210 and 105 cfm., one wagon drill, jack hammers.  
Trucks: 5-cu. yd. dumps: 6 Dodges, 3 Whites, 3 Internationals, 2 Macks, 10 Fords; 4 flatbeds, 10 pickups.

fall, the schools must be kept going, and for this purpose Klamath County spends some \$30,000 during a hard winter. When spring comes and all the snow removal money has been added up, there is nothing to show for these dollars.

County roads also serve as feeder roads to the State Highway systems,

and a very large percentage of State Highway traffic begins or ends on the county road system. Of particular interest to Klamath County and to many Oregon counties are the heavily traveled county roads serving the logging and lumber mill industry. Many of the outlying county roads serve the logging industry to such an extent that it would be prohibitive to log these areas without the use of these roads. This means a great deal of added expense since roadbeds and bridges must be built to much higher standards than would usually be necessary.

#### Bridge upkeep never ends

Klamath County maintains some 300 bridges on its road system, and these are being rebuilt and relocated continuously. The greatest number of these bridges are of wooden deck or timber truss design, and their maintenance keeps the county's 10-man bridge crew working constantly. Although many of these wooden bridges are very small, crossing only the numerous irrigation ditches in the county, some are steel truss bridges, crossing the Lost River, and both types will have to be replaced in the near future, since they are too narrow and not adequate for the standards of present day traffic.

During the past year the people of Klamath County, and Oregon in general, have become road conscious due to the thorough and commendable study of the Highway Interim Committee as set up by the Oregon State Legislature. After many months of hard and diligent work by this committee, their report shows, more than anything else, the need for more attention and funds for the road and highway system. In the May primary election of 1948 the voters

Concluded on page 128

## Two-inch Pier Separation Means Knotty Problems on—

# "Two-for-One" Bridge at Long Beach

**Building a bridge in mirror-image halves calls for unusual form work and piling installation**

**A**\$1,500,000 STRUCTURE, now being erected at Long Beach, Calif., has been dubbed a "two-for-one bridge" because it comprises two lengthwise halves which will be separated from top to bottom by a space interval of about 2 in. when construction work is complete.

It is a County of Los Angeles project, and will be officially known as the Belhart Street Bridge when it is ready for freeway traffic early in 1950. Its 1,100-ft. length and 100-ft. width will span the Los Angeles River at a maximum height of 48 ft. over the river bed at a point which is now a short distance north of the Long Beach flood control area.

Current construction work is being handled in accordance with terms of a contract awarded to Guy F. Atkinson

By  
THOMAS A.  
DICKINSON  
Los Angeles, Calif.



Company. Raymond Concrete Pile Co. is serving as a subcontractor in the preparation of 1,528 pilings for the basic bridge structure, and Graham Brothers Co. is providing mixed-in-transit concrete for all phases of the project at a pouring rate of about 30 cu. yd. per hour.

Aside from the fact that it is being constructed as two separate halves, the Belhart Street Bridge is unusual because its 16 piers (including four abutments) will be situated at an odd angle to its superstructure. This arrangement was necessary in order to align the "floating" concrete piers with the flow of current in the Los Angeles River during the rainy season without altering the path of the freeway which will eventually provide traffic for the bridge.

Angular piers in turn prompted the engineering decision to design the bridge as two mirror-image halves in order to relieve operational stresses due to unequal increments of expansion or contraction, and to increase the capacity.

#### Two inches mean knotty problems

Unusual structural features have provided some knotty problems for Atkinson superintendent Bob Boyd and Raymond superintendent Carl Johnson, but



HIS 100-FT. TALL Raymond Universal Pile river is being used to place the step-taper, cast-in-place piles, about 95% being battered.

At this writing the two veteran construction men have been remarkably successful in finding the right answers.

For example, in order to maintain a 2-in. distance between adjacent pier halves, they have worked out a system of preparing concrete pouring forms which have the following features:

(1) Prefabricated plywood segments which can be rapidly assembled by carpenter personnel to provide all but adjacent ends of the forms.

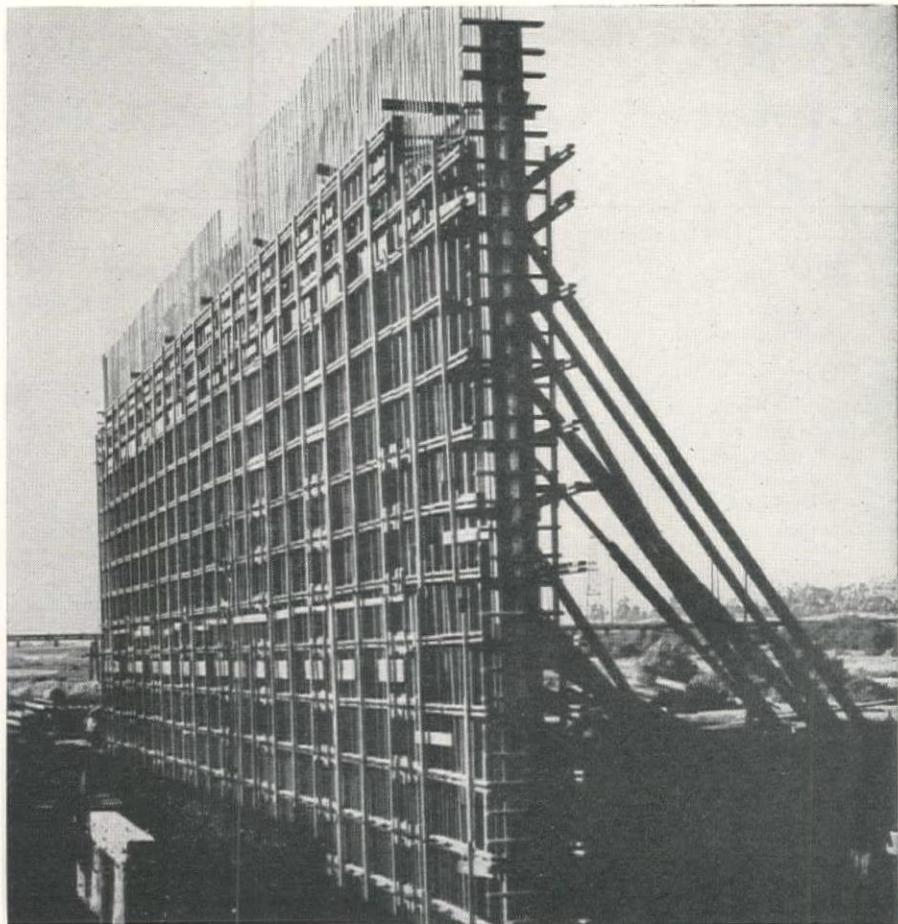
(2) Thin steel plates which are used at adjacent ends of the forms. These plates are held in place with removable steel bars or pins, so that they can be readily separated from the plywood form assemblies after the concrete has had about three days' setting time.

(3) An arrangement of turnbuckles, which unite sides and ends of the forms so that the latter can be braced from one side only. This causes the forms to be more accessible for pouring operations.

#### Piles built up from the depths

About 95 per cent of the piling being provided by the Raymond organization are batter piles. This is a rather high percentage in terms of current bridge building standards, but should be extremely advantageous in increasing structural strength and in minimizing the danger of damage due to earthquakes.

All piles are of the step-taper, cast-

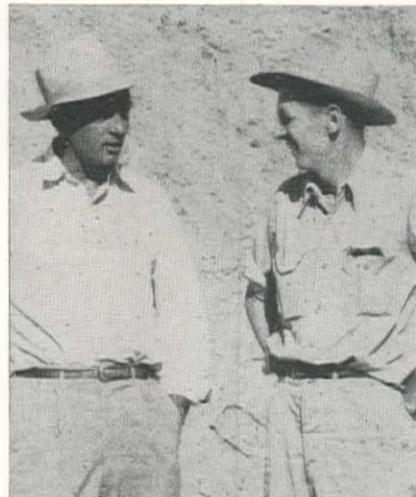


FOR MAINTAINING the 2-in. separation between the bridge's adjacent pier halves, forms are assembled with an unusual arrangement of turnbuckles so that bracing is required on one side only. The forms are made up of prefabricated plywood segments and thin steel plates.

in-place type exclusively developed by Raymond engineers. This design is said to be especially useful in bridge building, because it enables workmen to build up pilings from considerable depths by adding on sections without a loss of bearing.

Falsework piles are being driven by a portion of the Atkinson crew of 55 men with a steam rig. The Raymond crew of 20 men drives permanent piles to depths averaging 55 ft. by means of a 100-ft. tall Universal pile driver, which

CARL JOHNSON of Raymond Concrete Pile Co., left, and BOB BOYD of Guy F. Atkinson Co. are superintending construction of bridge.



is one of the largest machines of its type in the world today.

Footings for the reinforced concrete bridge structure are being cast for an individual thickness of four feet, and short dowels are embedded therein to maintain the alignment of piers cast thereon.

#### The equipment squadron

Necessary digging, leveling, and clearing of the river bed is being accomplished with a squadron of three Caterpillar D-8 bulldozers. One LeTourneau Carryall with 12-cu. yd. capacity is used to carry dirt.

Except for steel-setting, which is done with a Caterpillar tractor and a 40-ft. boom, framework is handled by one Bucyrus-Erie and one Northwest machine.

Average composition of each pier includes 350 cu. yd. of concrete and 25 tons of steel reinforcement, and the largest pier that has been completed at this writing is 40 ft. high and 130 ft. in length.

Prefabricated plywood form sections and related wood falsework elements are being made from stock materials by a crew of Atkinson carpenters under the supervision of Ray McLellen and Paul Paulson.

A number of piers have not been constructed, and only a small portion of the bridge's superstructure falsework has been erected, as this article goes to press.

# Small Sewage Treatment Plant Combines Units and Saves \$\$\$

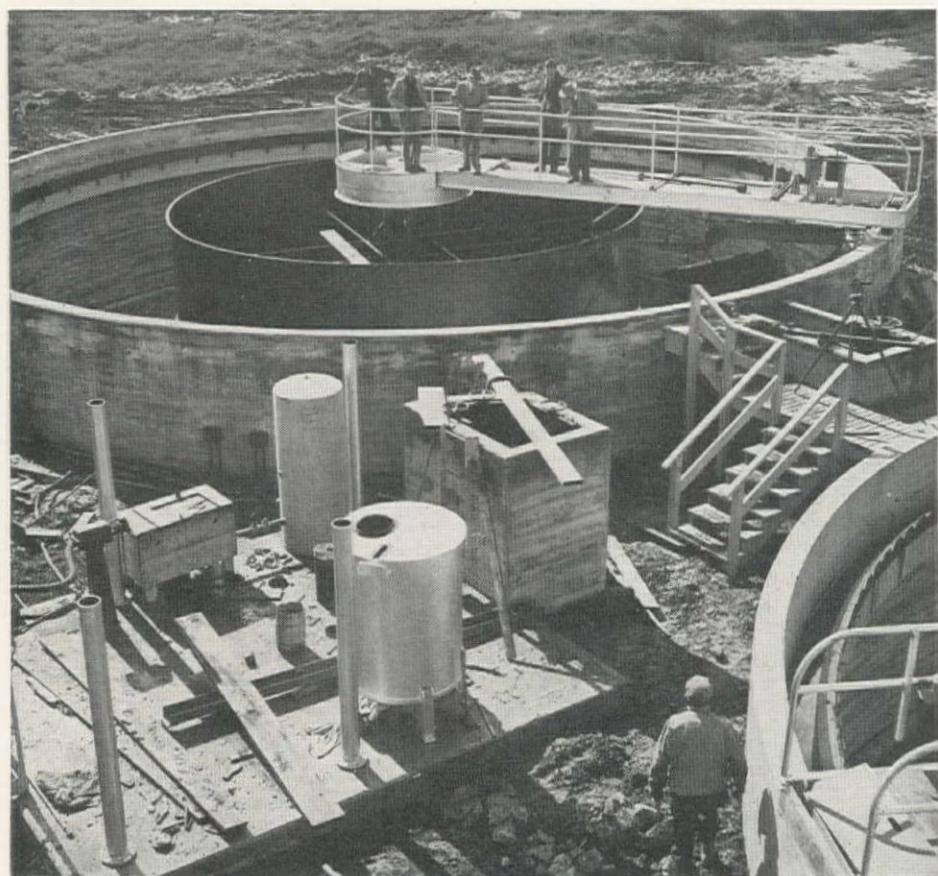
PUBLIC INSPECTION climaxed the recent completion of the Chula Vista, Calif., sewage treatment plant under a \$171,095 contract held by James W. Huntley, Inc., Los Angeles. The Southern California city is one of many with a population under 15,000 that was faced with the problem of giving new treatment facilities with maximum economy, and this was done in a unique manner.

The treatment plant treats the raw sewage by sedimentation, oxidation, and digestion; and consists of primary and secondary oxidizers, each 56 ft. in diameter with a side wall depth of 11 ft., and one digester 45 ft. in diameter with a side wall depth of 27 ft., an inlet structure and control house, with sludge beds to be added in the near future.

## New-type oxidizer units

Whereas the process of oxidation of sewage is not new, the oxidizer units in the Chula Vista plant combine aeration and sedimentation in one unit, a new procedure. Previously, aeration units and clarifying or sedimentation units were built separately and connected by a suitable pipe system. Combining these two into one unit makes for considerable saving in construction costs and simplifies operation. The oxidizers provide for the processes of sedimentation and oxida-

CITY OFFICIALS view concrete tank work on the compact treatment plant. Tanks on the job comprise one digester and primary and secondary oxidizers providing sedimentation and oxidation processes.



*Faced with the problem of giving Chula Vista new sewage treatment facilities with maximum economy, design engineers combined aeration and sedimentation into one unit*

By HAROLD C. FOSTER

City Engineer,  
Chula Vista, Calif.



dation. A predetermined amount of air is circulated through the inner or aeration chamber of blowers, and this circulating air provides a continuous supply of oxygen for the oxidation processes. The outer area or chamber of the oxidizer is quiet and provides for settling both organic and inorganic matter known as sludge. Sludge pumps transfer this material to the digester.

The digester has a floating cover which collects all gases generated inside. These gases have characteristics quite similar to commercial gas and are used as fuel around the plant. The digester operates best at 90 deg. F., and a heat exchanger, heated by gas from the digester, controls the temperature of the sludge.

## Fill or fertilizer

The final digested sludge will be delivered to sludge drying beds, and from there will be used as fill material or soil as fertilizer. The final effluent from the oxidizers, before being delivered to San Diego Bay, will be automatically chlorinated to eliminate possible disease-bearing germs that might contaminate the bay waters.

Practically all sewage treatment processes depend upon bacteria to reduce the organic matter in sewage. These bacteria are of many types and are quite sensitive to the conditions under which they exist. Different types of bacteria react to different conditions; for instance, one type, the aerobic, exist only when oxygen is present in the liquid, and another type, the anaerobic, cannot exist where oxygen is present. These bacteria are also highly influenced by temperature as they break down the organic matter into its different parts, mostly liquids and gases. It is the purpose of the treatment plant to provide and control the conditions which best promote the growth and activity of these bacteria and thereby produce the most rapid and efficient reduction of the sewage.

## Plant will permit future expansion

The capacity of the plant, as approved by the State Department of Public Health, is for a population of 20,000 when an additional digester has been provided. This additional digester will be required when the population of Chula Vista reaches 17,000. Combined with the 3,000-person capacity of the old plant, the city's engineers are of the opinion that the new plant will provide satisfactory treatment for the type of sewage likely to be produced by the city for a somewhat greater population than that approved by the state; probably for a maximum population of about 30,000. The plant is flexible and additional capacity can be provided by building the additional units when needed. The plant will be in operation soon and considerable interest has been aroused in observing the results of this type of treatment.

The contractor was James W. Huntley, Los Angeles, and design engineers were Kistner, Curtis, and Wright. Phillip W. Knights was chief civil engineer with the latter firm and supervised design. The writer directed construction.

# Running Sand Chemically Solidified

**Improved methods of soil solidification used successfully for construction of tower foundations in free-running sand**

**W**E REMEMBER the parable about a man who built his house upon sand—and when the rains descended and the winds blew, the house collapsed, while the house which was built upon the rock endured the buffettings and survived undamaged.

In recent years, various methods of chemical soil solidification have been developed with the objective of improving certain properties of unreliable soil in order to make it a better foundation or constructional material.

## Something in place of nothing

Chemical solidification is accomplished by introducing under pressure one or more chemical solutions which fill the voids in the soil, form gels, and cement together the loose grains.

The two principal methods of soil solidification are the "two solution" method and the "one solution" method. In the "two solution" method, first a solution of sodium silicate is injected and then it is followed by injection of calcium chloride solution (Jorgensen's method\*). The reaction between the two salts in solution results in the formation of one or more low-order hydrosilicates of lime.

In the "one-solution" method, the solution contains either sodium silicate, an acid and a soluble metallic salt or sodium silicate and an acid salt. The proportions are such that silicic acid gel is formed after a controllable interval of time (up to 2½ hours) and that a certain specified strength of the solidified material is obtained (from 50 to 1,200 lb. per sq. in. in compression\*\*).

## Success depends...

The solidification of sand to permit excavation without shoring is one of the many applications of the process. The success of chemical solidification depends upon a specialized knowledge, not only to use the correct solution in each individual case, but also to apply them in such a way and with such equipment that the reaction takes place exactly in the intended position. The choice of inadequate chemicals and solutions could readily cause the precipitating reagent to form a seal which would prevent the solidification of adjacent parts of the foundation soil and thus defeat the whole purpose of the operation.

Chemical solidification and sealing of permeable soils has been successfully

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applied to foundations, tunnels, bridge piers, dams, mine shafts, embankments, and to many other special structures where there is a necessity for improving the properties of the soil, increasing bearing capacity, or waterproofing structures.

*Western Construction News*, September, 1948, described and illustrated a very

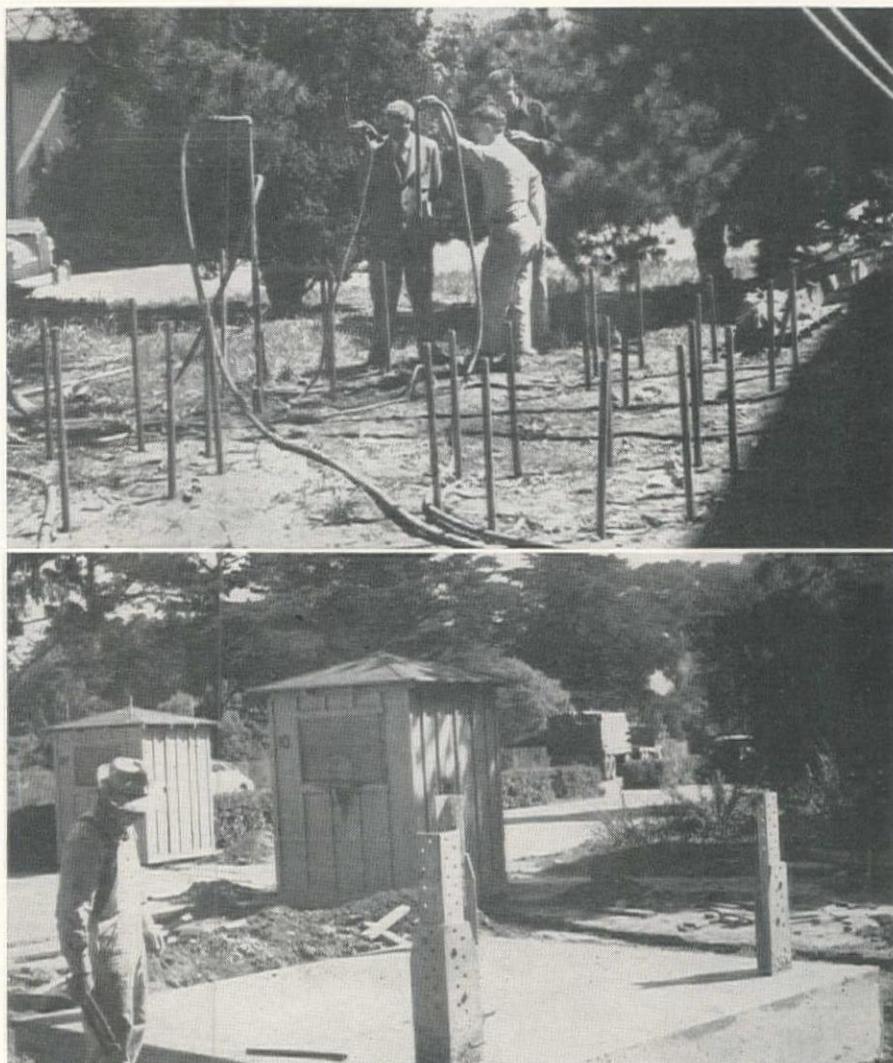
interesting application of solidification to tunneling under Grant Avenue in San Francisco, using a "one-solution" chemical treatment which changed the collapsing sand into a soft sandstone and eliminated the need for breastboarding.

## Towers anchored in free-running sand

A similar principle was used in another unusual application in connection with the recent construction of foundations in free-running sand for six flood-light towers at the Kezar Stadium in San Francisco. Illustrated below is one of the typical foundation, which consisted of a concrete slab supported on four circular piers. The lower part of the piers was enlarged to a bell-shaped section to increase the bearing capacity and resistance to overturning. Washington and Spitzer, consulting structural engineers in San Francisco, who designed this unusual but very effective and economical type of foundation, specified solidification of bell-shaped pier footings to permit the excavation of the sand without the necessity of shoring.

The solidification of the sand in which

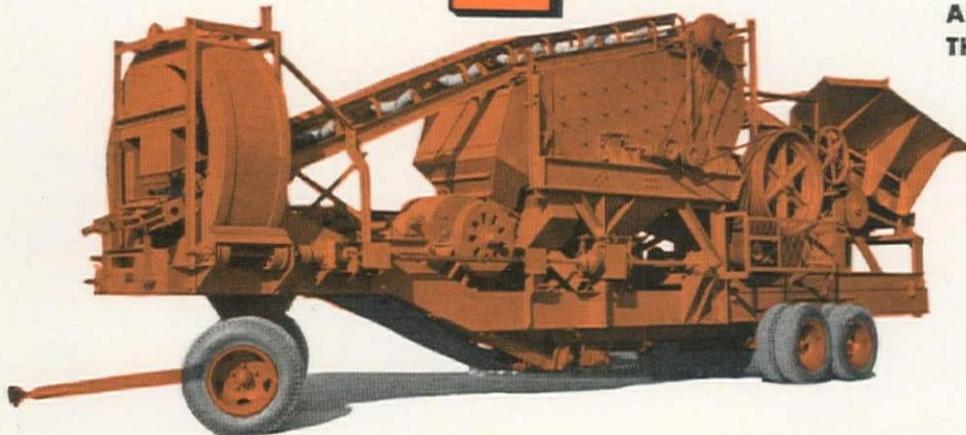
SPACING of pipes through which the solidifying chemical was injected into the loose sand before excavation is shown below. Typical completed foundation is shown at bottom.



\*Lars R. Jorgensen, "Solidifying Gravel, Sand, and Weak Rock," *Western Construction News*, November 10, 1931.

\*\*M. Polivka, "Soil Solidification by Means of Chemical Injection," M. S. Thesis, Civil Engineering, Graduate Division, University of California, Berkeley, California, 1948.

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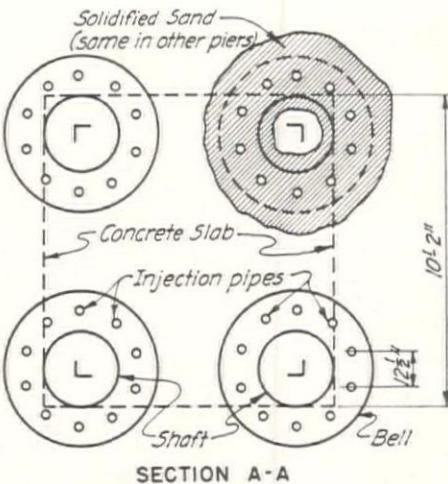
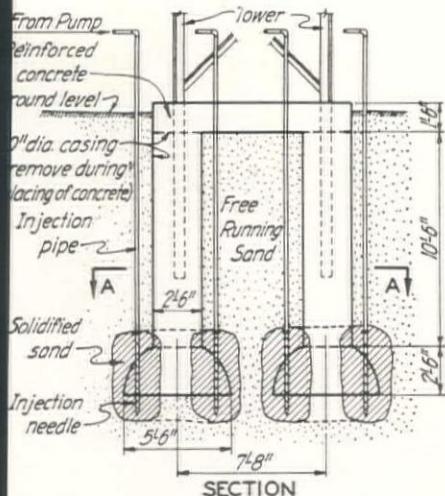
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**OOTING and injection pipe layouts for the tower foundations. Designers called for solidification of loose sand around the bell-shaped pier footings.**

The bell-shaped pier footing was excavated and was accomplished by injecting a "one-solution" chemical into the sand. The spacing of pipes, location of injection needles and a view of the injection pipes above ground are illustrated. The pump used was a triplex positive-displacement pump, and the chemicals were injected under a maximum pressure of 100 psi. Five hundred gallons of solution were required to solidify the sand of one pier. The compressive strength of the solidified sand was approximately 5 psi. The solidified sand was easily excavated using hand tools.

#### Engineering the job

The work of chemical solidification was supervised by R. E. Davis, Jr.,

George E. Wendell and the author, all of Berkeley, Calif., with Dr. J. J. Polivka of Berkeley as consulting engineer. The work was expeditiously completed with commendable skill by the contracting firm of H. E. Rahlmann Co., San Francisco, with Thomas Hurley and H. Hynding in charge. Superintendents G. Billiter and E. Kettig exercised special skill in overcoming many difficulties.

The steel floodlight towers were designed by the Bureau of Light, Heat and Power of the Public Utility Commission, B. A. Devine, Manager and Chief Engineer, and approved by the Board of Park Commissioners, J. Girod, Superintendent of Parks. The engineers in charge of supervision were William C. Eggert and J. Bristow.

## Reclamation Bureau Calls for Alaska Hydroelectric Potential Development

A REPORT on the potential development of water and related resources in the Territory of Alaska, which states that over 8,000,000 kw. of hydroelectric power capacity are available for development, has been approved by Secretary of the Interior J. A. Krug and forwarded to other Federal agencies and to Washington, D. C. The 8,000,000 kw. hydroelectric potential in Alaska is more than half the amount of hydroelectric power developed in the United States and is more than three times the installed capacity of the Tennessee Valley Authority. The report was prepared by the Bureau of Reclamation under the authority of the 1949 Appropriations Act and is designed to provide the Congress with information as a basis for legislation.

The Bureau of Reclamation report found that there is an immediate and urgent need for power development to meet the requirements of the civilian and military population in the Anchorage and Fairbanks area and to supply existing and proposed defense installations in the vicinity of Anchorage, Fairbanks, and Nome. Additional power is

needed for establishment of a pulp industry in Southeastern Alaska and for development of other resources.

Action is needed also, the report said, to bring into agricultural production at least 135,000 acres of new land as soon as possible. Special reports should be prepared on the reclaiming of lands in the Matanuska-Anchorage-Spenard district, the Fairbanks-Dunbar-Chena district and on the Kenai peninsula.

In addition, municipal and industrial water supplies are urgently needed and would be included in the Bureau of Reclamation's program.

If the Territory's resources are developed as proposed, the report foresees a possible population as high as five million. It points out that Norway, Sweden, and Finland, in approximately the same latitude as Alaska, have a population density of from two and a half to five times as much as the five million population potential for Alaska, even after discounting the treeless northern wastes. There are 386,000 sq. mi. of Alaskan land which are more habitable and fertile and have more natural resources than the average lands of Scandinavian countries.

## EBMUD Plans Mokelumne River Dams and Aqueduct

LONG RANGE plans for the further development of the Mokelumne River, principal source of water supply for the cities along the east shore of San Francisco Bay, have been disclosed by the East Bay Municipal Utility District, in announcing that it had filed application in Sacramento with the State Division of Water Resources for rights to an additional 125 million gallons per day of Mokelumne water.

The project required to obtain the additional supply will include the construction of three additional dams; the addition of spillway gates at Pardee Dam; and the construction of a third aqueduct to the East Bay. Storage capacity on the Mokelumne River will be increased from 68 billion gallons at the present time to more than 183 billion gallons. A total water supply of 349 mgd. will be available from the Mokelumne River and the local watersheds upon the completion of the project, or more than three times the present average consumption of about 110 mgd.

It is estimated that such a supply will be adequate to serve a population of some 2,600,000 persons. The Utility District now serves approximately 900,000 residents of the East Bay. In making application at this time for additional water, the District is looking ahead some thirty or forty years.

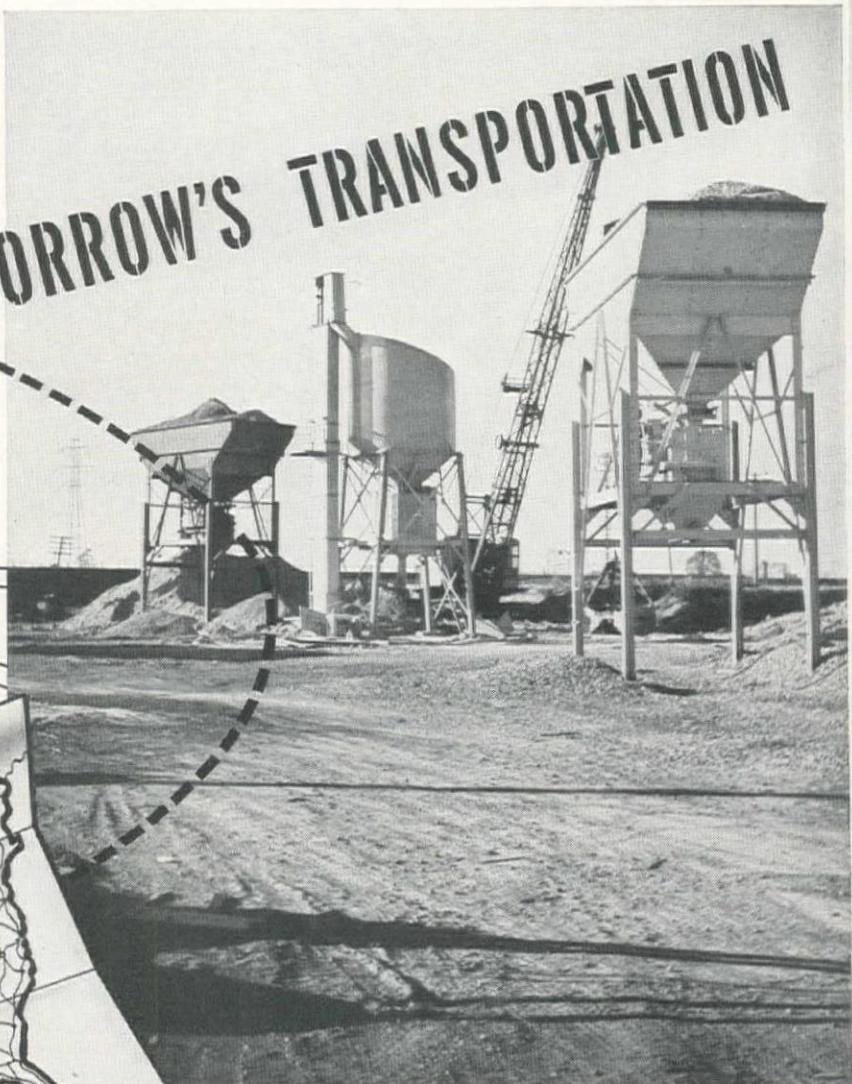
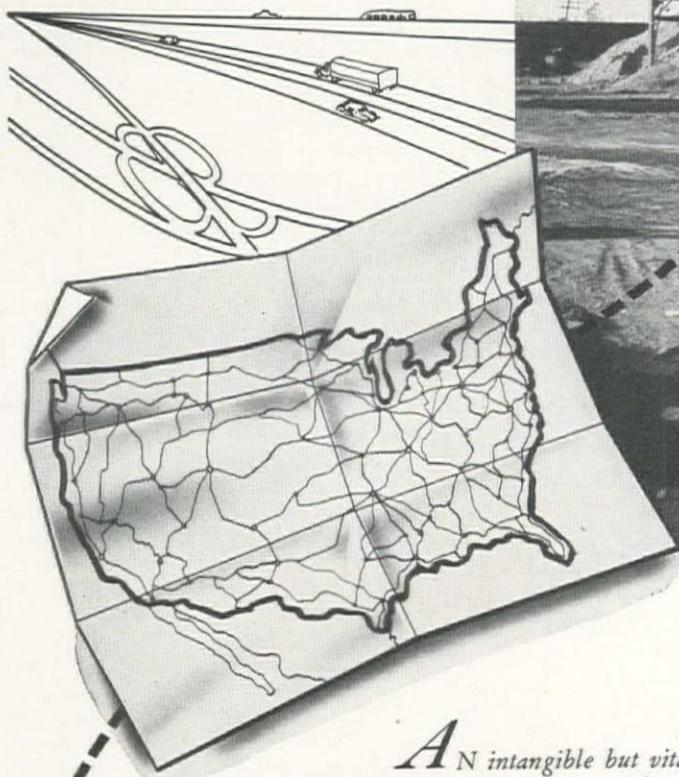
The project will include the construction of one dam, 119 ft. in height, on the Mokelumne River below Pardee Dam near the town of Clements. This dam will form a reservoir having a capacity of 212,000 ac. ft. The present Pardee Reservoir has a storage capacity of 210,000 ac. ft.

A second dam, 187 ft. high, will be constructed on the river above Pardee Reservoir at Middle Bar. This reservoir will have a storage capacity of 44,000 ac. ft. The third dam will be located on the South Fork of the Mokelumne River near Railroad Flat. It will be 340 ft. in height and will create a storage basin of 80,000 ac. ft. In addition, crest gates will be installed on the spillway of Pardee Reservoir increasing its capacity by approximately 17,000 ac. ft.

A third Mokelumne aqueduct will be required to deliver the additional supplies of water to the East Bay. Provision was made for such a pipeline in the plans of the original Mokelumne project. The Utility District owns a 100-ft. right of way between the East Bay and Pardee Reservoir, and the two existing aqueducts were so located within this right of way to permit the construction of a third pipeline when needed.

Since it is not known what conditions will exist at the time of the construction of these features, it is not possible to estimate the total cost but it is probable it would exceed the \$39,000,000 cost of the original Mokelumne project. Details of the financing will also be dependent upon conditions at the time of construction.

# The BIRTH OF TOMORROW'S TRANSPORTATION



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# Portrait of a Construction Manager

**From positions as brush cutter and timekeeper, A. J. Orselli has climbed the experience ladder to become construction manager of Bechtel Corporation's huge Refinery Division**

**C**ONSIDERING his profession, it is probably just as well that A. J. Orselli, Manager of the Refinery Division of Bechtel Corporation, does not speak with an Oxford accent. However, only a little matter of Latin grammar, us his own characteristic impatience, saved Orselli from having to make the difficult decision which faces every Rhodes scholar—the decision of whether or not to adopt the broad English "a" or his own.

Orselli was born in San Francisco, 4 years ago, son of a father who believed that every boy should be able and willing to make his own way in the world. In fact, when young Al was fourteen, his father went so far as to pay a blacksmith to let his son work in the shop. In a short time, however, Al was put on a salary, and considers that he earned every penny of that munificent two dollars a week.

## Healthy emphasis on things social

During one high school vacation, he worked as a brush cutter and chainman for the P. G. and E. Another time, he was employed by a photoengraver. Jobs such as these strengthened the boy's growing conviction that his future lay with engineering. By the time he entered the University of California, his career was thoroughly well mapped out in his mind.

At the University, Orselli's record was unequivocally brilliant. He was a straight "A" student throughout his entire four years, played football, basketball and tennis, and rounded out his time with a healthy emphasis on things social. He was Valedictorian for the class of '27, as well as runner-up to the Medalist. Recently, he was asked if he still had the same opinions as those expressed in his Commencement Day Address. "Well," he replied, grinning slightly, "as I remember it, my talk was idealistic, as those addresses generally are. But I said something to the effect that the world is full of opportunities, and it's up to us to take advantage of them. And I still feel the same way."

## Rhodes to nowhere

Following his graduation, Orselli took a job as Field Engineer on the Spaulding Drumm development for the P. G. & E., that finishing school for newly-fledged California engineers. Meanwhile, he had applied for one of the coveted Rhodes scholarships, which would send him to England for two years of graduate study at Oxford University. Somewhat to his surprise, but completely to

there, without a backward glance, he dismissed Oxford from his plans and went cheerfully back to P. G. and E.

During the next few years he served as engineer on the Salt Springs Dam and the Tiger Creek Power House, both big parts of P. G. & E.'s Mokelumne River Project. On this last job, he met his future wife who was teaching school at Jackson. They were members of the same class at Cal, had spent four years on the same campus and had never met until this time.

## Up the experience ladder

By now the fateful depression years were well under way and P. G. & E. disbanded its construction gang. Orselli took a job as structural engineer with the late Henry D. Dewell, and participated in the design of many buildings, including those at Principia College in Illinois. Next, with the M. B. McGowan Company, he worked on the Ventura Bridge, serving as everything from time-keeper and engineer to assistant superintendent.

In 1933, following work on San Gabriel Dam No. 1, near Azusa, Orselli joined W. A. Bechtel Company as estimator. At the next desk was another new arrival, V. G. Hindmarsh, the man who, as Vice-President in charge of Construction, is now Orselli's boss. Orselli considers that Hindmarsh has had a greater, and more helpful influence over his career than any other one person. "He's been like a father to me, which includes pinning my ears back whenever I need it!"

Orselli's first field job with Bechtel was in 1935-36, on the Coos Bay Bridge in Oregon. This was followed by the Broadway low-level tunnel at Oakland, where he was job engineer, and the Spanish Creek Bridge where, for the first time, he was in full charge of estimating, bidding and building a project, subject of course to approval from above.

## Finding the niche

In 1937, Orselli transferred to the newly formed Bechtel-McCone-Parsons Company, and entered a new and important phase of his career. Since that time, his work with Bechtel has centered around the refinery field, starting with the Standard Oil Plant at Richmond, and followed successively by a cracking unit and treatment plant at Cut Bank, Mont., an alkylation plant at Wilmington, Calif., and a hydroformer plant and delayed coker at Oleum. Orselli finds an added challenge in the greater complexity of such projects, adding, as they do, problems in metalwork, mechanics and piping, to the usual construction techniques.

In October, 1941, with war in the offing, Orselli went to Calship at Los Angeles, where for two and a half years

*Concluded on page 87*



# Western Highway Officials Foresee Huge Road Construction Job Ahead



W. T. HOLCOMB, Nevada State Highway Engineer and an expert on highway administration and construction problems, is new President of the Western State Highway Officials.

THE 28TH ANNUAL conference of the Western Association of State Highway Officials was held in Denver, June 13 to 16, inclusive. It was the expressed opinion of the Officers and Board, as well as the delegates, that it was one of the finest conferences in the history of the association.

The meeting, which was held at the Cosmopolitan Hotel in Denver, was convened by President W. C. Lefebvre on Monday morning. Mayor Quigg Newton of the City of Denver welcomed the convention group and made a short address, in which he called attention to the increasing problem faced by cities in attempting to construct and maintain arterial systems, which include in the traffic streams using them, traffic which has its origin outside of the city limits. The Mayor stated that he believed it would be a necessity for the states to assist the cities in the construction of these arterial street systems. A major point lead-

ing to this conclusion was the fact that a considerable amount of gas tax revenue results from the heavy use of these streets.

## Toll roads triple cost

After the opening session, an address was delivered by Dr. L. I. Hewes, Director of the Western Regional Office, U. S. Public Roads Administration, on "What Highway Transportation Now Reveals." Dr. Hewes stated that lags in road building offer a way for toll road promoters to knife through for their own personal gain. He further stated that toll roads normally will not receive more than one-half of the total traffic between terminal points and that it should be an obligation of all highway departments to keep free roads in proper condition for use by all motorists. Dr. Hewes called attention to the fact that toll roads more than triple the cost per vehicle mile to the motorist.

Mr. Lefebvre, President of the association and Highway Engineer of the State of Arizona, made the following statement: "We will stand or fall depending upon our contacts with the public. As a State Highway Department, our mission is to supply roads for vehicles that can be traveled at high speeds with safety. Our primary responsibility, then, is to please the road user."

## Panels on problems

The second session of the conference was a panel discussion, in which DeWitt C. Greer, Texas State Highway Engineer, was the moderator and in which "Administration" was the subject. Those participating were James Reid, Director of Highways, Idaho; Roy W. McLeese, Highway Engineer, Utah; and W. T. Holcomb, Highway Engineer of Nevada.

*Toll roads, the pressing need for more capable highway engineers, relations with A. G. C., public relations and price trends get a going over at W. A. S. H. O.'s Denver conference*

A second panel on "Maintenance" was held with R. S. Corlew, of P. R. A. Division 9 acting as moderator. Members of the panel were W. E. Sutton, Maintenance Engineer, Wyoming; J. I. Meacham, Construction Engineer, Nevada; and Guy Mayes, Maintenance Engineer, New Mexico.

The third session of the conference included papers on "Design" by A. M. Nash, Design Engineer of California State Highway Department; "Highway Trends" by Carl W. Brown, the Chief Engineer of the Missouri State Highway Department and President of the American Association of State Highway Officials; a discussion on "Concrete Practices" by Clarence Stahl, State Highway Engineer from Montana; and an address by A. N. Carter, Manager of the Highway Division of the A. G. C. entitled "The Contracting Industry Looks at the Huge Road Construction Job Ahead."

## Highway engineers needed!

In his paper, Mr. Carter stated that between 14,000 and 16,000 engineers and sub-professional people are now needed by the State Highway Departments to properly prosecute their work. He further stated that motor vehicular registration at the end of 1948 had climbed to 41,000,000, an all-time high. Other points covered by Mr. Carter related to the necessity of coordination between State Highway Engineers and committees of construction industries, the employment of engineering consultants and the diversion of highway user revenues.

The fourth session of the conference provided an innovation in Western Association Meetings. For the first time the delegates were divided into group meetings. These meetings with the subject handled and the presiding chairman are listed below:

Administration—C. A. Calhoun of Arizona

Bridge—Maurice Housecroft of Utah  
Construction—W. J. Walsh of Colorado

Design—D. C. Greer of Texas  
Maintenance—W. E. Sutton of Wyoming

Materials—E. B. Bail of New Mexico  
Planning & Factual Surveys—

R. E. Livingston of Colorado

Right-of-Way—Forrest Cooper of Oregon.

W. A. S. H. O. LEADERS, left to right: D. C. GREER of Texas, new vice-president; W. C. WILLIAMS, Oregon, retiring sec.-treas.; W. C. LEFEBVRE, Arizona, retiring president; HOLCOMB; MARK WATROUS, Colo., exec. committee; A. M. NASH, Calif., new sec.-treas.



These group meetings provided an opportunity for all delegates to participate in the discussions, and many points of interest were brought up and given a thorough going over. It was the feeling of the delegates generally that this type group meeting should be continued and extended.

The final session of the conference on Thursday was a general business session, in which the following officers of the association were elected:

President—W. T. Holcomb, Nevada

Vice-President—D. C. Greer, Texas

Secretary-Treasurer—A. M. Nash, California

Executive Committee—

William Dineen, Wyoming

Mark U. Watrous, Colorado

O. Ray Dinsmore, Washington.

Resolutions were passed favoring an increase in the moneys for forest high-

ways and for a re-investigation and extension of Federal road systems to provide an integrated overall system of highways.

#### Problems aired with A. G. C.

During the convention, a meeting of the Joint Cooperative Committee of the A. A. S. H. O. and the A. G. C. was held. At that meeting a number of subjects received an airing. Those of particular interest related to the payment for traffic control procedures required of contractors on construction jobs; the provision for balanced programs from year to year and price trends on highway construction in the West. The latter subject was presented in detail by Richard H. Wilson, the Assistant State Highway Engineer of California.

The total attendance registered for the convention was approximately 270 men and 80 women.

## The Orselli Portrait

...Continued from page 85

He participated in one of the greatest shipbuilding programs the world has ever seen. Then, in April, 1944, he returned to Bechtel, as assistant to Hindmarsh, who was handling a series of refinery construction projects made vitally important by reason of their place in the war effort.

Ranking high in this program was a 60,000,000 job for Aramco in Arabia, the first large scale refinery ever built in that country. As Construction Manager for the project, Orselli flew to Arabia in 1944, on his first foreign assignment. He got out of the plane at Rastanura to find a scene of almost archaic simplicity. The natives were living exactly as they had 2,000 years before. When he left, 8 months later, Rastanura was the picture of a modern, fast moving construction job, although the native way of life went on unchanged all around it. The project was completed on schedule, in 1945. However, the arrival of V-J day meant that its first production was to be destined for peacetime use.

#### The "I" and the "we" factors

As Manager of Bechtel's Refinery Division, Orselli has a job eminently suited to his driving, dynamic capabilities. Although he has had both engineering and construction experience, he prefers the active working out of ideas in the field to the more theoretical role played by the engineer, and intends to remain a construction man so long as he has anything to say about his career. He has a quick grasp of essentials, and the ability to foresee contingencies and lay out his work accordingly. Occasionally, the rapidity with which he reaches conclusions gives the effect of impatience, when in reality he is merely intent on the next step to be taken. He himself is aware of this fact, and says disarmingly, "I'm trying to mellow with age." He has an enviable ability to live fully in the present, neither wasting time in

futile regrets over what might have been, nor dreaming vaguely of great things to be done in the future.

Looking back over his career to date, Orselli emphasizes the "we" factor in every job he has accomplished. He gets personal satisfaction from early jobs such as the Coos Bay Bridge, the Broadway Tunnel and the first refinery units, when in effect he was proving himself to himself, but always points out that in a big organization no one man can take personal credit for anything. One of the precarious moments of his construction career occurred on the Ventura Bridge job. Half of the new bridge was built in the same position as the old one, and had twice as many spans as the latter. When it came time to demolish the old bridge, each arch had to be carefully weakened, then pulled down by a line attached to a tractor. The slightest miscalculation as to where the arches would give way and fall would have meant the destruction of the new bridge piers as well, and there was much breath-holding and finger-crossing before the job was safely completed.

#### No stopping

Orselli's present position keeps him so fully occupied that he has little time for his hobbies of riding and tennis. Not long back, for example, he found himself managing about 15 jobs at one time. At present, Bechtel is building a 506-mi long, 34-in. pipeline for P. G. & E. running from Topock to Milpitas. This is the largest diameter line built to date, and everything connected with it is extra-dimensional in size and weight, which presents new problems daily, challenges that, to Orselli, make his work worth while.

When asked concerning his aim in life, Orselli came forth with a characteristic answer. "My job is to direct the men I work with. I want to learn to do my job so well that I make their's easy. I've a long way to go to achieve this, and I may never get there—but I'm going to keep on trying."

## Flood Control Planned On Alaska's Gold Creek

ADVISABILITY of improvement of Gold Creek at Juneau, Alaska, at an estimated cost of \$331,000, in the interest of flood protection of the adjacent area, has been favorably reported by the District and Division offices of the Corps of Engineers.

The report states that the proposed improvement consists of minor correction of alignment and paving the bottom and sides of the stream's channel between Calhoun Avenue bridge and Wiloughby Avenue bridge in the city of Juneau.

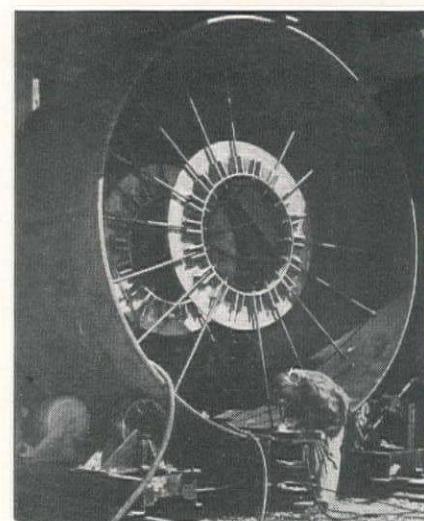
The proposed construction work would prevent erosion and furnish protection from floods larger than any of record, the Engineers' studies show. A condition of the recommended improvement is that local interests agree to contribute the cost of making necessary alterations to bridges and utilities and constructing a fence on both sides of the channel. This is estimated to cost \$20,000. The Federal government's share of the total cost is estimated at \$311,000.

The report states that Gold Creek, a short mountain stream flowing through Juneau, is subject to recurrent floods which cause annual damages and threaten a large area of the city with destruction. Existing control works, constructed with local and federal emergency funds, are inadequate and require unduly large maintenance costs.

Benefits from the proposed improvements, as cited in the report, include the reduction of yearly costs of maintaining the channel and removal of the threat of serious flood damages to Juneau, with possible loss of life. Savings of \$40,000 annually are anticipated from the proposed project.

#### "SPIDERS" ROUND OUT PENSTOCK

LARGE "SPIDERS," consisting of steel collars and bolts, are placed in the 13½-ft. diameter penstocks for the Hungry Horse Project in Montana. The collars maintain proper curvature of the steel plates and assure alignment of plate edges during the welding process. The four penstock pipes, each 426 ft. long, will be ready for installation next fall.



# Construction Design Chart

## CIX... Steel Beams in Flexure

THIS CHART is a companion to that presented in the Jan., 1949, issue. The first chart included standard "I" beams. The accompanying chart is identical to the first one except that it has been designed to be used for structural channels and unequal leg angles. Since it is not practical to include all possible combinations on such a chart, it has been assumed that the long leg of the angle is vertical, with the short leg outstanding. This is the economical position for such a member.

A solution line has been drawn on the chart for the following conditions:

Channel section = 7 in.  $\times$  9.8#

Simple span,  $L = 10$  ft.

It will be noted on the chart, that when

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



buckling of the compression flange is prevented by lateral restraint, such a channel will support a uniformly distributed load of  $w = 800$  lb. per lin. ft. of beam. As a check on this result, we have

$$M = \frac{w L^2}{8} = \frac{800 \times 10^2 \times 12}{8}$$

$$= 120,000 \text{ in. lb.}$$

7"  $\times$  9.8# channel, Sec. Mod.,  $S = 6.0$  in.

$$\text{Unit stress, } f = \frac{M}{S} = \frac{120,000}{6.0} = 20,000 \text{ p.s.i.}$$

Perhaps the problem involves the choice of section for a double angle lintel supporting a uniform load of 1,000 lb. per lin. ft. on a span of 7 ft., 0 in. When the two sections of a double member are identical, each section may be assumed to carry one half the load. Therefore, if a line is drawn on the chart from the span of 7 ft., 0 in.

1,000

through a load of  $\frac{1,000}{2}$ , it will be seen

necessary to select a 5  $\times$  3  $\times$  5/16 angle. In order to check this result, we have

$$M = \frac{w L^2}{8} = \frac{1,000 \times 7^2 \times 12}{8}$$

$$= 73,500 \text{ in. lb.}$$

Two angles, 5  $\times$  3  $\times$  5/16, long legs vertical

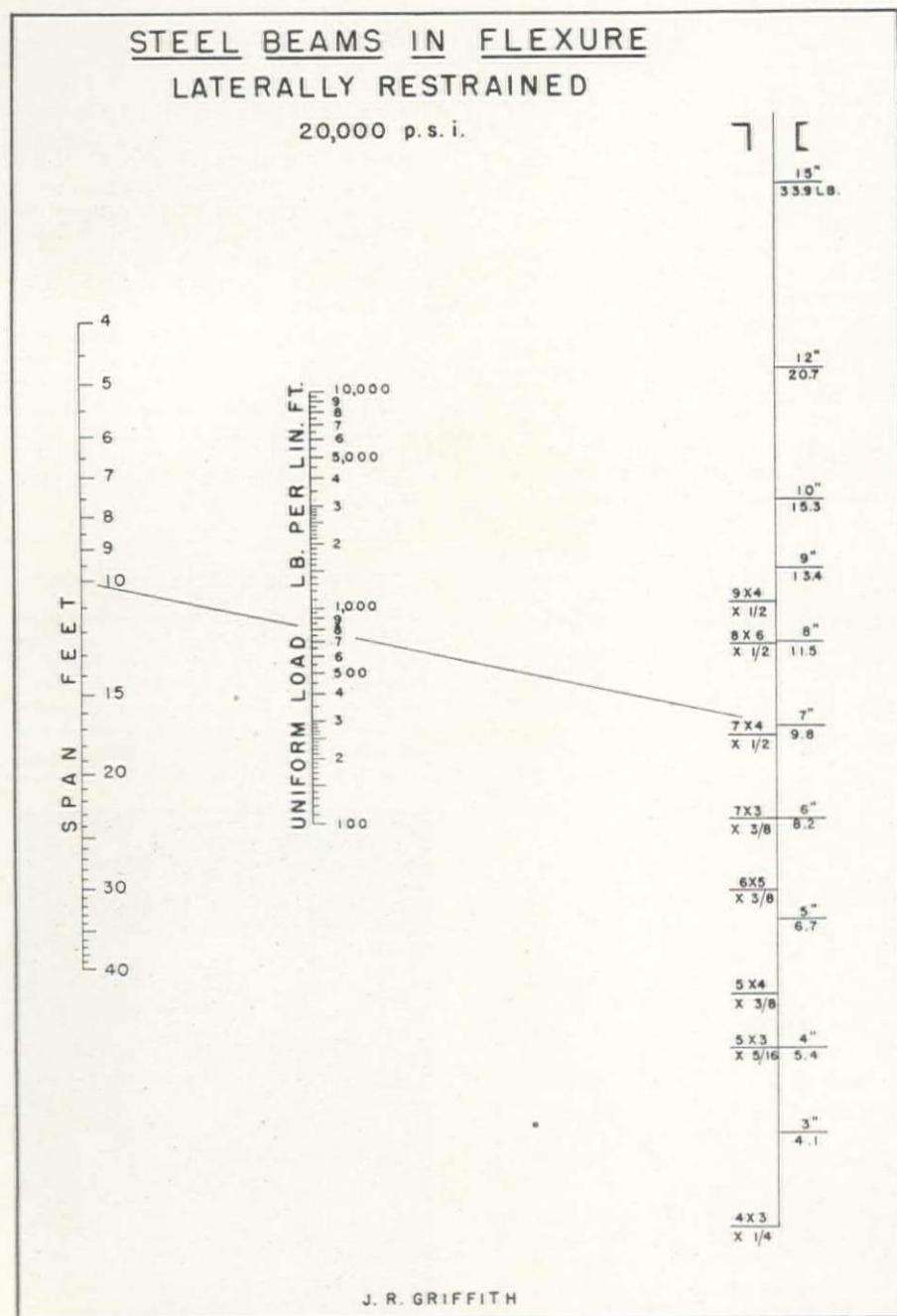
Sec. Mod.,  $S = 2 (1.9) = 3.8$  in.<sup>3</sup>

$$M = 73,500$$

$$\text{Unit stress, } f = \frac{M}{S} = \frac{73,500}{3.8} = 19,350 \text{ p.s.i.}$$

If the problem involves the choice of two sections which are not identical, complications arise from the fact that a shift of the neutral axis does not permit adding the moduli of the individual members. This becomes a cut and try problem. In order to obtain a trial section, the assumption is frequently made that the resistance of the resultant compound section is equivalent to the accumulative resistance of the sections taken individually. It then becomes necessary to check the solution by determining the position of the neutral axis, and section modulus of the compound section.

It is desired to call attention to the fact that flexural stress is not the only factor which should be investigated in structural steel beams. In fact, when beam loadings are increased to failure, very seldom is extreme fiber stress the cause of such failure. The designer who persistently neglects investigation of all possible modes of failure and relies entirely on the extreme fiber stress as his index, is ultimately due for embarrassment. When a beam deflects under load, the compression flange tends to act as a column if not restrained laterally. The compression flange, without such lateral support, may buckle and fail long before the extreme fiber stress approaches its limit. I often recall the case of one of my former students who was carrying on a research project in reinforced plaster beams. He was trying to produce failure by compression in the plaster. It seemed that the models would persist in failing by every other conceivable cause than the one he desired.



A TEN-YEAR highway development program in Alaska has been recommended by Thomas A. MacDonald, Public Roads Commissioner. He sees the development as essential to Alaska's future.

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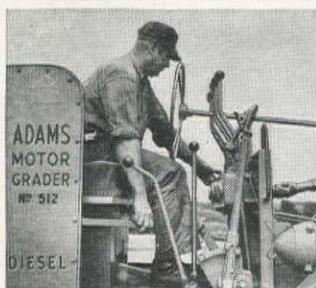
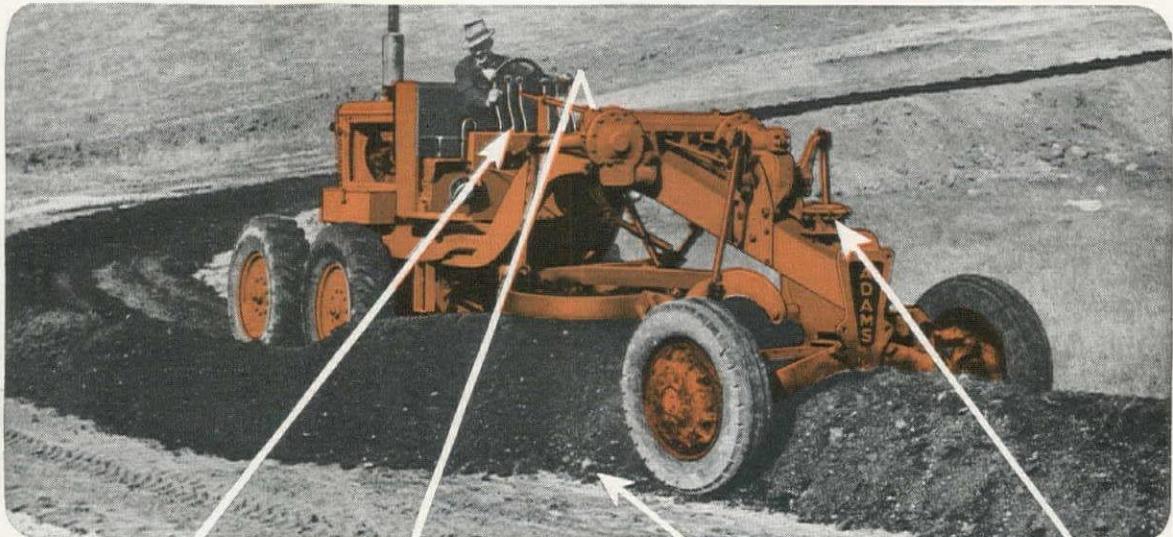


CALIFORNIA . . . bituminous . . . a P&H Stabilizer reprocessed a 10-year old "oil-mat" to a 3-inch depth at a rate of 1000 sq. yds. per hour.



NEBRASKA . . . clay-gravel . . . the sub-base of this airport was processed at 1900 sq. yds. per hour with a P&H Stabilizer.

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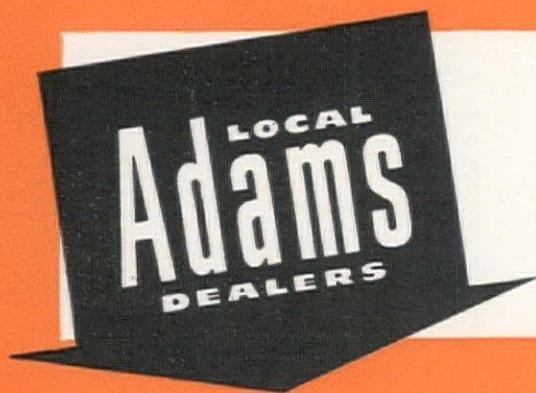


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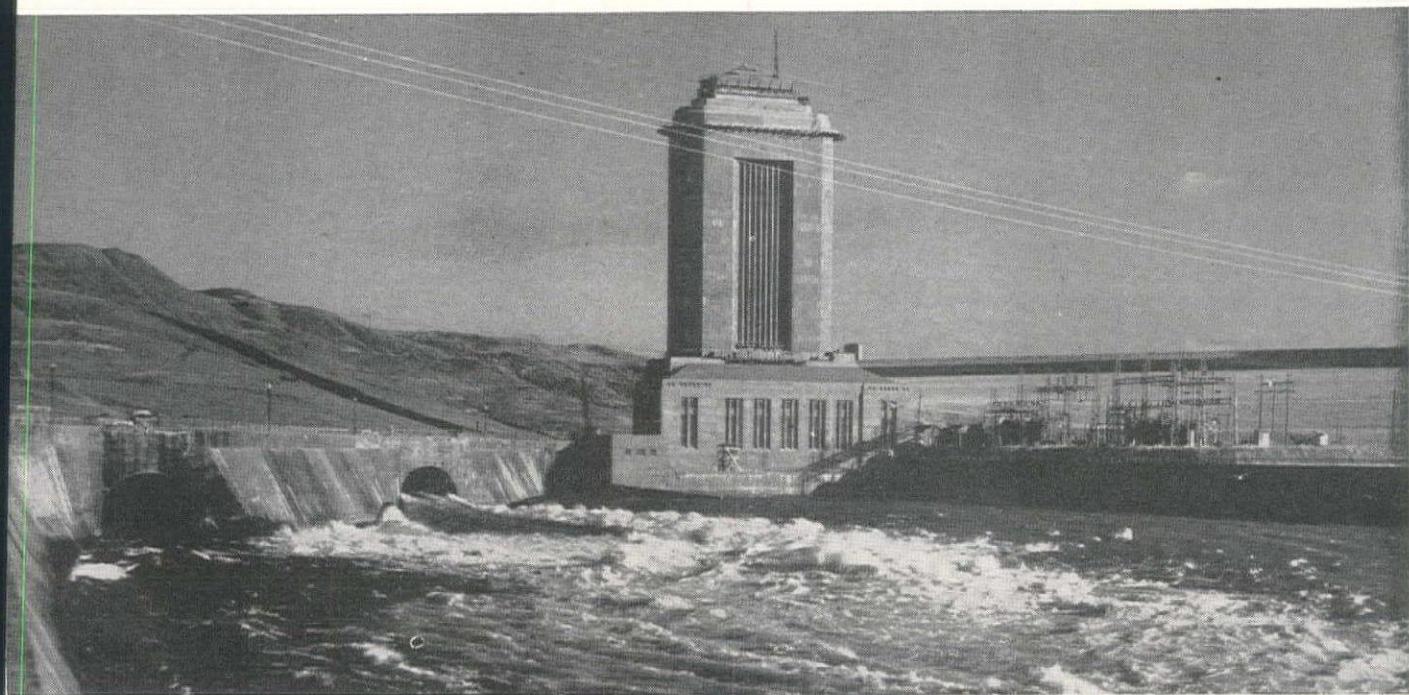
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## Control of Seepage Biggest Problem in— Fort Peck Dam Construction Wind-up

**Control of seepage through the world's largest earthfill dam and completion of the huge Fort Peck Power House will tighten the harness on the mighty Missouri River in Montana**

**H**ARNESSING of the mighty Missouri River in northeastern Montana, 1,869 river miles above its mouth, was essentially completed in 1940 when major construction ended on Fort Peck Dam, largest completed earthfill dam in the world. Since the close of the war, the Corps of Engineers, sponsors of the project, have been applying the finishing touches to the dam, whose reservoir of 19,412,000-ac. ft. capacity is second only to the reservoir at Hoover Dam (31,142,000 ac. ft.). Several sub-features of the great project are presently under construction. Described in detail in this article are the pressure relief well system, the Fort Peck Power House, and construction of roads, highway bridge, streets, etc.

### Seepage problems in all types of soil

To understand better the problems encountered in controlling the seepage through the man-made earthfill and underlying foundation material of the Fort Peck Dam, let us take a close look at these features. The main section of the dam is 250.5 ft. in maximum height, 10,578 ft. or more than 2 mi. long and 4,900 ft. wide at the base. This fill across the alluvial valley floor and the abutting 10,448 ft. of dike on the left abutment confines water to a maximum depth of as much as 220 ft. in the valley just upstream from the dam with an average

depth along and parallel to the dam of 200 ft. All types of soils, varying from gravel and sand to fat clay, are found in the foundation, deposited in lenses and pockets of irregular shapes.

Subsurface explorations conducted prior to the start of construction of the dam indicated that pervious strata of sand and gravel exist in the lower portion of the foundation, and that these strata are covered by a considerable depth of impervious material which is in contact at the valley sides with the Bearpaw shale bedrock which underlies the area. The fill above the valley floor consists principally of sand and clay hydraulically placed to give relatively porous upstream and downstream surfaces and grading to an impervious clay core along the axis. Finish work at the crest of the fill consists of rolled earth, some of which was clay borrow.

Conventional features for control of seepage through an earthfill structure,

such as a sheet steel cutoff wall across the valley floor, were all included in the design of the dam, and measures were provided for observation of the saturation line through the main dam fill and hydrostatic pressure in the pervious foundation strata. Readings of piezometers located in the dam indicated that the impervious core of the dam was effective in controlling normal seepage resulting from saturation of the fill. Observations of the hydrostatic pressure in the pervious strata below the impervious material underlying the dam and in the area downstream indicated that under-seepage flow, although greatly reduced upon passing the cutoff wall, tended to become entrapped by the impervious overlying materials.

### Piezometers watch seepage

In June of 1942, the reservoir water surface attained an elevation of 2,174 ft., the highest to that date. At that time, readings taken of piezometer pipes installed along the downstream toe indicated that hydrostatic pressures were relatively higher in the porous strata below the relatively impervious surface materials for a distance of 4,000 ft. along the downstream toe of the dam, with a maximum pressure in one area immediately downstream from the dam equivalent to 45 ft. of water above the ground surface. In order to reduce these pressures, it was concluded that controlled release of the entrapped foundation waters would be desirable. The measures undertaken to accomplish this control were closely followed by a board of consultants established in the summer of 1942.

It was decided that a pressure relief

**PICTURED ABOVE—**  
**DOWNSTREAM VIEW** of Fort Peck Power House shows partially-completed outdoor substation at right; No. 3 tunnel discharging its 20,000 cu. ft. per sec. of water for flood control and navigation requirements on the Missouri, and the top of the earthfill dam in background at right.

### Construction Contracts Now in Force on the Fort Peck Project

Project	Contractor	Amount
Hot Springs, South Dakota flood control project.....	Peter Kiewit Sons' Co., Sheridan, Wyo.	\$771,418
Power House, interior finish.....	Fegles Construction Co., Ltd., Minneapolis, Minn.....	384,000
Roads, Highway Bridge, Streets and appurtenances.....	S. J. Groves & Sons, Minneapolis, Minn.....	962,879
Power House Turbine.....	S. Morgan Smith Co., York, Pa.....	479,200
Power House Butterfly Valve.....	S. Morgan Smith Co., York, Pa.....	179,900
Generator, 38,889 kva.....	Allis-Chalmers Mfg. Co., Milwaukee, Wis.....	731,570
Powerhouse Governor.....	Woodward Governor Co., Rockford, Ill.	37,815

system would effectively control the hydrostatic pressures, if the wells were spaced in such a manner as to reduce the hydrostatic pressure head above the ground surface, for a full reservoir pool (elevation 2250), to a maximum of 15 ft. between the wells at the downstream toe. In order that the expected reduction in pressures could be observed as the installation of wells progressed, a line of piezometers was installed 50 ft. upstream from the proposed line of the wells.

#### Temporary wells, solid and slotted

The critical shortage of materials available during this period of World War II necessitated the use of a temporary system of wells. The first two wells installed consisted of a solid 6-in. casing extending through the impervious material and into the pervious stratum, with a clean gravel pocket extending approximately 10 ft. below the bottom of the casing to act as a collecting filter. Because the results were not completely satisfactory, slotted well screens were thereafter used.

Installation of wells was initiated using a well spacing of 50 ft. This spacing was soon increased to 125 ft., based on the piezometer readings which indicated a greater reduction in pressure than had been anticipated. During construction of the wells, it was also found that the hydrostatic pressure in the lower pervious stratum was several feet greater than in the upper pervious stratum. Due to this differential pressure between the strata, approximately half of the wells were made deep enough to tap the lower pervious stratum. The wells were installed by wash boring methods, using heavy drilling mud, and after drilling to the top of the pervious stratum, the well casing was placed and a smaller hole was drilled for installation of the slotted screen. After the screen was installed, the well was washed out with clear water until a good flow developed.

During the latter part of the installation period, it was discovered that several of the earlier placed wells were carrying considerable silt to the surface in the discharge flow. As most of the screens had half-inch slots and as the pervious strata averaged less than 5 per cent retained on a one-half inch sieve, the silting was not considered unusual. Thereafter, each well of the entire well system was surged with compressed air

upon completion in order to bring about the formation of a sand and gravel filter about the screen. The wells were then tested for performance by being closed in various combinations and their action under the higher pressures noted. The performance of the wells during severe pressure changes induced by again surging with compressed air during subsequent tests indicated a stable system.

#### Wood replaces metal

The temporary well system performed adequately until June, 1944, when it was noted that the discharge in one well was far below normal. Operations were immediately started to mud back the well and remove the screen for inspection. A short section of the screen, recovered by fishing methods, showed serious deterioration and upon being weighed it was found that two-thirds of the metal had dissolved and washed away. Due to the impossibility of recovering the old screen by "fishing," drilling operations were started and the screen, which had filled with gravel, was drilled out. During this operation it was discovered that the well casing was also very thin. Therefore, when the screen was replaced, a riser well casing the same size as the screen was extended to the surface and the area between the two casings was left filled with mud and sealed with oakum (hards of hemp) at the ground surface. A short time thereafter, several other wells ceased to perform, apparently from the same cause.

Studies were initiated in the spring of 1944 to develop plans for the more permanent well system, and tests were being made on all readily available types of commercial screens and casings. Both metallic and non-metallic materials were tested for well screens and riser pipe. Although many of the other materials tested withstood the corrosive action of the water, satisfactory service, ease of

**Key personnel at Fort Peck** currently are COLONEL RICHARD LEE, District Engineer; LIEUTENANT COLONEL EDWARD J. GALLAGHER, executive officer; HOWARD H. DUNHAM, chief of the Engineering Division, and HAROLD H. NICKELSON, head of the Construction Division.

handling and economic consideration were the primary reasons for selecting wood pipe for the screens and riser pipe of the permanent relief well system. The pipe was purchased by the Government and the screens were manufactured in the District carpenter shop by sawing horizontal slots between the bands of the wire wrapping reinforcement on the pipe. Metal couplings for the pipe were fabricated in the District machine shop.

#### New wells relieve toe-pressure

A contract was awarded for drilling the wells and placing the pipe for 16 of the 17 permanent wells. An experimental well using wood pipe screen and riser was installed by Government forces prior to the award of this contract. The contractor began drilling in June, 1946, using a 13-in. star drill and a heavy drilling mud, and completed the contract in November, 1946. Ten-inch steel drill casings was used where necessary to maintain the hole during placing of the six-inch wood pipe, which was installed by a method similar to that used during construction of the temporary wells.

In addition to observing the pressures in the pervious strata at the location of the wells, the pressure in these strata has been observed along three cross sections of the dam. Data obtained during these observations indicated that the installation of the wells approximately doubled the total flow in the pervious strata and reduced the pressure at the toe of the dam to about 7 ft. above the ground surface where it had previously been 45 ft. The amount of water produced by this system of relief wells has varied from a maximum of 12.4 cu. ft. per sec. in 1943 to the present discharge of 8.5 c.f.s., satisfactory reducing the hydrostatic pressures in the pervious strata beneath the downstream toe of the dam. A number of the original temporary wells not previously replaced by permanent wells are being converted to permanent piezometers by inserting a three-inch wood pipe inside the steel casing.

The Fort Peck Power House is located immediately downstream from the outlet portal of Tunnel No. 1, (shortest of the four diversion tunnels around the dam and having a plate steel liner to serve as a pressure or penstock tunnel). The building is of modern architectural design, and except for installation of the third generating unit and completion of interior decoration, is essentially complete, with two hydroelectric generating units, consisting of one 35,000-kw. generator and one 15,000-kw. generator, now in operation. An order has been placed for a third unit of 35,000-kw. capacity and at such time as the demand warrants the 15,000-kw. unit may be replaced by a 35,000-kw. unit to bring the power plant up to its design capacity of 105,000-kw.

Actual construction of the power plant was begun in 1940 and the substructure was completed in 1941. A contract for construction of the superstructure and surge tanks was awarded in February of 1942. However, due to wartime conditions and the need for conserving critical



material, construction was deferred. Due to the increased demand for power during the war the plans were modified to provide for partial completion and installation of one 35,000-kw. generator which was put into operation in 1943.

As soon as materials became available after the war, construction was initiated on the wye-branch for the three penstocks, on penstocks No. 2 and 3, for installation of two butterfly valves, installation of the 15,000-kw. generator and its turbine, construction of the three surge tanks and surge tank housing, and installation of necessary electrical equipment for operation of the two generators.

At the outlet portal of the power tunnel, the plate steel liner has been extended and increased in diameter from 24 ft. 8 in. at the tunnel mouth to 34 ft. at the wye-branch. The wye-branch is encased in a reinforced concrete head block from which three 14-ft. penstocks extend to their respective turbines. At the present time, penstock No. 1 is connected to the 50,000-hp. turbine which operates the 35,000-kw. generator. Penstock No. 2 has been reduced to an inside diameter of 11 ft. and is connected to the 20,000-hp. turbine which operates the 15,000-kw. generator. Penstock No. 3 has been bulkheaded on its downstream end and will remain bulkheaded until the third generating unit is installed.

#### Water momentum, a 45,000-ton battleship

An important feature of the Fort Peck Power Plant is the surge tanks which are necessary because of the extremely long power tunnel (5,667 ft.). The momentum of the water in this tunnel is

**SPECTACULAR VIEW** of the Fort Peck Project from the air shows the dam's reservoir filled (water appears as black); tunnel shaft buildings and power house at upper right on the right abutment of the dam, and the Fort Peck townsite nestled within the dam's sweeping curvature.

approximately equal to that attained by a 45,000-ton battleship traveling 20 m.p.h., and must be absorbed by the surge tanks without causing excessive penstock pressures, overflow of the tanks, or hydraulic instability when the load on the turbines is suddenly changed. Construction of the surge tanks and surge tank housing, which consists of a steel framework faced with pre-cast concrete, was completed during 1948. The steel surge tanks are connected to the penstocks by 70-ft. riser pipes 11 ft. in diameter and are interconnected by 5-ft. diameter pipes located 42 and 61 ft., respectively, above the surge tank bowls. Surge tank No. 3 has been bulkheaded and will remain so until it is put into operation in conjunction with generator No. 3.

Flow of water to the turbines is controlled by turbine wicket gates which are actuated by oil-pressure actuator-type hydraulic governors operating at 250-p.s.i. oil pressure of sufficient capacity to operate the turbine gates through a complete closing or opening stroke in 5 seconds with an operating head on the turbines of 216 ft. In case of emergency or in order to perform maintenance or repair work on the turbine, water in the penstock is shut off by huge plate and cast steel butterfly valves installed in each penstock immediately downstream from the surge tank riser connections.

The generators have a closed system of ventilation with surface air coolers

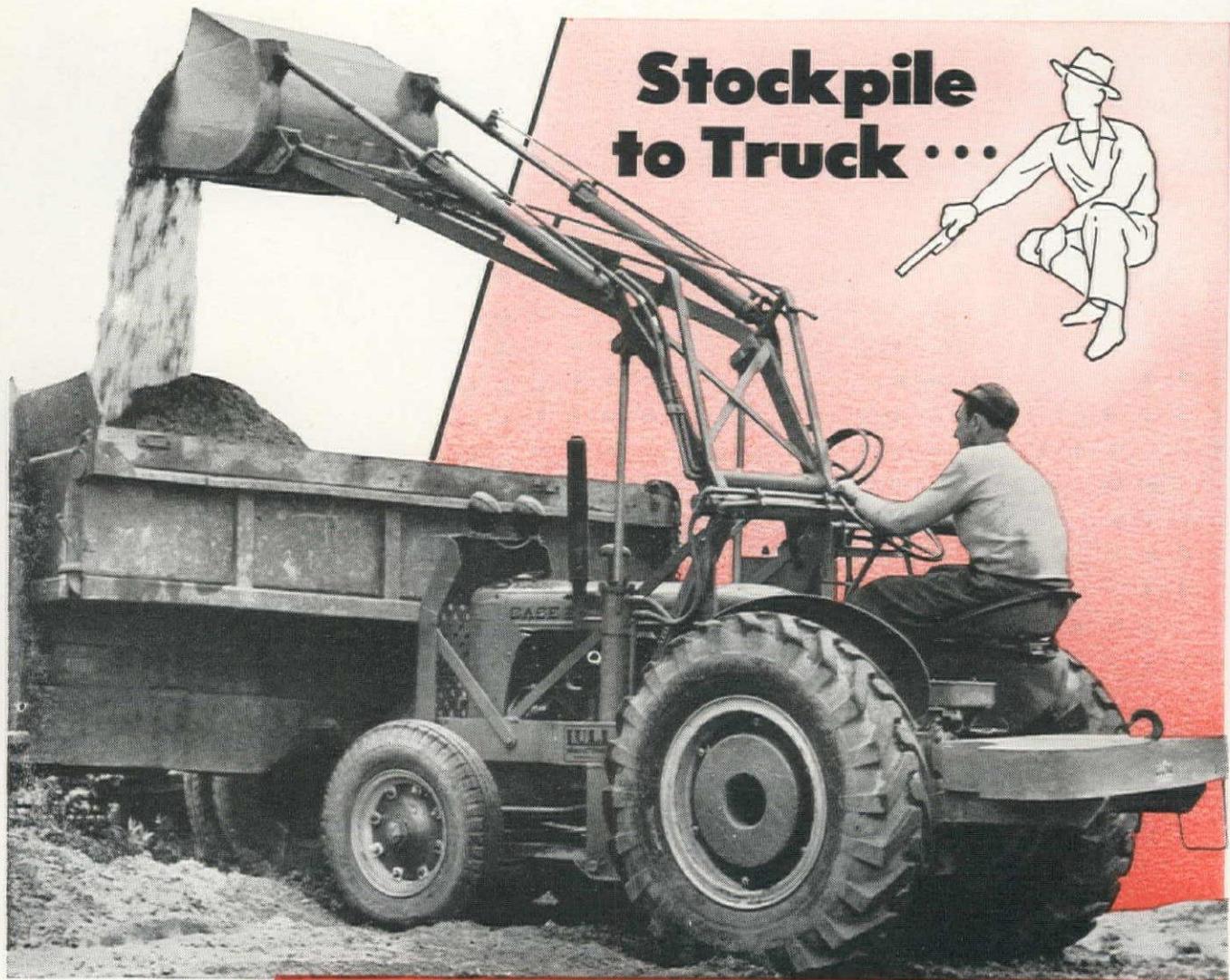
obtaining their water from the penstocks at a temperature which varies from a low of approximately 34 deg. to a high of 56 deg. F. during the year. By manipulation of a louvre system it is possible to discharge warm air from the generators into the penstock area for cooling and re-circulating during the summer or it may be discharged into the various rooms for heating purposes during the winter. This heat is supplemented by small unit electric heaters and by three large gas fired furnaces, one of which provides heat inside the surge tank housing to prevent freezing in that area.

#### Model studies substantiate design

In order to check the design of the three 40-ft. diameter by 160-ft. high surge tanks and the calculations on surge heights, pressure and effects of water hammer, model test studies were conducted by the U. S. Waterways Experiment Station at Vicksburg, Miss., using a scale model of the power tunnel, penstocks, and surge tanks which was constructed of  $\frac{1}{4}$ -in. pyrolin on a linear scale ratio of 1 to 20. A pyrolin model was also used to duplicate on a reduced scale the pressure wave propagation and water hammer effects caused by rapidly closing the turbine wicket gates which would occur in the prototype. The design was well substantiated by the model tests.

Such tests on the prototype as it has been possible to conduct since completion of the surge tanks and the installation of the two hydraulic turbine units have further substantiated the design assumptions and model test studies. A load rejection test with a five-second governor action from a total generator

*Continued on page 130*



## Stockpile to Truck ...

**IT'S A  
MAN SAVER**



Model "SI," above, loading cinders from stockpile. Model "VAI," at left, is used to charge mixer, fill and level sub-grade for sidewalks, etc.

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 & Equip. Co. .... Fresno, California  
 Electric Tool & Supply Co. .... San Bernardino, California  
 Growers Tractor & Implement Co. .... Sacramento, California  
 Nelson Equipment Co. .... Portland, Oregon - Seattle, Wash.  
 Robison Machinery Co. .... Salt Lake City, Utah  
 Wortham Machinery Co.  
 Cheyenne, Sheridan and Greybull, Wyo. - Billings, Mont.

**CASE** •

● You can load any kind of bulk material . . . from any number of piles . . . into any size of truck. You don't need any crew, any structures or any installations—just one man and a Case Industrial Tractor with shoveloader. With this outfit he digs, scrapes, lifts, carries and delivers. Hydraulic control dumps the load quickly, dribbles it slowly, or divides it into dabs.

Case tractors have extra strength and stability to bear the added burdens of mounted equipment. Their heavy-duty, Case-built engines develop full power at moderate piston speed, pull still stronger when slowed down. They pick up heavy loads promptly and accelerate eagerly.

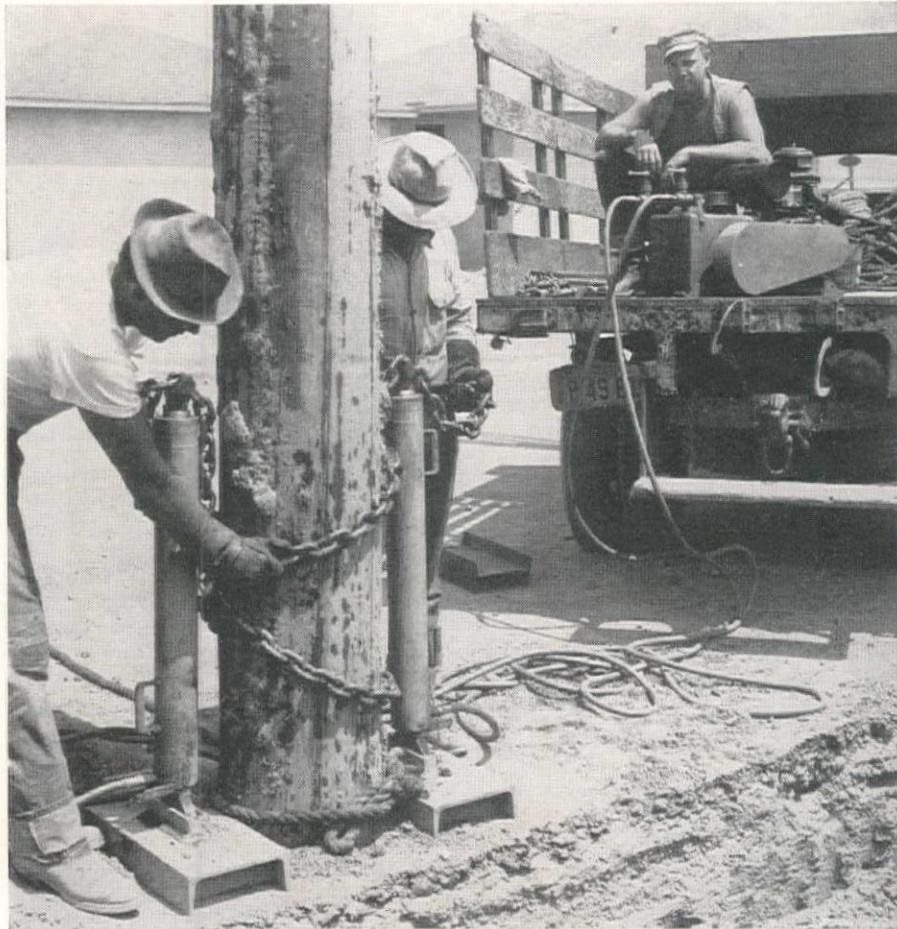
Built in four basic sizes, Case industrial tractors range in weight from 2,500 to more than 10,000 pounds—models to fit a wide range of loaders, dozers, snowplows, etc. They are highly respected for ENDURANCE—the way they keep going long years with low upkeep. J. I. Case Co., Racine, Wis.

# HOW IT WAS DONE

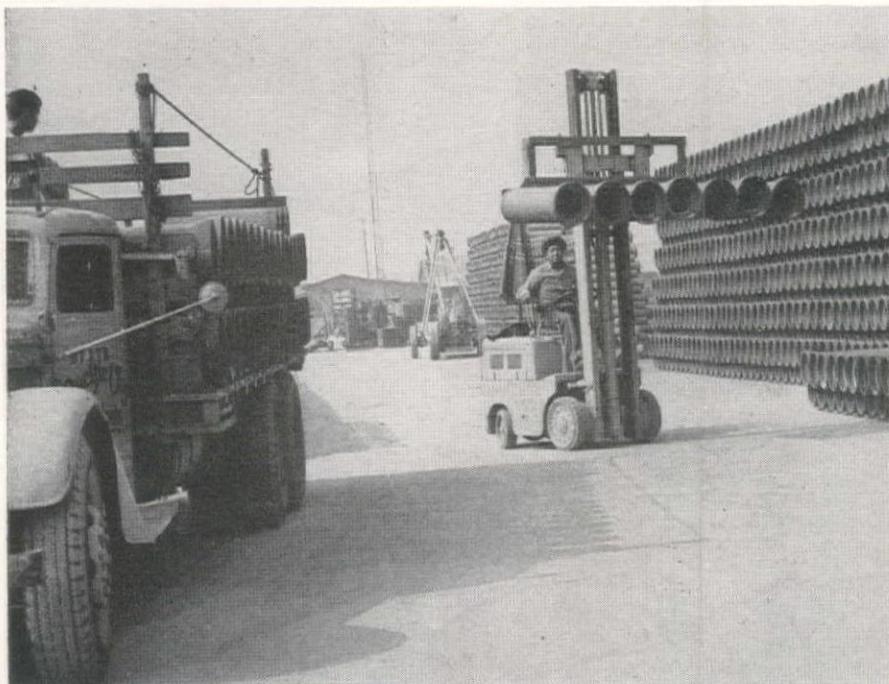
## JOB AND SHOP TIPS FROM THE FIELD



↑ CAP ROCK for San Diego's Mission Bay Jetty Project is picked up by a heavy rock hook, shown handling a 12-ton boulder. The special hook was made by the M. P. McCaffrey Co., Los Angeles, and is used by J. B. Stringfellow, Riverside, Calif., subcontractor on hauling and placing rock on the job. Heavy rock for the jetties is picked up by the hook and crane and hauled by 10-wheel dump trucks to the fill. Macco Corp., Clearwater, Calif., is prime contractor on the Army Engineer contract for placing 360,000 tons of rock in the two jetties at the entrance to Mission Bay.



↑ PULLING LARGE transmission poles with standard ratchet-type jacks is often a hard and expensive job. The Southern California Edison Company's Transmission Department is now using seven sets of power-driven hydraulic jacks to do the job. The jacks, using special alloy chains for lighter lifts and flexible wire rope slings for maximum pulls, are each capable of pulling 32 tons. The rams have 22 in. of lift and self-return, and can be operated together or independently from remote controls at the power pump. A Greenlee Power Pump, driven by a small air-cooled engine, powers the rams. The units were designed and manufactured by Fornaciari Co. of Los Angeles.



← A CONVEYOR TRUCK, recently developed by Pacific Clay Products Co. at Whittier, Calif., speeds the handling of ceramic pipe sections without resultant losses due to accidents and breakage. It differs from conventional hydraulic conveyor trucks in that it has a series of seven metal prongs instead of a single flat loading platform. The prongs are spaced so that they can be inserted without difficulty in the centers of a horizontal row of pipes, thus permitting the latter to be lifted and transported to a new location without any trouble due to pipes rolling. Truck was made to order for Pacific Clay Products Co. by Pearne & Lacy Machine Co., Los Angeles.

# NEWS OF WESTERN CONSTRUCTION

JULY 15, 1949



## West's Only Centrifugal Cast Iron Pipe Plant Built in Utah

THE ONLY centrifugal cast iron pipe plant west of the Mississippi has been completed by F. H. McGraw & Co., engineers and constructors, at Provo, Utah. Built for Pacific States Cast Iron Pipe Co., its cost is estimated at \$3,500,000. The first pipe was spun in April, eleven months after ground was broken by the McGraw construction crew.

The new foundry consists of four mill-type structural steel frame buildings with galvanized corrugated iron roofing and siding and has a capacity of 100,000 tons a year. The super deLavaud process—casting pipe in a revolving, water-cooled metal mold where the pouring ladle and mold are stationary—has been installed in the plant.

Three deLavaud casting machines are

in operation, and two additional machines, capable of producing up to 24-in. pipe, are being installed.

Raw material for the modern plant is brought into the covered storage yard on a railroad spur. Two specially designed bridge cranes handle the material for weighing and charging directly into two 96-in. bore cupolas. Each cupola is capable of melting approximately 25 tons of iron per hour; the two being used on alternate days. A Hough payloader handles the coke from the storage yard to the charging buckets with a minimum of damage to the coke.

Bridge cranes convey the hot metal from the cupolas to the casting machines and the hot pipe from casting machines to annealing furnace. An ex-

tensive shop has been provided for refinishing the steel molds used in the casting process. The only sand used in this casting process is in the core which forms the bell end of the pipe. Result: an unusually clean foundry operation. Structural steel was provided by American Bridge Co.; pumps and blowers are Ingersoll-Rand, and the eight bridge cranes are P & H, 7½ to 10-ton capacity and 55 to 120-ft. span.

Pipe is continuously heat treated in the annealing furnace, and then rolls by gravity on skid rails through various finishing processes. Special equipment designed by McWane Cast Iron Pipe Co. dips the pipe in a tar vat prior to shipment. All pipe is tested hydraulically under 500 lb. pressure on a special press.

Additional facilities are being provided for the installation of the McWane pre-caulked lead joint, patented by the parent firm, and for lining pipe for special conditions with a thin coat of cement.

The buildings were erected during one of the worst winters in Utah's history. Nearly one-and-a-half months' time was lost between November and February. Despite this, construction was completed almost on schedule.

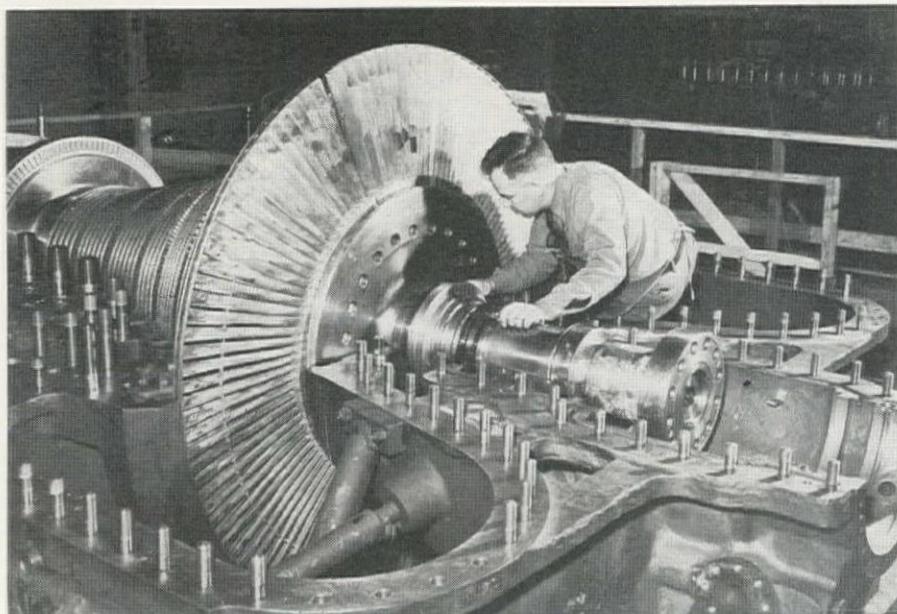
Preliminary equipment layouts and design of the equipment were prepared under the direction of W. Lee Roueche, manager of plant development for McWane, and E. L. Allen, Chief Engineer of Pacific States. Pacific States purchased and fabricated the equipment; F. H. McGraw & Co. designed and engineered the foundation and structures, and did electrical and mechanical work on the entire installation. Construction operations were under the supervision of D. W. Neville, McGraw vice-president.

### Transfer of Northwest Water To California Being Studied

PROPOSALS looking far to the future and visualizing possible transfer of water from the Columbia to the Colorado River were aired before the U. S. Senate Public Works Committee last month, as part of the hearings on the administration's proposal to set up a Columbia Valley Authority. Maj. Gen. Lewis A. Pick, Army Chief of Engineers, was asked if such a transfer of water would

### BELIEVED TO BE THE LARGEST TURBINE EVER BUILT IN THE WEST

BUILT by the Westinghouse Electric Corp., Sunnyvale, Calif., this 12,500-kw. turbine for the Tucson Gas, Electric Light and Power Co., Tucson, Ariz. is believed the largest ever made in the West. The big row of blades at the near end of the 20,000-lb. spindle is the final stage through which the steam passes at the exhaust end of the turbine. The 31 spindle rows hold more than 4,000 blades, and blade tips of the largest will move at a near-sonic velocity of nearly 750 mph. at 3,600 rpm.



ever be feasible. He chose to reserve comment until surveys have been made of the plan to bring water from the Pacific Northwest to the Colorado on the western slopes of the Rocky Mountains.

A statement by Assistant Secretary of the Interior, W. E. Warne, was called to the attention of the Committee. The statement pointed out that the Bureau of Reclamation now is working on two long range investigations of the problem. One will determine the most practical and advantageous use of the water resources of the Klamath River (with the possibility in mind that Klamath River water could be transferred to California's Central Valley), and the other will determine the engineering and economic feasibility of supplying the Colorado River Basin with surplus waters of the Columbia River. It will be several years before the studies will be completed, according to Warne.

## FPC's Okeh Asked for Pelton Power Project

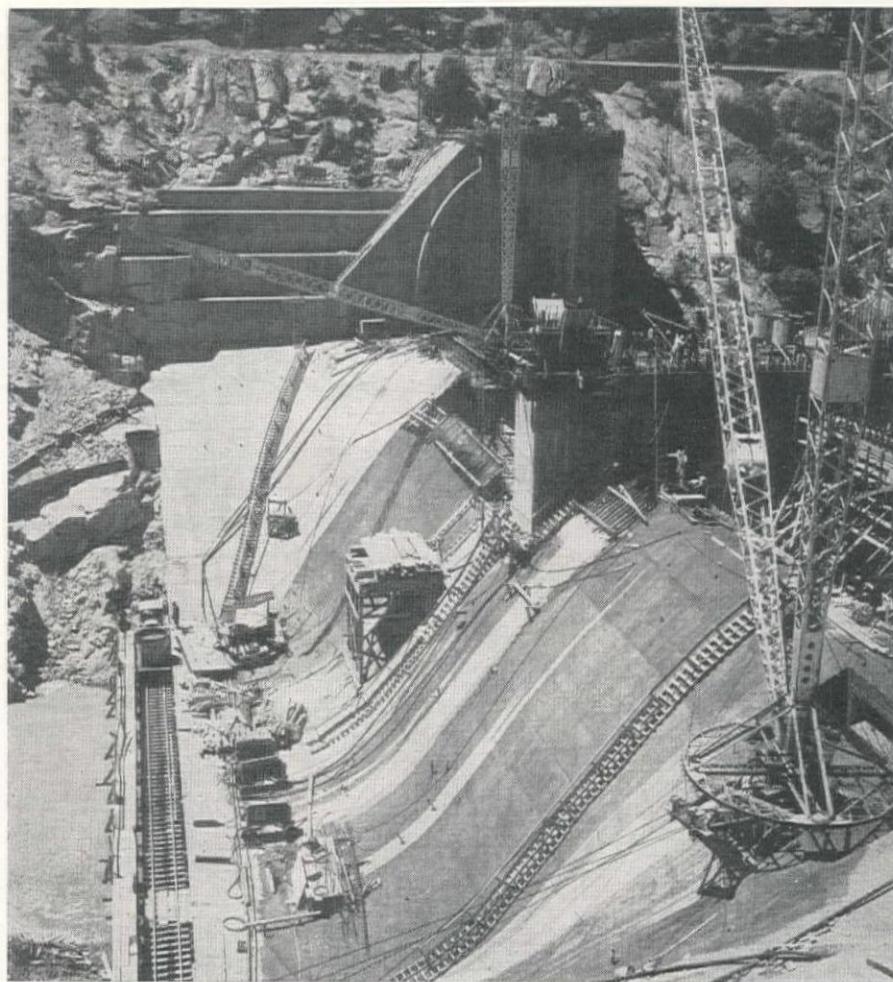
NORTHWEST POWER Supply Co. of Portland, Ore., has asked the Federal Power Commission to issue a license authorizing the construction of a proposed \$12,775,000 hydroelectric project on the Deschutes River near the town of Madras in Jefferson County, Ore. The development has been designated as Pelton Power Project.

The company plans to build a concrete arch dam, 190 ft. high and 850 ft. long at the crest, forming a 7.2-mi. long reservoir in the narrow Deschutes River canyon. A separate spillway would discharge surplus water through a tunnel from the reservoir to a point in the river below the dam. A powerhouse, located immediately downstream from the dam, would contain two units, each having a rated turbine capacity of 52,000 hp. and a rated generator capacity of 40,000 kva. The project would also include penstocks, a switchyard and connecting transmission lines.

The company said it expects either to sell the entire power output of the plant to operating utilities in the area, or to lease the plant to an operating utility. Estimated power available 90 per cent of the time is 39,000 kw., with an annual energy output of between 325,000,000 and 375,000,000 kw. hr.

Northwest Power proposes to finance the project primarily by the private sale of first mortgage bonds to an institutional buyer, and by the sale either publicly or privately of junior securities.

A SMALL BOAT HARBOR at Oxnard, Calif., would cost \$5,500,000, according to a report released after months of study by the Los Angeles Corps of Engineers. The report is now being reviewed by the Board of Engineers for Rivers and Harbors at Washington, D. C. About \$1,500,000 of the total amount would have to come from local funds, according to the report.



## P. G. & E.'s Big Feather River Project Nearly Ready After Record Schedule

THE PACIFIC Gas and Electric Co. of California unveiled its \$62 million construction program on the Feather River on June 7 to members of the press in a specially conducted tour of the hydroelectric project in Feather River Canyon. The huge power development is nearing completion exactly on a record-setting construction schedule of 2½ years (see *Western Construction News* for November, 1948) and during its peak employed a maximum of 3,000 men. First new power is scheduled to pour forth next November from the 101,000-hp. generators of Cresta Powerhouse. Three months later in February, 1950, the 169,000-hp. Rock Creek Powerhouse is scheduled for operation.

Rock Creek Dam construction began in September, 1948, and the concrete work is now 91% complete, with 140,000 cu. yd. in place. First concrete was poured at Cresta Dam in August of last year, and is now 96% complete with 76,500 cu. yd. in place. The dams will harness the plunging power of the Feather River, some 200 mi. northeast

of San Francisco, by diverting the water through 10½ mi. of tunnels, now 75% complete, to the powerhouses and then letting it flow undiminished for irrigation and domestic use in the valley below. The two powerhouses are 70% complete and will bring the number of P. G. and E. hydroelectric plants on the Feather River to five.

Actual construction is in the hands of five contracting firms. Both dams are being built by the Morrison-Knudsen Co., Inc., which is also building the Cresta Powerhouse and drilling 4,000 ft. of Rock Creek tunnel. The Rock Creek Powerhouse and the drilling of 6,700 ft. of Rock Creek Tunnel are under contract to the Walsh Construction Co., Davenport, Iowa. The remaining 24,000 ft. of Rock Creek tunnel is under contract to the Arundel Corp. and the L. E. Dixon Co. of San Gabriel, Calif., and T. E. Connolly, Inc., of San Francisco are driving the Cresta tunnel.

Starting immediately after the end of the war, the P. G. and E. power building program, largest in the United States, includes five hydroelectric plants and four steam-electric plants, presently costing \$12.5 million per month and generating a total of nearly 2 million horsepower. This is more than was needed to serve all demands in the Northern and Central California areas before the war.

**USING GUYED DERRICKS** at each abutment, Morrison-Knudsen crews have placed 96% of Cresta Dam's 80,000 cu. yd. of concrete since last August (Cresta's spillway above).

# Announcing.. A COMPLETELY NEW

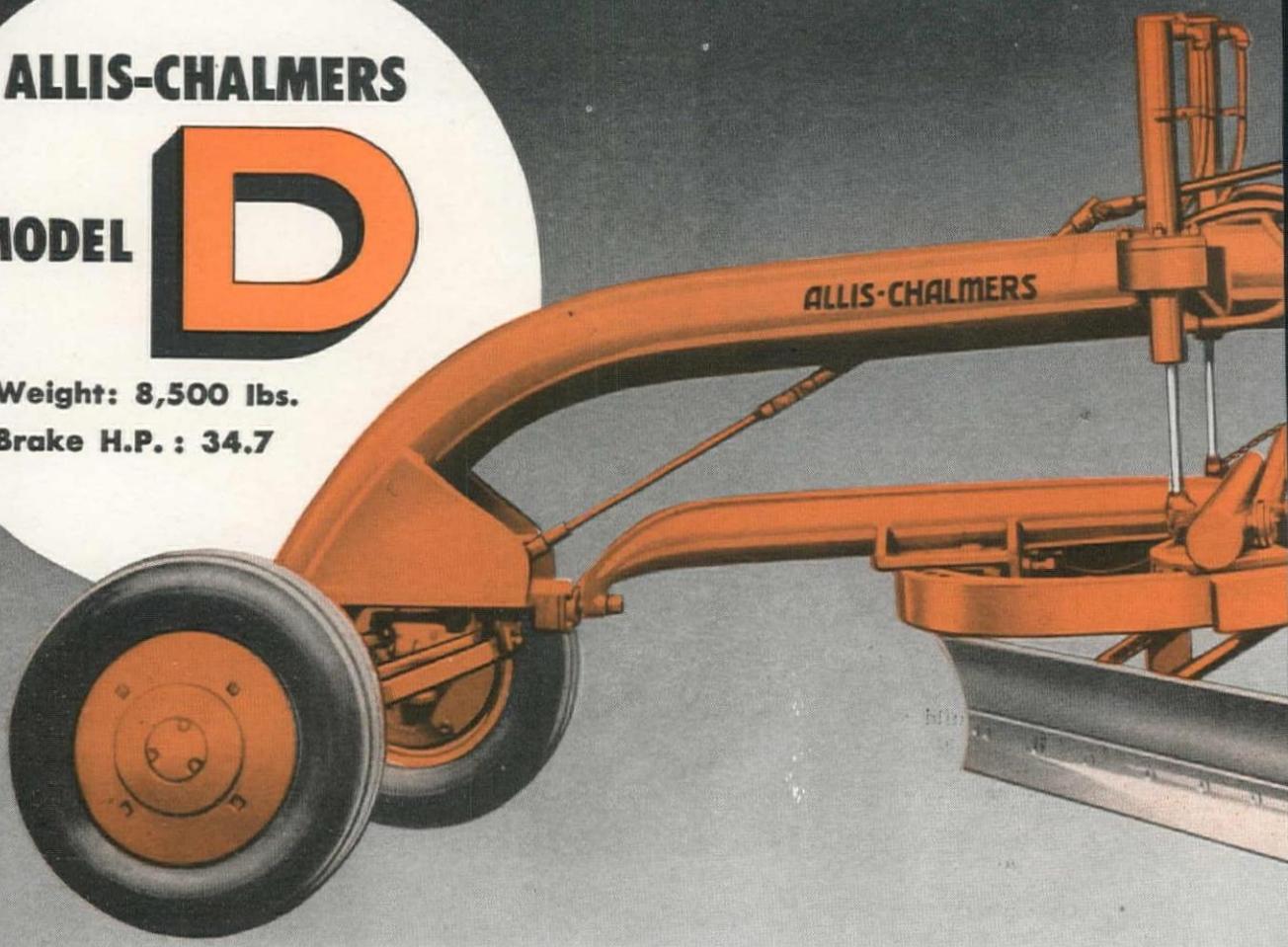
## ALLIS-CHALMERS

### MODEL



Weight: 8,500 lbs.

Brake H.P. : 34.7



**Engineered from the ground up  
—to bring you BIG grader design  
and performance advantages**

*Big in  
Performance*

● **TANDEM DRIVE** — maximum traction at all times, smoother riding.

● **PROPER WEIGHT DISTRIBUTION** — handles bigger loads . . . front-end stability.

● **"ROLL-AWAY" MOLDBOARD** — less power required to move more material at faster speeds.

● **HIGH THROAT CLEARANCE** — rolls larger loads without interference.

● **RIGHT WORKING SPEEDS** — four forward, 2.40 to 18.61 M.P.H.; reverse, 2.37 M.P.H.

● **TUBULAR FRAME AND DRAWBAR** — strong, shock absorbing, better visibility, more working clearance.

*Big in  
Economy*

● **RUGGED POWER** — famous Allis-Chalmers gasoline tractor engine; easy to service, economical to operate — fuel tank holds day's supply.

● **SIMPLIFIED SERVICING** — operating adjustments easily reached, quickly made.

● **ALL-WELD CONSTRUCTION** — strong, long life, stands up under tough service.

SEE YOUR **ALLIS-CHALMERS** DEALER

**ARIZONA**  
Phoenix—Neil B. McGinnis

**NORTHERN CALIFORNIA**  
Oakland—Buran Equipment Co.  
Sacramento—Capitol Tractor & Equipment Co.  
Modesto—J. M. Equipment Co.  
Fresno—Food Machy. & Chemical Corp.  
Paso Robles—E. C. Livingston Co.  
Sacramento—Moore Equipment Co., Inc.

Mountain View—Redwine Tractor Co.  
Visalia—Tulare County Tractor Co.

**SOUTHERN CALIFORNIA**  
Bakersfield—Kern Tractor & Equipment Co.  
Los Angeles—Shaw Sales & Service Co.

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

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

**NEVADA**  
Reno—Dennison Tractor & Supply Co.  
Elko—C. W. Paul Hardware & Machy.

**OREGON**  
The Dalles—Mid-Columbia Supply & Equipment Co.

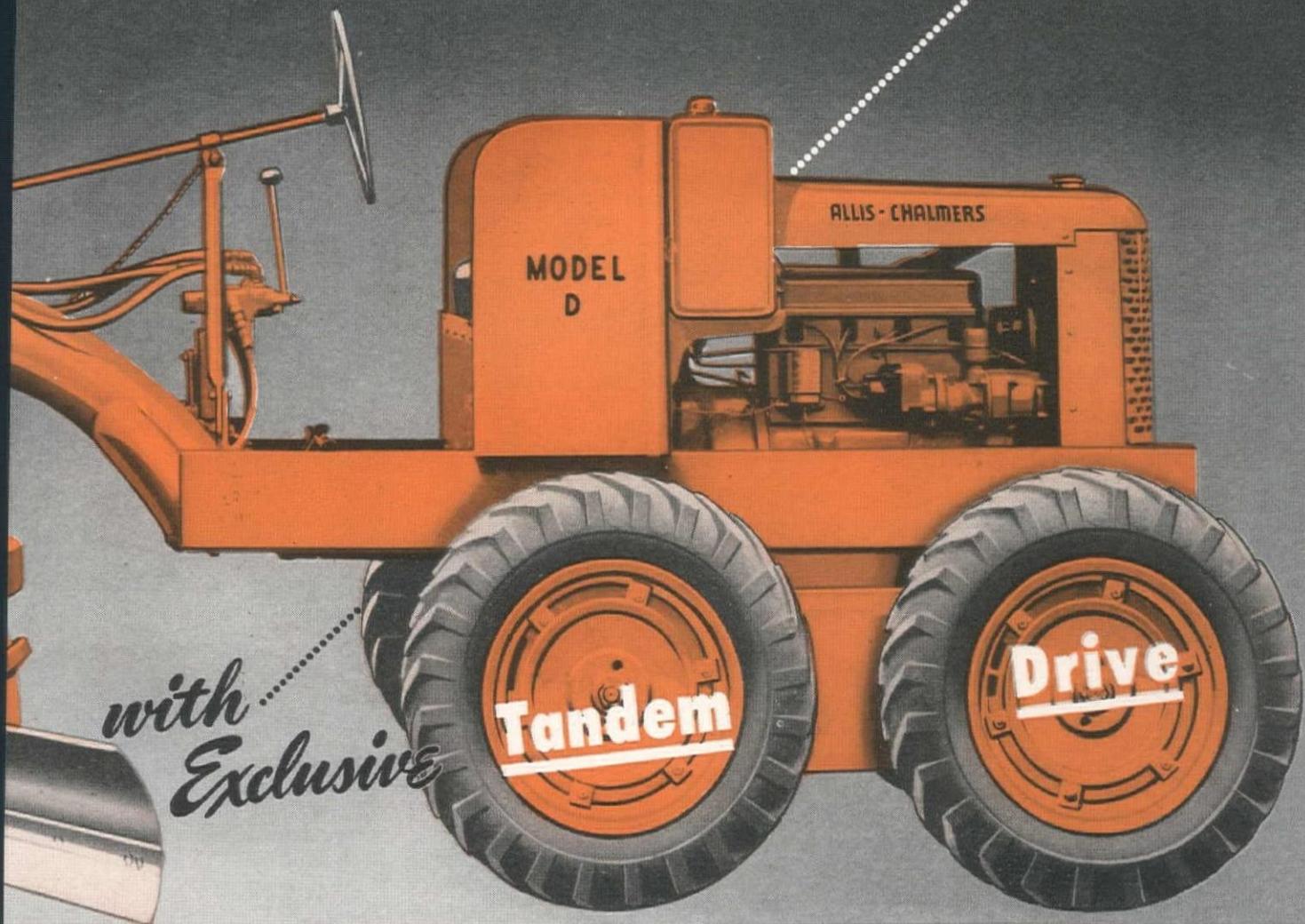
Eugene—Farm & Industrial Equip. Co.  
La Grande—Oregon Tractor Co.  
Medford—Tractor Sales & Service, Inc.  
Redmond—Tri-County Equip. Co., Inc.  
Klamath Falls—West Hitchcock Corp.  
Portland—Wood Tractor Co.

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

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

**WYOMING**  
Casper—Studer Tractor & Equip. Co.

# LOW-COST MOTOR GRADER



*Big in  
Operating Ease*

- **FULL VISIBILITY** — no obstructions, operator can see full blade while sitting or standing.

- **GREATER OPERATOR COMFORT** — roomy platform, comfortable seat, easy to handle.
- **HYDRAULIC BLADE LIFT** — fast, positive, trouble-free; only two control levers.
- **HANDY CONTROLS** — blade angle set from platform; throttle, shift lever, starter, conveniently located next to seat.

Upper half of cab quickly lifted off or replaced.



Scarifier location provides extra down pressure and allows controlled steering.

Watch  
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At Your  
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## SPECIAL ATTACHMENTS

- Hydraulically Controlled Scarifier
- Hydraulic Loader
- All-View Cab
- Snowplow
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# News from Here and There . . .

## Alaska Fuel Survey . . .

MAJOR GENERAL Lewis A. Pick, Chief of Engineers, announces that, in accordance with requests of the Department of the Interior, a \$1,341,637 contract for a survey in 37 states and Alaska, to determine suitable general areas for the manufacture of synthetic liquid fuels, has been awarded to the firm of Ford, Bacon and Davis, Incorporated, of New York City.

General Pick emphasized that the survey is not intended to select specific sites for the construction of synthetic liquid fuel plants, or to determine the total reserves of coal, oil shale, natural gas or oil impregnated stripable deposits in the continental United States and Alaska. No core drilling or extensive sampling will be made.

The Bureau of Mines, the agency having over-all responsibility for the synthetic liquid fuel program, designated the raw materials to be considered in the survey. These are coal, oil shale, natural gas and oil impregnated stripable deposits. The Bureau of Mines also will select the processes of manufacture to be considered and will furnish other technical data. The United States Geological Survey and the Bureau of Reclamation will provide consultant service.

Factors to be considered in determining the general area suitable for the manufacture of synthetic liquid fuels will include the availability of raw materials in sufficient quantity and quality, as well as water supply, power, transportation, labor, housing and markets. The survey of Alaska will be limited to the coal deposits in that portion of Alaska between the 142nd and 152nd meridians and south of the Arctic Circle.

All the 17 Western states are included in the area to be surveyed.

## The Dalles Bridge Site . . .

THE PROPOSED bridge across the Columbia River at The Dalles, Ore., should be built at the Covington Point site near Seufert, 3 mi. east of The Dalles, according to conclusions of a report presented by Seage & Tudor, consulting engineers of San Francisco. Length of the bridge at this site would be 1,458 ft., consisting of a 576-ft. cantilever and two 256-ft. side spans. Estimated cost of the structure was given as \$2,121,000.

## Kings River Power Feud . . .

THE FEDERAL Power Commission has postponed from July 21 to September 22 the oral argument on exceptions to an FPC presiding examiner's recommended decision in the proceeding involving conflicting proposals for development of power resources in the Kings River Basin of central California.

Pacific Gas & Electric Co. and Fresno Irrigation District both are proposing to develop Kings River power, while the

Bureau of Reclamation has drawn up a plan for development of the entire Central Valley of California, including the Kings River Basin. The FPC examiner in his decision found that the public interest "will best be served" if the power resources are developed by the Federal government.

The oral argument was scheduled on motions of Fresno Irrigation District and P. G. & E. Fresno subsequently requested the postponement, and other participants in the proceeding advised the Commission that they had no objections. The oral argument will be held in Washington, D. C.

## Oregon Road Funds . . .

THE NEXT TWO YEARS will see an outlay of \$23,500,000 for roads by the Oregon Highway Commission. Of the total allocated, \$19,573,000 comprises the state's Federal Aid Program, \$1,177,000 will be devoted to major highway improvements, and \$2,750,000 will go for right-of-way for the Sullivan Gulch express highway.

The Commission set aside \$1,250,000 for a new bridge over the Willamette River at Salem and more than \$1,000,000 for connecting streets and approaches to the bridge.

## Narrows Dam Site . . .

CONSTRUCTION of Narrows Dam on the South Platte River in northeastern Colorado will not be started until one of the three alternative sites has been agreed upon by the Bureau of Reclamation, sponsoring agency; the Colorado State Water Conservation Board and local residents. The three possible sites on the river above Fort Morgan all have drawbacks. The one nearest the town would present silting and seepage problems, the next to the west would involve expensive diversion of a tributary stream, and the third farther upstream would inundate the least amount of land but presents the most engineering difficulties.

At a Water Board meeting held in Denver recently, it was decided that no construction would begin until state and local interests give their consent, although action will begin at once toward obtaining a \$2,000,000 appropriation from Congress for the project which is a major flood control unit in the comprehensive Missouri Basin program.

## Point Mugu Work Proceeds . . .

DREDGING and placement of hydraulic fill for site preparation and construction of various buildings, including hangars and barracks, is now under way at the Navy's Guided Missile Test Center at Point Mugu, near Oxnard in Southern California. Work under contract now totals \$8,000,000 in cost, and a proposed \$30,000,000 program for establishment of a 7,000-acre permanent

base at the site is being whipped into final shape. Congress has appropriated \$14,000,000 for the project. Included in the planned \$30,000,000 program are construction of a flight test control center, concrete launching areas for rockets, rocket test pits, laboratories and supply and project buildings. Work on the permanent base should be completed in an estimated three years. The center has been operated for the last two years using temporary facilities.

## Bureau Calls Bids . . .

INVITATIONS TO BID will be issued this month by the Bureau of Reclamation for construction work on a number of large projects. For the following jobs, specifications and bid forms may be obtained from the office of the Chief Engineer in Denver or from regional offices of the Bureau.

**About July 20, 21 or 22:** Earthwork and structures for 12 mi. of the Wyoming Canal 20 mi. north of Riverton, Wyo., (includes excavation of 1,230,000 cu. yd.); transmission lines between Perkins and Tracy and Oroville and Elverta, Calif.; clearing of 4,000 ac. of the Cascade Reservoir site area near Cascade, Ida.; construction of two concrete-lined equalizing reservoirs on the Ogden River Project in Utah, and construction of 4 relief pumping plants with laterals and construction of the Willow Creek pumping plant on the C Line Canal of the Boise Project in Idaho.

**About July 25:** Construction of earthwork and structures for 20 mi. of the Cambridge Lateral System on the Missouri River Basin Project near McCook, Neb.; and construction of earthwork and structures for 6.5 mi. of the Cambridge Canal.

**About July 29:** Construction of three reinforced concrete pumping plants and installation of equipment and sewerage systems on the Wellton-Mohawk Canal about 20 mi. east of Yuma, Ariz., and construction of 26 mi. of H-frame, wood-pole transmission line between Wray and Yuma, Colo.

**During the next two months,** the Bureau expects to invite bids on the following projects:

**Canals:** Earthwork, structures, etc., for 8.5 mi. of the Delta-Mendota Canal near Ora Loma, Calif.; excavation for 6.5 mi. of the Potholes East Canal 16 mi. west of Warden, Wash.; earthwork and structures for 5 mi. of the Poudre Supply Canal near Fort Collins, Colo., and construction of two precast concrete pipe siphons near Paonia, Colo.

**Earthfill Dams:** Construction of Keyhole Dam, 109 ft. high and 3,300 ft. long at the crest, to be located on the Belle Fourche River near Moorcroft, Wyo., and construction of Moorhead Dam and Dike near Moorhead, Mont. This dam will be 190 ft. high and 2,660 ft. long at the crest; the dike will be 25 ft. high and 540 ft. long at the crest.

**Miscellaneous:** Erecting steel structures, placing concrete, etc., for Tracy switchyard at Tracy, Calif.

# PERSONALLY SPEAKING

**W. A. Bugge**, Managing Engineer of the Pacific Coast Division of the Asphalt Institute since early last year, has been appointed Washington State Highway Director by Governor Arthur B. Langlie. Bugge is a native of Washington, and served on the department's engineering staff from 1922 to 1926 and again in 1928. He was also County Engineer of Jefferson County in Washington and City Engineer of Port Townsend, Wash. His background also includes several years as construction engineer for Washington contracting firms. He is a member of the Highway Research Board and the American Road Builders Association.

Max J. Bartell, "Father of San Francisco's Cherry River Project," has resigned as San Francisco's Chief Hydraulic Engineer. For many years his work has been on the expansion and use of the Tuolumne River, San Francisco's main water source. His resignation came as San Francisco voters were due (November) to vote on a bond issue to finance the \$12,000,000 Cherry River Dam. Bartell is 69 and had been with the city for 41 years.

**R. P. Newland**, District Highway Engineer for the Washington State Highway Department at Spokane for the past ten years, has been named Washington State Highway Maintenance Engineer. He succeeds **James H. Marshall**, who is now right-of-way engineer for the Washington State Land Commission.

Establishment of a new system for the municipal engineering department at Great Falls, Mont., has resulted in the appointment of two assistant city engineers, according to City Engineer

## COL. O. E. WALSH, duties expanded



**R. E. McCormick**. They are **J. Martin Carroll**, formerly with the engineering department of the Anaconda Copper Mining Co. at Great Falls, and **A. J. Richardson**, with the city engineer's office for the last three years. Under the new setup, the two assistants will specialize. Carroll will be in charge of office duties, while Richardson will be in charge of surveys, inspection and field work.

John R. McKinney of Payette, Ida., has been appointed Commissioner of Public Works for the State of Idaho, succeeding **E. W. Sinclair**, who resigned three months ago. Acting Commissioner since Sinclair's resignation has been **James O. Reid**, Idaho's Director of Highways.

Gilbert E. Morris, Superintendent of Building for the Department of Building and Safety at Los Angeles, is the elected President of the American Society of Building Officials. **Harold O. Rasmussen**, Chief Building Inspector at Santa Ana, Calif., was named Second Vice-President.

Clyde Chaffins, Spokane, Wash., County Engineer, is the elected President of the Washington State Association of County Engineers. **John Patterson** of Port Angeles was named vice-president, and **Don West** of Chelan was elected secretary-treasurer.

Alfred J. Ryan, consulting engineer of Denver, Colo., is the elected President of the Professional Engineers of Colorado, a unit of the National Society of Engineers.

Col. Theron D. Weaver was relieved of his post as North Pacific Division Engineer for the Army Corps of Engineers July 1, a position he held since March, 1946. He is being reassigned to an overseas post in the European command. The European job will be nothing new for him. He served there during and after World War II, with the specific task of restoring industry in the American Zone of Germany. Replacing Col. Weaver as North Pacific Division Engineer is **Col. O. E. Walsh**, Portland District Engineer. Col. Walsh served in the Southwest Pacific theater during the war and came to Portland as District Engineer in January, 1946. In his new position, his offices will remain at the same location (Pittock Block, in Portland), but he will have charge of Engineer activities throughout Oregon, Washington, Alaska and portions of Idaho and Montana.

Other reassignment of key personnel in the Pacific Northwest includes the transfer of **Col. L. H. Hewitt**, Seattle District Engineer, to the Panama Canal

Zone. **Col. Emerson C. Itschner**, present head of military construction in the Chief Engineer's office at Washington, D. C., is coming to Seattle in August to replace Hewitt. Hewitt was Seattle District Engineer for the past three years.

B. C. Gosney, water superintendent at Auburn, Wash., is the new chairman of the Pacific Northwest Section of the American Water Works Association. Other new officers are **Elmo James**, water superintendent at Spokane, Wash., as vice-chairman; **Oscar P. Newman**, secretary of the Boise, Ida., Water Corp., as secretary-treasurer, and **Arthur Musgrave**, City Engineer of Oak Day, B. C., trustee.

Dr. Dean F. Peterson, Jr., Associate Professor of Civil Engineering at Utah State Agricultural College, has been named new head of the Civil Engineering Department at Colorado A & M College in Fort Collins. He succeeds **Robert L. Lewis** who resigned to become Chairman of the Civil Engineering Department at New York University. Peterson has served as irrigation consultant to the Utah State Engineer's office on the Upper Colorado River Basin Compact, and was project engineer for construction of a large dam in Maryland.

John L. Stackhouse, who has been acting as temporary chairman, was elected chairman of the Pacific Northwest Conference of the American Society of Civil Engineers at the organization's first annual meeting. He is a civil engineer from Olympia, Wash. **Thomas H. Campbell** of Seattle, Wash., was elected vice-chairman, and **Fred Langdale** of Tacoma, Wash., was named secretary. The conference, attended by

## COL. T. D. WEAVER, reassigned





Fisher Bros. Construction Co., Farmington, Minn., using Telsmith Dual Portable with standard truck-loader and field conveyor.

# TELSMITH

*Dual*

# POR TABLE

CRUSHING - SCREENING - LOADING

# PLANTS

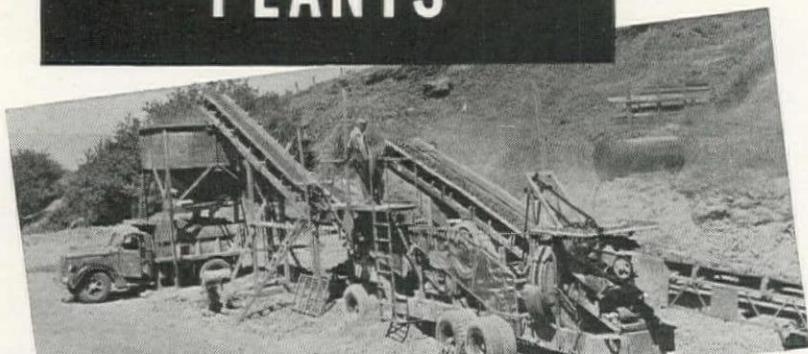
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...with DEPENDABLE  
LOW COST OPERATION

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This one-man-operated, quickly moved, easily set up Telsmith portable outfit may be had in any one of the three styles of plants illustrated; and with any one of three types of drives—flat belt . . . V-rope with direct connected coupling . . . engine mounted on plant, with V-rope drive. Get Bulletin P-30.



*Left, top:* A Bin-loading Telsmith Dual Portable with field conveyor, owned by Colonial Construction Co., Spokane, Wash.

*Left, bottom:* Truck-loading Telsmith Dual Portable with shoveling hopper on end of plant; no field conveyor. Operated by Braun Construction Co., Fond du Lac, Wisconsin.

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Spokane 1, Wash.

Lee Redman Equipment Co.  
Phoenix, Arizona

The Sawtooth Co. Gordon Russell, Ltd.  
Boise, Idaho Vancouver, B.C.

representatives from Washington, Oregon, Idaho and Montana, pledged to unify and expand ASCE activities in the Pacific Northwest. The first meeting was featured by a panel discussion on the proposed Columbia Valley Authority.

Carl E. Green, consulting engineer with John W. Cunningham & Associates of Portland, has received national recognition for work in the field of sewage disposal. He was awarded the Arthur S. Bedell medal from the National Federation of Sewage Works Associations for "outstanding service."

R. J. Ephland, highway district engineer at Billings, Mont., and oldest man in the Montana State Highway Department from the standpoint of service, retired June 1. He was succeeded by E. B. Martin, now in the state's road plans division in Billings. Martin came to the department in 1929 from South Dakota, and has been a resident engineer in charge of eastern Montana highway construction projects.

Elmer Biegel, for the past 8 years Assistant City Engineer of Ashland, Ore., has advanced to the position of City Engineer upon the retirement of F. H. Walker.

The new Central Arizona Chapter of the Society of Professional Engineers has selected Carl C. Huskison of the Arizona Blueprint Company as its president at its organizational meeting. Walter A. Burg of the Arizona State Highway Department was named vice-president. Neil McLeod, engineering professor at Phoenix College, was named secretary-treasurer.

Frank T. Waldeck, formerly with the Bureau of Reclamation at Antioch, Calif., and more recently resident bridge engineer with the Rhode Island Public Works Department, is now with the Army Corps of Engineers at Sacramento, Calif., where he is working on the design and control of concrete for Pine Flat and Folsom Dams.

G. Smith recently replaced George Brown as City Engineer at Vancouver, Wash. Smith was previously City Engineer of Camas, Wash., for 14 years.

George Cundiff, City Engineer at Elko, Nev., has resigned to accept an engineering position in Dallas, Texas.

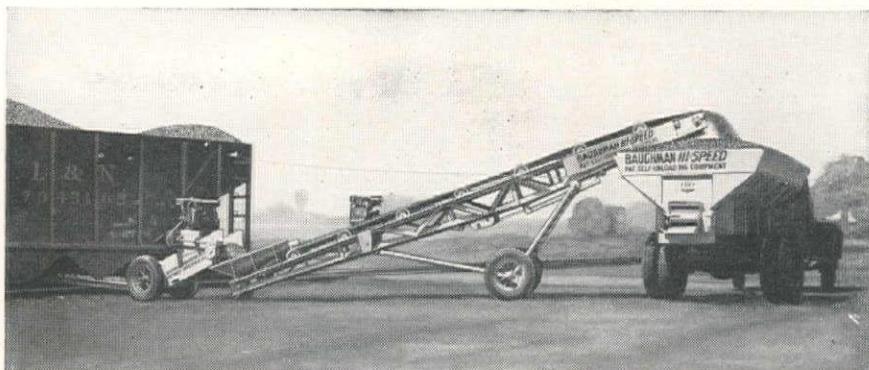
The Portland Cement Association district offices in Dallas and Austin, Texas, have been consolidated into a single district office located in Austin, and James D. Piper, formerly the Association's District Highway Engineer in Dallas, has been appointed District Engineer in charge of all Association work

designed for all materials

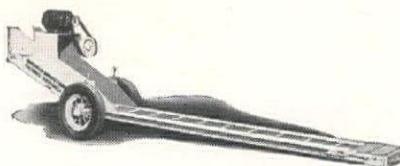
# Baughman

HI-SPEED PORTABLE

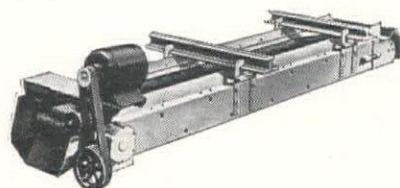
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in Texas. Piper is a licensed architect, a registered professional structural engineer in Texas, and an associate member of the American Society of Civil Engineers. **Charles A. Clark**, who has been in charge of PCA activities in Texas in other than the highway paving and bridge fields, will continue with the Association as Office Engineer in the newly-consolidated Austin office. He has been with the Association for 27 years.

**Robert Edward Lee** of Limestone, Maine, has been named resident engineer for the Corps of Engineers on construction of Meridian Dam on the Middle Fork of the Willamette River in southwest Oregon. **Thomas G. Waring**, acting resident engineer, has been reassigned as assistant to Lee. Lee, before his transfer, was construction engineer on a \$16,000,000 Army air base near Boston, Mass.

**John L. Savage**, retired chief designing engineer of the Bureau of Reclamation, is in the news in a big way once again. He has been engaged by the Government of Turkey to make a study of the reorganization of hydraulic works and methods of financing them. He also has been requested to visit the new government of Israel to discuss reclamation. Savage, who directed the designing of Grand Coulee, Hoover and Shasta Dams during his career with the Bureau of Reclamation, has been something of a roving ambassador since his retirement in 1945. He is currently in India, and his passport shows visits to Australia, Afghanistan, Ceylon, China, Egypt, France, Greece, Italy, Mexico, Netherlands East Indies, Palestine, Pakistan, Philippines, Siam, Spain, Switzerland and the United Kingdom.

Establishment of the Rigby, Idaho, field office as a resident engineer office with responsibility for all construction work under the Army Corps of Engineers on the Snake River and tributaries above the confluence of Big Wood River has been announced by **Col. William Whipple**, Walla Walla District Engineer. At the same time, the appointment of **Walter J. Murphy**, who recently transferred to the Engineers' Walla Walla District from the Seattle District, as resident engineer at Rigby was announced. Formerly the Rigby office operated as a branch office under the direction of **Leonard G. Estey**, Boise resident engineer.

**L. F. Martin** has retired as District Engineer of the Public Roads Administration in Missoula, Mont., concluding an active engineering career of service. Receiving his discharge as a Captain in the Army Engineering Corps after the First World War, he went to Missoula in 1920 as bridge engineer with PRA. He was placed in charge of the Missoula offices and personnel in 1937, and under the reorganization plan, became District

Engineer in 1945. **Karl Chamberlain**, who has been with the Public Roads Administration for 23 years, has recently gone from Boise, Idaho, to Missoula to succeed Martin.

After many years of service, **William E. Hague** has resigned from his position as Secretary-Manager of the Central California Chapter of the Associated General Contractors of America. Under his management, the chapter has gradually built up into the largest Building Chapter of AGC. **Frank G. Corker**, noted labor and management consultant, has been named by the chapter's executive board to fill the vacated position. Although Hague will take a well-earned vacation and rest, he will continue as a consultant to the chapter's board of directors.

**R. F. Westover**, formerly responsible for highway maintenance in Pacific and Wahkiakum Counties and part of Lewis County for the Washington State Highway Department, has resigned to take a position as road superintendent for King County, Wash.

**Lt. Col. Lawrence J. Lincoln** has been appointed Denver District Engineer, Corps of Engineers, it was announced by **Colonel Louis W. Prentiss**, Acting Division Engineer for the Missouri River Division. Colonel Lincoln has been stationed at Fort Shafter, Hawaii, since June, 1948, and will succeed Lt.

## OBITUARIES...

**Sheldon A. Modglin**, 54, chief construction engineer for M and K Corporation, general contractors of San Francisco, died of a heart attack June 18. He served with the Army Engineers during World War I, and was with the M and K firm since 1914, supervising many of their outstanding projects. At the time of his death, he was in charge of work at the \$8,000,000 sewage disposal plant at North Beach.

**Frank C. Cuffe**, 48, widely known mining and construction engineer, died in San Francisco on June 16 after a six months' illness. At the time of his death, he was president of River Pines Mining Co. of Plymouth, Calif., engaged in river dredging. Before he took up mining, Cuffe was engaged in road construction for 20 years.

**Willard L. Fullmer**, 65, one of the owners of Fullmer Bros., contractors of Salt Lake City, Utah, died recently.

**Daniele P. Peressini**, 75, retired contractor of Havre, Mont., died June 11.

**Benjamin F. Wade**, consulting engineer for the California Redwood Asso-

**Col. Craig Smyser**, who has been transferred to Washington, D. C., to serve as executive officer to **Maj. Gen. Lewis A. Pick**, new Chief of Engineers.

**C. Fred Capes**, construction and maintenance engineer of the Denver Division of the U. S. Public Roads Administration, has left the Washington, D. C., office for Ecuador, South America, where he will serve as a consultant to that government for a period of two years.

**David R. May**, Bureau of Reclamation Construction Engineer in charge of the Gulch Dam at Mancos, Colo., has left the Denver office for Washington, D. C., where he will be assigned to duty in Salisbury, Southern Rhodesia, to act as consultant on an earth-fill dam project in the African city. May was formerly Office Engineer for the Scofield Project at Price, Utah, before heading the Jackson Gulch Dam.

**Patton N. Syler**, formerly with the Arizona State Highway Department for 15 years and recently superintendent for Arizona highway contractors, is now assistant to **Julius Irion** on state highway work in Maricopa County, Ariz.

**George S. Sherman**, formerly of the Materials and Research Laboratory at Sacramento, is now attached to District III of the California Division of Highways at Marysville.

ciation since 1936, died suddenly at his home in San Francisco May 31. A member of the American Society of Civil Engineers and an officer of the Forest Products Research Society, he helped to pioneer many industrial applications of redwood.

**James F. Dickason**, 55, contractor, of Culver City, Calif., shot himself to death in an apparent suicide on June 18.

**Mark Tuttle**, for many years manager of the Intermountain Branch of the Associated General Contractors of America at Salt Lake City, Utah, died recently in Los Angeles, where he had been living since his retirement in 1947.

**John F. Gorman**, contractor of Spokane, Wash., died recently.

**Douglas Rose**, 58, building contractor of Los Angeles, died May 22.

**Earl C. Elliott**, 71, power engineer, who served as the head of water power and electric companies in Oregon, Indiana and California over the past forty years, died last month in San Francisco. He was a member of the American Society of Civil Engineers.

# SUPERVISING THE JOBS

Earl Williams is project manager, T. L. Terry is project superintendent and P. L. Schneider is assistant project superintendent for Utah Construction Co., main contractor for construction of Davis Dam, the Bureau of Reclamation's huge multiple-purpose structure on the Colorado River 67 mi. upstream from Hoover Dam. Other Utah personnel currently includes: Paul Newell, project engineer; W. T. Lloyd, field engineer; Art E. Manning, office engineer; Ted Richards, office manager; Bill Ketro, camp manager; Cliff Sansburn and L. Jones, carpenter superintendents; C. Stevenson and Archie Jeffries, general carpenter foremen; George Nethercott, foreman in the carpenter shop; H. K. Thiesen, master mechanic; Hal Meyer, welding superintendent; Mel Whitsell, manager of the shop office; R. E. Tarver, general equipment foreman; A. W. "Bud" Sutherland, superintendent of the batch plant; Frank Masterson, superintendent of transportation; D. D. Carter, superintendent of excavation; Art Winfrey, labor foreman, and Bill Destal in charge of Utah's Kingman equipment yard.

Penstocks at Davis Dam are being fabricated by Southwest Welding & Mfg. Co. of Alhambra, Calif. with W. E. Casper as project manager, R. Garity as superintendent, and Ed Jones as foreman. The 22-ft. diameter expansion joints on the penstock pipes are the biggest ever made on a Bureau of Reclamation project. The penstocks are being installed by J. H. Pomeroy & Co., San Francisco, who are also the contractors for installation of steel structures on the project. J. R. McDonald is the project manager for Pomeroy. William Little is superintendent, Ed Kowell is engineer, and foremen include Joe Williams, Carl Payne and Jerry Hipsley. For steel subcontractors, Rutherford-Skoubye and Stolte, Inc., Harry Rutherford is superintendent, V. O. Wheatley is project manager and Jack Reynolds is office manager.

Bureau of Reclamation personnel at Davis Dam currently includes: H. Bahmeier, construction engineer; Jean Walton, field engineer; Harold Orr, J. D. Seery and Charles Inman, office engineers; H. McInnis, in charge of earthwork; Ernie Burke, in charge of inspections; Frank Dallor, in charge of surveys, and Aubrey Walker, in charge of grouting.

Don Osborne is the general superintendent for Newstrom-Davis Construction Co. of Denver, Colo., on their \$750,000 contract for construction of facilities for a dog race track in Denver. W. A. Gill is engineer in charge of the work

and C. J. Rawalt is purchasing agent and expeditor. Foremen on the job are Horace Jones, Joy Cooper, Bill Osvrik and Slim Kuhn.

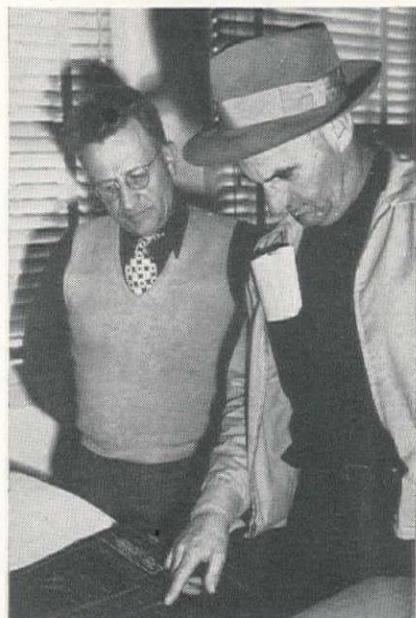
Roy J. Hill is the superintendent for Peter Kiewit & Sons' Co., on their \$874,000 contract for construction of 3.7 mi. along the Ridge Route in Southern California. Fred Welsh is the general foreman, Brinton Turner is the job engineer, and master mechanics are Maurice Kennedy and Ernest Lane. John Daugherty is the shovel foreman, and scraper foremen are Harry Kauffman and Lonnie Lawler. Camie Jarvis is labor foreman and O. K. Hoepner is the job office manager. A. F. Jones is time-keeper and Albert Robbins is oiler foreman. L. E. Crane is resident bridge engineer for the California Division of Highways and R. E. Deffebach is resident highway engineer.

Charles Utley is the superintendent for C. C. Moore Co. of San Francisco on construction of the \$750,000 steam generating plant at Tempe, Ariz., for the Salt River Valley Water Users Asso-

ciation. The 7500-kv. turbine generator plant is nearly completed. Clarence A. Johnson is electrical superintendent, Jules Maugé is electrical foreman, Fred Phillipi is pipe foreman, Dave Aldrich is carpenter foreman, and Bob Nigh is labor foreman. Max Davolt is the job office manager. E. L. Emerson is on the job as representative for the General Electric Co. Representing the Water Users on the job are Calvin Kirk, superintendent; L. A. Highly, assistant superintendent, and Bill Wallace, superintendent of Diesel equipment.

Ewing Storm and James McKay, both with a varied background of construction experience have formed a new construction company at Great Falls, Mont., to be known as Storm-McKay Construction Co. Storm was superintendent of construction in Glacier National Park, and McKay has been engaged in the construction of concrete block houses in northern Montana.

Charles J. Dorfman, contractor of Los Angeles, is constructing the power line from Parker Dam to Davis Dam, a distance of 70 mi. Louis Dorfman is managing the project, and foremen include



Photos courtesy Em Kayan.



FOR ECONOMICAL

# *Water Storage*

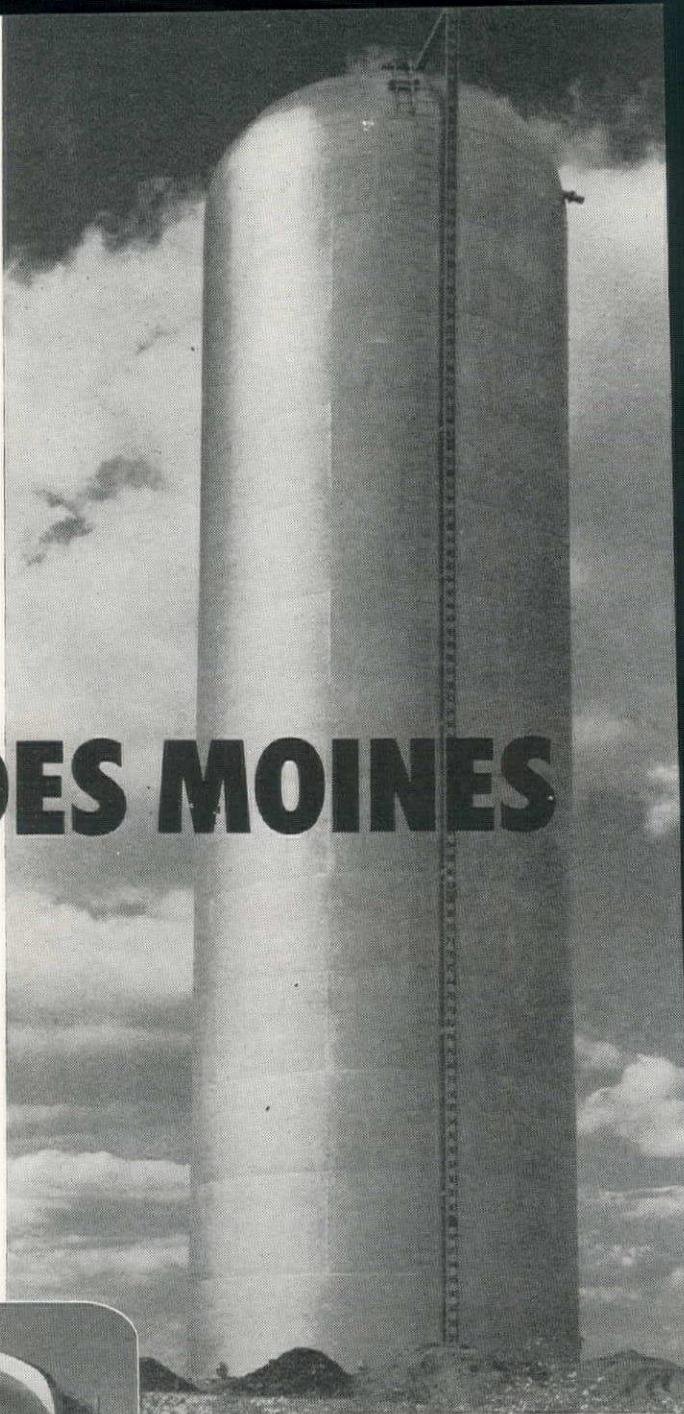
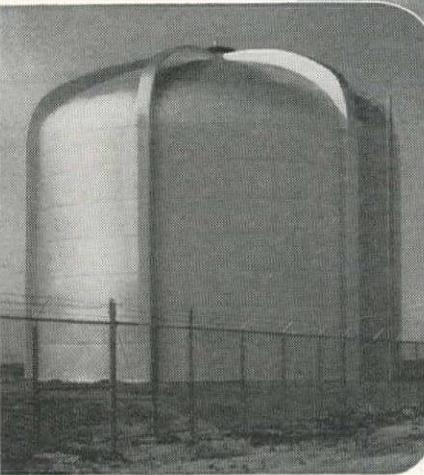
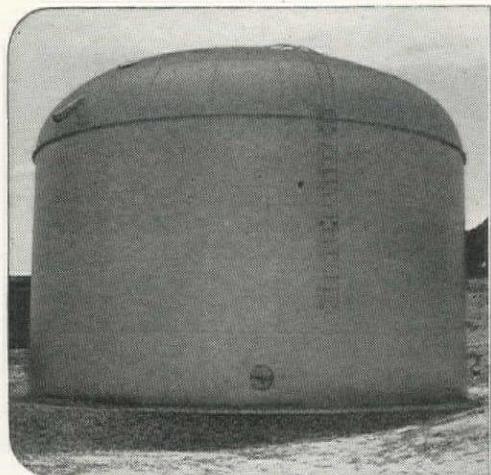
AT NATURAL ELEVATIONS

# PITTSBURGH-DES MOINES

## Standpipes

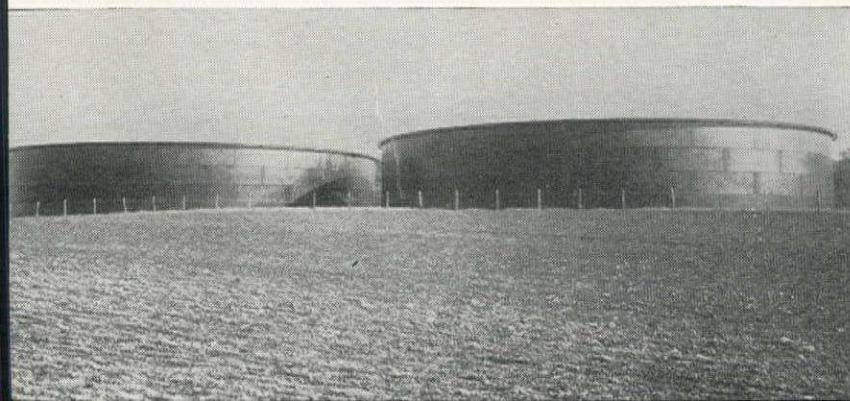
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## Reservoirs



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**SUPERINTENDING** construction of the Los Angeles County Sheriff's building for Curlett Construction Co. of Long Beach are, l. to r.: BOB CLINE, labor foreman; L. E. DAVIS, sawyer; ED. PENNEWELL, job superintendent, and JIM TALLEY, carpenter foreman.

Leo Dietrich, Earl De Pugh, L. Reed and Charles Houlgate. Erection of the towers is under subcontract to J. R. Cantrall Co. of Los Angeles with A. B. Cox as raising foreman, Lew Youngstafel and Mark Hentis as assembly foremen, and Cy Joyce as yard foreman.

U. S. B. Companies (a joint venture of United Concrete Pipe Co., Stolte, Inc., Ralph A. Bell and the Arizona Sand & Rock Co.) is constructing 325 mi. of power line between Davis Dam, Hoover Dam, and Prescott and Phoenix, in Arizona. Superintendent for the project is R. W. Drake, formerly superintendent for Rutherford-Skoubye and Stolte, Inc., on their work at Davis Dam. Charles Gould is superintendent of steel erection; M. E. Hanger is concrete superintendent; Leo F. Young is excavation superintendent; Clyde Watkins is camp manager; William Lytle is project engineer, and Paul Clifton is concrete foreman.

Frank Lusk is the superintendent for H. F. Lauritzen of Pittsburg, Calif., subcontractor to Morrison-Knudsen Co., and M. H. Hasler for construction of timber and concrete bridges and overpasses on the Delta-Mendota Canal near Tracy, Calif. Floyd Carbaugh is general foreman, and carpenter foremen are Phil Storal and Pete Phillips. Labor foremen are Tony Mills, Roy Johns and Bob Perry.

B. A. Wheeler is the master mechanic at Guy F. Atkinson Company's maintenance shops in South San Francisco. Odis Roling is the shop foreman. Other foremen are H. R. Thompson on motor work, Pete Johansen in the fuel pump room, Jeno Brusatori as head lathe man, M. C. Casstevens as tire foreman, Bob Whitfield as welder layout man, Lee Truesdale as head warehouseman, and M. Spears as shop layout man.

Julian W. Powers is the general superintendent for Matich Bros. and E. L. Yeager of Riverside, Calif., on their section of the Los Angeles River Channel Improvement Project from Tujunga Wash to Whitsett Ave. M. Kruse is the bridge structures superintendent and

Jack Matich is heavy equipment superintendent. George Pope is the grading superintendent and L. C. Cole is field engineer. Roger Williams is the job office manager. Sam Payton is master mechanic, Leslie Anderson and Pete Owens are carpenter foremen, and William Schmidt is design engineer. Eugene Yeager is the purchasing agent.

James Cagle is the superintendent for A. Teichert & Son, Inc., Sacramento, Calif., on their \$2,800,000 contract for construction of flood control facilities along Tujunga Wash in Los Angeles County. Art Murphy is the assistant superintendent and L. F. deStwolinski is the job engineer. Art Harrisberger is the carpenter superintendent, and car-

penter foremen are S. G. Gleim, Nils Johnson, K. W. Towle and Paul Veeder. Wade Johnson and J. O. Sheldon are equipment foremen, and Roy Hamm is master mechanic. Robert Smith is the job office manager. Jack Hanafin is on the job as contractor representative for General Petroleum Corp.

George Waters is project manager for S-U-H-B Co., joint venture firm of Oakland, Calif., on construction of the Delta-Mendota Intake Canal and pumping plant near Tracy, Calif., for the Bureau of Reclamation. Charles Champion is the general superintendent. Victor McFarland is concrete superintendent, and cement finisher foremen include James F. Hegarty, John James Moore and Ce-

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cil R. Spencer. Carpenter superintendents include Charles Ballard, John L. Becker, Robert W. Busse and Wille G. Hartshorn. Labor foremen include Rudolph Chmelka, Vincent E. Mork and Worth Hawkins. W. R. Mathews is superintendent of excavation equipment, Jack Corbett is excavation foreman, and Roy H. Edwards is equipment foreman. Bud M. Bruhn is steel foreman, F. Barone is pipe foreman and R. Rice is yard foreman. Foremen at the repair shop are A. V. Barker and Hatley Bardine, and structural iron worker foremen are C. M. Reaster and Herbert J. Skinner. Vern McGregor is in charge of welding in the repair shop, Peter Smolenski is foreman for the discharge lines reinforcement.

ing steel, and carpenter foremen include Harvey Adams, Leo French, Estil Stiles, Orchard Watson and John Wright. Wesley Holden is in charge of the warehouse. Designer on the job is William Giddings and chief draftsmen are Eric Essex and Arthur Froerer. John Weicksel is chief-of-party. Job office manager is Warren Mooers.

building at Wilmington, Calif. Assisting him are Clarke Cherry, engineer; Scottie Noble and Lee Wire, carpenter foremen; Frank Garcia, labor foreman, and P. D. Benson, office manager. Cement finisher foreman is Jack Isom. Grading is being done by the Griffith Co. with Jack Belding in charge, assisted by George Harrison in charge of cement work.

William G. Brownie, for 5 years a Major in the Army working in the South Pacific area and more recently a project engineer with the Federal Works Agency, is superintendent for Baruch Corp., Los Angeles, supervising completion of the Harbor Junior College

Louis Schmidt is the superintendent on construction of the \$800,000 David Starr Jordan High School at Long Beach, Calif. Frank Dennison is carpenter foreman and Bill Bird is labor foreman.



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Superintendent for G. Iannini, contractor of Manhattan Beach, Calif., on construction of 59 houses for the Pacific Hills Corp. in Torrance, Calif., is E. M. Kast. Virgil Carpenter is the carpenter foreman.

On construction of sanitary sewers at Geraldine, Mont., Olin McElroy is the project manager and Earl A. Gray is the general superintendent for Gray Co., Inc.

James W. Henry is the superintendent for Harms Bros. of Sacramento, Calif., on the reconstruction and paving of 7 mi. of state highway near Madera, Calif. Cliff Jasper is general foreman, and L. H. Beal is master mechanic. Other foremen on the job are C. C. Woods and Oliver Plemous. Resident engineer for the state highway department is C. F. Oliphant and Joe Landers is his assistant.

C. A. Olein is superintendent for B. H. Maland & Sons, contractors of Santa Paula, Calif., on construction of the new Pleasant Valley School at Camarillo, Calif.

Emmett Odum is the general superintendent for Daley Corporation, San Diego, Calif., on their \$750,000 contract for construction of the Alvarado Canyon Freeway near El Cajon, Calif. Ed Dulin

s grading engineer, and Bob Caswell and Jim Saucedo are grading foremen. Dale Paddock is in charge of culvert construction. Bill Rogers is the job office manager. Bridge work on the project has been subcontracted to Oberg & Cook of Gardena, with Walter Cook as superintendent. Caudell & Johnson of San Diego are subcontracting for production of aggregate, and Art Johnson of that firm has designed a special rock plant to produce the crusher run base. Ed Stratton was in charge of construction of the rock plant, and Marion Stewart is the master mechanic.

E. W. Simpson of Los Angeles is general superintendent for Canyon Constructors joint venture on the \$12 million Canyon Ferry Dam project on the Missouri River in Montana. Canyon Constructors expect to open an office in Helena and will soon be receiving heavy equipment and construction machinery there.

A. Aegeuter is project superintendent and W. E. Bradbury is assistant superintendent for James I. Barnes Construction Co., Santa Monica, Calif., on construction of the Veterans Administration Hospital at Fresno, Calif. Barnes holds the general contract for the job. Roy E. Webb is the contractor's expeditor, and Leslie Liess is job engineer. Lloyd Westfall is carpenter superintendent, and carpenter foremen include Orville Beatty, Kelly Smith, Lee P. R. Sallee and Gus Bell. Emmett Fore is labor foreman, George Sanders is steel foreman and Grover Dillon is cement finishing foreman. Ray Eastburn is the job office manager. For Anderson & Rowe, Inc., who have the subcontract for plumbing and mechanical installations, S. L. Berg is superintendent, and foremen include C. G. Crouch, J. V. Munson, E. R. Bates, C. S. Grace, H. H. Mohr and John Powell. For Fielding Electric Co., Jack Eby is superintendent and foremen are Roland Davis, Herb Douty and Pete Thompson. Paul Confer is superintendent for R. I. Johnson, plastering subcontractor, and M. R. McCauley is superintendent for Fresno Marble & Tile Co. E. M. Kanzle is the resident engineer for the Army Corps of Engineers, and Stan Bonnumort is chief building inspector. Other engineer inspectors include M. G. Harris and Bob Mitchell.

J. G. Benson is general superintendent on all operations for the Bentson Contracting Co. of Phoenix, Ariz. Dan Moats is superintendent of operations in the Phoenix area, and James E. Power is superintendent in the Casa Grande area. Boyd Skidmore is master mechanic for the firm, and Louis Diehl is labor foreman.

H. A. Lind is the general superintendent for Kuckenberg Construction Co. of Portland on construction of the North Santiam Highway between Gates



**CAMERA CLICKS** of key personnel on Pacific Gas & Electric Company's \$62-million hydroelectric project in the Feather River Canyon north of Oroville, Calif. In the top row, left to right: JACK E. COONEY, project superintendent for P. G. & E. at Cresta Dam; GUNNAR NYGARD, Morrison-Knudsen's superintendent on the Cresta Powerhouse; ED W. WISMER, partner in the Wismer & Becker firm of Sacramento who are installing the equipment at Rock Creek Powerhouse; ED BOWMAN, superintendent for erection of turbines at Rock Creek Powerhouse, and C. B. REESE, superintendent in charge of electrical and mechanical construction at both powerhouses for P. G. & E. Bottom row, left to right: JACK WEST, Morrison-Knudsen's superintendent on Rock Creek Dam; DAVID AGEE, M-K carpenter foreman on Rock Creek Dam; CHARLES E. JOSLIN, engineer in charge for P. G. & E. at Cresta Dam; MIKE H. DONAHEY, resident engineer for P. G. & E. on Cresta Powerhouse; GENE TUFTS, superintendent on Rock Creek Powerhouse for Walsh Construction Co., and JOHN W. WOODWARD, resident engineer for P. G. & E. at Cresta Dam.

and Detroit, Ore. L. Franklin is engineer on the job and E. C. Larkins is the office manager. Foremen on the job include Ed Pinkston, Bill McFall, Paul Menard, Dick Mortensen, Lou Mace, Bill Abel and B. Beisell.

On a large paving job in Kalispell, Mont., Fred Kirkpatrick is acting as general superintendent and Theodore Kirkpatrick as project manager for Kirkpatrick Brothers, the contractors. William Hebert is the job engineer and Clyde Parks is foreman. Ray Spurzem is resident engineer for the Montana State Highway Department.

On construction of the \$635,000 Junior-Senior High School at Boulder City, Nevada, Lewis G. Biel is superintendent and C. W. "Bill" Johnson is carpenter foreman for Lembke Construction Co. of Las Vegas.

Carl Johnson is the superintendent for H. C. Smith of Los Angeles on construction of a large building for the Western Wax Co. in Los Angeles. Charley Larson is foreman on the project and Frank Hyman is the job engineer.

George Lyle is the general superintendent for Silas Mason Co., Shreveport, La., on drilling of the 30-ft. diameter tunnels for the Pickstown Tunnel Project in South Dakota. A total of twelve tunnels, each 900 ft. long, are included in this phase of the Corps of Engineers' project. Assistant superin-

tendents are Louis Pitman and Charles Maxey. "Pete" Ciucci is in charge of the day-shift drill crew, and E. J. Fitzgerald is in charge of the swing shift.

Joiner Construction Co. is a new heavy construction firm located at 3285 Atlantic Blvd. in Long Beach, Calif. L. A. Joiner is the owner. B. J. Bryce, formerly of Bryce Construction Co., Wilmington, is superintendent of all work for the new firm, and J. G. Anderson is foreman.

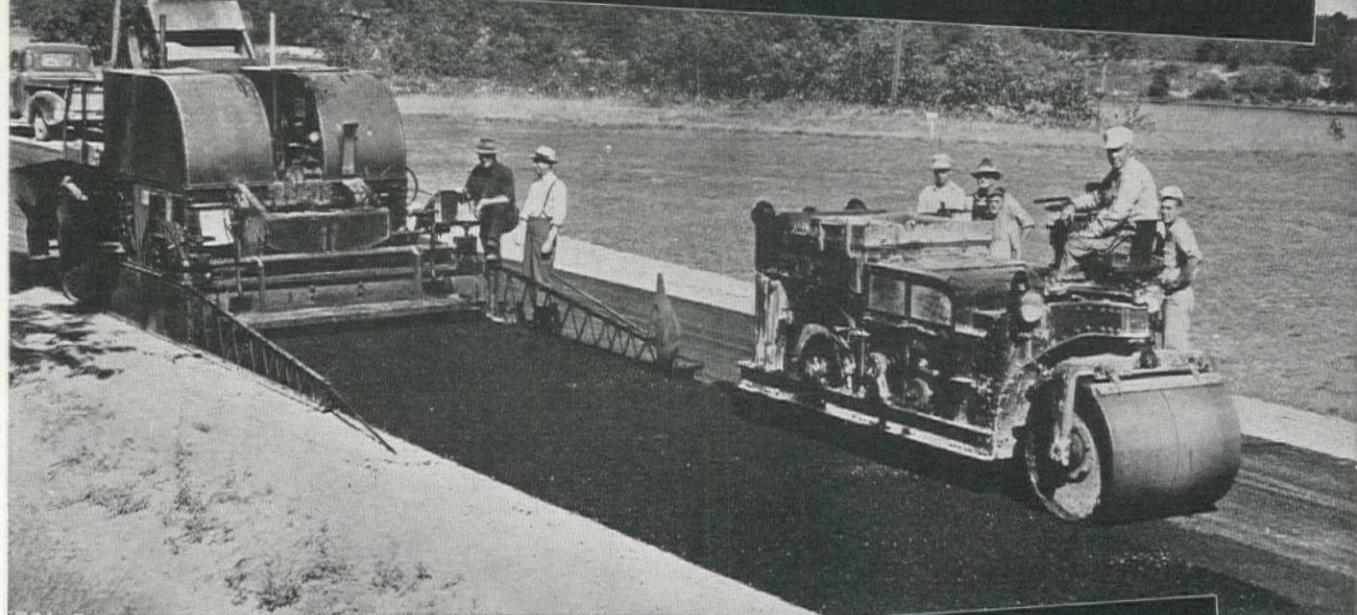
Matt Peterson is the general superintendent for Newstrom-Davis Construction Co. of Denver, Colo., on construction of the \$500,000 Presbyterian Hospital in Denver. William Pondford is cement finishing foreman, and foremen include Lee Randleman, A. McClelland and Robert Jameson.

J. F. Porcher is the superintendent for Griffith Co. of Los Angeles and H. G. McGregor is the assistant superintendent on the firm's large contract for structures of the Santa Ana Parkway through Los Angeles. Foremen include: W. Dills, excavation and pavement; A. Kinnamon, grading; L. D. Meeks, structures; G. McGrew, concrete, and O. L. Richardson, carpenter work. G. M. Weir is the timekeeper.

Fred R. Bennett is superintendent and A. W. Hartwig is acting as project manager for a pipeline construction job at Billings, Mont., for A. W. Hartwig, Inc.

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# Contracts . . .

## Summary of Major Construction Contracts Awarded Last Month

**Anderson Construction Co.** of Great Falls, Mont., was awarded a \$1,174,129 contract by the Montana State Highway Commission for construction of a 1,007-ft. long steel and concrete bridge and a 1,085-ft. long overpass at Great Falls to carry U. S. Hwy. No. 91 across the Great Northern railway line and the Missouri River and thus around the city's business district.

A \$6,170,337 contract has been awarded to **Peter Kiewit Sons' Co.** and **Fred J. Early, Jr., Co., Inc.**, Box 114, Torrance, Calif., by the Los Angeles Department of Public Works for construction of the aeration system and the final settling system of the Hyperion Activated Sludge Plant at El Segundo. 450 days allowed for completion.

With a bid of \$2,369,654, **Western Paving Construction Co.**, 5230 Washington St., Denver, Colo., was awarded the contract by the Bureau of Reclamation for construction of earthwork, concrete lining and structures and an access road for the Horse-tooth Feeder Canal of the Colorado-Big Thompson Project between Loveland and Fort Collins.

**N. M. Ball Sons Co.**, 645 Willard Ave., San Gabriel, Calif., were awarded a \$1,287,397 contract by the California State Highway Department for improvements on Hollywood Parkway in Los Angeles. About 1.6 mi. are to be graded and surfaced with PCC.

**Howard S. Wright & Co.**, Seattle, Wash., has been awarded a \$6,500,000 contract for construction of 16 commercial buildings at the Northgate Shopping Center just north of Seattle.

The Seattle Board of Public Works awarded a \$4,454,222 contract to **Westinghouse Electric Corp.** for the construction of three 100,000-kv. generators for the City Light Department's Ross Dam Power Plant.

A \$1,111,566 contract for completion of the Baldwin Hills Reservoir has been awarded by the Los Angeles Department of Water and Power to **M. F. Kemper Construction Co.**, 3701 Overland Ave., Los Angeles. The work, to be finished in November of 1950, will include construction of drains, inlet and outlet tunnels, roadways and fencing for the 300,000,000-gal. capacity reservoir.

**Haddock Engineers, Ltd., and Associates**, Box 390, Montebello, Calif., were awarded a \$5,405,760 contract by the U. S. Atomic Energy Commission for construction of 438 apartment buildings with appurtenances at the Atomic Energy Base, Los Alamos, N. M.

A \$1,381,020 contract for construction of three public schools at Anchorage, Alaska, has been awarded to a joint venture of **Brady Construction Co.**, Seattle, and **A. C. Swalling Co.**, Anchorage, Alaska.

A \$764,010 contract was awarded to **Hydraulic Dredging, Ltd.**, Central Bank Bldg., Oakland, Calif., by the Army Corps of Engineers for dredging the channel, construction of culverts, placing of riprap bank protection, etc., in the Napa River Channel between Mare Island Strait and Napa in California.

**Utah Construction Co.**, 1 Montgomery St., San Francisco, were awarded a \$1,178,057 contract by the Portland District, Corps of Engineers, for relocation of 2½ mi. of the Southern Pacific Railway and 2½ mi. of Oregon State Highway No. 58 around the Meridian Dam site on the Middle Fork of the Willamette River in southwest Oregon.

**Barrett & Hilp**, 918 Harrison St., San Francisco, were awarded a \$1,300,000 contract by the University of San Francisco, Board of Regents, for construction of a reinforced concrete library on the University campus.

A \$814,482 contract was awarded by the Washington State Highway Department to **Peter Kiewit Sons' Co.**, Longview, Wash., for the grading and surfacing with asphaltic concrete and PCC on 6.5 mi. of P.S.H. 1 and 12.

**N. M. Ball Sons**, Box 430, Berkeley, Calif., were awarded a \$633,228 contract by the California Division of Highways for the paving with PCC of 7.8 mi. on the state highway between Tipton and Tulare Airport in Tulare County, Calif.

The general construction contract for an 8-story psychopathic ward at General Hospital in Los Angeles was awarded to

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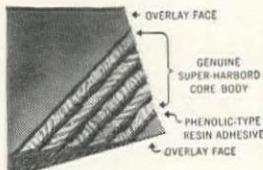
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Demand Harborite for really re-usable panels, for incomparable concrete form work, for definite savings in concrete form work.

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★ ★ ★ SUPER-Harbord PLYCRETE—Grade-marked: EXT • DPFA • AA. For multiple re-use form work. Hot-press-bonded with phenolic-type resin adhesive. ALL veneer jointed. All open defects in crossbands repaired. Rehumidified after pressing. Sanded smooth both sides. Edge-sealing and oiling optional.

★ ★ ★ Harbor PLYCRETE—Grade-marked: INTERIOR • AA • DPFA. Harbor PLYCRETE has the same veneer faces as SUPER-Harbord PLYcrete, but is bonded with 10-cycle moisture resistant glues instead of waterproof adhesives. Sanded smooth both faces. Will withstand many re-uses. Factory edge-sealing and oiling optional.

★ Harbor PLYFORM—Grade-marked: PLYFORM • DPFA • BB. Bonded with water-resistant 10-cycle glues (not waterproof). Both faces are BB (solid) veneer, free from open defects. Sanded smooth. Factory edge-sealing and oiling optional.

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Stanton-Reed Co., 816 W. Fifth St., Los Angeles, on their bid of \$1,610,729.

Smith & White of Seattle, Wash., were awarded a \$897,622 contract by the Bonneville Power Administration for construction of the 77-mi. Columbia-Grand Coulee transmission line. A total of 270 days are allowed for completion.

Dinwiddie Construction Co., Crocker Bldg., San Francisco, was awarded the \$952,000 general contract for construction of a 10-story apartment building on West Third Ave. in San Mateo, Calif.

The East Bay Municipal Utility District of Oakland, Calif., awarded a \$572,387 contract to Stanley H. Koller, 1694 Pomona St., Crockett, Calif., for construction of a raw sewage pumping plant and grit chambers in the sewage disposal project for six Oakland area cities. It will be the first of several structures composing the treatment plant for the \$23,500,000 project.

The Washington State Public Institutions Department awarded a \$1,260,338 contract to MacDonald Building Co., Tacoma, Wash., for completion of a 500-patient ward building at Western State Hospital at Steilacoom, Wash.

United Concrete Pipe Corp., Box 425, Baldwin Park, Calif., was awarded a \$555,302 contract by the Metropolitan Water District of Southern California for construction of the 14,742-ft long Victoria Street lateral for the Colorado River Aqueduct Distribution system.

A \$602,859 contract was awarded by the California Department of Public Works to W. J. Distelli, 4814 West Jefferson Blvd., Los Angeles, for reconstruction of the plate girder bridge across the San Gabriel River on Valley Blvd. near El Monte. The job includes  $\frac{1}{2}$  mi. of approaches.

Spencer Webb Co. and James S. White, 4719 Melrose Ave., Los Angeles, were awarded a \$444,992 contract by the Los Angeles District, Corps of Engineers, for construction of the Sawtelle-Westwood flood control system from Ballona Creek to Braddock Drive in the Los Angeles County Drainage Area.

L. A. & R. S. Crow, 4756 Valley Blvd., Los Angeles, were awarded the \$408,654 contract by the Public Roads Administration for construction of 4.6 mi. of Project California FH 90-A in Sequoia National Forest in Tulare County.

W. W. Clyde & Co., Springville, Utah, were awarded a \$393,641 contract by the Utah State Road Commission for construction of a 3-in. bituminous surfaced road along U. S. 40 between the Summit County line and Lamb's Canyon, a total of 2.8 mi.

Dragline Rentals Co., Long Beach, Calif., was awarded a \$573,545 contract by the Bureau of Reclamation for repairs to Ochoco Dam on the Deschutes Project near Prineville, Ore.

Curtis Gravel Co. of Spokane, Wash., was awarded a \$883,796 contract by the Washington State Highway Department for the grading, surfacing and stockpiling on 3 mi. of State Highways No. 3 and 3-K in Asotin County.

McGillivray Construction Co., Box 873, Sacramento, Calif., was awarded the \$424,445 contract by the California Division of Highways for improvement of portions of about 35 mi. of state highway in Shasta and Siskiyou Counties between Crespos and Spring Hill.

## Sure—Let 'Em Vote

...Continued from page 57

from those who hope to see the destruction of the traditional American system of enterprise, thrift, and self-government; and from those deluded souls who suppose that money from Washington is nothing but a gift.

We support Sen. Cain's idea for a ballot on the subject. We doubt if the government would permit such a vote, for those favoring an Authority in the Columbia Basin are in a small minority. But even if they were known to be in the majority, we'd agree to the plan. We sometimes have to remind ourselves that this is a democracy, and if a majority of the people of the nation or a given section wish to regress instead of advance, to wreck instead of build, to support autocracy or anarchism instead of democracy, it is their privilege and right to do so. We have confidence that even with the encroachments socialism has already made, the mind of America would remain strong for individual freedom. But we say again—if the majority want something different, they have a right to it—Let 'em vote!

# TRADE WINDS

News of Men Who Sell to the Construction West

## Western Distributor News Round-up

BOW LAKE EQUIPMENT CO. of Seattle, Wash., have been named exclusive western Washington distributor for the HARNISCHFEGER CORPORATION, Milwaukee, Wis. Besides the P & H line of earthmoving, logging and construction equipment, Bow Lake are distributors for a great many other lines, such as Noble batching equipment; Union pile driving equipment; Le Roi portable gasoline and Diesel compressors; Cleveland jackhammers, paving breakers and air tools; and others.

★ ★ ★



SCANLAN

The appointment of Edward J. Scanlan as California zone sales representative for the DETROIT DIESEL ENGINE DIVISION of General Motors Corp. was announced by V. C. Genn, general sales manager of the company. Territory covered in the assignment includes the entire states of California, Arizona and Nevada, in which Scanlan will direct General Motors Series 71 industrial, petroleum and marine Diesel engine sales through Detroit Diesel's distributor-dealer organization.

★ ★ ★

RAY CORSON MACHINERY COMPANY, with headquarters at 350 Kalamath St., Denver, has been appointed MARION POWER SHOVEL COMPANY distributor for the entire state of Colorado. Ray E. Corson is president and general manager of the firm, J. J. Booth is vice-presi-

dent and sales manager, and J. E. Biggs serves as treasurer and office manager. The company was established in 1932 and incorporated in 1948. In addition to Marion, it serves as distributor for some ten other prominent manufacturing concerns.

Also recently announced by the company is the appointment of M & F EQUIPMENT COMPANY of Albuquerque as Marion distributor for all of New Mexico lying north of and including Catron, Socorro, Lincoln, Chaves and Roosevelt counties. Headquarters of the firm are at 2521 Isleta Highway, Albuquerque. Established in 1946 as distributor of contractors' machinery, M & F is headed by President C. L. McClaskey, who has a background of 18 years in the equipment supply field. Louise B. McClaskey is secretary-treasurer, L. L. Ripley and Ed. H. Bedingfield are sales representatives and Tom N. Brown is shop manager. Several other leading equipment manufacturers in New Mexico are represented by M & F Equipment Company.

★ ★ ★

CUMMINS & MORAN of Phoenix, Ariz., distributors for Cummins engines, announces the opening of their new branch in Albuquerque, New Mex. Harvey Emblie is in charge of this office. John Anders is shop foreman and Art Willmore is parts manager. The new branch is located at 1921 N. Broadway.

★ ★ ★

The EQUIPMENT SALES CO. of Phoenix, Ariz., announce their appointment as distributors for T. L. SMITH CO.

★ ★ ★

W. E. "Bill" Lively, Jr., president and owner of the LIVELY EQUIPMENT CO. of Albuquerque, New Mex., recently

announced three new appointments to his sales staff: W. E. Keller, E. H. Kloeckel and P. E. Whittington. Keller will devote all his time to heavy equipment sales; Kloeckel will be in charge of public relations. Their headquarters will be at Albuquerque, while Whittington will be located at El Paso, Tex.

★ ★ ★

The WEST COAST ENGINE & EQUIPMENT CO., Berkeley, Calif., has been appointed Northern California distributor for GLADDEN PRODUCTS CORP. of Glendale, Calif. This company manufactures air cooled engines in three models, No. 40, 50 and 75.

★ ★ ★

William Harry Cornelius, Jr., has succeeded his father as president and sole owner of the HARRY CORNELIUS CO. The senior Cornelius, founder of the Albuquerque, New Mex., equipment com-



CORNELIUS



WIGGANS

pany, died last March. Neal Wiggins, who had formerly been with the company for many years, has returned as manager, and assistant to President Cornelius. The company recently were given the distributorship for ALLIS-CHALMERS equipment.

★ ★ ★

The BLYSTONE EQUIPMENT CO. of Santa Ana, Calif., was recently appointed distributor in the Southern California area for INGERSOLL-RAND CO.'s complete line of compressors and allied air tools. The newly incorporated equipment company is headed by John C. Blystone as president. Lyle C. Blystone is vice-president and Dan J. Foley, secretary. President Blystone has had twenty-two years' experi-

A PORTABLE CLASSROOM for instructing contractor's personnel who own and operate General Motors Series 71 Diesel engines is currently touring the West. The mobile unit is contained in a GMC 2-ton cab-over-engine truck, and equipment includes such items as a cutaway model of the 71, testing apparatus, charts, movies, etc. Two instructors from Detroit Diesel's staff handle the teaching assignment. Below, A. F. BRECHT, Service

Manager, left, and W. T. CROWE, General Manager, right, bid bon voyage to T. L. GUARNIERE, standing, and JACK LESLIE, in the cab. Picture at right was taken at the site of Garrison Dam in North Dakota with personnel of Peter Kiewit Sons' Co. and Morrison-Knudsen Co. receiving instruction in the fuel, lube oil, water and air flow systems through a GM Series 71 Diesel. Engine tune-up procedures are demonstrated on an actual unit.



ence as a building contractor to his credit. His son, Lyle, who has been with the company for the past ten years, has had the management of the company's equipment rental department, and greatly through his efforts, the company has become one of the largest specializing in air compressors and tools in the southern section of the state. Headquarters of the company at 2649 W. First St. are being enlarged to take care of the new distributorship.

★ ★ ★

The STATE TRACTOR & EQUIPMENT CO. of Phoenix, Ariz., have moved into their new quarters at 401 S. 17th Ave. Formal dedication is scheduled for July.

★ ★ ★

SHAW SALES & SERVICE CO., Los Angeles, were the third largest in sales of Schramm compressors for 1948, according

## TRADE WINDS

to Karl S. Burlie, district manager of SCHRAMM, INC., West Chester, Pa. This was their first complete year as distributor for this company.

★ ★ ★

J. W. Hildred has been appointed sales engineer of the WESTERN MACHINERY CO., Phoenix, Ariz., according to J. P. Keller, branch manager.

★ ★ ★

Leonard G. Heller, San Francisco, has been appointed distributor in the state of California for Flame-Seal, the unique fire retardant and non-toxic paint that resists a 2,000-deg. F. blow-torch flame for 30

min. without any flame spread, it was announced by STALLTON CHEMICAL CORP., Long Island City, N. Y. Heller offices are located in the Mills Bldg.

★ ★ ★

Before a class of some forty student engineers enrolled in an optional course of earthmoving equipment conducted by C. H. Oglesby, Associate Professor of Civil Engineering at Stanford University, Kenneth F. (Ken) Park, earthmoving engineer with PETERSON TRACTOR AND EQUIPMENT CO., San Francisco

PARK

area distributors for Caterpillar products spoke extemporaneously on the advantages of knowing equipment, its use, performance and cost of operation. Park, himself a civil engineer, has specialized in earthmoving and earthmoving equipment for the past thirty years. During his short talk before the students, he emphasized the fact that earthmoving performances and costs can be calculated as surely and as accurately as can the capacity of a concrete structure, and that a thorough knowledge of the factors on which these quantities are based can widen the engineer's field of usefulness and opportunity.

★ ★ ★

ARIZONA EQUIPMENT SALES, INC., Phoenix, Ariz., have been appointed distributors for HARNISCHFEGER CORPORATION, Milwaukee, Wis.

★ ★ ★

G. W. Gutkunst, manager of GARDNER-DENVER CO., Los Angeles, was a recent visitor to the company headquarters in Quincy, Ill.

★ ★ ★

FORNACIARI CO., Los Angeles, announced recently the appointment of Ronald Johnson as sales engineer to their staff. He was formerly with International Business Machines Corp.

★ ★ ★

Maurice J. Mooney, formerly with Smith Booth Usher Co., recently joined the staff of the O. S. STAPLEY CO., Phoenix, Ariz., according to H. E. Walters, industrial sales manager.

★ ★ ★

Ray H. Anderson, Chicago, who has been associated with the sales department of THE SISALKRAFT CO., Chicago, New York and San Francisco since 1939, was appointed sales manager of the company, succeeding W. Lawrence Kennedy, 48, who died last May following an operation.

★ ★ ★

GLOBE STEEL TUBES CO., Welding Fittings Division, announced the appointment of PACIFIC PIPE CO., 401 Folsom St., San Francisco, as exclusive distributor of Globe precision process welding fittings for the San Francisco-Oakland bay area. A complete line of seamless welding fittings and flanges will be stocked at all times in various weights and in sizes ranging from  $\frac{1}{2}$ -inch to 24-inch diameters.

★ ★ ★

Appointment of Charles S. Conrad as director of steel sales for TAY-HOL-

Dumpcretes gave Guy F. Atkinson a low-cost answer to a concrete hauling problem at the new 41-million-dollar Hyperion job.

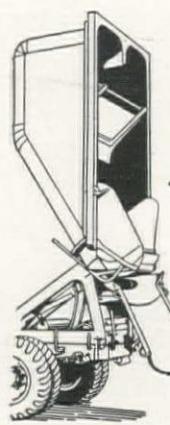
He wanted to mix at a central plant, where he could produce uniform air entrained concrete. He found an ideal site—right on a railroad siding—but it was 5.7 miles from the pour. So he needed a hauling unit that would maintain a constant slump and air content

on a haul this long. Dumpcretes were the answer.

Normal hauling time is 20 minutes. But the City of Los Angeles stamped "OK" on his top quality, Dumpcrete-hauled concrete, even after 45 minutes from plant to discharge.

Five Dumpcretes handle the entire production of the 2-yard plant. When pours are held up, they haul sand, so they "earn their pay" every day.

Mail coupon today for new booklet on Dumpcrete features—just off the press.



The lower cost Dumpcrete is lightweight, watertight, with 13-foot chute, controlled higher discharge and lower center of gravity. Hauls sand, gravel, and coal too. Available in 2, 3, and 4 yard sizes.

Please send NEW Dumpcrete booklet  
 Name \_\_\_\_\_  
 Firm \_\_\_\_\_  
 Address \_\_\_\_\_  
**DUMPCTRE**  
 DIVISION MAXON CONSTRUCTION CO. INC.  
 550 Talbot Bldg., Dayton 2, Ohio

ROOK, INC., San Francisco, Calif., well known distributor of industrial, sheet metal and plumbing supplies, was recently announced by J. Milton Hagler, president. Hagler resigned as general manager of Miles for Columbia Steel Co. to accept the position.

☆ ☆ ☆

Robert Taylor, general sales manager of DWARD F. HALE CO., Hayward, Calif., recently made a trip to the vicinity of Big Bear Lake where tests were being conducted with the new Cedarapids contractor. Previously, tests were made at the San Francisco Airport, where it is reported contractors witnessing the tests were well pleased with the results.

☆ ☆ ☆

J. H. Stannard, formerly of Salt Lake City, has been appointed sales engineer for DWARD F. HALE CO. of Hayward, Calif. He will cover all of the San Francisco Peninsula territory.

☆ ☆ ☆

E. L. Benson, area sales manager for BARBER-GREENE CO., Aurora, Ill., recently returned from the home office, where he attended the area sales managers meetings in May. On his return trip to the coast he spent a few days with KIMBALL EQUIPMENT CO., Barber-Greene distributor in Salt Lake City.

Harry Jackson, area service manager of Barber-Greene, also was a recent traveller, having gone to Aurora to attend the area service managers meetings there.

☆ ☆ ☆

H. K. Hughes, sales manager of BORDER MACHINERY CO., El Paso, Tex.,

## TRADE WINDS

has announced the appointment of Malcolm Smith, W. L. Rose and W. P. Andrews to their sales staff.

☆ ☆ ☆

R. C. Nobbs, formerly district manager for UNION WIRE ROPE CO., has

## News of the Western Manufacturers

Roy E. Wood, president of WOOD TRACTOR CO., Portland, Ore., announces that Charles E. O'Hallaren has been elected vice-president and E. L. Aikens secretary of the company. Both men have also been named to the board of directors. Wood Tractor Co. distributes Allis-Chalmers tractors; Osgood shovels; Gar Wood scrapers, dozers and power control units; Isaacson dozers; Skookum blocks and rigging; Baker dozers and road construction equipment; Broderick & Bascom wire rope; General excavators; Carco hoists, arches and dozers, and Esco buckets and rigging, etc.

☆ ☆ ☆

William G. Jeffrey has been transferred from Chico to Modesto, Calif., as sales representative for CALAVERAS CEMENT CO. His headquarters are in the Modesto Builders Exchange.

☆ ☆ ☆

Howard L. Franks, director of sales for MERRILL BROTHERS, Maspeth, N. Y., manufacturers of drop forgings and ma-

joined the staff of the N. C. RIBBLE CO. of Albuquerque, New Mex. He will cover the territory east of Albuquerque. Ribble was recently given the distributorship for STANDARD STEEL CO. of Los Angeles.

☆ ☆ ☆

THE BURAN EQUIPMENT CO., Oakland, Calif., have been appointed distributors for the Lima Shovel Division of LIMA-HAMILTON CO.

terials lifting devices, recently announced the appointment of Henry R. Hansen as sales representative for the territory comprising Colorado, Wyoming, Utah and New Mexico. His headquarters are at 330 Downing St., Denver, Colo.

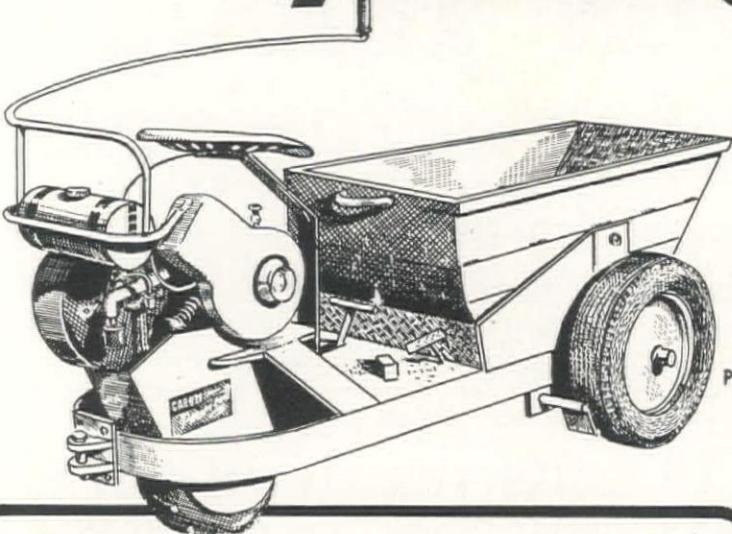
☆ ☆ ☆

Ward Mayer, president of TIMBER STRUCTURES, INC., recently announced the appointment of Lawrence Price of Seattle, Wash., as production control manager of their Portland plant. Price was formerly service manager for Timber Structures in Seattle, and he is succeeded there by John J. Kossler of the Portland plant.

☆ ☆ ☆

As part of the expanding sales program of ATHEY PRODUCTS CORPORATION, the appointment of two new representatives has been announced by G. O. Britton, domestic sales manager of the Chicago firm. Marvin B. Stanley has been appointed sales and service representative for the Southwest territory. He will service

## see these 7 job speeding improvements on GAR-BRO'S new power-cart



1. STRONGER . . . no added weight.
2. IMPROVED FORWARD and REVERSE CLUTCHES give longer service; smoother, easier operation.
3. NEW 5-inch TIRE for smoothest flotation in sandy or loose soil.
4. CLIMBS 20% grades with 1-ton load.
5. PROTECTED from bumps all around.
6. TOW BAR attachment optional.
7. TIMKEN ROLLER BEARINGS throughout.

PLUS — 7-hp, 4-cycle gasoline engine; easy side-dumping on 5-ft. runways; steers through 180-degree arc on 4-ft. radius. Replaces 6 hand-pushed carts or 4 wheelbarrows on any construction job. Pays for itself in 30 days!

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# GAR-BRO

### DISTRIBUTORS:

WASHINGTON—A. H. Cox & Co., 1757 First Ave., So., Seattle 4  
Construction Equipment Co., 1118 Ide Ave., Spokane 1  
ORE.—Loggers & Contractors Mch. Co., 245 S. E. Clay, Portland 14  
NO. CALIF.—Edward R. Bacon Co., 17th at Folsom St., San Francisco 10  
SO. CALIFORNIA—Garlinghouse Bros., 2416 E. 16th St., Los Angeles 21  
IDAHO—Intermountain Equipment Co., Broadway at Myrtle St., Boise  
UTAH—Arnold Machinery Co., 427 W. 2nd St., Salt Lake City 1

California, Nevada and Arizona. Joining Athey in 1940 as Pacific Coast service representative, he has already become well acquainted with Athey-Caterpillar distributors in the three states he will now serve. The second appointment announced is that of **Reid Evans** as sales and service representative for the North Central territory.

☆ ☆ ☆

The Los Angeles branch office of TUBE TURNS, INC., manufacturers of Tube-Turn welding fittings and flanges, has been moved from West Washington Blvd. to the General Petroleum Bldg., 612 S. Flower St. Manager of the Los Angeles branch is **Norton P. Bosemer**. The main offices and plants of Tube Turns, Inc. are in Louisville, Ky.

☆ ☆ ☆

The ROSENDIN ELECTRIC WORKS, 1070 Park Ave., San Jose, Calif., has been named Santa Clara County dealer for ALLIS-CHALMERS motors, controls, centrifugal pumps and transformers, and a certified service shop for the company's motors, transformers and controls in the same area. **Moses Rosendin** is owner of the electric works, which was founded in 1919, and **Joe Perrina** is manager of the firm.

☆ ☆ ☆

To augment the Northwest sales force of the PERMANENTE CEMENT CO. of Oakland, Calif., and to assure closer contact and a readier supply of materials for customers of that region, several personnel changes were recently announced by this company. From Oakland, **Leo McNett** has been moved to the Northwest Division. **Doug Ashton** moves from Diamond to Portland, where he will cover cement sales

## TRADE WINDS

for Oregon and southern Washington. **Mel Fisher** replaces Ashton at Diamond. **Laurance H. McEwen** has been named administrative assistant to Sales Manager **E. H. Kendall**.

☆ ☆ ☆



LOVELL

was a special assistant to **Roy Fruehauf**, now president of the company.

**L. H. Chaille**, public relations director for Fruehauf's Western Division, recently added to his accomplishments by being admitted to the practice of law in California. He is a graduate of Loyola University School of Law.

☆ ☆ ☆

NOBLE CO., Oakland, Calif., manufacturer of batching and concrete handling equipment, has announced the appointment of **William H. Schutte**, formerly vice-president of Western Pipe & Steel Co., to the vice-presidency of its newly created steel

forms division; and the promotion of **H. Vines** from general sales manager to vice-president of the batching equipment division.

**Schutte** has wide experience in contracting, steel fabricating and industrial activities, having spent fifteen years with Western Pipe & Steel Co. and ten years with Blaw-Knox Co. **Vines** joined Noble Co. four years ago, after having served as district representative for Caterpillar Tractor Co. and western sales manager of R. C. LeTourneau, Inc.

☆ ☆ ☆

## Manufacturing News From the East and Midwest Regions

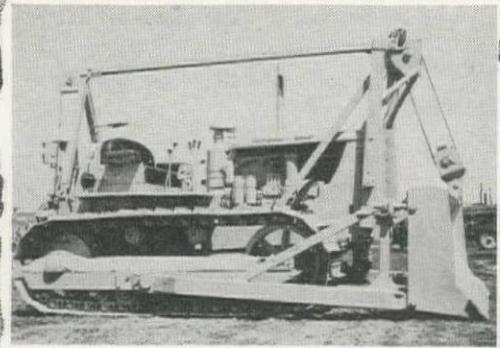
**William R. Timken**, last of the three founders of the TIMKEN ROLLER BEARING CO., INC. of Canton, Ohio, died in New York on June 12 of a heart ailment. He was 83 and had been retired from active participation in the company since 1930.

☆ ☆ ☆

At a meeting of the Board of Directors of WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J., **Robert E. Marshall** was elected secretary of the corporation, succeeding the late **C. Neal Barney**. Marshall's headquarters will be at the New York offices at 2 Park Ave.

☆ ☆ ☆

**H. A. Cartwright**, well known in the asphalt field as a designer of spray bars and distributors, has joined the research and engineering group of the WM. BROS.



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ON TERMS  
for factorized\*  
"CATERPILLAR" DIESEL  
D7 TRACTORS*

Exactly as illustrated, these factorized\* Caterpillar Diesel D7 Tractors with the LeTourneau Dozers and R7 double-drum cable control units are offered at any reasonable terms you may suggest, with a minimum of 8% down. They may be purchased for cash or on contract terms, or leased with option to buy. "Write your own ticket," but act immediately.

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DISTRIBUTOR

BOILER & MFG. CO., Minneapolis, Minn. His research and engineering duties at the Bros Company will be in connection with the expansion of that organization's asphalt road machinery program.

☆ ☆ ☆

THE THEW SHOVEL CO., Lorain, Ohio, celebrates its 50th anniversary as a corporation on July 17. Thew's actual history began four years earlier, in 1895, when Captain Richard P. Thew conceived the idea that a shovel that was full revolving, that is, could dig or load in any position of a 360-deg. circle, and had a horizontal crowding motion, would solve many material-handling problems. It was then that the first full revolving shovel—a Thew—was created. Today, Thew operates five plants: two in Lorain, two in Elyria and one in Bucyrus, Ohio, and employs 1,500 persons.

☆ ☆ ☆

MACK TRUCKS, INC., has made public the announcement that L. G. Bissell and C. T. Ruhf early in June relinquished their respective positions as chairman of the board and president, and that the board of directors elected to both offices E. D. Bransome, who for the last five years has been a director of the company, and since 1935 has been president of Vanadium Corporation of America, with which company he will continue his association as chairman of the board. Bissell and Ruhf will continue as members of the Mack board, with Ruhf remaining with the company in a consulting capacity.

☆ ☆ ☆

Alden G. Roach, president of COLUMBIA STEEL COMPANY, has announced the election of James B. Du Prau to fill the newly created position of Vice-President of Administration of this U. S. Steel subsidiary. Du Prau has been serving as Assistant to the President since 1943, and is a member of the Board of Directors, to which he was elected last year.

☆ ☆ ☆

Hobart C. Ramsey was recently named president of WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J. He succeeds Clarence E. Searle who was named vice-chairman of the board of directors. Ramsey joined Worthington in 1920 as a sales engineer in the export department, becoming manager of that department in 1922. From 1925 to 1937 he served successively in various key capacities, and for seven years was in Europe with Worthington's foreign operations. Prior to his recent elevation to the presidency he was executive vice-president of the company, a post which is now taken over by Edwin J. Schwanhauser. Another recent personnel elevation at Worthington was that of John J. Summersby, who was elected vice-president in charge of sales.

☆ ☆ ☆

At the MINNEAPOLIS-MOLINE CO. home office at Hopkins, Minn., a special meeting was held for the purpose of co-ordinating industrial sales effort, under the direction of Edwin A. Henry, industrial sales manager, with the assistance of E. R. Raveling and Rex Jeide. Among those attending the meeting were C. A. Brogle, Denver, Colo., and E. W. Anderson, Great Falls, Mont., recently appointed industrial supervisors for Minneapolis-Moline. Allied manufacturers who demonstrated their equipment included: Allen Industrial Products, Battle Creek, Mich., tractor cabs; American Hoist & Derrick Co., St. Paul, Minn., tractor winch; Davenport Besler

## TRADE WINDS

Corp., Davenport, Ia., tractor plow; Henry Mfg. Co., Inc., Topeka, Kans., hydraulic scrapers and dozers; Little Giant Products, Inc., Peoria, Ill., rotary brooms; Ottawa Steel Products, Inc., Ottawa, Kans., hydraulic front end loaders; and Reese Engineering Co., Los Angeles, Calif., hydraulic front end loaders.

☆ ☆ ☆

THE LINDE AIR PRODUCTS CO. unit of Union Carbide & Carbon Corp., New York City, recently announced the completion and operation of the company's oxygen distributing station and acetylene producing plant at Fargo, N. Dak. A ware-

house for the distribution of Union brand calcium carbide is also included in the facilities. The plant will provide industries in the area with a convenient supply of two of the company's main products: Linde oxygen and Presto-O-Lite acetylene.

☆ ☆ ☆

B. L. Hagglund, Western Division Sales Manager of CATERPILLAR TRACTOR CO., San Leandro, Calif., states that a re-alignment and expansion of the General Sales Department and of the Advertising Department has been announced by Gail E. Spain, Caterpillar vice-president located in Peoria, Ill. In the new sales structure, H. H. Howard, general sales manager, assumes the title of Director of Sales, with J. J. Valentine and J. H. Mohler as his assistants. Valentine, heretofore assistant general sales manager, will have adminis-

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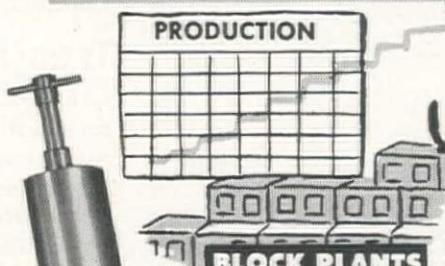
### READY-MIX COMPANIES

- Cutting material costs
- Increased flowability
- Faster discharge
- Faster handling by customer



### CONCRETE CONTRACTORS

- Increased workability & placeability
- Shortened finishing time
- Reduces surface water
- Immediate finishing after placing
- Requires less troweling



### PRODUCTION

### BLOCK PLANTS

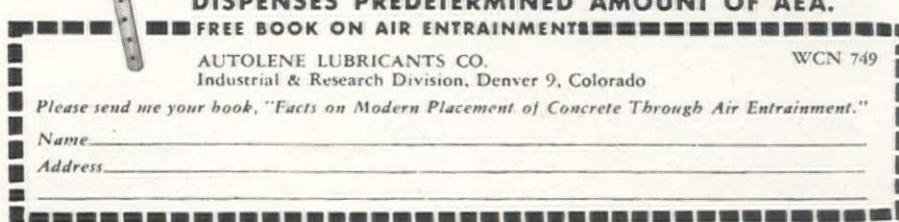
- Increased production
- Decreased green breakage
- Increased material yield

Protex fully approved under ASTM C-175-48T and Federal spec. SSC-192



### PIPE PLANTS

- Increased production through placeability
- Decreased machinery wear through plasticity
- Decreased breakage during stripping
- Increased material yield



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tration of Eastern, Central, Western and Governmental Sales Divisions. Mohler, formerly manager of Sales Training Division, will now administer Sales Development and Sales Training divisions, as well as two newly created divisions, Sales Engineering and Market Research, the latter two divisions being headed by **W. N. Foster** and **L. J. Deyo**, respectively. **K. F. Ames** succeeds Mohler in his former position, and **J. M. Abbey** assumes Ames' former duties. Foster will be succeeded by **C. K. McClelland**. In the Advertising Department, **George E. Wennerlyn** has been named assistant to **W. K. Cox**, advertising manager. **Burt Powell** has been promoted to the position of assistant advertising manager.

☆ ☆ ☆

**Stanley M. Hunter**, executive vice-president of the AMERICAN HOIST & DERRICK CO., St. Paul, Minn., recently announced the appointment of **John E. Carroll** as general sales manager of the company. Carroll originally started to work for American Hoist in 1937 as a district sales representative in the Texas, then Chicago, and later West Coast territory. He resigned his sales position to become a partner in the firm of Harron, Rickard and McCone Co. of Southern California, heading the Construction Equipment Division. Carroll brings with him, on his return to American Hoist as general sales manager, invaluable field experience and a broader understanding of company-customer relationship.

☆ ☆ ☆

INDUSTRIAL BROWN HOIST CORP. of Bay City, Mich., manufacturers of railroad type locomotive cranes and

## TRADE WINDS

clamshell buckets, announce the appointment of **H. D. Wright** as director of sales for the entire Western region of the United States. Wright will be remembered by his many friends as having formerly managed the San Francisco office of the Brown Hoisting Machinery Co., later being transferred to New York, where he managed the entire Eastern division for the company. This new move returns him to the West, where he will make his headquarters with the company's local representative, GARFIELD & CO., 1232 Hearst Bldg., San Francisco.

☆ ☆ ☆

Recent organization changes in the Truck Division of GENERAL MOTORS CORPORATION Truck & Coach as announced by **J. E. Johnson**, general sales manager, are: **R. C. Woodhouse**, formerly regional manager for the Southwest, has been promoted to the position of assistant general sales manager of the Truck Division at Pontiac. **R. E. Holsaple**, zone manager in Charlotte, N. C., moves to Chicago. **G. R. Blackburn** succeeds him at Charlotte, and **A. B. Campbell** takes over Blackburn's former position. **W. P. Smith** becomes retail store manager for GMC in Cleveland, taking over this position from **Glenn G. Bennett**, who has resigned to take a GMC dealership in Phoenix, Ariz.

☆ ☆ ☆

**A. W. Smythe**, vice-president and general manager of THE THEW SHOVEL CO., Lorain, Ohio, announces the appoint-

ment of **E. E. Esgate** as assistant to the general manager, to work under the direct supervision of the general manager. Esgate is well known in the construction, logging and pulp and paper industries as a consulting engineer.

☆ ☆ ☆

**Fred C. Schulze** has been named sales manager of WAUKESHA MOTOR CO. Waukesha, Wis. Since joining the company in 1928 he has served in various capacities and before his recent appointment was assistant sales manager.

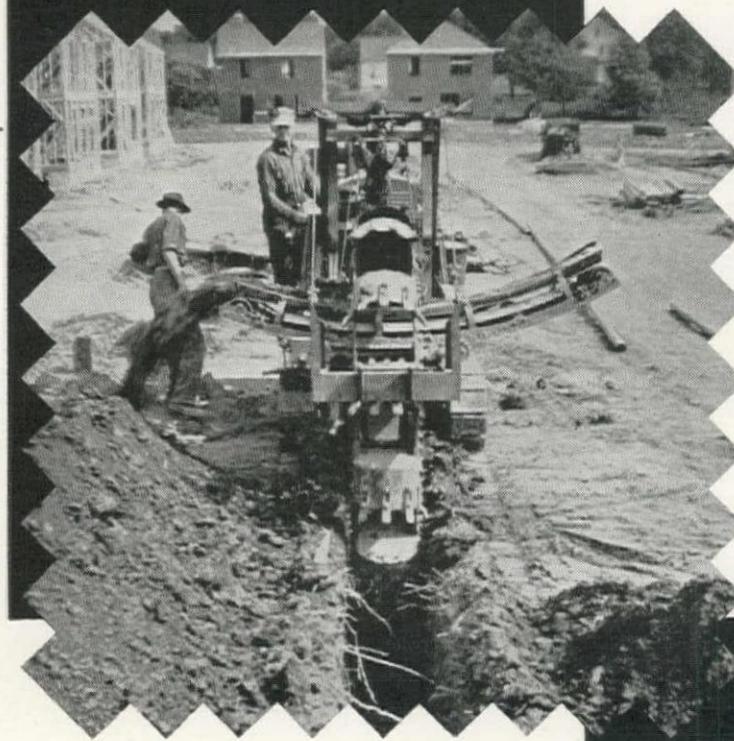
☆ ☆ ☆

Two key appointments recently announced by **A. C. Fetzer**, vice-president and general sales manager of MACK TRUCKS, INC., New York City, are: **J. W. Adelung** as manager of Mack-International Motor Truck Corp.'s Brooklyn branch, and **W. A. Brady** as manager of the White Plains (N. Y.) branch. Adelung joined Mack in 1946 as manager of the White Plains branch, and Brady has been with Mack since 1938.

☆ ☆ ☆

Following the recent death of **L. G. Stelzle**, former president, WALTER MOTOR TRUCK CO., Queens, L. I., N. Y. announces several new appointments. **Clyton A. Misson** has been named president and director, while **Maurice Walter** continues as vice-president and has been elected chairman of the board of directors. The Walter Motor Truck Co., founded in 1909, specializes in the production of heavy-duty, Four Point Positive Drive Motor Trucks for highway and airfield snow removal, fire and rescue work and for off-the-road hauling.

With  
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*on-the-job Dependability*

**You MINIMIZE "Down Times"**  
**ACCELERATE Production Time**  
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## EW BOOKS . . .

PLAIN CONCRETE—By Edward E. Bauer, Associate Professor of Civil Engineering, University of Illinois. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18. 440 pages, 6 x 9. Price \$5.00.

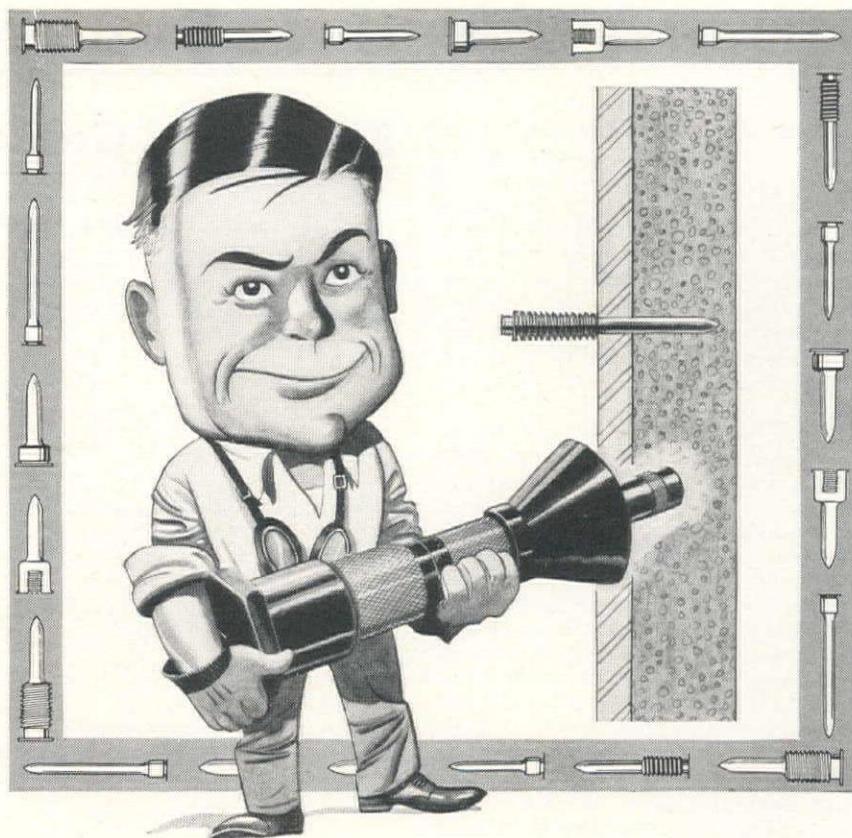
This is the third edition of a well-known book on the fundamental problems of concrete production. The main emphasis is on the understanding of materials used in concrete, the terms involved, people who have done work in the field, methods of calculating certain values, and some idea of the actual values and conditions in current use. Information has been brought up to date, and material on cement has been revised in accordance with new specifications and methods of designating Portland cements of the ASTM.

PROFESSIONAL GUIDE FOR JUNIOR ENGINEERS—By the late William E. Wickenden, President, Case Institute of Technology, 1929-1947. Published and distributed by the Engineers' Council for Professional Development, Engineering Societies' Bldg., 29 West 39th St., New York 18. Price \$1.00.

The philosophy and engineering ethics a young engineer needs for success, as viewed by Dr. Wickenden, is the theme of this book. It opens with a historical survey of the engineer's heritage, going back to Tubal Cain, and traces the beginnings of Engineering Societies. From there, Wickenden traces the engineering profession through its very aspect, what the young engineer can expect to find, the difference between a trade and a profession, professional relationships—finally ending the book with his most famous essay on a philosophy of life, *The Second Mile*, known to engineers the world over. Addenda to the book are "Faith of the Engineer," a credo accepted by the ECPD; a recommended reading list for junior engineers, a self-appraisal questionnaire, and the Canons of Ethics for Engineers.

ROUTE SURVEYING—By G. W. Pickels, C. E., late Professor of Civil Engineering, and C. C. Wiley, Professor of Highway Engineering, University of Illinois. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 438 pages, 4½ x 7. Price \$4.75.

The third edition of this book contains a number of important changes. The chapter on string-lining has been rewritten to stress reasons rather than mechanical methods behind each procedure. Another change is the inclusion of a discussion in the chapter on Spirals which outlines a simple procedure for computing the deflection angles when a setup is made on the spiral. Also, to meet the demand for greater precision brought on by the use of flatter curves on both railroads and highways, the 5-place tables of natural trigonometric functions have been replaced by 7-place.



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WN-7

## Glued Laminated Timber

Continued from page 74

other operations, it should be remembered that all contribute to a high price, and they should not be required unless expense is warranted. Also, more strength, better appearance and longer life than service conditions justify should not be required in the design.

Where glulam timbers are to be stained, then shop seals or shop protective coatings should not be specified. Waterproof construction is more expensive than water resistant construction.

Glulam, like sawn timbers, can be cut, bored, and routed, and like dry sawn timbers, will engage timber connectors, bolts, nails and screws. Present economic conditions have left behind the man with the saw in hand and carpenter pencil behind his ear. In his place is the shop man beside the whirling machine.

In timber, sawn or glulam, as in steel construction, framing is cut in fabricating shops to details and to patterns and transported knocked down to the job site for assembly and erection. For pressure treatments, prefabrication is a necessity.

The National Board of Fire Underwriters place timber construction in the classifications of:

1. Heavy timber.
2. Ordinary.
3. Wood frame.

Other codes use identical or similar divisions. Height, area, occupancy, and fire zone restrictions of cities are coordinated with construction classifications. Heavy timber construction is allowed the most privileges of the three and has the lowest insurance rates.

Usually in order to receive Heavy Timber classification, wood members must have a 6-in. net thickness and buildings must have concrete or masonry exterior walls.

It is true that wood is combustible, but fire hazard depends on many factors such as contents, availability of fire apparatus, and temperature at which members lose strength as well as combustibility of members. Unprotected metal loses strength quickly and completely. Most codes require one hour's protection for metal members used in structures with Heavy Timber classification.

Some tests have been made which indicate that glulam members are as fire resistive as sawn timbers and therefore can be used in heavy timber construction classification. Consider 5 1/4 in. thick planed glulam timber as six inches net.

Charles Walker, Research Engineer of Timber Structures, Inc., makes this statement:

"In laboratory and outside enveloping flame tests on glulam members, it has been found that there is no breakdown of either casein or phenolic glue in the glue lines until the wood collapses from combustion. There appears to be no deterioration of glue line from high temperatures of fire until heat is sufficient to destroy the wood. This opinion is concurred in by the manufacturers of glues used by Timber Structures, Inc."

## UNIT BID SUMMARY

### Bridge and Grade Separation . . .

#### California—Los Angeles County—State—Plate Girder

With a bid of \$602,859, W. J. Distelli of Los Angeles was low before the California Division of Highways for construction of a new plate girder bridge and reconstruction of an existing plate girder bridge and approaches to be graded and paved with asphaltic concrete pavement and pre-mix pavement on aggregate base and existing pavement across the San Gabriel River on Valley Blvd. near El Monte. Unit bids were submitted as follows:

	\$602,859	(6) United Concrete Pipe Corp. and	\$715.6			
(2) Winston Bros. Co. & Yount Constructors, Inc.	626,196	— Ralph A. Bell	\$715.6			
(3) Byerts & Sons and E. G. Perham	634,272	— Guy F. Atkinson Co.	739.3			
(4) Erickson, Phillips & Weisberg	670,431	— Spencer Webb Co.	785.1			
(5) Charles J. Rounds and Lars Oberg	674,745	— Charles MacClosky Co.	788.5			
		— J. E. Haddock, Ltd.	816.7			
		— Carlo Bongiovanni	860.4			
	(1)	(2)	(3)	(4)	(5)	(6)
1,800 cu. yd. removing concrete	7.75	8.00	10.00	12.00	8.00	8.00
Lump sum, clearing and grubbing	850.00	\$2,500	\$1,500	\$1,850	\$1,000	\$10,000
1,500 cu. yd. roadway excav.	1.20	.35	1.50	1.00	1.00	1.00
6,660 cu. yd. structure excav.	7.00	8.50	10.00	2.00	13.50	10.00
Lump sum, dev. water supply and furn. watering equip.	425.00	500.00	\$1,000	\$2,000	\$1,000	\$5,000
800 M. gal. applying water	2.00	1.70	2.25	3.00	2.00	1.00
32,900 cu. yd. imported borrow	.35	.70	.55	.80	.90	.90
11 sta. finishing roadway	30.00	20.00	45.00	50.00	20.00	20.00
822 cu. yd. Class "A" PCC (footing block)	20.00	21.00	40.00	18.00	30.00	30.00
3,210 cu. yd. Class "A" PCC (struct.)	46.00	46.00	42.00	56.00	50.00	60.00
86 cu. yd. Class "B" PCC (gravity wall)	45.00	38.00	40.00	55.00	30.00	30.00
1,382,000 lb. structural steel	.123	.12	.12	.14	.12	.12
2,400 lb. misc. iron and steel	.28	.25	.40	.40	.30	.30
12,000 ft. furn. concr. piling	2.75	3.10	2.70	2.70	2.70	3.00
414 ea. driving piles	55.00	62.00	65.00	103.50	60.00	65.00
65 cu. yd. light stone riprap	7.50	4.00	10.00	30.00	20.00	7.00
285 cu. yd. PCC curbs and gutters	34.00	34.00	34.00	31.00	35.00	30.00
79 ea. guide posts	5.00	5.00	5.00	6.00	4.00	5.00
813 lin. ft. 18-in. CMP (16 ga.)	3.25	2.80	3.50	3.50	3.00	2.50
85 lin. ft. 24-in. CMP (14 ga.)	4.50	4.00	4.50	5.00	5.00	4.00
35 lin. ft. 30-in. CMP (14 ga.)	6.00	5.00	5.50	6.00	6.00	5.00
655,000 lb. bar reinf. steel	.08	.085	.08	.08	.075	.075
1,894 lin. ft. steel railing	7.35	7.20	7.00	8.00	7.50	7.50
63 lin. ft. pipe handrail	3.50	4.00	4.50	5.00	3.50	4.00
Lump sum, clean and paint existing bridge	\$14,500	\$11,700	\$11,000	\$12,210	\$10,000	\$13,000
1 ea. storm drain manholes (8-ft. deep)	105.00	200.00	150.00	250.00	150.00	150.00
2 ea. storm drain manholes (14-ft. deep)	195.00	250.00	250.00	500.00	200.00	250.00
950 ton pre-mix. pavement	5.00	8.40	8.00	5.00	5.00	5.00
4,750 ton asph. concr. pavement	5.00	4.70	4.50	5.20	5.00	5.00
2,280 cu. yd. aggr. base	3.30	1.60	2.00	2.50	2.50	2.00
Lump sum, office facilities	3.50	500.00	\$2,000	700.00	\$1,000	\$2,000

#### California—Tulare County—County—Concrete

L. C. Clark of Visalia, Calif., with a bid of \$14,166, was low before the County Surveyor of Tulare County for construction of a small steel and concrete bridge in the County. Bids were submitted as follows:

	\$14,166	(4) E. A. Pollard	\$17,52
(2) Threewitt & Webb	14,723	(5) Wheeler Construction Co.	18,72
(3) Tout & Martin	15,975		
	(1)	(2)	(3)
220 cu. yd. Class "A" Portland cement concrete	42.00	42.00	48.00
43,400 lb. furn. and placing bar reinforcing steel	.09	.095	.095
170 lin. ft. steel railing	6.00	8.00	7.00
	9.00	9.00	7.00

#### Washington—Stevens and Lincoln Counties—State—Reinf. Cone.

Henry Hagman, contractor of Cashmere, Wash., with a low bid of \$233,698, was awarded the contract by the Washington Department of Highways for construction of approach roadway and a reinforced concrete Spokane River Bridge at the Long Lake Project. Time for completion is 270 calendar days. Unit bids were submitted by the following:

	\$233,698	(3) David Nygren	\$270,341
(2) State Construction Co.	244,366		
	(1)	(2)	(3)
2.6 acres clearing	500.00	440.00	800.00
1.7 acres grubbing	500.00	440.00	800.00
17,570 cu. yd. common excavation incl. haul of 600 ft.	.50	.55	.60
640 cu. yd. solid rock excav. incl. haul of 600 ft.	3.00	3.30	3.00
13,730 cu. yd. sta. overhaul	.02	.03	.02
31.02 M. cu. yd. sta. overhaul	7.00	11.00	10.00
20 cu. yd. structure excavation	2.00	3.50	3.00
700 lin. ft. slope treat., Class B	.20	.20	.25
13.6 sta. (100 ft.) finishing roadway	20.00	20.00	20.00
1,000 cu. yd. selected roadway borrow in place	1.75	1.40	2.00
350 cu. yd. one course screened grav. surf. in place	4.00	4.50	4.00
50 M. gal. water	4.00	4.25	3.00
400 cu. yd. screened gravel surf. in stkpds.	3.75	4.00	3.00
470 lin. ft. beam gd. rail, Type No. 1 or 2 des. No. 6 com., in place	2.75	3.40	3.00

(Continued on next page)

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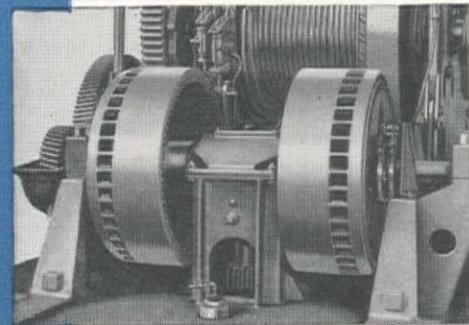
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2 only reflect. units complete in place.....	14.00	17.00	15
7 only reinf. conc. right-of-way markers in place.....	7.00	6.00	5
66 lin. ft. bit. coa. corr. met. pipe Type No. 2, 16 gauge 8 in. dia., in place.....	3.50	4.00	3
66 lin. ft. std. reinf. conc. culv. pipe 18 in. diam. in place.....	4.00	5.00	5
BRIDGE			
1,850 cu. yd. structure excavation.....	20.00	12.00	20
1,140 cu. yd. concrete Class A in place.....	80.00	95.00	100
390 cu. yd. concrete Class B in place.....	80.00	95.00	100
986 lin. ft. reinf. conc. bridge rail. in place.....	8.00	10.00	10
345,000 lb. steel reinf. bars in place.....	.12	.11	
10 only bridge drains complete in place.....	65.00	60.00	60
85 lb. copper seals in place.....	3.00	3.00	2
1,400 lb. struct. steel in place.....	.45	.50	
285 lin. ft. downspouts in place.....	4.50	5.00	5
Lump sum, removing existing structure.....	\$1,200	\$3,500	\$2,0
10 days mechanical tampers.....	40.00	50.00	40

## Sewerage . . .

### California—Contra Costa County—District—Sewers

P & J Artukovich of Los Angeles, with a bid of \$343,059, were low before the Central Contra Costa Sanitary District, Walnut Creek, Calif., for installation of sanitary sewers in the town of Walnut Creek. Unit bids were submitted as follows:

(1) P & J Artukovich .....	\$343,059	— Oakland Sewer Construction Co.....	\$370.94
(2) Stolte, Inc. ....	343,399	— Associated Electrical & Mechanical Co. 415.97	
(3) Underground Construction Co. ....	350,260	— R. A. Wattson Co. ....	467.79
(4) DeVilbiss & DeSoto & Sons .....	351,554	— Charles J. Dorfman .....	469.71
(5) Burch & Bebek .....	368,004		

	(1)	(2)	(3)	(4)	(5)
68,000 lin. ft. 6-in. diam. vit. clay pipe sewer.....	2.75	2.71	2.80	2.80	3.0
10,500 lin. ft. 8-in. diam. vit. clay pipe sewer.....	2.90	2.90	3.05	3.15	3.2
5,400 lin. ft. 10-in. diam. vit. clay pipe sewer.....	3.00	3.95	3.80	3.65	4.0
2,600 lin. ft. 12-in. diam. vit. clay pipe sewer.....	4.00	5.00	4.00	4.90	4.5
4,000 lin. ft. 15-in. diam. vit. clay pipe sewer.....	6.50	6.90	5.00	6.40	6.0
700 lin. ft. 6-in. diam. cast iron cement lined pipe sewer.....	7.00	3.30	4.30	5.00	10.0
3 6-in. diam. cem. lined, cast iron pipe Y branch 6x4-in. two bells one spigot.....	25.00	25.00	30.00	44.00	20.0
45 lin. ft. 6-in. ID cement lined and coated steel pipe sewer.....	7.00	6.80	8.00	8.00	10.0
29 lin. ft. 8-in. ID cement lined steel pipe in creek crossings.....	10.00	8.00	10.00	10.00	12.0
20 lin. ft. 15-in. ID cement lined and coated steel pipe under canal siphon .....	30.00	11.50	15.00	14.00	20.0
2,245 lin. ft. 8-in. diam. reinf. coner. pipe sewer with T & G jts. 92 lin. ft. 18-in. diam. ext. str. centrifugal cast reinf. concr. pipe sewer with collar joints installed in culvert.....	6.00	8.00	6.80	8.00	8.0
80 lin. ft. 15-in. diam. corr. metal pipe conductor, 12 ga. under railroads, including sand backfill.....	30.00	17.15	20.00	14.00	25.0
160 lin. ft. 18-in. diam. corr. metal pipe conductor, 12 ga. under highway pave and railroads, incl. sand backfill.....	35.00	19.00	22.00	15.00	30.0
50 lin. ft. 30-in. diam. corr. metal pipe conductor, 12 ga. under railroad, incl. sand backfill .....	40.00	31.50	30.00	22.00	40.0
40 lin. ft. 30-in. dia. corr. metal pipe conductor, 10 ga. under S P R incl. sand backfill.....	45.00	33.00	33.00	31.00	40.0
105 ea. flushing inlets, incl. cast iron frame and cover.....	40.00	31.00	30.00	43.00	40.0
130 48-in. ID manholes .....	230.00	215.00	299.40	220.00	200.00
900 ea. 6x4-in. vit. clay pipe wye branches.....	3.00	3.70	4.00	5.00	2.5
17 ea. 6x6-in. vit. clay pipe wye branches.....	3.50	5.30	5.00	6.60	3.5
70 ea. 8x4-in. vit. clay pipe wye branches.....	3.50	5.30	5.00	7.00	6.0
55 ea. 10x4-in. vit. clay pipe wye branches.....	5.60	8.00	8.00	9.50	4.5
1 ea. 10x4-in. vit. clay pipe wye branches.....	5.60	8.00	8.00	10.84	4.5
3 ea. 12x4-in. vit. clay pipe wye branches.....	7.00	10.25	10.00	11.00	12.0
20 ea. 15x4-in. vit. clay pipe wye branches.....	8.00	16.90	20.00	19.00	15.0
40 ea. 6-in. vit. clay pipe, 1/8 bend.....	2.00	3.00	4.00	4.00	4.0
4 ea. 8-in. vit. clay pipe, 1/8 bend.....	3.00	3.80	4.00	5.00	5.0
8 cu. yd. reinf. concer. for connection supports and expansion support incl. reinf. and excav.....	60.00	55.00	40.00	85.00	15.00

## Highway and Street . . .

### Utah—Salt Lake City—State—Surfacing

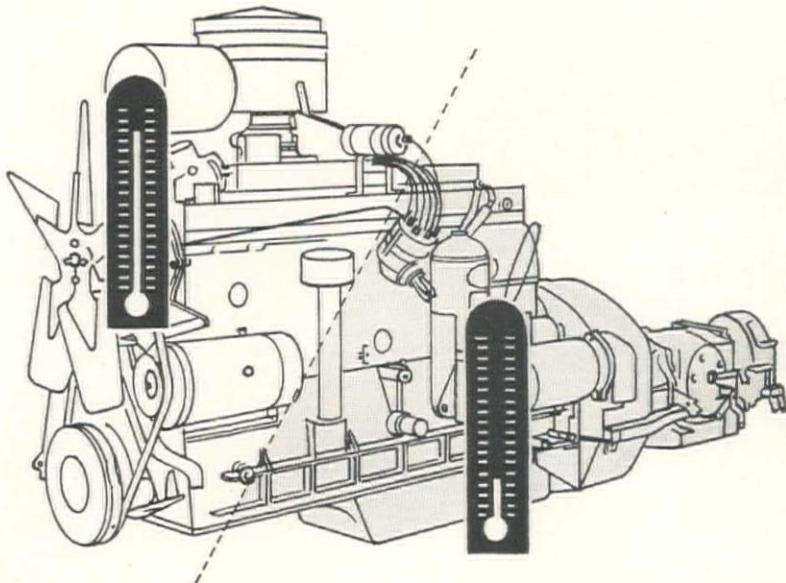
W. W. Clyde & Co., Springville, Utah, with a bid of \$393,641, was low before the State Road Commission of Utah for surfacing with a 3-in. plant-mixed bituminous course of 2.77 mi. of U. S. Highway No. 40 in Parley's Canyon, Salt Lake County. Unit bids were submitted as follows:

(1) W. W. Clyde Co. ....	\$393,641	(4) Reynolds Construction Co. ....	\$579,664
(2) Gibbons & Reed Co. ....	397,996	(5) Engineer's Estimate .....	405,469
(3) Strong Co. ....	501,033		

	(1)	(2)	(3)	(4)	(5)
15,625 tons plant mixed bituminous surfacing .....	2.40	2.27	2.40	2.50	3.00
199,000 gal. bituminous material, Type 120-150 Pt. ....	.13	.10	.15	.14	.14
48,000 gal. bituminous material, Type MC-1.....	.13	.12	.17	.13	.15
26,000 gal. bituminous material, Type RC-4.....	.14	.125	.17	.13	.15
10,000 gal. bituminous material Type SC-3.....	.115	.10	.15	.11	.11
1,200 ton cover material .....	3.00	3.35	5.00	3.00	3.00
0.587 mile scarifying and mixing (20-ft. wide).....	\$1,000	960.00	700.00	\$1,000	\$1,000
17,800 ton cr. rock or cr. gravel surface course.....	.95	.87	.78	.90	1.05
30,000 ton gravel or crushed rock base course.....	.90	.77	.72	.85	.90
369,000 cu. yd. unclassified excavation .....	.42	.42	.58	.85	.41
1,575,000 st. yd. overhaul, Class "A" .....	.01	.015	.015	.015	.01
29,000 yd. mi. overhaul, Class "B" .....	.15	.15	.15	.15	.15
5,900 1,000 gal. watering .....	1.25	2.10	2.50	1.25	2.00
4,200 hr. rolling .....	4.00	5.10	6.00	5.00	4.50
54 lin. ft. 8-in. C.G.M. pipe .....	1.60	1.70	2.68	1.50	1.40
13 lin. ft. 18-in. C.G.M. pipe .....	4.00	3.30	4.27	3.00	2.90
7 lin. ft. 24-in. C.G.M. pipe .....	6.00	6.50	5.25	4.40	4.60
23 lin. ft. 30-in. C.G.M. pipe .....	7.00	5.60	6.25	5.20	5.65
131 lin. ft. 36-in. C.G.M. pipe .....	8.50	8.00	10.50	8.65	8.75
1,146 lin. ft. 18-in. concrete pipe .....	3.50	3.85	5.50	3.20	3.35
633 lin. ft. 24-in. concrete pipe .....	4.75	4.80	6.50	4.20	5.11
342 lin. ft. 36-in. concrete pipe (special strength) .....	14.50	13.35	17.00	13.25	10.00
420 lin. ft. 60-in. section C.G.M. pipe, 3 and 5 gauge .....	50.00	46.50	48.00	46.00	49.00

(Continued on next page)

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1 yr. \$4.00 2 yrs. \$7.00 3 yrs. \$10.00

Remittance enclosed  Bill me.

Name.....

Address.....

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

Title.....

5,852 lin. ft. 8-in. underdrains	.75	.87	1.40	1.00	
736 lin. ft. 12-in. underdrains	1.20	1.30	1.60	1.10	
1,590 cu. yd. gravel backfill	2.00	1.95	1.00	2.00	
5,450 cu. yd. excavation for structures	1.50	2.15	4.00	3.00	
1 each embankment protector	30.00	55.00	50.00	20.00	50
40 acres clearing and grubbing	150.00	89.00	200.00	300.00	150
2,000 lin. ft. surface ditches	.10	.06	.20	.10	
1.80 mile obliteration of old road	200.00	165.00	200.00	500.00	150
1,100 cu. yd. channel excavation	1.00	1.00	.75	1.50	
82 cu. yd. concrete, Class "A"	70.00	82.00	75.00	75.00	55
2,055 lb. structural steel	.20	.20	.50	.20	
9,750 lb. reinforcing steel	.14	.13	.14	.14	
67 each guide posts	5.00	9.60	6.00	6.00	5
1,480 lin. ft. guard rail	3.00	2.70	3.50	3.00	2
1,500 lin. ft. right of way fence, Type "B"	.30	.20	.35	.35	
80 each right of way markers	5.00	5.50	5.00	6.00	4

## California—San Joaquin County—State—Grade and Pave

United Concrete Pipe Corp., Baldwin Park, Calif., with a bid of \$1,067,164, was low before the California Division of Highways for construction of 7.2 mi. of State Highway between Mariposa Road south of Stockton and Calaveras River north of Stockton, and between Wilson Way and new Route 4 in Stockton. This length is to be graded and paved with Portland Cement concrete on cement treated subgrade, and with plant mix surfacing on Portland Cement concrete base and untreated rock base. Units bids were submitted as follows:

(1) United Concrete Pipe Corp.....	\$1,067,164	(2) A. Teichert & Son, Inc.....	\$1,177,		
(2) Fredrickson Bros.....	1,079,580	(3) Haddock Engineers, Ltd., Engineers, Ltd. and Cox Brothers Construction Co.....	1,183,		
(3) M. J. B. Construction Co.....	1,091,875	(4) Griffith Co.....	1,189,		
(4) Fredrickson & Watson Construction Co.....	1,095,082	(5) Guy F. Anderson Co.....	1,219,		
(5) Westbrook & Pope and A. G. Raisch Co.....	1,098,661	(6) Stolte Inc., and The Duncanson-Harrelson Co.....	1,348,		
(6) N. M. Ball Sons.....	1,115,700				

	(1)	(2)	(3)	(4)	(5)	(6)
360 cu. yd. remove conc.	4.00	4.50	5.00	2.70	4.00	5
89 sta. clearing and grubbing	50.00	23.00	30.00	14.00	250.00	100
27,100 cu. yd. roadway excav.	.40	.45	.60	.38	.50	
1,005 cu. yd. structure excav.	3.00	3.50	3.50	2.60	3.00	3
65 cu. yd. ditch and channel excav.	1.50	1.25	2.50	1.50	3.00	2
34,100 sq. yd. compact, original ground	.05	.06	.05	.04	.05	
595,000 cu. yd. overhaul	.005	.008	.005	.006	.005	
10,400 cu. yd. imported borrow	1.43	1.05	1.20	1.39	1.15	1
156,600 cu. yd. imported base matl.	1.23	1.35	1.39	1.39	1.15	1
Lump sum. dev. wat. supply and furn. wat. equip.	\$24,000	\$4,600	\$5,000	\$3,900	\$3,000	\$1,0
14,470 M. gal. applying water	.50	1.45	1.20	1.15	1.50	1
380 sta. finish, roadway	12.00	20.00	12.00	21.00	28.00	23
179,400 sq. yd. mixing and compact. (cem. tr. suggrade)	.24	.28	.23	.20	.18	
6,350 bbl. P. C. (cem. tr. subgrade)	5.00	3.50	4.00	4.25	4.00	4
305 tons asph. emuls. (curing sl. pt. bdr. & sl. cts.)	50.00	28.00	40.00	29.00	35.00	32
32,300 tons untreated rock base	2.10	2.37	2.45	2.30	2.50	2
230 tons liquid asph. SC-2 (pen. tr. and pr. ct.)	40.00	28.00	30.00	28.00	30.00	33
151 cu. yd. sand (pr. ct. and sl. ct.)	5.00	4.60	5.00	5.90	6.00	7
765 tons screenings (sl. cts.)	4.00	5.20	5.00	5.50	6.00	5
325 tons liquid asph. SC-3 (B.S.T.)	35.00	30.00	30.00	27.00	25.00	25
52,700 sq. yd. prep., mix., shaping surface (B.S.T.)	.08	.12	.15	.11	.14	
13,900 tons mineral agrgr. (P.M.S.)	4.00	4.00	4.20	4.40	4.50	4
690 tons paving asph. (P.M.S.)	30.00	25.00	23.00	25.00	23.00	22
2,350 lin. ft. raised bars	1.30	1.10	1.30	1.10	1.00	1
6,500 sq. yd. plac. P.M.S. ditch lining	1.70	.60	.90	.50	1.50	
1,170 cu. yd. Cl. "B" P.C.C. (base)	11.50	12.00	12.00	12.65	12.50	12
38,400 cu. yd. Cl. "B" P.C.C. (pavement)	11.70	12.00	12.00	12.65	12.50	12
28,430 cu. yd. pavement tie bolt assemblies	.50	.45	.50	.51	.60	
65 cu. yd. Cl. "A" P.C.C. (structures)	70.00	63.00	65.00	50.00	75.00	65
21,200 lb. bar reinf. steel	.17	.10	.12	.095	.12	
575 cu. yd. Cl. "A" P.C.C. (curbs and gutters)	36.00	39.00	40.00	40.00	40.00	40
100 ea. curb dowels	1.00	.45	1.00	.60	.75	
55 ea. monuments	5.00	5.75	6.00	4.50	6.00	6
170 ea. barrier posts	4.00	4.60	5.00	4.25	7.00	4
1,040 lin. ft. metal plate guard railing	3.00	4.00	4.00	3.10	3.00	2
185 ea. install metal culv. markers	5.00	3.45	3.00	2.50	4.00	3
110 ea. install metal guide posts	5.00	3.45	3.00	3.00	4.00	3
32 ea. horiz. reflector units	10.00	4.60	5.00	6.00	7.00	5
0.6 mi. new property fence	\$1,000	\$1,400	\$1,200	\$1,250	\$1,500	\$1,00
30 lin. ft. 8-in. C.M.P. (16 ga.)	2.00	1.65	2.00	1.70	2.00	1.8
552 lin. ft. 18-in. C.M.P. (16 ga.)	2.50	3.12	3.60	2.80	3.00	3.4
54 lin. ft. 24-in. C.M.P. (14 ga.)	4.00	3.50	5.50	4.30	4.50	4.0
134 lin. ft. 30-in. C.M.P. (14 ga.)	5.00	5.85	7.00	5.40	6.00	6.0
492 lin. ft. 48-in. C.M.P. (12 ga.)	14.00	13.70	11.00	10.75	12.00	13.0
4 ea. spillway assemblies	40.00	25.00	35.00	36.00	25.00	24.0
116 lin. ft. 8-in. C.M.P. downdrains (16 ga.)	2.00	1.72	2.20	2.00	2.00	2.0
138 lin. ft. salvaged exist. pipe culverts	2.00	1.72	1.50	1.60	2.00	1.0
52 lin. ft. relay salvaged C.M.P. culverts	2.00	1.15	1.50	1.60	2.00	1.0
1 ea. cast steel frame and cover for drop inlet	100.00	69.00	50.00	80.00	100.00	75.00

## Wyoming—Carbon County—State—Grade and Drain

With a bid of \$484,865, Forney Construction Co. of Casper, Wyo., was awarded the contract by the Wyoming State Highway Department for the grading, draining, construction of two reinforced concrete culverts and miscellaneous work on 10.5 mi. of the Rawlins-Medicine Bow Road in Carbon County. Units bids were submitted as follows:

(1) Forney Construction Co.....	\$484,865	(4) S. Birch & Sons Co.....	\$537,55
(2) Lowdermilk Brothers.....	507,305	(5) Read Construction Co.....	539,76
(3) Platte Valley Construction Co.....	519,590	(6) Engineer's estimate.....	571,97

Also bidding: Leach Brothers; Gibbons & Reed Co.; Northwestern Engineering Co.; W. W. Clyde & Co.; Peter Kiewit Sons' Co.; J. H. & N. M. Monaghan and Associates Co.; and Taggart Construction Co.

	(1)	(2)	(3)	(4)	(5)	(6)
1,138,300 cu. yd. excavation	.20	.22	.23	.236	.22	.2
51,010 cu. yd. excavation (selected embankment)	.29	.20	.25	.24	.31	.3
3,681,600 cu. yd. sta. haul	.01	.01	.01	.01	.01	.0
297,800 cu. yd. mi. haul	.12	.10	.14	.12	.16	.1
13,920 M. gal. watering	1.70	1.00	2.00	1.50	2.50	2.2
3,500 hr. sheep's foot roller operation	10.00	12.00	9.00	10.00	11.00	10.0
190 hr. pneumatic tired roller operation	8.00	6.50	5.00	5.75	6.00	6.0
175 hr. smooth steel roller operation	8.00	7.50	8.00	5.75	6.00	6.0
1,860 lin. ft. 18-in. std. R.C.P.	4.20	5.00	4.00	4.50	3.70	4.0
1,052 lin. ft. 24-in. std. R.C.P.	6.00	6.75	5.60	6.50	6.00	6.0
180 lin. ft. 30-in. std. R.C.P.	8.00	9.25	9.00	10.00	8.00	9.0
88 lin. ft. 36-in. std. R.C.P.	9.50	12.00	11.00	12.00	11.00	11.0

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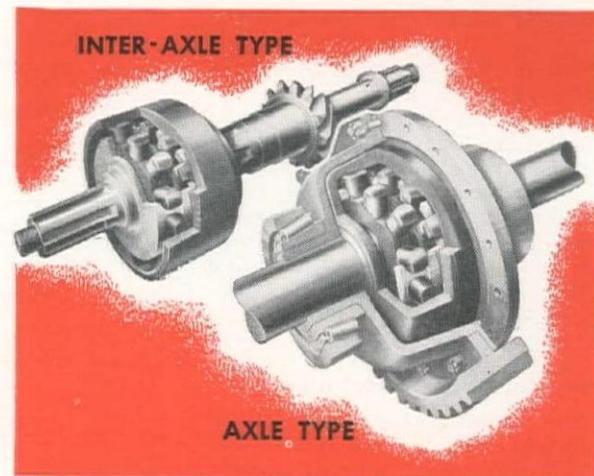
NO PLACE FOR...

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Masters of the mire, Mack six-wheelers keep going through slippery mud and sand because they have the benefit of Mack's exclusive Power Divider. This unique device divides torque between the two bogie axles and between the four driving wheels. Torque is delivered proportionately to wheels having the most traction, thus eliminating dissipation of power in useless slippage and wasteful wheel spinning.

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## Coos Bay Dredging

Continued from page 70

This last winter was one of the worst winters in many years and conditions were far from ideal. Also the big ebb tides, backed by a freshet from Coos River, would almost pull the empty pipeline pontoons under water. There were many times when the *Alabama* just barely made it in from the entrance before the surge was built up to a point that it could not have been held in the area.

Because of the power shortage in the Northwest, a special barge was built by the Standard Dredging Corp. and was brought to the job from Los Angeles. The power barge *Dynamo* is a converted LSM with four 1,800-hp. Fairbanks-Morse, opposed-piston Diesel generators mounted in it. The barge was moored in the vicinity of the *Hindes* and fed power to the dredge through a submarine cable. The barge delivered 7,408,800 kwh. through the job.

### Two-way radio ties the fleet together

All the major pieces of equipment were closely tied together by two-way radio communication and this made it possible to keep all equipment working with the least amount of delay. Also tide readings and storm warnings could be relayed to the *Alabama* and delay due to breakdowns was cut materially.

There were no serious accidents on this job. The contractor and the Engineer's Safety Section cooperated closely, and even with the highly hazardous nature of the outside channel work, a broken toe was the worst accident that happened.

### The job master-minds

Col. O. E. Walsh, District Engineer, Corps of Engineers, Portland District was the officer in charge of the contract. Allen G. Terry was the Resident Engineer in charge of the field work at Empire, Ore. Elwood B. Oliphant was the chief inspector with Ted L. Webb and V. N. Case assisting him.

Barrett G. Hindes, president of the San Francisco Bridge Co., was the general manager of the joint venture. Knox Borden was the general superintendent in charge of the work in Coos Bay. A. S. Heltwood was superintendent in charge of the clamshell work at Guano Rock with Frank J. Peterson as captain of the *Alabama* and J. W. Patton, dredge engineer. H. J. Rossebo was captain of the *S. G. Hindes* and F. H. Lampson, dredge engineer. F. H. Snider was the engineer in charge of the *Dynamo*. Mark F. Lund was the office manager. Homer Reno was the foreman in charge of the blasting operations.

THE BUILDING Committee of the Oregon State Board of Higher Education has approved a building program of \$6,000,000 for the Oregon colleges. Included in the program will be a science-classroom-laboratory building at the University of Oregon, \$1,500,000.

192 lin. ft. 48-in. C.M.P. ....	10.35	12.00	13.00	14.00	14.00	14.00	14.00
396 lin. ft. 66-in. C.M.P. ....	19.20	22.00	22.00	24.00	24.00	24.00	24.00
80 lin. ft. 90-in. M.P.C.M.P. (58-17) ....	48.50	45.00	50.00	51.00	51.00	51.00	50.00
164 lin. ft. 90-in. M.P.C.M.P. (510-18) ....	46.75	42.00	50.00	49.00	49.00	49.00	49.00
415 cu. yd. excavation for pipe culverts ....	1.50	4.00	1.50	1.25	1.25	3.00	2.00
465 cu. yd. structure excavation ....	3.00	5.00	2.00	5.00	5.00	3.00	3.00
427.5 cu. yd. Class A concrete ....	48.00	57.50	44.00	55.00	50.00	51.00	51.00
96.3 cu. yd. Class B concrete ....	47.00	57.50	44.00	53.00	50.00	47.00	47.00
66,580 lb. reinforcing steel ....	.12	.12	.12	.135	.135	.13	.13
4 ea. cattleguards (prefabricated) ....	150.00	500.00	175.00	300.00	250.00	200.00	200.00
730 hr. mechanical tamping ....	6.00	6.00	5.00	6.00	6.00	6.00	6.00
155 cu. yd. Class 1 riprap ....	15.00	10.00	8.00	14.50	16.00	12.00	12.00
20 cu. yd. grouted riprap ....	20.00	17.50	12.00	18.50	25.00	15.00	15.00
46,700 lin. ft. std. r/w fence (3 wire) ....	.16	.15	.16	.18	.16	.16	.16
64,200 lin. ft. Type A r/w fence (26-in.) ....	.22	.25	.20	.25	.20	.20	.20
55 ea. end panels ....	12.00	8.00	8.00	15.00	12.00	15.00	15.00
110 ea. brace panels ....	10.00	7.00	10.00	13.00	10.00	12.00	12.00
40 ea. right of way markers ....	10.00	10.00	8.00	5.00	8.00	10.00	10.00
2 ea. provide and maint. field testing lab. bldgs. ....	250.00	\$1,000	400.00	868.00	500.00	800.00	800.00
1,250 lin. ft. industrial type fence ....	2.90	3.00	3.25	5.00	3.50	3.50	3.50
ea. galvanized steel gates ....	100.00	200.00	50.00	225.00	50.00	100.00	100.00

## New Mexico—Otero County—Public Roads—Grade and Drain

Brown Contracting Co. of Albuquerque, N. M., with a bid of \$337,801, was low before the Public Roads Administration at Denver, Colo., for the grading and construction of drainage structures on 4,321 mi. of the Alamogordo-Cloudcroft road in the Lincoln National Forest. The roadbed will be 28-ft. wide. Unit bids were submitted as follows:

(A) Brown Contracting Co. ....	\$337,801	(F) Henry Thygesen & Co. ....	\$397,400
(B) Martin & Cowart ....	341,334	(G) Lee Moor Contracting Co. ....	410,700
(C) Skousen Construction Co. ....	369,908	(H) Plate Rogers, Inc. ....	411,400
(D) Lowdermilk Bros. ....	371,223	(I) Armstrong & Armstrong ....	498,700
(E) W. T. Bookout Construction Co. ....	384,059	(J) Engineer's Estimate ....	366,100

(1) Conting. sum. Miscellaneous Force Account Work to be paid for as earned		(15) Lump sum, prov. and maint. sheepfoot or tanking roller or rollers on the project	
(2) 36 ac. clearing and grubbing		(16) 300 cu. yd. conc. Class A (air-entrained, low alkali cement)	
(3) 5,000 cu. yd. stripping and storing topsoil		(17) 11,500 lb. reinforcing steel	
(4) 280,000 cu. yd. unclassified excav.		(18) 550 lb. struct. steel-furn. fabr., and erecte	
(5) 3,750 cu. yd. unclass. excav. for structs.		(19) 200 cu. yd. cement rubble masonry	
(6) 14,000 cu. yd. unclass. excav. for borrow, Case 1		(20) 130 lin. ft. 18-in. C.G.S.M. culvert pipe	
(7) 500,000 sta. yd. overhaul (1,000 ft. free haul)		(21) 2,948 lin. ft. 24-in. C.G.S.M. culvert pipe	
(8) 3,000 cu. yd. mi. spec. overhaul of borrow (1,000 ft. free haul)		(22) 724 lin. ft. 30-in. C.G.S.M. culvert pipe	
(9) 4,000 cu. yd. replacing topsoil		(23) 210 lin. ft. 36-in. C.G.S.M. culvert pipe	
(10) Conting. sum. obliteration of old roadways to be paid for as earned		(24) 144 lin. ft. 42-in. C.G.S.M. culvert pipe	
(11) 4,321 mi. finishing earth graded roads		(25) 396 lin. ft. 48-in. C.G.S.M. culvert pipe	
(12) 5,400 unit watering of embankment		(26) 176 lin. ft. 60-in. C.G.S.M. culvert pipe	
(13) Lump sum, prov. and maint. water plant or plants		(27) 2,800 lin. ft. 6-in. perf. C.G.S.M. pipe under drain	
(14) 1,400 hr. sheepfoot tamping roller for embankment		(28) 24 ea. concrete maint. marker posts	
		(29) 1 ea. cattle guard, 26-ft.	
		(30) 22,000 lin. ft. barbed wire fence, Type 1	
		(31) 12 ea. gates, 12-ft.	

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
(1) ....	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
(2) ....	100.00	500.00	400.00	700.00	425.00	240.00	50.00	400.00	125.00
(3) ....	.50	.50	.50	.40	.50	.50	.25	.40	.30
(4) ....	.73	.64	.78	.78	.82	.90	.99	.87	.126
(5) ....	3.00	2.50	3.00	2.50	3.00	3.00	1.00	5.00	3.50
(6) ....	.50	.50	.50	.50	.50	.60	1.00	.80	.85
(7) ....	.03	.0125	.02	.02	.03	.025	.05	.02	.03
(8) ....	.50	.30	.50	.20	.50	.25	.25	.30	.20
(9) ....	.50	1.00	1.00	.60	.50	.80	.25	.50	.30
(10) ....	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
(11) ....	200.00	500.00	\$2,000	500.00	600.00	500.00	100.00	500.00	500.00
(12) ....	1.00	2.00	.50	1.00	1.00	1.00	.50	1.50	1.40
(13) ....	500.00	\$2,700	\$1,000	500.00	500.00	\$2,450	100.00	\$2,000	300.00
(14) ....	5.00	6.00	5.00	6.50	6.00	7.00	1.00	6.00	6.00
(15) ....	500.00	\$1,400	\$1,000	250.00	500.00	\$1,000	\$3,000	500.00	\$2,000
(16) ....	50.00	58.00	57.00	50.00	60.00	52.00	40.00	55.00	50.00
(17) ....	.15	.25	.15	.15	.20	.12	.20	.14	.14
(18) ....	.25	.75	.40	1.00	1.00	.50	.50	.30	.35
(19) ....	30.00	55.00	40.00	40.00	40.00	30.00	50.00	30.00	40.00
(20) ....	4.00	3.35	3.50	4.00	3.50	3.15	4.10	4.00	3.50
(21) ....	5.50	5.10	5.00	5.25	5.20	5.00	5.89	5.00	5.30
(22) ....	6.60	6.15	6.00	6.25	6.15	7.45	6.00	6.00	6.50
(23) ....	10.00	9.70	8.85	9.00	9.18	8.80	10.23	9.00	8.50
(24) ....	13.00	11.20	10.50	10.50	11.50	11.65	11.38	10.00	12.00
(25) ....	15.00	12.80	12.50	13.25	12.25	13.10	13.08	14.00	14.00
(26) ....	20.00	19.50	20.00	19.90	19.80	20.29	30.00	21.00	18.00
(27) ....	2.00	3.25	1.50	2.75	2.15	2.00	2.33	4.00	2.60
(28) ....	10.00	30.00	20.00	18.00	20.00	22.00	10.00	20.00	15.00
(29) ....	\$2,000	\$2,400	\$1,800	\$2,500	\$3,200	\$3,000	\$2,500	\$2,000	\$2,000
(30) ....	.20	.25	.40	.16	.20	.30	.20	.30	.25
(31) ....	20.00	50.00	40.00	60.00	60.00	35.00	50.00	60.00	30.00

## California—Humboldt County—State—Grading

Piombo Construction Co., San Francisco, with a bid of \$668,708, was low before the California Division of Highways for the grading and draining of 3.8 mi. between 0.5 mi. south of Stone Lagoon Summit and 1 mi. south of Orick. Unit bids were as follows:

(1) Piombo Construction Co. ....	\$668,708	(A) Teichert & Son, Inc. ....	\$ 865,634				
(2) L. A. & R. S. Crow ....	698,857	(B) Guy F. Atkinson Co. ....	925,30				
(3) Westbrook & Pope ....	774,267	(C) Haddock-Engineers, Ltd. ....	1,109,44				
(4) Fredericksen & Kasler ....	798,378	(D) Stolte, Inc., United Concrete Pipe Corp., The Duncanson-Harrelson Co. ....	1,173,86				
(5) Harms Bros. ....	843,738	(E) and Ralph A. Bell ....					
(6) N. M. Ball Sons ....	863,837	(F) (1) (2) (3) (4) (5) (6)					
		500.00	860.00	\$1,500	650.00	800.00	\$1,000
		.44	.435	.465	.52	.58	.5
		3.00	2.50	4.00	2.60	3.00	3.7
		1.80	2.25	3.60	1.75	1.00	3.3
		1.00	.75	.60	.90	1.00	1.5
		.005	.0075	.005	.01	.003	.00
		\$13,000	\$6,000	\$13,000	\$4,000	\$10,000	\$12,000
		.50	.50	.60	1.40	1.00	.3

(Continued on next page)

# You don't lead in sales for 17 years unless you lead in value!

International Trucks have led in heavy-duty truck sales for 17 straight years!

WHAT HEAVY-DUTY TRUCKS offer the biggest value? The most exacting truck buyers in America have answered that one.

You can find their answer by looking at registration figures for new trucks with gross weight ratings of 16,001 pounds or over.

Those figures show that International Trucks have been *America's largest-selling heavy-duty trucks for 17 straight years!*

A heavy-duty truck is a major investment. You can bet your bottom dollar that the men who buy them don't give any line of trucks a vote of confidence like they've given International unless their profit and loss statements show them that it pays.

But don't think that International Trucks offer outstanding value in the heavy-duty field *alone*. There are 22 models of International Trucks plus 1000 different specialized variations to meet individual hauling requirements. Gross vehicle

weight ratings range from 4,400 to 90,000 pounds.

**Trucks built to meet your specifications**—No matter what model International Truck you buy, you get the basic values that have made International Trucks the largest-selling heavy-duty trucks in America for the past 17 years.

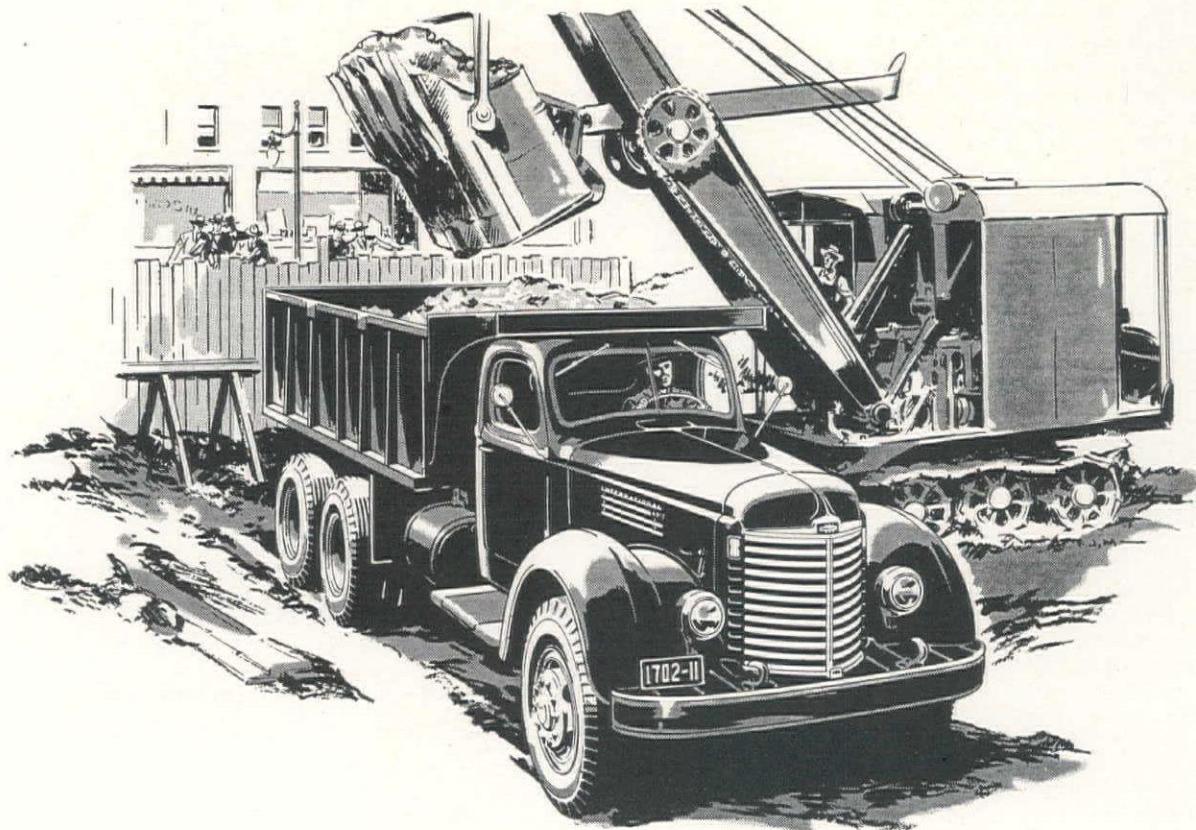
You get a rugged truck unweakened by a single compromise with passenger car design.

You get a long-lasting truck. *More than half of all the Internationals built in the last 42 years are still on the job.*

You get a truck specialized to meet your particular specifications; specified by a truck sales engineer who knows your business in terms of the demands it makes on trucks.

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International Harvester Builds  
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**INTERNATIONAL**  **TRUCKS**  
INTERNATIONAL HARVESTER COMPANY • CHICAGO  
FIRST IN HEAVY-DUTY TRUCK SALES FOR 17 STRAIGHT YEARS

## Klamath County Roads

Continued from page 78

of Klamath County had the foresight to start the road program by passing a 3-mill special road levy. This special levy is now giving the county an additional \$100,000 for this year's funds, and will extend for a period of three years. Highway systems are not the greedy tax gobblers they are all too often thought to be; in reality the public is paying far less for their roads and highways than for the other public utilities, which are often taken for granted.

Klamath County had a 1947-48 budget of \$299,000, less an amount of \$40,000 for its revolving trust fund. This left \$259,000 available for county road purposes. Similarly, for the budget year 1948-1949, an amount of \$355,500 net total was available, including the special 3-mill levy and less the revolving trust fund. An average of the two fiscal budget years gives an amount of \$307,250.

### Where the dollars go

Klamath County regraded 19 mi. of road and gravel-surfaced 42 mi. of road last year at an estimated contract cost of \$212,625. Also, during 1948, Klamath County oiled 29 mi. of roads at a contract cost of \$138,339. The county also constructed 11 new bridges at a contract cost of about \$36,000. These major items, namely new construction, surfacing, oiling, and bridges, would amount to a total of \$386,964 in improvements to the county road system if the work had been done by contract such as is the case with the Oregon State Highway system. This is not all, for to this total of \$386,964 in construction must be added routine and normal costs that must be carried for ordinary work. These figures, according to County Engineer Hector, amount to: 1—Ordinary maintenance, approximately \$103,300. 2—Purchase of new equipment, \$40,200. 3—Other, including repairs, materials, administration, etc., and not charged against new construction, approximately \$43,000. These three items total \$186,500.

From the average county road budget of the past two years, \$307,250, the tax payers of Klamath County have received during the year 1948 a value on their county road system of \$386,964 in new construction plus \$186,500 in regular and maintenance costs for a total of \$573,464. This value received of \$573,464 from an amount spent of \$397,250 leaves a net saving to the tax payers of \$266,214. This method of operation is what the county is doing to make the most of its available funds. Following these practices, the county will eventually have a road system adequate for its many needs, regardless of the temporary setbacks experienced when seasonal weather causes potholes and surface upheavals.

ARTICLES written by "Dick" Clark, Associate Editor, on county and city construction and engineering problems appear regularly in *Western Construction News*.

200 sta. finish roadway	15.00	10.00	12.00	20.00	15.00	10.00
40,200 cu. yd. sand blanket matl.	.80	.78	.65	.67	1.00	.90
6,000 cu. yd. gravel embankment matl.	1.30	1.75	2.00	1.90	2.50	1.30
360 cu. yd. Cl. "A" P.C.C. (structures)	55.00	55.00	70.00	71.00	70.00	71.00
350 lin. ft. furn. conc. piling	3.70	4.50	5.00	10.00	5.00	5.00
14 ea. driving piles	300.00	175.00	200.00	120.00	200.00	115.00
49,000 lb. bar reinf. steel	.11	.10	.09	.16	.10	.10
6,130 cu. yd. heavy stone riprap	5.75	6.50	9.00	4.50	8.50	8.10
94 ea. monuments	5.00	6.00	6.00	12.00	7.00	7.00
3.5 mi. new property fence	\$2,500	\$2,000	\$2,000	\$2,800	\$3,500	\$2,750
9 ea. drive gates	50.00	100.00	50.00	60.00	60.00	40.00
11 ea. redwood covers	14.00	40.00	25.00	26.00	20.00	17.00
150 lin. ft. 8-in. C.M.P. (16 ga.)	1.75	2.00	2.00	2.50	2.00	2.15
2,280 lin. ft. 18-in. C.M.P. (16 ga.)	3.20	3.20	3.50	3.50	4.00	4.20
140 lin. ft. 18-in. C.M.P. (14 ga.)	3.70	3.75	4.00	4.20	4.50	4.50
96 lin. ft. 24-in. C.M.P. (14 ga.)	4.80	4.60	5.00	5.50	6.00	5.00
290 lin. ft. 24-in. C.M.P. (12 ga.)	6.30	6.00	6.50	6.50	7.00	7.00
194 lin. ft. 24-in. C.M.P. (10 ga.)	7.70	7.20	8.00	7.80	8.00	8.50
136 lin. ft. 42-in. C.M.P. (12 ga.)	10.80	13.50	11.00	11.00	12.00	12.00
5,400 lin. ft. 8-in. perf. met. pipe under drains (16 ga.)	1.65	1.70	1.70	2.00	2.00	2.20
1,300 cu. yd. filter material (Type A)	3.20	2.50	5.00	2.50	5.00	5.50
7,700 cu. yd. filter material (Type B)	1.10	2.10	2.50	2.80	2.50	1.50

## Oregon—Malheur County—State—Reoiling

J. C. Compton Co., McMinnville, Ore., with a bid of \$44,084, were low before the Oregon State Highway Department for the reoiling with 200-300 asphalt of the I.O.N. and Jordan Valley Highway from the Idaho State Line to Blue Mountain Pass. Bids were submitted as follows:

(1) J. C. Compton Co.	\$44,084	(4) Acme Construction Co.	\$58,388	
(2) Tom McCorkle Construction Co.	49,471	(5) Babler Bros.	61,888	
(3) Newport Construction Co. & Russell Olsen	49,633	(1) (2) (3) (4) (5)		
43.68 mi. preparation of base	50.00	75.00	100.00	100.00
8,100 cu. yd. placing aggregates	1.00	1.25	1.25	2.00
21,600 yd. mi. hauling aggregates	.20	.15	.20	.20
670 tons furnishing and placing 200-300 asphalt	44.00	49.00	46.00	50.00
	52.00			

## California—Tulare County—State—Grade and PCC Pave.

N. M. Ball & Sons of Berkeley, Calif., with a bid of \$633,228, were low (by less than \$1,000) before the California Division of Highways for the paving with PCC concrete on cement-treated subgrade and plant-mixed surfacing on crusher run base of about 7.8 mi. of the road between Tipton and the Tulare Airport in Tulare County. Unit bids were submitted by the following:

(1) N. M. Ball & Sons	\$633,228	(6) M. J. B. Construction Co.	\$727,149			
(2) Griffith Co.	634,149	— Fredrickson Bros.	731,681			
(3) Guy F. Atkinson Co.	662,950	— Fredrickson & Watson Construction Co.	744,344			
(4) A. G. Raisch Co.	674,747	— Peter Kiewit Sons' Co.	799,532			
(5) Cox Bros. Construction Co.	686,923	(1) (2) (3) (4) (5) (6)				
270 cu. yd. removing concrete	4.00	4.15	5.00	2.35	7.50	4.00
1,000 cu. yd. roadway excav.	1.00	1.50	.90	1.50	1.00	1.50
500 cu. yd. structure excav.	2.40	2.50	3.00	3.00	2.00	3.50
25 cu. yd. ditch excav.	1.50	2.00	3.00	3.00	3.00	3.00
6,000 cu. yd. imp. borrow	.90	1.10	.95	1.20	1.10	1.40
Lump sum, dev. water supply and furn. watering equip.	\$1,000	\$4,000	\$5,000	\$7,500	\$12,500	\$7,100
6,200 M. gal. applying water	1.30	1.30	1.25	1.50	1.40	1.00
Lump sum, finishing roadway	\$4,000	\$2,500	\$3,500	\$3,250	\$3,500	\$4,710
4,000 bbl. Portland cement (cem. tr. subgrade)	3.70	4.00	3.00	4.50	3.75	4.50
132,000 sq. yd. mix and compact (cem. tr. subgrade)	.20	.225	.25	.22	.23	.25
13,000 ton crusher run base	3.10	3.00	3.30	3.20	4.20	3.75
240 ton asphalt emuls. (pt. bdr., curing sl. & sl. cts.)	40.00	45.00	40.00	34.00	40.00	45.00
750 ton screenings (sl. ct.)	5.50	3.75	5.50	3.75	5.25	5.50
105 ton liq. asph., SC-2 (pr. ct.)	26.00	24.00	24.00	25.00	22.50	28.00
19,500 ton min. aggr. (plant-mix. surf.)	4.00	3.75	4.03	4.25	3.75	3.85
1,030 ton paving asph. (plant-mix. surf.)	22.00	21.50	20.00	20.00	22.00	23.00
500 lin. ft. raised bars	1.00	1.20	1.15	.90	1.15	1.50
240 sq. ft. placing plant-mix. surf. (curb open. drs.)	.20	.30	.70	.60	.20	.15
30,400 cu. yd. Class "B" PCC (pavement)	12.11	11.85	12.60	12.75	12.80	14.10
21,000 cu. yd. pavement tie bolt assemblies	.50	.60	.50	.52	.50	.50
160 cu. yd. Class "A" PCC (struct.)	50.00	40.00	50.00	52.50	55.00	55.00
500 cu. yd. Class "A" (curbs)	32.00	45.00	41.00	41.00	40.50	40.00
230 lin. ft. met. plate guard rail	3.00	3.50	4.00	3.50	3.60	3.50
5,100 lin. ft. chain link fence	1.10	1.10	1.00	1.15	1.05	1.20
8 lin. ft. 24-in. CMP (14 ga.)	5.00	6.00	6.00	5.00	5.00	6.00
92 lin. ft. 18-in. CMP (16 ga. close riveted, soldered)	3.20	5.50	6.00	4.75	4.50	5.00
5 ea. field joints for siphons	15.00	30.00	25.00	29.00	20.00	25.00
625 lin. ft. salv. exist. pipe culv.	1.00	1.00	1.50	.60	.60	1.20
50 ea. horiz. reflector units	7.00	9.00	10.00	5.00	8.75	4.00
16 ea. timber barricades	25.00	35.00	60.00	29.00	80.00	50.00
12,000 lb. furn. bar reinf. steel	.07	.08	.09	.08	.073	.08
24,000 lb. placing bar reinf. steel	.03	.03	.035	.03	.0375	.04

## Waterway Improvement . . .

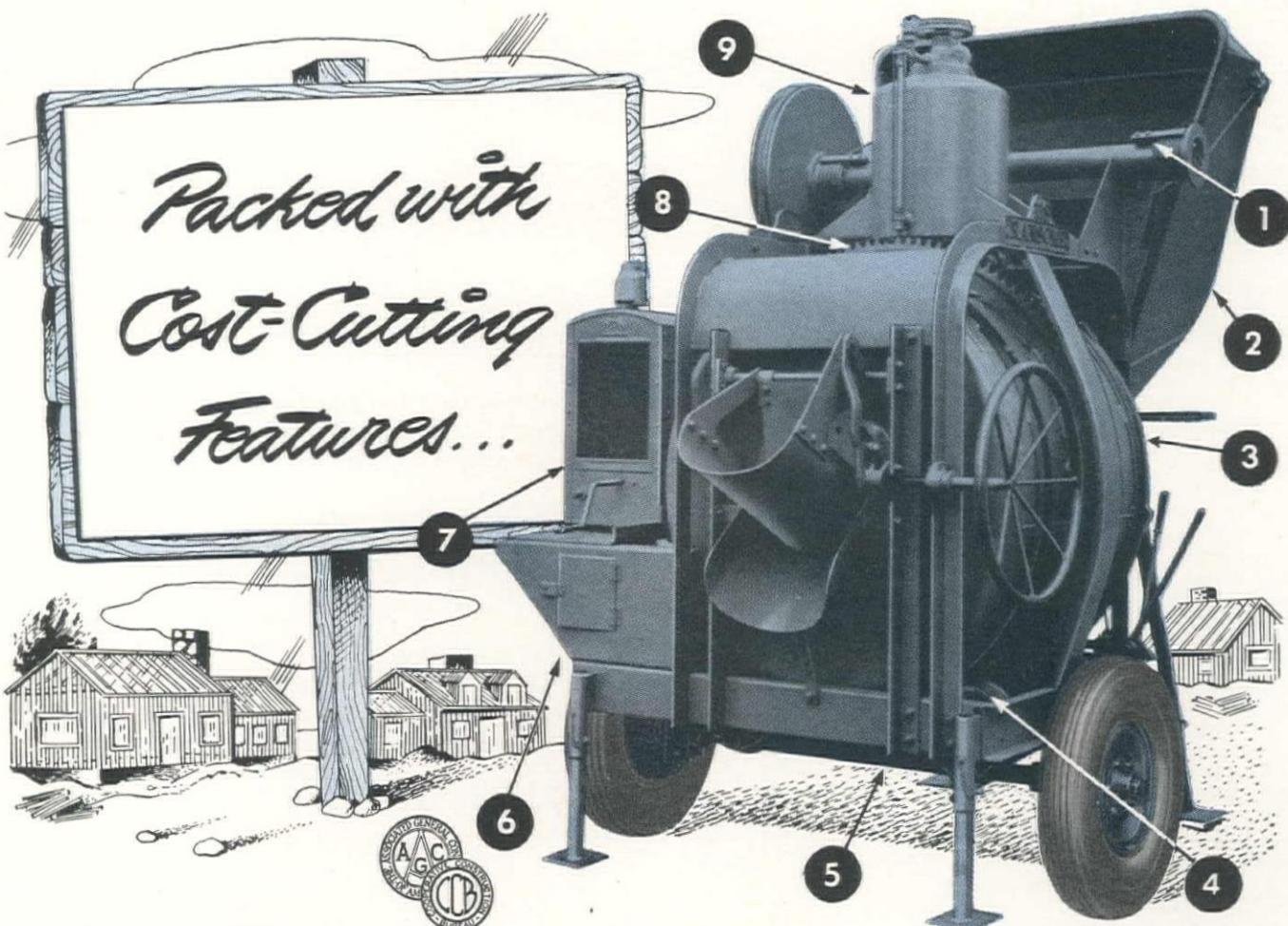
### California—Los Angeles County—Corp of Engineers—Channel Improve.

Spencer Webb Co. and James A. White, contractors of Los Angeles, were low bidders before the Corps of Engineers, Los Angeles District, for construction of Creek Channel improvements for the Sawtelle-Westwood System from Ballona Creek to Braddock Drive in Los Angeles County. Unit bids were submitted as follows:

(1) Spencer Webb Co. and James S. White	\$444,992	(6) Vinnell Co., Inc.	\$506,907			
(2) Bent Construction Co.	455,194	— Fred D. Chadwick and McDonald & Kruse	524,426			
(3) Charles J. R. Rounds and Lars Oberg	469,210	— Peter L. Ferry & Son and John M. Ferry	544,264			
(4) Bressi & Bevanda Constructors, Inc.	478,109	— Hongola & Elliott Construction Co.	560,859			
(5) T. E. Teichert & Sons	482,117	— Draglin Rentals Co.	563,242			
(6) W. J. Distelli	483,620	— W. E. Kier Construction Co.	567,758			
(7) Guy F. Atkinson Co.	488,891	(6) Government Estimate	455,001			
(8) Clifford C. Bong & Co.	493,476	(1) (2) (3) (4) (5) (6)				
Lump sum, diversion and control of water	\$5,000	\$4,000	\$5,000	\$17,000	\$18,000	\$4,900
68,000 cu. yd. excav.	.35	.55	.60	.45	.55	.54

(Continued on next page)

Packed with  
Cost-Cutting  
Features...



## BLUE BRUTE design shows you what to look for in a portable mixer

Give a Worthington-Ransome Blue Brute 11-S or 16-S Portable Mixer a thorough going over — and get a real revelation of how far mixer-design has advanced! For example: ① **skip cable** winding shaft, mounted on self-aligning bearings, has grooved spools for longer cable life; ② **power loader** with automatic knock-out and brake set when skip raises to charging position; ③ **skip vibrator**, simple and effective, assures quick transfer of materials from skip to drum; ④ **drum rollers** of genuine car wheel metal with chilled treads — each roller mounted on two Timken bearings; ⑤ **roller sub-frame** under drum prevents concrete accumulation on roller shaft or bearings; ⑥ **countershaft** of heat-treated alloy steel in self-aligning

ball bearings — all units easily accessible; ⑦ **engine** mounted with radiator facing mixer's discharge side avoids dust, clogging and overheating; ⑧ **drum drive gear** of one-piece semi-steel casting, machined to true circle; ⑨ **water tanks** of accurate, exclusive spiral cut-off type — no rubber to deteriorate.

These and many other features — including Ransome's perfected mixing action, famous for producing better quality concrete — are the reasons why construction men everywhere depend on Blue Brute Portable Mixers for more concrete at less cost. See your nearby Worthington-Ransome distributor for performance facts that prove *there's more worth in a Blue Brute.*

RO-5



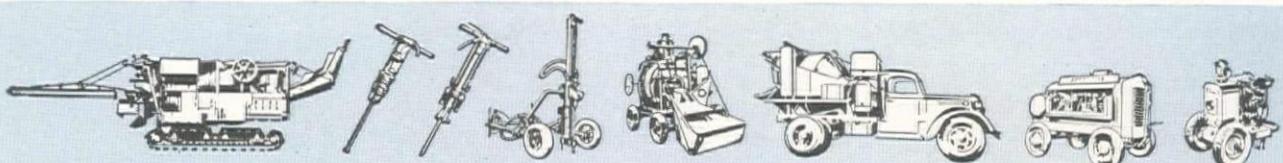
A Blue Brute 16-S Portable Mixer speeds operations on a big housing project in Springfield Gardens, Long Island, N. Y. This machine is one of a fleet of both 16-S and 11-S Blue Brutes owned by Angelo Aragone, who says: "I am well pleased with their performance and economy."

Worthington Pump and Machinery Corporation, Worthington Construction Equipment Dept., Harrison, N. J.  
Distributors in all principal cities

**WORTHINGTON**



# Buy BLUE BRUTES



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

## Fort Peck Project

...Continued from page 93

load of 57,000 kw. to no load gave a maximum water surge in the interconnected tanks of approximately 18 ft. above normal static head. Additional tests have indicated that the maximum penstock pressures resulting from water hammer with a 5-second governor are approximately equal to those indicated by the model study and will not exceed the design assumption.

### Existing and ultimate

The existing outdoor substation facilities consist of a Fort Peck Project Substation; a Fort Peck-Indian Service Substation; a Fort Peck - Glendive Substation with a Petersen Coil; and a Fort Peck-Rainbow (Great Falls) Substation. Future construction work planned for the outdoor substation yard includes a Fort Peck-Williston (Garrison Dam) Substation with overhead steel structure switchyard with four 800-amp., 115-kv. high speed oil circuit breakers. This high-tension switchyard will be used in combination with the 50,000-kva. Fort Peck-Williston and 15,000-kva. Fort Peck - Glendive substations to provide greater flexibility of power switching operations. The power transformers and circuit breakers for the switchyard are now on order.

Ultimate installations in the outdoor substation yard include a Fort Peck-Glasgow Bench Pumping Substation; increasing the transformer capacity of the Fort Peck-Glendive Substation from 15,000 to 50,000 kva. at 13.8/115 kv., and installation of a new 3,750-kva., 13.8/4,160-kv. double-ended spot network system for supplying loads at and near Ft. Peck.

### Project's roads and streets

In September of 1948, a contract was awarded for the construction of roads, streets, and a highway bridge as well as repair of existing roads and streets and appurtenant work at the Fort Peck Project.

A short section of new road will be constructed to provide a direct route between the permanent townsite and the industrial area which will shorten travel for vehicles going to and from the townsite or industrial area. This section of road and other new sections will be paved with a hot-mix asphalt concrete similar to the surfacing placed on the roads and streets of the project in 1934. A typical section of the roadway will have a bituminous paved surface 2½ in. thick and 24 ft. wide, placed on a stabilized gravel base course 8 in. in thickness. On curved portions of the roadway the width of the paved surface will be increased to 26 ft. The transverse slope of the roadway on tangents will be 0.02 feet per foot each way from the centerline, with the exception of the roadway on the crest of the dam, where the transverse slope will be continuous across the roadway towards the upstream face of the dam, so that runoff from the paved surface will drain down the protected upstream slope of the dam and not cause erosion of the unprotected hydraulic fill material on the downstream slope.

An access road approximately 1,000 ft. in length, to be used mainly for maintenance purposes, will be constructed on the downstream slope of the dam and will extend diagonally in an easterly direction from the base of the left abutment to the crest

523 sqs. remove slope protection.....	6.00	4.00	3.50	6.50	4.00	4.
31,500 cu. yd. compacted fill.....	.46	.40	.50	.30	.55	.55
3,600 cu. yd. sand backfill.....	5.00	4.00	5.00	5.00	2.50	4.5
3,000 sqs. addtl. sheep's foot rolling.....	.05	.06	.05	.03	.04	.04
6,250 cu. yd. concr. invert slab.....	11.00	12.00	11.00	13.00	11.00	12.
4,300 cu. yd. concr. channel walls.....	17.50	16.00	18.00	10.00	26.00	17.8
37 cu. yd. concr. parapet walls and bases.....	35.00	16.00	30.00	60.00	60.00	35.0
840 cu. yd. cement grout.....	7.00	8.00	9.00	10.00	10.00	8.0
17,450 bbl. Portland cement.....	3.12	3.00	3.00	3.00	3.00	3.1
1,200,000 lb. steel reinf. ....	.08	.08	.075	.08	.07	.07
6,100 ton derrick stone.....	6.85	7.00	8.00	6.25	5.50	4.2
280 sqs. 12-in. gravel blanket.....	14.50	16.00	12.00	17.00	12.00	15.0
800 sqs. 6-in. gravel blanket.....	7.50	11.00	6.00	9.50	6.00	7.7
320 sqs. 6-in. sand blanket.....	6.50	13.00	6.00	8.25	6.00	7.4
480 sqs. levee bank paving (without grout).....	45.00	45.00	60.00	50.00	50.00	43.0
3,900 lin. ft. channel fencing.....	.80	.80	.70	.75	.70	.8
Lump sum, wood guard rail.....	150.00	200.00	100.00	100.00	300.00	90.0

## Dam . . .

### California—Merced County—Corp of Engineers—Earthfill

M. J. B. Construction Co. of Stockton, Calif., with a bid of \$359,111, were low before the Sacramento District, Corps of Engineers, for construction of the earthfill Burns Creek Dam about 18 mi. northeast of Merced, Calif. Unit bids were submitted as follows:

(1) M. J. B. Construction Co. ....	\$359,111	(2) Peter L. Ferry & Son and John M. Ferry ....	\$436,975
(2) Foster & McGarg ....	373,409	(3) Vinnell Co. ....	456,589
(3) A. Teichert & Son ....	386,565	(4) Dan Caputo & Edward Keeble ....	481,665
(4) Morrison-Knudsen Co., Inc. ....	393,043	(5) Munn & Perkins ....	485,495
(5) Stolte, Inc. ....	394,882	(6) Norman I. Fadel ....	567,515
— W. C. Lever & D. Gerald Bing ....	397,000	(6) Government Estimate ....	383,006
— H. Earl Parker ....	403,952		
— Utah Construction Co. ....	436,665		

	(1)	(2)	(3)	(4)	(5)	(6)
143,000 cu. yd. unclass. excav. ....	.30	.35	.46	.40	.35	.36
8,600 cu. yd. borrow excav. for test fill. ....	.20	.60	.25	.23	.25	.28
399,000 cu. yd. borrow excav. for imperv. fill & backfill. ....	.22	.29	.26	.26	.30	.26
3,800 cu. yd. pervious fill and backfill. ....	.20	.415	.20	.25	.50	.23
14,100 M. gal. water. ....	2.00	2.00	2.50	2.75	1.60	2.50
400 hr. discing. ....	8.00	10.00	9.00	10.00	10.00	8.90
1,050 hr. mix or scarifying with motor grader. ....	9.00	8.10	8.50	10.00	8.00	9.85
1,820 hr. compaction rolling. ....	13.00	16.00	11.00	10.00	15.00	9.35
1,450 hr. pneumatic tamping. ....	5.00	5.00	6.00	8.00	6.00	5.75
1,100 cu. yd. conc. for slabs and cut-offs in place. ....	22.00	22.00	15.00	17.00	26.00	21.00
530 cu. yd. conc. for walls and baffle blocks in place. ....	37.00	30.00	42.00	36.00	39.00	40.00
730 cu. yd. concrete for conduit in place. ....	32.00	26.00	32.00	31.00	38.00	35.00
3,400 bbl. cement. ....	4.50	4.25	4.50	5.00	4.00	4.40
325,000 lb. steel reinf. in place. ....	.094	.09	.08	.095	.09	.09
550 lin. ft. rubber water stops. ....	1.50	1.00	5.50	4.75	2.25	4.00
1,200 cu. yd. gravel. ....	3.00	1.00	2.50	5.00	3.00	3.50
1,000 cu. yd. cobbles. ....	3.50	2.00	4.00	5.00	3.50	3.85
1,070 cu. yd. 1-man stone in place. ....	12.00	4.00	7.00	6.00	5.00	5.30
400 cu. yd. derrick stone in place. ....	14.00	5.00	6.00	8.00	7.00	7.00
180 lin. ft. drain trench fill in place. ....	1.80	2.00	2.00	1.50	2.00	1.50
20 lin. ft. 6-in. vit. clay pipe in place. ....	1.50	1.00	2.50	1.25	2.00	1.60
430 lin. ft. 6-in. vit. clay pipe in place. ....	1.50	1.30	3.00	1.60	2.50	1.80
700 lin. ft. fence spillway and outlet struct. in place. ....	.35	.81	.80	.75	.40	.45
500 lin. ft. construct fence, in place. ....	.30	.36	.25	.35	.37	.30
3 ea. double gates in place. ....	120.00	100.00	140.00	150.00	60.00	165.00
3 ea. single gates in place. ....	60.00	80.00	75.00	75.00	30.00	70.00
3 ea. cattle guards in place. ....	\$2,000	\$1,400	\$1,600	\$1,450	\$1,500	\$1,475
Lump sum, gauge well and reservoir staff gauges. ....	\$5,000	\$3,000	\$4,000	\$4,500	\$4,500	\$4,000
Lump sum, remove timber. ....	200.00	250.00	350.00	800.00	650.00	270.00

## Irrigation . . .

### Washington—Grant County—Bur. of Recl.—Earthwork and Struct.

J. A. Terteling & Sons, Inc., Boise, Idaho, with a combined bid of \$1,088,817, were low before the Bureau of Reclamation at Coulee Dam, Wash., for construction of earthwork and structures and the Winchester Wasteway on the Columbia Basin Project. The work begins about 8 mi. east of Quincy. Unit bids are presented below for the lowest six of the sixteen firms presenting bids:

	Schedule I	Schedule II	Total
(1) J. A. Terteling & Sons, Inc. ....	\$388,069	\$700,748	\$1,088,817
(2) Western Contracting Corp. ....	380,661	744,552	1,125,214
(3) S. A. Marshall and Haas, Inc. and Ken Royce. ....	406,180	847,824	1,254,004
(4) Morrison-Knudsen Co., Inc. ....	380,658	874,684	1,255,342
(5) Donovan Construction Co. and James Construction Co. ....	616,624	764,092	1,380,717
(6) Peter Kiewit Sons' Co. ....	480,740	873,343	1,354,083

	SCHEDULE I	(1)	(2)	(3)	(4)	(5)	(6)
2,180,000 cu. yd. excav., common, for wasteway. ....	.15	.134	.15	.14	.25	.185	
500 cu. yd. excav. rock, for wasteway. ....	2.50	4.50	1.50	5.00	2.65	2.00	
140,000 sta. cu. yd. overhaul. ....	.02	.02	.03	.03	.022	.02	
27,000 cu. yd. compacting embank. ....	.30	.29	.30	.32	.35	.35	
500 cu. yd. backfill. ....	.25	.50	.50	.75	.51	1.00	
550 cu. yd. compacting backfill. ....	2.50	2.31	2.50	3.60	1.33	4.00	
5,900 cu. yd. riprap. ....	2.50	5.74	5.00	3.90	4.05	5.40	
1,500 cu. yd. gravel bedding under riprap. ....	4.00	4.55	5.00	5.40	4.12	4.75	
3,100 cu. yd. selected rdwy. borrow. ....	2.40	3.53	1.00	3.00	3.35	1.70	
820 cu. yd. furn. and placing crushed stone surf. ....	4.70	4.81	6.00	5.30	4.40	3.00	
225 cu. yd. furn. and placing cover stone for surf. tr. ....	5.30	5.69	6.00	6.00	4.85	5.00	
6,200 gal. furn. and apply bit. mats. ....	.34	.23	.30	.25	.34	.25	
25 M. gal. furn. and apply water. ....	2.50	10.00	10.00	5.00	11.60	2.00	
4,000 lin. ft. furn. and const. cable guardrail. ....	3.00	3.88	4.00	2.50	2.30	3.00	

	SCHEDULE II	(1)	(2)	(3)	(4)	(5)	(6)
37,900 cu. yd. excav., common, for wasteway. ....	.20	.16	.25	.45	.25	.60	
500 cu. yd. excav., rock, for wasteway. ....	2.40	4.50	1.50	5.00	2.65	1.60	

(Continued on next page)

Concluded on page 132

# No Place For a Weakling!

**U. S. MATCHLESS PILE  
DRIVER HOSE HAS TO  
STAND UP UNDER ROUGH,  
RUGGED TREATMENT...**

**SAFE—NEVER BURSTS**



U. S. Matchless Pile Driver Hose stands up to 200 pounds working pressure, at temperatures approaching 400 degrees F. with utmost safety. For use only where tools are lubricated through hose, because specially designed tube resists hot oil as well as steam. Matchless has braided high tensile steel wires over the finest steam-resistant rubber. When, after extra-long use, the tube finally fails, the steam merely trickles through, giving plenty of warning to the operator. Asbestos Cords and a thick rubber cover protect against heat when handling. Employees are safe when U. S. Matchless is on the job.

## **U. S. ENGINEERED RUBBER PRODUCTS FOR THE CONTRACTOR**

**HOSE • BELTING • GATE SEALS AND  
WATER STOPS • HYDRON**

### **MATCHLESS HIGH-PRESSURE WATER HOSE**

With highest quality rubber tube, resilient and flexible. The cotton braids are of the strongest cotton fibres, with great resistance to high pressure. Has thick red cover of high tensile rubber, with unusual resistance to the abrasion caused by dragging hose over rough stones, concrete, sharp corners.

### **U. S. MATCHLESS HYDRAULIC GROUTING AND JETTING HOSE**

A rugged dual purpose hose for construction work. Made with multiple plies of heavy hose duck with the cover securely anchored to the carcass by an open weave breaker ply. This hose is perfectly balanced, extremely flexible, yet has the highest pressure resistance.

### **U. S. GIANT CONTRACTORS SUCTION HOSE**

Much lighter than the conventional smooth or rough bore construction. Has woven cotton carcass interwoven with round spiral wire. U. S. Giant has smooth bore construction with a high grade rubber tube protecting the wire in the cotton woven carcass from rust and deterioration . . . tough abrasion-resistant, long-wearing rubber cover. This super-flexible hose can be rounded out if crushed or flattened in service.

MADE BY  
**U.S.RUBBER**  
SERVING THROUGH SCIENCE  
UNITED STATES  
RUBBER COMPANY

## Fort Peck Project

Continued from page 130

of the dam. This road will have a stabilized gravel surface with a continuous transverse slope toward the inner edge of the road. A "V" shaped reinforced concrete gutter will be constructed along the intersection of the road with the slope of the dam to collect and carry away runoff from the road and that portion of the slope located above the roadway.

A highway bridge will be constructed across the dredged channel which connects the borrow area west of the Nashua-Fort Peck highway with the borrow area adjacent to the main channel of the river. This bridge will accommodate traffic on the Nashua-Fort Peck highway which is presently served by a one-way crossing over the existing timber pile railroad trestle on the Government-owned Fort Peck to Wiota railroad.

The new bridge will be a 5-span steel girder structure with reinforced concrete bents and floor and will have a 5-ft. wide pedestrian walkway cantilevered to the outside steel girder along one side. The substructure will be supported on clusters of timber piles capped with reinforced concrete. The width of the roadway across the bridge will be 24 ft. varying in thickness from 8 1/4 in. at the center to 7 1/4 in. at the edges with 20 in. concrete safety curbs. A standard safety curb and railing will be installed on both sides of the bridge.

The existing roads and streets that are paved will be repaired where necessary and both the existing and new pavement will receive a seal coat and an application of cover aggregate. In conjunction with the construction and repair of streets within the townsite, concrete curbs, driveways and sidewalks will be built. The sidewalks in the residential areas will consist of concrete 4 in. thick and 4 ft. wide placed on a 4-in. layer of gravel. In areas where heaviest pedestrian traffic is expected the sidewalk will have a width of 5 ft. Concrete pipe storm sewers will be installed where required within the permanent townsite at a minimum depth of 6 ft. to prevent freezing during the winter months.

The contractor has completed approximately 70 per cent of the earthwork, 50 per cent of the storm sewer and 4 per cent of the sidewalks with final completion of the entire contract scheduled for December, 1950.

## Paper Column Forms Used on Seattle Store Construction

FOR CONSTRUCTION of Bon Marche's new suburban store in the Northgate section of Seattle, Howard S. Wright Co., contractors, have purchased five carloads of Sonotube paper column forms, a new type of construction equipment handled on the West Coast by W. J. Burke & Co.

For the store job, the tube forms were supplied in 22-ft. lengths and diameters of 18 to 20 inches. This is the first application of tubes of such size in the West, although they had previously been used in smaller sizes for underground construction during the war. The tubes can be easily sawed to proper length and after the concrete has set, can either be easily stripped off or allowed gradually to slough off, depending on the location and type of job.

105,300 cu. yd. excav., common, for structures.....	.20	.20	.40	.45	.30	.
12,600 cu. yd. excav., rock, for structures.....	1.50	2.08	2.00	2.50	2.26	.
49,800 cu. yd. backfill.....	.27	.33	.35	.40	.21	.
25,700 cu. yd. compacting backfill.....	1.90	2.31	3.00	2.25	1.30	2.7
1,700 cu. yd. riprap.....	2.00	5.74	6.00	3.90	3.10	5.4
600 cu. yd. gravel bedding under riprap.....	3.50	4.55	6.00	3.80	3.28	4.7
320 lin. ft. screed'd grav. drs. with 4-in. dia. sewer pipe.....	1.25	2.00	1.50	1.10	.76	3.6
9,000 cu. yd. concr. in structs.....	43.00	47.20	49.00	52.00	44.60	51.0
13,500 bbl. furn. and placing reinforcement bars.....	5.40	3.51	5.00	5.00	5.00	5.0
1,153,000 lb. furn. and placing elastic filler in joints.....	.09	.09	.11	.11	.126	.
1,520 sq. ft. furn. and placing elastic filler in joints.....	1.10	2.28	2.50	3.40	2.02	2.0
50 lin. ft. placing rubber water stops in joints.....	1.00	1.39	2.00	1.40	1.70	2.5
86.1 m.b.m. furn. and erecting timber in structs.....	200.00	225.00	240.00	240.00	272.00	250.0
5,500 lb. install gates and gate hoists.....	.20	.19	.25	.17	.17	.
200 lb. furn. and install miscel. metalwork.....	.60	.67	1.00	.35	.95	1.0

## Washington—Grant County—Bur. of Reclam.—Earthwk. & Struct.

Morrison-Knudsen Co., Inc., Hoge Bldg., Seattle, Wash., with a total bid of \$6,136,234, was low before the Bureau of Reclamation for construction of earthwork, concrete lining and structures on the West Canal of the Columbia Basin Project. The project was divided into two schedules (see below). Morrison-Knudsen made no stipulations along with their bid. The bid of Peter Kiewit Sons' Co. was based on the condition that their firm be awarded both schedules, as were the bids of J. A. Terteling & Sons and Western Contracting Corp. The Utah-Winston joint venture stipulated 5% and 10% increases in their unit bids for schedules 1 and 2 respectively, if awarded separately. Unit bids were submitted as follows:

	Schedule 1 (Sta. 351 to Sta. 381 and Sta. 511 to Sta. 734)	Schedule 2 (Sta. 73 to Sta. 1229)
(1) Morrison-Knudsen Co., Inc.....	\$3,060,169	\$3,076,065
(2) Peter Kiewit Sons' Co.....	3,040,308	3,155,883
(3) Utah Construction Co. and Winston Bros. Co.....	3,189,770	3,299,094
(4) J. A. Terteling & Sons, Inc.....	3,351,360	3,632,945
(5) Western Contracting Corp.....	4,155,036	4,172,943

### SCHEDULE I

	(1)	(2)	(3)	(4)	(5)
1,246,000 cu. yd. excavation, common for canal.....	.20	.418	.24	.16	.75
803,000 cu. yd. excavation, rock for canal.....	1.00	.418	.95	1.05	.75
320,000 sta. cu. yd. overhaul, up to 1,200-ft. haul.....	.03	.02	.02	.02	.02
53,000 mi. cu. yd. overhaul, more than 1,200-ft. haul.....	.30	.35	.30	.20	.30
334,000 cu. yd. compacting embankments.....	.20	.25	.34	.33	.30
700 cu. yd. excav. common for drainage channels and dikes.....	.40	.418	1.00	1.50	.45
200 cu. yd. excav., rock for drainage channels and dikes.....	2.50	.418	4.00	5.50	4.70
358,000 sq. yd. trimming earth foundations for concrete lining.....	.50	.98	.75	.66	.84
132,000 sq. yd. preparing rock foundations for concrete lining.....	1.10	.98	1.15	1.51	1.40
36,000 cu. yd. excavation, common for structures.....	.50	1.20	1.10	.70	1.75
2,200 cu. yd. excavation, rock for structures.....	3.50	2.70	3.50	5.00	4.70
17,500 cu. yd. backfill around structures.....	.35	.95	.80	1.00	.90
27,300 cu. yd. backfill at top of canal lining.....	.60	1.25	.75	1.35	.45
4,600 cu. yd. compacting backfill.....	3.00	4.15	3.25	2.00	4.40
100 sq. yd. dry-rock paving.....	5.80	15.00	5.00	7.00	7.40
3,000 cu. yd. concrete in structures.....	56.00	56.00	71.00	60.00	78.50
54,850 cu. yd. concrete in unreinforced canal linings.....	11.00	10.00	10.50	11.70	15.10
6,100 cu. yd. concrete in reinforced canal lining.....	11.00	10.25	10.50	11.70	15.60
103,000 bbl. furnishing and handling cement.....	5.00	5.15	4.50	5.60	4.10
410,000 lb. furn. and placing reinforcement bars in structures.....	.16	.12	.135	.15	.18
590,000 lb. furn. and placing reinforcement bars in canal lining.....	.12	.116	.105	.10	.14
500 sq. ft. furn. and placing elastic filler material in joints.....	3.00	3.00	2.00	1.65	2.40
500 lin. ft. placing rubber water stops in joints.....	1.20	1.85	.85	1.40	1.55
11,000 lb. furnishing and placing metal water stops in joints.....	.30	.30	.10	.60	.50
100 M.B.M. furnishing and erecting timber in structures.....	210.00	250.00	210.00	250.00	270.00
300 lin. ft. furnishing and laying 24-in. diam. concrete pipe.....	5.00	6.00	7.15	6.75	8.30
80 lin. ft. furnishing and laying 30-in. diam. concrete pipe.....	7.00	8.50	9.75	10.25	11.40
7,400 lin. ft. furn. and construct. 6-in. diam. under-drains with un cemented joints.....	1.00	1.50	1.20	1.50	3.20
1,500 lin. ft. furn. and laying 6-in. diam. sewer pipe with un cemented joints.....	.80	1.20	1.30	2.10	2.80
3,700 lb. installing screw-lift gates and hand-operated hoists.....	.12	.20	.20	.30	.12
3,000 lb. installing miscellaneous metalwork.....	.25	.12	.40	.56	.30

### SCHEDULE II

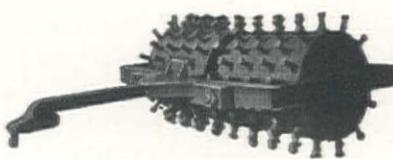
	(1)	(2)	(3)	(4)	(5)
1,258,000 cu. yd. excavation, common for canal.....	.20	.418	.24	.21	.79
632,000 cu. yd. excavation, rock for canal.....	1.00	.418	1.15	1.33	.79
265,000 sta. cu. yd. overhaul, up to 1,200-ft. haul.....	.03	.02	.02	.02	.02
3,900 mi. cu. yd. overhaul, more than 1,200-ft. haul.....	.30	.35	.30	.20	.30
291,000 cu. yd. compacting embankments.....	.20	.25	.34	.33	.30
1,200 cu. yd. excav. common for drainage channels and dikes.....	.40	.418	1.00	1.50	.45
400 cu. yd. excav., rock for drainage channels and dikes.....	2.50	.418	4.25	5.50	4.70
483,000 sq. yd. trimming earth foundations for concrete lining.....	.50	.98	.75	.66	.84
80,000 sq. yd. preparing rock foundations for concrete lining.....	1.10	.98	1.15	1.67	1.40
9,300 cu. yd. excavation, common for structures.....	.70	1.20	2.10	.70	1.75
3,200 cu. yd. excavation, rock for structures.....	3.50	2.70	3.50	5.00	4.70
31,600 cu. yd. backfill at top of canal lining.....	.60	1.25	.75	1.35	.45
5,200 cu. yd. compacting backfill.....	3.00	4.15	3.25	2.00	4.40
420 sq. yd. dry-rock paving.....	5.80	15.00	5.00	7.00	7.40
2,400 cu. yd. concrete in structures.....	80.00	56.00	75.00	85.00	78.50
63,170 cu. yd. concrete in unreinforced canal lining.....	11.00	10.00	10.50	11.70	15.10
7,020 cu. yd. concrete in reinforced canal lining.....	11.00	10.25	10.50	11.70	15.60
116,000 bbl. furnishing and handling cement.....	5.00	5.15	4.50	5.60	4.10
265,000 lb. furn. and placing reinf. bars in structures.....	.16	.12	.135	.15	.18
680,000 lb. furn. and placing reinf. bars in canal lining.....	.12	.116	.105	.10	.14
800 sq. ft. furn. and placing elastic filler material in joints.....	3.00	3.00	2.00	1.65	2.40
899 lin. ft. placing rubber water stops in joints.....	1.20	1.85	.85	1.40	1.55
300 lb. furnishing and placing metal water stops in joints.....	.30	.30	.10	.60	.50
130 M.B.M. furnishing and erecting timber in structures.....	210.00	250.00	210.00	250.00	270.00
80 lin. ft. furnishing and laying 21-in. diam. concrete pipe.....	4.00	6.00	6.25	6.50	8.00
230 lin. ft. furnishing and laying 24-in. diam. concrete pipe.....	5.00	6.00	7.15	6.75	8.30
40 lin. ft. furnishing and laying 30-in. diam. concrete pipe.....	7.00	8.50	9.75	10.25	11.40
9,000 lin. ft. furn. and constr. 6-in. diam. underdrains with un cemented joints.....	1.00	1.50	1.20	1.50	3.20
1,800 lin. ft. furn. and laying 6-in. diam. sewer pipe with cemented joints.....	.80	1.20	1.30	2.10	2.80
210,000 lb. erecting structural steel.....	.06	.055	.06	.08	.10
3,700 lb. installing screw-lift gates and hand-operated hoists.....	.12	.20	.20	.30	.12
84,000 lb. installing radial-gates and motor-operated hoists.....	.07	.20	.10	.16	.12
14,000 lb. installing radial-gate float-operated mechanisms.....	.08	.20	.20	.16	.12
80 hundred-weight furnishing and placing bitum. material in float drums.....	5.00	15.00	3.50	10.00	5.40
16,000 lb. installing miscellaneous metalwork.....	.25	.12	.30	.56	.30
1,000 lin. ft. installing embedded electrical conduits.....	.90	3.25	.65	2.00	2.70
100 lb. installing embedded electrical ground wires.....	1.80	2.50	2.10	1.00	2.70



BULLDOZERS & TRAILBUILDERS



RIPPERS



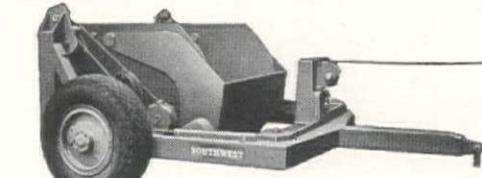
TAMPERS



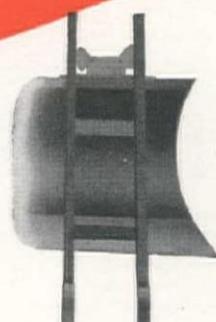
LOADERS



**SOUTHWEST Construction Equipment**  
*for every job!*



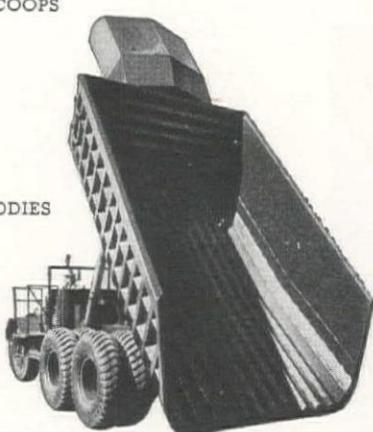
HAULING SCOOPS



QUICK SHIFT  
ROOTERS

Southwest's complete, standardized line affords construction men an opportunity to fill their needs from one dependable source. From start to finish, no matter whether Allis-Chalmers, Caterpillar, International or Cletrac tractors are used, an economical Southwest unit is available to bring you increased profits.

In addition to the standard line, special Southwest Dump Wagons, Tampers, Heavy Duty Compaction Units, etc., are giving outstanding performance on out-of-the-ordinary jobs all over the country . . . Why not let Southwest help solve YOUR problems?

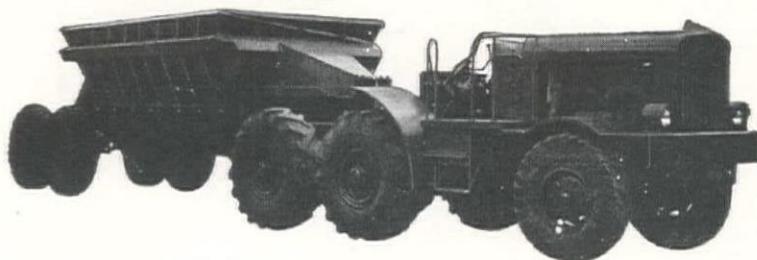


DUMP BODIES



FOUR WHEEL  
SCRAPERS

BOTTOM DUMP WAGONS



CONSTRUCTION MACHINERY DIVISION

**Southwest Welding &  
Manufacturing Company**

ALHAMBRA, CALIFORNIA

BRUSHCUTTERS



# NEW EQUIPMENT

MORE COMPLETE INFORMATION on 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, 503 Market Street, San Francisco 5, Calif. For quicker service, please designate the item by number.

701

## Profit Trencher

Manufacturer: Construction Products Corp., Los Angeles.

Equipment: The CPC Profit Trencher with cross conveyor.



Features claimed: The trencher has eight forward creep speeds and two wheel speeds to provide 16 forward digging combinations, and is especially profitable for foundations, drainage ditches, water and service

pipes, cables, and mains. The Profit Trencher features wheel construction, high clearance, hydraulic lift, heavy-duty chain drive, high capacity buckets, wedge type reversible and replaceable bucket teeth. The unit works within 30 in. of curbs and other obstacles.

702

## Revolving All-Purpose Crane

Manufacturer: Washington Iron Works, Seattle, Wash.

Equipment: Crane mounted on a tractor with capacity of 11 tons at 18-ft. radius.

Features claimed: The Trakmount is designed for mounting and dismounting in 15 min., without removing the tractor's bulldozer blade. Stability is increased through utilization of the weight of the tractor and the transferring of the overturning moment directly to the ground through a front sill. It is equally well adapted to use as a crane, dragline, clamshell or pile driver. Positive drive on the front drum combined with a powered slack thrower in the tip of the gooseneck boom enables the operator to throw the leading tongs to a distance of

200 ft. Controls are hydraulic. The unit can be attached to a Caterpillar D-8, International TD-24 or Allis-Chalmers HD-19 or HD-14. Power is from the tractor's take-off.

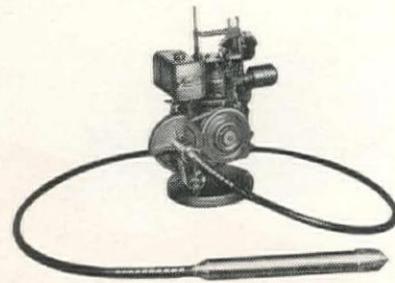
703

## Gas Engine Vibrators

Manufacturer: Mall Tool Co., Chicago Ill.

Equipment: Models with increased horsepower and no increase in price.

Features claimed: All of Mall's gasoline engine model vibrators now have an in-



creased horsepower; 1 1/4-h.p. units have been increased to 2 h.p., and 3-h.p. unit have been upped to 4 h.p. This should be welcome news to contractors with construction jobs at high-altitude areas, since the added power will compensate for loss of efficiency in the thinner air of high altitudes.

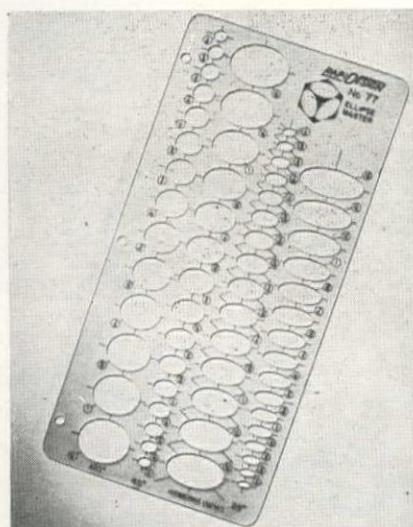
704

## Draftsman's Ellipse Template

Manufacturer: Rapidesign, Inc., Glendale, Calif.

Equipment: Template to draw sixty ellipses, ranging in size from 1/4 to 1 3/8-in.

Features claimed: The Ellipse Master Template is applicable to all axonometric



drawing. Each ellipse is milled from .030 plastic material to engraving machine accuracy. The true isometric ellipses are projected from an angle of 35 deg. 16 min. Ellipses are compactly grouped to allow for a wide range of sizes yet maintain a handy, working size.

705

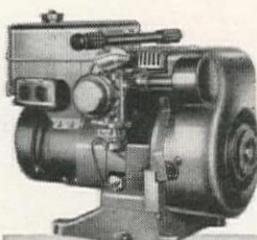
## Four-Cylinder Gasoline Engine

Manufacturer: International Harvester Co., Chicago, Ill.

Equipment: New 16-h.p. engine for a

## 1 MAN CAN DO THE WORK OF A CREW... with an ONAN PORTABLE ELECTRIC PLANT

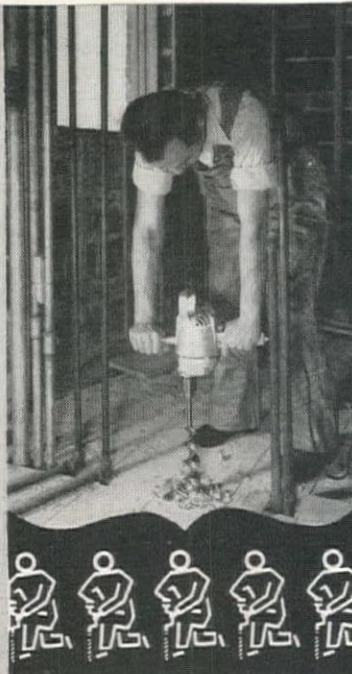
Use fast-working, cost-cutting electric tools on every job. Lightweight, Onan air-cooled, engine-driven electric plants supply instantly-available power anywhere for lights, drills, saws, pipe-threaders, planers, spades, and tampers. Carry 'em, wheel 'em, or truck 'em right to the spot and plug-in for all the power you need. Equipped with carrying handles or dolly-mounted.



A.C. Models: 350 to 35,000 watts.

D.C. Models: 1200 to 15,000 watts.

Diesel Plants: 2,500 to 55,000 watts.



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D. W. ONAN & SONS INC.

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Send your catalog on Portable Electric Plants

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CITY \_\_\_\_\_ STATE \_\_\_\_\_

**ONAN**  
**ELECTRIC**  
**PLANTS**

wide range of "Cub-horsepower" applications.

**Features claimed:** The new International U-1 is available as a stripped engine or with attachments as a complete power unit, and



can be equipped to operate either on gasoline or natural gas. Stripped, the U-1 delivers a maximum of 16.3 brake horsepower at 2500 rpm. Overall dimensions: 26½-in. length; 16½-in. width, and 25-in. height. The engine itself weighs 280 lb.; the complete power unit, 450 lb. The engine should be suitable for powering fans or blowers, oil or water pumps, generators, portable in-plant or outdoor units, etc.

706

#### Materials Handling Loader

**Manufacturer:** Tractomotive Corp., Deerfield, Ill.

**Equipment:** TL-W Tracto-Loader with ½-cu. yd. standard bucket.

**Features claimed:** The loader is mounted on rubber tires and has the bucket over the driving wheels, steering wheels in the rear. The short overall length of 12 ft. with the



bucket down and narrow width of 5 ft. 9 in. means the unit is small enough to be used where working areas are limited. Close-quarter operation is possible since the bucket is eased into the material and picks up a load through forward crowding action and an automatic "tilt-back" feature. The bucket is hydraulically operated.

707

#### Truck Models

**Manufacturer:** Peterbilt Motors Co., Oakland, Calif.

**Equipment:** New models accentuating a wider, deeper, roomier and more comfortable cab.

**Features claimed:** Cabs for the six new models are manufactured by Peterbilt and are completely new. They have been redesigned for quick removal from the chassis when repairs to either cab or chassis become necessary. Three-point suspension on Lord rubber mountings permits the cab, hood and radiator shell to move

as a unit, relieving the radiator core of all strains and stresses, adding immeasurably to the riding comfort of all trucks. New fenders are larger and with a deeper crown. Wheel bases have been changed to accommodate maximum train lengths. Spring suspensions have been improved and steering made easier. Accessibility for both maintenance and repairs are stressed in the new designs. Specification sheets for the models are now available.

708

#### Truck Crane and Carrier

**Manufacturer:** Northwest Engineering Co., Chicago, Ill.

**Equipment:** Mobile truck carrying 20-ton capacity crane.

**Features claimed:** The Carrier has a box-



type truck frame that is reinforced the full length of the carrier. The method of attaching the crane lower base to the carrier permits the transmission of loads evenly

The New DENVER POST Building

*Another Outstanding*

**DAREX<sup>AEA</sup>**

**JOB**

The new Denver Post building now under construction at Denver, Colorado. T. H. Buell Company, Architects, Meade & Mount, Contractors.

**T**alk to the Architect, Engineer or Contractor on any important construction job today and it's ten to one he will tell you that Darex Air Entrained Concrete is being used. Wherever it is imperative that the concrete mix have the greatest possible plasticity, workability, durability and maximum strength — wherever difficult monolithic pours are being made and smooth, flawless, architectural concrete is desired you'll find that Darex AEA is on the job.

Darex Air Entrained Concrete was specified for the new Denver Post building because it is thoroughly safe and reliable and fulfills every construction requirement. Only Darex AEA can give such outstanding performance! — only **DAREX AEA** can point to the **superlative** record of successful usage in over 60,000,000 cubic yards of concrete in every type of construction, with every type of aggregate . . . in concrete blocks and pipe. AND more important — you actually cut costs when Darex AEA is used — because the small initial cost, only pennies per cubic yard of concrete, is more than offset by savings in time and labor.

Write for complete information on major construction projects where Darex AEA has been the primary factor in the successful and economical pouring of concrete.

**Specify**  
**DAREX<sup>AEA</sup>**  
it does a better  
job for less!

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Pacific Coast Aggregates, San Francisco; Blue Diamond Corporation, Los Angeles; Denver Fire Clay Co., Salt Lake City; Baker-Thomas Lime & Cement Co., Phoenix; Ray Corson Machinery Co., Denver; Mason's Supply Co., Portland; Darco, Inc., Great Falls; Hawaii Builders Supply Co., Honolulu.

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Darex AEA Distributors for Dewey & Almy Chemical Corporation in 11 Western States, Alaska & Hawaiian Islands.  
\* T.M. Reg. U. S. Pat. Off.

over the top and sides of the Carrier. Outriggers extend the full width of the carrier. Minimum boom length for crane work is 30 ft., extendible by sections to 100 ft. The rear outrigger trunk is demountable and makes possible changing from crane work to shovel, dragline or pull-shovel work without the necessity of repositioning the lower base of the crane.

709

### Pump for Calking Compounds

Manufacturer: Gray Co., Inc., Minneapolis, Minn.

Equipment: Air-operated pump for pumping industrial fluids and semi-fluids from original 5-gal. containers.

Features claimed: Special feature of the Powerflo is a new-type follower plate which utilizes the weight of the pump to

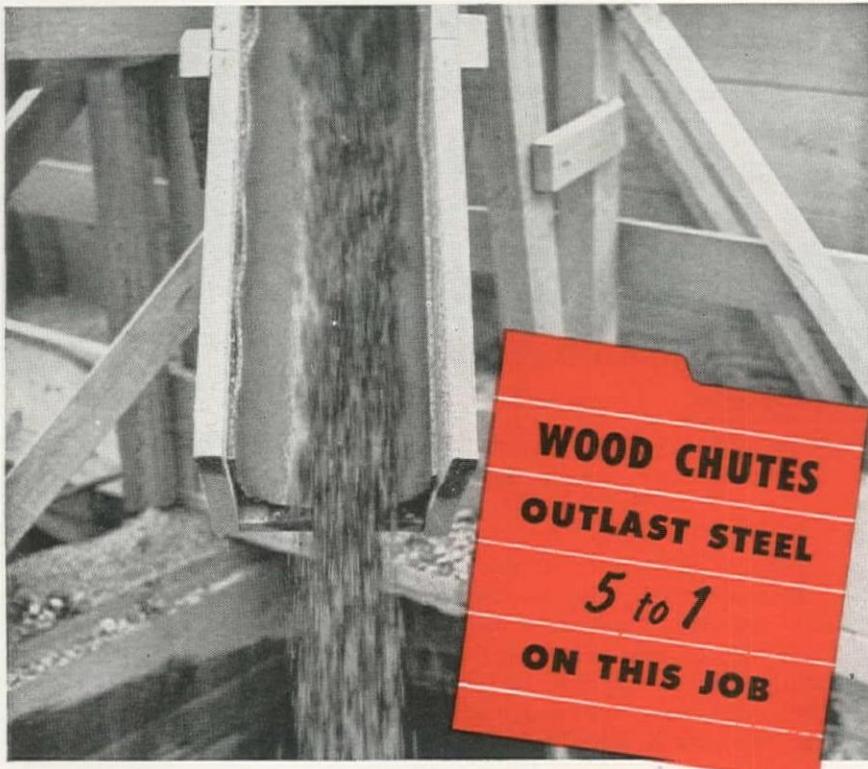
insure positive priming at all times. The follower plate also prevents waste by forcing all material out of the container. The pump has a pressure rating of 4½ to 1, with a double-acting piston to assure continuous flow of material. Material can be applied directly to the work surface from this one-man operated pump or transferred to hand guns. An air compressor capable of delivering 5 cu. ft. per min. at a minimum of 150-lb. pressure will operate the pump. The pump will handle gun-grade calking compounds, gun-grade putty, semi-fluid adhesives, sealers, etc.

710

### Diesel Electric Shovel

Manufacturer: Harnischfeger Corp., Milwaukee, Wis.

Equipment: P & H shovels with heavy-



High speed, low-cost sand and gravel handling has helped make concrete one of today's greatest bargains in building materials. Early attempts at mechanization were successful—but chutes were often ripped to shreds in a few short weeks.

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Pioneer came up with the answer in Tensilite Chute Lining. This super abrasive-resisting rubber lining not only outlasts steel many times, but is replaced in minutes instead of hours or days by skilled or unskilled labor. Sometimes nailed, other times riveted, bolted, or vulcanized in place, Tensilite is available for lining any type of chute, for high-speed, low-cost handling of almost any bulk material—wet or dry. Another plus, Tensilite Chute Lining reduces noise to a minimum.

If you handle bulk materials—solid or liquid—chances are Pioneer Rubber can help you lower the costs.



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**PIONEER RUBBER**  
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duty, slow-speed Diesel engine which powers crowd and swing generator sets.

Features claimed: Called the Model 1400-DE, the new machine provides electric shovel efficiency independent of power line service. Connected to the Diesel engine by a multiple V-belt, the generator set with



alternator is designed specifically for shovel service with a swing and crowd generator mounted in one frame. Low field current and specially designed magnetic field structure combine to develop faster response to changes of load and control. The new shovel is made possible by P & H's "Magnetorque" Hoist Drive, which eliminates the hoist generator, hoist motor, slip friction clutches and other mechanical devices usually involved in the hoist train.

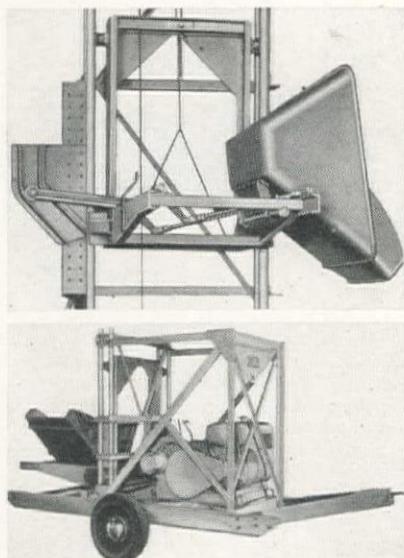
711

### Accessories for Hoist Tower

Manufacturer: Jaeger Machine Co., Columbus, Ohio.

Equipment: Concrete bucket and transporter for the Self-Raising Hoist Tower.

Features claimed: Completely interchangeable with the 5 ft., 6 in. by 5 ft., 9 in. material platform which has always been



standard equipment for the tower, the new ½-cu. yd. concrete bucket fits on the same frame and can be easily adapted to towers now in service. The bucket is of the roll-over type and will hold the full load of an 11-S concrete mixer. Bucket discharge is automatic, and discharging levels may be regulated in 3-in. increments at any point from 10 ft. above ground to within 5 ft., 6 in. of the top of the tower. A positive-acting safety device prevents material platform or

concrete bucket from falling. A new Trailer - Transporter accommodates the largest unit of the tower, the base section and engine-driven hoist. With it, the tower is readied for transport easily and quickly, and the contractor's truck carries only the upper tower sections and braces.

712

### Carbide-Tipped Hammer Bit

**Manufacturer:** New England Carbide Tool Co., Cambridge, Mass.

**Equipment:** Bit developed to drill hard concrete and granite.

**Features claimed:** The Thunderbolt bit can be used with any type of electric ham-



mer, and is available in sizes from 3/16 to 1 in., inclusive, with suitable chucks that fit the drill. Reports from users drilling hard concrete show expense for bits reduced from 14 to less than 2 cents per hole.

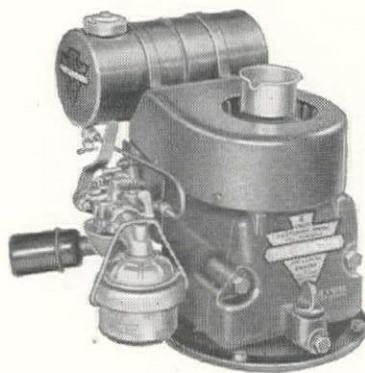
713

### Gasoline Engine

**Manufacturer:** Clinton Machine Co., Clinton, Mich.

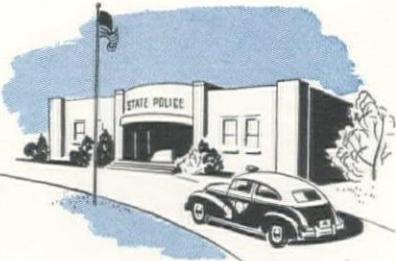
**Equipment:** Vertical shaft type engine.

**Features claimed:** The VS-700 weighs approximately 35 lb., develops 1 1/2 to 1 3/4 h.p., is 4-cycle, full carburetor equipped, and is available with or without flange



mounting. It has needle bearings as main bearings, extra heavy spring-loaded oil seals and an adjustable air-velocity governor. Ignition is dust-proof, waterproof, and with high-voltage output for quick starting and smooth running at low speeds. Oil level is below moving parts with splash-type lubrication. Superior scavenging of exhaust gases produces greater efficiency. Besides the VS-700, there are five other Clinton Engines.

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90 lbs.  
pressure here,  
instead of  
70

125  
ft. of air,  
instead of  
105



with "new standard"  
*Jaegers they do*  
**4 days' work in 3**



Nelson H. Chick, partner in Underground Construction Co., a leading contractor in the Oakland, California area, wears the happy look of other Jaeger owners when he says: "The new standard 125 ft. compressor enables us to do as much cutting and drilling in 3

days as we did in 4 days with old type machines." That's why Underground now has 8 Jaegers in their fleet.

You can get a comparable increase in production with any "new standard" Jaeger. From the Model 75 that holds full 90 lbs. pressure in a heavy pavement breaker, up to the Model 600 that runs 2 heavy wagon drills at full 90 lbs., every "Air Plus" rating is matched to today's tools, not the tools of 1932 when 60 to 500 ft. ratings were sufficient. Ask your Jaeger distributor to prove this on your job.

*Note: Because of "Fuel Miser" speed control, Jaegers use no more fuel than smaller units when not delivering more air.*

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CENTRAL MACHINERY CO. .... Great Falls & Havre, Mont.  
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J. D. COGGINS & CO. .... Albuquerque, N. M.  
MILES CITY EQUIPMENT CO. .... Miles City, Mont.  
SHRIVER MACHINERY CO. .... Phoenix, Ariz.  
IDAHO MACHINERY CO. .... Boise, Ida.

714

**Chrome-Plated Chain Tape**

Manufacturer: Lufkin Rule Co., Saginaw, Mich.

Equipment: Spring-tempered steel tape with non-glare chrome-white surface.

**Features claimed:** The white chrome plating on Lufkin's special tough steel Super Hi-Way tape will not chip, crack or peel and resists corrosion, wear and tear. Jet black lines and figures are etched in to make them stand out sharply and easy to read at a glance, even in poor light. The tapes have one-half railroad gage mark, 2 ft., 4½ in. from zero, and clips of improved type are riveted to line with reinforcing strip to help avoid end-of-line breakage. Three types of graduations and numbering are available, in either 100, 200 or 300-ft. lengths.

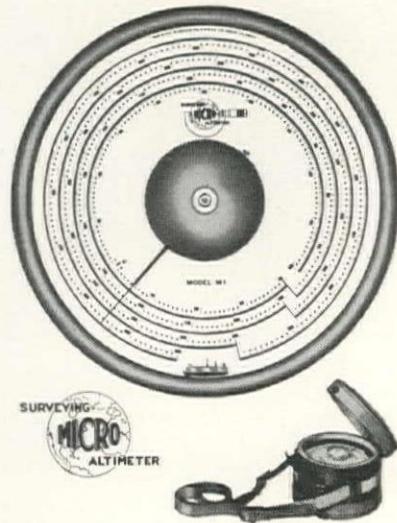
715

**Micro-Surveying Altimeter**

Manufacturer: American Paulin System, Los Angeles.

Equipment: Micro-Altimeter graduated in intervals of one ft. over a range of 6,000 ft.

**Features claimed:** Geologists, surveyors, and field engineers can now run surveys with this 4½-lb. instrument in a fraction of the time consumed in ordinary surveys and with an accuracy and dependability greater than that previously known in this type of instrument work. The Model M-1 is accurate to one foot and sensitive to altitude changes in inches. It is the first of the new MICRO series available and will shortly be supplemented by Model M-5 with a range of 15,000 ft. graduated in intervals of five ft., and also Model MM-1 with a range of 5,000 meters graduated in intervals of one meter. Included with each instrument is a magnifier, thermometer, and full operational procedures booklet.



716

**Newly Designed Watersphere**

Manufacturer: Chicago Bridge & Iron Co., Chicago, Ill.

Equipment: Completely re-designed elevated water tank of welded construction.

**Features claimed:** The Watersphere is a modern elevated water tank and consists of a spherical tank supported on a single, cylindrical column. On the new tanks, the supporting column has a graceful curved shape from top to bottom where previously the column was supported on a cone-shaped base. The Watersphere has been built in capacities from 25,000 to 250,000 gal., and the new design is available in standard sizes from 25,000 to 100,000 gal. in heights of 50, 75, 100, and 125 ft. Special designs are made to order for the above standard capacities in special heights, or for tanks of larger capacity in heights to the bottom of the water capacity as specified.

717

**Tractor-Drawn Scraper**

Manufacturer: Wooldridge Mfg. Co., Sunnyvale, Calif.

Equipment: Model TC-142 scraper with 14.2 cu. yd. capacity struck and designed to withstand the heavier stresses imposed by today's more powerful tractors.

**Features claimed:** Comparative tests of the TC-142 show faster loading characteristics than previous models as a result of a new 3-piece cutting edge. A wider 65-in. front apron opening and newly-designed curved bowl ejector have been added to achieve faster complete discharge of load. High yoke and ground clearance have been achieved, together with low center of gravity, short wheel base and equalized weight distribution to permit increased stability and maneuverability over all types of terrain. Basic Wooldridge design features have been maintained, including pivot-tilt forced ejection, rear-draft fulcrum leverage, boiling bowl loading and replaceable side cutter blades. Cable is easily accessible and is reeved in simple straight lines over a minimum

of sheaves located away from load for maximum cable life. Overall height with blade on ground, 10 ft., 9 in.; overall width, 11 ft., 6 in.; overall length with pusher, 35 ft., 2 in.; approximate weight, 28,400 lb.

718

#### Rubber-Tired Tracto-Loader

Manufacturer: Tractomotive Corp., Deerfield, Ill.

Equipment: Model TL-B Tracto-Loader with 10 cu. ft. standard bucket.

Features claimed: The TL-B is similar in design to the one-half cu. yd. TL-W, recently introduced, and also has the bucket over the driving wheels and the steering wheels in the rear, resulting in good traction and easier steering. The unit is mounted on rubber tires, and has a hydraulically controlled bucket that can be dumped in whole or in part to a height of about 5 ft. The bucket has a forward crowd action and an automatic "tilt-back" feature that permits getting a load without ramming. Overall length with bucket down is 9 ft., 5 in.; overall width from outside tire measurements is 4 ft., 6 in.; and the wheel base is 4 ft., 1 in. Major tractor components are from Allis-Chalmers tractors. Brake hp. is 27.8. The TL-B is designed primarily to handle bulk materials in congested areas, where working space is small. It will go into a standard 6-ft. wide box car door without the necessity of backing up or jockeying around. It is claimed to handle 20 to 25 tons of most bulk materials per hour on a 300-ft. round trip haul.



719

#### Supercharged 300-Hp. Diesel

Manufacturer: Cummins Engine Co., Columbus, Ind.

Equipment: High-speed NHRS-600 Cummins Diesel, developing 300 hp. at 2100 rpm.

Features claimed: Deliveries of the new Cummins Diesel will begin August 2, and the unit will feature a completely new fuel pump based on Cummins principles of fuel metering and injection but 56% smaller in size and 65% lighter in weight, a reduction in fuel consumption in the high horsepower-output operating range, and the same size and installation dimensions as for the Cummins NHS-600 engines, except for the smaller fuel pump and new oil cooler. Other features include a fully counterbalanced crankshaft, improved piston design, and improved tubular type lubricating oil cooler.

720

#### Stationary Concrete Mixer

Manufacturer: Chain Belt Co., Milwaukee, Wis.

Equipment: The Rex 56S stationary 56 cu. ft. mixer.

Features claimed: The Rex 56S Mixer is of the same general design and employs many of the features of the Rex 28-S Mixer. These features include: high carbon steel drum head liners, center sheet, blades and buckets; Rex fast discharge; cast manganese steel drum rollers; Rex chain drum drive and rigid frame; and the accurate Rex water system.

721

#### New Allis-Chalmers Motor Grader

Manufacturer: Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Equipment: Model "D" 34.7 hp. low-priced motor grader.

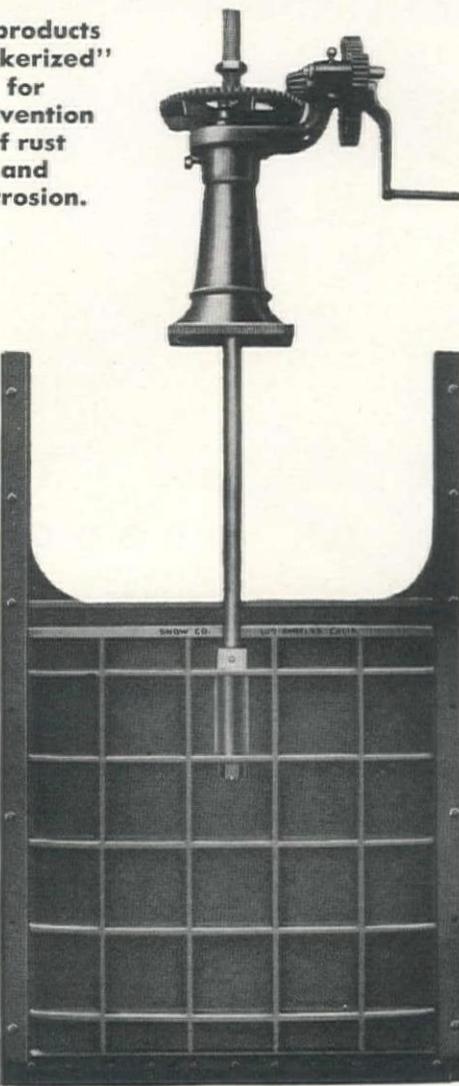
Features claimed: This rugged 8,500-lb. machine introduces to the low-priced grader field several popularly accepted big-grader features, such as tandem rear-wheel drive, tubular frame design, and rear-mounted engine transmission construction for improved visibility. It has been specifically engineered for low-cost maintenance and light construction work, and is particularly suited to meet economically the needs of governmental bodies, contractors, loggers, mine operators, airports and railroads. The tandem drive rear wheels afford more driving power

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Gates manufactured in sizes up to 72" by 72".

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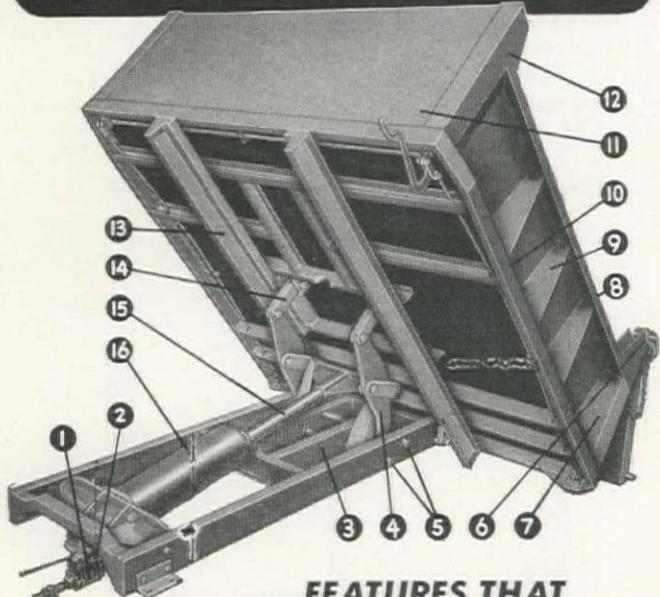
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DUMP TRUCK

1. The amazing patented "Non-thrust" Anthony Roller Bearing Pump. Eliminates the number one cause of pump failure—destructive mechanical thrust on the gears.
2. "BALANCED" PISTON-TYPE CONTROL VALVE. Only one moving part. Positively raises, lowers or locks hoist at any dumping angle.
3. DOUBLE "T" MEMBERS support lift mechanism through center.
4. DOUBLE ARM "POWER-SPEED" HOIST gives power to beginning of lift when load is heaviest and increasingly faster action as body goes up and load becomes lighter.
5. DOUBLE SHAFTS. "Lift Load" of hoist is supported at 4 points on 2 shafts instead of only one.
6. NON-BINDING OFFSET TAILGATE HINGES standard on Model "D-6" Contractors Body.
7. ENCLOSED REAR AND FRONT CORNER BRACES for maximum support of body.
8. TOP BODY ROLLS strong, extra wide  $3\frac{1}{8}$ " for maximum strength.
9. CLOSED IN PYRAMID "V" TYPE SIDE BRACES give extra support to box sides for heavy loadings.
10. RUNNING BOARDS are 6" wide and are supported by cross members to withstand side swiping.
11. INTERNALLY BRACED BODY END where depth of end requires bracing to prevent bulging.
12. DOUBLE GUSSET SIDE BOARD POCKETS prevent side boards from falling out.
13. TELESCOPIC TIPPING FRAME permits Anthony Hydraulic Hoists to have "LOWEST MOUNTING HEIGHT" without reducing or sacrificing strength.
14. DOUBLE ARMS lift advantageously "far ahead" under load—eliminating hinge strain.
15. PISTON SHAFT, a most important part of the hoist, is extra-large  $2\frac{1}{4}$ " diameter solid steel.
16. CYLINDER seamless steel. Cylinder head designed to prevent gasket "blowing".

### Distributed by:

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#### CALIFORNIA

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Oakland—Truckstell Calif. Sales

#### OREGON

Portland—Northwest Truckstell Sales

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ANTHONY CO., STREATOR, ILL.

than that previously obtainable in lightweight graders. The "D's" short turning radius, its maneuverability and blade control, its speeds up to 18.6 mph., and its low investment and operating costs give it an advantage in the field, thus relieving larger and more expensive equipment for bigger jobs.

## 722 Heavy-Duty Stationary Compressor

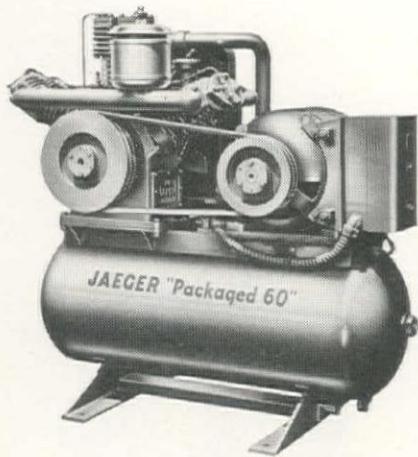
Manufacturer: Jaeger Machine Co., Columbus, Ohio.

Equipment: The "Packaged 60" airpower plant.

#### Features claimed:

The "Packaged 60" consists of a 2-stage, V-belt driven, air-cooled compressor and 15-h.p. electric motor, mounted on an 8.5 cu. ft. air receiver with base, and all electrical controls. The compressor is the "Air-Plus" unit, with two low-pressure and one high-pressure cylinders, arranged in "W" form for maximum balance, ease of operation, and minimum vibration, for those who want the heavy-duty dependability of

larger compressors in a 60-cfm. unit. Maximum working pressure is 125 lb. The standard 15-hp. motor operates at 1200 rpm. Automatic, across-the-line starter and dual controls are standard equipment, for operating the unit at constant speed with automatic unloading, or automatically starting and stopping it in intermittent service.



## 723

### Impact Breaker for Gravel

Manufacturer: New Holland Mfg. Co., Mountville, Pa.

Equipment: Double impeller impact breaker designed for secondary crushing and small gravel installations.

Features claimed: Using the New Holland principle of breaking stone by impact in suspension, the new Model 1212 will handle material passing a 12-in. square opening. It is designed to produce crushed aggregate as fine as one-inch minus in a recirculating system. The Model 1212 differs from its big brothers in only two major aspects—size, and the use of rotor rolls in the two impellers instead of 4-cornered impeller bars. Use of rotor rolls in the impellers provides even-wearing breaking surfaces since the rolls automatically rotate when the breaker is in action. Weight of the model is 7,900 lb.

## 724

### Bucket Elevator

Manufacturer: Markroy Co., Madison, Ill.

Equipment: Markroy car unloader.

Features claimed: The bucket-type elevator is of tubular steel construction, and the unloader transfers materials such as aggregate and chemicals from hopper cars to truck or stockpile at the rate of  $1\frac{1}{2}$  to 2 tons per minute. The need for a concrete pit at the trackside is eliminated, and the unloader need not be removed during location or movement of the hopper cars. The Markroy feeder unit is readily installed beneath the rails and between two ties whose spread need measure only 16 in. The equipment meets all railroad clearance specifications and is easily transported from job to job in a pickup truck.

## 725

### Diesel Electric Plant

Manufacturer: D. W. Onan & Sons, Inc., Minneapolis, Minn.  
Equipment: Opposed-two-cylinder, air-cooled Model 5DRP.

Features claimed: Longer engine life is obtained by the extra large bearing surfaces and forced pressure lubrication, and greater economy and convenience are assured by compression starting and running on Diesel or domestic fuel oils. Air-cooling and an oversized (6-quart) oil sump keeps servicing requirements at a minimum. Two intake air manifolds have built-in electric heaters operating from the starting batteries, reducing cold weather cranking time. The 5 kw. generator is directly and solidly connected to the engine crankshaft, assuring permanent alignment.

ment for the life of the unit. The saturated field governor is completely self-regulating without the use of any additional electrical controls and is warranted to produce its full rated capacity. All 5DRP models are electrically cranked from a start-stop switch control located on the plant, and remote-control stations can be installed within 250 ft. of the unit. The plant's dimensions emphasize its compact design: length, 38½ in.; width, 30½ in.; height, 26½ in. Air-cooling helps to keep the weight down to approximately 725 lb., less batteries. Standard equipment on all 5,000-watt Onan Diesel electric plants includes the following items: Two 6-volt heavy-duty starting batteries, battery cables, hydrometer, mounting rubbers, 5-gal. fuel tank, 2 flexible fuel lines, muffler, 2 large oil bath air cleaners, primary and secondary fuel filters, 2 air heaters, and one remote station and instruction book.

726

#### Paving Breaker

Manufacturer: Le Roi Co., Milwaukee, Wis.

Equipment: Model 52AJ Air-Jac with an integral air lift cylinder to utilize line air pressure to lift the tool and pull stuck steel.

Features claimed: The breaker relieves the operator of heavy lifting normally associated with 80-lb. class paving breaker operation, and has a lift cylinder with a leg parallel to the breaker steel, through which the lifting force of 100 lb. is exerted. After penetrating the pavement in a normal manner, line air pressure is applied to the lift cylinder through a control at the breaker handle. For breaking through upper-story concrete floors, the air cylinder leg is kept on solid concrete, thus eliminating the necessity for two-man operation or rope slings to prevent the tool from falling through.

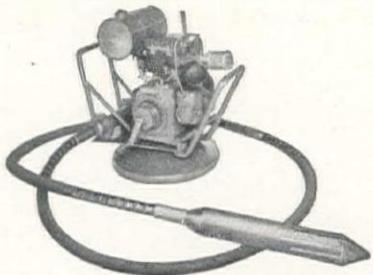
727

#### Medium-Weight Jackhamer

Manufacturer: Ingersoll-Rand Co., Phillipsburg, N. J.

Equipment: Model J-40 Jackhamer

Features claimed: A double-kicker port valve permits full air pressure on the piston for a longer period of time, giving more powerful blows and much stronger rotation. A specially designed auxiliary port allows full-line air pressure to pass through



### White Concrete Vibrators Have Many Noted Features

which have made them highly successful all over the world.

**DEPENDABLE FLEXIBLE DRIVE.** All sections are interchangeable, in multiples of 7' and 12' lengths. No special sections are required. Each casing has ball bearing connector. Each alloy steel core has slip joint which does not separate in service. It prevents stretching and overheating. No limit to length of drive.

**RELIABLE VIBRATING HEADS.** Also interchangeable and can be applied to any drive section. Heads can be opened for repairs. Rotor mounted on double row ball bearings. Alloy steel external ribs reduce wear.

**STANDARD POWER UNITS.** Well-known gasoline engines and electric motors. Can be serviced almost everywhere.

**CONCRETE GRINDERS.** Speed reducing heads, to hold wheels, can be attached to any drive section.

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ROUGH  
TREATMENT**



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BLADES**

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\*Delivers 33,000 gallons of water  
on one gallon of gasoline.

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Lee & Thatro Equipment Co., Los Angeles, Calif.

The Rix Co., Inc., San Francisco, Calif.

The C. H. Jones Equipment Co., Salt Lake City, Utah

H. W. Moore Equipment Co., Denver, Colorado

R. L. Harrison Co., Inc., Albuquerque, New Mexico

The O. S. Stapley Co., Phoenix, Arizona

**BARNES MANUFACTURING CO., MANSFIELD, OHIO**

the drill steel when the blower valve is opened, giving a strong blowing action which quickly cleans even deep holes of cutting. The design of the throttle valve and the air-supply port permits the gradual admittance of air into the cylinder, making the collaring of holes easier. A three-in-one backhead enables the machine to be quickly adjusted for wet, dry, or blower-type drilling. The J-40 Jackhamer was designed with Carset (set with tungsten carbide inserts) Jackbits in mind and is especially suited for use with these new bits.

728

### Heavy-Duty Gasoline Engines

Manufacturer: Hercules Motors Corp., Canton, Ohio.

Equipment: Additions to the line of Hercules 4-cylinder gasoline engines for general purpose power application.

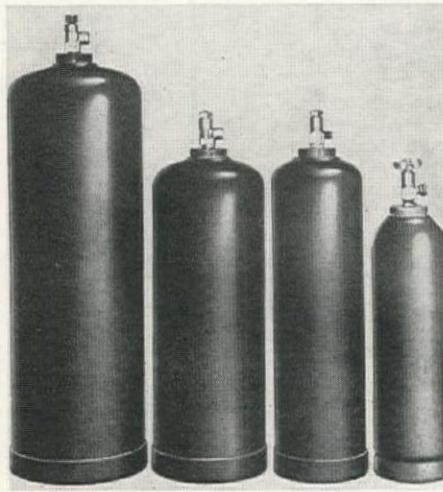
Features claimed: Three models have been added to the "JX4" series of 4-cylinder models. These are the "JX4E" (3½-in. bore x 4¾-in. stroke, 164 cu. in. displacement); the "JX4C" (3¾-in. bore x 4½-in. stroke, 188 cu. in.), and the "JX4D" (4-in. bore x 4¾-in. stroke, 214 cu. in.) The "JX4" series is equipped with five main bearings and the crankshaft is counterbalanced for double assurance of smooth, vibrationless operation and to reduce bearing loads. The pistons, of special alloy aluminum and equipped with 4 rings all above the piston ring, are of the heavy-duty type. Special attention has been given to efficient and ample cooling. The engines are compact and engineered to meet strenuous power needs.

### 729 Acetylene Cylinders

Manufacturer: Aetna Cylinders, Inc., Detroit, Mich.

Equipment: Fast-filling cylinders.

Features claimed: These cylinders have a monolithic filler which permits faster filling and more gas capacity. This, combined with their lighter weight, enables the manufacturer of compressed acetylene to effect savings in labor, trucking, and shipping costs. All Aetna cylinders have five safety plugs and are manufactured in conformance to I.C.C. specifications. They are available at present in four sizes: 24 by 6 in., 30 by 10 in., 30 by 18 in., and 39 by 12 in. Bottom rings are standard equipment.



### 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, 503 Market Street, San Francisco 5, California.

730

FORMS FOR CONCRETE HIGHWAYS—A six-page bulletin on steel forms for concrete highways and airports has been announced by the manufacturer, The Heltzel Steel Form and Iron Co., Warren, Ohio. The new literature covers thoroughly the features of the standard Heltzel highway form and also details such special forms as the dual airport form, integral curb forms, extension forms, safety zone forms, stake pullers, and miscellaneous accessory equipment. A special section of the bulletin is devoted to the practical tests conducted by Heltzel engineers to analyze the strength of standard Heltzel road forms. In one of these tests, a railroad gondola, loaded with steel, was run on Heltzel 9-in. by 8-in. road forms.

731

EUCLID LOADER — Euclid Road Machinery Co., Cleveland, Ohio, has just released a new 24-page book entitled "Euclid Loader for High Speed Loading of Large Hauling Units" containing a large number of operating views showing the loader at work on various jobs in this country and abroad. Operations and performances are stressed in the book, and many performance data are given.

732

WORTHINGTON PUMPS—Worthington Pump and Machinery Corp., Harrison, N. J., has just released two folders giving accurate descriptions of their self-priming centrifugal pumps and their vertical turbine pump, type Q, and featuring drawings and photographs of the units together with the specifications.

733

TIMBER—Immediately available from Timber Structures, Inc., Portland, Ore., is the illustrated booklet "Composite Deck Bridges for Endurance and Economy," showing erection techniques, pressure treatment of timber members, financial economies, elimination of formwork and shoring, and reduction in work crew, all complying with the Public Roads Administration and the American Association of State Highway Officials standards. In-

### A MIXER built for ASPHALT!

YOU can't mix asphalt like concrete. It takes better equipment to accurately proportion and mix asphalt. The Foote Kinetic Mixer is especially designed and built for asphalt, and is not comparable in any way with the ordinary concrete mixer. It provides a mulling action. Asphalt is pumped between and within the aggregate layers assuring complete coating of every particle of aggregate without waste of asphalt. This means 8 to 10 batches more out of every barrel of asphalt. Capacity is 3 cu. ft. in 30 seconds. Ask for Bulletin K-100.

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CALIFORNIA

DEALERS: Los Angeles, Spokane, Seattle,  
Portland, Salt Lake City, Honolulu.

cluded are details of timber deck grooves, sps, scupper blocks, felloe guards, and hand rails.

734

STEEL MAKING IN AMERICA—This is the title of an illustrated 100-page book prepared and published by the **United States Steel Corp.**, describing in simple terms the manufacture of steel in the United States from raw materials through the finished steel products ready for shipment from the mills. A brief story of the iron and steel industry from earliest times to the present is also included. The book was prepared to help not only students but adult laymen who desire to further their knowledge of the manufacture of the basic metal, steel.

735

PORABLE ELECTRIC TOOLS—**Independent Pneumatic Tool Co.**, Aurora, Ill., has a four-page circular describing all models in their new Thor "Silver Line" of portable electric tools.

736

PORABLE CRUSHING AND SCREENING PLANT—**Pioneer Engineering Works, Inc.**, Minneapolis, Minn., has issued a four page folder on its new 17-V portable crushing and screening plant. The new Pioneer duplex plant features the exclusive bottom deck feed principle and is designed for smaller construction jobs, maintenance and county work. In the folder are nine views of the plant and a detailed flow diagram with complete specifications.

737

HOSE CLAMPS—Le-Hi Hose Clamps, to fit every type and size of industrial and construction hose, are described in the hose

clamp bulletin just published by the **Hose Accessories Co.**, Philadelphia, Pa. More than 160 different sizes and types make up the line of clamps, including universal type, single and double bolt clamps for shank couplings, interlocking type high pressure clamps in sizes up to 4 in. oversize, double bolt hose clamps, and band type hose clamps.

738

PAVER ADVANCEMENTS—**Chain Belt Co.** of Milwaukee has just published a four-page folder on two new design advancements now featured as standard equipment on the Rex Pavers. The new hydraulic bucket provides positive control of spreading, and the same lever that controls bucket travel also controls the opening of the bucket. The opening action of the pivoted gate can be stopped at any desired point, and the bucket can be partially emptied and the door closed if necessary. The re-designed Rex boom can be elevated to provide a 10-ft. bucket at the end of the boom.

739

WELDERS' ACCESSORIES—**Air Reduction Pacific Co.**, manufacturers of industrial gases and welding equipment, has announced the publication of a new welding accessories catalog. The 15-page catalog, second of a projected series of ten, covers both oxyacetylene and electric arc accessories, including goggles, hose, spark-lighters, gloves, electric holders, cable, weld cleaning tools, helmets, face shields, and many other accessory items.

740

ARC WELDER—**Birdsell Mfg. Co.**, Los Altos, Calif., has just printed a two-page bulletin giving a description of their

Model 170 ampere AC arc welder. Twelve construction and operating features of the Birdsell welder are listed, together with specifications, operator's instructions, and hints for obtaining good welds on tricky welding jobs.

741

STEEL CONCRETE FORMS—**Irvington Form & Tank Corp.**, Irvington, New York, has immediately available a complete and detailed book of steel forms for concrete and their use. Explanations are given of how to cut costs by crane-handled panels. The complete instructions on the erection of steel forms are graphically illustrated by diagrams and photographs. Blueprints for the use of forms in special dimensions or applications, and of the various form accessories, with illuminating text comments, are also found in this Irvington pamphlet.

742

WELDING SUPPLIES—**Lincoln Electric Co.**, Cleveland, Ohio, has just published an eight-page directory of their welding supplies, including electrode holders, ground clamps, wire brushes, head shields, cables, and others.

743

WATER MEASURING—**R. W. Sparling Mfg. Co.** has available a four-page folder giving descriptions of their water measuring equipment for main lines together with cut-away diagrams and photographs.

744

NEW CAT BOOKLET—Adaptability of motor graders to various methods of road maintenance the year around is the feature presentation of the **Caterpillar**

**GOODALL "INFERNO" STEAM HOSE**

\*Leading construction firms specify "INFERNO" STEAM HOSE because it's Stronger, Safer, More Flexible

Powerfully constructed with tightly braided layers of steel wire imbedded in a heat-resistant carcass, Inferno lasts longer, under high pressure.

In case of damage to hose, special construction diffuses steam, preventing a violent burst as steam escapes—a real safety factor.

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Note the tough braided steel construction.

\*Raymond Concrete Pile Co. has specified Goodall Steam Hose for over 15 years.

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SEATTLE - DENVER - SALT LAKE CITY

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### Surplus NEW AND USED MOTORS

Induction Motors 220/440/2200 volt

1—	2 HP	1500 RPM
23—	3 HP	750-2870 RPM
34—	5 HP	870-3470 RPM
30-7½ HP		900-1500 RPM
35—	10 HP	900-3480 RPM
5—	15 HP	900-3460 RPM
12—	20 HP	900-3600 RPM
5—	25 HP	875-1760 RPM
2—	30 HP	880-1000 RPM
5—	40 HP	880-3600 RPM
11—	50 HP	720-3500 RPM
1—	60 HP	870 RPM
5—	75 HP	880-2955 RPM
1—	100 HP	700 RPM
5—	150 HP	700-1000 RPM
2—	400 HP (Explosion-proof)	3000 RPM

#### Synchronous Motors

1—	75 HP	600 RPM
2—	150 HP	750-1000 RPM
2—	200 HP	600 RPM
1—	400 HP	600 RPM

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Tractor Co., San Leandro, Calif., new 16-page booklet. Illustrated with applications of precision ditching, bank shaping, general road maintenance, mixing road surfaces, terracing, and snow removal, this booklet offers performance records on coast-to-coast projects.

745

**REFUSE DISPOSAL** — Caterpillar Tractor Co., San Leandro, Calif., has available a new eight-page booklet entitled, "Lowering Health and Sanitation Costs." Well illustrated, this booklet offers readers the various steps of garbage disposal as applied through Caterpillar equipment. It also features seven steps in the advantages of sanitary landfills and broadens its presentation by giving the use of "Caterpillar" Diesel engines and electric sets for powering many installations devoted to serving the public in sewage, light, and water facilities.

746

**CASTER CATALOG** — Rapids-Standard Co., Inc., Grand Rapids, Mich., has just issued for distribution a new caster catalog, containing 12 pages of descriptions and illustrations of the Rapistan line of flame-hardened and steel-forged casters and wheels. Published in two colors, the new catalog lists metal, plastic, and rubber wheels; roller and oilite-type bearings; and casters ranging from heavy duty Aircraft steel-forged series, with capacity load ratings of 2,500 lb., to the Scout formed-steel caster series, with capacity load ratings of 250 lb.

747

**WELDING EQUIPMENT** — Modern Engineering Co., St. Louis, Mo., manufacturers of Meco welding equipment, has an-

nounced completion of their new catalog containing over 150 illustrations with descriptions of each item in detail. Its pages form a comprehensive guide for the welder covering every type of equipment necessary for all acetylene and oxygen operations.

748

**MOTION PICTURE** — "Steel Built the West," a new industrial film presented by the Bethlehem Pacific Coast Steel Corp. was released June 22. The new picture depicts the vital part which steel has played in building Western industries. This is the first film to be produced by an industry portraying work in other major industries and at the same time showing the ultimate function of its product, in this case steel in building a better standard of living. Although presented by a private company, the film is refreshing because of the absence of any commercial "plugs." It is in 16mm. color and sound, and is offered for showings to civic groups, colleges, high schools, engineering and trade associations, and others.

749

**FORM-TYING DEVICES** — Richmond Screw Anchor Co., Inc., Brooklyn, N. Y., has available for immediate release their book giving drawings, specifications, and descriptions of Richmond Form-Ties and accessories for concrete construction. A special feature of this catalog is the "functional index" on the back cover, where products are listed under the heading of their most common uses and are represented by symbols to be found on the first page of each section. Complete engineering data are included with important construction details in the classification of each major product.

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#### APPLICATION:

Giving age, full particulars of qualifications, and experience, should reach the Educational Attaché at the Embassy not later than the 14th of August, 1949.

750

**GAS WELDING SUPPLIES**—Air Reduction Pacific Co. has published a new catalog on gas welding supplies. The catalog, first of a projected series of ten, completely describes the 19 different gas welding rods and 8 different fluxes and includes a section on silver brazing alloys plus a page devoted to carbon rods and carbon plates. The 16-page catalog is carefully indexed for ready reference and has punch holes for loose leaf filing.

751

**THE CONWAY SHOVEL**—Goodman Manufacturing Co., Chicago, Ill., has published a 20-page booklet describing the latest models of the Conway Shovel, the mucking machine universally known for its established records of speed and low costs of production at scores of famous tunnels. Discussed is the new Type 100 Conway Shovel, built for the handling of bulkier, heavier loads and for work in tunnels as large as 18 and 30 ft. in size. Dimensions and specifications are given for the new model and for the improved Type 75 Conway, as well as other Conway models.

## EXCESS EQUIPMENT FOR SALE

### SHOVELS

Two Marion 93M Shovels, 26 ft. booms, 20 ft. handles, 2½ yd. dippers, Cat D17000 Diesel Engines, Serial Nos. 8780 and 8782. New Summer of 1948, used about three months. Located New Milford, Pa.

Marion 7200 Walking Dragline, Serial 8794, 135 ft. boom, 5 c.y. Medium Weight Bucket, also has new 6-yard Hendrix Bucket. Purchased new in June 1948, never used. Located Havana, Illinois.

### TRACTORS

The following D8 Caterpillar Tractors 1H Series:

One with Bulldozer and P.C.U. located Bristol, Pa.

One with P.C.U. located Woodbridge, N. J.

Two with P.C.U. located Minneapolis, Minn.

One with P.C.U. and Bulldozer located Minneapolis, Minn.

Two with P.C.U. located Royersford, Pa.

Three with Bulldozer and P.C.U. located Johnstown, Pa.

One with P.C.U. located Harrisburg, Illinois.

### COMPRESSORS

One Chicago-Pneumatic 105 c.f. Ser. No. 38605 Hercules Engine. Located Johnstown, Pa.

One Worthington 315 c.f. Ser. No. 72583 International Diesel Engine. Located Minneapolis, Minn.

One Worthington 160 c.f. Ser. No. 72422 Gasoline Engine. Located Harrisburg, Ill.

One Sullivan 105 c.f. Ser. No. 43083 Gas Engine. Located Harrisburg, Ill.

One Gardner-Denver 365 c.f. Ser. No. 95410 Diesel Engine. Located Nedrow, N. Y.

One I-R 500 c.f. Ser. No. 4078653 Hesselman Oil Engine. Located Nedrow, N. Y.

One Gardner-Denver (105 c.f. gas engine) Compressor. Located Johnstown, Pa.

One Worthington (160 c.f. gas engine) Compressor. Located Johnstown, Pa.

### PATROLS

One No. 112 Caterpillar Patrol Ser. No. 2N33. Located Johnstown, Pa.

One No. 12 Caterpillar Patrol Ser. No. 9K407. Located Minneapolis, Minn.

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### PIPING SUPERINTENDENT

Construction firm has opening in California for an experienced Piping Supt. Minimum 5 years experience on lump sum contracts. Furnish experience record and photo. Box 1058, Western Construction News, 503 Market Street, San Francisco 5, California.

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8 Whites, all with 12 yd. bodies, all in perfect condition. 3 new, others less than 15,000 mi. No reasonable offer refused.

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ONE OF THE MOST MODERN LIGHT WEIGHT CONCRETE PIPE AND BLOCK PLANTS in the central part of California. All Electric Equipped Machinery, all Steel Fireproof Buildings. Practically New. Should be seen to appreciate. Plenty of Business to Look Forward To. ADDRESS P. O. BOX 1010, PASO ROBLES, CALIF.

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Portland, Seattle

MacDonald Co.  
Reno

Mahl Steel & Supply Co.  
Los Angeles