

# WESTERN CONSTRUCTION NEWS

CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

PUBLISHED SEMI-MONTHLY  
VOLUME IV NUMBER 22

SAN FRANCISCO, NOVEMBER 25, 1929

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\$3.00 PER YEAR



DENNY HILL REGRADE No. 2, SEATTLE. A 4,000,000-CU.YD. EXCAVATION PROJECT HANDLED IN A UNIQUE MANNER





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STURDINESS is a quality that *all* power shovels must possess, of course. But P & H Diesel Shovels have it to a remarkable degree for they will withstand unusual punishment and grief without faltering. In rock, in shale, in clay, P & H Shovels carry on with the same reliable persistence as in "easy" materials.

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These and other features are what impart unusual sturdiness to P & H Shovels. They are combined only in P & H machines. Capacities range from  $\frac{1}{2}$  cu. yd. to 3 cu. yds. Ask for bulletins which give full details.

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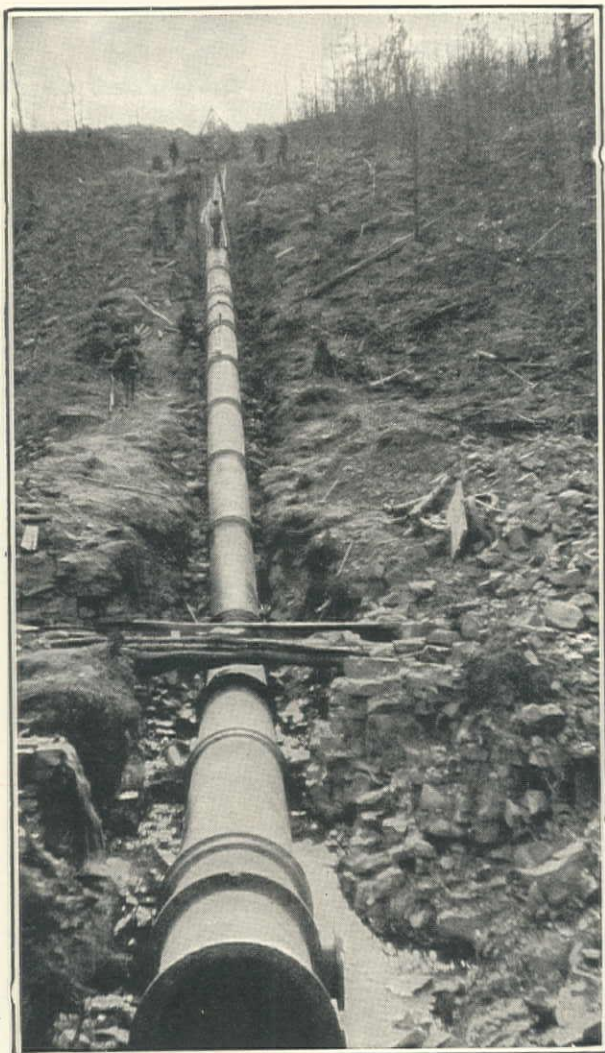
**1930  
CONVENTION &  
ROAD SHOW  
A. R. H. A.  
ATLANTIC CITY N.J.  
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TRADE

# "LEADITE" MARK

Registered U. S. Pat. Office



Section of 9 miles 30 in. and 36 in.  
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# NO CAULKING





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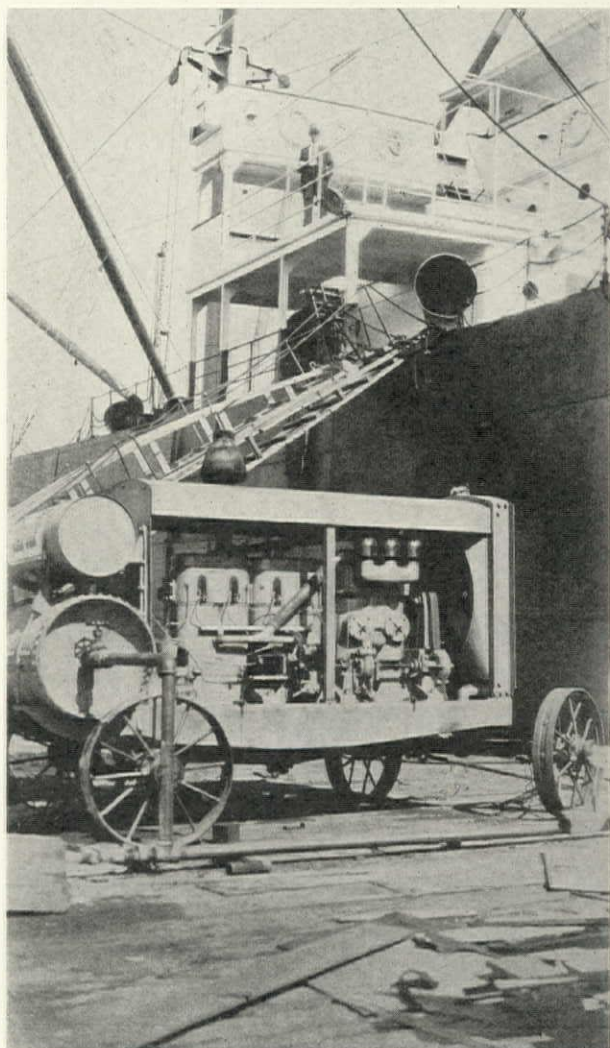
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*The RIX Pioneer line includes vertical and horizontal compressors in all sizes for all purposes, compressor service and supplies. Agents for COCHISE Drills, exclusive distributor for THOR Pneumatic Tools in Los Angeles and Seattle territories.*



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DEVOTED TO CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

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NUMBER 22

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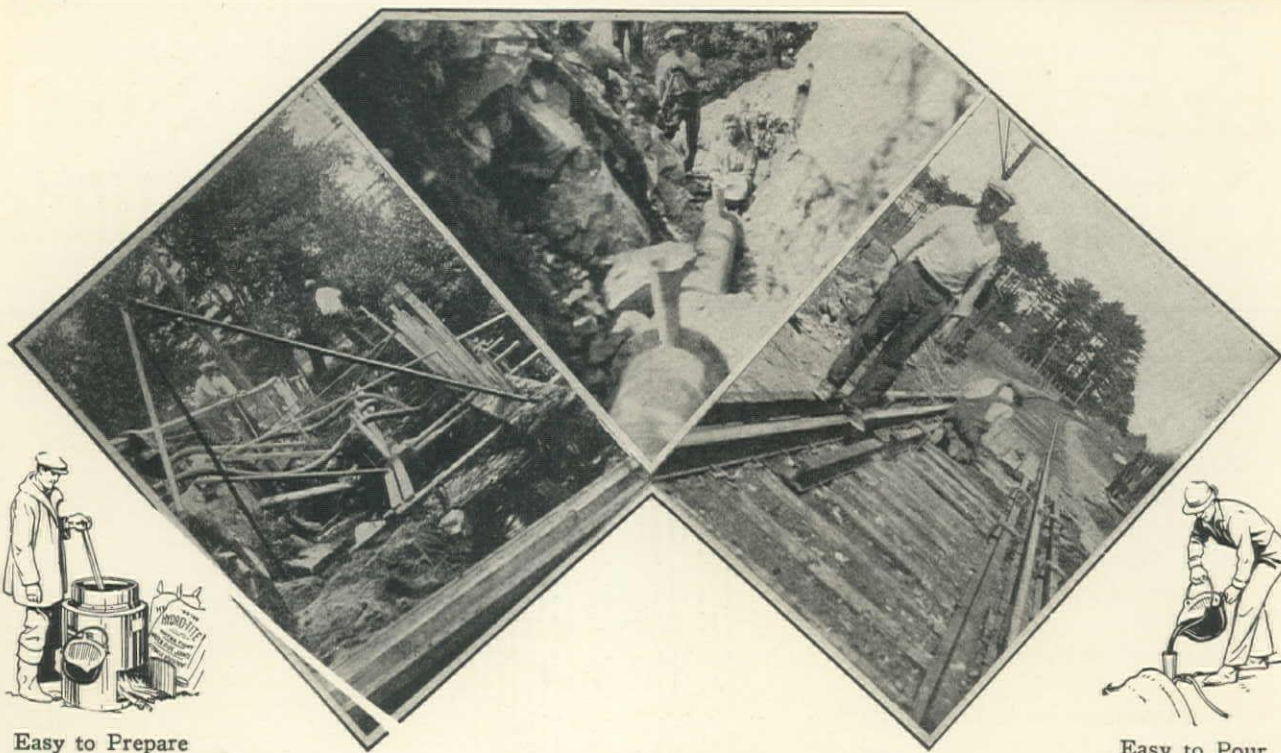
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Easy to Prepare

Easy to Pour

## UNDER ALL KINDS OF CONDITIONS HYDRO-TITE MAKES BETTER PIPE JOINTS

THE pictures above show some of the worst conditions encountered when laying cast iron bell and spigot pipe. These were taken during the installation of twenty-one miles of pipe in a new water system. The picture on the left shows one of the wet sections. The center picture shows pipe being laid through ledge and the picture on the right is where the pipe is laid directly under the railroad track.

Hydro-Tite was selected as the joint material on account of its splendid record in meeting every joint requirement.

Joints made with Hydro-Tite are superior to lead—yet can be made at one-quarter the cost. They require no caulking—are easily made and are strong—tight and flexible. The proven dependability of Hydro-Tite for over 19 years has made its use sound engineering practice.

Hydro-Tite is now shipped in a new style cloth bag which has a heavy moisture proof liner. This insures dry material and a clean bag. If you are not one of the many users of Hydro-Tite we will be glad to arrange a demonstration. If you prefer we will ship you a bag for test or trial.

*Write for literature and full information*

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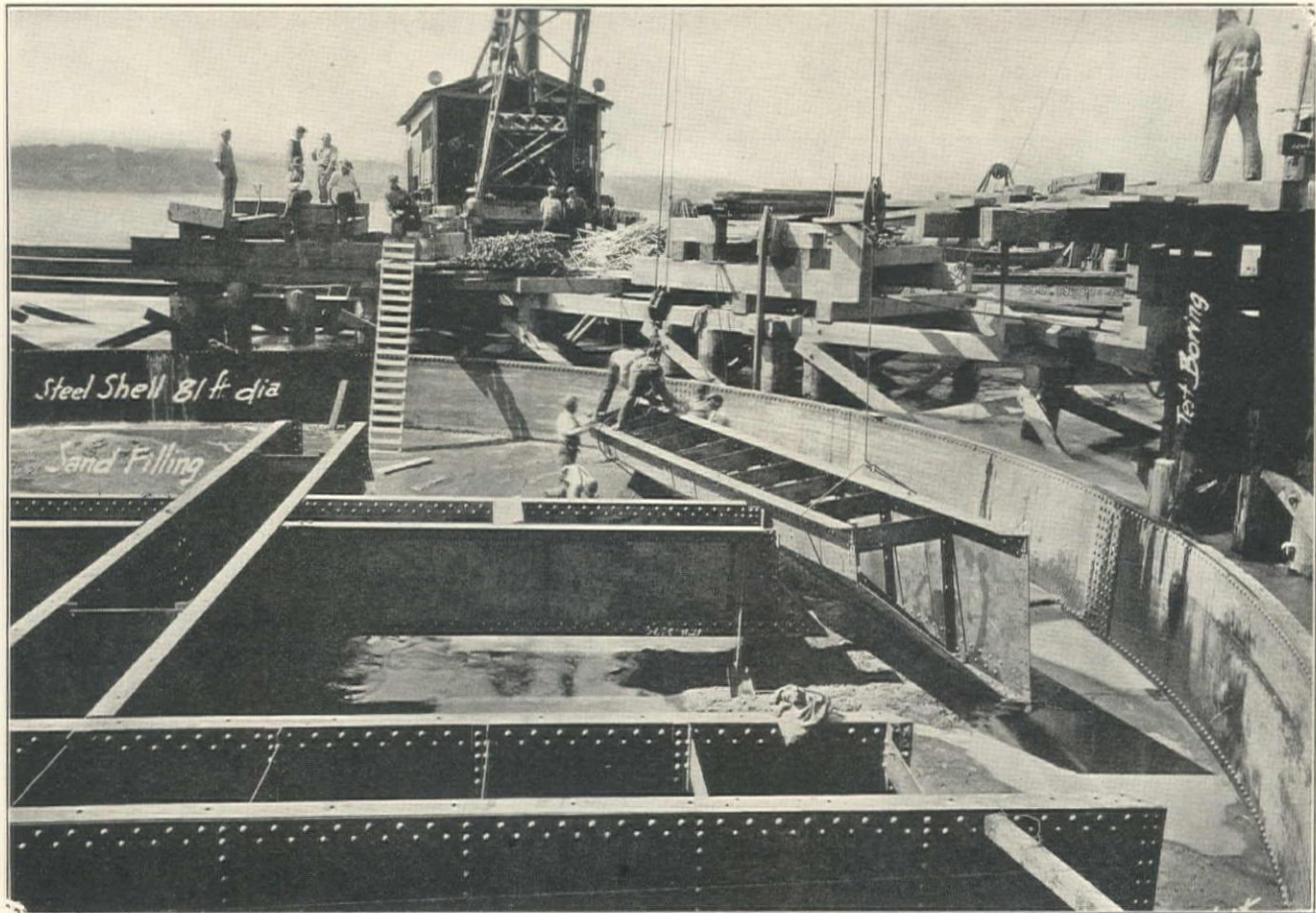
REG. U. S. PAT. OFF.

The MODERN JOINT MATERIAL





# Erecting an 81' Diameter Steel Caisson for the Southern Pacific's Great Suisun Bay Bridge



**W**ESTERN PIPE & STEEL COMPANY OF CALIFORNIA fabricated at its South San Francisco plant, eight steel bridge pier caissons 81 feet in diameter and of varying lengths, for the Southern Pacific Railroad Co.'s gigantic Suisun Bay Bridge between Martinez and Benicia. The order required 1900 tons of steel, and included cutting edges 38'x 60'x 4' 8" deep. In the illustration above, a section of the cutting edge is being swung into place.

## WESTERN PIPE & STEEL CO.

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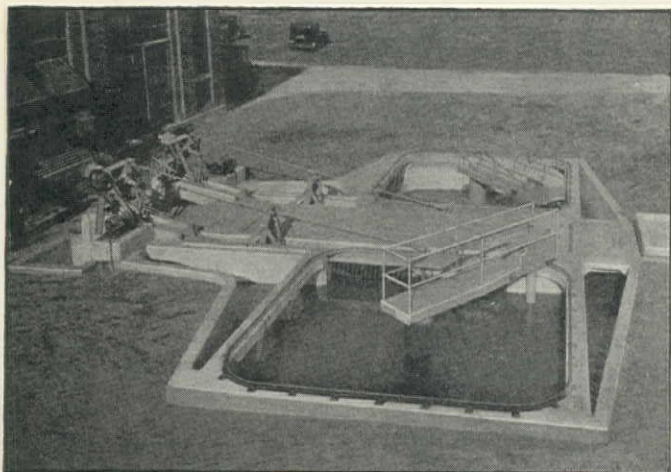
OF CALIFORNIA

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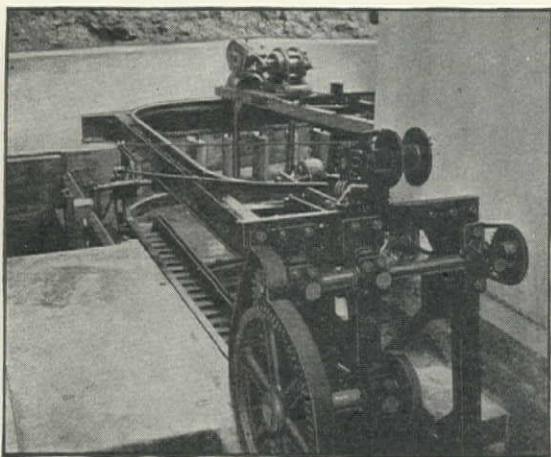
—  
Factories:

South San Francisco ~ Los Angeles ~ Fresno ~ Taft ~ Phoenix





Two Dorr Detritors in the sewage treatment plant at Winston-Salem, N. C.



Washing compartment and discharging mechanism of a Dorr Detritor operating in the sewage treatment plant at Harrison, N. Y.



Our nearest office will gladly send you a booklet which describes the Detritor. Ask for Bulletin 6481.

# Grit Removal

## Important in all sewage treatment methods

**G**RIT, sand and other inert material are always troublesome in all sewage treatment methods. Not only does grit cause wear and abrasion on equipment in the plant but its presence is of no use in sludge digestion tanks, and in the activated sludge process it often interferes with the operation of the aeration units.

A plain, old-fashioned grit chamber can never satisfactorily keep grit from passing on to other steps in the treatment process. But a Dorr Detritor can and does in an extremely simple way.

The Detritor automatically and continuously collects the grit in the flow, washes it, and discharges it in a clean, drained condition.

Detritors can readily be installed in most existing treatment plants. Their installation improves plant operation, cuts down wear on other equipment caused by grit, and does away with the offensive conditions attendant on the intermittent cleaning out of plain grit chambers.

## THE DORR COMPANY ENGINEERS

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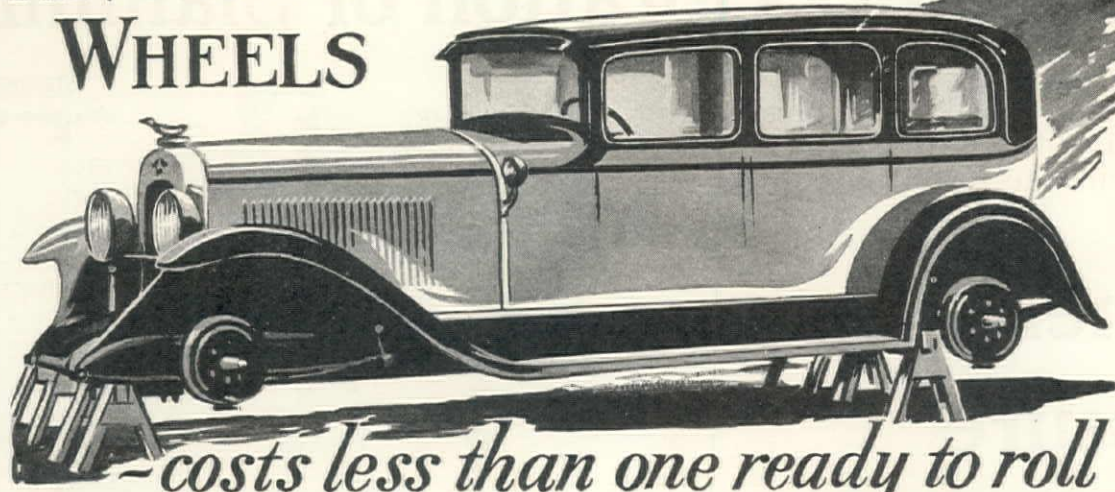
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# AN AUTO WITHOUT WHEELS

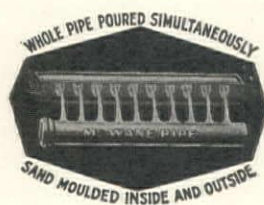


**BUT** of what use would it be? What economy in buying the car one place, wheels another, and putting them together yourself?

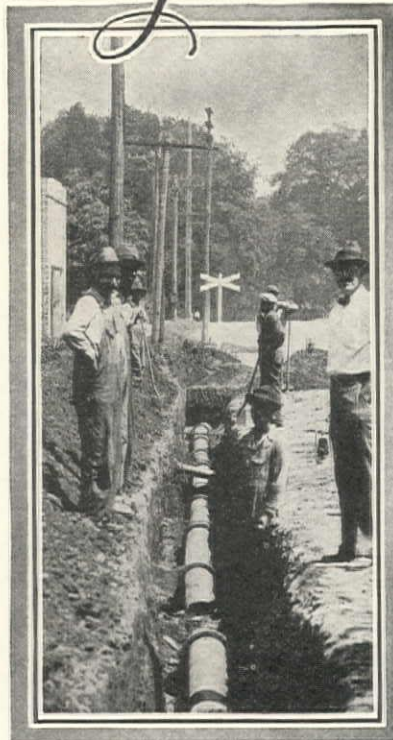
*Yet many cast iron pipe users are following exactly this uneconomical policy when they buy pipe one place, joint materials another, and cap the costly climax by slowly, laboriously, and expensively making the joints themselves in the trench.*

But users of McWane-Pacific Precalked Joint Cast Iron Pipe buy theirs "fully equipped." Lead, jute, and part of the calking are complete in place. Instead of MAKING joints on the job they merely FINISH them there, at 3 times the speed for half the labor. Simply "socket and 'sock' it" with a calking hammer.

McWane-Pacific Pipe is WESTERN-MADE—sand-cast, easy to cut and tap, and ready for quick all-rail ship-



ment. Sizes, 1¼ through 12 inches. Standard lengths. Precalked Joints or open bells. Precalked Fittings, too.



*Laying 10-inch McWane-Pacific Precalked Joint Pipe. Pipe and Joint are shipped as a unit, ready to "socket and 'sock' it."*

WRITE FOR ILLUSTRATED LITERATURE

# MCWANE

## CAST IRON PIPE

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PACIFIC STATES CAST IRON PIPE CO.  
PROVO, UTAH.

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PELTON

# No Chatter, Vibration or Slamming

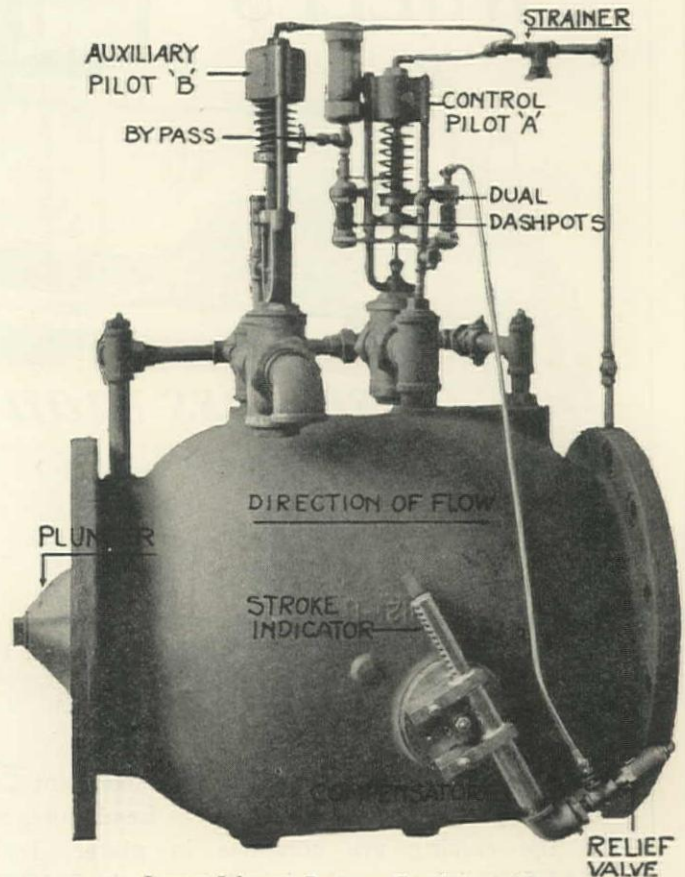
These Ideal Operating Conditions Are Assured with the Installation of

## Larner-Johnson Pressure Regulators

for Control of Upstream or Downstream Pressures in Water Works Distribution Service

THE Larner-Johnson valve principle which has proved so successful for handling water under a wide variety of conditions has been applied with equal success to the problem of pressure regulation in water works service. It performs the dual function of releasing water in varying quantities at a prescribed pressure and that of protecting the feeder line against the dangers of excessive periodic surge.

These regulators consist essentially of an internal operating cylinder concentric with the main valve body, within which a plunger moves with and against the direction of flow for opening and closing. The operating force is obtained from the pressure under which the valve is installed, the plunger movement in either direction being the result of pressure differential between the control chambers and the conduit.



Larner-Johnson Pressure Regulator with indication of parts and their functions

A unique restoring mechanism is incorporated in the design of this regulator to prevent any tendency toward periodic surge and to increase the stability by damping out any disturbances initiated by sudden changes in water demand. The compensator, dual dashpots and adjustable bypass are the parts indicated in the illustration which accomplish this purpose.

A complete description of the Larner-Johnson pressure regulator, complete with illustrations and charts, will be promptly mailed to those interested.

### THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

2985 Nineteenth Street, SAN FRANCISCO

100 Broadway, NEW YORK

ASSOCIATED COMPANIES: I. P. Morris & De LaVergne, Inc., Philadelphia; Dominion Engineering Works, Ltd., Montreal. PACIFIC COAST REPRESENTATIVES for Larner Engineering Co., Philadelphia

# PELTON



# TWINS!

**T**HE mother of twins who had to mark them with colored ribbon to identify them would have far worse trouble in a Lock Joint manufacturing yard.

Each length "looks like the one before it, only more so," as the Irishman phrased it; and one would have to mark any one length of Lock Joint Pressure Pipe to be able to recognize it again.

But far more important than their similarity in appearance is their similarity in service; each length of Lock Joint Pressure Pipe is a counterpart of every other length in Strength, in Long Life, and in Freedom from Tuberculation, which fact, in turn, insures Highest Carrying Capacity.

**LOCK JOINT PIPE CO. :: Ampere, New Jersey**

*Established 1905*

**PRESSURE, SEWER, SUBAQUEOUS, CULVERT**

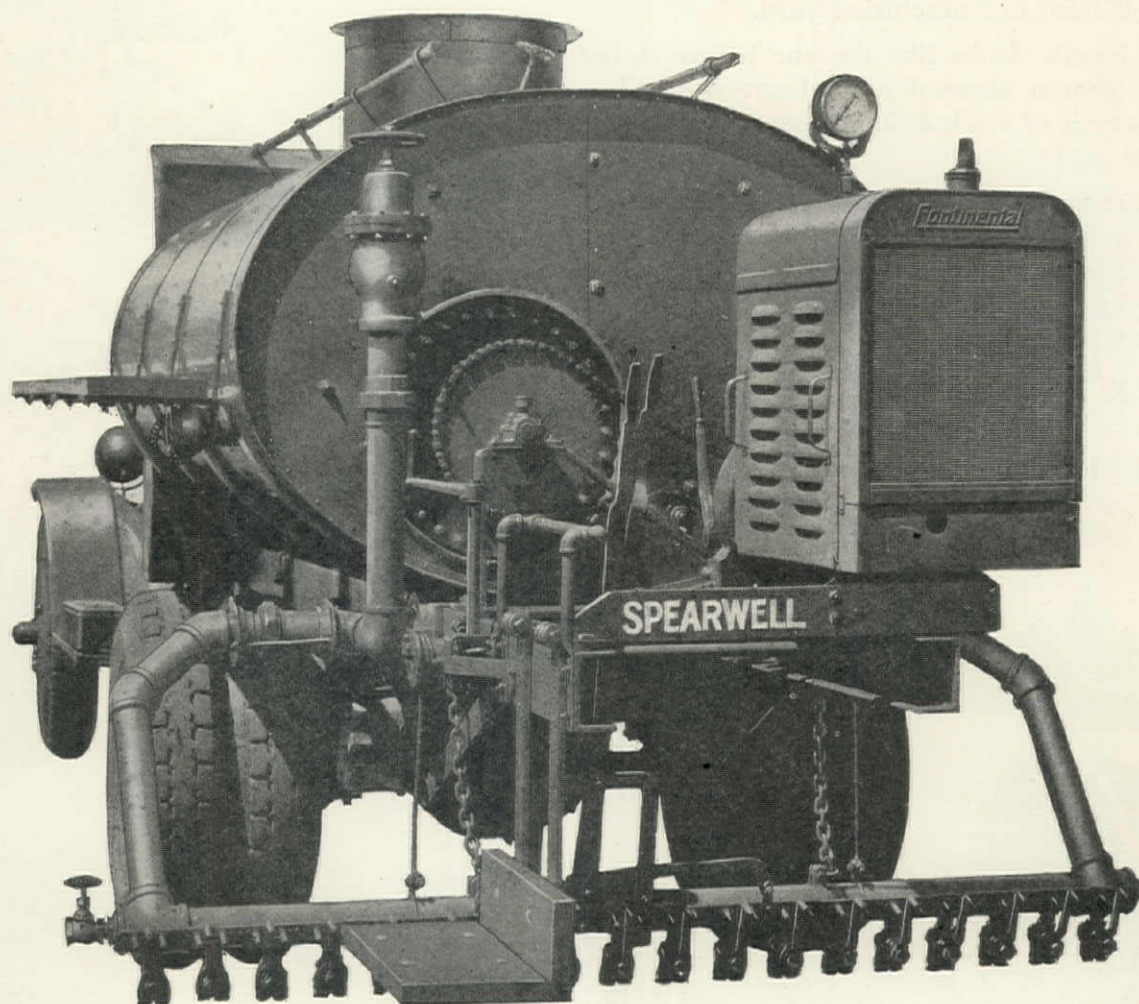


**LOCK JOINT**  
*Reinforced Concrete*  
**PRESSURE PIPE**



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*SPEARWELL*



**We Are Road Oil Distributor Specialists**

*Manufacturing a Complete Range of  
Sizes and Types for Hot, Cold and Emulsified Oils*

*Write, Phone, Wire or Call for Complete Details, Prices, Etc.*

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**ROAD CONSTRUCTION AND MAINTENANCE EQUIPMENT**

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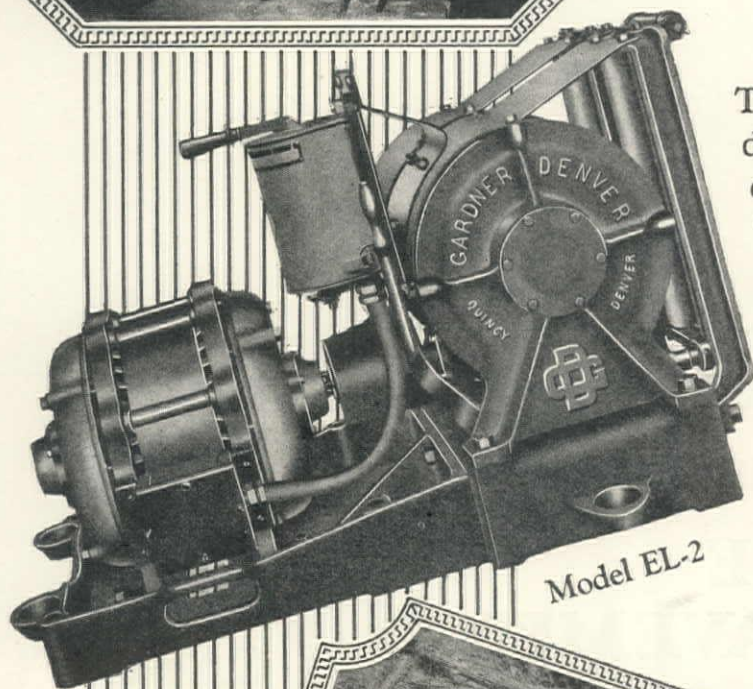
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HOLLIDAY 4100

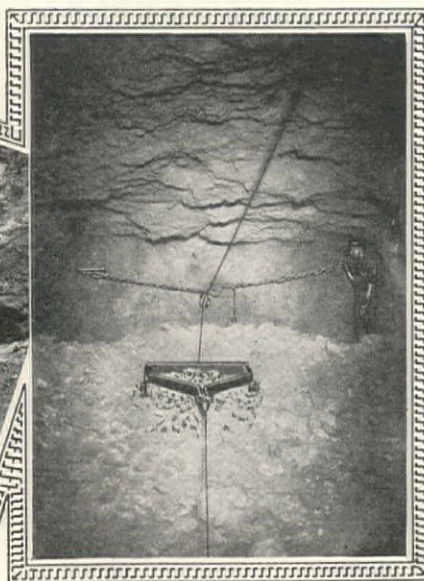
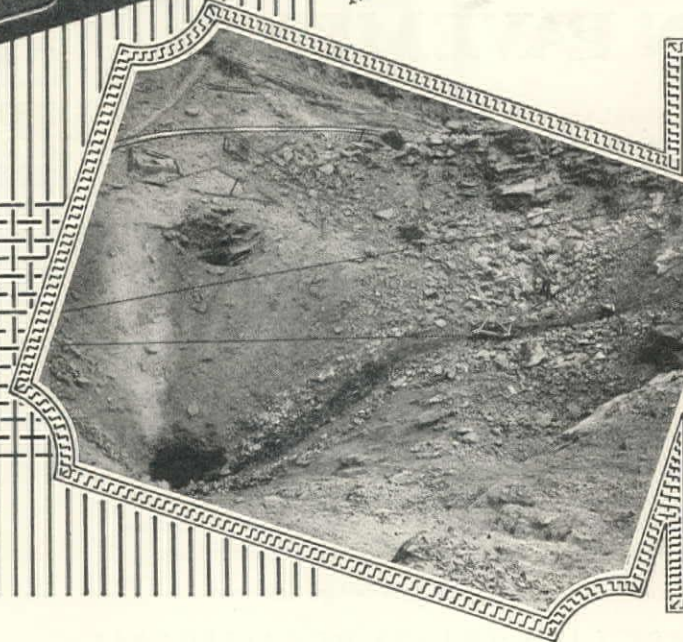




# Lower Slushing or Scraping Costs with Electric Hoists



The Model EL-2 Electric Hoist was designed to reduce the cost of scraping ore, rock and coal into cars and chutes. The handling of heavy loads at either high or low speeds, portability and adaptability are salient features of this hoist, making it especially efficient in slushing operations. Furnished in AC and DC units, in all standard voltages. Write for descriptive bulletin and prices.



**GARDNER-DENVER COMPANY**

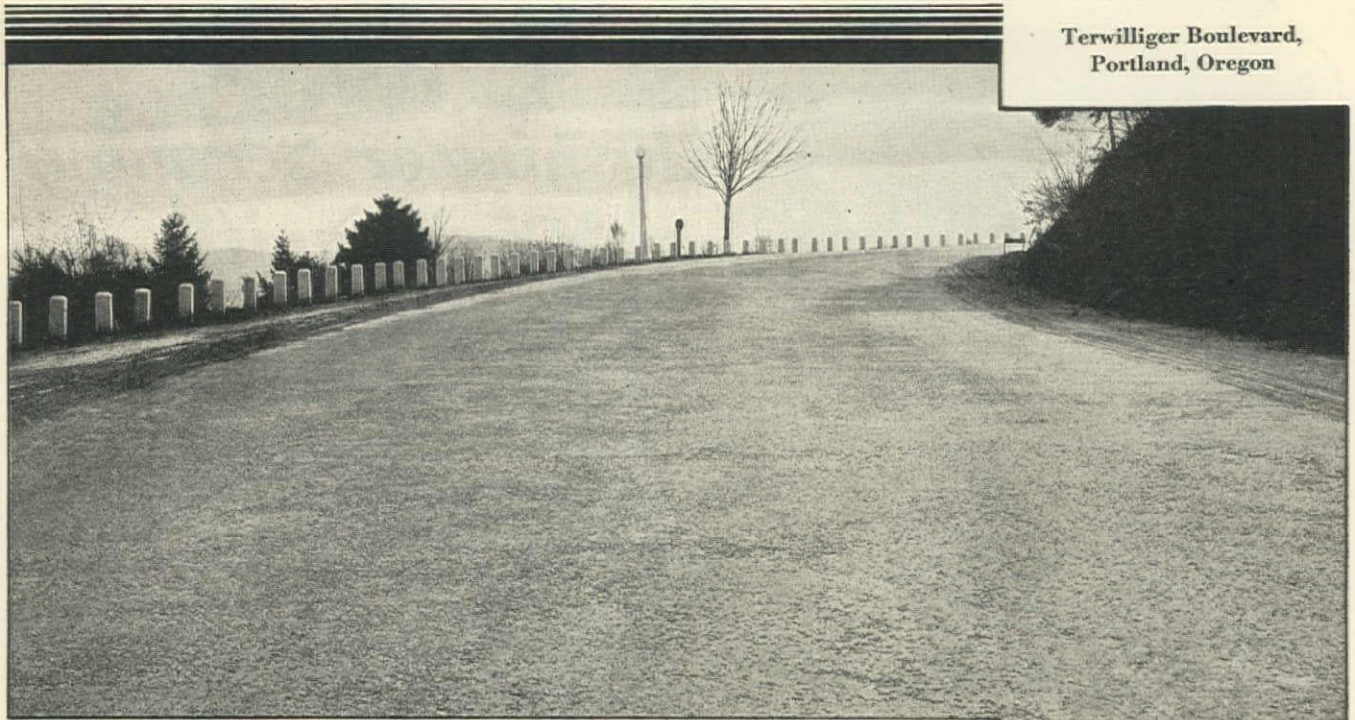
ROCK DRILL DIVISION

DENVER, COLORADO

Sales Offices Throughout the World

# GARDNER-DENVER





Terwilliger Boulevard,  
Portland, Oregon

**Safe for all kinds of driving~  
Economical in construction~**

## **THAT'S THE MODERN PAVEMENT!**

When your paving is Non-Skid Asphaltic Concrete, heavy grades—quick stops—"hairpin" turns, hold fewer dangers! The safety factor, built right into this road surface, reduces the peril of skidding to a minimum.

Stone chips pressed into the Asphaltic Concrete surface provide a smooth attractive ribbon of highway with just enough tiny indentations to afford automobile tires a sure, firm grip in all kinds of weather.

You take safety, smooth riding, freedom from glare for granted on Asphaltic Concrete pavements, but they'll also save you money on construction costs and upkeep! Many Asphaltic Concrete highways, with practically no repairs whatever, are still standing up under heavy traffic after 15 or 20 years' service!

These are the reasons Non-Skid Asphaltic Concrete has been adopted as "Standard" by the California State Highway Commission and by some 230 odd towns and cities in the Pacific West States.

Investigate Non-Skid Asphaltic Concrete before you pave.

STANDARD OIL COMPANY OF CALIFORNIA

*Asphaltic* **CONCRETE**  
**NON-SKID pavements**

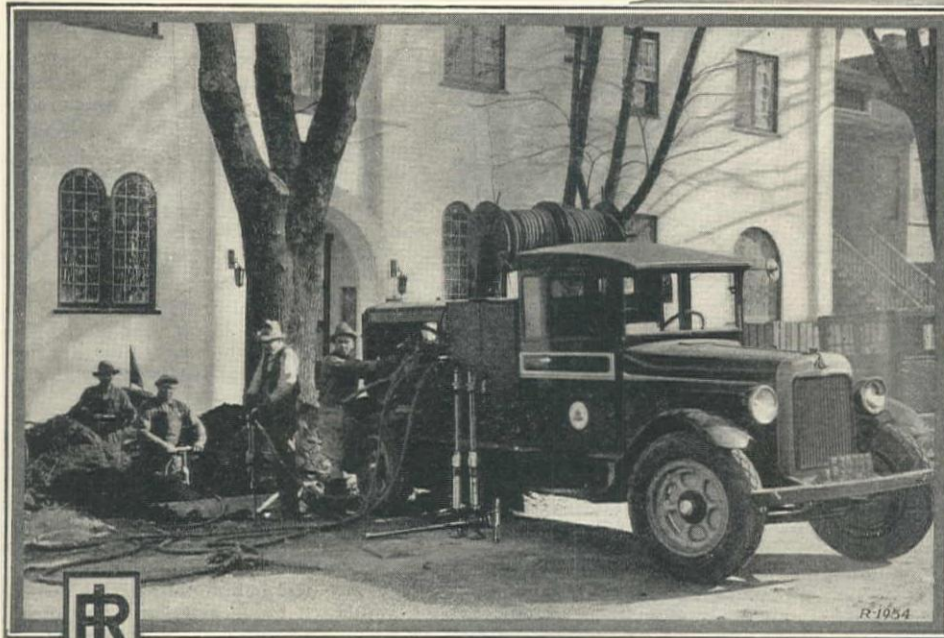
**CALOL  
ASPHALT**  
for best  
results



Below: An I-R truck-mounted outfit of the type used by many large public utility companies. The compressor, a 110-foot unit, operates paving breakers, rock drills, pneumatic diggers, backfill tampers, air hoists, and other machines.



Above: Tearing up blocks with I-R Paving Breakers. When a job of this sort is finished, the tools are packed up beside the compressor and hurried along to another assignment.



## Truck-Mounted Units Offer Many Advantages

Contractors and public utility companies have been quick to realize the advantages of the truck-mounted portable compressor outfit.

Equipment of this character is particularly valuable for short-time jobs, where the work requires but a small supply of air. Ingersoll-Rand Portables can be mounted on any of the standard trucks, which will also accommodate a complete set of labor-aiding tools.

Many utility companies maintain large fleets of these truck-mounted units. As a rule, the outfits are fully equipped with "Jackhamers," Paving Breakers, Pneumatic Diggers, and other kinds of tools.

If your work is the type that requires air at short notice, we suggest an Ingersoll-Rand truck-mounted compressor. Our nearest office will gladly furnish particulars.

### INGERSOLL-RAND COMPANY of Cal.

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526 First Avenue, South  
Seattle, Wash.

1460 East Fourth Street  
Los Angeles, Cal.

# Ingersoll-Rand

227-PC



# Why Babylon's Streets Have Lasted 2500 Years



**D**URING the recent excavations in ancient Babylon, this inscription was found on a brick imbedded in a street which seemed to be the leading thoroughfare.

"Nebuchadnezzar, King of Babylon, son of Nabopolassar, King of Babylon.

"On the procession street of Nabu and Marduk in Babylon, Nabopolassar, the father who begot me, has made a road glistening with asphalt and burnt brick.

"I, the wise suppliant who fears their lordships, Nabu and Marduk, have placed above the asphalt and burnt bricks, a mighty superstructure of shining dust made strong within with asphalt and burnt bricks, as a highlying road.

"When you traverse these streets in joy, may benefits for me rest upon your lips."

It is evident that both Nebuchadnezzar and his father, Nabopolassar, realized the value of asphaltic pavements as early as the 6th century B. C. And so successfully did this asphalt seal these famous streets that portions of them exist today, after being exposed to the elements for more than 2500 years.

## Secret of Asphalt's Endurance

The success of asphalt in roadbuilding then, as well as now, lay in these qualities:

1. It resists moisture and thus seals the subgrade from undermining by water.
2. It absorbs expansion and contraction—a protection against surface buckling.
3. It resists the wear of heavy traffic.

Through its adaptation to modern roadbuilding problems, Union D Grade Asphalt has these further advantages:

4. No traffic delays—road can be opened to traffic soon after laying.
5. Easily replaced after opening for water mains, etc.
6. Noiseless and dustless.
7. Easily resurfaced.

Communicate with Asphaltic Division, Union Oil Company, Los Angeles, or the nearest Union Oil Distributing Station for complete details concerning Union D Grade Asphalt.

## UNION D GRADE ASPHALT



It's moisture proof

**UNION OIL COMPANY**





**They  
"Repeat"**

MARION  
TYPE  
450

MARION

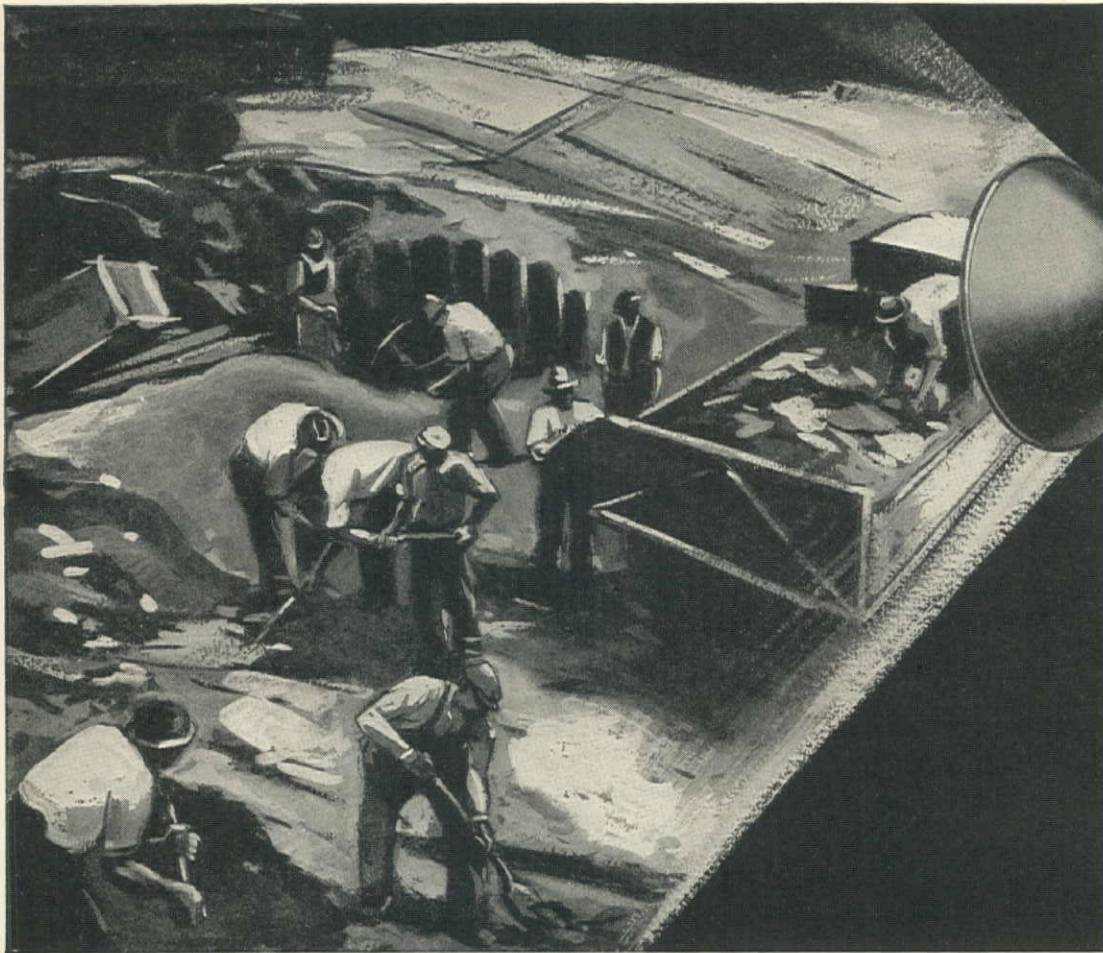
**T**HE first 450 Gas-Electric had been in service only a few weeks when its owner ordered a second one. The record is incomplete unless you know that this latter 450 is this customer's fourth Marion Gas-Electric. Write for Bulletin 337.

THE MARION STEAM SHOVEL CO.  
MARION, OHIO, U. S. A.

# MARION

29008





Wherever building and construction work is carried on, emergencies are bound to arise. Breakdowns, adverse weather conditions and unexpected holdups tend to make the job lag behind. Such delays, however, may often be economically overcome by a regular night shift.

Successful contractors throughout the country provide Carbic Flood

Lights for their jobs from start to finish and keep up to schedule. Contracts completed on time give them added profits—and reputation.

Carbic Flood Lights are simple, rugged and portable. They are always ready for service. Carbic Light costs only a few cents an hour and under its clear white rays your men can work with daylight rapidity and safety.

## OXWELD ACETYLENE COMPANY

Unit of Union Carbide and Carbon Corporation

NEW YORK CITY  
Carbide and Carbon Building

CHICAGO  
Carbide and Carbon Building

SAN FRANCISCO  
Adam Grant Building

Technical Publicity Department, Oxweld Acetylene Company  
205 East 42nd Street, New York, N. Y.

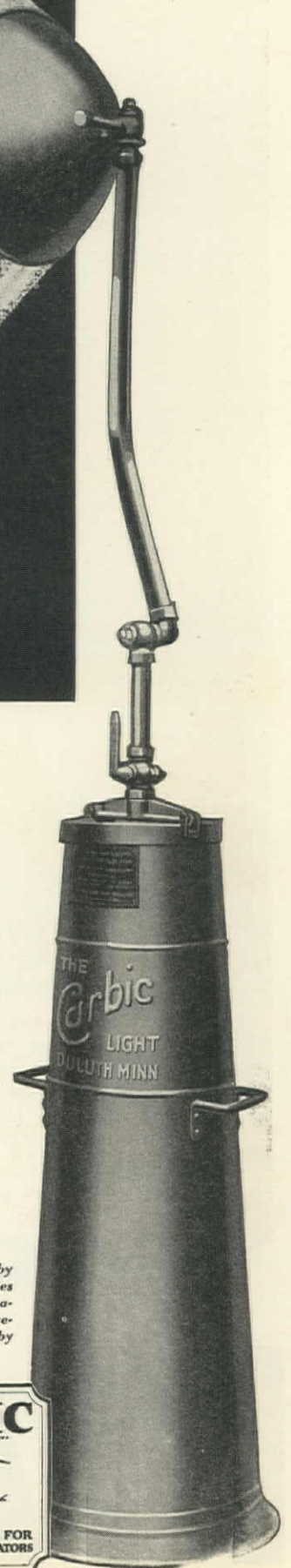
Without obligation, I would like to have additional information on Carbic Lights.

Name .....

Street Address .....

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

Carbic is distributed by the Union Carbide Sales Company through its national chain of warehouses and is sold by jobbers everywhere.





L. H. BILL

President and General Manager  
FAGEOL MOTORS COMPANY

## The Fageol Principle

"We will never build to a standard lower than the highest. When we can buy better parts than we can make, we will buy them. When we can make better parts than we can buy, we will make them. Utilizing superior engineering judgment, we will produce the best equipment or we will produce nothing." . . . . L. H. BILL



# FAGEOL

## The IMPORTANCE of little things . .

For the want of a nail, once a battle was lost . . . for the want of a bolt, the truck broke down . .

**FAGEOL**  
TRUCKS AND SAFETY COACHES  
**BILL-BUILT**

## FACTORY BRANCHES

SEATTLE . . . . .	717 Dexter Avenue
BELLINGHAM . . . . .	1417 State Street
SAN FRANCISCO . . . . .	180 Twelfth Street
LOS ANGELES . . . . .	770 East Ninth Street
SAN DIEGO . . . . .	1208 Market Street
PORTLAND . . . . .	267 Pacific Street
OAKLAND . . . . .	1640 East Twelfth Street
TACOMA . . . . .	503 Puyallup Avenue
SPOKANE . . . . .	1126 Second Street
YAKIMA . . . . .	116 South Second Street

An important schedule kept, a customer's good-will, a profitable hauling job . . . all may depend upon the deft adjustment of a tiny working part.

Just as a hair can make a locomotive helpless, a broken spring or faulty adjustment can put a truck in the shop. No matter how strong the steel, how rugged the iron . . . how is it put together?

L. H. Bill puts a sturdy heart in the Fageol body . . . and every valve knows its duty. Whether the sun beats down at a hun-

dred or the snow flies at ten below . . . whether the day be fair or drenching . . . Fageols move on, up to the battle line of business.

The drivers say there's a "feel" in a Fageol . . . a something unexplained. A something which inspires confidence . . . that keeps a smile on the face when he-man loads are drawn along like leaves in the wind.

Perhaps, a Fageol is a better truck than the average . . . maybe closer attention to little things makes a Fageol aware of its responsibility, ashamed to show the slightest weakness . . . and proud of its Alma Mater . . . the Fageol Motors Company.

MANUFACTURED BY **FAGEOL MOTORS COMPANY** OAKLAND, CALIFORNIA

## Distributors

VANCOUVER, B. C., Fageol Motors Sales Canada, Ltd., 2781 Fourth Ave., West

VICTORIA, B. C., L. H. Campbell, 921 Wharf St.

HONOLULU, T. H., Chester R. Clarke, 620-622 Beretania Street



# "It DOES the Work"

IN expressing this brief but emphatic opinion, Essi & Haddad, Inc., of Cleveland, join the ranks of thousands of other enthusiastic contractors who are capitalizing with Buckeye Trench Excavators. Their experience with the Type C illustrated has convinced them that it is an "exceptionally well-organized and engineered power and mechanical unit." Made in a complete range of sizes and types, there is some Buckeye which will profitably handle any trenching job that is practical for machine digging. The purchase of any Buckeye is an investment in its dependable earning power.

THE  
BUCKEYE TRACTION  
DITCHER COMPANY  
FINDLAY, OHIO

SEE OUR EXHIBIT  
Booth 320—Section C—Main Floor  
1930 ROAD SHOW  
Atlantic City, N. J.—January 13-18

*for over thirty years*

# Buckeye ✓

A. L. YOUNG MACHINERY CO.  
SAN FRANCISCO

The BROWN-BEVIS COMPANY  
LOS ANGELES



# Fast

*West Coast Representatives*

**Frank T. Hickey Co.**    **A. L. Young Machinery Co.**  
2528 Santa Fe Ave.    26-28 Fremont Street  
Los Angeles    San Francisco

**Tyee Machinery Co., Ltd.**  
Vancouver, B. C.

**Western Road Machinery Co.**  
315 Belmont Street  
Portland

## With plenty of power

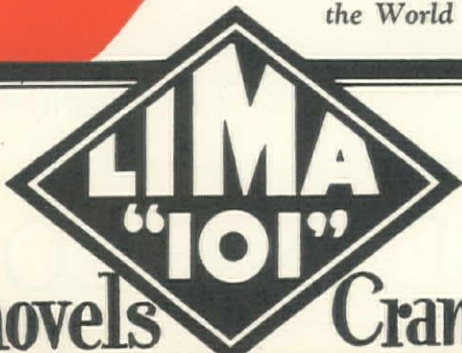
Another thing you will like about the LIMA "101" is the new and advanced principle of compounded power in the hoist. This exclusive feature gives the tremendous hoist pull of 30,000 lbs. at a dipper speed of 100 feet in one minute—a remarkable accomplishment to meet the present demands for more production. Write for Bulletin 291.

**The Ohio Power Shovel Co.**

LIMA, OHIO, U. S. A.



62 Roller Bearings---a Timken at Every Vital  
Bearing Point---the Only Shovel in  
the World So Equipped.



*Mail this  
Coupon  
Now!*

The Ohio Power Shovel Co.  
Lima, Ohio  
Gentlemen: Send me further information  
about the Lima "101"

Firm name .....  
By .....  
Address .....  
Nature of work.....

**Shovels    Cranes · Draglines · Drag shovels**



# Vitrified Salt-Glazed Clay Sewer Pipe



**I**NSTALLATION of 33" diameter Vitrified Salt-Glazed Clay Sewer Pipe for the City of Los Angeles at Formosa and Melrose avenues. Davenport Fennelly Co., contractors, John C. Shaw, City Engineer. The quality of permanence—most essential in sewer pipe—is assured by the use of Vitrified Salt-Glazed Clay.

## GLADDING McBEAN & CO.

SAN FRANCISCO  
PORTLAND

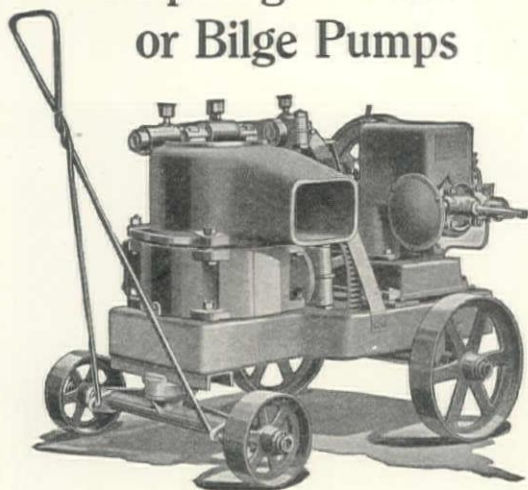
OAKLAND  
SEATTLE

LOS ANGELES  
SPOKANE



# CH&E "Mud Hen"

Diaphragm Trench  
or Bilge Pumps

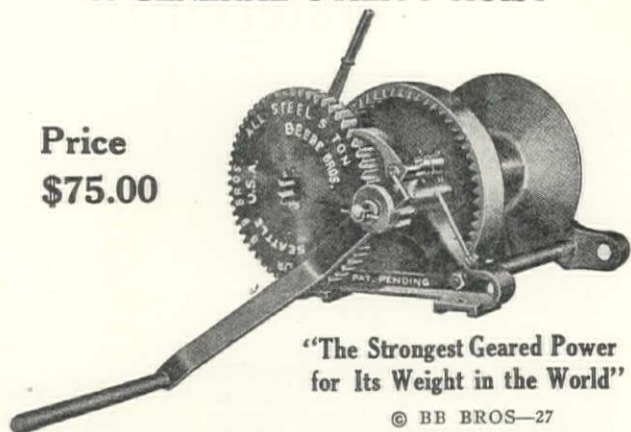


No Splashing of Water from Top of Pump  
Light Weight, Compact and Sturdy  
CARRIED IN STOCK

# B. B. *Brothers* ALL STEEL HAND HOIST

SEATTLE, U.S.A.  
A GENERAL UTILITY HOIST

Price  
\$75.00



"The Strongest Geared Power  
for Its Weight in the World"

© BB BROS.—27

5-Ton Capacity  
Weight:

Hoist ..... 100 lbs.  
Handle .... 10 lbs.

Dimensions:  
16 in x 17 in.  
x 13 in. high

Cable Capacity:

160 ft. of 5/8 in. Rope  
250 ft. of 1/2 in. Rope  
445 ft. of 3/8 in. Rope

Two Speeds 4-1 and 24-1  
Positive Internal Brake

# ERSTED



*Automotive*  
**CRANE**  
BALL BEARINGED

THE ONLY  
CRANE

with

3 HOISTING AND  
ROTATING SPEEDS

For Truck or  
Stationary Mounting

Prices \$2500 to \$3800  
f. o. b. Factory

OTHER WILLAMETTE-ERSTED PRODUCTS

The "Hyster," for McCormick-Deering and Fordson Tractors. Single and double-drum hoists for the "Caterpillar" 2-Ton, Twenty, Thirty, and Sixty Tractors. Gasoline and Electric Stationary Hoists. Lumber Carriers.

WRITE FOR CATALOG

**WILLAMETTE-ERSTED COMPANY**  
PORTLAND, OREGON

**Harron, Rickard & McCone Co.**

"SINCE 1875"

2205 Santa Fe Avenue, Los Angeles  
JEfferson 4191

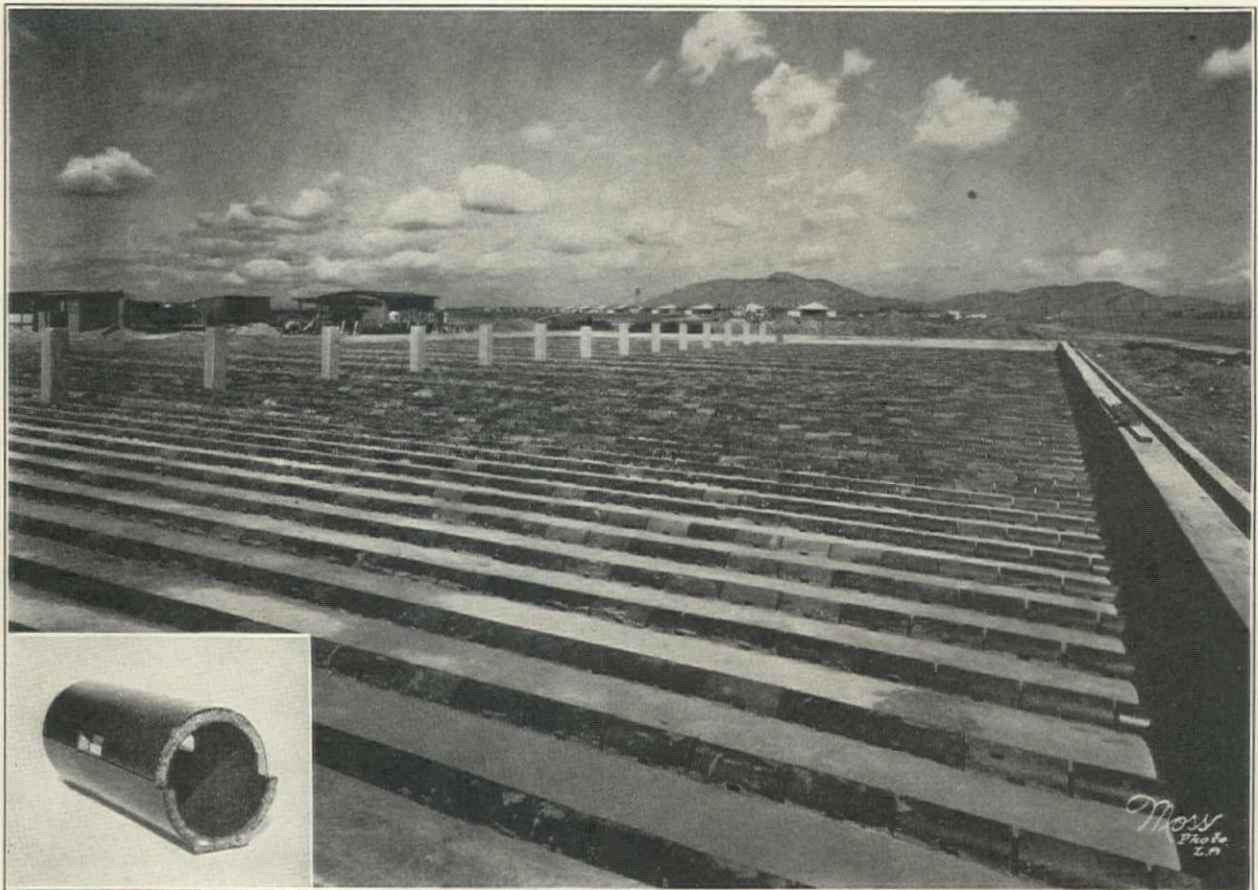
1600 Bryant St., San Francisco  
UNderhill 3740



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Hofius-Ferris Equipment Co.  
PORTLAND, OREGON:  
Howard-Cooper Corporation



# VITRIFIED CLAY—the Only Everlasting Material for Sanitary Sewers



“Plymouth” Vitrified Clay Underdrain Tile---a Pacific product---in the trickling filter beds (during construction) of the sewage treatment plant at March Field, the U. S. Army Aviation Camp, Riverside, Calif.



*The United States Government uses VITRIFIED  
CLAY for all permanent improvements . . . . .*



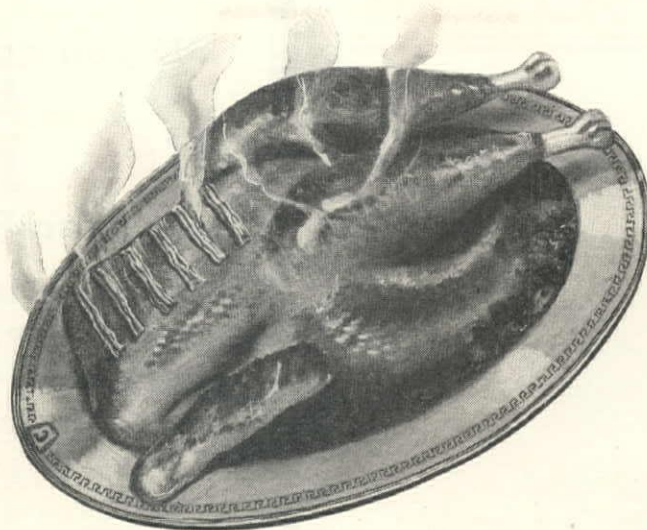
## *Pacific Clay Products*

Suite 650  
Chamber of Commerce Bldg.



1151 South Broadway  
Los Angeles



IT'S  
BACON  
IN SAN FRANCISCO**RE:**

## **BACON AND TURKEY**

Back in the gay nineties, when about this time of year Mother used to baste monstrous turkeys in our kitchen wood burner, we remember how she pinned bacon on top of the noble bird's breast to insure it being roasted without scorching---we remember, too, how the bacon helped to make the gravy taste so good.

This year, this organization is grateful for the largest sales in its existence. There's more than mere sales figures to that assertion. It means more customers used Bacon Equipment---asked for and got Bacon Service---and liked our general policy in office and field than ever before. It means more construction men used Bacon to keep abreast of the times and on top of the job. If sales were indicative of favor, we are certain that Bacon has added a flavor of profits to all concerned---there's been more gravy for all---if you get our point.

For all of which we are thankful and for which we thank you---our customers.

**EDWARD R. BACON COMPANY, Construction Equipment**  
**17th and Folsom Streets, San Francisco, Phone HEmlock 3700**

**We have branches at**  
**Fresno, Sacramento,**



**San Jose, Oakland,**  
**Reno, Honolulu**

IT'S  
BACON  
IN SAN FRANCISCO



## THE BABY DIGGER



### *Pioneering the Distinctive Trencher Features That Count in Economic Digging*

**B**UILT into the Baby Digger are those distinctive features that mean true economy in gas trench digging.

**VERY COMPACT**—it is usable on more than 90 % of all your jobs.

**HIGHLY POWERED**—always with plenty in reserve—it has more than enough for the roughest, toughest going.

**EXTREMELY MOBILE**—it is easily and quickly transported from location to location.

**FAST AND FLEXIBLE**—it is easily handled, agile, quick.

**RUGGED AND DEPENDABLE**—because precision built, according to the most advanced engineering design and of the finest material.

You'll find the Baby Digger just made to measure for your particular trenching need. Save more money in more places—put a Baby Digger to work. Write today for full information.

### **The Cleveland Trencher Company**

*"Pioneers of the small trencher"*

20100 St. Clair Ave., Cleveland, Ohio, U. S. A.



**EDWARD R. BACON CO.**

17th at Folsom Streets

SAN FRANCISCO :: CALIFORNIA

If you don't believe  
that

## O. M. P.

(Old Man Performance)

is real stuff—try and  
get by without per-  
formance--particular-  
ly on wire rope jobs.

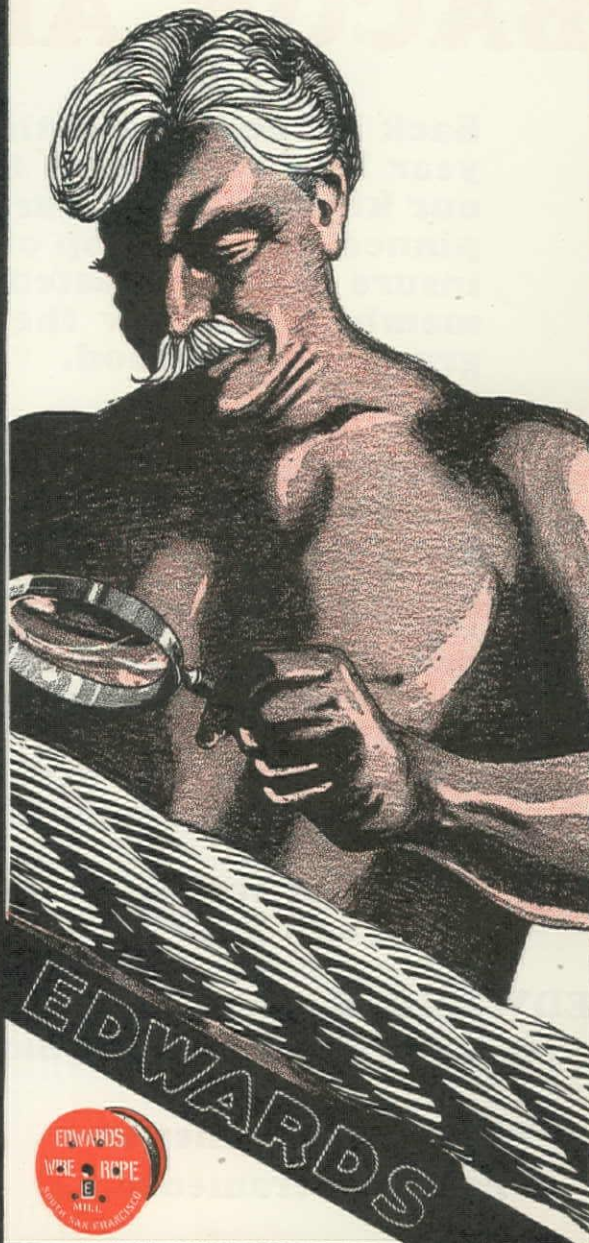
**E. H. EDWARDS COMPANY**

Standard Oil Building - San Francisco

912 Nicolai Street - - - - Portland

1252 Sixth Avenue South - - Seattle

620 E. 61st Street - - - Los Angeles



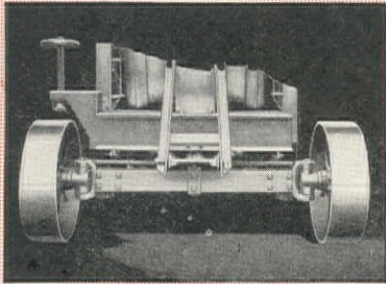
IT'S  
BACON  
IN SAN FRANCISCO

IN SAN FRANCISCO  
IT'S  
BACON



IT'S  
BACON  
IN SAN FRANCISCO

## THE ORIGINAL ONE MAN END CONTROL



PIVOT AXLES make for easier trailing. Note jack for taking loader thrust when charging.



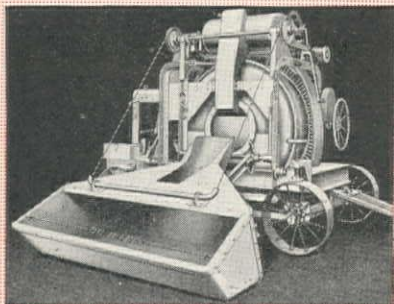
JAEGER 14S NON-TILT MIXER

# Faster, more Compact, more Portable Half-Yard Mixer!

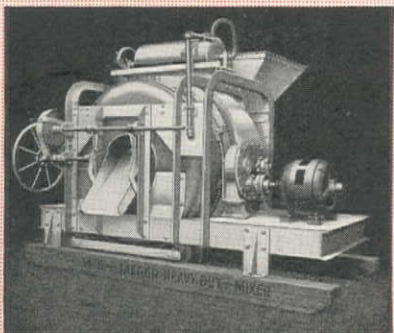
FROM Automatic Skip Shaker to Pivot Axles, this mixer is an engineering achievement—smooth, fast (with Skip Shaker charger, fast discharging drum), nearly 1,000 lbs. lighter (because of steel construction) and really portable.

Drum runs with machined steel tracks on chilled face ground car wheel rollers with ball bearings—minimum power and wear. One man end control is an original Jaeger feature. Construction is far sturdier than average 14S machine. First cost is moderate; operating savings are real. We can prove it.

[Get Specifications and Prices on this and famous SPEED-KING end discharge 7S—other Non-Tilters up to 28 ft. Tilters 3½ to 14S—PUMPS—TOWERS.]



90 in. WIDE SKIP can be furnished for charging from truck bodies.



DIRECT MOTOR DRIVE, Batch Hopper, Track Loader, Skids or Wheels.

### CARRIED IN STOCK BY


Edward R. Bacon Co., San Francisco  
Smith Booth Usher Co., Los Angeles  
The C. H. Jones Co., Salt Lake City  
Clyde Equipment Co., Portland—Seattle  
General Machinery Co., Spokane

JAEGER STOCKS AND SERVICE AVAILABLE IN OVER 100 CITIES OF U. S.

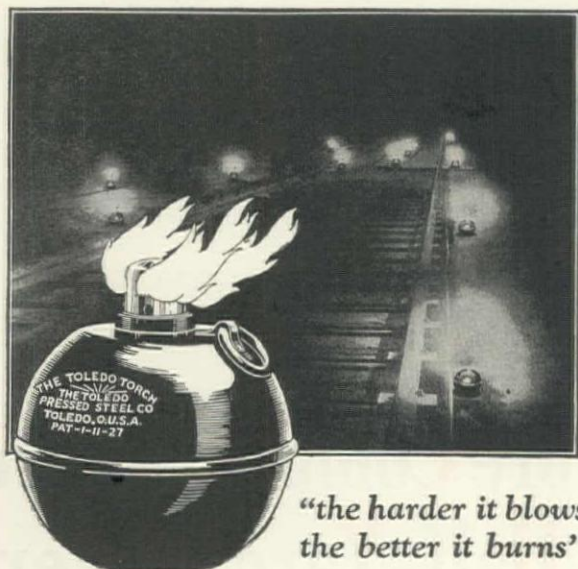
IN SAN FRANCISCO  
IT'S  
BACON



# you don't need a watchman

- to prevent theft of safety lights
- to replace broken globes 
- to keep globes clear

# when you use Toledo Torches



*"the harder it blows  
the better it burns"*

## THE *Economy Burner*

completely solves the problems of excessive oil and wick consumption. No other safety light combines such rugged durability with such unfailing performance in all kinds of weather.

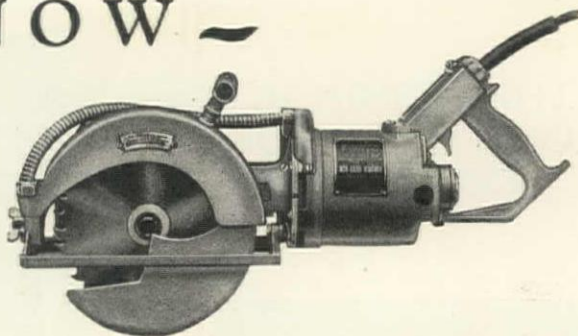
**THE  
Toledo Pressed Steel Co.**

TOLEDO :: OHIO

DISTRIBUTED BY

EDW. R. BACON Co.	San Francisco, Calif.
THE BROWN-BEVIS Co.	Los Angeles, Calif.
CONCRETE MCHY. & SUPP. Co.	Los Angeles
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LUND & Co.	Salt Lake City, Utah
PAUL FITZGERALD	Denver, Colo.

# NOW



You can cut wood, vitritile, concrete brick, cinder block, marble, stone, etc., the

## SUPER PORTO SAW way

which does it cheap, fast and easy. The moment you get your hands on a SUPER PORTO SAW you will feel the difference.

When you see it work—when its features prove themselves on the job—when your SUPER PORTO SAW goes through work that would stop an ordinary electric hand saw—then you will realize why users wouldn't trade one SUPER PORTO SAW for three of the old-fashioned kind.

Every 30 working days SUPER PORTO SAW pays back its cost in money saved.

Insist upon a demonstration of SUPER PORTO SAW. Will not cost you anything—may save you a whole lot.

*Write for descriptive catalogue*

### WESTERN DISTRIBUTORS:

**EDW. R. BACON CO.**

Folsom at 17th Street  
SAN FRANCISCO, CALIF.

**ELECTRICAL SPECIALTY CO.**

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LOS ANGELES, CALIF.

**SMITH BOOTH USHER CO.**

228 Central Avenue  
LOS ANGELES, CALIF.

**C. W. CROCKETT, JR.**

328 Skinner Building  
SEATTLE, WASH.



IT'S  
BACON  
IN SAN FRANCISCO

# the POWER OPERATOR

A new element  
in Paver speed

*coordinates  
every factor  
on the job*



The MultiFoote Power Operator clips off the seconds lost in manual operation eliminating that loss of co-ordination that makes the mechanical mixing cycle impractical.

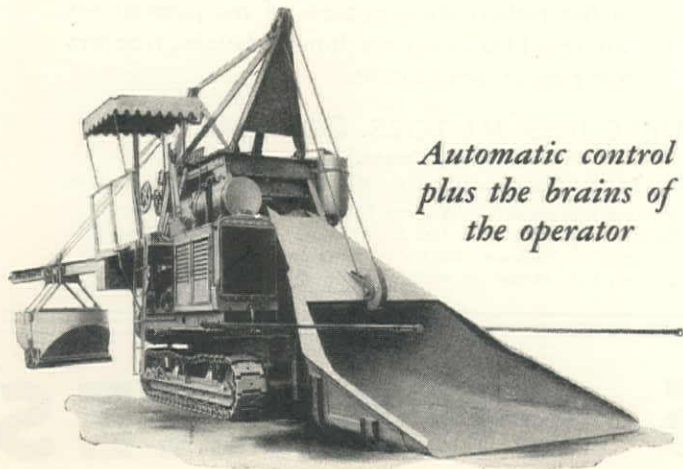
Write the nearest general agent.

**Smith Booth Usher Co.**  
1910 Santa Fe Avenue  
LOS ANGELES

**Edward R. Bacon Company**  
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SAN FRANCISCO  
FRESNO SACRAMENTO OAKLAND

**THE FOOTE COMPANY, Inc.**  
of NUNDA, N. Y.

*World's largest exclusive builders  
of road pavers*



*Automatic control  
plus the brains of  
the operator*

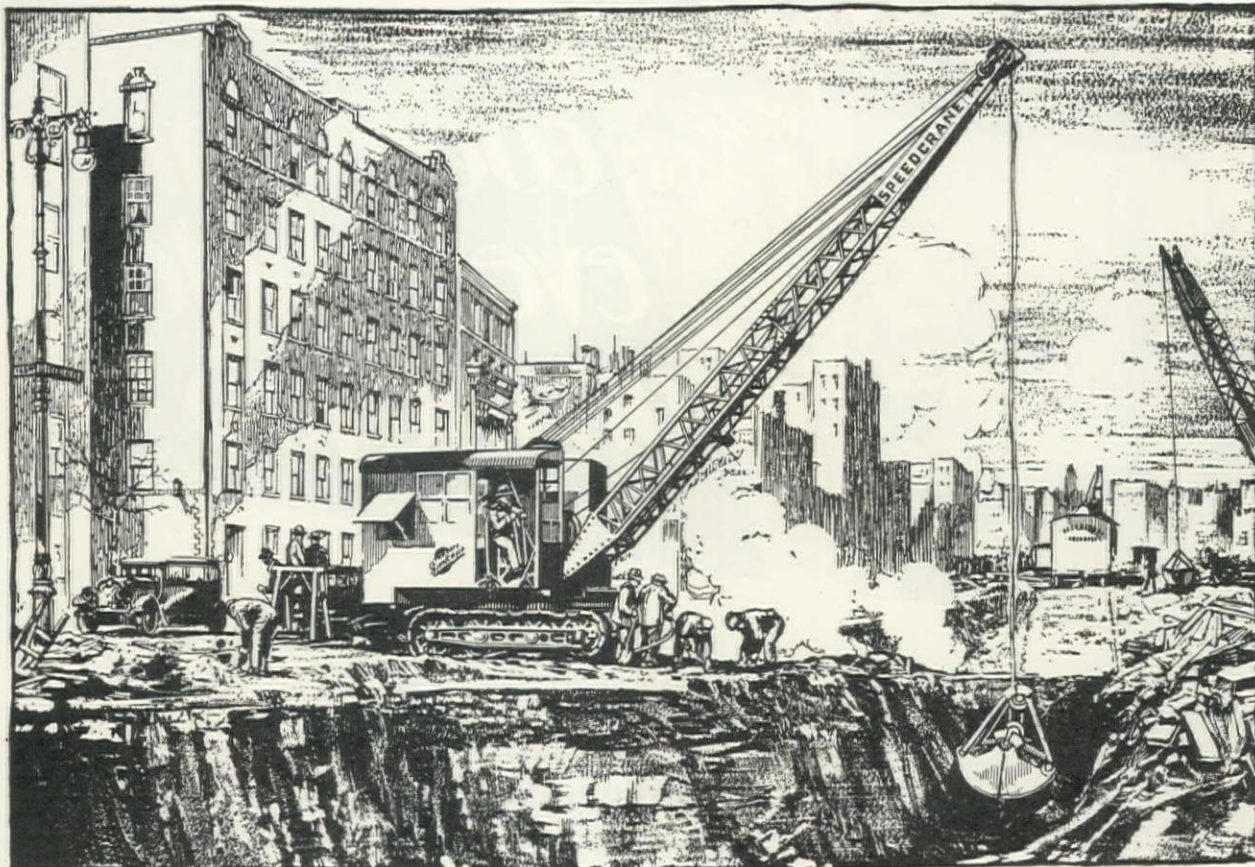
**See the 1929**

**MULTIFOOTE**  
*The Paver with Timken Bearings*

IN SAN FRANCISCO  
IT'S  
BACON



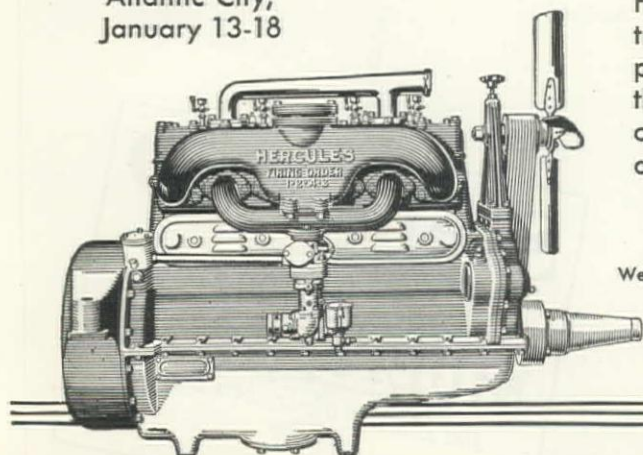
# Working Both Day and Night to Dig New York's New Subway



Hercules will exhibit  
at the 1930 A.R.B.A.  
ROAD SHOW  
Atlantic City,  
January 13-18

Three Moore Speedcranes, sturdily powered by Hercules Heavy-Duty Engines, worked continuously—often on double shifts—during the eight months required to dig the New York Concourse subway between 160th and 175th Streets. Throughout this entire job there was not a five-minute delay—a characteristic example of Hercules reliability.

For excavation work and other heavy-duty contracting jobs, Hercules Engines can always be depended upon. Flexible, powerful and economical, they are the outstanding choice of manufacturers of shovels, road building machinery, trucks, tractors and other power equipment.



## HERCULES MOTORS CORPORATION

General Offices: Canton, Ohio, U. S. A.

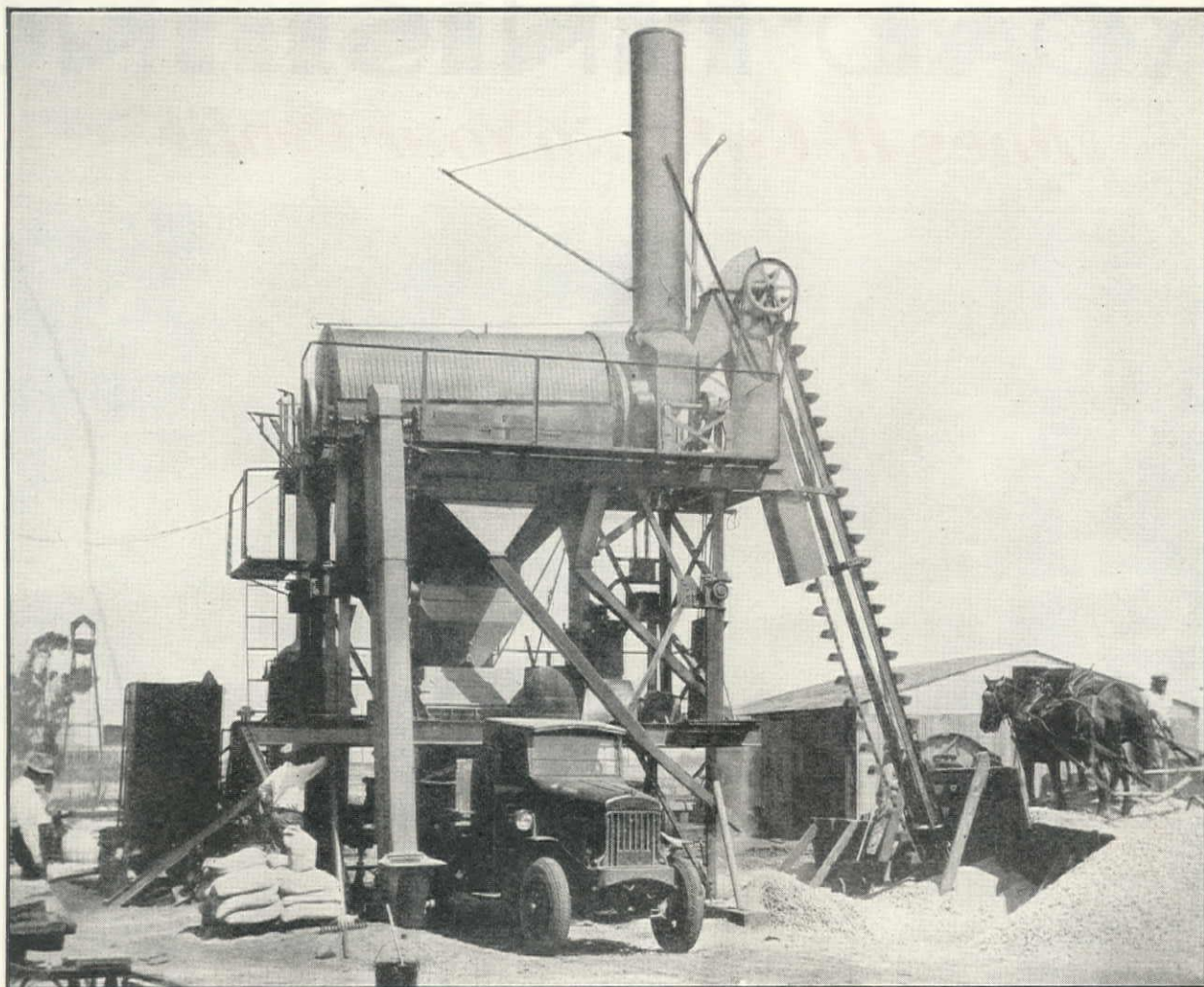
West Coast Branch: Los Angeles, Calif. Mid-Continent Branch: Tulsa, Okla.

Western Representatives: Edward R. Bacon Co., San Francisco, Calif.; Smith Booth Usher Co., Los Angeles, Calif.; General Machinery Co., Spokane, Wash.; H. W. Moore Equipment Co., Denver, Col.; Nickerson Machinery Co., Salt Lake City, Utah

# HERCULES ENGINES



IT'S  
BACON  
IN SAN FRANCISCO



**N**INETEEN years' paving plant experience and eighteen months' intensive development work have gone into this 1000-pound 2-unit Mobile Asphalt Paving Plant.

In it are combined low production costs, low investment and labor overhead, ample output and complete portability. It permits competitive bidding on a profitable basis.

New but thoroughly tested in actual service . . . regarded by competent engineers and road-builders as the most efficient portable plant ever produced.



### May We Send This Folder?

**A** COMPLETE folder descriptive of the new plant now is on the press. It gives full details, specifications, production records. It will be mailed promptly to all who are interested. Send in your name today.

## NOW... a 2-unit, 1000-Pound MOBILE MADSEN PAVING PLANT

**C**OMpletely portable . . . handles 1000-pound batches in  $1\frac{1}{4}$  minutes, 200 tons per 8 hours, which can be increased to 1500 pounds per batch by weighing off twice to the mix.

Complete discharge in 6 to 7 seconds . . . electric motor or oil or gas engine drive . . . (50-hp. electric motor standard equipment).

Self-contained elevator assembly, transportable as whole or in two parts . . . separate trailer unit on which are mounted 25-hp. steam boiler, 10-ton capacity steam-heated asphalt tank . . . 200-gallon water and 400-gallon fuel tanks . . . asphalt, fuel and boiler feed pumps.

## MADSEN IRON WORKS

Madsen Paving Equipment for Every Paving Purpose

**EDWARD R. BACON CO.**

*Distributors*

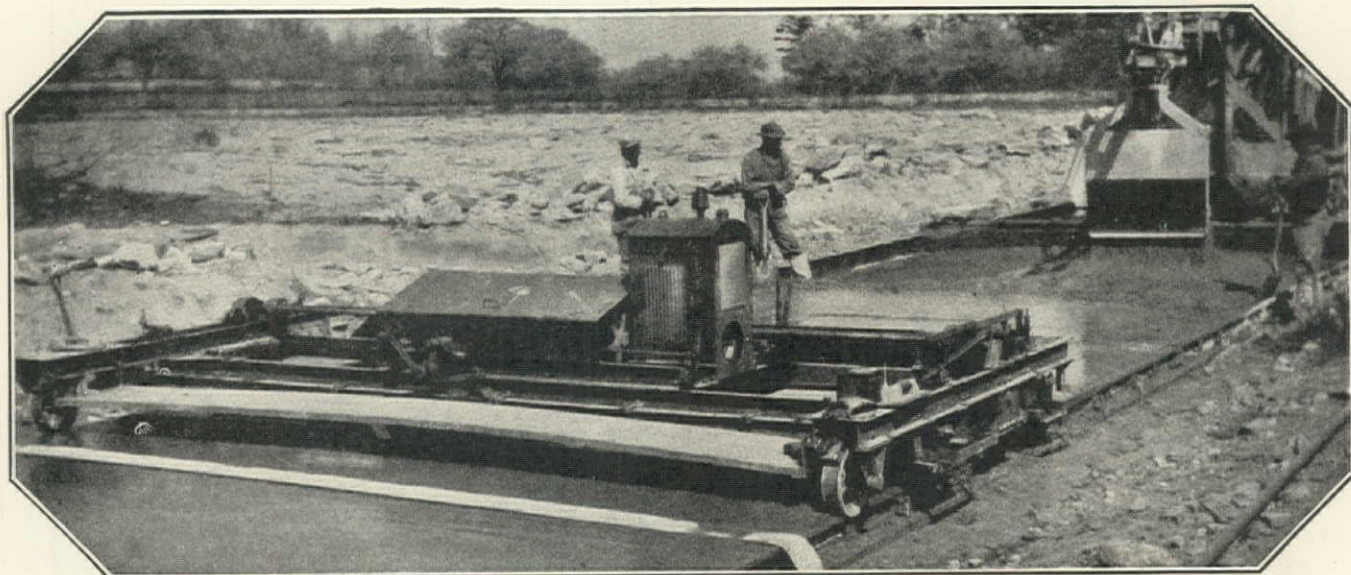
Folsom at 17th Street, San Francisco, California

IT'S  
BACON  
IN SAN FRANCISCO



# ROAD FINISHING

*Does It Cut Into Your Profit?*



**W**HEN the finishing lags, all other operations, from loading at the supply base to mixing and pouring on the grade, are almost certain to follow suit. Time and labor costs increase, your profit margin is lowered, and your vision of a well-bid job starts to fade.

Take time to investigate the **ORD Road Finishing Machine** now and save time on the job.

The ORD will keep up with and finish the

maximum output of any mixer—this, in turn, hustling up most of the other operations. And you'll find, the same as all other users of the ORD, that the quality and uniformity of the finished concrete are far better than with hand screeding and invariably gain the prompt approval of the highway engineer.

Right now is a good time to get acquainted with the many features of the ORD. Write for our new bulletin.

## A. W. FRENCH & COMPANY

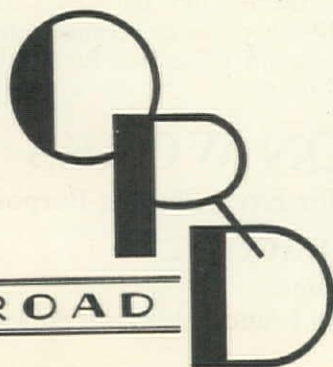
*Division of Blaw-Knox Co.*

**Manufacturers of the ORD Road Finishing Machine**

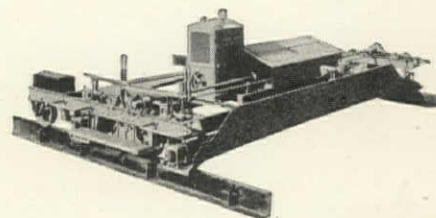
**Sales Dept. 122 S. Michigan Ave., Chicago, Ill.**

SMITH BOOTH USHER CO.  
1910 Santa Fe Avenue, Los Angeles

EDWARD R. BACON CO.  
Folsom at 17th Street, San Francisco



The ORD is the only double sliding screed finisher. Works equally well on level straight-away, curves and grades, city streets and country highways. Can be adjusted for various road widths and withstands the hardest kind of service.



ROAD

FINISHING MACHINE



NOVEMBER 25, 1929

WESTERN CONSTRUCTION NEWS

33

### A Mouthful At Every Bite

... With a habit of cleaning up the Job  
Faster output, and thorough results—  
that's typical of the Type "S" Owen  
Rehandling Bucket. On the job it  
demonstrates the Owen Guarantee in  
record time—"A Bigger Day's Work  
than any other Bucket of the same  
weight and capacity." Nothing left  
for the usual clean-up after the Type  
"S" finishes. That's why it's such a  
money saver on barges and cars. Write  
for a Type "S" Folder and read more  
about how this bucket eats up the job.

#### THE OWEN BUCKET COMPANY

6018 Breakwater Avenue  
Cleveland, Ohio

R. E. Slick, Oakland, Calif.  
Brown-Berls Co., Los Angeles, Calif.  
Balzer Machinery Co., Portland, Ore.  
H. J. Armstrong Co., Seattle, Wash.



# Owen Buckets



NOVEMBER 25, 1929

WESTERN CONSTRUCTION NEWS

34



MONTECITO  
COUNTY WATER DISTRICT  
SANTA BARBARA, CALIFORNIA

August 20, 1929

The Fate-Root-Heath Co.,  
Plymouth, Ohio.

Dear Sirs:

The Montecito County Water District has purchased Five--Four Ton Plymouth Locomotives from you at different times and they are all in use at the present time on our construction work.

We are constructing two dams on the Santa Ynez river north of Carpinteria under rather unusual conditions as all supplies and material have to be transported through a two mile tunnel, down an incline, up a three mile railroad with a 6% grade and through another 1000 ft. tunnel to the work. Naturally under these conditions we are absolutely dependent on our transportation system.

We are very well pleased with the performance of the Plymouth Locomotives. We are hauling ten tons up a 6% grade and our hauling costs are very reasonable.

I feel that our choice of locomotives was a happy one and under similar conditions would specify Plymouth Locomotive again.

CW/as

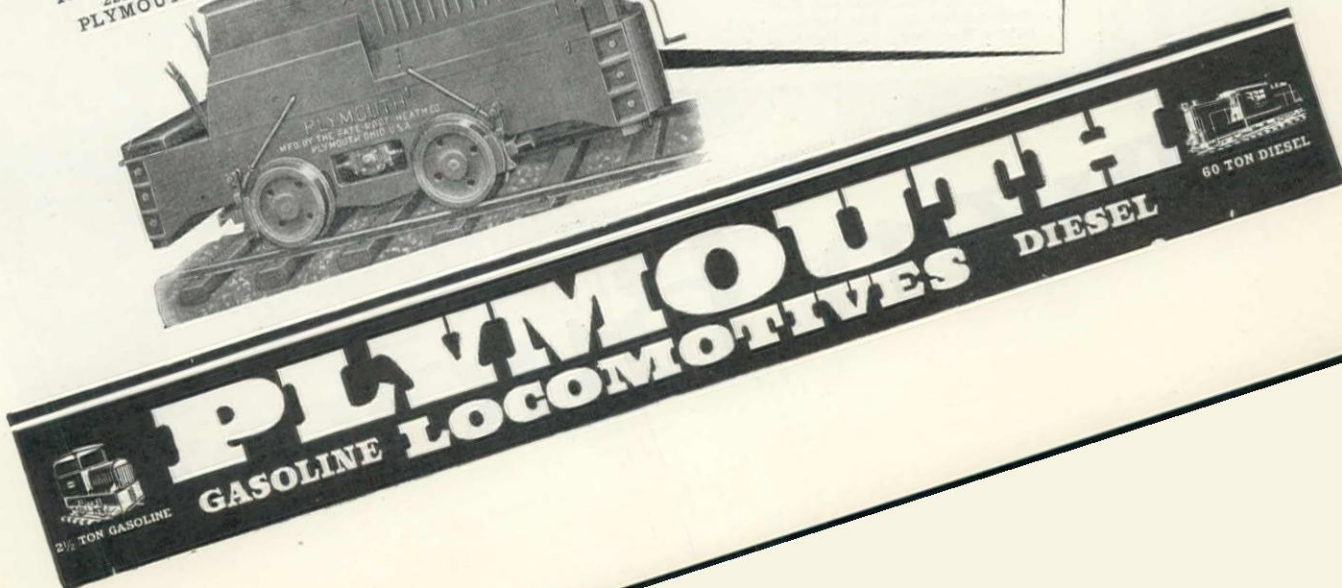
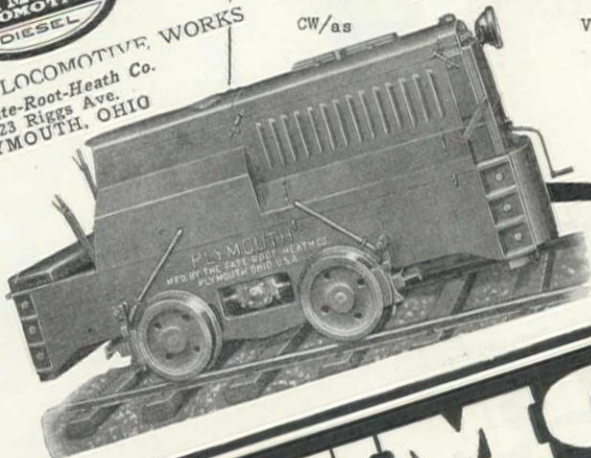
Very truly,

*Paul Hyatt*  
Resident Engineer.

*Everything*  
**DEPENDENT UPON**  
**TRANSPORTATION**  
*so they ordered*  
**PLYMOUTH**

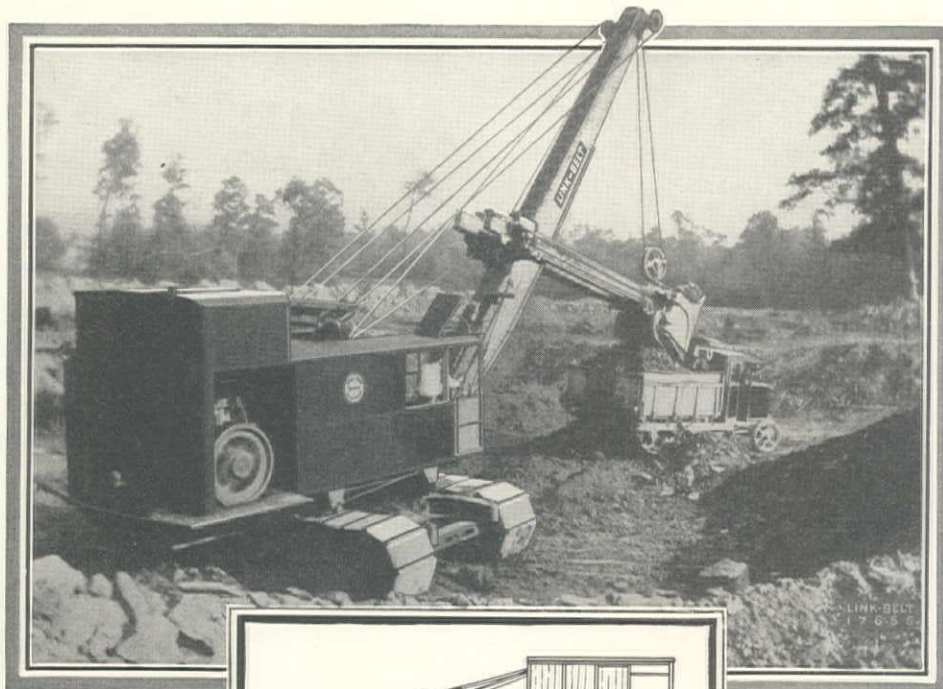


PLYMOUTH LOCOMOTIVE WORKS  
The Fate-Root-Heath Co.  
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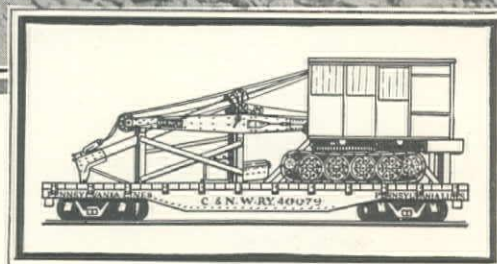




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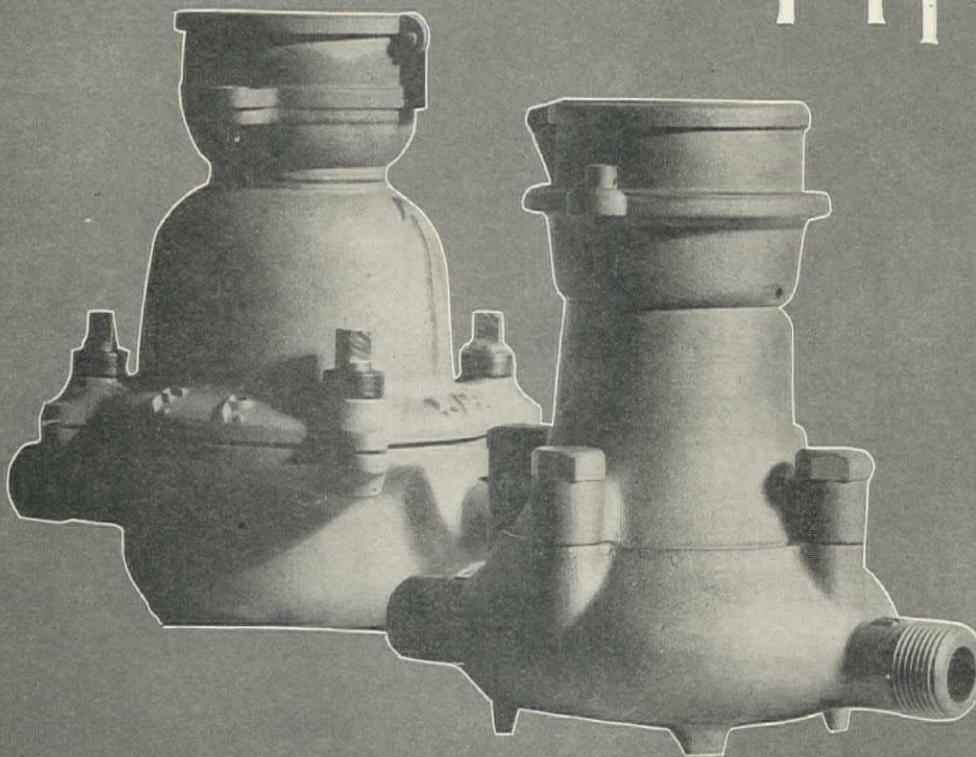
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VOLUME IV

NOVEMBER 25, 1929

NUMBER 22

In this issue, A. H. Benedict describes the precautions in erecting through continuous, truss type, steel spans for the Springfield highway bridge over the

## Precautions in Erecting Steel Spans for Highway Bridges

Willamette river, Oregon. The center span of this bridge is 198 ft. long and each side span is 176 ft. 7 in. long, a fixed bearing shoe being designed for the west intermediate pier and roller shoes for the other three piers.

Some interesting applications of structural theory were possible in this construction. It was necessary to compute the bearing shoe elevations at the end of the steel spans in order to closely secure the desired reaction values. Thus, the correct distribution of stresses in the continuous truss for a given condition of loading was insured. The spans at the end pier were then jacked to the desired reaction and grouted in place. Shoes for the center piers were set to elevations shown on the camber diagram and grouted in place.

Deflections at the ends of the bridge averaged  $\frac{7}{8}$ -in. less than those computed, but in the first computations the effect of stringers in taking stress from the lower chords was disregarded. By recalculation, in which the outside stringers were assumed to take some stress, the theoretical deflection was decreased to within  $\frac{1}{8}$ -in. of the actual deflection, and the difference between assumed and actual elevations at the ends of the bridge was absorbed when the approach spans were constructed.

For nearly a year the engineers and officials of the Great Northern and Western Pacific Railway systems have been gathering statistics and local approval to support their application for permission

**G.N.-W.P.** to build 200 miles of connecting line  
**vs** between Klamath Falls, Oregon, and  
**S.P.** Keddie, California, and thus give Northern California and the San Francisco bay region primarily, another trans-continental outlet.

For many years the Southern Pacific, together with the Union Pacific, dominated California. Then the Santa Fe reached Richmond from Los Angeles, and later the Western Pacific fought its way from Denver to Oakland and San Jose. More recently the Great Northern extended its branch south from Bend to Klamath Falls. In the meantime, the Southern Pa-

cific has opposed each of these moves on the basis of 'wasteful duplication'.

Finally, the Great Northern and Western Pacific joined hands and applied to the Interstate Commerce Commission on February 14, 1929, for permission to build the 200-mile, Klamath Falls-Keddie line to connect the two systems. The 'battle of the railroad giants' before a special hearing of the Interstate Commerce Commission in San Francisco has been going on for two weeks.

The State Railroad Commission of California has ruled in favor of this connection and practically every Chamber of Commerce and civic organization in Northern California has endorsed it. With this strong support, it seems more than probable that the Interstate Commerce Commission will sanction the connection.

In the meantime, the Western Pacific has an application pending before the State Railroad Commission for permission to build from San Francisco south to Redwood City (25 miles) and by bridge across San Francisco Bay to Niles and a junction with its main line; and also an application to extend its branch from Stockton south through the San Joaquin valley.

The construction of these lines would not only assist in bringing prosperity to Northern California, but would add \$30,000,000 to \$40,000,000 to the 1930 construction program of the far west.

The Calaveras flood control dam for the protection of Stockton, California—described elsewhere in this issue—is to our knowledge the first dam of its type to be constructed. It is a variable-radius

**New Type of Dam** arch with a decided overhang downstream at the center and upstream at the abutments—the unique feature—combined with gravity-section abutments and a gravity wall. This dam presents some interesting problems in structural mathematics and should be of particular interest to those who specialize in the design and construction of dams. We expect to publish a detailed description of the design features in a later issue, as this is the first dam in California to come under the new state regulation requiring that all dams be approved by the state engineer.

It is well to note that the Calaveras dam was originally designed in 1925 and bonds voted for the project in that year, but construction was held up by land-owner litigation until 1929.



# Shell Building, San Francisco

## Construction of 29-Story Office Building at Bush and Battery Streets

By A. GILBERT DARWIN

P. J. Walker Co., managers of construction, are engaged on a large office building for the Shell Oil Co. at Bush and Battery st., San Francisco. From



Fig. 1. Erecting Structural Steel Frame for Shell Bdg. November, 1929. Architectural Perspective of Building Shown on Sign at Corner of Bush and Battery St.

the street level at the Bush and Battery corner, the building will be 381 ft. high to the parapet and 397 ft. 3 in. to the base of the flagpole. It covers an area 137 ft. square, less 20 by 80 ft. for 10 floors, above which is a tower 88 ft. square, and will cost in excess of \$3,000,000. Construction began June 10, 1929, with a schedule of 11 months for completion. Caissons were finished September 17 and the remainder of the foundation was in place September 30. By November 15, twenty stories of the steel frame had been erected.

There will be 29 floors above and 2 below street level. Part of the ground floor will be occupied by shops. The remainder of the ground floor, portions of the sub-basement and basement, all of the mezzanine and the court roof, will be reserved for garage space. Six of the latest type electric main passenger elevators, one garage passenger elevator, and two automobile elevators will be installed.

George W. Kelham is the architect for the Shell building, with H. A. Thomsen, Jr., assistant architect, and W. G. Pigeon design chief. Henry J. Brunnier is the structural engineer, and H. C. Powers is assistant engineer. G. E. Greenwood is general superintendent, and A. M. Croxson is job superintendent for P. J. Walker Co. Hunter & Hudson are engineers for the mechanical and electrical equipment. H. H. Anderson is general representative for the Shell Oil Co. on the work.

**Design**—The structural design follows the requirements of the San Francisco building ordinance. The



FIG. 2. PREPARING FOUNDATION ON AUGUST 10, 1929. EXCAVATION IN PROGRESS IN LEFT FOREGROUND, SHELL SECTIONS FOR CAISSON BEING STORED NEAR HOLE. TRUCKING INCLINE IS IN RIGHT BACKGROUND



design live loads include: garage—100 lb. per sq.ft.; first floor—125 lb. per sq.ft.; office floors—40 lb. per sq.ft. with 20% reduction to beams and 40% reduction to columns. Loads for partitions were allowed for on the basis of a possible maximum, the load per sq.ft. varying from 20 to 40 lb. The design wind load is 25 lb. per sq.ft., which is equivalent to a lateral force of  $1\frac{3}{4}\%$  gravity. The combined dead, live, and wind load stresses do not exceed the permissible dead and live load stresses by more than one-third. The masonry walls are carried by the steel frame and are not considered in the design as resistance to the above

tery and Bush st., spaced 7.0 ft. apart and 3.0 ft. out from the curb. Shoring posts 12 by 12-in., were dropped into these wells, the casings pulled, and sand tamped around the timbers. As the excavation was carried down, lagging was put in place back of the vertical shoring posts. The posts in turn were shored by timbers and jacks against heavy wood pads supported by the side walls of pits specially dug for the purpose. The shoring was arranged so as to miss column centers, thus permitting caissons to be constructed and steel columns erected without the necessity for changing shores.

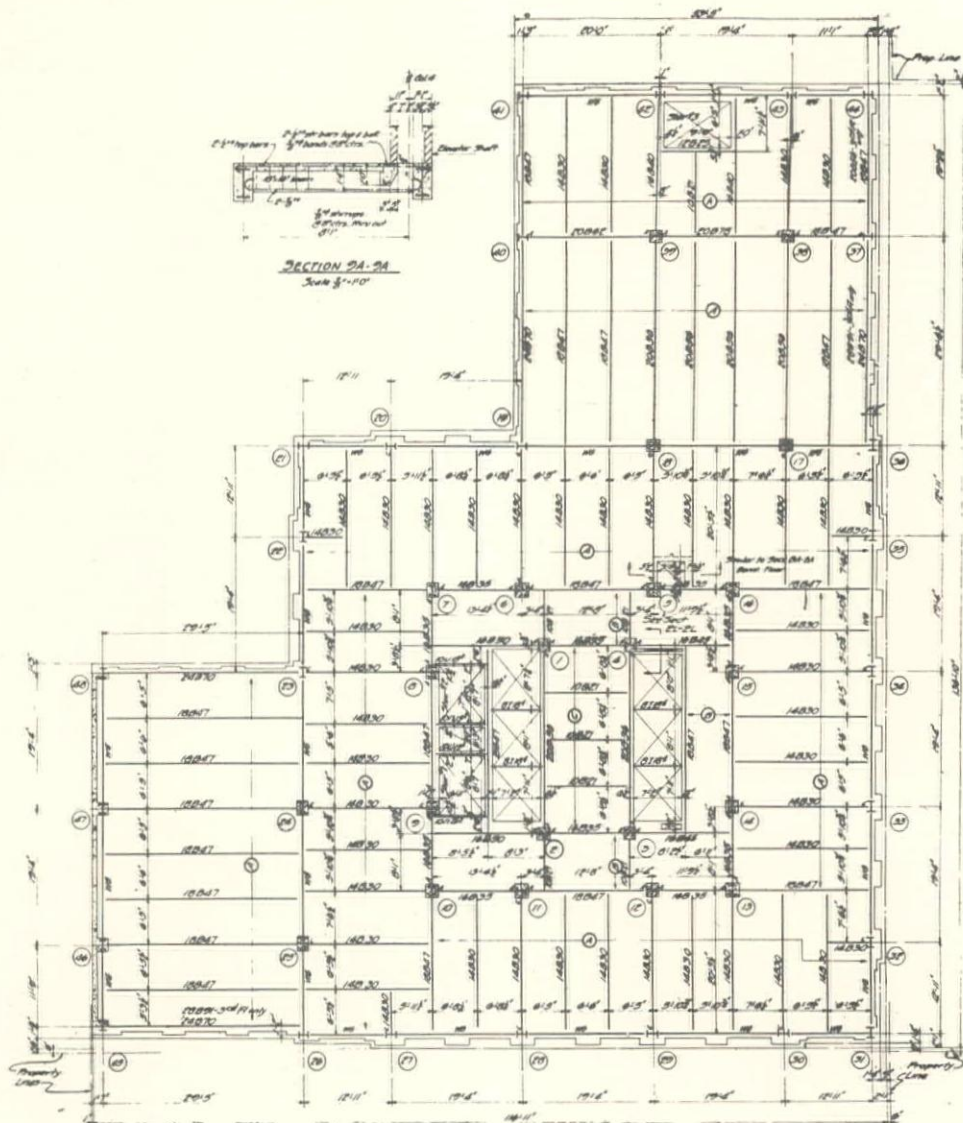


FIG. 3. TYPICAL FLOOR FRAMING PLAN FOR THIRD TO TENTH FLOORS OF SHELL BLDG. TOWER WILL BE 88 FT. SQUARE

lateral forces. The foundations are designed to support the total weight of the building, including sub-basement floor, and a bearing value of 7 tons per sq.ft. is used at the bottom of the caissons.

The basement excavation was carried to a uniform depth of 28 ft. below street level at the low corner (Bush and Battery st.) or to elev. -23 ft., city datum. The finished sub-basement elevation is -20½ ft., city datum.

After former buildings on the site had been wrecked and before basement excavation was started, a row of 16 in. diam. well holes from 33 to 48 ft. deep, was sunk by three keystone drilling machines along Bat-

Adjacent buildings were underpinned with 16 to 18-in. steel shell caissons (straight-sided), forced down by jacks, excavated with well-boring equipment, and filled with concrete. After the concrete had set and before final keying was done, a 50-ton pressure was applied. Some 32-in. caissons were required under the Heineman building adjoining the property. D. J. and T. Sullivan had charge of the underpinning and shoring for the individual owners.

Foundation Studies—Test borings were made with a well rig, using a 12-in. steel casing for the upper section to seal off the surface water, and a 7-in. main core section. One boring was carried to rock at elev.



-200 ft. The borings were of limited value because taken wet, but they indicated a loose fine sand to an average depth of -16 ft. and blue mud and shells from this elevation to -30 ft. Underlying this and to elev. -70 ft. was a very compact sand and sandy clay, interlaid with a hard sand and clay strata 2 ft. thick, having its top at elev. -45 ft.

A building of approximately 16 stories is the limit for pile foundations on account of the relation of load

which to excavate for the bells. By driving the steel shell at least 2 ft. into this clay strata a water seal was formed. Also, by taking water which accumulated from above back of the last shell, it was possible to excavate that shell and the bell and to place the lowest concrete in the dry.

**Caissons**—There were 66 open caissons extending from elev. -23 ft. to an average elev. of -82 ft., city datum, and spaced as in Fig. 4. These caissons were

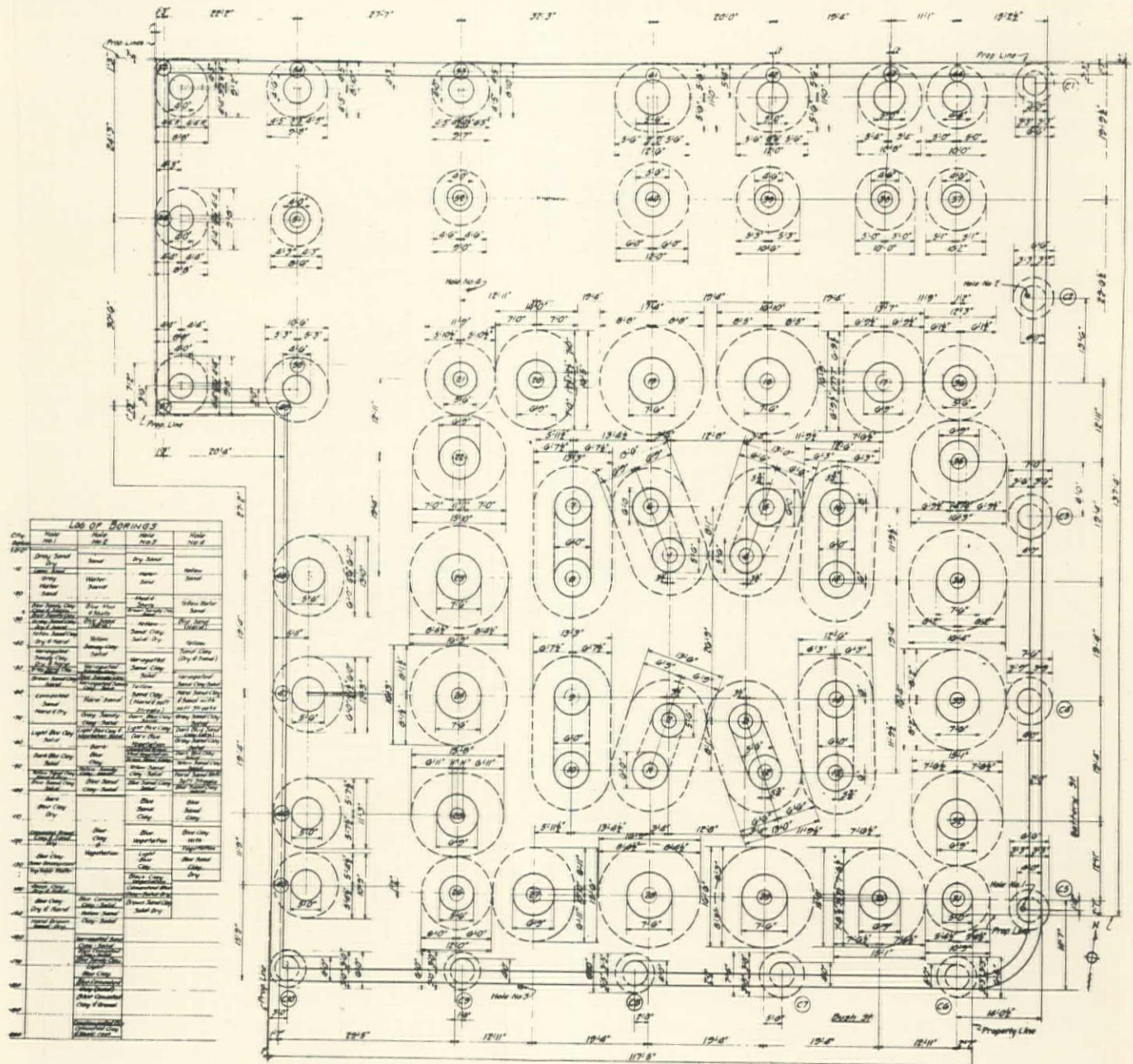


FIG. 4. CAISSON LOCATIONS, SHAFT AND BELL DIAMETERS, AND LOG OF BORINGS FOR SHELL BLDG. FOUNDATIONS

to area. Exposure of wood piling under adjoining buildings showed that such piles cannot be driven through a sandy soil without splitting and brooming. Caissons were selected for the Shell building foundation, the first job of this type done in the city.

The caissons were driven to a blue clay strata which the borings indicated to be at about elev. -70 ft. An analysis of the cored section of this clay showed only a 21% moisture content and indicated a good foundation as well as satisfactory material in

formed from cylindrical steel shells, 8 ft. long and  $\frac{1}{8}$ -in. thick, with varying diameters, depending on the position of the caisson beneath the building. The next to the lowest shell has the full effective diameter as shown in Fig. 5, and the lowest shell has this diameter less 9 in., thereby leaving room for a small pump on the outside of the last shell. The base of each caisson is a frustum of a cone, side slopes 1:2, resting in the blue clay. The bell diameters vary from 6 ft. to a maximum of 17 ft. 10 in., the maximum



height being 11 ft. 4 in. Typical shell sections are given in Fig. 5 and 6.

The Chicago method was used to excavate the upper part of some caissons. The sand was so hard that free shoveling was impossible, so air spades were employed. Muck was loaded by hand into stocking-shaped, top-dump buckets. These were hoisted by specially designed niggerhead-type winches, powered by 2-hp. electric motors. Seven niggerheads were used, one being rigged over each hole. The buckets were tripped by hand and dumped into skips. They were automatically righted and latched as soon as relieved of their load.

Considerable water was encountered and pumps were kept going all the time during excavation. Otherwise, as much as 15 ft. of water would rise in the holes in 4 or 5 hours. In some cases sand was loosened by water and then sloughed into the holes. Where the sloughing of material opened voids adjacent to the caisson, openings were burned through the shell with acetylene torches and concrete then deposited into the voids. A few voids were filled by flowing the concrete out at the caisson joints.

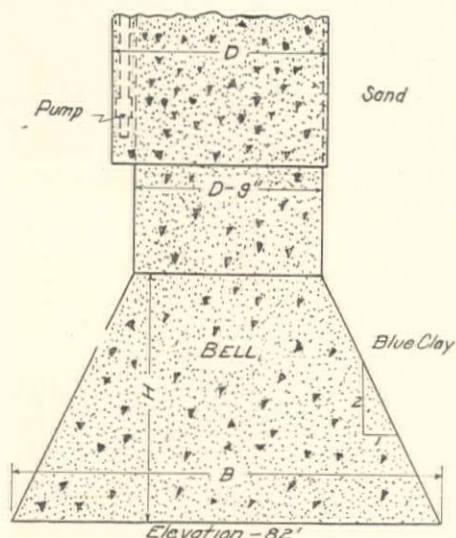


Fig. 5. Typical Section Showing Dimensions of Caisson Bell and Arrangement of Pump for Unwatering Hole

The shells were driven with air hammers. All cylinders were left in the ground as this was cheaper than to remove them against skin friction and also because it expedited the work.

Material was collected from the caissons and other excavation by two stiff-leg bull-wheel derricks, powered by American steam hoists. The muck was placed in skips and moved to the base of a ramp on the Battery st. side, where it was dumped and piled. Here it was picked up by a 1-yd. clamshell and loaded into trucks. The area close to the base of the ramp was excavated directly by clamshell. Loaded trucks were assisted up the incline by a cable from a steam hoist on the street level. This cable was also attached as a precaution while backing empty trucks down the steep incline. Caisson excavation was carried on continuously in three 8-hour shifts. So much material was removed by the continuous working on caissons that it required 8 hours for the trucks to remove one day's accumulation of material.

**Concreting the Foundation**—Two grades of ready-

mixed concrete were used in the foundation, the caissons taking 2000-lb. concrete, 1:5 mix, with extra cement below the water line. On account of limited space, only one mixer or tower might have been erected at the site but with ready-mixed concrete deliveries were made on either of two streets. The concrete was then chuted close to the caissons and finally deposited by tremie or by a 2-yd. bottom-dump

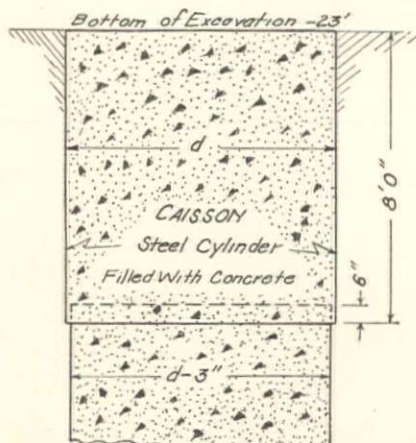


Fig. 6. Top and Second Sections of Typical Caisson

bucket. On account of the depth, it was found after some experimentation that better concrete could be obtained by using a bottom-dump bucket rather than a tremie. In placing the concrete in the lower section of the caisson where the conditions were dry, concrete was dropped from the bucket at an elevation of about 12 to 15 ft., but as soon as the concrete reached the

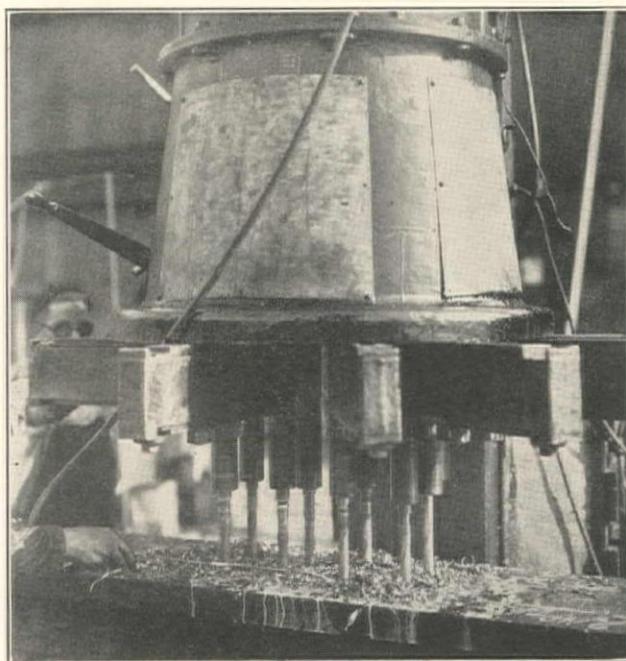


Fig. 7. Multiple Drills in Moore Dry Dock Co. Shop, Oakland, September 12, 1929, Boring Through 4-in. Metal on Column for Shell Bdg. Drills Move at Rate of 2 Minutes Per Hole

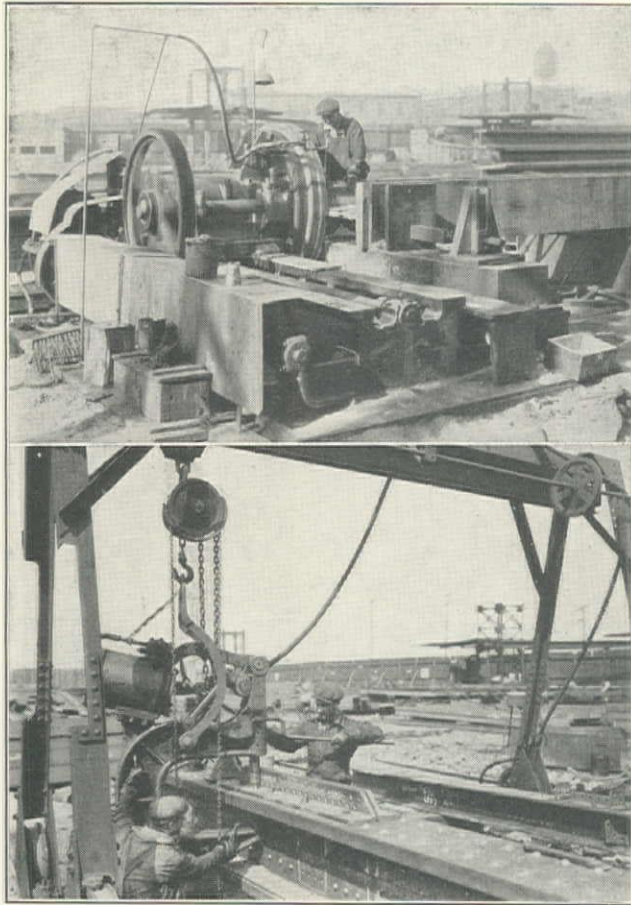
top of the lower shell and the pump was removed, the bucket was always dropped into the previously deposited material before it was tripped. This carried the water up to the surface of the concrete previously placed and avoided washing out of the cement.

Each caisson was filled in a continuous operation, from 1½ to 2½ hours being required. The head due



to the length of caissons served to compact the material. Considerable chemical heat was generated in the mass and the concrete set rapidly. This heat was especially noticeable during the early hardening period and, where two caissons came close together, inconvenienced the workmen. When the distance between caissons was such that the bells overlapped, one caisson was filled and the concrete allowed to set before any material was deposited in the second caisson.

With ready-mixed concrete a total of 480 cu.yd. was



(Upper) Facing Column with 48-in. Facing Machine in Moore Dry Dock Co. Shop. (Lower) Bull Riveting Fittings on Column for Shell Bldg.

placed in one 8-hour shift, an average of 60 cu.yd. per hour. There was 4221 cu.yd. of concrete used below the water level in the caissons, 796 cu.yd. above the water level, and 896 cu.yd. in the pressure slab system. Much of the concrete was placed at night since lighter traffic permitted the mixer trucks to reach the site with less loss of time.

**Structural steel erection** was begun September 16 by the Moore Dry Dock Co., of Oakland, contractors on fabrication and erection. Shop views of steel fabrication are shown in Fig. 7 and 8. There are 4500 tons of structural steel in the frame. Two stiff-leg derricks are used in erecting the structural frame and two tubular frame multi-compartment temporary elevator installations have been made to facilitate work subsequent to steel erection.

**Terra Cotta and Finishing**—N. Clark & Sons, of west Alameda, will furnish the 2100 tons of exterior terra cotta and the 60,000 face brick for the Shell building. Exterior granite was furnished and set by the McGil-

vray-Raymond Corp. Other specialty contracts have been made as follows: Roofing—J. W. Bender; exterior double hung windows and hollow and sheet metal work—Forderer Cornice Works; exterior steel sash—U. S. Metal Products Co.; ornamental iron work—California Artistic Metal and Wire Co.; metal lath and fur—National Lathing Co.; pneumatic tube systems—The Lamson Co.; mill work—Pacific Manufacturing Co.; auto turntables—C. Jorgenson & Co.; glass and glazing—W. P. Fuller & Co.; portable partitions—Weber Showcase & Fixture Co.; and rolled steel doors—Gunn, Carle & Co. Three force account contracts have been let, as follows: Electric wiring—Langlais Electric Construction Co.; plumbing and drainage—the Turner Co.; heating and ventilating—James A. Nelson Co.

Fig. 5 and 6 courtesy 'California Engineer'.

### Synthetic Zeolite Plant

A plant has recently been constructed on the Yuma mesa to manufacture, by solar dehydration, synthetic zeolite for water softening. The plant is owned by the Arizona Minerals Corp., of Yuma, and its patented product is known as 'Arizona'. By solar dehydration, the cost of manufacture is from one-third to one-half less than at middle west or eastern plants using artificial dehydration.

The synthetic zeolite, composed of sodium aluminate and sodium silicate, has four times the capacity of native zeolite as a water softener. Sand from the desert dunes some 15 miles west of Yuma is adapted to the manufacture of sodium silicate and a 6 by 20-ft. reverberatory furnace has been installed at the plant for this purpose. Sodium aluminate will be purchased from outside sources.

The new plant has a capacity of 1,000,000 lb. per year. However, it is planned to soon enlarge the present plant to a capacity of 2,000,000 lb. per year. The plant includes a mixing tower, a system of underground pipe lines for conducting the solution to drying beds, and eleven concrete drying beds, each 11 by 300 ft. in plan. These beds are divided by separator boards into drying beds 5 by 10 ft. in size. The solutions of sodium aluminate and sodium silicate are distributed in the beds by a traveler which contains measuring tanks. These tanks mix the ingredients in solution and deposit the solution in each of the small beds. Here it immediately jells. Water is then evaporated out of the solution, 96 lb. of water being evaporated from each 100 lb. of solution. The residue is stamped by machinery into 2-in. cubes, which are further processed. The product leaves the plant in granular form and has the same appearance as rock salt.

### Expenses Not Chargeable to Capital

Consumers Gas Co., having applied to the California Railroad Commission for authority to issue and sell \$9000 of its common capital stock for the purpose of paying legal and engineering expenses of that amount, the Railroad Commission denied the application, holding that expenses of such a nature may not be included in the rate base.



# Paved Highway in Yosemite Valley

## Asphaltic Penetration Macadam on Valley Floor Roads—A Bureau of Public Roads Project in California

Prior to and including 1927, the traffic problem in Yosemite national park received the grave consideration of park officials. Although Yosemite park has an area of 1125 square miles, the greater part is a mountain wilderness, seldom visited. The majority of the tourists to the park, nearly 500,000 in 1928, see nothing but the valley and its surrounding cliffs. This is but a small part of the park, being ten or twelve miles long and from less than one-half mile to two miles wide. Since the tourists, most of whom visit the park during the summer season, must be accommodated in a small area, good transportation facilities are required.

Most of the traffic now entering Yosemite valley is via Merced and the new 'All-Year State Highway' to El Portal, the park entrance. When the present con-

floor roads, to be surfaced with asphaltic penetration macadam and intended to relieve the traffic problem, was made by the Bureau of Public Roads in the summer of 1926. In national parks there is always careful consideration of landscape features, so the new road followed the old quite closely in order to avoid marring additional areas. The design was on the basis of an 18-ft. asphaltic penetration macadam wearing surface placed on a 19-ft. crushed rock base course with 2-ft. crushed rock shoulders. The base course is 4½ in. thick, while the wearing surface is 2½ in. thick. The total length paved is 13.9 miles, including many loop and connecting roads around Yosemite village and Camp Curry.

**Construction**—Will Moreing, of Stockton, Califor-



Fig. 1. (Upper Left) Use of Harrow to Shake Down Filler to Bottom of Base Course on Asphaltic Penetration Macadam, Yosemite Valley Highway. (Upper Right) Brooming Screenings Into Voids and Rolling in One Operation. (Lower Left) Applying First Coat of Asphalt to Second Half of Road. (Lower Right) Bleeding Truck to Insure That All Sprays Are Clean Before Spreading Asphalt on Road. These Tar Paper Troughs Will Later Be Collected and Burned

struction on the Wawona south entrance road is completed, much of the traffic will enter from Fresno over this new road. Wawona road probably will not be completed until the latter part of 1930, and the major portion of traffic from the south will continue to use the Merced highway.

**Survey and Design**—The survey for the new valley

nia, submitted the low bid on December 28, 1926, for surfacing the project and on May 11, 1927, was awarded the contract by the secretary of the Interior. Moreing immediately began setting up a rock-crushing plant in the Government quarry near Pohono bridge on the El Portal road, and on May 17 began preparing the subgrade and placing header boards. By October



8, 1927, the weather was too cold to continue placing the top course, but laying and rolling of the base course was continued until this work was completed on November 10, when all work was suspended for the winter. Construction was resumed on April 16, 1928, and the project completed July 28, 1928.

Fig. 2 (upper) shows the 4½-in. base course ready for the 2½-in. wearing surface. In Fig. 2 (center) the first application of hot asphaltic cement has been made. This was applied at the rate of 1 to 1½ gal. per sq.yd. when the temperature was above 50°F. The appearance of the non-skid surface of the finished road is given in Fig. 2 (lower). To obtain the surface, a thin intermediate layer of crushed rock and from ¼ to ½

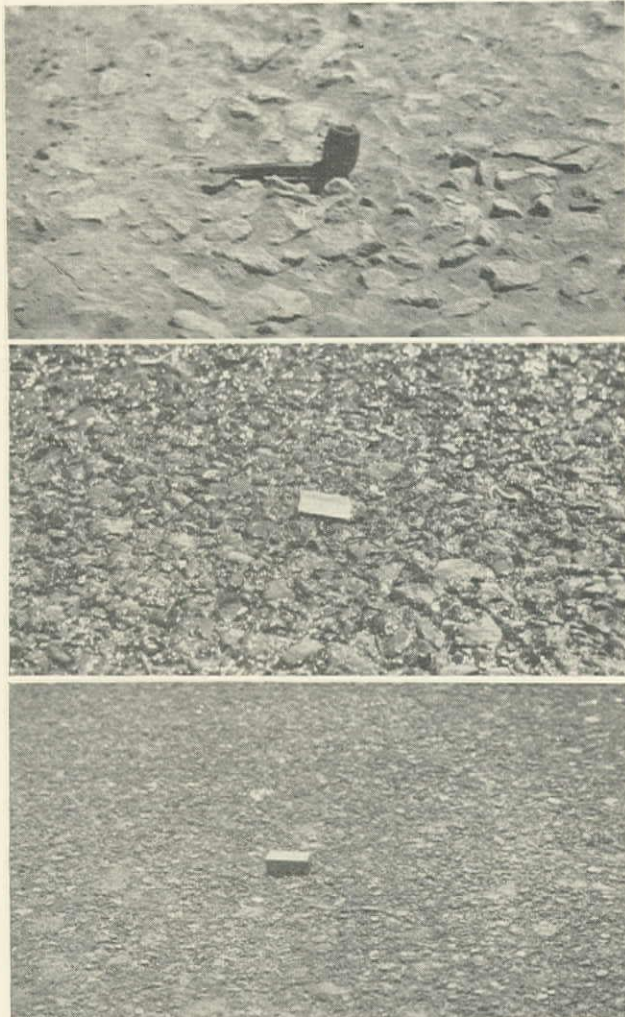


Fig. 2. Yosemite Paving. (Upper) Base Course Ready for Second Course Rock. (Center) Same Section of Roadway After First Application of Asphalt. (Lower) Non-Skid Surface of Finished Road

gal. per sq.yd. of oil were applied and rolled. In Fig. 1 (upper left) a harrow is being used to shake down the filler to the bottom of the compacted base course, rock screenings being used for filler. Fig. 1 (upper right) shows the method of brooming intermediate graded crushed rock into the surface voids and then rolling in one operation. The first coat of asphalt is applied to the second half of the roadway as in Fig. 1 (lower left). Before spreading oil on the road, the asphalt truck is bled to insure the clearing of all sprays. The bled asphalt (Fig. 1, lower right) is collected in tar paper troughs which are burned after the road is completed.

The major equipment used on the work follows: One 24 by 36-in. primary crusher, one No. 5 Tel-smith gyratory crusher, one No. 3 Allis-Chalmers gyratory crusher, one 3 by 10-ft. scalping screen, one 35 by 12-ft. grading screen, one Northwest 1-yd. gas shovel, two 3-yd. dump cars, one 75-hp. electric motor, one 10-hp. electric hoist, one oil distributor, three rollers, and dump trucks.

Major items of the contract work and prices follow:

Preparing subgrade, 13.873 miles at \$700.....	\$ 9,711
Crushed rock base course, 153,717 sq.yd. at 0.70 .....	107,602
Asphaltic macadam top, 145,651 sq.yd. at 0.55..	80,207
Applying asphaltic cement, 830,116 tons at \$33 ..	27,394
Crushed rock shoulders, 2166 cu.yd. at \$4.70....	10,180

Total amount earned under contract.....\$241,850

Total cost of contract to the Government

(including engineering) .....\$257,674

**Conclusions**—The new paved road has helped to solve the traffic problem of Yosemite valley. In the seasons of 1928 and 1929, park officials have experienced little traffic troubles. The trip to Yosemite valley is rendered more pleasant to tourists who wish to view its scenic wonders, unhampered by narrow, crowded, and dusty roads.

### RUSKIN POWER-HOUSE

Plans completed by Theo Kerner, architect, for the Ruskin power-house of the British Columbia Electric Railway Co. show a design which is declared to be without parallel.

As designed, the machinery will be completely hidden and the generator room will be safe for inspection by visitors to the plant. The initial dimensions of the generator room will be 62 by 168 ft., providing space for two large machines. Later the building will be enlarged to 62 by 270 ft. and space provided for housing two additional generators.

Besides the generator room, the main building will contain a control and service room, covering a ground space 56 ft. square, and three stories high. The power-house will be of structural steel frame and reinforced concrete. Some of the machinery will be installed before the concrete walls are raised. The generator room will be paved with quarry tile. The generator heads will be railed off and will protrude slightly above the floor level. All wiring will be covered, the main lines being carried beneath the corridor and up the walls to the roof, where the switching station will be installed. These wires will be readily accessible for inspection or adjustment, a means of approach being provided under the covered ways. Wires which pass through the side walls and thence to the roof will be handled, when necessary, by the removal of wall panels.

### Correction

Ben E. Torpen was erroneously reported on p. 599, November 10th issue, as the representative and chief engineer of Thebo, Starr & Anderton on a 45,000-hp. hydroelectric plant for Medellin, Colombia. This position is held by his brother, A. M. Torpen.



# Calaveras Flood Control Dam

*Plans Revised After Construction Begun—Job Now Above Possible Flood Waters*

By K. L. PARKER

*Superintendent, Bent Bros., Inc., Valley Springs, California*

The city of Stockton is constructing a flood control dam at the Jenny Lind site on Calaveras river 40 miles northeast of Stockton and  $3\frac{1}{2}$  miles south of Valley Springs, California. This dam will provide 163,000 acre-feet storage and should effectively protect Stockton against the flashy floods of the Calaveras river. The average annual rainfall on the watershed is 33 in., the minimum recorded annual runoff is 24,000 ac.ft. and the maximum 750,000 ac.ft. Floods are of

are to be incorporated in the dam. One 36-in. steel sluice pipe is installed at streambed elevation with a valve at its downstream end. Four openings, 4 ft. in diameter and plugged at the upstream end, are to be constructed at a higher level.

Although designed for flood control, some of the storage from the Calaveras dam may be controlled for irrigation in the Linden Irrigation District, which was formed October 3, comprising 12,000 acres of

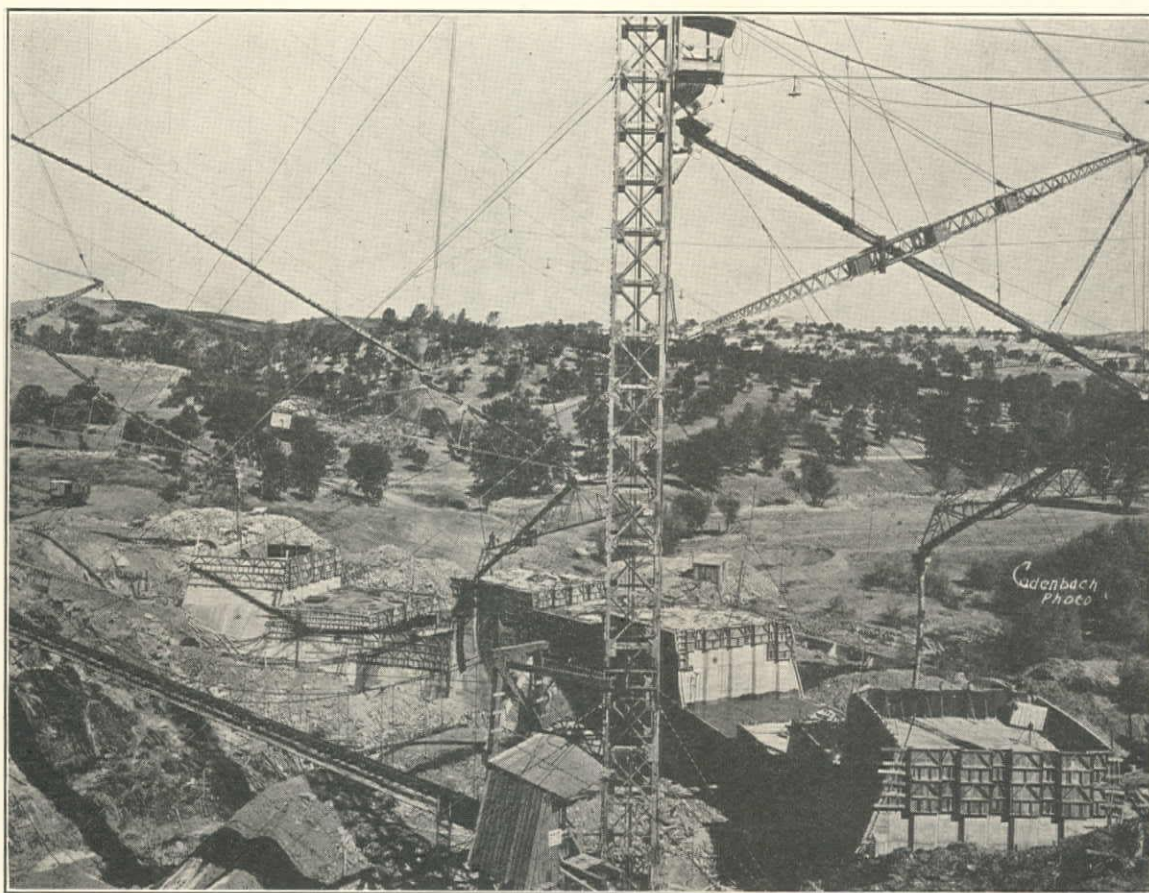


FIG 1. CALAVERAS DAM UNDER CONSTRUCTION OCTOBER 23, 1929. CONVEYOR BELT IN LEFT FOREGROUND CARRIED BY SUSPENSION BRIDGE INSTEAD OF CUSTOMARY FRAME TRESTLE

short duration, the maximum flood of record being 80,000 c.f.s. on January 30 and 31, 1911.

**Description**—The Calaveras flood control dam is a variable-radius arch structure with gravity section abutments and a gravity wall. It will be 160 ft. high above lowest bedrock, 1400 ft. long on the crest, 50 ft. thick at the base, and 7 ft. thick at the top. This dam has the unique features of a decided overhang downstream at the center and upstream at the abutments, as shown by the typical sections in Fig. 2.\* Seven uncontrolled openings, each  $5\frac{1}{2}$  ft. in diameter,

highly developed orchard land, if a suitable agreement can be made with the city of Stockton. Fred H. Tibbetts was appointed engineer for the district and has H. I. Wood, his assistant, making surveys.

The original plans, approved in 1925 by the state engineer, provided for a gravity dam, arched in plan, across the streambed, and a long, straight gravity wall at the north end of the arched section. Bonds for construction were voted in that year but landowner litigation held up the work until 1929, bids being opened on June 3.

**Contract**—The contract was awarded July 25, 1929,

\*The design of the Calaveras dam will be described in a later issue.



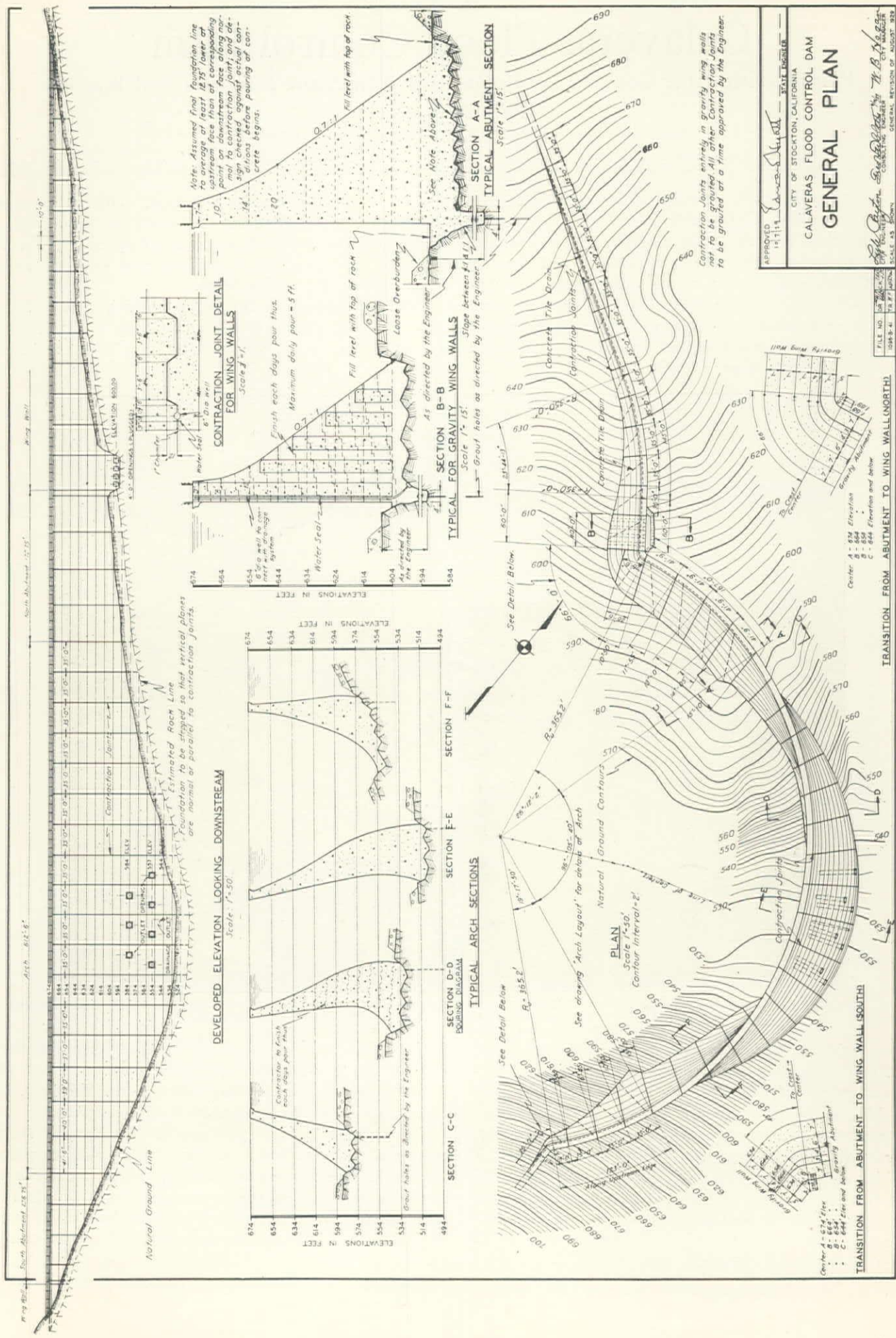


FIG. 2



to Bent Bros., Inc., of Los Angeles, for \$838,715; the lowest of three bids received. The contract quantities and unit prices follow: foundation excavation below 530 ft. elev.—8800 cu.yd. at \$3.00; cutoff trench excavation below 530 ft. elev.—200 cu.yd. at \$7.00; foundation excavation above 530 ft. elev.—17,400 cu.yd. at \$2.80; cutoff trench excavation above 530 ft. elev.—1000 cu.yd. at \$5.00; concrete foundation drain, in place—2800 lin.ft. at \$0.50; furnish and place reinforcing steel—159,600 lb. at \$0.05; portland cement—97,000 bbl. at \$2.68; furnish and place copper contraction seal—2500 lin.ft. at \$4.00; galvanized iron grout stop (city to furnish material)—5600 lin.ft. at \$2.00; furnish and place structural steel—48,000 lb. at \$0.10; slide gates, frames, etc., and operating equipment (city to furnish material)—105,000 lb. at \$0.02; furnish and place structural steel handrail—2705 ft. at \$1.00; placing pressure grout—500 cu.ft. at \$2.00; drilling groutholes—1300 lin.ft. at \$3.50.

change the total quantities but, in view of foundation conditions, is a real improvement. Under the revised plans, 30,000 cu.yd. of excavation, all classes, and 105,000 cu.yd. of concrete are involved in the work. The legality of the contract based on the original plans was questioned at the time the design was changed and the work was slowed down to a great extent. The appellate court recently upheld the contract and work has been actively resumed. Completion of the dam is scheduled for the spring of 1930.

**Excavation** is handled by a  $1\frac{1}{4}$ -yd. P&H gas shovel and a  $\frac{3}{4}$ -yd. Erie steam shovel, both of which are convertible to cranes. The bulk of the excavation is first removed by shovel and truck, seven 4-yd. dump trucks being used. Later, the crane boom is installed and the remainder of the muck is hand-shoveled into skips which are hoisted out and dumped just beyond the limits of the dam. Overburden from the steep hillside on the south side is removed by sluicing, one 6-in.

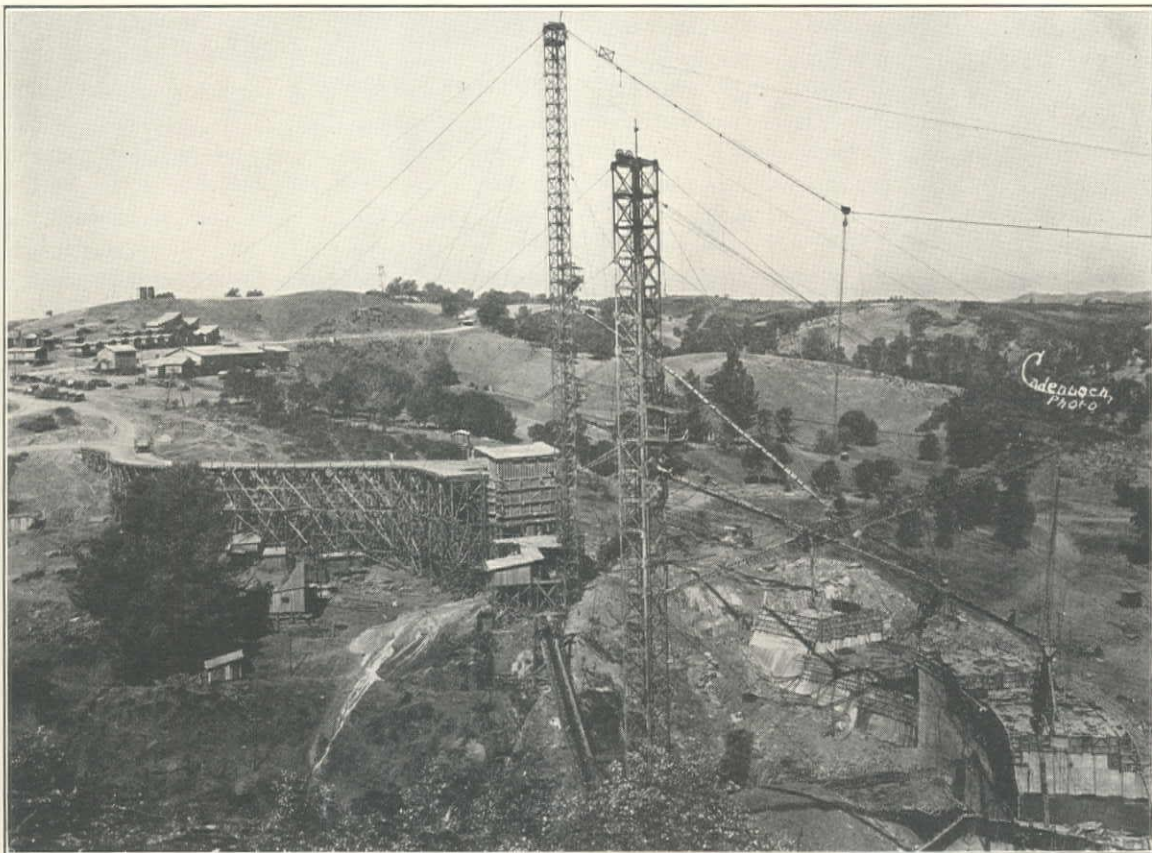


FIG 3. CALAVERAS DAM UNDER CONSTRUCTION. CONCRETE PLACING EQUIPMENT AND VARIABLE-RADIUS ARCH SECTION IN FOREGROUND. TRESTLE AND MIXING PLANT IN CENTER, WITH CAMP IN LEFT BACKGROUND

**Changes in Design**—After the contract had been signed, and at the instigation of Edward Hyatt, state engineer, the plans were changed. This was the first dam in California to come under the new state regulation which requires that the plans for all municipal or private dams be approved by the state engineer. That the change was made after construction had started and before the state legislation went into effect, indicates prompt and proper cooperation between the parties concerned.

The arched section, as now designed, has a variable radius, with gravity abutments and the same gravity wall on the north end. This design does not materially

high-pressure pump (800-ft. head capacity) being used.

**Aggregates** are obtained from gravel deposits three-fourths mile below the damsite. They are dug with a  $2\frac{1}{2}$ -yd. Monighan walking dragline and are loaded on two trains, each having two 12-yd. Western dump cars. The trains are pushed by 20-ton locomotives, operating on standard-gauge track, to a nearby gravel screening and washing plant. Here all aggregates are washed and screened in a Bodinson gravel plant, with a normal capacity 1200 tons per 8-hour shift. The trucks are run over a trestle 450 ft. long, 60 ft. high,



with a roadway 24 ft. wide, and are dumped directly into bins over the mixing plant.

Rock and sand are measured by volume in Blaw-Knox batchers hung beneath the bins, and are then dropped onto two 30-in. conveyor belts running longitudinally beneath the bins. Each belt feeds a hopper above a 2-yd. Smith tilting mixer.

Cement from the San Andreas plant of the Calaveras Cement Co. is shipped by freight in sacks to Valley Springs, the nearest railroad point. It is then hauled the remaining  $3\frac{1}{2}$  miles by two flat-bed cement trucks which run over the trestle to cement silos directly above the mixers. The sacks are opened as they are removed from the trucks and the cement is dumped through grizzlies into the silos. A Blaw-Knox cement weighing batcher is hung beneath each silo. Cement is dropped from the batchers into the mixer hoppers.

**Placing Equipment**—Concrete is fed into chutes, so arranged that either or both mixers will feed to the base of a 380-ft. single compartment Insley steel tower, built practically integral with the mixing plant, or to a hopper. This hopper feeds a 30-in. conveyor belt which runs to a second Insley steel tower, 180 ft. high and on the farther side of the canyon, 315 ft. distant. The belt-conveyor is carried on a suspension cable bridge. The bridge was selected rather than a conventional trestle because of the danger of a trestle being washed out during high winter floods. The mixer chutes are also arranged so that concrete can later be chuted directly beneath the mixers and to 1-yd. buckets, set on trucks. These buckets will be hauled to the extreme north end of the dam and there lifted from the trucks and elevated to the dam by a P&H crane.

On each tower a 90-ft. boom is carried, on which is hung a 65-ft. single counterbalanced chute. A pair of counterbalanced chutes, respectively 50 and 65 ft. long, is hung on a  $2\frac{1}{4}$ -in. cable which runs over the top of the dam. These chute concrete to the center portion of the arch where the boom plant chutes do not reach. The north gravity abutment and the larger part of the north gravity wall will be covered by a pair of 50-ft. counterbalances, carried on a 25-ton derrick, set on top of a wooden tower 64 ft. high. The derrick plant will be fed, as are the counterbalances in the center of the arch, by a chute line run from the higher tower. Thus, the entire dam is effectively covered. All chutes are 16-in., Insley make.

**Concrete Production**—The first concrete was placed September 5, and by November 1 there had been deposited 27,000 cu.yd. of concrete. This concrete is in the streambed or arched section of the dam and the job is well in the clear of possible flood waters. Concrete is placed under the personal supervision of L. H. Tuthill, concrete technologist, who maintains a testing laboratory on the job. Mixing and placing have been handled so as to give a minimum of segregation. A maximum slump of 4 in. and a 28-day compressive strength of 1500 lb. are required. Daily strength tests have shown an average of over 2500 lb. per sq.in. at 28 days. The mix is varied to meet conditions at the gravel pit, but is approximately 1 part cement to 4

parts fine aggregate to  $6\frac{1}{2}$  parts coarse aggregate. There is 0.92 bbl. of cement used per cubic yard of concrete. Three sizes of rock and sand are used, with cobbles up to 5 in. being required. Tuthill deserves much credit for his helpful attitude toward the contractor and for his ability to get a workable, high strength, impermeable concrete using, as nearly as possible, aggregates as they happen to run at the pit.

**Additional Equipment and Plant**—A 650 c.f.m. Ingersoll-Rand air-compressor and a Best '30' Caterpillar tractor are also included in the equipment. The trucking is subcontracted. Except for the digging machines, all of the general contractor's equipment is electrically operated. The P.G.&E.Co. has erected an 11,000-volt transmission line from Valley Springs to the job and installed 300-kv. transformers near the mixing plant. Bent Bros. has erected an 11,000-volt branch line to the gravel plant, 4000 ft. long, and installed 100-kv. transformers near that plant. Power service has been satisfactory and the power factor quite steady.

The construction plant includes a machine shop, drill sharpening shop, carpenter shop, and completely equipped rigger's loft.

**Camp Facilities** were provided for 300 men in order to speed up plant erection and river bottom excavation. These included 47 four-man bunk houses and 24 large tents, mess-house, commissary, first-aid hospital, 30,000 gal. water storage tank, engineers' office, contractor's office, guest house, and ten family houses. The number of family houses is small because of the short construction period. The tents have since been removed, as the crew is not expected to exceed 150 men during the rest of the job. All camp operations were contracted to the Anderson Boarding & Supply Co., of San Francisco and Los Angeles. Water for the camp supply and construction purposes is pumped from the river to the storage tank and is chlorinated at the pump. Daily samples are tested in the first-aid hospital maintained at the job by J. W. Newton, M. D., of San Andreas. All of the contractor's job business is handled through the local office.

**Personnel**—Lyle Payton is city engineer of Stockton and is in charge of the project, W. B. Hogan being city manager. W. S. Post is the resident engineer on the work and Sam Thomas is his assistant. Louis C. Hill and Fred H. Tibbetts have been the consulting engineers on this flood control dam. L. T. Grider, general superintendent for Bent Bros., Inc., is in charge of all the firm's work.

### The 1929 Hill Cup Contest

The Pacific Northwest Section of the American Water Works Association is the winner of the Hill cup contest for the year ending with the 1929 national convention. This competitive cup, offered by Nicholas S. Hill, Jr., is awarded to the section which shows the greatest yearly percentage gain in membership. The name of the winning section is engraved on the cup and the cup is held by that section until its record is exceeded. The gain in membership in the Pacific Northwest Section during the past year was 10%.



# Springfield Bridge

*Steel and Concrete Highway Bridge Over Willamette River Near Springfield, Oregon*

By A. H. BENEDICT

*Assistant Highway Engineer, Department of Post Roads,  
United States Bureau of Public Roads, Portland*

The Springfield bridge, over the Willamette river near Springfield in Lane county, Oregon, is on the McKenzie highway. This highway forms the only connection in central Oregon over the Cascade range between two main north and south routes: The Dalles-California and the Pacific highways. The new structure will replace an old 300-ft. steel bridge now carrying traffic well beyond its designed capacity.

Constructed by the Oregon State Highway Commission, with Federal aid, the estimated cost of the new

approach spans. At pier No. 1, on the opposite end of the bridge, a maximum expansion of  $2\frac{1}{2}$  in. was allowed for.

Ordinarily the rise of the top chord in a continuous truss over four supports reaches a maximum at the point of greatest negative moment, which occurs directly over the two intermediate supports, and drops as it approaches the center of the middle span. Because of the conspicuous situation of the Springfield bridge, the dictates of strict economy were violated by placing the point of maximum rise at the center of the bridge, thus securing more regular and pleasing top chord lines.

The concrete roadway was made 27 ft. wide. The sidewalks, 5 ft. 3 in. wide, which extend out from each side of the main girders, are supported by cantilever action and occasional brackets.

The original design called for three 50-ft. and one 40-ft. approach spans on the east end, toward Springfield, and three 50-ft. spans on the west end. Later, in compliance with the request from the city of Springfield that drainage from their territory be unobstructed, another 50-ft. span was added to the approach on that end of the bridge by a supplemental agreement with the contractor. Also, as a result of a

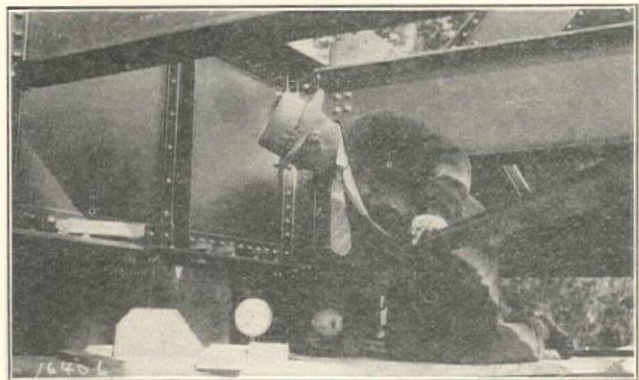


Main Spans of the Springfield Bridge

bridge, including engineering but excluding grading of the approach roadway, was \$158,854, of which the Federal share was 62.23%, or \$98,855. This is the maximum ratio of cost which may legally be paid by Federal aid in Oregon.

**Design**—The structure was designed and erected under the direct supervision of State Highway Commission engineers, the plans and erection being subject to inspection by, and approval of, representatives of the U. S. Bureau of Public Roads, as is required on all Federal aid projects. Approval of the plans and estimates prepared by the state bridge department was made by the Bureau on March 17, 1928, and authority for construction was then issued.

The bridge design consisted of three main steel spans with reinforced concrete T-beam approaches. The steel spans, total length 550 ft., were of the through continuous truss type, the center span being 198 ft. and each side span 176 ft. 7 in. long. A fixed bearing shoe was designed for pier No. 2, the west intermediate pier, while roller shoes were provided at the other three piers. No intermediate expansion joints were provided in the roadway slab, but a maximum expansion of  $4\frac{1}{2}$  in. was allowed at pier No. 4. This pier receives the expansion for two steel and one



Jacking Span at End Pier to Desired Reaction. Glen Paxson, Assistant State Bridge Engineer, Using a Blackhawk Jack

compromise settlement arising from a protest regarding waterway under the bridge, made by land owners along the west side of the river above the structure, three additional 50-ft. spans are being added to the west approach. These are now 50% completed. New posts will be constructed at the end of the added spans.

A clearance of 7 ft. above extreme high water was provided. The Willamette river is not considered as being navigable above Springfield, hence no War Department permit involving provision for major water traffic was required.



Test-pits made with a wash-boring outfit during the preliminary investigations showed solid rock underlying a layer of sand and gravel, varying in depth from 4 to 15 ft.

**Construction**—Award of the contract for the bridge was made by the Highway Commission on March 27, 1928, to the lowest of seven bidders, Lindstrom & Feigenson, of Portland, who bid \$127,300.

The work of fabricating and assembling the steel spans was assigned to the Virginia Bridge & Iron Co., of Roanoke, Virginia.

The contract quantities and unit prices were: excavation—600 cu.yd. at \$3.00; excavation below stated elevation—100 cu.yd. at \$5.00; class A concrete—550 cu.yd. at \$21.50; class B concrete—400 cu.yd. at \$18.00; class D concrete—840 cu.yd. at \$20.00; reinforcement steel—310,000 lb. at \$0.0375; structural steel—1,060,000 lb. at \$0.065; concrete handrail—1730 lin.ft. at \$5.00.

Work was begun on April 18, 1928. Excavation for the piers was carried on inside the usual type of

tinuous truss for a given condition of loading, were carefully determined. The equipment for this purpose consisted of two Blackhawk hydraulic jacks of 30-ton rated capacity, with 20-in. lever arms and attached pressure gauges. The gauges were calibrated to 1000 lb. per sq.in. readings; they were checked in a testing laboratory and found to register less than 1% error.

The shoes for the center piers were set to the elevations shown on the camber diagram and were grouted into place. When erected, the elevations of the shoes at the end piers were temporarily set  $3\frac{3}{4}$  in. high, this being the computed amount of deflection under continuous action that would permit the ends of the structure to drop to grade after the ties over the center piers were fixed and the computed end reactions obtained. The three trusses were erected on falsework as simple spans, the ties over the center piers drilled and riveted in the field, and the spans swung free.

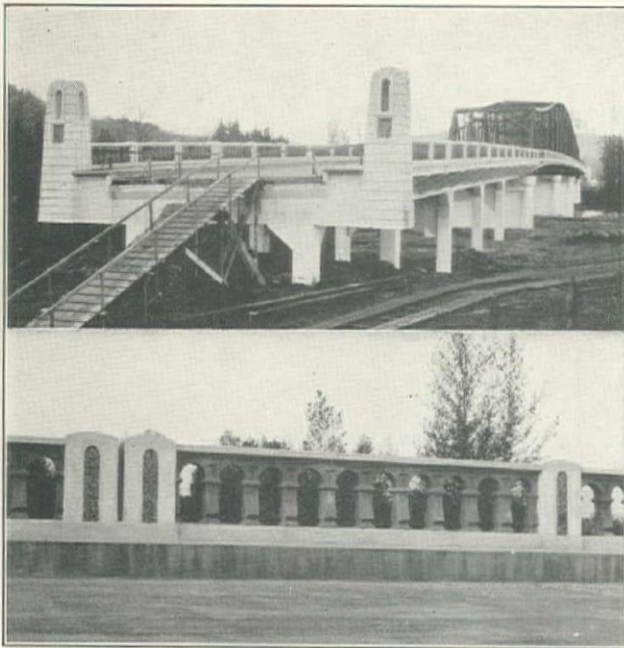
The jacks were placed to support one end of the structure over an end pier and were gradually lowered until the reaction, computed for the weight of the steel only, was obtained. Simultaneous readings were taken of the reaction at each bearing and the jacks were then transferred to the opposite end pier. With four bearings and only two jacks, several trials were necessary before reactions were obtained that were as close as desired. The shoes were then grouted into place.

The actual deflections at the ends of the bridge averaged  $\frac{7}{8}$  in. less than those computed. It is thought probable that this difference can be attributed to disregard of the effect of stringers in taking stress from the lower chords. A recalculation of the deflections was made, in which the outside stringers were assumed to take some stress. This resulted in a decrease in the theoretical deflection of  $\frac{3}{4}$  in. Since the approach spans had not been poured, the difference between the assumed and actual elevations at the ends of the bridge was easily absorbed.

Field observations were also made of the chord strains produced, these being later converted to unit stress values as a check on the ones computed. For this purpose, Berry strain gauges were used; one attached to the top and one to the bottom chord at points at which the greatest stresses would occur. The deformation of the top chord as shown by this test was close to that expected, but the bottom chord reading was considerably less. This was construed as indicating that the floor system does relieve the bottom chord of some stress, substantiating the assumption made in accounting for the difference between the computed and actual truss deflections.

Construction of the approach spans went forward with as satisfactory progress as that of the steel erection. Much of the placing and finishing on the precast handrail was done simultaneously on the main and approach spans.

**Architectural Details**—Consistent with the policy of the Oregon Highway Commission, the completed structure presents an unusually pleasing appearance. An impressive miniature watch-tower, to be lighted eventually, serves as an end post at each corner of the approach entrance. Recessed panels along the outer sides of the concrete girders and in the intermediate



(Upper) Springfield Bridge from East End. (Lower) Typical Precast Handrail Details. No Expansion Joints in Rail Except Over Supports

timber sheet cofferdams; all footings being carried into solid rock. Piling was driven for falsework under the entire length of the bridge. One concrete mixing plant, of two-bag capacity, was erected on a gravel bar adjacent to the east end of the bridge, and a second plant near the west end. Sand and gravel were obtained from a local commercial plant, delivered as used. Cement, steel, and other materials were shipped in by truck and by rail to a nearby point.

Construction progressed rapidly, Lindstrom & Feigenson doing all work except the erection of structural steel. The subcontractors, Virginia Bridge & Iron Co., erected the floor system in three days and erected and riveted the entire trusses in five weeks. The steel fitted well and caused no delays in erection.

**Precautions in Erection**—The elevations of the bearing shoes at the ends of the steel spans necessary to assure reaction values close to those computed and to thus insure correct distribution of stresses in the con-



handrail posts were faced with a stucco surface made of fine obsidian and quartz chips; thus giving a sharp black and white contrast. The remainder of the concrete surface exposed to view, with the exception of the piers, was given a plaster coating, total average thickness  $\frac{3}{8}$  in., applied in two layers. The first coat was mixed in the proportion of one part of standard waterproofed portland cement and three parts of ordinary sand. For the second layer, the same mix ratio was used but white, waterproofed portland cement was required and a mixture of white and local sand was

used. The mix was varied so as to produce a clear white color. The proportions were set by weight, the contractor being required to furnish a set of scales on the job and to dry all materials before weighing.

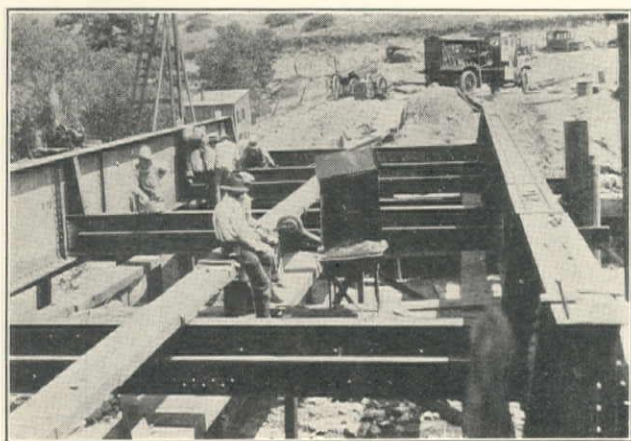
A rubbed surface was specified in the contract for the surface of the piers but, in order to give these the same intense white finish as the concrete superstructure, a coating of commercial cement cold-water paint was applied after rubbing was completed. This paint finish was used also on the under side of the deck and the inside of the concrete girders.

## Road Construction in Denver Parks

By JOS. C. COYLE, *Denver, Colorado*

Denver's 1929 construction program includes \$35,000 for the improvement of Red Rocks park, a 1400-acre addition to the city's string of mountain playgrounds, in the foothills of the Rockies 15 miles from the city. The park has long been privately owned, and was pur-

chased in 1925 for \$50,000. A 24-ft. auto road is now being built through the park. This leaves Bear creek road at two different points, meanders among the red sandstone cliffs of the park, and intersects the 'Hog Back' road two miles north of Morrison. Five miles of new road is being constructed and old roads within the park are being widened. This will make all parts of the park easily accessible to automobilists.



Erecting Steel Bridge Near Red Rocks

with the grade of the road, to prevent dirt lodging in them during the sudden heavy rains. The intake and outlet ends of the culverts are walled about with rough stone. Many hairpin curves were necessary to carry the road between the rock formations. A tunnel will be constructed through the high rim of a natural amphitheatre within the park, making this interesting spot accessible to motorists.

At the north entrance, a steel bridge was constructed across a small creek. Two trusses 60 ft. long and weighing 8 tons each, were removed from an abandoned viaduct in the city and used for this bridge. The trusses are supported on wooden piling, driven deep in the streambed.

Denver will spend \$80,000 during 1929 in improvement and upkeep of its mountain parks and roads. Shelter houses, well houses, picnic grounds, stone ovens for campers, covered trash containers, and other



Osgood Gas Shovel Excavating Highway

chased in 1925 for \$50,000. A 24-ft. auto road is now being built through the park. This leaves Bear creek road at two different points, meanders among the red sandstone cliffs of the park, and intersects the 'Hog Back' road two miles north of Morrison. Five miles of new road is being constructed and old roads within the park are being widened. This will make all parts of the park easily accessible to automobilists.

The work is being done by day labor, 40 men being employed under Walter Ailenger, construction engineer. An air compressor and drills are in service, and much 'double jack' drilling is required in the more inaccessible spots. Work is being carried on at several different points in order to speed construction. One Osgood heavy-duty gas shovel is used to load into dump wagons. Large boulders are blasted and then dragged away with a team and chain. Fresnoes are principally used for grading.

Most of the road within the park has a 6% maximum grade, while one short section has a 9% grade. Armco and Uloy-iron culverts, ranging in size from 16 to 72 in., are used in the numerous steep ravines bisecting the road. These are given a slope corresponding

conveniences are being provided. There are free municipal trout streams, stocked every year, and a game preserve with buffalo, deer, elk, mountain sheep, antelope, and other big game. The nineteen mountain parks of the system comprise 5000 acres.

C. D. Vail, manager of parks and improvements, and Craig Bradford, superintendent of mountain parks, are directing the program.



# Collapse of Littlefield Dam

## Failure of Rock-Fill Dam in Arizona Due to Inadequate Design and Faulty Construction Methods

By J. A. FRAPS

*Engineer on Dam Supervision and Control, Arizona  
Highway Department, Phoenix*

Investigation of the collapse on August 5 of the Littlefield diversion dam, under construction at the 'Narrows' on the Virgin river six miles above Littlefield and in the northwestern corner of Arizona, showed that failure was due to inadequate design and faulty construction methods.

**Site**—In former years, a dam 60 ft. high was built at the 'Narrows' by blasting rock from the canyon sides into the river below. Insufficient spillway capacity was said to have been the cause of failure of this early structure. The method of construction may have been an additional factor. After the failure of this dam, it was found that the streambed was 20 ft. higher. This change was probably due to a deposit of immense boulders in the bottom of the river.

At the damsite the river flows through a narrow gorge. A box canyon, with high, precipitous sides,

available, although wash borings were said to have been made after the failure of the 60-ft. dam.

**Design and Construction**—The structure was of the rock-fill type, but without foundation preparations, cutoff wall, core wall, or impervious upstream face. Material for the fill was secured from the spillway excavation on the north canyon side, and the fill carried across at the spillway floor level. The material was permitted to take its natural slope, and no effort was made to place any of the rock. Thus, by starting at one side and working toward the other, large rocks

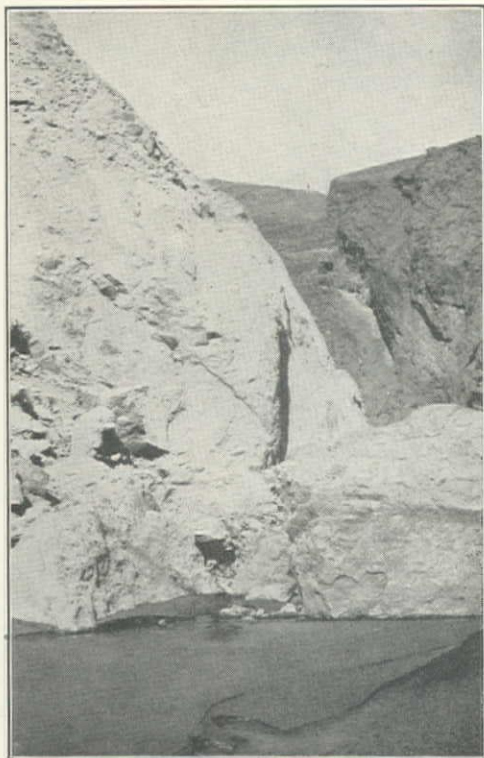


Fig. 1. North Abutment, Looking Upstream. Pile of Rocks in Left Background Was Formerly Part of Dam

extends for several miles above the site, while below it the Virgin river flows through open, rolling country. With the changes caused by former construction, the existing damsite is about 100 ft. wide at streambed and 300 ft. wide at 125 ft. above this elevation. Information on the depth to bedrock was not

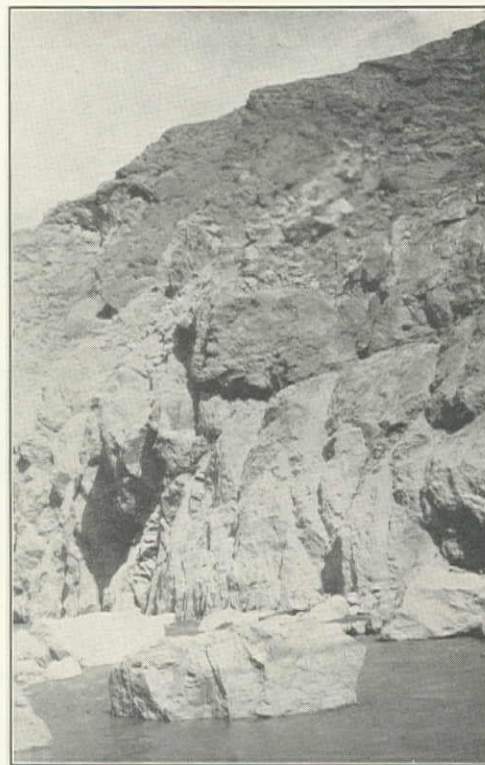


Fig. 2. South Abutment of Littlefield Dam, Looking Upstream

rolled to the bottom of the canyon, leaving interstices which provided a devious but continuous path for the passage of water. It was expected by the owners that the spaces between the rocks would be filled with silt, and thus give a watertight structure. This expectation was too optimistic, even though the Virgin river does carry a large quantity of silt.

The dam design provided for water diversion at the spillway crest, but a small amount of storage was to have been secured with 8-ft. automatic spillway gates. The actual storage capacity thus to be obtained is unknown, as no reservoir surveys have been made. From Fig. 3 it will be noted that the dam was to have



a crest elevation of 2037 ft., or 137 ft. above streambed. The crest width was to have been 6 ft. and the side slopes 1.4 to 1. Dotted lines on Fig. 1 indicate the stage of construction at the date of the failure, August 5; the water line at this time is also shown.

Construction was started in April, 1929, and was to have been completed in June, the work being done during the three months of minimum flow. No provisions were made to care for water during the period of construction. Delays caused the construction period to extend into July and August, during which time flash floods of dangerous magnitude are not unexpected. The Littlefield dam failed before it was overtopped, but it would have been overtopped as a result of these floods, had it held a few hours longer.

The fill had been extended on a level with the spillway floor to a point 85 ft. from the south abutment,

this time the leakage increased to 300 c. f. s. and the reservoir level rose 4 ft., or to a point 10 ft. under the lowest point on the crest. At 1:30 p. m. there remained only a triangular section of the dam, the apex being only a few feet above the water line. Final failure occurred, the reservoir was emptied in 30 minutes, and by 2 p. m. not more than 40 of the 85,000 cu.yd. of earth and rock remained in place.

Residents below the dam had ample warning of the failure and there was no loss of life. The property loss in Arizona was estimated at \$2000, with probably a greater loss in Nevada. There was no damage to highways or bridges, although the flood went over the floor of a highway bridge on U. S. Highway 91, two miles west of Mesquite, Nevada.

**Remarks**—Imperfections in design and construction of the Littlefield dam may be summed up as follows:

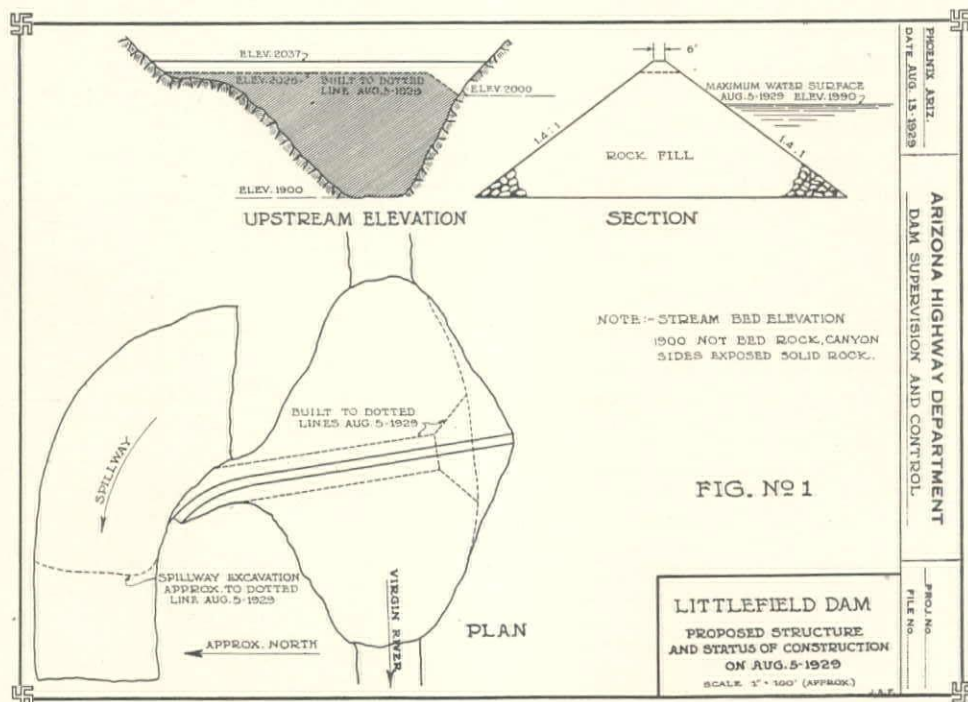


FIG. 3

as shown by Fig. 1. The lowest point on the crest was then 25 ft. below the spillway floor, or 100 ft. above streambed. The top width at the spillway floor was 40 ft. and the side slopes were running about 1.4 to 1.

**Leakage and Failure**—The Virgin river had been at flood stage intermittently for several weeks prior to failure of the dam, and the level of the reservoir had gradually risen. Leakage through the dam had increased with rises in reservoir level and, on the morning of August 5, was estimated at 200 c.f.s. The leakage was discharging principally from the downstream slope at an elevation 25 ft. above streambed, although smaller leaks were in evidence at other elevations. Heavy rains on the watershed above the dam brought a sharp rise in the reservoir level during the morning of August 5, until at noon a depth of 86 ft. was reached. This rise increased the velocity of water passing through the structure, with a resulting increase in volume and, at 12:30 p. m., a slide occurred on the downstream face. Other slides followed the first, and the dam was gradually eaten away. During

A dam was being constructed to store water to a maximum height of 133 ft., and yet no foundation preparations were made. A rock-fill dam is a porous structure, hence it is necessary and customary to construct an impervious upstream face from the crest of the dam to lowest bedrock. If the dam had been finished and had stood, it would not have been useful during dry periods since more water passed through the structure than is normally carried by the Virgin river at low stage. The stability of such a dam depends on the ability of the upstream face to prevent the passage of water in quantities sufficient to carry off particles of the fill. An attempt to build a dam which will fail if overtopped, without means of caring for floods, can succeed only if conditions are ideal. The extremely flashy nature of southwestern streams is against an attempt of this sort.

The failure of the Littlefield dam is further proof of the need for the recently enacted laws of Arizona and California pertaining to dam supervision and control by the state.

(Fig. 1-3 courtesy 'Arizona Highways')



## PERSONAL MENTION

**Byron K. Curry**, engineer for the Standard Oil Co. of California, has left Maracaibo, Venezuela, for Barranquilla, Colombia, where he will be engaged in engineering for several months.

**John F. Johannsen**, for the past eight years city engineer of Glendale, California, has joined the LeTourneau Manufacturing Co., of Stockton, as chief engineer. He is directing the design of LeTourneau heavy grading equipment. Johannsen was for six years in the Ordnance department, U. S. Army, being stationed at Rock Island Arsenal. As city engineer of Glendale, he had charge of design and construction of a sanitary sewer system and also completed a comprehensive program of street improvements.

**Raymond Matthew**, recently associated with Fred H. Tibbetts, consulting engineer, San Francisco, and assistant chief engineer of the Nevada Irrigation District, is now hydraulic engineer with the California division of water resources. He has been assigned to investigate the salinity problem and the salt water barrier proposed for San Francisco bay.

**W. G. Knox**, civil engineer, of Santa Ana, California, has been appointed chief engineer of a construction company formed by California and Arizona capitalists to direct a \$7,500,000 road building, sewer, and water development in the vicinity of Monterrey, Mexico. Knox was formerly an engineer for the Utah Highway Commission, and was later city engineer, city councilman, and city manager of Santa Ana. He will receive a salary of \$10,000 for his first year with the construction company. Mexican engineers will be employed exclusively on his staff.

**Luis Eyquem**, chief construction engineer of the reclamation department of the Chilean government, attended a recent special luncheon in Phoenix, given by the Arizona Section, American Society of Civil Engineers. He was accompanied by Miguel Montalva, assistant director-general of Chilean public works. Both men were guests of James B. Girard, president of the section, who returned from Chile, where he is supervising a government power project. Eyquem and Montalva have been in the western states for the last two months inspecting various types of dams and reclamation works, including Ambursen dams on the Orland and Rodriguez projects. They are now leaving for New York to return to Chile where a 20-year construction program is in progress.

**Charles Grunsky**, gas and electric engineer of the California Railroad Commission, San Francisco, resigned November 15 to become supervising engineer with the management and engineering company which will direct the activities of the Pacific Public Service Corp., its subsidiaries and allied companies. Grunsky graduated in electrical engineering from the University of California in 1913. He was employed by a private contracting firm, mainly on construction of reinforced concrete dams, until 1914, when he became assistant engineer for the California Railroad Commission. Grunsky was on valuation work in 1914 and 1915, gas and electric work in 1916, and was in charge of the gas laboratory in 1917 until the United States entered the war, when he enlisted as a first lieutenant in the U. S. Engineer Corps. He served in the army from 1917 to 1919, being for most of the period in France in command of Engineer Train and Company B, 5th Engineers. Grunsky was discharged as a captain and returned to the Railroad Commission as assistant engineer. He was appointed gas and electric engineer in 1926.

## OBITUARY

**Arthur H. Dimock**, 64, consulting engineer of Seattle, died at Mt. Vernon, Washington, on November 14. Dimock was born in Windsor, Nova Scotia, and received his engineering training in that province. He came to the United States in 1888 on railroad work, and moved to Seattle in 1890. He entered

the city engineer's office as a draftsman in 1897, became assistant city engineer in 1900, and was city engineer for an 11-year period beginning in 1911. Dimock was a member of the American Society of Civil Engineers. He is survived by his wife and three children.

**John Wallace**, graduate of Purdue University and a telephone engineer for over thirty years, died September 10. He was a member of the Society of Engineers, San Francisco bay region, and served one year as its vice-president.

**R. R. Slick**, sales engineer in northern California for the Byers Machine Co. and the Owen Bucket Co., with headquarters in Oakland, died on November 3. Slick came to Oakland from Salt Lake City. He was 39 years of age and is survived by a widow and one daughter.

**Arthur R. Wilson**, founder and president of the Granite Rock Co. and the Granite Construction Co., died at Watsonville, California, on October 19. Wilson was born in San Francisco in 1866 and received the B. S. degree from Massachusetts Institute of Technology in 1890. He began the practice of civil engineering in Oakland and was city engineer from 1895 to 1897. He founded the Granite Rock Co. in 1900 and had been engaged in construction since that date.

## ASSOCIATIONS

### ASSOCIATED GENERAL CONTRACTORS

#### Eleventh Annual Convention and Christmas Party of Northern California Chapter

Everyone in the engineering construction industry looks forward with anticipation to the annual Christmas banquet and theatre party given by the Northern California Chapter of the Associated General Contractors of America. Each previous banquet has surpassed in sumptuousness the preceding one, and the directors announce that the forthcoming banquet on Saturday, December 14, in the Palm Court of the Palace hotel, San Francisco, will be 'bigger and better yet'. Last year over 600 attended. Fortunate is he who is invited to these functions.

There will be a theatre party on Friday evening, as usual.

The business sessions will be held in the Clift hotel this year instead of the Hotel Whitcomb—subjects of general interest only to be discussed. There will also be a meeting of the executive board of the State Branch and election of officers.

**American Water Works Association, Pacific Northwest Section**—A meeting of the directors of this local section was held at Portland on November 2 with the following attendance: Ben S. Morrow, chief engineer, water bureau, Portland; Carl A. McClain, general superintendent and secretary, Eugene water board; Fred J. Sharkey, superintendent, Wenatchee water department; Ernest C. Willard, consulting engineer, Portland; and E. W. Thompson, northwest manager, Neptune Meter Co., Portland (by invitation). The remaining board member, Alex Lindsay, superintendent, water division, Spokane, was unable to be present. This section includes the states of Oregon and Washington. Its officers are: Ben S. Morrow, chairman; Alex Lindsay, vice-chairman; and Ernest C. Willard, secretary-treasurer.

The next annual meeting of the Section was set for April 24-26, 1930, at Portland. About 125 engineers and other water works men are expected to attend. The tentative program includes a golf tournament on April 24; presentation of papers and business on April 25, with a dinner meeting and entertainment on that evening; and an inspection trip of the local water system, including Bull Run dam and headworks, on April 26. The following committees were appointed to work for the annual meeting: Program—W. A. Kunigk, superintendent, water division, Tacoma, chairman; Carl F. Klapp, superintendent of water, Everett; and R. E. Koon, of Stevens & Koon, consulting engineers, Portland. Registration and Reception—R. J. Disher, northwest representative, Pacific States Cast Iron Pipe Co., Portland, chairman; R. T. Wetteland, Steel Tank & Pipe Co., Portland; Sydney J. Benedict, assistant engineer, water bureau, Portland; and Chester G.



Ehle, chief draftsman and distribution engineer, water bureau, Portland. Local Arrangements and Entertainment—John S. Beal, president, Beal Pipe & Tank Co., Portland; H. M. Chadwick, engineer, Beal Pipe & Tank Co., Portland; R. C. Poik, northwest agent, American Cast Iron Pipe Co., Seattle; and E. N. Hallgren, Rensselaer Valve Co., Seattle. Golf—W. B. Severyns, superintendent of water, Seattle, chairman; R. H. Corey, division engineer, Public Works Engineering Corp., Salem; E. W. Thompson; and Sam Kerr, Mueller Co., Seattle. Transportation—H. A. Goode, secretary to water commissioner, Portland, chairman; and C. F. Wagner, engineer, Oregon Insurance Rating Bureau, Portland.

The membership committee appointed by the board includes: H. T. Judson (chairman), northwest representative, Hersey Manufacturing Co., Portland; F. P. Tangway, National Meter Co., Seattle; Hugh G. Purcell, manager, Hugh G. Purcell Co., Seattle; H. I. Miller, vice-president, Pacific Water Works Supply Co., Seattle; Kenneth Shibley, manager, California Filter Co., Seattle; H. W. Nightingale, Alaska bldg., Seattle; Emerson Dolliver; and James Q. Osborne, DeLaval Steam Turbine Co., Seattle. The committee deserves whole-hearted support as this section has won the competitive cup for the greatest percentage gain in members for the year ending on Wednesday night of the 1929 national convention. The section had 59 members on November 4 but should be materially strengthened before the annual meeting.

**Editor's Note**—An account of the second annual meeting, held in Spokane May 17-19, 1929, with an attendance of 75, was given on p. 299-300 of the June 10th issue. Two of the papers presented at that meeting have been published in **Western Construction News** (see p. 416-417, August 10th, and p. 550-551, October 25th issues).

#### Engineering Societies Employment Service

Thos. H. Means, consulting engineer, of San Francisco, has been appointed representative of the San Francisco Section, American Society of Civil Engineers, on the advisory committee of the local office of the Engineering Societies Employment Service. Means succeeds Fred. H. Fowler, consulting engineer, and chairman of the committee for the past four years. Holdover representatives on this committee are: American Chemical Society—L. H. Duschek; American Institute of Mining and Metallurgical Engineers—R. A. Kinzie; American Society of Mechanical Engineers—C. R. Weymouth; American Institute of Electrical Engineers—F. R. George; Engineers Club of San Francisco—W. P. L'Hommedieu. Newton D. Cook, secretary of the Service, reports that October was the best month of the present year in the number of placements made.

**Associated General Contractors, Alameda County (California) Chapter**—This chapter—the seventh in California—was formed November 1, with 23 members, all building contractors. The affiliation of this group of building contractors in Oakland with the A.G.C. is the outcome of cooperative work in securing the passage of the Contractors' License Law.

**Prequalification of Bidders on State Highway Work in California**—The final date for contractors on state work in California to submit the financial statements and experience questionnaires as required by the new statute, has been extended to November 30 by the Division of Highways and November 15 by the Division of Architecture. No bid will be considered after these dates if the contractor has not filed a pre-qualification questionnaire. A board of three engineers has been delegated by C. H. Purcell, state highway engineer, to study and report on the questionnaires submitted.

**Enforcement of Contractor's License Law in California**—More than 10,000 contractors have complied with the new California statute requiring the registration and licensing of all contractors. Every listed contractor has been notified by James F. Collins, registrar and director of the new Department of Professional and Vocational Standards, and a final notice will shortly be mailed.

The attorney-general of the state has defined the 'material fabricator' under Section 3 of the Act; and also the status of the speculative builder as not being exempt under Section 2; and that an unlicensed contractor cannot enforce a lien under provisions of Section 1187 of the Code of Civil Procedure.

#### AMERICAN SOCIETY OF CIVIL ENGINEERS, LOCAL SECTIONS

Recent meetings of local sections of the Society have included the following programs:

**Colorado Section**—The 185th regular meeting was held at the Denver Athletic Club on October 2, with 40 in attendance. H. W. Dennis, director for District 11, spoke briefly on various questions which have come before the Society. Elwood Mead, commissioner, Bureau of Reclamation, presented some of the problems relative to the division of waters of the Rio Grande and other southwestern rivers, which would come before the International Commission representing the United States and Mexico. H. S. Crocker led a discussion of the report prepared by a committee of the Board of Direction on 'Charges and Methods of Making Charges for Professional Services'. Crocker was followed by R. G. Shankland, J. E. Field, Eckles, F. C. Carstarphen, H. J. Gilkey, Walters, W. W. Curtis, J. W. McCullough, R. J. Tipton, O. W. Childs and H. W. Dennis.

**Los Angeles Section**—A regular monthly meeting was held October 9 at the Engineers' Club, the principal portion of the program being in the nature of an industrial symposium. Short talks were given with reference to recent developments in the design of pumping equipment, the manufacture and use of clay products, modern developments in concrete pipe manufacture, and the automobile and aeroplane industry in southern California. The report of a committee of the Society on 'Charges and Methods of Making Charges for Professional Services' (published in the September 'Proceedings') was discussed by several members and then referred to a special committee for further study and report.

At the regular meeting on November 13, Dave C. Moore, vice-president of the University of Finance, appealed to the engineer to assert himself and to strive for his rightful place in the economic life of the nation. John C. Shaw, city engineer, Los Angeles, and each of his department heads, gave short talks on the organization and activities of the Los Angeles city engineer's office. This office has more than 3200 employees and during the last fiscal year planned and constructed nearly \$17,000,000 of permanent pavement, sanitary sewers, storm drains, bridges, tunnels, and viaducts.

The present membership of the section is 540. Its officers are: president, Walter E. Jessup; vice-presidents, A. F. Barnard and Edward R. Bowen; secretary, Ormand A. Stone; and treasurer, Roy L. Anderson.

**Sacramento Section**—At regular weekly luncheons at the Sacramento hotel, the subjects and attendance have been as follows:

August 27, attendance 28; 'Some Engineering Factors Effecting Agriculture', by Harry B. Walker, professor of agricultural engineering, University of California.

September 3, attendance 22; 'Types of Airplane Motors' (illustrated), by Royal U. St. John, president, Sacramento Chapter, American Aeronautical Society.

September 10, attendance 27; 'The Explorations of Jedediah Smith—First American to Cross the Great Desert and Penetrate Upper California in 1826-28', by T. E. Stanton, materials and research engineer, California Division of Highways, Sacramento.

September 14, attendance 31 (special meeting); joined with San Francisco Section in an excursion to inspect the \$12,000,000 Suisun Bay bridge over Carquinez straits, now under construction by the Southern Pacific Co.

September 17, attendance 38; 'Unusual Flow Conditions in Water Conduits and Their Influence on Carrying Capacity' (illustrated), by Fred C. Scobey, senior irrigation engineer, Bureau of Public Roads, U. S. Department of Agriculture.

The San Francisco Section, American Society of Mechanical Engineers, and the California Post of the Army Ordnance Association attended an ordnance field day at the Benicia arsenal on September 19. The program included: tour of exhibits of 500 pieces of ordnance material; lunch; address by David P. Barrows, Maj. Gen. commanding 40th Division, California National Guard; inspection of the world's largest piece of railway artillery (a 14-in. gun on railway mount); program of exhibition firing of small arms and field artillery; inspection of shops, magazines, and storehouses at Benicia arsenal; side trip to the new Suisun bay bridge.



# Construction Review

## HIGHWAY GRADING

By S. J. SANDERS

Editor, Daily Construction News Service

Progress being made on important projects as follows:

### CALIFORNIA STATE HIGHWAY PROJECTS

**Marin County**—Granfield, Farrar & Carlin, of San Francisco, will complete their contract about January 1, 1930, for 4.6 miles grading from San Rafael to Alto, the project at present being over 85% complete. No surfacing is included in this contract. There are several large culverts, one 20-ft. girder and bridge, and five creosoted timber cattle passes. There are two



Constructing Section of California State Highway System in San Bernardino County from Alray to Summit, Gist & Bell, Contractors

major cuts on the project, each containing considerably over 100,000 cu.yd. The cut near the San Rafael end was solid rock, a thorough cut, the maximum depth being 108 ft., while the cut near the Alto end was 1400 ft. long with a maximum cut of 70 ft., being 75% serpentine mixed with large boulders. All cuts were taken out in 12-ft. lifts, this eliminating heavy blasting, which left slopes in excellent condition, and up to date slides have not exceeded 500 cu.yd. The fills were placed in layers, earth being spread 8 in. in depth and rock layers 2 ft. in depth. Each earth layer was watered when necessary and rolled before the next layer was placed. All fills were started at their lowest point and brought up in horizontal layers from there. Major items of equipment include one Bucyrus-Erie 1¼-yd. power shovel, one Bucyrus-Erie 1-yd. power shovel, two ¾-yd. Osgood power shovels, one ¾-yd. Marion power shovel, five tractors, five compressors, two water tanks, one pile driving rig, and thirty 5-yd. trucks. Contract price, \$293,447, involving in the main 423,000 cu.yd. of roadway excavation, 47¢ yd.; 3350 cu.yd. of structure excavation, \$2.00 yd.; and 179,185 mi.yd. of haul, 25¢ yd.

**Calaveras County**—Gabler Construction Co., of Los

Angeles, completed the contract September 19 for 2.2 miles grading from 2 miles and 4 miles south of Mokelumne Hill. Contract price was \$48,773, including 71,400 cu.yd. roadway excavation at 46¢. Major items of equipment included two 1-yd. Koehring No. 301 gas shovels, one Russell grader, one 3-ton White truck, three 5-ton White trucks, one 30 Best tractor, one Ingersoll-Rand air compressor, one Rix air-compressor No. 200, one Schramm air-compressor No. 12744.

**Amador County**—J. P. Holland, Inc., of San Francisco, completed the contract on October 10 for 2.8 miles grading from Drytown to Amador City. The contract called for expenditure of \$99,591, and involved in the main 95,600 cu.yd. of roadway excavation at 68½¢. The main items of equipment included: one 1-yd. Northwest gas shovel, five 5-ton Kleiber trucks, one 30 Best tractor, one 8-ft. Adams grader, and an Ingersoll-Rand air-compressor.

**Tuolumne County**—Lilly, Williard & Biasotti, of Stockton, completed their contract on October 20 for 1.6 miles between Sonora and Sullivan Creek. Equipment used included one 1-yd. model 105 Northwest power shovel, three 3-yd. dump trucks, one 30 Best tractor, one 210 Ingersoll-Rand air-compressor, and one 2-sack Jaeger concrete mixer. Contract was awarded at \$44,075, and called for in the main: 32,700 cu.yd. of roadway excavation at 40¢; 2700 tons of oil-



White Trucks and P&H Dragline on E. C. Coats Contract from Loleta to Beatrice, Humboldt County, for California Division of Highways

treated gravel or stone surfacing at \$3.45; and 3300 tons of crusher run base at \$2.15.

**Humboldt County**—Kennedy & Bayles, of Oakland, have practically completed their contract for grading and surfacing a portion of the Redwood highway between Arcata and Mad river about 3 miles long. Contract price was \$84,705, and involved 61,250 cu.yd. of roadway excavation at 40¢ yd.; 63,270 cu.yd. of im-



ported borrow at 45¢ yd.; and 11,100 tons of crusher run base at \$2.00.

**Humboldt County**—E. C. Coats, of Sacramento, has completed the contract for 3.7 miles grading and surfacing from Loleta to 1 mile north of Beatrice. The contract calls for expenditure of \$83,115, and involved 130,000 cu.yd. of roadway excavation at 40¢; and 26,000 cu.yd. imported borrow at 50¢. Contractor used eleven White trucks, one 206 P&H dragline, one 206 P&H power shovel, two 30 Caterpillar tractors, two 60 Caterpillar tractors, seven gondola scrapers, and two LeTourneau graders. B. T. Millard was superintendent for the contractor.

**San Mateo County—Bayshore Boulevard**—H. W. Rohl has completed his contract for grading 3.5 miles of the Bayshore boulevard from South San Francisco to San Francisco. Major items of equipment used include two 1¼-yd. Northwest 104 shovels, one of which is equipped with a 6-cylinder gas engine; one 1½-yd. P&H 700 gas shovel; one 1¼-yd. P&H 700 diesel shovel; one Northwest 105 crane; one Northwest 104 crane; and one 1-yd. Northwest 105 shovel. Sterling trucks were used exclusively, equipped with Wood hydraulic hoists and steel bodies, four of 10-yd. capacity; there being 17 trucks in use.

Additional equipment on this job included: two Best-McMillan bulldozers, Sullivan air-compressors, and one Ingersoll-Rand portable compressor.

Contract price, \$661,373, involving in the main 805,000 cu.yd. roadway excavation, 48¢ yd.; 11,000,000 sta.yd. of overhaul, ½¢ yd.; 13,750 tons of gravel or stone surfacing (base), \$2.00 ton; 15,030 tons of oil-



P&H 206 Shovel on T. E. Connelly Contract, Nevada and Placer Counties, for California Division of Highways

treated gravel or stone surfacing, \$2.50 ton; 425 cu.yd. of 'A' concrete in subway, \$25.00 yd.; and 1250 cu.yd. of Class 'B' concrete in subway, \$20.00 yd.

**Inyo County**—F. W. Nighbert, of Bakersfield, will complete his contract about February 10, 1930, for 9.8 miles grading and surfacing between Inyo county line and Little Lake. The project as a whole is over 5% complete, while the rough grading is over 25% complete. Contract was awarded at \$111,920, and includes 53,000 cu.yd. of roadway excavation at 40¢; 22,000 tons of crusher run base at \$1.65; and 16,350 tons of gravel or stone surfacing at \$2.07. The contractor is using one 1-yd. Northwest gas shovel, one 60 Best tractor, two 30 Best tractors, one 10-ft. blade;

one 8-ft. blade, and scarifiers, rooters, fresnos, and trucks.

**Mono County**—C. Miles, of Sacramento, will complete the contract about January 1, 1930, for 2.2 miles grading and surfacing from Mattley ranch to Leevining. Grading is over 85% completed, the surfacing will start shortly, and the project as a whole is over 50% finished. The main items of equipment include a crusher, power taper, grader, trucks, etc. Contract price was \$54,567.

**Kern County**—Black & Hagey, of Mojave, and Bartlett & Mathews, of Pasadena, have completed about 40% of their contract for 13.9 miles grading and



Constructing Section of California State Highway System in Marin County, from San Rafael to Alto, Granfield, Farrar & Carlin, Contractors

surfacing from Freeman to north boundary of Kern county. The finishing grading is completed except about two miles at the south end of the project, and on this two miles one-half has been brought to a rough grade. Project will be finished about February 1, 1930. Contractor is using one ¾-yd. and ¼-yd. power shovels, one motor patrol, one tractor, one blade, and a rock-crushing plant. Work will cost \$137,274, and includes 71,200 cu.yd. of roadway excavation at 33¢; 31,100 tons of crusher run base at \$1.50; and 22,700 tons of oil treated gravel or stone surfacing at \$1.90.

**Lassen County**—Doveri & Co. and J. A. Maddox, of Klamath Falls, Ore., will complete their contract about January 1, 1930, for 4.4 miles grading and surfacing from Goodrich to Coppervale. Grading is over 60% complete, and the surfacing was started on October 8. Equipment being used includes one Bucyrus 1-yd. power shovel; one Austin 12-ton gas roller; one 30 Best tractor; one Austin road grader; one Johnson scarifier; one Jaeger concrete mixer; three 5-yd. Sterling dump trucks; one 3-yd. Bernstein dump truck; one Schramm air-compressor; one Symons No. 2 crusher; one Champion jaw crusher No. 6 12 by 24-in.; one Norris K. Davis hoist and Bagley bucket; one 75-hp. Westinghouse motor; five 4-horse fresnos; and two 2-horse fresnos. Contract was awarded at \$68,213, and includes 60,000 cu.yd. roadway excavation at 38¢; and 9150 cu.yd. of untreated creek gravel or stone surfacing at \$2.65.

**Nevada County**—C. R. Adams, Nevada City, has completed the drainage structures and over 90% of the grading in connection with his contract for 11.3



miles of a 24-ft. graded roadbed with crusher run base, 20 ft. wide and 5 in. thick, oil treated, from Nevada City to Washington Road. Project is now over 70% completed and will be finished about April 1, 1930. Surfacing has not yet started. Major items of equipment being used include two 1-yd. P&H power shovels; one gas shovel; one Diesel shovel; one 60 hp. bulldozer; three 5-yd. Autocar trucks; one 3-yd. White truck; one Ingersoll-Rand compressor and three Jackhammers. Contract price \$263,482, involving



Lima '101' Ohio Power Shovel on T. E. Connolly Contract in Nevada and Placer Counties for California Division of Highways

in the main 289,700 cu.yd. of roadway excavation 48¢ yd.; 37,350 tons of crusher run base \$1.80 ton; and 4260 tons of gravel or stone screenings \$2.10 ton.

**Nevada and Placer Counties**—Callahan Construction Co., of Los Angeles, have completed over 75% of their contract for 10.6 miles of a 24-ft. graded roadbed from Indian Springs to Soda Springs. The grading is over 70% completed, the drainage structures are practically finished, but the rubble walls have not been started. Work will be finished about July 1, 1930. Major items of equipment include one Northwest gas shovel, 1-yd. capacity; two P&H gas shovels, ¾-yd. capacity; one 60 Best tractor; one super Mogul grader with 12-ft. blade; eight power dump-trucks with 3-yd. capacity; and three Ingersoll-Rand air-compressors. Contract price, \$242,441, involving in the main 165,000 cu.yd. of roadway excavation, 94¢ yd.; 34,600 cu.yd. borrow excavation, 70¢ yd.; 1300 cu.yd. of dry rubble (retaining walls), \$5.00 yd.; 1225 cu.yd. of rubble masonry (headwalls and retaining walls), \$5.00 yd.; and 1200 lin.ft. of arched masonry parapet, \$5.00 yd.

**Lake County**—Von der Hellen, Pierson and Logan, of Medford, Oregon, will complete their contract about January 1, 1930, for 10.6 miles of 24-ft. graded roadbed, with stone surfacing 20 ft. wide and 6 in. thick from Clear Lake Oaks to Lucerne. Project as a whole is over 85% complete, the grading has been finished, 15% of the stone surfacing has been placed, and the drainage structures, rubble walls, and riprap have been completed. Work was awarded on a bid of \$219,882, and included 51 acres of clearing and grubbing at \$100; 190,000 cu.yd. of roadway excavation at 55¢; 15,550 tons of gravel or stone base at \$1.40; 17,250 tons of gravel or stone oil treated surface at \$2.25; 2310 cu.yd. of rubble masonry in retaining walls at \$10.00; and 2390 lin.ft. of arched masonry parapet at \$4.00.

**Nevada and Placer Counties**—To date T. E. Connelly, of San Francisco, has completed 25% of his

contract for 9.3 miles of a 28-ft. graded roadbed from Airport to Indian Springs. Grading is over 20% completed and the drainage structures have been started. T. E. Connelly is using a P&H power shovel, 1¼-yd. capacity, Model 206; a 101 Lima power shovel (Ohio Power Shovel Co.) 1¼-yd. capacity; one portable compressor; and one Caterpillar tractor. Contoules Construction Co., who have a sub-contract for a portion of the work, are using a 1¼-yd. Osgood power shovel, and Chigris and Sutsos, sub-contractors on the work, are also using a 1¼-yd. Osgood power shovel. A rock wall involving 2500 cu.yd. is being constructed, using a 12-ft. derrick. Project will be completed about October 1, 1930. Contract price was \$396,385 and involved in the main: 475 stations of clearing and grubbing at \$30.00; 57,000 cu.yd. of roadway excavation, Location A at 56¢; 275,000 cu.yd. of roadway excavation, Location B at 70¢; 81,500 cu.yd. of roadway excavation, Location C at \$1.22; 1,498,000 sta.yd. of overhaul at 1¢; and 2350 cu.yd. of rubble masonry at \$12.00.

**El Dorado County**—Nate Lovelace, of Berkeley, has just started his contract for 1.8 miles of highway from Bayview Rest to Eagle Falls. Work consists of constructing a 24-ft. graded roadbed with selected surfacing 24 ft. wide and 6 in. thick, also drainage structures, walls, parapet, and curbing. Project will be



Link-Belt Shovel on A. J. and J. L. Fairbanks Contract, Yuba Pass National Highways, Sierra County, California, for Bureau of Public Roads

completed about January 1, 1931. Contract price was \$179,936, the unit bids submitted being published in Unit Bid Summary, issue of September 25.

**San Bernardino County**—Good progress is being made by Gist & Bell, of Arcadia, on their contract for 3.8 miles grading from Alray to Summit.

During the month ending September 25 the contractor moved 62,000 cu.yd. of roadway excavation. The work is progressing according to schedule and there is every indication that the job will be completed before the contract time expires (February 6, 1930).

This job is distinctive because of the heavy yardage of roadway excavation in the upper two miles of the project. The roadway cuts across a series of ridges and defiles as it approaches the summit of Cajon Pass. There being no side hill or overcast work, it is necessary that all excavation material be transported to adjacent embankments. Cuts and fills range from nothing to over 150 ft. in depth in short distances and the material must be transported over temporary



roads or by special equipment. The average length of haul is approximately 500 ft. There are 401,500 cu.yd. of roadway excavation included in the contract. The material consists of a cemented sand and gravel hard enough in places to make tough going for the contractor's power shovels, but it does not require shooting.

The major equipment in use on this job consists of three 1¼-yd. power shovels, eight 5-yd. dump trucks, one 60-hp. tractor, one 4-yd. hydraulic dirt mover, and one air-compressor. About 58 men are employed.

Contract price was \$127,029, involving 401,500 cu.yd. of roadway excavation at 27¢.

**San Bernardino County**—Geo. Herz Co., of San Bernardino, starting grading on September 3, 1929, in connection with their contract for grading and surfacing from Barstow to Yermo. Project will be completed about June 17, 1930. Work will cost \$169,695 and involves: 40,900 cu.yd. of roadway excavation (Location A) at 60¢; 129,000 cu.yd. of roadway excavation (Location B) at 27¢; and 34,000 tons of oil treated crushed gravel or stone surfacing at \$1.70.

The major equipment in use on this job consists of two Ball wagon graders, one 6-yd. LeTourneau grader, four tractors, one 10-ft. Galion blade, twenty head of stock, two power shovels, one compressor, and four trucks. Forty men are employed.

C. H. Purcell is engineer of the California Division of Highways with headquarters at Sacramento.

#### U.S. BUREAU OF PUBLIC ROADS, CALIFORNIA

**Alder Creek-Eleven Mile Section, Yosemite National Park**—W. A. Bechtel Co., of San Francisco, has completed the contract for 4.98 miles of the Alder Creek-Eleven Mile grading project in Yosemite Na-



Thew Shovel of T. E. Connolly Contract, Glenbrook Project, Tahoe National Forest, Nevada, for Bureau of Public Roads

tional Park. Contract called for expenditure of \$107,094, involving 125,000 cu.yd. roadway excavation at 72½¢.

The equipment on the job consisted of two Northwest 1-yd. gas shovels, one Northwest diesel, 7/8-yd. shovel, one Bucyrus 20-B gas shovel, three air-compressors, one air sharpener and gasoline forge, one 60 Best tractor with bulldozer, one 12-ft. Russell blade, six Sterling and White dump trucks, service truck, Lincoln stable-arc electric welder, and 85 men.

The handling of the traffic has been a problem, but was satisfactorily solved by closing the road to traffic

between 4 p.m. and 9 a.m. and working a night shift. Good weather was encountered throughout the contract time and a minimum of delay was had due to wet weather.

**El Dorado County**—Nate Lovelace, of Berkeley, will complete his contract about December 1 for 4.2 miles of the Strawberry-Phillips section of the Placerville-Lake Tahoe National Forest highway. The comple-



Power Shovel on Fairbanks Contract for Bureau of Public Roads in Lassen National Forest, Shasta County

tion of this work will eliminate the old Slippery Ford Grade, and provide a scenic highway with excellent alignment on a ruling 5% grade.

Contractor's equipment consists of one 1-yd. No. 600 P&H gas shovel, one ¾-yd. Northwest gas shovel, one ½-yd. P&H gas shovel, three Rix 125-cu.ft. compressors, one 30-hp. caterpillar, one 2-ton caterpillar, five Autocar 4-yd. dump trucks. Contract included 102,765 cu.yd. excavation, \$1.08 yd., and 27 acres clearing, \$200 acre.

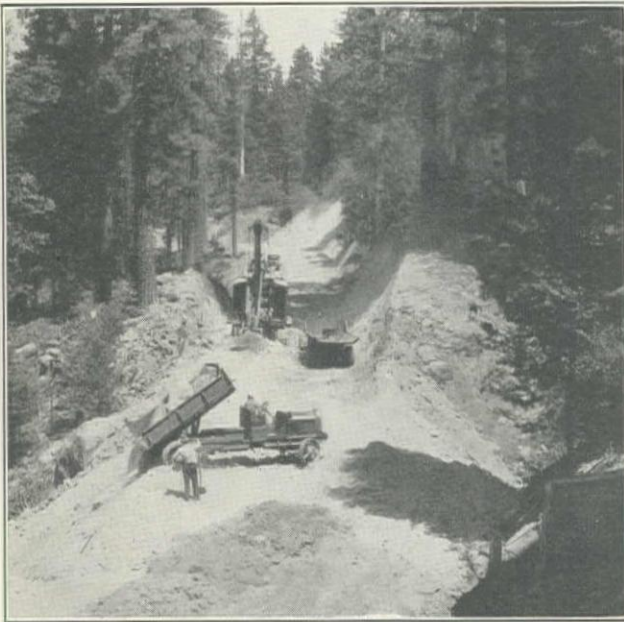
**Lassen National Park, Tehama County**—C. R. Johnson, of Portland, Ore., has practically finished the contract for 12.36 miles of the Morgan Springs section of the Paynes Creek-Susanville National Forest highway in the Lassen National Forest. The cost of project was \$258,953, involving 110,000 cu.yd. roadway excavation at 62¢; 69 acres of clearing at \$450; 30,210 cu.yd. rock or gravel surfacing at \$2.43; and 1058 cu.yd. of class A concrete at \$34.00. Contractor's equipment included one Bucyrus 1¼-yd. diesel shovel, one Erie power shovel, four McMillan scrapers, one LeTourneau scraper, four 60 caterpillar tractors, one 12-ft. Austin grader, two 8-ft. Russell graders, two compressors, one 30-hp. tractor with bulldozer, two concrete mixers, one Russell crushing and screening plant, one Grant Universal primary crusher, one dragline, two motors, and seven 4 and 5-yd. trucks for gravel hauling.

**Yuba Pass National Forest, Sierra County**—A. J. & J. L. Fairbanks, of South San Francisco, will complete the contract about January 1, 1930, for grading 5½ miles of the Sierra City-Ladies Canyon section of the Yuba Pass National Forest highway in Sierra county. Equipment being used includes one Link Belt 1¼-yd.



gas shovel, three 5-ton trucks, one 2-hammer Rix compressor, one 1-hammer Rix compressor, one Holt 60 tractor, one Adams 8-ft. blade, one portable Universal mixer, one Koehler light plant. Contract awarded at \$74,347, involving 99,200 cu.yd. roadway excavation at 58¢.

**Eleven Mile-Grouse Creek Section, Yosemite National Park**—Welsh & Murdock, of Oakland, started



Northwest Diesel Shovel on Alder Creek-Eleven Mile Section, Yosemite Valley, for Bureau of Public Roads, W. A. Bechtel Company, Contractors

their contract on September 26, 1929, for 6.59 miles grading Eleven Mile-Grouse Creek section of the Wawona Road 2A3, Yosemite Park. Contract time is 300 calendar days exclusive of winter shut-down. Grading is under way at Grouse creek at one end of the project, and at Chinquapin Summit. While traffic at the present time is light, the sections of the new grade interfering with the old road will be completed at once so as to inconvenience next year's traffic as little as possible. Work is under way on placing two 4 by 4-ft. reinforced concrete box culverts at Avalanche and Grouse creeks. All concrete work will be finished this season. Contractor is using one P&H 600 diesel shovel, one Thew 60 gas shovel, five dump trucks, one compressor, and a 30 caterpillar tractor with bulldozer attachment. Project will be completed about January 1, 1931. Work will involve an expenditure of \$189,882, including 230,000 cu.yd. of roadway excavation at 63¢; and 16,000 cu.yd. of type B roadway excavation at \$1.10.

**Tahoe National Forest, Douglas County, Nevada**—T. E. Connolly, of San Francisco, has completed contract for 1 mile of grading and 3.087 miles surfacing Glenbrook project, in the Tahoe National Forest, Douglas county, Nevada. The project is on the east side of Lake Tahoe, near Glenbrook, and is a part of the Placerville-Carson City highway. Contract was awarded at \$50,033. A 1¼-cu.yd. Thew gas shovel was used to do the grading, with two 4-cu.yd. Mack dump body pneumatic tired trucks. One 5-cu.yd. White dump body truck, used with the Thew shovel on excavation and on hauling the surfacing material.

Other equipment included one No. 5 Rix compressor with two jackhammers; one rock crusher, No. 8A, Tel-smith; one rock crusher, No. 32A, Tel-smith; one bucket conveyor; one rotary screen, 14 ft. long, 1-in. holes; one power plant for crushers, conveyor, and screen; a Holt 75; one rock bin, or bunker, 12 by 20 by 14 ft.; cars and track from quarry to primary crusher. The quarry and plant was located at roadside between Stations 40-50 and 42-50. The rock was granite, somewhat hard, with maximum cut above road grade of over 80 ft. A trap, constructed of logs, 10-in. to 14-in. diameter, extended around the toe of the quarry at road grade. The deck of the trap was supported by post bents, about 5 ft. high, under which one car was operated. The material was shot down from the quarry slope and was worked to trap. A cushion of quarry material 2 ft. thick was always on the deck of the trap.

**Placerville-Lake Tahoe Highway, El Dorado County**—G. E. Finnell, of Sacramento, has excavated over one-half of the total yardage to date, and will complete his contract about June 1, 1930, for 2.3 miles grading Section C, Riverton-Kyburz section of the Placerville to Lake Tahoe highway. Grading operations were started on July 8, 1929. Shaping of the rough grade and finishing is under way on the easterly 2.3 miles of the project, and 2000 cu.yd. of cement rubble masonry has been completed. Crushed rock for surfacing the west end of the project is being stockpiled near the quarry site pending the completion



P&H Shovel and Autocar Truck in Granite Cut, Strawberry Phillips Section of Placerville-Tahoe Highway, El Dorado County, California, for Bureau of Public Roads, Nate Lovelace, Contractor

of the grading. The project is approximately 50% complete. Contract price was \$243,529 and the major items of construction are 207,000 cu.yd. of unclassified excavation at 73¢; 2800 cu.yd. of cement rubble masonry at \$12.00; and 9000 cu.yd. of crushed rock surfacing at \$3.05. The following equipment is in use on the work: three 1¼-yd. Osgood gas shovels, one 1-yd. Osgood gas shovel, one ½-yd. Orton gas shovel, four Best 60 tractors, eight 5-ton trucks, four 7-yd. caterpillar dump wagons, five compressors. The crushing plant consists of one No. 2 and one No. 5 Tel-smith gyratory crushers, with a Holt 75 motor furnishing the power.

**Quincy-Beckwith National Highway, Plumas County**



—Good progress is being made by D. McDonald, of Sacramento, on the Greenhorn Creek-Spring Garden section of the Quincy-Beckwith National Forest highway in Plumas county. Contract price was \$69,065. The project consists of grading of 6.62 miles of highway between Quincy and Spring Garden, California. The work involved is composed of 100,000 cu.yd. of unclassified excavation at 52¢, with incidental items such as the construction of two reinforced concrete box culverts and a large number of pipe culverts with concrete headwalls and the piling of logs left from previous clearing operations. Grading was begun on July 16, 1929, and it is expected that the work will be finished this season, probably about December 1. The equipment used on the project is as follows: one 1½-yd. P&H gas shovel, one 1-yd. P&H diesel shovel, six Autocar dump trucks, one 3-hammer Ingersoll-Rand compressor, one 60 Caterpillar tractor with McMillan dirt mover attachments, one 30 Caterpillar tractor with bulldozer attachment, one 12-ft. blade grader, one 9-ft. blade grader, one Little Wonder ½-sack concrete mixer, one White utility truck, one Ford utility truck, one Ruggles truck with concrete crew, and miscellaneous small tools.

**Lassen National Highway, Shasta County**—A. J. & J. L. Fairbanks, of South San Francisco, has completed over 60% of their contract for 4.58 miles of Lassen Highway system in Lassen Volcanic National Park, Shasta county, Route No. 1, Section C-4. Construction on this project closed for the 1929 construction season on October 19, 1929. Major equipment used on this project consisted of: one P&H 600 shovel, diesel operated; two Sterling trucks, 5-cu.yd. capacity; one Autocar, 5-cu.yd. capacity; one Ingersoll-Rand



Constructing Bernal Cut Project for City and County of San Francisco, MacDonald & Kahn, Contractors, Showing Austin Trencher in Operation

compressor, 2-hammer; one Caterpillar tractor 60; one Caterpillar tractor 30; and one 8-ft. Galion blade. Completion of this section will complete the original length of Route No. 1, which consists of a scenic drive beginning at the Park boundary near Mineral, Calif., known as the Southwest entrance. Through the park the route touches many points of interest and terminates at the northwest entrance near Viola, Calif. This section has a minimum of 22-ft. roadway and will be surfaced 16 ft. wide. Excavation is approximately 50% solid rock of dacite and lava composition. Work was awarded at \$68,273, and involves in the main 83,000 cu.yd. of roadway excavation at 69¢. C. H. Sweetser

is district engineer of Bureau of Public Roads with headquarters at San Francisco.

### BERNAL CUT, SAN FRANCISCO

MacDonald & Kahn, of San Francisco, will complete the contract for construction of Bernal Cut project for the City and County of San Francisco about April, 1930. Progress to date is as follows: Grading (250,000 yd.) 95% complete, sewers 71% complete, retaining walls 53% complete, Bosworth bridge 90% com-



Bucyrus Erie 50 B Shovel, Equipped with 100 hp. Atlas Diesel Engine, Loading Le Tourneau 16-yd. Dump Carts, North Approach to Southern Pacific R.R. Bridge Over Suisun Bay, R. G. Le Tourneau, Contractor

plete, Highland bridge 90% complete, Richland bridge 95% complete.

The greater part of the excavation was done with a Northwest dragline of 1-yd. capacity. At the present time three Marion power shovels and 22 trucks are being used, and the sewer trenching is being done with an Austin trenching machine. Project is to be 4200 ft. long. Contract price \$504,729, involving in the main: Bosworth Street bridge, involving 6400 cu.yd. of concrete, \$22.00 yd.; and 692,000 lb. of reinforcing steel, 3.6¢ lb.; Highland Ave. bridge, involving 1242 cu.yd. of concrete, \$25.00 yd.; and 183,000 lb. of reinforcing steel, 3.6¢ lb.; walls, involving 5300 ft. of rubble masonry, \$5.50 yd.; 250,000 cu.yd. of excavation, 48¢ yd.; and 75,000 cu.yd. of excavation (Alemany Boulevard fill), 20¢ yd.; as well as vitrified sewers, paving, etc. M. M. O'Shaughnessy is city engineer of San Francisco.

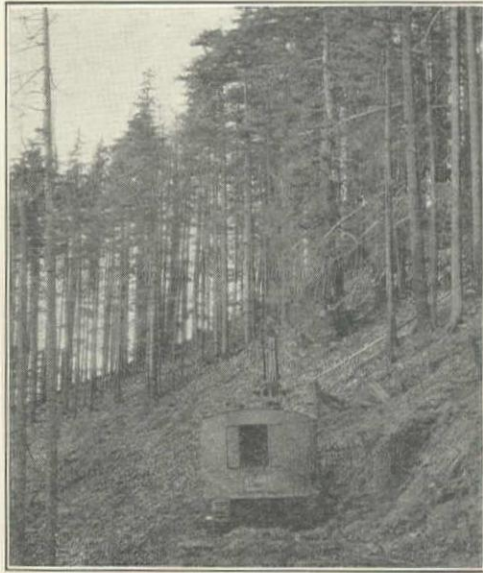
### LOS ANGELES COUNTY PROJECTS, CALIFORNIA

**Glendora Mountain Road**—M. S. Ross, of Los Angeles, has completed over 25% of the grading and 15% of the culverts in connection with his contract for grading 5.17 miles of Glendora Mountain road, southwest from Camp Bonita on east fork of San Gabriel canyon near the city of Glendora. Contractor is using two Bucyrus steam shovels and one Marion steam shovel working 8 hours per day. Other equipment being used includes one 60-hp. Caterpillar tractor with bulldozer, six dump trucks, and two portable compressors. Most of the material encountered so far is being dug with steam shovel without previous shooting. Work will cost \$220,323, and involves in the main 600,000 cu.yd. of roadway excavation at 31¢. E. A. Burt is construction engineer for the Los Angeles County Road Department.



**BUREAU OF PUBLIC ROADS, WASHINGTON**

**Round Pass Section, Mt. Rainier National Park—**Joplin & Eldon, of Portland, Ore., have completed the grading, and surfacing is underway on their contract for 9 miles grading and surfacing of the Round Pass section, West Side highway in Mt. Rainier National Park. Project as a whole is over 90% complete, and will be finished about December 1, 1929. Three power shovels were used, including one  $\frac{3}{4}$ -yd. Marion, also trucks, and tractors. Contract price was \$304,094, involving in the main 317,000 cu.yd. of excavation at



Northwest Shovel on Klapatche Ridge Section Mt. Rainier National Park, Washington, for Bureau of Public Roads, A. C. Greenwood, Contractor

58¢; 12,800 cu.yd. of crushed rock bottom course, surfacing at \$2.40; and 11,000 cu.yd. of crushed rock, top course, surfacing at \$2.55.

**Klapatche Ridge Section, Mt. Rainier National Park—**A. C. Greenwood, of Portland, will complete his contract about January 15, for grading 4 miles of the Klapatche Ridge section, West Side highway in Mt. Rainier National Park. Project as a whole is over 75% completed. The contractor is using two power shovels, working double shift, four trucks, and three compressors. Work will cost \$217,000, and involve 220,000 cu.yd. of roadway excavation.

**White River Road, Mt. Rainier National Park—**Three contracts are in progress on this road. The Lidal Construction Co. have a contract for grading about 4.1 miles from the White River crossing toward the Park boundary, which contract will be finished about December 1, 1929. One power shovel, two trucks, one compressor, and six teams are being used. A. C. Goerig has a contract awarded at \$126,960 for Section 3B3 of the White River crossing road, and is using two gas shovels, and trucks. This contract will be completed about July 1, 1930. A. C. Goerig also has a contract for grading 1.3 miles which joins with the Lidal contract on the lower end and extends to a connection with the State road. This contract is practically finished, and the contractor used one power shovel, one tractor and blade, and 35 men were employed.

W. H. Lynch is district engineer of the Bureau of Public Roads with headquarters at Portland, Ore.

**SEPULVEDA BLVD. TUNNEL, LOS ANGELES**

J. G. Donovan & Sons, of Los Angeles, will complete their contract about October 1, 1930, for constructing Sepulveda Blvd. tunnel under Mulholland drive and grading roadway in connection therewith. The contracts call for expenditure of \$536,930, and includes 599 lin.ft. cross section 1, including tunnel excavation at \$280; and 501,297 cu.yd. of roadway excavation at 44¢.

At north portal, three drifts are being driven at a rate of about ten feet per day. As this operation has started but recently, no grading has been done inside the tunnel. Material from these bores is carried to the dump by dump cars drawn by a Whitcomb locomotive, type M. O. Grading of the approach to the north portal is proceeding rapidly, one shovel and two tractor trucks being utilized for this work.

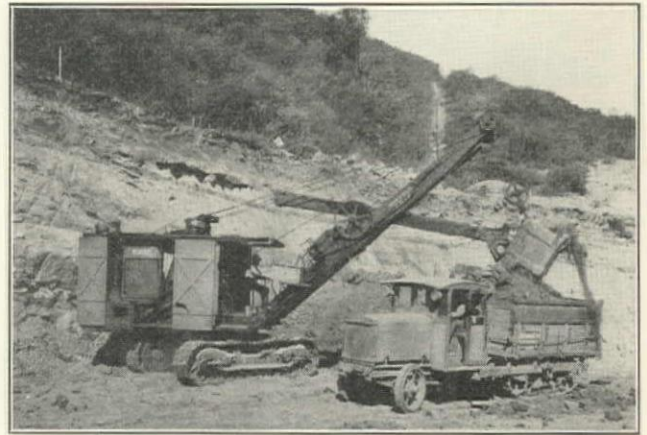
The bore has not been started at the south portal, as the work of facing has not been completed. Equipment includes:

Two Erie steam shovels,  $\frac{3}{4}$ -yd. capacity, one Northwest shovel,  $1\frac{1}{4}$ -yd. capacity, two Erie shovels,  $1\frac{1}{4}$ -yd. capacity, four Linn tractor trucks, 8 cu.yd. capacity, four Republic trucks, one Ingersoll-Rand compressor, 8 by 10 in., one Chicago Pneumatic compressor, 8 by 10 in., one Whitcomb locomotive, type M. O., sixteen dump trucks.

John C. Shaw is City Engineer of Los Angeles.

**COLORADO STATE HIGHWAY PROJECTS**

**El Paso and Pueblo Counties—**M. E. Carlson, of Denver, Colorado, will complete the contract about



Bucyrus Erie Power Shovel Excavating Approach to North Portal of Sepulveda Boulevard Tunnel Under Mulholland Highway for City of Los Angeles, J. G. Donovan & Sons, Contractors

March 1, 1930, for grading 15.5 miles from Pueblo to Buttes. Good progress has been made on the roadway grading, and the grading of the detour has been complete. Equipment includes two blacksmith shops, small tools, and 18 wheelbarrows, one steam shovel, one tractor, one elev. grader, four large trucks, eight small trucks, three concrete mixers, and one mixer at underpass, two blades, three tank wagons, nine plows, ten dump wagons, twenty-two fresnoes, two concrete carts, one screening plant.

Contract will cost \$218,277, and includes 154,000



cu.yd. of common excavation at 20¢; 75,750 cu.yd. of borrow at 20¢; 7800 cu.yd. detour surfacing at \$1.75; 3039 cu.yd. of class A concrete at \$16.00; 350,000 lb. of reinforcing steel at 4.75¢, and 514,000 lb. of structural steel at 6¢.

**El Paso County**—J. L. Busselle, of Colorado Springs, will complete the contract about March 1, 1930, for 10 miles grading north of Colorado Springs. Equipment being used:

Three Fordson tractors, ¾-yd. Koehring shovel, tractor, Johnson sand and rock bins, seven-sack Koehring mixers, sand screening plant, and elevating grader.

Contract price, \$221,389, involving 53,600 cu.yd. of common excavation at 19¢; 104,800 cu.yd. of borrow at 18¢; 3288 cu.yd. of class A concrete at \$16.50; 444,450 lb. reinforcing steel at 5¢; and 857,800 lb. of structural steel at 5¢.

**Mesa County**—Hinman Bros. Construction Co., of Denver, Colorado, will complete contract about May 1, 1930, for grading and surfacing 9.9 miles southwest of Debeque. Contractor is using two gas shovels, two compressors, two blacksmith forges, six trucks, and one pile driver. Work will cost \$312,453, and includes 253,000 cu.yd. unclassified excavation at 73¢; 55,300

volving 400,000 cu.yd. of excavation. Project was started on July 20, 1929. Equipment being used includes one 2-yd. Bucyrus-Erie excavator, powered with a 100-hp. Atlas diesel engine, 60-hp. Caterpillar tractors, LeTourneau bulldozers, and 16-yd. LeTourneau dump-carts. Record run was made on September 3,



Constructing North Fork-Payette Highway, Idaho, for Bureau of Public Roads, J. A. Terteling & Sons, Contractors

when 276 loads were moved in one 11-hour shift, the total yardage for the day being 6060. This amount of compacted material was excavated by the Bucyrus-Erie diesel powered shovel, and hauled 1500 ft. by six dumpcarts.

#### MARICOPA-CARPINTERIA ROAD, CALIFORNIA

Bert Calvert, of Los Angeles, will complete his contract about January 1, 1930, for the construction of 17 miles of road in Cuyama River valley, the first unit of road for Joint Highway District No. 9, to be known as the Maricopa-Ventura-Carpinteria road. Contractor is using one Northwest 1-yd. shovel; one Osgood 1¼-yd. shovel; one 60 Best tractor; and one Ingersoll-Rand compressor. Lumber for bridges will be shipped to Port San Luis and hauled to the job by truck a distance of 120 miles. Contract price \$124,506, involving in the main 230,000 cu.yd. of roadway excavation, 24½¢ yd.; as well as corrugated culverts and timber bridges. C. W. Petit is engineer for Joint Highway District No. 9. Project at present is over 75% finished.

#### UTAH STATE HIGHWAY PROJECTS

**Carbon and Utah Counties**—Morrison and Knudsen, of Boise, Idaho, have just started the contract for 6.14 miles of grading from Nolan to Beaver Creek for the Utah State Road Commission. Contractor is using one steam shovel, a gas shovel, and a power dragline. Project will be finished about September 1, 1930. Work will cost \$183,276, including 212,000 cu.yd. of roadway excavation at 59¢; and 1090 cu.yd. of cement rubble masonry at \$12.00. H. S. Kerr is state highway engineer of Utah.

#### WASHINGTON STATE HIGHWAY PROJECTS

**Kittitas County**—John Slotte Co., Inc., Cle Elum,



P&H Diesel Shovel on Quincy-Beckwith National Highway, Tehama County, for Bureau of Public Roads, D. McDonald, Contractor

cu.yd. borrow at 33¢; and 23,500 cu.yd. of gravel surfacing at \$1.60.

L. D. Blauvelt is State Highway Engineer of Colorado.

#### BUREAU OF PUBLIC ROADS, IDAHO

**North Fork-Payette Forest Highway**—J. A. Terteling & Sons, of Moscow, Idaho, have completed over 80% of their contract for grading the North Fork-Payette Forest Highway Project No. 23A2 located in the Payette National Forest, Valley county, Idaho. Project will be finished December 1, 1929. Equipment in use includes one 1-yd. diesel shovel, seven trucks, and two compressors. Work will cost \$106,261, and includes 113,290 cu.yd. of roadway excavation at 78½¢. B. J. Finch is district engineer of the Bureau of Public Roads with headquarters at Ogden, Utah.

#### APPROACH TO SUISUN BAY BRIDGE, CALIFORNIA

**North Approach**—R. G. LeTourneau, of Stockton, will complete the contract soon for grading the north approach of the Suisun Bay bridge from Suisun Point to Army Point for the Southern Pacific Company, in-



Wash., will complete their contract about May 1, 1930, for 4.25 miles grading Station Road No. 3 from Bristol east, to date project being over 35% finished.

Major items of equipment: One 1¼-yd. gas shovel, one 1-yd. gas shovel, three 1½-yd. trucks, two compressors. This project is a section of the new location of State Road No. 3, following the Yakima River canyon. The contract involves the construction of a high cement rubble retaining wall containing 2200 cu.yd. of masonry to support the roadway above the railway.

Work was awarded at \$139,786.

**Jefferson County**—C. J. Erickson, of Seattle, has practically finished the contract for 7.5 miles grading State Road No. 9 from Bogachiel to Hoh river, to cost \$278,000. Contractor is using gas shovels, and Fordson dinkeys and cars.

On account of the heavy growth of timber and vegetation, stripping of the right-of-way was required for a width of approximately 60 ft. before the grading op-



Morse Creek to Crystal Creek Section, Yakima and Pierce Counties, for Washington Highway Commission, After Shooting Cut at Station 40, Von der Hellen & Pierson, Contractors

erations began. The stripping operation consists of removing all vegetation and organic matter and piling the material on the edge of the right-of-way. The average depth of this stripping is 18 to 24 in. One of the great difficulties encountered on this work is the transportation of materials and supplies.

**Jefferson County**—Work on 11.7 miles of State Road No. 9 from Cedar river to Hoh river will be finished about December 1, 1930, at present being over 25% finished. Work will cost \$388,000. This section was let under two projects—one to C. J. Erickson, Seattle, and the other to Strong & McDonald, Tacoma.

Major items of equipment: Bagley scraper, one 1¼-yd. Northwest gas shovel with drag line attachment, Fordson, dinkeys and cars, also tractors and Caterpillar trailers. Materials and supplies have been transported over the beach by means of Caterpillars and Caterpillar trailers. The operation of any machinery on the beach is costly owing to the rusting of the metal parts of the machinery from salt water action.

**Yakima and Pierce Counties**—Von der Hellen and Pierson of Medford, Oregon, will complete their contract about March 31, 1931, for 15.6 miles of State Road No. 3 from Morse creek to Crystal creek, to date project being over 20% finished. Work was awarded at a cost of \$729,740.

The general progress of the work has been satisfactory and is in good shape so that work can be carried

on to advantage on both the east and west slopes of Cascade mountains as soon as the snow leaves in the spring.

Major items of equipment: Three 1¼-yd. Thew shovels, one ¾-yd. Thew shovel, one 1-yd. Bucyrus shovel, six Chicago Pneumatic compressors, three Sullivan compressors, two Ingersoll-Rand compressors, one Gardner-Denver compressor, four 4-yd. Auto-car trucks, and eight trucks of various sizes and makes. The contract covers one of the most rugged sections of state highway across the Cascade mountains. The principal items of work involved in this contract are the moving of 790,000 cu.yd. of material, 80% of which is solid rock; the placing of 10,000 lin.ft. of culvert pipe, some as high as 60 in. diam.; the construction of a timber bridge over Deadwood creek, about 90 ft. high; and placing of 10,000 cu.yd. of crushed rock surfacing. A difficult problem confronting the contractor was to get his equipment to the project. Shovels were unloaded at the nearest point, proceeded to the work under their own power, and then dug their way into various portions of the work. Due to the altitude, which reaches the 5400-ft. level, some doubt was felt as to the operating efficiency of the compressors; however, no difficulty was experienced from this feature.

Weather conditions have been favorable this fall and the contractor expects to continue operations until snowed in, which will be about December 1.

**Kittitas County**—Edward J. Dunnigan, Inc., of Seattle, will complete the contract about September 1, 1930, for 5.2 miles grading State Road No. 3 in Lake Keechelus vicinity. To date the work is over 45% finished, the contract price being \$239,705.

Major items of equipment: one 1-cu.yd. gas shovel, four 1¼-cu.yd. gas shovels, eight compressors, two 8-cu.yd. trucks, tractor type, seven 4-cu.yd. trucks.

This project is a portion of the main east and west highway between Snoqualmie Pass and Easton which is being constructed along the shores of Lake Keechelus. Heavy rock construction is involved. One of the difficult problems encountered on this project is the necessity of maintaining traffic while the heavy work is being done. The greater improvement follows closely to and in some places includes the existing traveled road, and no detours can be provided. The contractor is required to keep the road open to traffic except during the night period for the first four days of each week when he is permitted to close the road between the hours of 10 p.m. and 8 a.m. of the following day. This system works satisfactorily to the advantage of both the contractor and the traveling public.

**Wahkiakum County**—Myers & Goulter, of Cathlamet, Washington, will complete their contract about October 1, 1930, for 5.5 miles of State Road No. 12 from Nassa Point to Eagle Cliff at a cost of \$270,274. Work has just been started and contractor has two 1¼-yd. power shovels and four trucks on the work. Owing to the danger of spreading fires from clearing operations the work has not progressed as rapidly as contemplated.



Samuel J. Humes is director of highways for the state of Washington with headquarters at Olympia.

### OREGON STATE HIGHWAY PROJECTS

**Lincoln County**—Edlefsen-Weygandt Co., of Portland, have completed 1480 lin.ft. of concrete seawall and moved 50,000 cu.yd. of excavation in connection with the contract for 8.72 miles grading Waldport-Yachats Section of the Roosevelt Coast Highway. Project will be finished about May 31, 1930. Contractor is using one P&H power shovel, one 30 Caterpillar tractor, and one 20 Caterpillar tractor. Work will cost \$126,987, including clearing and grubbing at \$15,400, 146,000 cu.yd. of common excavation at 27¢, and 14,000 cu.yd. of rock excavation at \$1.00.

**Jackson County**—Washburn & Hall, of Portland, have completed over 40% of the grading in connection with their contract for 6.67 miles regrading and surfacing of Keene Creek-Jenny Creek Section of the Green Springs highway. Contract price was \$132,117. Contractor is employing 38 men, and using one Marion gas-electric power shovel, five trucks, and two tractors. Crushing plant has been set up and includes one Fairbanks Morse 120-hp. Diesel engine, a Universal jaw crusher, and 8-in. bulldog gyratory crusher. Clearing has been finished, the tractors being used to pile the logs and remove boulders.

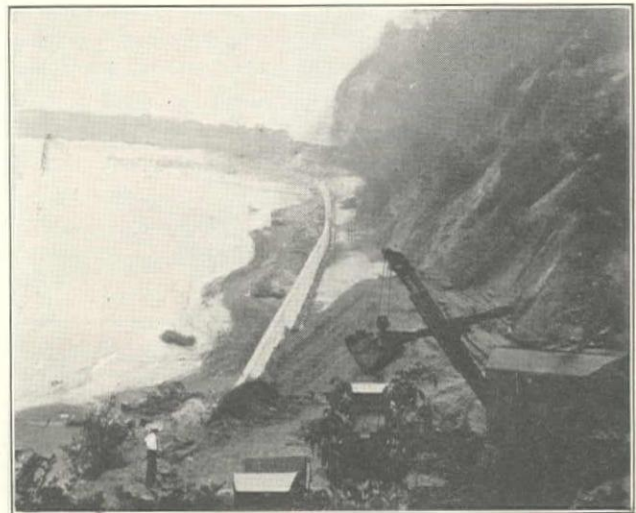
**Lane County**—Slate Construction Co., of Albany, Oregon, will complete their contract about September 30, 1930, for 3.31 miles grading Black Canyon section of the Willamette highway. Contract is employing 40 men, and is using two trucks, two power shovels, and an air-compressor. To date over 25,000 cu.yd. of material has been excavated. Contract was awarded at \$138,029, and includes 139,000 cu.yd. roadway excavation at 70¢.

**Wheeler County**—H. E. Cornell, of Boise, Idaho, has moved about 30,000 of a total of 160,000 cu.yd. of material in connection with his contract for 6.95 miles of grading the Fort Creek-Barnhouse Ranch section of the Ochoco highway. Contractor's force averages 29 men; and one power shovel, three trucks, and one air-compressor are being used. Contract calls for expenditure of \$117,645, involving 27,000 cu.yd. of common excavation at 25¢; 36,000 cu.yd. of intermediate excavation at 40¢; and 91,000 cu.yd. rock excavation at 85¢. Work will be finished about August 1, 1930.

**Douglas County**—To date Peck & Einerson, of Hoquiam, Wash., have moved 35,000 cu.yd. of a total of 247,000 cu.yd. of material to be excavated in connection with their contract for grading 10.1 miles of the Red Bridge-Drain section of the Umpqua highway in Douglas county. The present force averages 26 men, and the contractors are using four teams, one power shovel, and three trucks, and intend to place two more power shovels on the work in the spring of 1930. Project will be finished September 30, 1930, and will cost \$155,972, including 117,300 cu.yd. of common excavation at 33¢; 52,000 cu.yd. of intermediate excavation at 33¢; and 77,500 cu.yd. of rock excavation at 85¢.

**Union and Umatilla Counties**—E. L. Gates, of South Beach, Ore., has moved about 30,000 cu.yd. of a total of 253,000 cu.yd. of material to be excavated in

connection with the contract for regrading 14.53 miles of the Kamela-Hilgard section of the Old Oregon Trail. Contractor's force comprises 40 men, and equipment being used includes four tractors, one power shovel, four trucks, and four tumble bug fresnoes. Clearing and burning has been finished, and the shovel is working double shift using lights and flagmen. Two compressors have drilled about 2½ miles of the project. Part of this project borders on the main line of the O.W.R.R. & N. Co. tracks, requiring contractor to use care in blasting operations.



Seawall on Waldport-Yachats Section, Oregon Highway System, Edlefsen-Weygandt Company, Contractors

Work was awarded at a cost of \$172,591, and involves in the main 41,000 cu.yd. of common excavation at 35¢; 74,000 cu.yd. intermediate excavation at 45¢; and 138,000 cu.yd. rock excavation at 75¢. Project will be finished about September 1, 1930.

**Lincoln and Tillamook Counties**—Clearing and grubbing operations are under way and grading will start shortly by contractors, Milne & Dussault, of Portland, Ore., in connection with the contract for 10.94 miles regrading and resurfacing of the Nesko-win-Otis section of the Roosevelt Coast highway. Contract calls for expenditure of \$128,792, and includes 60,000 cu.yd. of 'A' roadway excavation at 50¢; 17,500 cu.yd. of sub-base surfacing at \$1.05; 8200 cu.yd. of base course surfacing at \$1.05; and 5000 cu.yd. of top course surfacing at \$1.05. Work will be completed November 1, 1930.

Roy A. Klein is state highway engineer of Oregon.

### BUREAU OF PUBLIC ROADS, COLORADO

**Rocky Mountain National Park**—W. A. Colt & Sons, of Las Animas, Colorado, have just started their contract for 17.2 miles of mountain highway, Rocky Mountain-Trail Ridge section of the Fall River Pass highway in the Rocky Mountain National Park. Most of the contractors' operations this fall are temporary work preparing the project for next season. Present equipment includes a 1¼-yd. Thew gas shovel, and various hauling equipment. Contractor will probably place three gas shovels on the project in the spring. Work will be finished in 1931 and calls for expenditure of \$393,674, including 70 acres of clearing at \$250; 50 acres of grubbing at \$100; 267,500 cu.yd. of class 'A'

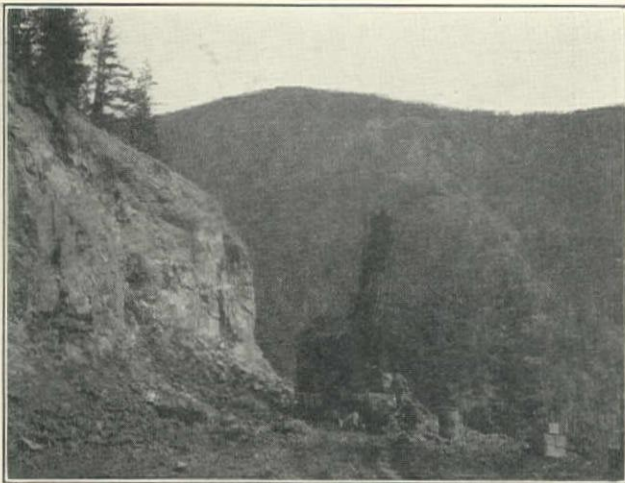


roadway excavation at 83¢; and 64,000 cu.yd. of class 'B' roadway excavation at \$1.40. A. E. Palen is acting district engineer for the Bureau of Public Roads with headquarters at Denver, Colorado.

#### BUREAU OF PUBLIC ROADS, WYOMING

**Yellowstone National Park**—Morrison-Knudsen Co., of Boise, Idaho, will complete their contract during the summer of 1931 for 5 miles of grading and 11 miles of surfacing East Entrance Project in Yellowstone National Park, Wyoming, Project 5-A2 and B (grading) and A, B, and C (surfacing). Work involves about 139,000 cu.yd. of excavation and the crushing and placing of 45,000 cu.yd. of surfacing. The contractors have concentrated all of their work so far this season on minor structures and grading. They have three gas shovels on the project, one being ½-yd. Orton, one a 1-yd. P&H, and the other a 1-yd. Erie.

A. E. Palen is acting district engineer for the Bureau of Public Roads with headquarters at Denver, Colorado.



Side Hill Excavation at East Entrance Section, Yellowstone National Park, Wyoming, for Bureau of Public Roads, Morrison-Knudsen Co., Contractors

#### DENNY HILL REGRADE, SEATTLE

**Denny Hill Regrade**—The grading of Denny hill and improvement of Sixth avenue and other streets, covering an area of 30 blocks, and involving the excavation and removal of 2,700,000 cu.yd. from city streets and 1,500,000 cu.yd. from private property, will be completed about September 15, 1930. Contract for this work was awarded September 20 to Geo. Nelson & Co., of Seattle, at \$1,516,974; the excavation unit-price being 25¢ per cu.yd. The excavation has been sublet to the Nevada Contracting Co., of Fallon, Nev., and Copenhagen & Copenhagen, of Portland; and the disposal of material by barge in deep water to Croft & Johnson. The earth is being removed by four 2-yd. Marion electric shovels, working 24 hours per day. It is shoveled into hopper which discharges on a portable belt-conveyor which carries earth to permanent conveyor, constructed overhead on Blanchard street. This conveyor system transports earth to Blanchard and Railroad avenue, where provision is made for discharge into cars if needed. Earth not deposited here is carried on to the end of the conveyor at dock where

it is discharged on two self-dumping scows which are towed out to a depth of 71 ft. below low tide in Elliott bay and dumped. Actual operation by conveyor system started on May 11. The conveyor system was furnished by Link-Belt Co. W. D. Barkhuff is city engineer of Seattle.

#### NEVADA STATE HIGHWAYS

**Pershing and Humboldt Counties**—The Nevada Rock & Sand Co., of Reno, Nevada, have made good progress on their contract for grading and surfacing with gravel 41 miles from 2 miles west of Humboldt House to Winnemucca. This project is 90% complete and will undoubtedly be finished by the middle of December. The work consisted of widening the present roadway and surfacing and placing of additional gravel. The major items of equipment are one ¾-yd. gas shovel, seven 4-yd. dump trucks, one No. 30 and one No. 60 Caterpillar, concrete mixer, assembled gravel plant, two McMillan scrapers. Contract will cost \$99,228, and involves in the main: 44,800 cu.yd. of roadway excavation at 20¢; and 70,250 cu.yd. of crushed rock or gravel surfacing at 97¢.

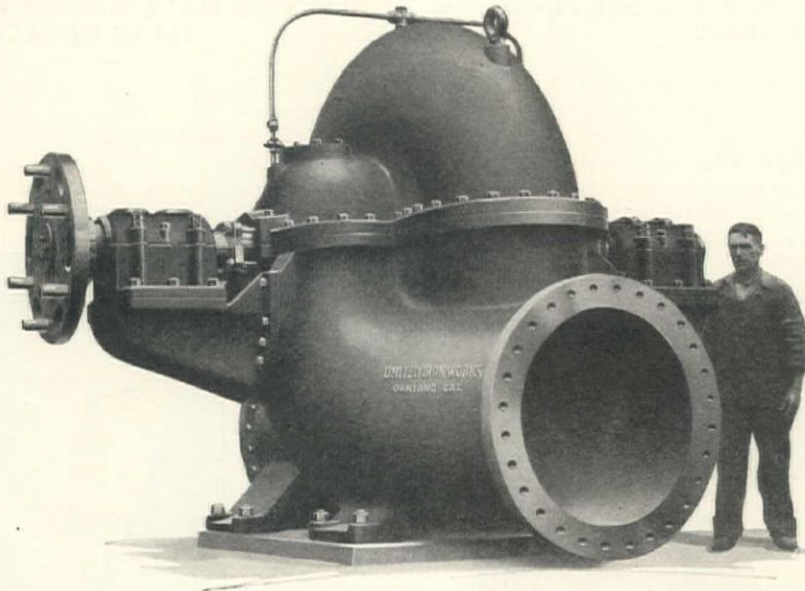
**Mineral County**—Grading and gravel surfacing in Mineral county, between Hawthorne and 13 miles east, 13.65 miles, contractor, Dodge Brothers, Inc., Fallon, Nevada. This contract is 80% complete and should be finished by December 15. The contractor has been using teams and fresnoes for the major portion of the work, with one Cedar Rapids gravel plant and five or six 4-yd. dump trucks to care for the surfacing. A 1-yd. gas shovel has been placed on the work to handle the excavation in two large cuts.

**White Pine County**—Grading and gravel surfacing, from McGill to Magnusson's in White Pine county, 17 miles, contract awarded to Isbell Construction Co., Carson City, Nevada. This work was sublet to J. M. Tedford, of Fallon, Nevada, and he has completed approximately 60% of the project. If weather conditions hold good, he will be able to complete about January 1. The equipment being used consists of teams and fresnoes, gravel plant, and five 2 to 4-yd. dump trucks, together with large blade and a No. 30 Caterpillar.

**Elko County**—Dodge Bros., Inc., of Fallon, Nevada, have made good progress on their contract for 53.52 miles grading and gravel surfacing from the south Elko county line to Wendover. The work is approximately 85% completed and if the weather conditions do not become too severe, the work should be completed by January 1. Work on this project started on May 4, and has advanced rapidly. The items of equipment are: 1-yd. Northwest gas shovel, Cedar Rapids gravel plant, two No. 60 Monarch tractors with McMillan scrapers, compressor, ten dump trucks, and eighty head of stock, with fresnoes, plows, and blades. Contract will involve expenditure of \$247,127, including 341,000 cu.yd. of roadway excavation at 35¢; and 113,000 cu.yd. of gravel surfacing at 80¢.

S. C. Durkee is state highway engineer and H. D. Mills is office engineer for the State of Nevada Department of Highways with headquarters at Carson City, Nevada.



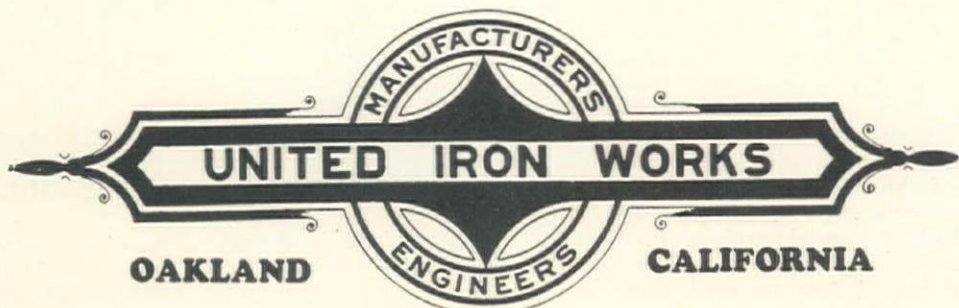


# UNITED PUMPS

*'The Standard of Comparisons'*

**The pleasure of purchasing a Centrifugal Pump for any duty is secondary to the lasting pleasure realized by no maintenance, continuous performance, and the services rendered by the manufacturer**

*The Standard of Comparisons truly expresses the feeling of purchasers of United Pumps*



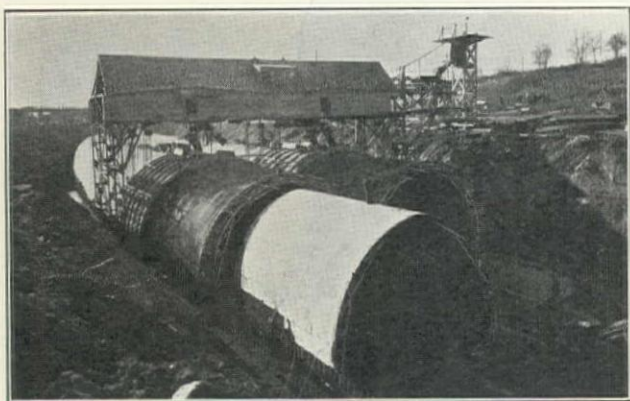


# New Equipment and Trade Notes

## BLAW-KNOX FORMS ON RIVER DES PERES STORM DRAIN

St. Louis is building an \$11,000,000 storm sewer to confine the River Des Peres, a surface stream draining an area of 110 sq.mi., of which 16,000 acres lie within the city limits. The sewer has a capacity of 9540 c.f.s. where the stream enters the city and 43,693 c.f.s. near its mouth. It is approximately 13 miles long and is to be built in nine sections.

On section E, Blaw-Knox collapsible steel forms in 35-ft. lengths are being used for the horseshoe-shaped sewer, which



Blaw-Knox 29-ft. Telescopic Inside Forms, Telescopic Outside Forms, and Traveler for River Des Peres Storm Drain, St. Louis, A. Guthrie & Co., Inc., Contractor

is 29 ft. high by 32 ft. wide, and 2 ft. thick. Forms are laid in a ditch 45 to 50 ft. deep, 40 ft. wide at the bottom and 150 ft. at the top, dug by a walking dragline. The forms are rigged by 16 men in 5 hours and are knocked down in 1 hour.

## SMITH BOOTH USHER CO. ENDS THIRD ANNUAL JAEGAR MONTH

Smith Booth Usher Co., Los Angeles, closed its third annual Jaegar month on October 31 with an open house at the construction equipment division show rooms. At this time a 3½-C.T. heavy-duty trailer mixer was given away free in recognition of the event, Joe Sutalo, Los Angeles contractor, drawing the lucky card from the mixer drum. Many contractors witnessed the drawing.

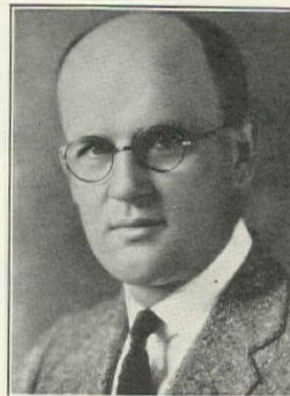
The third annual Jaegar month was pronounced the usual big success, many sales being made and a number of new contractors joining the family of Jaegar users. October 31 closed a 3-months national contest in selling Jaegar concrete mixers and Smith Booth Usher Co. led in the number of sales made throughout the United States.

## WALLACE & TIERNAN WIN TWO INJUNCTIONS

The U. S. District Court of New Jersey has directed that an injunction be issued against the Paradon Manufacturing Co., restraining that company from selling or offering for sale solution feed chlorinators. The U. S. District Court for the northern district of New York has issued an injunction against the city of Syracuse restraining that city from using a Paradon chlorinator. Both of these cases were brought by Wallace & Tiernan, Newark, manufacturers of chlorine control apparatus for water and sewage purification, bleaching and industrial work, and sole licensee of the Ornstein process of antisepticizing water. It was ruled in the last case that the Bull Pot, used by Paradon at Syracuse, does not work some process other than the Ornstein patent.

## CHAMBERS MADE WESTERN 'CATERPILLAR' SALES MANAGER

The Caterpillar Tractor Co. announces the promotion of H. H. Chambers, former assistant sales manager of the eastern territory, to sales manager of the western division, with headquarters at San Leandro, California. He succeeds I. E. Jones, who is beginning an extended trip through foreign lands in the interests of the export sales division. E. I.



H. H. CHAMBERS

Stouffer, former district representative in Pennsylvania and New York, will take Chambers' place in the eastern division.

Chambers began his employment with the company 14 years ago as a laborer on the assembly line, where he spent three years. He served in the army during the world war and then rejoined the company as a member of the sales promotion and advertising department. Later he spent three years as salesman and general manager for a Wisconsin 'Caterpillar' dealer.

## NEW FACTORY UNIT FOR PLYMOUTH LOCOMOTIVES

The Fate-Root-Heath Co. (Plymouth Locomotive Works), manufacturers of industrial and railway locomotives, has just completed a large factory unit, of steel and brick construction, and is installing equipment sufficient to double the output of Plymouth gear-drive gasoline and diesel locomotives. The company also manufactures 20 to 100-ton gas-electric and diesel-electric locomotives.

## WESTINGHOUSE PUMPING EQUIPMENT FOR LOS ANGELES

Los Angeles plans to erect a new pumping station, known as the North Hollywood station, for transferring water from the natural underground reservoir in San Fernando valley outside of the city into the city mains. This water, which is previously used for irrigation in the valley, will be recovered by pumping from deep wells.

The pumping station will have four units and a capacity of 45,000 g.p.m. against 225-ft. head, with 85% pumping efficiency. Worthington and DeLaval pumps are to be used. Westinghouse will furnish the electrical equipment.

## AMERICAN CABLE CO. MOVES CHICAGO OFFICE

The Chicago headquarters for sales and service of the American Cable Co. Tru-Lay wire rope and Tru-Loc fittings has been moved to room 1765, 400 W. Madison st., the recently completed Chicago Daily News Bldg.





You drive right over  
them and never  
know they're there.....

*until wet weather proves their worth!*

Armco Part Circle Culverts insure street crossings with unbroken smoothness no matter how limited the headroom . . . .

. . . . and they provide drainage of the highest efficiency, even under abnormal conditions.

Pure, rust-resistant Armco Ingot Iron gives them long life . . . . low cost per year.

We'll gladly give full details that will in no way obligate you.

## California Corrugated Culvert Company

Los Angeles: 424 Leroy Street

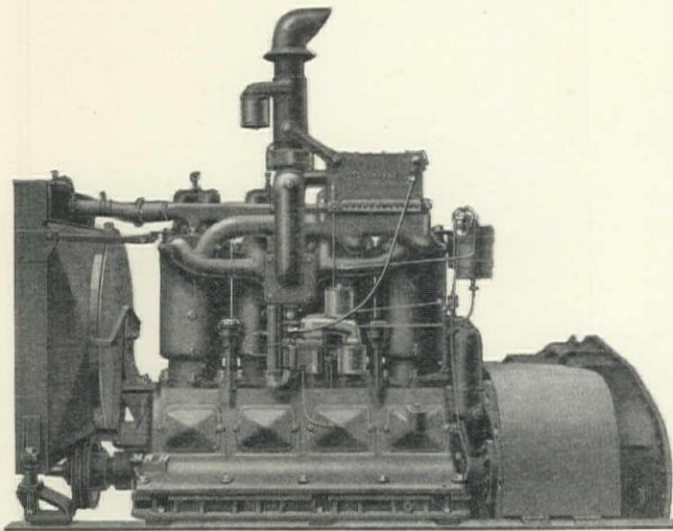
Berkeley: 417 Parker Street



### NORTHWEST ANNOUNCES NEW OIL ENGINE

The Northwest Engineering Co., Chicago, builder of gasoline, oil burning and electric shovels, cranes and draglines, has announced a new oil burning engine for crane and shovel service. This engine is based on gasoline motor principles, having the usual ignition system. The engine is started from cold on gasoline, for which a small tank is provided. A valve switches the fuel after a few minutes running.

Essential features of the oil engine are: 1. the proper development of carburetor apparatus for low grade fuels, resulting in accurate metering; 2. adequate vaporization of the heavier fuels to permit clean burning under extremely varying conditions of load—which are characteristic of crane and excavator operation; 3. special combustion chamber shape which



Northwest Oil Engine

promotes clean combustion, together with suppression of undue detonation; and 4. special means for the elimination of lubricating oil dilution which would otherwise accompany the use of oils heavier than gasoline.

The engine is free from complicated metering devices or pumps. Because its operation is identical to that of a gasoline motor and is understood by any operator or truck driver, the manufacturer claims gasoline motor dependability. Maintenance and care can be accomplished in the normal way without the need of special mechanics.

The new device has been found to reduce fuel consumption 10%, and as it burns fuels that can be purchased for much lower prices than gasoline, it is the source of highly important operating economy. Fuels of a character suitable for the engine have a distillation range which extends from 195° C. initial point to 365° C. end point. This type of oil is readily available and in most districts can be bought without ordering in tank car lots.

### CHANGES IN LINK-BELT PERSONNEL

The executive offices of the Link-Belt Co. announce the resignation of F. B. Caldwell, vice-president of the Chicago plant, because of ill health. W. C. Carter, formerly vice-president in general charge of production at all the plants, assumes the duties of vice-president and general manager of the Chicago plant. E. J. Burnell, former manager of the Pittsburgh office, has been appointed sales manager of the western division, with headquarters at the Chicago plant. Nels Davis, from the Chicago engineering sales force, has succeeded Burnell at the Pittsburgh office.

### McKIERNAN-TERRY DRILL CO. CHANGES NAME

On November 1, the McKiernan-Terry Drill Co., New York, became the McKiernan-Terry Corp. and acquired the ownership of the National Hoisting Engine Co., Harrison, New Jersey, and Steele & Condict, Inc., Jersey City. The consoli-

dation of these three firms, whose products entered the same fields, has been effected to adequately provide for business expansion. The two last-named companies will be operated and known, under their former names, as divisions of the McKiernan-Terry Corp., but their executive activities will be transferred to the New York sales office of the corporation. Work previously done at the Steele & Condict plant will be transferred to and divided between the McKiernan-Terry plant at Dover, New Jersey, and the National Hoisting Engine plant at Harrison, New Jersey. Both of the latter plants have been substantially enlarged and further building expansion and increases in tool equipment are pending.

Officers of the new corporation are: president—Arthur W. Bittenheim, vice-president in charge of production—Lester H. Bittenheim, vice-president in charge of sales—Charles S. Ackley, vice-president in charge of National Hoist division—Wm. F. Campbell, vice-president in charge of Steele & Condict division—John C. Smaltz, vice-president in charge of field operations—Earle R. Evans, treasurer—Thomas E. Sturtevant, assistant treasurer—Samuel Harper, secretary—Samuel S. Whitehurst, assistant secretary—J. Forrester Campbell.

### MONARCH '75' TRACTORS FOR HEAVY WORK

The Allis-Chalmers Monarch '75' track-type tractor is adapted to road building, construction, logging, industrial uses, snow removal, and agricultural service. It is said to have unusually high road clearance, low upkeep cost, accessibility to parts, and to be so balanced that it has constant ground contact.

Monarch '75' tractors are being used at East Chicago to level off land, most of which is covered by sand dunes, for a large addition to an industrial plant. The sand is full of sink holes and the crawler dump wagons often sink to the hubs but they are efficiently handled by Monarchs. The sand is



Allis-Chalmers Monarch '75' Hauling Heavy Load Through Sand

dumped in low places and a land leveler is later attached to the tractor to even up the ground.

On the lake Lotawona earth-fill dam, Blue Springs, Mo., five Monarch '75' tractors are used to haul 7-yd. wagons, two wagons to each tractor. The dam will contain 300,000 cu.yd. of material and will be 1900 ft. long, 470 ft. wide at the base, and 55 ft. in maximum height.

### PLANT ADDITION STRENGTHENS SULLIVAN PRODUCTION

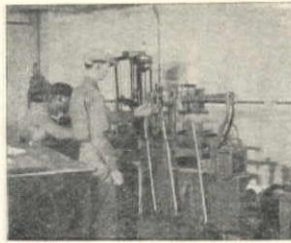
Sullivan Machinery Co., Chicago, reports a gratifying increase during the current year in the demand for its stationary and portable air compressors, mining and quarrying machinery, core drills, concrete breakers, rock drills, portable hoists, and other equipment. This demand has been met by the recent construction of an addition to the Michigan City, Indiana, plant and an increase in machine tool equipment both at this plant and at the one in Claremont, New Hampshire. Orders have been placed for additional tools so as to secure an even larger volume of production.



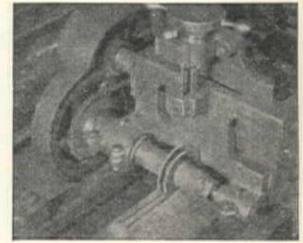
R



Left — Analyzing the iron for percentages of carbon, silicon, phosphorus, manganese and sulphur



Left — Testing Talbot transverse strips



Above — Test strip 12" long by 1/2" wide is cut from the pipe wall to determine the physical characteristics of the iron as cast in the pipe

## RIGID MANUFACTURING PROCESS

TESTS Insure Absolute Uniformity of

# ACIPCO MONO-CAST PIPE

B E L L A N D S P I G O T

**J**UST as a chain is no stronger than its weakest link, a pipe line is no stronger than its weakest length. By submitting it to rigid manufacturing process tests, we make sure MONO-CAST is ship-shape when it leaves us. That's why you can be sure MONO-CAST is job-shape when you receive it. Thus we know and you know that "when you lay a line of MONO-CAST centrifugal cast iron pipe, you bury your pipe problems with it!"

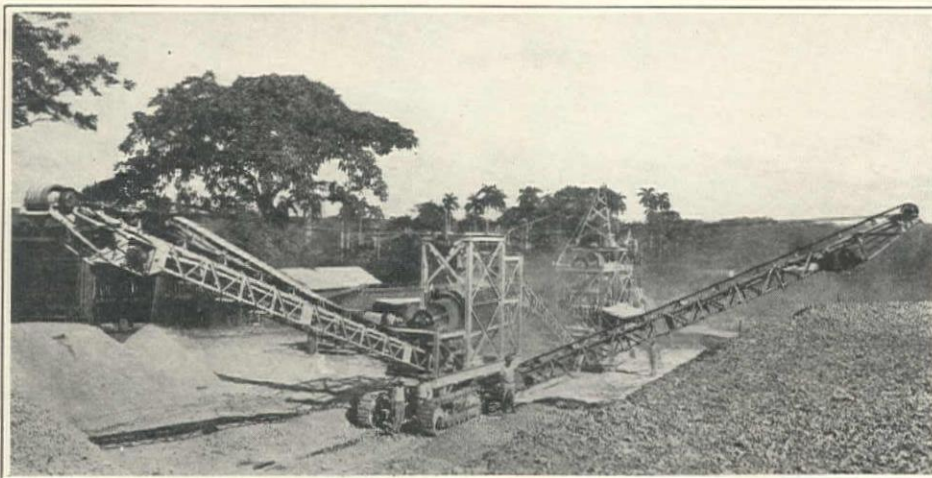
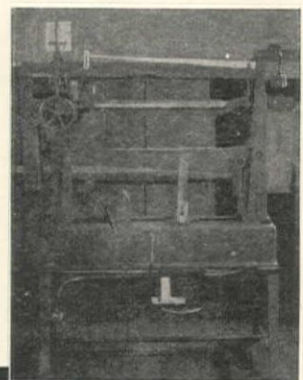
## AMERICAN CAST IRON PIPE COMPANY

SAN FRANCISCO  
DALLAS  
CHICAGO  
NEW YORK CITY

BIRMINGHAM, ALABAMA

MINNEAPOLIS  
SEATTLE  
LOS ANGELES  
KANSAS CITY

Below — Transverse machine for testing the 2"x1" bar



This portable crushing, screening and conveying plant in road building service typifies the scope of Bodinson material handling equipment

**W**ASHING, screening, weighing, elevating, conveying and other methods of material handling are a few of the problems completely worked out in our engineering department. Craftsmen of long experience fabricate this equipment in our works to provide for the contractor a most economical installation with due regard for first cost and ability to perform its functions under most rigorous conditions. The performance of Bodinson rock, sand and gravel handling equipment at Pardee Dam, Bull Run Dam, Calaveras Dam and other outstanding construction projects offers convincing proof of the completeness of Bodinson engineering and quality of Bodinson products.



705 Ray Building  
OAKLAND

# BODINSON

MANUFACTURING CO., Inc.

Labor Saving Machinery

4401 San Bruno Avenue

:: ::

San Francisco



335 S. San Pedro  
LOS ANGELES



# UNIT BID SUMMARY

Note: These unit bids are extracts from our Daily Construction News Service

## BRIDGES AND CULVERTS

### SACRAMENTO, CALIFORNIA—STATE—MARIN COUNTY

Contract awarded to Fredrickson & Watson Const. Co., 354 Hobart St., Oakland, and Fredrickson Bros., Stockton, \$121,683 for overhead crossing over Northwestern Pacific tracks at California Park, MARIN COUNTY, for California Division of Highways. Bids on:

(1) 2,000 cu.yd. structure excavation	(5) 155 M ft. BM redwood (select all heart structural)	(9) 143,000 lb. reinforcing steel
(2) 15,700 lin.ft. furnish redwood piles	(6) 735 cu.yd. 'B' concrete	(10) 555,000 lb. structural steel
(3) 284 drive redwood piles	(7) 660 cu.yd. 'A' concrete (bridge)	(11) 5,200 lb. cast steel
(4) 220 M ft. BM redwood (dense select all heart structural)	(8) 545 cu.yd. 'A' concrete (paving)	(12) Miscellaneous work
Fredrickson & Watson & Fredrickson Bros.	(1) 1.25	(2) .60
Lord & Bishop, Oroville	(3) 14.00	(4) 77.00
Butte Const. Co., S. F.	(5) 72.00	(6) 17.00
M. B. McGowan, S. F.	(7) 17.00	(8) 12.00
W. L. Proctor, Santa Rosa	(9) .05	(10) .07
Healy-Tibbitts Const. Co., S. F.	(11) .045	(12) .066
Rocca & Caletti, San Rafael	(1) .62	(2) 12.00
C. J. Nystedt	(3) 91.00	(4) 81.25
MacDonald & Kahn, S. F.	(5) 17.00	(6) 18.00
Pan Pacific Piling & Const. Co., L. A.	(7) 13.00	(8) .05
Average bid	(9) .0635	(10) .1655
	(11) \$741	(12) \$800
	(1) 1.50	(2) .63
	(3) 14.00	(4) 90.00
	(5) 85.00	(6) 20.00
	(7) 16.80	(8) 13.25
	(9) .044	(10) .068
	(11) .15	(12) \$1000
	(1) 1.50	(2) .70
	(3) 15.00	(4) 90.00
	(5) 85.00	(6) 17.00
	(7) 20.00	(8) 14.00
	(9) .05	(10) .06
	(11) .15	(12) \$1000
	(1) 1.75	(2) .64
	(3) 21.00	(4) 90.50
	(5) 90.50	(6) 15.20
	(7) 15.20	(8) 12.00
	(9) .045	(10) .07
	(11) .20	(12) \$1000
	(1) 2.00	(2) .62
	(3) 14.00	(4) 90.00
	(5) 80.00	(6) 16.75
	(7) 19.00	(8) 13.25
	(9) .046	(10) .072
	(11) .14	(12) \$552
	(1) 1.50	(2) .65
	(3) 20.00	(4) 85.00
	(5) 83.00	(6) 20.00
	(7) 22.00	(8) 10.50
	(9) .05	(10) .0725
	(11) .18	(12) \$1000
	(1) 6.83	(2) .583
	(3) 13.31	(4) 99.16
	(5) 102.95	(6) 15.89
	(7) 16.91	(8) 12.05
	(9) .048	(10) .076
	(11) .17	(12) \$1509
	(1) 2.18	(2) .63
	(3) 14.73	(4) 88.63
	(5) 84.97	(6) 17.16
	(7) 18.48	(8) 12.41
	(9) .048	(10) .068
	(11) .16	(12) \$870
		TOTALS
		\$121,683
		123,808
		125,109
		126,156
		126,190
		126,780
		128,518
		129,800
		134,716
		145,209
		128,797

## SEWER CONSTRUCTION

### SAN CLEMENTE, CALIF.—VITR. AND CAST-IRON PIPE AND PUMPING PLANT—CITY

Contract awarded to C. Anili, 2817 57th St., Huntington Park, who bid \$88,912 for intercepting and outfall sewer system and pumping plant for City of San Clemente, Orange County. Bids from:

(1) C. Anili, 2817 57th St., Huntington Park	\$ 88,912	(4) A. Dalmatin, Long Beach	\$118,435
(2) Merritt, Chapman & Scott	99,565	(5) C. H. Johnston, Hollywood	120,678
(3) C. M. Milovich, Montebello	105,258		

6,247 ft. 15-in. vitrified pipe	(1) 2.56	(2) 3.00	(3) 3.00	(4) 2.65	(5) 3.65
108 ft. 16-in. B cast-iron pipe	3.95	2.00	2.00	7.00	5.26
936 ft. 18-in. vitrified pipe	3.10	3.00	3.00	3.00	4.47
3,614 ft. 21-in. vitrified pipe	4.46	3.00	3.00	4.25	5.42
24 ft. 22-in. B cast-iron pipe	7.00	3.00	3.00	12.00	8.35
240 ft. 8-in. vitrified pipe	1.55	1.00	1.00	1.50	1.07
59 ft. 8-in. B cast-iron pipe	1.72	2.00	2.00	5.00	2.70
200 ft. 6-in. B cast-iron pipe	2.20	1.00	1.00	3.50	2.01
4,000 ft. 12-in. B cast-iron pipe	6.75	11.00	12.50	8.50	12.00
70 ft. blanket conc. reinf. for 12-in. pipe	1.50	4.80	.42	2.00	1.50
563 ft. conc. cradle for 15-in. pipe	1.50	.50	.50	1.50	2.50
288 ft. conc. cradle for 21-in. pipe	1.80	1.00	1.00	2.00	2.50
2,710 ft. 1-in. galv. iron water line	.50	.05	.05	.27	.25
33 manholes	90.00	50.00	50.00	90.00	100.00
6 drop manholes	100.00	75.00	75.00	100.00	100.00
Sewage pumping plant No. 1	\$8,000	\$10,287	\$10,287	\$18,375	\$8,570
Sewage pumping plant No. 2	\$5,500	\$4,450	\$4,450	\$11,869	\$4,570
Sewage pumping plant No. 3	\$5,500	\$4,450	\$4,450	\$11,210	\$4,570

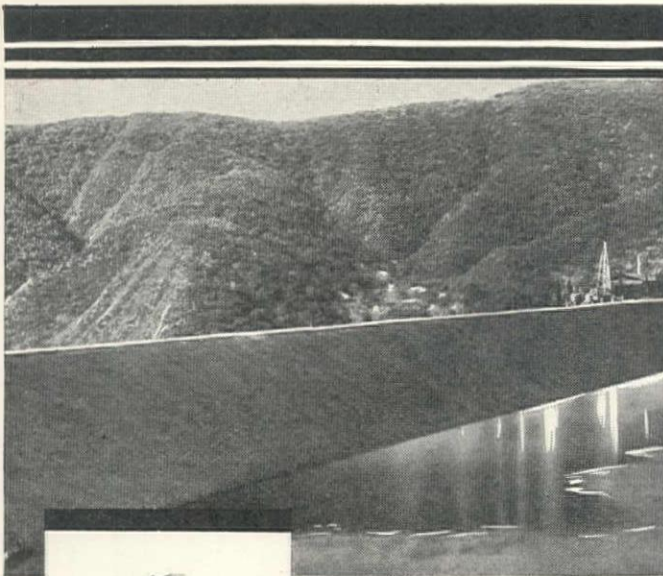
## POWER DEVELOPMENT

### TACOMA, WASH.—CITY—POWER HOUSE CUSHMAN PROJECT No. 2

H. E. Doering, 568 Maple St., Portland, Ore., \$215,937 low to Board of Contracts and Awards, City of Tacoma, for constructing Cushman Power House Project No. 2. Bids from:

(1) H. E. Doering, Portland.....	\$215,937	(2) Ward Const. Co., Tacoma.....	\$219,940	(3) G. F. Atkinson.....	\$288,482		
38,100 cu.yd. excavation.....	(1) 1.60	(2) 1.50	(3) 2.72	100 ft. 10-in. conc. drain pipe.....	(1) 1.00	(2) 1.00	(3) 2.00
10 cu.yd. solid rock excavation..	12.00	2.00	10.00	1,800 cu.yd. "C" concrete.....	10.00	10.00	15.00
100 cu.yd. drain ditch excavation..	3.00	1.00	3.00	3,800 cu.yd. "E" concrete.....	15.00	14.00	20.00
100 cu.yd. gravel backf.....	3.00	2.00	3.00	70 cu.yd. "F" concrete.....	25.00	30.00	30.00
5,000 lb. sheet steel piling (above cut-off).....	.08	.03	.05	600 lb. copper water stops.....	.70	.50	1.25
80,000 lb. sheet steel piling (below cut-off).....	.08	.05	.05	650,000 lb. reinf. steel.....	.045	.08	.045
100 ft. timber piling (above cut-off).....	.50	.10	.30	870 lb. tailrace paving.....	12.50	10.00	18.00
4,000 ft. timber piling (below cut-off).....	.50	1.00	1.25	4,500 ft. BM timber (weir).....	75.00	60.00	100.00
100 ft. 4-in. conc. drain pipe.....	.50	.40	.60	7,000 ft. BM timber (cover).....	50.00	60.00	100.00
500 ft. 6-in. conc. drain pipe.....	.60	.60	.80	Cast-iron drains.....	\$300	\$1,000	\$1,500
100 ft. 8-in. conc. drain pipe.....	.75	.80	1.00	80,000 lb. set metalwork.....	.03	.02	.03
				Substructure.....	\$1,650	\$2,000	\$2,000
				Oil storage tanks.....	\$1,800	\$1,500	\$1,500
				Highway bridge.....	\$17,500	\$10,100	\$10,000
				40,000 ft. BM timber (detour).....	50.00	40.00	75.00





Finished face of Stone Canyon dam now in third year of use.

## WATER TIGHT!

AFTER other methods had failed, Gilmore Road Oil was used to successfully render the earth face dam of the Stone Canyon reservoir impervious to water.

Apply final 90% Asphaltic Seal Coat.

This is but one of the countless surfacing problems now being solved by the use of Gilmore Asphaltic Road Oils.

60% Gilmore Asphaltic Oil, 1½ Gal. per sq. yd.  
Worked in to a depth of 6 inches.

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Worked in to a depth of 6 inches.

90% Gilmore Asphaltic Oil, ¾ Gal. to the sq. yd.  
Seal Coat.

Specifications by Gilmore Oil Company. Work done for City of Los Angeles Department of Water and Power. Fred J. Fisher, Chief Mechanical Engineer.

**GILMORE OIL COMPANY**  
2423 East 28th St. Los Angeles



5429

**GILMORE**  
*Roadamite*  
**ASPHALTIC OIL**

## ROBERT W. HUNT COMPANY ENGINEERS



CONSOLIDATED NATIONAL BANK, TUCSON, ARIZONA  
WALKER & EISEN, Los Angeles Architects  
ROBERT W. HUNT COMPANY Inspectors

### Inspections of Construction Materials

PHYSICAL  
TESTS



CHEMICALS  
ANALYSES

CHICAGO: 2200 Insurance Exchange

SAN FRANCISCO: 251 Kearny Street

LOS ANGELES: 1151 S. Broadway

SEATTLE: 621 Lyon Building

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# STREET AND ROAD WORK

## PHOENIX, ARIZ.—GRADING—FLORENCE-TUCSON HIGHWAY—STATE

Hodgman & MacVicar, 714 Plymouth Road, Pasadena, Calif., \$103,204, low bid to Arizona State Highway Commission for 17 miles grading Florence-Tucson Highway from Coolidge south toward Pichaco. Bids received from the following concerns:

cerns:												
(1) Hodgman & MacVicar, Pasadena.....	\$103,204											
(2) Mulligan & Martin, Tucson.....	111,027											
(3) T. J. Tobin Construction Co. ....	116,487											
(4) Yglesias Bros., San Diego.....	118,201											
(5) E. B. Skeels, Roseville, Calif. ....	121,227											
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2,182 yd. road excavation.....	.25	.19	.20	.40	.34	.40	.18	.30	.26	.22	.30	
141,254 yd. borrow.....	.18	.19	.20	.19	.20	.20	.18	2.15	.22	.22	.30	
2,574 yd. stream excavation.....	.60	.50	.70	1.00	.75	.90	1.00	1.00	1.00	2.25	1.25	
24,632 yd. ditch excavation.....	.15	.19	.25	.20	.23	.20	.18	.20	.22	.22	.30	
202 sta.yd. overhaul.....	.05	.01	.05	.10	.05	.05	.02	.06	.10	.05	.05	
1,778 yd. 'A' concrete (fords).....	14.00	18.00	17.50	17.50	17.00	18.50	22.00	20.00	22.00	19.20	25.00	
170 yd. 'A' concrete (except fords).....	21.00	19.50	21.00	22.00	24.00	24.00	24.00	23.75	22.00	22.70	25.00	
715 yd. 'B' concrete.....	14.50	18.00	18.00	21.00	22.75	22.00	16.00	20.00	22.00	23.70	25.00	
31,895 lb. reinforcing steel.....	.055	.05	.05	.05	.0525	.05	.065	.07	.05	.07	.07	
78 ft. 24-in. corrugated pipe.....	3.00	2.50	3.50	3.00	3.00	2.90	2.89	2.50	3.00	3.25	2.90	
214 ft. 30-in. corrugated pipe.....	4.00	3.00	3.50	3.50	3.50	3.50	3.53	3.00	3.50	3.75	3.50	
44 ft. 36-in. corrugated pipe.....	5.00	4.50	5.00	5.00	5.50	5.60	5.68	4.75	6.00	5.35	4.70	
36 ft. 48-in. corrugated pipe.....	7.00	8.00	7.50	10.00	10.00	10.90	9.54	9.00	8.00	8.60	6.90	
204 ft. remove and reset 24-in. corrugated pipe.....	2.00	.50	1.00	1.50	.75	.75	.60	1.00	1.00	.35	1.00	
34 ft. remove and reset 30-in. corrugated pipe.....	3.00	.50	1.50	2.00	1.00	.75	.70	1.50	1.00	.40	1.10	
1 36-in. automatic outlet gate.....	\$85	68.00	75.00	30.00	\$100	97.00	75.00	50.00	80.00	80.00	100.00	
1 48-in. automatic outlet gate.....	165	\$135	\$150	50.00	\$180	\$173	\$140	75.00	\$160	\$120	150.00	
</												

### STRUCTURES OVER 20-FT. SPAN—

852 yd. excavation.....	1.00	.50	.70	1.50	1.25	.90	1.00	1.00	1.00	2.50	1.25
26 yd. 'AA' concrete.....	70.00	65.00	55.00	60.00	65.00	60.00	70.00	65.00	60.00	81.20	75.00
702 yd. 'A' concrete.....	21.00	19.50	23.00	22.00	21.75	23.00	26.25	24.00	22.00	22.70	30.00
206 yd. 'B' concrete.....	20.00	19.50	23.00	22.00	20.50	22.70	16.00	23.00	22.00	22.70	28.00
76,160 lb. reinforcing steel.....	.055	.05	.05	.05	.0525	.05	.065	.07	.05	.07	.07
700 ft. concrete piling.....	4.50	3.75	2.50	3.50	5.25	4.75	5.00	5.00	4.00	10.00	7.00
40 yd. bank protection.....	5.00	3.00	5.00	10.00	10.00	7.50	5.00	6.00	2.00	10.00	20.00
1 yd. remove concrete.....	5.00	1.00	20.00	15.00	10.00	10.00	10.00	3.00	2.00	25.00	10.00

## PHOENIX, ARIZ.—GRADING AND SURFACING—ASHFORK-KINGMAN ROAD—STATE

Henry Galbraith, Jerome, Ariz., who bid \$82,635, low bid to the Arizona State Highway Commission for grading and constructing bridge on the Ashfork-Kingman Highway, beginning at Ashfork and extending west about 6 miles toward Crookton. Bids received from:

(1) Henry Galbraith, Jerome, Ariz. ....	\$ 82,635	(5) T. J. Tobin Construction Co., Albuquerque.....	\$104,172
(2) Tenney & Black, Clifton, Ariz. ....	90,966	(6) Canion & Francis, Phoenix, Ariz. ....	104,531
(3) V. R. Dennis Construction Co., San Diego.....	93,892	(7) H. C. Lallier, Denver, Colo. ....	111,773
(4) Otto & Hagar, Crown Point, N. M. ....	102,140	(8) Hodgman & MacVicar, Pasadena.....	127,351

### SCHEDULE NO. 1—

38,527 cu.yd. borrow excavation.....	.30	.40	.40	.48	.50	.44	.40	.78
5,000 sta.yd. overhaul.....	.02	.06	.02	.03	.05		.03	.02
5 cu.yd. ditch excavation.....	.50	.50	.65	1.00	2.50	.25	1.00	1.00
643 cu.yd. roadway surfacing.....	.75	.70	1.00	1.10	1.00	1.00	2.10	1.25
945 cu.yd.mi. surfacing haul.....	.20	.24	.20	.25	.18	.26	.15	.20
2,360 lin.ft. mesh guard fence.....	1.00	.80	.90	.70	1.25	1.00	1.00	.75
211 cu.yd. structure excavation.....	1.00	1.50	2.00	2.00	3.00	3.50	1.50	2.50
7 cu.yd. 'AA' concrete.....	50.00	65.00	75.00	50.00	75.00	70.00	60.00	75.00
275 cu.yd. 'A' concrete.....	25.00	28.00	35.00	25.50	25.50	30.00	25.00	27.00
3 cu.yd. 'B' concrete.....	24.00	27.00	33.00	24.50	26.00	28.00	25.00	23.00
12 bronze bridge plate seats.....	50.00	50.00	25.00	30.00	65.00	18.00	70.00	60.00
42,825 lb. reinforcing steel.....	.07	.07	.06	.055	.065	.06	.05	.06
32 ft. 24-in. corrugated pipe.....	3.00	3.50	4.00	4.00	4.00	2.75	5.00	4.00

### SCHEDULE NO. 2—

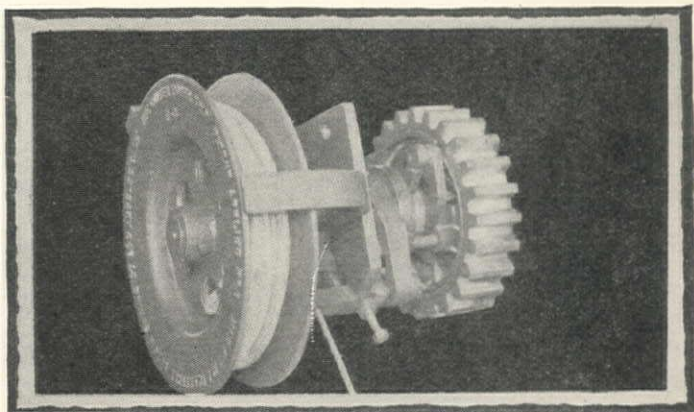
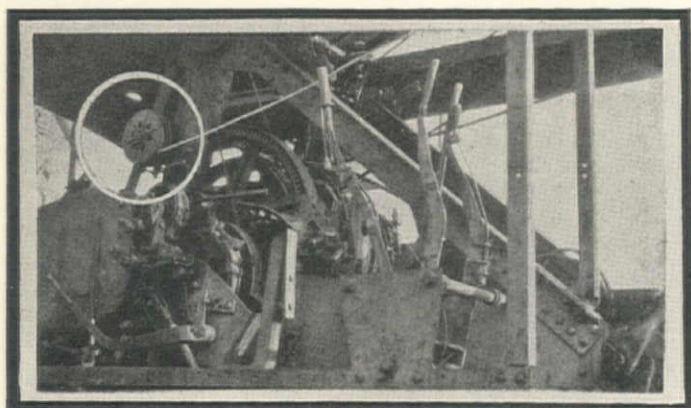
7,837 cu.yd. roadway excavation.....	.75	.90	.75	1.50	1.50	1.00	1.00	2.00
17,832 cu.yd. borrow excavation.....	.30	.28	.40	.25	.40	.50	.40	.60
223 cu.yd. structure excavation.....	1.00	1.50	1.00	2.00	2.00	1.00	1.50	2.50
60 cu.yd. ditch excavation.....	.50	.50	.75	1.50	2.00	.35	1.00	.75
16,002 cu.yd. roadway surface.....	.75	.70	.90	1.10	.90	1.00	2.20	1.25
49,065 cu.yd.mi. surface haul.....	.20	.24	.15	.25	.18	.25	.15	.20
90 cu.yd. 'A' concrete.....	25.00	26.00	30.00	25.50	25.50	30.00	25.00	27.00
27 cu.yd. 'B' concrete.....	24.00	25.00	25.00	24.50	25.00	28.00	25.00	23.00
8,338 lb. reinforcing steel.....	.07	.07	.06	.055	.065	.06	.05	.06
1,750 ft. mesh guard fence.....	1.00	.80	.90	.70	1.25	1.00	1.00	.75
42 ft. 24-in. corrugated pipe.....	3.00	3.50	4.00	4.00	4.00	2.75	3.00	4.00

### STRUCTURES OVER 20-FT. SPAN—

811 cu.yd. excavation.....	.50	1.50	1.50	2.00	2.00	1.25	1.00	2.50
11 cu.yd. 'AA' concrete.....	50.00	65.00	75.00	50.00	75.00	70.00	60.00	75.00
446 cu.yd. 'A' concrete.....	25.00	26.00	30.00	25.50	25.50	30.00	25.00	27.00
79 cu.yd. 'B' concrete.....	24.00	25.00	22.00	24.50	25.00	28.00	25.00	23.00
45,490 lb. reinforcing steel.....	.07	.07	.06	.055	.065	.06	.05	.06
12 each bridge plates, bronze.....	50.00	50.00	50.00	30.00	65.00	18.00	70.00	60.00
6,063 ft. standard stock fence.....	.05	.10	.10	.07	.08	.08	.10	.08



# CULVER POWER TRIP



## INSTALLED ON NORTHWEST

**THE CULVER POWER TRIP** is adaptable to any type or make of gasoline, electric, diesel or gas-air shovel. Unquestionably, it is near perfect as far as mechanical construction is concerned and will provide years of uninterrupted satisfactory service.

This device is designed to operate the latch on the bucket door at the touch of a

finger and with lightning-like speed. It weighs approximately 85 pounds, therefore, is easily and quickly installed.

**THE CULVER POWER TRIP** can be installed in an hour by any shovel crew. There are no delicate parts requiring skilled mechanics to keep in adjustment. Simple and effective in operation.

**THE CULVER POWER TRIP WILL INCREASE YOUR SHOVEL'S OUTPUT AT LEAST FIFTEEN TO TWENTY PER CENT.**

**Mfgd. and Sold by M. P. McCaffrey, 1420 No. Spring Street, Los Angeles, Calif.**



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Deep Carpets pave the way to the "sleepiest" beds on the coast. Each room an entrenchment of grandeur designed for comfort through its circulating Ice Water, Radio, Vita-Glass Windows, and Servidor.

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**RATES: From \$3.50**

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## SACRAMENTO, CALIF.—STATE—SISKIYOU COUNTY—GRADING AND SURFACING

Wren & Greenough, P.O. Box 138, Portland, Ore., \$591,067 low bid to California Division of Highways for 7 miles grading and surfacing with untreated gravel or stone from Yreka to Klamath River, SISKIYOU COUNTY. Bids from:

(1) Wren & Greenough, Portland, Ore.	\$591,067	(10) J. M. DeLuca, Oak and	\$692,553
(2) Kern & Kibbe, Portland	601,694	(11) Ward Engineering Co., San Francisco	701,909
(3) H. E. Doering, Portland	615,866	(12) D. McDonald, Sacramento	726,392
(4) W. A. Bechtel Co., San Francisco	616,127	(13) T. E. Connolly, San Francisco	748,512
(5) Nevada Contracting Co., Fallon, Nev.	619,564	(14) Bauers & Bauers, Dayton, Wash.	755,234
(6) Guy F. Atkinson Co., San Francisco	644,338	(15) Utah Const. Co., San Francisco	758,394
(7) Morrison-Knudsen Co., Boise, Idaho	649,352	(16) Isbell Const. Co., Fresno	759,773
(8) T. M. Morgan Paving Co., Gazelle	670,354	(17) Geo. Mitchell Co., Huntington Park	763,084
(9) C. R. Johnson, Portland	688,596	(18) Average bid	684,000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
624,500 cu.yd. roadway excav. unclass.	.74	.74	.74	.735	.74	.785	.78	.80	.825	.83	.83	.86	.95	.96	.95	.92	.93	.83
1,223,700 sta.yd. overhaul	.01	.02	.02	.01	.01	.01	.02	.01	.015	.01	.007	.02	.01	.01	.02	.01	.01	.013
6,850 cu.yd. structure excavation	1.50	1.40	1.50	1.80	1.50	2.20	1.50	3.00	2.50	2.50	2.40	2.00	1.85	2.00	2.00	2.50	2.50	2.04
8,890 cu.yd. crusher run base	1.50	1.95	2.25	2.35	2.50	2.40	2.50	2.00	2.75	3.00	3.30	2.90	2.15	2.30	2.50	3.50	3.00	2.46
9,560 cu.yd. untr. cr. gravel or stone surface	1.50	2.05	2.25	2.75	2.75	2.50	2.50	2.25	2.75	3.00	3.65	3.00	2.35	2.30	3.00	2.50	3.00	2.59
875 m. gal. water applied to surf.	1.50	3.00	3.00	3.50	2.00	4.00	3.00	3.00	2.75	3.00	2.50	3.00	3.00	2.00	2.00	2.50	3.00	2.75
2,390 cu.yd. screenings—stockpiled	2.50	2.30	2.50	3.15	3.25	2.90	2.50	2.65	3.25	3.00	3.40	3.20	2.35	2.30	3.00	2.75	3.00	2.83
940 cu.yd. Class 'A' P.C.C. (struc.)	30.00	23.00	25.00	25.00	30.00	24.00	25.00	30.00	28.00	30.00	30.00	30.00	28.50	30.00	22.00	40.00	30.00	28.25
105,400 lbs. bar reinf. steel (struc.)	.06	.07	.055	.06	.05	.05	.06	.07	.06	.06	.06	.06	.065	.07	.05	.07	.06	.061
362 lin.ft. corr. metal pipe, 12-in.	.60	.40	.50	1.00	.50	.60	.50	.85	.70	.60	.55	1.50	.50	.40	.50	.50	1.00	.66
2,400 lin.ft. corr. metal pipe, 18-in.	.85	.50	.70	1.50	.50	1.00	.60	1.00	.75	.75	.85	1.75	.50	.50	.65	.75	1.00	.83
560 lin.ft. corr. metal pipe, 24-in.	1.10	.75	1.00	2.00	.80	1.50	.70	1.25	1.00	1.25	1.50	2.00	1.00	.80	.85	1.00	2.00	1.21
236 lin.ft. corr. metal pipe (clean and relay)	1.00	.50	.50	2.00	.50	2.00	1.00	1.00	1.75	1.00	1.50	3.50	1.25	1.00	1.50	1.00	2.00	1.35
1,075 cu.yd. dry rubble (ret. walls)	7.00	6.00	6.00	7.00	8.00	7.00	6.00	5.00	7.00	8.00	6.00	6.00	6.50	7.00	6.00	10.00	10.00	6.97
1,760 cu.yd. rub. masonry (ret. walls)	10.00	8.00	11.50	10.00	13.00	11.00	12.00	15.00	11.00	12.90	11.00	15.00	12.75	11.50	11.00	14.50	14.00	12.00
1,345 lin.ft. arched masonry parapet	3.00	2.50	4.00	3.25	2.25	3.00	3.25	4.00	4.50	3.00	2.50	3.50	3.25	3.00	3.00	5.00	3.50	3.33
2,675 sq.yd. hand placed rock slopes	.75	1.00	1.00	2.50	1.00	1.50	2.00	2.00	2.00	1.25	2.00	2.00	2.50	3.00	2.00	2.25	1.00	1.75
370 sta. finishing roadway	6.00	7.00	5.00	7.50	10.00	10.00	8.00	20.00	7.00	8.00	30.00	5.00	10.00	6.00	8.00	10.00	15.00	10.15
148 ea. monuments comp. in place	3.00	2.75	3.00	3.00	4.00	5.00	3.00	4.00	3.00	4.00	3.00	3.00	3.00	3.00	3.00	3.50	4.00	3.37

Bids rejected, plans and specifications being revised, grading quantity will be increased, and project will be readvertised shortly.

## PHOENIX, ARIZ.—STATE—GRADING AND STEEL BRIDGE—HOLBROOK-LUPTON HIGHWAY

Contract awarded to F. D. Shufflebarger, Albuquerque, New Mexico, \$174,003 to Arizona State Highway Commission, low bid for 22.5 miles grading and steel bridge on Holbrook-Lupton Highway from 2 miles west of Sanders northeast of Arizona-New Mexico line. Bids from:

(1) F. D. Shufflebarger, Albuquerque	\$174,003	(6) Tenney & Black, Clifton, Ariz.	\$195,740
(2) Lee Moor Contracting Co., El Paso	180,614	(7) Mt. States Const. Co., Pueblo, Colo.	203,007
(3) H. C. Lallier, Denver, Colo.	181,838	(8) Otto & Hagar, Brown Point, N. M.	204,807
(4) Hodgman & MacVicar, Pasadena, Calif.	192,607	(9) John Mulligan, Mesa, Ariz.	223,492
(5) E. J. Maloney, Winslow, Ariz.	195,344		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
70,114 cu.yd. excavation road	.465	.42	.62	.55	.32	.63	.68	.48	.89
900 cu.yd. overbreakage excav.	3487	315	.465	.4125	.24	.4725	.51	.36	.6675
107,995 cu.yd. borrow	.23	.25	.23	.27	.31	.24	.27	.38	.29
3,122 cu.yd. struct. excavation	.80	1.25	1.00	.75	1.00	1.00	1.00	.50	1.00
9,921 cu.yd. excavation, ditch	.23	.30	.30	.30	.32	.30	.30	.38	.29
53,582 sta.yd. overhaul	.015	.03	.02	.02	.04	.04	.04	.04	.04
571 cu.yd. 'A' concrete	25.00	25.80	23.00	29.50	29.50	26.50	26.00	30.00	27.00
852 cu.yd. 'B' concrete	23.00	25.40	23.00	20.00	29.50	23.00	26.00	25.00	27.00
61,715 lb. reinforcing steel	.055	.05	.05	.06	.06	.07	.06	.06	.06
300 ft. mesh guard fence	1.00	1.00	.80	1.00	1.50	1.00	1.00	1.00	1.00
1,554 ft. 24-in. corr. pipe	3.00	2.76	3.00	3.00	3.00	2.75	3.00	2.81	3.00
994 ft. 36-in. corr. pipe	5.25	5.45	5.50	5.00	5.00	5.00	5.50	5.62	5.00

## STRUCT. OVER 20-FT. SPAN

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1,992 cu.yd. excavation	1.25	1.25	1.00	1.25	2.00	1.10	2.25	2.00	2.25
13 cu.yd. 'AA' concrete	65.00	60.00	60.00	75.00	90.00	55.00	70.00	40.00	70.00
1,073 cu.yd. 'A' concrete	25.00	29.00	23.00	29.50	27.75	26.80	26.00	30.00	27.00
40 cu.yd. 'B' concrete	23.00	28.00	23.00	27.50	27.75	23.00	26.00	29.00	27.00
96,075 lb. reinforcing steel	.055	.05	.05	.06	.055	.055	.06	.06	.06
125 cu.yd. riprap	1.50	2.80	2.00	3.00	4.00	5.00	2.50	3.00	2.50
8 plate bridge seats	60.00	25.00	50.00	60.00	75.00	50.00	25.00	25.00	22.00
342,515 lb. structural steel	.082	.0725	.075	.08	.09	.086	.075	.073	.08
Dismantling and piling steel span	\$350	\$500	\$500	\$600	\$2000	\$275	\$300	\$1000	\$100

## VENTURA, CALIF.—JOINT HIGHWAY DISTRICT No. 6—GRADING

C. G. Willis & Sons, 2119 E. 25th St., Los Angeles, \$271,030 low bid to Joint Highway Dis. 6, Ventura, for 6 miles Section C of Cuyama Division of Maricopa-Carpinteria Road, from near Cuyama River to summit of Pine Mt. Bids on:

(1) 650,000 cu.yd. roadway excavation	(6) 6 M ft. BM Oregon pine (struct.)	(11) 236 ft. 30-in. corr. pipe
(2) 500,000 sta.yd. overhaul	(7) 64 ft. standard guard rail	(12) 318 ft. 36-in. corr. pipe
(3) 1,200 cu.yd. structure excavation	(8) 12,000 lb. reinf. steel	(13) 96 ft. 48-in. corr. pipe
(4) 124 cu.yd. 'A' concrete	(9) 284 ft. 18-in. corr. pipe	(14) 100 acres clearing right of way
(5) 6 M ft. BM redwood (structures)	(10) 510 ft. 24-in. corr. pipe	

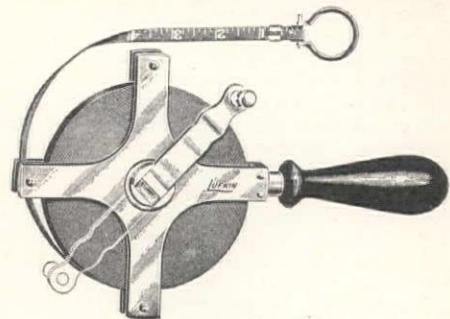
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	TOTALS
C. G. Willis & Sons, Los Angeles	.38	.01	1.25	30.00	140.00	105.00	1.00	.06	2.25	2.65	3.85	4.55	7.40	65.00	\$271,030
Isbell Const. Co., Fresno	.38	.015	1.00	26.00	100.00	100.00	1.00	.07	1.80	2.20	3.40	4.10	7.60	65.00	\$271,997
Mutual Income Properties, Los Angeles	.39	.01	1.00	20.00	115.00	80.00	1.50	.05	2.05	2.45	3.70	4.50	7.50	50.00	\$273,901
Nevada Contracting Co., Fallon, Nev.	.38	.01	.80	28.00	100.00	100.00	1.00	.06	2.50	3.50	5.00	6.50	9.50	100.00	\$275,070
J. P. Holland, Inc., San Francisco	.39	.005	1.00	25.00	100.00	100.00	1.50	.06	2.00	3.00	4.00	5.50	7.50	85.00	\$276,327
Lewis Const. Co., Los Angeles	.39	.01	1.50	22.00	125.00	120.00	2.50	.07	2.50	3.00	3.50	4.40	7.40	150.00	\$285,673
Haas, Doughty & Jones, San Francisco	.39	.025	2.00	22.00	125.00	100.00	1.50	.07	2.50	3.00	4.00	5.00	10.00	90.00	\$288,148
O. A. Lindberg, Newhall	.42	.01	1.50	35.00	125.00	110.00	1.00	.05	2.56	3.53	5.20	6.25	10.22	50.00	\$297,937
Bert Calvert, Los Angeles	.42	.02	2.00	35.00	100.00	75.00	2.00	.07	3.25	3.50	4.50	5.25	8.50	75.00	\$305,513
Gist & Bell, Arcadia	.45	.01	1.00	25.00	125.00	100.00	1.50	.05	3.00	3.50	4.00	5.00	8.50	100.00	\$319,833
C. R. Butterfield, San Pedro	.46	.01	1.25	40.00	90.00	100.00	1.25	.05	3.00	3.90	5.20	6.00	9.45	100.00	\$329,163
Geo. Mitchell Co., Huntington Park	.475	.01	2.00	35.00	140.00	120.00	1.80	.08	3.01	3.43	5.05	5.75	10.25	200.00	\$349,733
R. G. LeTourneau, Stockton	.52	.02	1.00	22.00	90.00	80.00	2.50	.06	2.50	3.20	4.10	4.75	7.60	50.00	\$364,377
Campbell-Reichert Co.	.57	.005	2.00	30.00	100.00	90.00	1.75	.06	2.17	2.78	4.06	4.75	8.84	75.00	\$393,943
J. P. Berne Co., Los Angeles	.606	.01	1.50	15.00	153.00	133.00	1.00	.07	1.60	2.00	2.56	3.20	5.70	75.00	\$416,323
Macco Const. Co., Clearwater	.67	.01	1.90	35.00	250.00	140.00	2.00	.08	2.50	3.00	4.00	5.00	9.00	75.00	\$463,686
Sharp & Fellows, Los Angeles	.67	.015	1.50	32.00	120.00	110.00	1.50	.06	2.50	3.50	4.50	5.25	8.50	150.00	\$472,096
B. B. Boyd, East San Diego	.77	.04	1.50	25.00	110.00	100.00	1.50	.06	2.50	3.00	3.75	4.70	6.50	50.00	\$537,719



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**SACRAMENTO, CALIF.—STATE—ORANGE COUNTY—GRADING AND CONCRETE PAVING**

Macco Construction Co., Clearwater, who bid \$201,545, low bid to California Division of Highways, Sacramento, for 6.4 miles grading and concrete paving from Sunset Beach to Newport Beach, ORANGE COUNTY. Bids from:

(1) Macco Construction Co., Clearwater.....	\$201,545	(5) C. G. Willis & Sons, Los Angeles.....	\$208,988				
(2) Jahn & Bressi, Los Angeles.....	203,004	(6) Sander Pearson, Riverside.....	224,713				
(3) Matich Bros., Elsinore.....	203,100	(7) Average bid.....	208,000				
(4) Griffith Co., Los Angeles.....	208,214						
204,000 cu.yd. roadway embankment.....	.54	(1) .55	(2) .56	(3) .60	(4) .58	(5) .66	(6) .58
300 cu.yd. structure excavation.....	1.00	.75	1.00	1.00	1.50	.75	1.00
36,000 sq.yd. subgrade for concrete paving.....	.08	.07	.09	.10	.13	.10	.095
7,400 cu.yd. 'A' concrete (paving).....	9.00	9.50	8.80	8.37	8.40	8.75	8.80
10 cu.yd. 'A' concrete (structures).....	20.00	20.00	25.00	20.00	16.00	20.00	18.50
172,000 lb. reinforcing steel.....	.045	.035	.04	.035	.05	.05	.04
110 ft. 18-in. corr. pipe, place.....	.70	.50	.50	.75	.75	.70	.65
290 ft. 18-in. conc. pipe, reinf.....	2.15	2.25	2.00	3.00	2.50	2.20	2.35
400 ft. 24-in. reinf. conc. pipe.....	2.90	3.35	3.00	3.60	3.25	2.60	3.12
2.7 miles new property fence.....	500.00	500.00	700.00	500.00	700.00	450.00	568.00
216 ft. solid timber guard rail.....	2.00	1.00	1.50	1.75	2.50	.85	1.60
636 10-in. reinf. conc. headers (cribbing).....	4.99	4.25	4.50	4.50	4.45	4.35	4.56
594 6-in. reinf. conc. stretchers (cribbing).....	3.14	2.60	2.80	2.90	3.25	2.70	2.90
400 8-in. reinf. conc. stretchers (cribbing).....	3.56	2.95	3.20	3.30	3.10	3.05	3.19
333 10-in. reinf. conc. stretchers (cribbing).....	4.48	3.75	4.00	4.25	4.00	3.90	4.06
340 stations finishing roadway.....	5.00	3.00	5.00	6.00	7.00	7.00	5.50
92 monuments.....	4.00	2.50	2.00	3.00	4.00	3.00	3.08

**SACRAMENTO, CALIF.—STATE—HUMBOLDT COUNTY—GRADING AND SURFACING**

H. H. Boomer, 284 Mills Bdg., San Francisco, \$74,977 low bid to California Division of Highways, Sacramento, for 1.2 miles grading and surfacing with untreated crushed gravel or stone, HUMBOLDT COUNTY from Garberville to Bluff Creek. Bids from:

(1) H. H. Boomer, San Francisco.....	\$74,997	(7) J. E. Johnston, Stockton.....	\$ 96,840									
(2) Tieslau Bros., Berkeley.....	88,178	(8) W. H. Hauser, Oakland.....	107,271									
(3) Contoules Const. Co.....	92,746	(9) Kennedy-Bayles Const. Co., Oakland.....	111,704									
(4) C. R. Johnson, Portland.....	94,070	(10) E. C. Coats, Marysville and Sacramento.....	130,737									
(5) D. McDonald, Sacramento.....	94,897	(11) Mathews Const. Co., Sacramento.....	131,192									
(6) Young Bros., Berkeley.....	96,522	(12) Average bid.....	101,700									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
12 acres clearing and grubbing.....	40.00	\$125	\$300	\$320	\$150	\$200	\$200	\$250	\$250	\$150	\$100	\$189
119,600 cu.yd. road. excavat.....	.42	.46	.49	.48	.54	.56	.55	.60	.65	.82	.69	.57
1,096,200 sta.yd. overhaul.....	.005	.01	.01	.01	.01	.0075	.005	.01	.01	.01	.02	.01
725 cu.yd. struct. excavat.....	1.75	1.25	1.25	2.00	1.00	1.25	2.00	2.00	2.00	1.00	2.50	1.64
3,200 cu.yd. grav. or stone surfacing.....	2.00	2.90	2.50	2.90	2.20	2.50	3.00	2.50	2.25	2.70	3.00	2.58
240 M gal. watering.....	3.00	1.50	3.00	3.00	3.00	2.50	3.00	3.00	2.50	3.00	3.00	2.77
660 yd. screen (stockpiles).....	3.00	3.25	3.00	2.90	2.50	2.50	3.50	2.50	2.50	2.70	4.00	2.94
220 cu.yd. 'A' conc. (struct.).....	25.00	25.00	25.00	25.00	25.00	25.00	30.00	30.00	30.00	25.00	32.00	27.00
20,000 lb. reinf. steel.....	.07	.065	.07	.07	.05	.06	.05	.07	.07	.065	.075	.065
60 ft. 12-in. corr. pipe, place.....	1.00	.60	.50	1.00	.50	.60	1.00	1.00	.75	.75	1.50	.84
674 ft. 18-in. corr. pipe, place.....	1.00	.75	.65	1.00	.60	.70	1.25	1.25	.75	1.00	2.00	1.00
70 ft. 30-in. corr. pipe, place.....	1.50	1.00	1.00	2.00	1.00	1.00	1.75	1.50	2.00	1.50	3.00	1.57
62 sta. finish roadway.....	10.00	8.00	7.00	10.00	5.00	6.00	6.00	10.00	5.00	5.00	7.50	7.22
34 monuments.....	2.25	3.00	3.00	3.00	3.00	3.50	3.00	3.00	3.00	3.00	3.50	3.02

**SANTA ANA, CALIF.—ASPHALT AND CONCRETE PAVING, SEWER, WATER, AND LIGHTING SYSTEMS—COUNTY—DANA POINT**

Contract awarded to Western Construction Co., 4735 E. 52nd Drive, Maywood, \$439,606 for improvements in Dist. 25, Dana Point, for County. Bids from:

(1) Western Const. Co.....	\$439,606	(2) Geo. H. Oswald.....	\$455,288	(3) Hall-Johnson Co. ....	\$490,208		
	(1)	(2)	(3)		(1)	(2)	(3)
183,355 yd. excavat. ....	.43	.50	.62	1,122 ft. 8-in. cast iron sewer.....	3.00	2.25	2.00
90,551 sq.ft. conc. pav. ....	.225	.235	.26	66 conc. manholes .....	75.00	\$100	\$100
19,828 sq.ft. conc. pav. (alleys).....	.19	.205	.22	15 conc. flush manholes .....	\$100	\$120	\$125
1,006,445 sq.ft. asphalt paving .....	.13	.14	.13	2 conc. drop manholes .....	\$152	\$115	\$135
53,331 ft. conc. curb .....	.50	.50	.47	Drainage Lay. No. 1.....	\$12,645	\$8,000	\$14,000
244,163 ft. sidewalk .....	.155	.15	.15	Drainage Lay. No. 2.....	82.00	\$100	\$200
33,515 ft. 6-in. vitr. sewer.....	.87	1.00	1.15	Drainage Lay. No. 3.....	\$1,651	\$2,500	\$4,000
3,705 ft. 8-in. vitr. sewer.....	1.00	1.10	1.30	Cast iron water syst. and fire hyd.....	\$47,345	\$40,000	\$50,000
2,365 ft. 6-in. cast iron sewer.....	2.30	2.00	1.50	Lighting system .....	\$31,128	\$30,000	\$30,000

Nat H. Neff is County Road Commissioner of Orange County.

**WATER SUPPLY SYSTEMS****SAN DIEGO, CALIF.—CAST-IRON MAINS—CITY—LA MESA COLONY AND METROPOLITAN CENTER**

Edgeley Company, 800 E. 61st St., Los Angeles, who bid \$32,410 low bid to City for water system in La Mesa Colony and Metropolitan Center. Bids received from:

(1) Edgeley Company, Los Angeles.....	\$32,410	(5) Watson & Sutton, San Diego.....	\$36,897					
(2) Miracle Const. Co., San Diego.....	34,282	(6) R. A. Hazard Contr. Co., San Diego.....	39,862					
(3) Ben Pearce Contr. Co., San Diego.....	35,228	(7) Butterfield Construction Co. ....	40,316					
(4) F. A. Rhodes, San Diego.....	36,847	(8) V. A. Thompson .....	40,324					
12,996 ft. 6-in. cast iron main .....	(1) 1.26	(2) 1.35	(3) 1.40	(4) 1.40	(5) 1.43	(6) 1.50	(7) 1.65	(8) 1.74
5,191 ft. 8-in. cast iron main .....	1.68	1.78	1.91	1.90	1.89	2.15	2.00	2.15
1,727 ft. 10-in. cast iron main .....	2.31	2.30	2.37	2.90	2.95	3.50	2.80	2.69
25 fire hydrants .....	132.00	140.00	120.00	150.00	135.00	125.00	145.00	75.00



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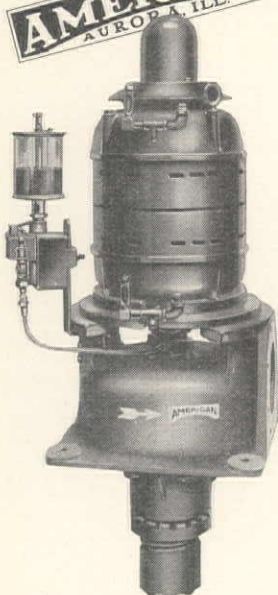
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The turbine proper is a special style of the turbine type of centrifugal and consists of one or more stages of suitable diameter to enter bored wells of 6-in. and 8-in. inside diameter. The number of stages may be varied according to the head required.

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# CONSTRUCTION NEWS SUMMARY

**NOTE:** For additional information regarding projects in this summary refer to *Daily Construction News Service*, date appearing at end of each item.

## LARGE WESTERN PROJECTS

(See *Construction News*, this issue, for details.)

### WORK CONTEMPLATED

Water system improvements for Santa Clara Water Conservation Dist., San Jose, Calif. \$5,000,000.  
 Pipe-lines for City of Seattle, Wash. \$3,000,000.  
 Sewer and water improvements, golf course, library, etc., for City of Phoenix, Ariz. \$4,823,000.  
 Steel plant for Pacific Iron & Steel Co. at Compton, Calif. \$500,000.  
 Club building for Washington Athletic Club on 6th Ave. and Union Sts., Seattle. \$2,000,000.  
 Pipe-line, dams, and reservoirs for City of Anacortes, Wash. \$417,000.  
 Railroad from Las Animas, Colorado, to Amarillo, Tex., for Atchison, Topeka & Santa Fe RR. \$5,000,000.  
 Apartment on 7th and Seneca Sts., Seattle, for Mark Twain Apartments, Inc. \$1,000,000.  
 Apartment on 9th and University, Seattle, for Chancellor Apartments, Inc. \$2,000,000.  
 Hospital on 9th and Seneca Aves. for Seattle General Hospital, Seattle. \$1,500,000.

### BIDS BEING RECEIVED

Pipe-line from Otay Reservoir to City, for City of San Diego, Calif., bids open about Dec. 23, \$1,500,000.

### BIDS RECEIVED

Grain elevator and shipping gallery for Port of Tacoma, Wash., Albertson-Cornell Bros., Tacoma, \$520,956 low.  
 Grading and surfacing 16 miles of Haleakala Road for Territorial Highway Dept., Honolulu, T.H., G. C. Mellor, \$514,900 low.

### CONTRACTS AWARDED

Asphalt and concrete paving, sewer and water mains, Dist. 25, for Orange County at Dana Point, to Western Construction Co., Los Angeles, \$439,606.  
 Steel bridge for State of California over San Luis Rey River, San Diego County, to Gutleben Bros., Oakland, \$281,542.  
 Tunnel and dam on Lewis River Project, Ariel, Wash., for Northwestern Electric Co., Portland, to Phoenix Utility Co., Portland, Ore., \$8,000,000.  
 Industrial building for El Travia Industrial Terminal Corp., at Los Angeles, to Geo. A. Fuller Co., New York, N. Y., \$10,500,000.  
 Roads, bridges, sewers, and water mains for Mexico Govt., near Monterey, Mexico, to B. W. Kuhn Co., Los Angeles, \$7,500,000.

## STREET and ROAD WORK

### WORK CONTEMPLATED

**FRESNO, CALIF.**—Plans by A. M. Jensen, City Engr., for paving with 5½-in. asphalt, alley in Block 126. Bids after Nov. 29. 11-15  
**LOS ANGELES, CALIF.**—Plans by County Surveyor, protests Dec. 9 for improving 1.2 miles Wilson Ave. near El Monte, involving 19,491 cu.yd. excavation, 186,329 sq.ft. 8-in. 6-in. concrete paving, rock sub-base, reinf. conc. culvert, \$70,265. 11-15  
**LOS ANGELES, CALIF.**—Plans by J. E. Rockhold, County Surveyor, protests Nov. 25, for improvement of Cerritos Ave. between Centre St. and Long Beach, involving: 25,697 cu.yd. excavation, 217,660 sq.ft. 8-6-in. concrete paving, 226,370 sq.ft. 5-in. rock subbase, 418 lin.ft. 12-in. corr. iron pipe. \$72,215. 11-12  
**LOS ANGELES, CALIF.**—Plans by J. E. Rockhold, County Surveyor, protests Dec. 2, for: (1) Virginia Ave. from Mortan Road to Los Flores Blvd., grading, curbs and sidewalks, \$28,560; and (2) Carmentia Road east of Santa Fe Springs, 2.6 miles, involving 17,903 cu.yd. excavation, 381,672 sq.ft. 3-in. asphalt base, 304,788 sq.ft. 2-in. asphalt surface, rock shoulders, rock subbase, corr. pipe, etc., \$85,000. 11-12  
**LOS ANGELES, CALIF.**—Plans by J. E. Rockhold, County Surveyor, protests Dec. 9, for improving ½ mile of Broadway near Huntington Park, involving 4035 cu.yd. excavation, 82,598 sq.ft. 8-in. 6-in. concrete paving with 5-in. disint. rock sub-base, lighting system, etc. \$40,000. 11-19  
**NEWPORT BEACH, CALIF.**—Plans by R. L. Patterson, City Engr., for improving streets in Tract 948, involving concrete paving, sewers, water mains and lighting system, \$50,000. Bids after Dec. 2.  
**OAKLAND, CALIF.**—Plans by City Engr. for improving Knoll Ave. near Mt. Blvd., involving 23,164 sq.ft. Vibrolithic concrete paving, vitr. sewers, grading, etc. Bids after Dec. 5. 11-19

**OROVILLE, CALIF.**—Plans by City, protests Nov. 25 for widening Downer St. from Montgomery St. to Robinson St., grading, paving with Warrenite Bit. paving, curbs, concrete retaining walls, gutters, sidewalks. 1925 Act. 11-13

**SAN DIEGO, CALIF.**—Plans by H. W. Jorgensen, City Engr., for improving Marlborough St., etc., involving 29,819 sq.ft. 6-in. concrete paving, 106,046 sq.ft. 6-in. Willite paving, cast iron mains, etc. Bids after Dec. 9. 11-15

**SAN DIEGO, CALIF.**—Plans by H. W. Jorgensen, City Engr., for: (1) Improving Elm St., involving 40,467 sq.ft. 6-in. concrete paving, 824 ft. 4-in. and 67 ft. 6-in. cast-iron pipe, etc.; and (2) 33rd and Kalmia Sts., involving 31,231 sq.ft. 6-in. asphalt paving, 362 ft. 6-in. and 131 ft. 4-in. cast-iron pipe, 1 hydrant, etc. Bids after Dec. 2. 11-9

**SAN DIEGO, CALIF.**—Plans by H. W. Jorgensen, City Engr., for improving F St., involving 65,469 sq.ft. 6-in. concrete paving, 1206 ft. 6-in. 'C' cast-iron pipe, concrete sewers, etc. Bids after Dec. 9. 11-19

**SANTA CRUZ, CALIF.**—Plans by City Engr. R. Fowler, protests Nov. 18, for Soquel Ave. and Front St., concrete paving, curbs, sidewalks, driveway approaches, concrete pipe drains, vitrified sewer, 2½-in. asphalt wearing surface and waterbound macadam base. 1911 Act. 11-12

**SANTA MARIA, CALIF.**—Plans by City Engr., protests Nov. 18, for improving East Main St., East Tunnell St., Pershing St., etc., paving with asphalt, concrete curbs, concrete gutters, and concrete sidewalks. 1911 Act. 11-12

### BIDS BEING RECEIVED

**PHOENIX, ARIZ.**—Bids to 2 p.m., Dec. 10, by Bureau of Public Roads, 461 Market St., San Francisco, for surfacing Bright Angel Point-Cape Royal Section; Grand Canyon National Park, Arizona, 25.85 miles, involving 30,700 tons crushed rock base course, and 34,500 tons oil-treated crushed rock. 11-16

**PHOENIX, ARIZ.**—Bids to 2 p.m., Dec. 12, by Bureau of Public Roads, 461 Market St., San Francisco, for grading 9.97 miles Bright Angel Springs-North Entrance Section, North Rim of Grand Canyon National Park, Arizona, involving 83,450 cu.yd. excavation, etc. 11-16

**BERKELEY, CALIF.**—Bids to 10 a.m., Dec. 3, by City Clerk for improving San Pablo Ave., involving 174,500 sq.ft. grading and 6-in. rock cushion, 115,000 sq.ft. 5-in. asphalt base with 2-in. Warrenite Bit. surface, 190,000 sq.ft. Warrenite Bit. resurfacing, curbs, gutters, concrete and vitrified sewers, etc. 11-19

**FRESNO, CALIF.**—Bids to 10:30 a.m., Nov. 29, by City Clerk, for (1) Alley Block 9, Central Addition, involving 7100 sq.ft. 5¼-in. asphalt paving and grading, and (2) Alley Block 36, involving 7600 sq.ft. 6-in. concrete paving and grading. 1911 Act. 11-15

**OAKLAND, CALIF.**—Bids to 12 m., Dec. 5, by City Clerk for improving Hillmont Drive from 73rd Ave. to Tully Place, involving 18,635 cu.yd. excavation, 77,788 sq.ft. 3½-in. asphalt base with 1½-in. Warrenite Bit. surface, curbs, sidewalks, vitr. conduits, etc. 11-15

**OAKLAND, CALIF.**—Bids to 12 m., Dec. 5, by City Clerk for improving Hermosa Ave. and Broadway Terrace, involving 4144 cu.yd. excavation, 23,414 sq.ft. 3½-in. asphalt base with 1½-in. asphalt surface, vitrified conduits and sewers. 11-16

**SACRAMENTO, CALIF.**—Bids to 2 p.m., Dec. 11, by California Division of Highways for 6.7 miles in SAN BERNARDINO COUNTY, from 4½ miles west of Running Springs to Squirrel Inn, involving 72 acres clearing and grubbing, 271,000 cu.yd. roadway excavation, concrete structures, concrete cribbing, etc. 11-13

**SACRAMENTO, CALIF.**—Bids to 2 p.m., Dec. 4, by California Division of Highways for: (1) TEHAMA AND PLUMAS COUNTIES—21.7 miles, from Morgan Springs to Lake Almanor, involving 15,000 cu.yd. roadway excavation, 6000 cu.yd. gravel or stone surface, 8800 cu.yd. gravel or stone screenings (stockpiles), etc.; and (2) IMPERIAL COUNTY—10.4 miles concrete paving and grading from Brawley to west of Westmorland, involving 72,400 cu.yd. roadway excavation, 23,450 cu.yd. 'A' concrete paving, 634,800 lb. reinf. steel, corr. pipe, etc. 11-7

**SALINAS, CALIF.**—Bids to 10 a.m., Dec. 2, by County Clerk for improving San Lucas-Lockwood Road. Work involves 19,314 cu.yd. hauling and dumping gravel on subbase. 11-9

**SAN FRANCISCO, CALIF.**—Bids to 2 p.m., Dec. 3, by Bureau of Public Roads for 1.9 miles Route 72, Idyllwild National Highway, Riverside County, involving 29,400 cu.yd. roadway excavation. 11-12

**SONORA, CALIF.**—Bids to 2 p.m., Dec. 3, by County for improving 3½ miles of Yankee Hill Road, involving 30,000 cu.yd. excavation, corr. pipe, etc. \$17,000. 11-19

**VENTURA, CALIF.**—Bids to 11 a.m., Dec. 3, by County Clerk for improving 2660 ft. of Erbs Road, involving: 4700 cu.yd. excavation, 102 cu.yd. concrete, 5000 lb. reinf. steel, 70 ft. 36-in. corr. pipe, 74 ft. 24-in. corr. pipe. 11-15

### BIDS RECEIVED

**HOLBROOK, ARIZ.**—Bids as follows by City for improving Porter, Montano, Oakland Sts., etc:

4-IN. BITUMULS PAVING

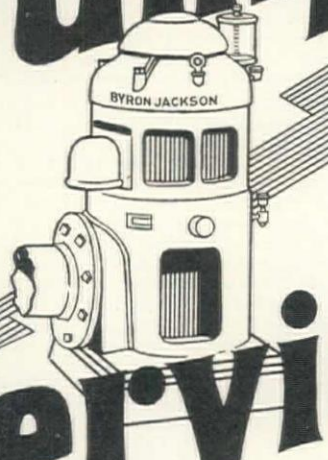
Southwest Paving Co., Washington Bldg., Los Angeles (low).....\$45,338

Pearson & Dickerson, Riverside..... 51,641

Engineer's estimate ..... 46,305



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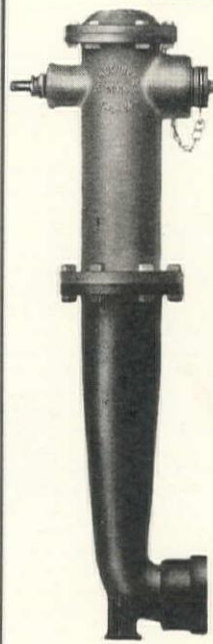

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 Southwest Paving Co., L. A. \$61,363  
 New Mexico Const. Co. 68,205  
 Engineer's estimate 80,645

4-IN. WARRENITE PAVING  
 Western Roads Co., Oakland, Calif. \$67,950  
 New Mexico Const. Co. 70,494  
 Engineer's estimate 80,645

6-IN. BITUMULS PAVING  
 Southwest Paving Co., L. A. \$52,206  
 Pearson & Dickerson, Riverside. 59,654  
 Engineer's estimate 55,463

6-IN. ASPHALT CONCRETE PAVING  
 Southwest Paving Co., L. A. \$70,520  
 New Mexico Const. Co. 82,169  
 Engineer's estimate 90,947

6-IN. WARRENITE BIT. PAVING  
 Western Roads Co., Oakland, Calif. \$81,228  
 New Mexico Const. Co. 84,459  
 Engineer's estimate 90,947

**PHOENIX, ARIZ.**—Low bids as follows by Arizona Highway Commission: (1) Hodgman & MacVicar, 714 Plymouth Road, Pasadena, Calif. \$103,204, low for 17 miles grading Florence-Tucson Highway from Coolidge south toward Pichaco; and (2) Henry Galbraith, Jerome, Ariz., \$82,635, low for 6 miles grading and bridges on Ashfork-Kingman Highway from Ashfork toward Crookton. (See Unit Bid Summary.) 11-18

**LOS ANGELES, CALIF.**—Low bids as follows by City for improving Devonshire St. from Zelzah Ave. to Santa Susana Ave., paving, grading, corr. culverts, concrete culverts, cast iron mains, hydrants, etc.; **CONCRETE PAVING**—J. Papac, 726 N. Hill St., L. A., \$135,540 low; and **ASPHALT PAVING**—Osborn Co., 455 California Terrace, Pasadena, \$137,716 low. 11-15

**MARYSVILLE, CALIF.**—K. I. Dowdy, San Francisco, \$5709 low bid to City for sidewalks and wooden retaining walls on B, F, 11th, and other streets. 11-19

**SACRAMENTO, CALIF.**—Bids received by California Division of Highways, Sacramento, for grading and surfacing 7 miles of highway in **SISKIYOU COUNTY** from Yreka to Klamath River have been rejected. Low bid for the work was submitted by Wren & Greenough, P.O. Box 138, Portland, who bid \$591,067. Plans and specifications will be revised, the grading quantity will be increased and project will be readvertised in about three weeks. (See Unit Bid Summary.) 11-8

**SACRAMENTO, CALIF.**—Low bids as follows by California Division of Highways, (1) **HUMBOLDT COUNTY**—H. H. Boomer, 284 Mills Bldg., San Francisco, \$74,977 low for 1.2 miles grading and surfacing from Garberville to Bluff Creek; and (2) **ORANGE COUNTY**—Macco Const. Co., Clearwater, \$201,545, low for 6.4 miles grading and concrete paving from Sunset Beach to Newport Beach. (See Unit Bid Summary.) 11-13

**VENTURA, CALIF.**—C. G. Willis & Sons, 2119 E. 25th St., L. A., \$271,030, low bid to Joint Highway Dist. 6, for Section C, Cuyama Division of Maricopa-Carpinteria Road from Cuyama River to summit of Pine Mountain, 6 miles of grading. (See Unit Bid Summary.) 11-15

**HONOLULU, T. H.**—G. C. Mellor, \$514,900, low bid to Territorial Highway Department, Honolulu, for grading, rock base course with asphaltic surface paving, bridges, etc., on 16.6 miles of Haleakala Road. 11-18

### CONTRACTS AWARDED

**PHOENIX, ARIZ.**—Awards as follows by Arizona Highway Commission: (1) Contract awarded to F. D. Shufflebarger, Albuquerque, New Mexico, who bid \$174,003 for 22.5 miles grading and steel bridge on the Holbrook-Lupton Highway from 2 miles west of Sanders northeast to the Arizona-New Mexico Line; (2) Contract to N. G. Hill & Co., 1344 E. McKinley St., Phoenix, Arizona, who bid \$14,320 for 7.7 miles oiling Mesa-Florence Highway from end of pavement east of Mesa to Apache Junction; and (3) Contract awarded to Dudley & Amesbury, P.O. Box 108, El Paso, Texas, who bid \$16,196 for surfacing on the Globe-Safford Highway from 6 miles west of Bylas approximately 4.6 miles west therefrom. (See Unit Bid Summary.) 11-8

**FRESNO, CALIF.**—To Thompson Bros., Fresno, \$43,514 for asphalt paving and resurfacing North H St. from Eldorado St. to Belmont Ave. for City. 11-8

**LOS ANGELES, CALIF.**—To J. L. McClain, 3052 W. Slauson Ave., Los Angeles, who bid \$127,705 for improving Kittridge St. and Lemp Ave. Dist. for City, concrete paving, grading, sanitary sewers, water system, lighting conduit, etc. 11-6

**LOS ANGELES, CALIF.**—To J. L. McClain, 3052 W. Slauson Ave., Los Angeles, who bid \$67,464 for improving streets in Mansfield and First St. Improvement District, work consisting of grading, concrete paving, water system, etc., for City. 11-7

**MARKLEEVILLE, CALIF.**—To Isbell Construction Co., Carson City, Nev., \$18,115 for road from Woodsford to Nevada State Line for County. 11-18

**OAKLAND, CALIF.**—To Oakland Paving Co., 5000 Broadway, Oakland, \$36,792 for improving Camden St., Courtland Ave., Meldon Ave. for City, 3-in. asphalt base with 2-in. National surface, vitr. conduit, concrete box culvert, etc. 11-7

**SACRAMENTO, CALIF.**—To Southwest Paving Co., Washington Bldg., Los Angeles, who bid \$51,361 for oil-treated rock borders in **LOS ANGELES COUNTY** and **VENTURA COUNTY** from Calabasas to Conejo for California Division of Highways. 11-8

**SACRAMENTO, CALIF.**—To Hartman Construction Co., 1804 M St., Bakersfield, who bid \$41,993 to California Division of Highways, Sacramento, for 2 miles grading and bituminized macadam surface from 5 miles to 7 miles east of Lost Hills, **KERN COUNTY**. 11-14

**SACRAMENTO, CALIF.**—Awards as follows by California Division of Highways: (1) To Hemstreet & Bell, Marysville, who bid \$37,330 for 8.7 miles surfacing from Arnold to Sherwood-Laytonville Road, **MENDOCINO COUNTY**; (2) To Engelhart Paving & Construction Co., Eureka, who bid \$27,050 for 7.3 miles surfacing from Bean Creek to Fish Creek, **HUMBOLDT COUNTY**; (3) To Allied Contractors, Inc., Ludlow, who bid \$239,792 for 21.3 miles grading and oil-treated gravel or stone surfacing from Coso Junction to Olancha, **INYO COUNTY**; (4) To Grier & Taylor, 480 Chetwood St., Oakland, who bid \$59,941 for surfacing with untreated crushed gravel or stone 26 miles in **SHASTA COUNTY**, from Bayha to La Moine; and (5) To Los Angeles Decomposed Granite Co., 2171 W. Washington Blvd., Los Angeles, who bid \$50,379 for 12.2 miles surfacing with oil-treated crushed gravel or stone from Pentland to San Emigdio, **KERN COUNTY**. 11-6

**SAN BERNARDINO, CALIF.**—To W. D. Bohan, San Bernardino, \$13,861, for improving Genevieve St., 28th St., etc., grading, oil macadam paving, vitr. sewers for City. 11-6

**SANTA ANA, CALIF.**—To Western Const. Co., 3735 E. 52nd Drive, Maywood, \$439,606 for grading, concrete and asphalt paving, vitr. sewers, cast-iron mains, fire hydrants, etc., in Dist. 25, Dana Point, for County. (See Unit Bid Summary.) 11-6

**SONORA, CALIF.**—To Whitney & Lyons, Jamestown, \$6043 for grading road and concrete bridge on Jamestown-Rawhide Road for County. 11-7

**VENTURA, CALIF.**—To Silveria & Robbins, Ventura, \$16,766 for grading, culverts, concrete paving on Del Norte Ave. for County. 11-8

**WOODLAND, CALIF.**—To J. G. Motroni, Woodland, \$11,440 for 6-in. concrete paving, corr. culverts, etc., on Main St. from Elm to Third St. for City. 11-6

**BOISE, IDAHO**—Awards as follows by State: (1) To C. A. Robinson, Twin Falls, Ida., \$113,910 for 9.9 miles surfacing and 23 miles grading Old Oregon Trail Highway from Regina to Mt. Home, **ADA AND ELMORE COUNTIES**; and (2) To H. W. Perham, St. Anthony, Ida., \$10,121 for bridge over Fall River, **FREMONT COUNTY**. 11-8

**OLYMPIA, WASH.**—Awards as follows by Highway Comm.: (1) To C. E. Martin, Seattle, \$10,152 for resurfacing with crushed stone 21.6 miles of Olympic Highway, from Lake Quinault Junction to Harlow Creek, **GRAYS HARBOR AND JEFFERSON COUNTIES**; and (2) To L. Romano Co., Inc., Seattle, \$80,681 for clearing, grading, and draining, and surfacing 2 miles of Pacific Highway, from Bellingham to Austin Pass, Terminal Lake south, in **WHATCOM COUNTY**. 11-8

## BRIDGES and CULVERTS

### BIDS BEING RECEIVED

**LOS ANGELES, CALIF.**—Bids to 2 p.m., Dec. 2, by County for 150-ft. wooden and concrete bridge 50 ft. wide over Ballona Creek on Sawtelle Blvd. 11-7

**MERCED, CALIF.**—Bids to 11 a.m., Dec. 3, by County for: Timber bridge, No. 205, over Mud Slough on the Fremont Road in Orestimba Rancho, Timber bridge, No. 206, over Deep Slough on the Fremont Road in Orestimba Rancho. 11-16

**PLACERVILLE, CALIF.**—Bids to 2 p.m., Dec. 3, by County Clerk for reinf. conc. bridge over Sweetwater Creek near Salmon Falls and over Knickerbocker Creek near Cool. 11-9

**SACRAMENTO, CALIF.**—Bids to 10 a.m., Nov. 27, by County for 96-ft. redwood trestle over Dry Creek near Rio Linda. 11-7

**SANTA BARBARA, CALIF.**—Bids to 11 a.m., Dec. 9, by County for five retaining walls, two in Toro Canyon, one in Montecito, and two on the foothill road above Carpinteria, \$9000. 11-15

**VENTURA, CALIF.**—Bids to 11 a.m., Dec. 3, by County for: (1) Concrete lining and curb on storm ditch north of Lot 8, Rancho Santa Paula Saticoy. Work involves 204 cu.yd. A concrete, 11,500 lb. reinf. steel; (2) Reinf. concrete culvert and check dam with earthwork, Sudden Barranca Check Dam on Lot 2, Tract R, Rancho Ex-Mission, for Saticoy Protection District, involving 1450 cu.yd. embankment, 67½ cu.yd. A concrete, 4000 lb. reinf. steel, 75 cu.yd. struct. excav. 11-15

### BIDS RECEIVED

**LOS ANGELES, CALIF.**—E. G. Perham, 1128 Stearns Drive, L. A., \$28,100, using Redwood and \$18,850 using Douglas Fir, low bid to County for trestle bridge on Sepulveda Blvd. over Ballona Creek. 11-14

**LOS ANGELES, CALIF.**—L. A. Sand Blasting Co., L. A., \$2350, low bid to Dist. Engineer, California Division of Highways, L. A., for cleaning and painting steel bridge over Santa Ana River, **ORANGE COUNTY**. 11-14

**SACRAMENTO, CALIF.**—Pittman & Hippenstiel, Riverside, \$13,087, low bid to California Division of Highway for concrete bridge near Tejon Station, **SAN BERNARDINO COUNTY**. 11-14

**SANTA ROSA, CALIF.**—Smith & Jackson, San Rafael, \$6871, low bid to County for concrete pipe trestle over south fork of Green Valley Creek on Sebastopol-Freestone Highway. 11-13

### CONTRACTS AWARDED

**PHOENIX, ARIZ.**—Awards as follows by State: (1) To General Const. Co., Box 1813, Phoenix, who bid \$40,633 for Phoenix-Prescott Highway south of Hot Springs Junction, 1 mile roadway and one reinf. concrete overpass; and (2) To Cotey & Bowman, Box 171, Clifton, Arizona, who bid \$16,117 for cleaning, painting, dismantling, and re-erecting Mining Canyon and Post Office Canyon bridges. 11-8

**MARTINEZ, CALIF.**—To L. T. Isham, Rio Vista, \$4980 for wooden bridge over Hastings Slough near Avon for County. 11-18



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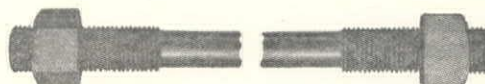
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**MERCED, CALIF.**—To T. A. Wayne, Atwater, \$1350 for concrete bridge over Mustang Creek on Montpelier & Ryer Road for County. 11-15

**SACRAMENTO, CALIF.**—Awards as follows by California Division of Highways, (1) To Siemer, Kendall & F. J. Main, San Anselmo, \$17,190 for concrete overhead crossing over N. W. Pacific R.R. near Greenbrae, MARIN COUNTY; and (2) To Fredrickson & Watson, 354 Hobart St., Oakland, and Fredrickson Bros., Stockton, who bid \$121,683 for steel and concrete overhead crossing over the Northwestern Pacific tracks at California Park, MARIN COUNTY. (See Unit Bid Summary.) 11-14

**SACRAMENTO, CALIF.**—Awards as follows by California Division of Highways: (1) To Johnson Const. Co., 2131 Barclay St., Los Angeles, \$88,054 for bridge widening over San Gabriel River on Foothill Blvd., LOS ANGELES COUNTY; and (2) To Gutleben Bros., 4815 Calaveras Ave., Oakland, \$281,542 for steel bridge over San Luis Rey River near Oceanside, SAN DIEGO COUNTY. 11-6

**SALINAS, CALIF.**—To Criberti & Massero, 635 44th St., Oakland, \$1870 for double-box culvert over Alisal St. for City. 11-6

**SAN ANSELMO, CALIF.**—To F. J. Main, 54 Suffield Ave., Fairfax, \$25,203 for improving San Anselmo Ave., Sycamore Ave., etc., for City, concrete bridge, electroliners, corr. pipe, concrete and asphalt paving. 11-6

**YUBA CITY, CALIF.**—To Holdener Const. Co., 2608 R St., Sacramento, \$5912 for reinf. conc. bridge over main drain canal, Subaco Road. 11-8

**OLYMPIA, WASH.**—To Henry Hagnan, Cashmere, Wash., who bid \$34,260 for 375-ft. concrete girder bridge over the Methow River at Pateros, OKANOGAN COUNTY, for State. 11-8

## SEWER CONSTRUCTION

### WORK CONTEMPLATED

**MARTINEZ, CALIF.**—Plans by R. L. Calfee, Engr., 322 Arlington Ave., Berkeley, for outfall in Stege Sanitary Dist. for County, involving 3000 ft. 30-in. and 4000 ft. 36-in. vitrified pipe and 2000 ft. 48-in. monolithic conc. pipe. 1907 Act. 11-19

**OAKLAND, CALIF.**—Plans by City Engr. for 14,147 ft. 8-in. vitrified sewer in Wood Drive, Estates Drive, etc. Bids after Dec. 5. 11-19

**REDWOOD CITY, CALIF.**—Plans by Geo. A. Kneese, County Surveyor, protests after Dec. 2, for 200,000 ft. 6-in. to 30-in. concrete and vitr. sewer in Atherton and North Fair Oaks for County. 1921 Act. 11-19

**SAN JACINTO, CALIF.**—Plans by Engineers, Koebig & Koebig, Rowan Bldg., Los Angeles, bids soon, by City for: (1) Sewage treatment plant, \$30,000, under bond issue; and (2) Vitrified sewers, \$60,000, under 1911 Act. 11-18

### BIDS BEING RECEIVED

**PASADENA, CALIF.**—Bids to 11 a.m., Dec. 6, by City Clerk for 1 cylindrical revolving, double-shell, dryer for sewage sludge. 11-18

### BIDS RECEIVED

**LOS ANGELES, CALIF.**—P. J. Akmadzich, 320 Wilcox Bldg., L. A., \$34,146 low bid to County for cement sewers in Deana Ave., etc. 11-14

### CONTRACTS AWARDED

**MARCH FIELD, CALIF.**—To K. L. Colborn, Inc., Pasadena, who bid \$6487 for water mains, sanitary sewer mains, and extension of gas mains to serve 22 bungalows for non-commissioned officers at March Field, near Riverside. 11-14

**OAKLAND, CALIF.**—To W. J. Tobin, 527 Balfour St., Oakland, who bid \$7787 to City for vitrified sewers in Estates Drive, Bullard Drive, etc. 11-9

**SAN CLEMENTE, CALIF.**—To C. Anili, 2817 57th St., Huntington Park, \$88,912 for vitr. and cast-iron sewers, sewage pumping plants, etc., for City. (See Unit Bid Summary.) 11-8

**SAN MARINO, CALIF.**—To J. L. Kruly, 1449 S. Reeves St., Los Angeles, \$9800 for 8-in. vitrified sewer in Fleur Drive, etc., for City. 11-18

## WATER SUPPLY SYSTEMS

### WORK CONTEMPLATED

**LOS ANGELES, CALIF.**—Bond election Nov. 29 by the Downey County Water District, Downey, to vote bonds in amount of \$150,000 for the construction of water system improvements for the District. Burns-McDonnell-Smith Engineering Co., Western Pacific Bldg., Los Angeles, are the Engineers. 11-13

**SAN JOSE, CALIF.**—At election Nov. 5 by Santa Clara County the Santa Clara Water Conservation District has been formed. Construction work proposed will cost \$5,000,000. 11-6

**ANACORTES, WASH.**—Report filed with City by Morse Engr. Co., Smith Tower, Seattle, for water project involving: 68,000 lin.ft. of 20-in. pipe-line; construction of intake pier, pump house, one 1,000,000-gallon reservoir, chemical house, three small dams, rock spillway, 10,000 cu.yd. deep rock trench excavation. \$417,000. Bond election will be held in December. 11-19

**SEATTLE, WASH.**—City is considering following improvements during 1930: (1) 66-in. steel pipe-line from the City to the Cedar River basin, to cost \$1,500,000; and (2) Construction of a new branch pipe-line from the south city limits to the West Seattle Section, including a new reservoir, \$1,500,000. W. D. Barkhuff is City Engineer, and Wm. B. Severyns is the City Water Supt. 11-12

### BIDS BEING RECEIVED

**SAN BRUNO, CALIF.**—Bids to 8 p.m., Dec. 11, by City for extension on Sneath Lane, involving 27 ft. 8-in. and 3380 ft. 6-in. cast-iron pipe, and three 6-in. gate valves. 11-18

**SAN DIEGO, CALIF.**—Bids to Dec. 2, by City Clerk for water system in La Mesa Colony and Metropolitan Center. Work involves: 12,997 lin.ft. 6-in. cast iron pipe, 5191 lin.ft. 8-in. cast iron pipe, 1734 lin.ft. 10-in. cast iron pipe, 24 fire hydrants. 11-14

**SPOKANE, WASH.**—Bids to 9:30 a.m., Nov. 29, by City Clerk for furnishing one 2800-g.p.m. pump, one 250 hp. motor, and starting equipment, f.o.b. Spokane. 11-13

### BIDS RECEIVED

**OAKLAND, CALIF.**—C. G. Claussen Co., S. F., \$36.25 per ton low bid to East Bay Municipal Utility Dist. for 119 tons 16-in. and 28½ tons 8-in. "B" cast iron pipe. 11-14

**SACRAMENTO, CALIF.**—Kennedy Valve Co., San Francisco, \$40.54, low for 50 fire hydrants for City. 11-16

### CONTRACTS AWARDED

**ARCADIA, CALIF.**—To National Cast Iron Pipe Co., L. A., \$1277 for furnishing cast-iron pipe to City. 11-9

**OAKLAND, CALIF.**—To Steel Tank & Pipe Co., 1100 Fourth St., Berkeley, \$8418 to the East Bay Municipal Utility District, for furnishing 2300 lin.ft. ¼-in. plate, 24 in. diameter, welded sheet steel pipe. 11-14

**RED BLUFF, CALIF.**—To Western Pipe & Steel Co., 444 Market St., San Francisco, who bid \$4655 to City for riveted steel storage tank, 36 ft. diameter and 29 ft. high, foundations to be furnished by the City. 11-9

**SAN FRANCISCO, CALIF.**—To Pelton Water Wheel Company, San Francisco, by the Public Works Engineering Co., Hunter-Dulin Bldg., San Francisco, for three pumping units for the Port Costa development project, consisting of three 12-in. submerged type pumps with two speed 900 and 1200 r.p.m. motors. Lifts are 76 to 148 ft., and capacity 4150 r.p.m. 11-14

**SAN FRANCISCO, CALIF.**—To R. P. Easley, Antioch, for constructing dredged canal for California Water Service Co., Hunter-Dulin Bldg., San Francisco, in connection with Port Costa water supply project, work involving 30,000 cu.yd. dredging. 11-8

**PORT ANGELES, WASH.**—To Olympic Forest Products Co., Port Angeles, Wash., who bid \$272,288 as follows for the construction of Elwha River dam and tunnel project: \$27,923 for constructing diversion dam and intake, \$39,740 for constructing intake tunnel, \$204,565 for constructing flow tunnel. Work is for the City. 11-14

## IRRIGATION and RECLAMATION

### WORK CONTEMPLATED

**GILA BEND, ARIZ.**—Bond election Nov. 20 by Gila Water Conservation District, Gila Bend, Arizona, to vote on issuing bonds in the amount of \$365,000 for acquisition, construction, and installing irrigation works. Edwin D. Green is Secretary of the District. 11-12

**BEVERLY HILLS, CALIF.**—Application filed by Daniel V. O'Flaherty, 420 Rodeo Drive, Beverly Hills, California, for the appropriation of 30 cu.ft. per second from Coyote Creek in San Diego County for irrigation of 2400 acres of land near Borrego, Calif. Work will involve: Main canal and pipe line about 9 miles in length. It is proposed to start construction as soon as surveys are made by Engineer, Thos. H. King, 716 Electric Bldg., San Diego. 11-16

**GRIMES, CALIF.**—Application filed by Rowena B. Coulter, Grimes, Calif., for appropriation of 12½ cu.ft. per second water from the Sacramento River for irrigation of 655 acres of land near Knights Landing. Work will involve: Diversion by pumping plant with a capacity of 11,500 gallons per minute, 1240 lin.ft. of earth ditch to be 14-ft. wide on top, 6 ft. wide on the bottom with a 2-ft. depth of water, 200 lin.ft. of 24-in. riveted steel pipe line over levee, \$8000. K. C. Langenour, Robbins, Calif., is Engineer. 11-16

**LADERA, CALIF.**—Bonds voted, \$200,000, by Ladera Irrigation District for canals, pipe-lines, flumes, reservoirs, pumps, etc. H. Hawgood, H. W. Hellman Bldg., Los Angeles, is Engineer. 11-16

**LOS ANGELES, CALIF.**—Application filed by T. E. Hunt, 322 South Vendome St., Los Angeles, for the appropriation of 10 cu.ft. per second water from Arrastre Creek and Baldwin Lake in San Bernardino County for irrigation and domestic use on 800 acres of land in Lucerne Valley. Work will involve: Small concrete diversion dam, 38,280 lin.ft. of 18-in. concrete pipe line. \$90,000. 11-16

**PARADISE, CALIF.**—Paradise Irrigation District, Paradise, Butte County, is considering installation of water meters. 11-18

**SAN FRANCISCO, CALIF.**—Application filed by James W. Flannery, c/o Washington Hotel, San Francisco, for appropriation of 150 second feet of water from Canyon Creek in Sierra County for hydraulic mining purposes. Work will involve: Small diversion dam; 42,240 lin.ft. of earth ditch, flume, and pipe-line. Ditch is to be 16 ft. wide on top, 6 ft. wide on bottom, with a water depth of 5 ft. \$125,000. F. H. Vahrenkamp, c/o Washington Hotel, San Francisco, is Engineer. 11-19



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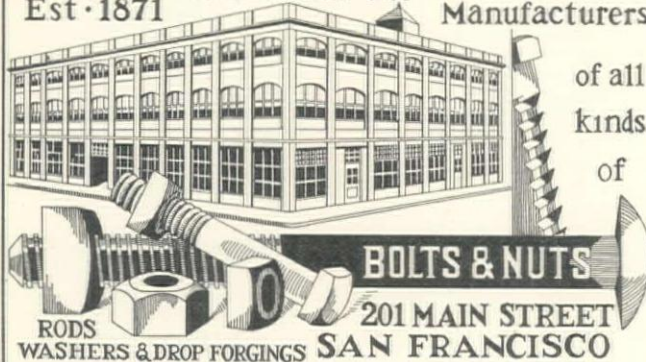
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**STOCKTON, CALIF.**—Linden Irrigation Dist. formed October 3. Fred Tibbetts, Alaska Commercial Bdg., San Francisco, is the Engineer. A. L. Cowell, of Stockton, is the Attorney. The District comprises 12,000 acres of highly developed orchard land, between Mormon Channel and old Calaveras River. The District will work out agreement with City of Stockton for use of Calaveras dam, so water can be released to replenish underground supply. Surveys are being made. 11-9

**YUBA CITY, CALIF.**—Application filed by E. H. Christenson & Sons, Route 3, Yuba City, Sutter County, for appropriation of 10.96 cu.ft. per second water from East Dredge Cut of Sutter By-Pass in Sutter County for irrigation of 438 acres of land near Robbins, involving: Pumping plant with capacity of 5940 g.p.m.; 4000 ft. of ditch, 12 ft. wide at top, 6 ft. wide at bottom, and 2.6 ft. deep; 200 lin.ft. 16-in. riveted steel pipe. \$6000. 11-19

**RENO, NEV.**—Application filed by A. Saralegui, Box 295, Reno, Nev., for 5000 ac.ft. storage water from Long Valley Creek, Lassen County, for 1500 acres irrigation, involving: Storage dam, earth fill type with concrete core, 50 ft. high and 1200 ft. long; 12,000 lin.ft. of earth ditch, 12 ft. wide on top, 6 ft. wide on the bottom, and with a 2-ft. depth of water. 11-19

**PORTLAND, ORE.**—Application filed by Fred J. Blakeley, 349 East Glisan St., Portland, Ore., for the appropriation of 25 cu.ft. per second and 2000 ac.ft. water storage from Elliott Creek in Siskiyou County, Calif., for irrigation and domestic use near Medford, Ore. Work involves: Small diversion dam, ditch to be 25,000 ft. in length, 8 ft. wide on top, 6 ft. wide on bottom, with 2-ft. depth of water, storage dam to be rolled earth type with concrete core, 40 ft. high, 300 ft. long on top and 50 ft. long on bottom, 20 ft. wide on top. Slope on front is to be 3 to 1 and the slope on the back to be 2 to 1. \$50,000. Powell & Wood, Medford, Ore., are the Consulting Engineers. 11-16

### BIDS BEING RECEIVED

**BUTTONWILLOW, CALIF.**—Bids to 2 p.m., Dec. 11, by Buena Vista Water Storage District, Buttonwillow, Kern County, for diversion works and various canal structures, as follows: Kern River Diversion Weir, 8 ft. high, 20 ft. wide, 150 ft. long. Rein. conc. floor and wing-wall, timber superstructure. Main Canal Structures, headgate and 4 weirs to be of rein. conc. and timber; 6 drops, reinforced concrete. Alejandro Canal Structures, headgate, 2 weirs and 5 drops, same as above. 11-15

**SAN DIEGO, CALIF.**—Bids will be opened about Dec. 23 by City for constructing second main pipe-line from the Otay Reservoir to the city on the municipal impounding system, involving: 89,000 ft. trench, including excavation and backfill, 43,150 ft. 40-in. pipe, 43,000 ft. 38-in. pipe, 15,270 ft. 36-in. pipe under streets, piers and trestles for support of 1500 ft. of pipe, 7200 ft. excavation and lining of tunnel, furnishing and installing valves, etc. The line is approximately 19 miles long, and schedules provide for several kinds and classes of pipe, and substitute proposals may be submitted. N. N. Savage is City Hydraulic Engr. 11-8

**TURLOCK, CALIF.**—Bids to 3 p.m., Dec. 2, by Turlock Irrigation District for 215,000 sq.ft. 2-in. concrete lining on Lateral 5½ and 6. 11-7

**BURLEY, IDA.**—Bids to 2 p.m., Dec. 27, by Bureau of Reclamation for earthwork, Sta. 2315 to Sta. 3129, Main Canal, Gravity Extension Division, Minidoka Project, involving 1,050,000 cu.yd. canal excavation, 900 cu.yd. concrete, etc. 11-18

### BIDS RECEIVED

**COMPTON, CALIF.**—Lee R. Webber, 3134 Indiana St., Southgate, \$7245 low bid to City for cast-iron main in Oliver St. from Long Beach Blvd. to Atlantic Blvd. 11-14

### CONTRACTS AWARDED

**LOS ANGELES, CALIF.**—Awards as follows by City Water & Power Bureau under Spec. 1225: (1) To Fairbanks, Morse & Co., L. A., who bid \$546 each for five 60-hp. motors, \$618 each for six 75-hp. motors, and \$880 each for two 100-hp. motors; and (2) To Kimball-Krogh Pump Co., Los Angeles, \$21,430 for 16 pumps. 11-19

## POWER DEVELOPMENT

### BIDS RECEIVED

**TACOMA, WASH.**—H. E. Doering, 568 Maple St., Portland, Ore., \$215,937 low bid to City Board of Contracts and Awards, for Cushman Power House No. 2. (See Unit Bid Summary.) 11-9

### CONTRACTS AWARDED

**HAWTHORNE, NEV.**—To Moore Electric Co., 823 West Third St., Los Angeles, \$13,691 to Bureau of Yards and Docks, Washington, D. C., for electric and telephone transmission line, consisting of poles, messenger cables, conductor cables, and pole line material at the Naval Ammunition Department, Hawthorne. 11-12

**ARIEL, WASH.**—To Phoenix Utility Co., Public Service Bdg., Portland, for constructing the following work in connection with Lewis River hydroelectric power project at Ariel, Lewis County, Washington, for Northwestern Electric Co., Portland: 200 ft. high concrete dam; 1300 ft. tunnel, to be 26 ft. diameter. First unit of project will cost \$8,000,000, and will develop 40,000 kilowatts. 11-9

## RIVER AND HARBOR WORK

### BIDS RECEIVED

**SAN FRANCISCO, CALIF.**—Low bids as follows by State Harbor Comm. for cold storage plant at Pier 48 (A) Additions to building—W. W. Williamson, 320 Market St., S. F., \$16,450 low; (B) Cork board insulation and cooler room doors—York Ice Mch. Co., 239-9th St., S. F., \$37,572 low; (C) Refrigeration machinery, etc.—Baker Ice Machine Co., 2459 E. 14th St., Oakland, \$28,250 low; and (D) Elevators—Otis Elevator Co., S. F., \$13,960 low. 11-13

**TACOMA, WASH.**—Albertson-Cornell Bros., 1113½ A St., Tacoma, \$520,956 low bid to Port of Tacoma for grain elevator and shipping gallery. 11-12

### CONTRACTS AWARDED

**OAKLAND, CALIF.**—To American Dredging Co., 255 California St., S. F., \$12,440 for dredging yacht harbor, foot of 19th Ave. for Oakland Port Comm. 11-13

## LIGHTING SYSTEMS

### WORK CONTEMPLATED

**ALAMEDA, CALIF.**—Plans by City Engr., protests Dec. 3, for improvement of Park St., from San Jose Ave. to Clement Ave., by installation in place on the city's poles, of wires, lamps, cast-iron bases, transformers, cast-iron brackets, lighting units, globes, and appliances. City will pay \$6800, balance 1911 Act. 11-8

## MUNICIPAL DEVELOPMENTS

### WORK CONTEMPLATED

**PHOENIX, ARIZ.**—Bond election Dec. 3 by City to vote \$4,823,000 for: (1) \$2,786,000 for water improvements, including the construction of a 22-mile 48-in. flow line from sand trap to reservoir; additional 48-in., 42-in., and 24-in. mains; necessary distributing mains; installation of meters; installation of five wells; installation of pumping stations; purchase of land for well field; construction of protection work on the Verde River; and construction of 10,000,000-gallon concrete-lined reservoir. (2) \$817,000 for construction of sewer mains and installation of sewage treatment plant. (3) \$125,000 to pay outstanding indebtedness. (4) \$200,000 for repayment of the Verde loan. (5) \$250,000 for park and playground improvements. (6) \$125,000 for constructing municipal golf course. (7) \$300,000 for the construction of a public library. W. J. Jamieson is City Engineer, and R. T. Gardner is City Water Superintendent. 11-12

### CONTRACTS AWARDED

**MONTEREY, MEXICO**—To B. W. Kuhn Co., 2900 Santa Fe Ave., Los Angeles, for construction of highways, bridges, and water and sewer systems in the vicinity of Monterey, for the Mexican Government, work involves 200 miles of road construction, \$6,000,000; bridges, \$1,000,000; sewer and water lines, \$500,000. W. G. Knox is the Engineer in charge of the work. 11-16

## MACHINERY and SUPPLIES

### BIDS BEING RECEIVED

**MADERA, CALIF.**—Bids to 11 a.m., Dec. 2, by County for furnishing one 30 Caterpillar tractor. 11-12

**PLACERVILLE, CALIF.**—Bids to 8 p.m., Dec. 2, by City Clerk for 800 ft. 12-in., 96 ft. 8-in., 600 ft. 6-in., and 700 ft. either cast-iron or riveted steel pipe. 11-18

**REDWOOD CITY, CALIF.**—Bids to 2 p.m., Dec. 2, by City Clerk for 21 30-ft. and 21 36-in. creosoted douglas fir piles. 11-16

**SACRAMENTO, CALIF.**—Bids to 10 a.m., December 2, by State Purchasing Agent, P.O. Box 621, Sacramento, for: 3 more or less 7-ft. rubber-tired graders; 3 more or less medium weight 8-ft. graders; 15 more or less heavy 8-ft. graders; 5 more or less heavy 8-ft. graders with scarifier attachments. 11-7

### CONTRACTS AWARDED

**MARE ISLAND, CALIF.**—To R. W. Kaltenbach Corp., Bedford, Ohio, who bid \$95,817 to Bureau of Yards and Docks, Navy Department, Washington, D. C., for three electrically operated revolving hammer-head cranes, each with a capacity of 5 tons at a radius of 95 ft. and 10 tons at 50 ft., erected complete on foundations furnished by the Government at the Navy Yard, Mare Island, under Spec. No. 6038. 11-15



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## RAILROAD CONSTRUCTION

### WORK CONTEMPLATED

**LAS ANIMAS, COLO.**—Plans by Engineering Department of the Atchison, Topeka & Santa Fe Railroad, Topeka, Kansas, for the construction of railroad from Las Animas, Colorado, to Amarillo, Texas. \$5,000,000. 11-19

## SWIMMING POOLS

### WORK CONTEMPLATED

**LOS ANGELES, CALIF.**—Plans by County Surveyor J. E. Rockhold, protests Dec. 9, for improvements at Morgan Park at Baldwin Park, by clearing, excavation and embankment, bath house, swimming pool, pool water filtration, purification, and cleaning equipment, pool piping, gas and water supply lines, waste dispersion system, water heater and laundry equipment, street improvement, irrigation system, lawn, tennis courts, lighting system, wading pool, central paved area, 60-ft. steel tube flagpole, surfaced sidewalks, concrete seats, and fire hydrants. \$73,445. 11-14

## BUILDING CONSTRUCTION

### WORK CONTEMPLATED

**EUREKA, CALIF.**—Plans by Architects, Balch & Stanberry, Film Exchange Bldg., Los Angeles, for a 2-story 'A' theatre building to be erected at Eureka, Humboldt County, for the Fox West Coast Theatres, Inc.; \$200,000. 11-18

**LOS ANGELES, CALIF.**—Plans by W. E. Flannery, 1229 Flores Ave., L. A., for 7-story 'A' hospital on Hoover and Willowbrook Ave. for Sylvan Lodge Hospital. \$600,000. 11-19

**LOS ANGELES, CALIF.**—Plans by P. and Walter S. Davis, Architects, 3215 W. Sixth St., Los Angeles, for a new steel fabricating plant and office building to be erected on a 22½-acre site at S. Alameda St. and Lynwood Road, Compton, for the Pacific Iron & Steel Co. Estimated cost \$500,000. The building will be 400 by 700 ft. of steel frame construction with corrugated side walls and roof, steel sash, cement floors, etc. The office building will be two stories, of brick and frame construction, 50 by 75 ft. The plant will fabricate 1000 tons of steel monthly. A spur track has been installed by the Southern Pacific Company. 11-9

**MODESTO, CALIF.**—Plans by Engr. Department, Pacific Gas & Electric Co., San Francisco, for reinf. conc. powerhouse near Modesto. \$200,000. 11-19

**OAKLAND, CALIF.**—Plans by M. I. Schwartz, Architect, 110 Sutter St., San Francisco, for Class C auto service station and garage for Firestone Tire Co. \$60,000. 11-12

**PASO ROBLES, CALIF.**—Plans by A. H. Larsen, Architect, 447 Sutter St., San Francisco, for a steel and reinforced concrete theatre, store, office, and apartment building for the Paso Robles Realty Co., San Francisco. \$165,000. 11-12

**SAN CARLOS, CALIF.**—Plans by E. L. Norberg, Architect, 580 Market St., San Francisco, for one-story concrete grammar school building for the San Carlos Grammar School District. \$50,000. 11-8

**SAN FRANCISCO, CALIF.**—Plans by Architect, E. C. Young, 2002 California St., S. F., for 'C' apartment house on California and Octavia Sts. for Herman Hogrefe. \$250,000. 11-19

**SAN FRANCISCO, CALIF.**—Plans by Architects, O'Brien & Peugh, 315 Montgomery St., S. F., for 'A' office building on Montgomery and California Sts. to be leased by Chapman-DeWolfe Co. \$60,000. 11-19

**SAN RAFAEL, CALIF.**—Plans by N. W. Sexton, Architect, DeYoung Bldg., San Francisco, for concrete gymnasium building for Board of Education. \$60,000. 11-8

**SAN RAFAEL, CALIF.**—Plans by N. W. Sexton, Architect, deYoung Bldg., San Francisco, for reinforced concrete gymnasium at San Rafael High School; \$65,000. 11-16

**ST. HELENA, CALIF.**—Plans by Albert F. Roller, Architect, Crocker First National Bank Bldg., San Francisco, for concrete bank building for Bank of America. C. F. Haas, San Francisco, is Consulting Engineer. \$40,000. 11-12

**SEATTLE, WASH.**—Plans by Earl Morrison, Architect, Lumber Exchange Bldg., Seattle, for 'A' apartment house on 7th and Seneca Sts., for Mark Twain Apartments, Inc. \$1,000,000. 11-19

**SEATTLE, WASH.**—Plans by Architect, L. Baeder, Securities Bldg., Seattle, for 18-story 'A' reinf. conc. and brick apartment on 9th Ave. and University St. for Chancellor Apartments, Inc. \$2,000,000. 11-19

**SEATTLE, WASH.**—Plans by Architects, Schack & Young, Central Bldg., Seattle, for 'A' reinf. concrete, brick, terra cotta, and stone hospital on 9th and Seneca Aves. for Seattle General Hospital. \$1,500,000. 11-19

**SEATTLE, WASH.**—Plans by Architect, S. Ford, Lyon Bldg., Seattle, for Class 'A' club building for the Washington Athletic Club on Sixth Ave. and Union Sts.; \$2,000,000. 11-18

### BIDS BEING RECEIVED

**ALTURAS, CALIF.**—Bids to 10 a.m., Dec. 2, by County for frame and stucco County Hospital Addition; \$10,000. R. D. Taylor is Architect. 11-18

**CHICO, CALIF.**—Bids to 5 p.m., Dec. 3, by Chico School Dist. for Oakdale School at 11th and Broadway, \$60,000. Cole & Brouhard, Chico, are Architects. 11-7

**NORWALK, CALIF.**—Bids to 2 p.m., December 3, by Geo. B. McDougall, State Architect, Public Works Bldg., 11th and P Sts., Sacramento, for Assistant Physician's residence at the Norwalk State Hospital, Los Angeles County. The building will be one-story frame structure, to contain six rooms and basement, with stucco exterior, and shingle roof. 11-8

**OAKLAND, CALIF.**—Bids to 12 m., Dec. 5, by City Clerk for corporation yard buildings for City, \$75,000. 11-14

### BIDS RECEIVED

**BENICIA, CALIF.**—Low bids as follows by Constructing Quartermaster, Benicia, for roads and magazine buildings: **ROADS AND BUILDINGS COMBINED**—Fredrickson & Watson, 354 Hobart St., Oakland, \$102,314. **BITUMINOUS ROADS**—R. E. Burgund, 806 Rodeo Drive, Beverly Hills, \$7000. **BUILDINGS ONLY**—A. Pringle & Fred Turner, Oakland, \$94,724. 11-14

**SAN DIEGO, CALIF.**—Low bids as follows by State Architect, Sacramento, for steel and concrete library and science building at State Teachers College, San Diego: (1) **GENERAL CONTRACT**—Pettifer Hunt Co., PO Box 146, San Diego, \$182,930 low; (2) **MECHANICAL EQUIPMENT**—Pemberton Heating & Ventilating Co., 105 Macy St., L. A., \$33,500 low; and (3) **ELECTRICAL WORK**—American Electric Const. Co., 757 E. 9th St., L. A., \$13,498 low. 11-6

**PULLMAN, WASH.**—Northwest Contracting Co., 1240 E. Pine St., Portland, \$81,340, low bid to U. S. Treasury Department, Washington, D. C., for postoffice at Pullman, Wash. Fred R. Comb Co., Minneapolis, Minn., \$82,000 next lowest bid. 11-13

### CONTRACTS AWARDED

**ATHERTON, CALIF.**—To Chas. H. Stockholm & Sons, Russ Bldg., San Francisco, at \$60,000 for 2-story concrete residence for Mrs. Clark Raiss. A. A. Tantau, 210 Post St., S. F., is Architect. 11-19

**EUREKA, CALIF.**—To Monson Bros., 475 Sixth St., San Francisco, for steel frame and brick addition to telephone building for Pacific Telephone & Telegraph Co. E. V. Cobby, 140 New Montgomery St., San Francisco, is the Architect. \$125,000. 11-8

**HOLLISTER, CALIF.**—Awards as follows for High School at Hollister: **GENERAL**—To Minton Co., Palo Alto, \$21,191; and **ELECTRICAL WORK**—To Minton Co., Palo Alto, \$1456. W. H. Weeks, San Francisco, is Architect. 11-6

**LOS ANGELES, CALIF.**—To Geo. A. Fuller Co., New York, for construction of a \$10,500,000 industrial building on the corner of Main and Jefferson Sts., Los Angeles, for El Travia Industrial Terminal Corp., 6600 Lexington Ave., Los Angeles. The structure will be 980 by 150 ft., 12 stories, basement, and subbasement, of reinforced concrete construction, with concrete slab floors and roof, steam heating system, automatic fire sprinkler system, etc. The roof will be equipped with landing runways, etc., for airplanes. The landing field on the roof will be 1005 ft. long, and will be outlined with Neon lights. O. R. Angelillo, 6600 Lexington Ave., Los Angeles, is the Architect and Engineer. 11-9

**MARTINEZ, CALIF.**—To W. Snelgrove, 24th St. and Esmond Ave., Richmond, at about \$75,000 for hospital building for the Martinez Hospital Association. A. A. Cantin, 544 Market St., San Francisco, is Architect. 11-18

**MODESTO, CALIF.**—To H. H. Henning, 1751 Berkeley Ave., Stockton, who bid \$76,767 for construction of a building, to be known as Unit No. 2, Ward Building and Power House, for the Stanislaus County Hospital. 11-14

**OAKLAND, CALIF.**—To Pacific Coast Engr. Co., foot of 14th St., Oakland, \$9732 for steel for framework for Transit Shed No. 12 extension at foot of 14th St. for Oakland Port Comm. 11-13

**SACRAMENTO, CALIF.**—Awards as follows by State Architect for additions to Public Works Building, 11th and P Sts., Sacramento: General construction to Geo. D. Hudnutt, Inc., 1915 S St., Sacramento, who bid \$13,061. Complete mechanical work to Latourrette-Fical Co., 907 Front St., Sacramento, who bid \$1853. 11-13

**SAN FRANCISCO, CALIF.**—To Industrial Construction Co., 815 Bryant St., San Francisco, for concrete 'B' factory building on Mariposa St. and Bryant St. for the Best Foods Co., Inc.; \$20,000. O'Brien & Peugh, 315 Montgomery St., San Francisco, are the Architects. 11-18

**SAN FRANCISCO, CALIF.**—Construction to start by day labor by the Ready-Mix Concrete Co., 575 Berry St., San Francisco, on a concrete mixing and storage plant for the Ready-Mix Concrete Co., to be constructed at Division and Rhode Island Sts., to cost \$100,000. Plans by Engineer, L. H. Nishkian, 525 Market St., San Francisco. 11-19

**TALMAGE, CALIF.**—Awards as follows by State Architect, for erection and completion of Ward 7, consisting of a main building and four dormitory buildings at Mendocino State Hospital, Talmage: General Construction to Sorensen & Hagmark, 2652 Harrison St., S. F., \$98,900. Heating and plumbing, to Pemberton Heat. & Vent. Co., 105 Macy St., L. A., \$16,200. Electric work to Eddy Electric Co., 309 E. Weber Ave., Stockton, \$2300. 11-15



# OPPORTUNITY PAGE

RATES: Situations wanted, 5c per word, MINIMUM CHARGE, \$1.00; HELP WANTED, no charge to Subscribers; OFFICIAL BIDS, 15c per line; ALL OTHERS, \$2.00 per column inch or fraction thereof

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R. Lynn Colomb, Agency Supt.  
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Ben C. Sturges, Manager

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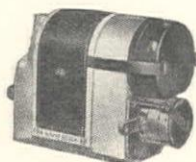
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# THE BUYERS' GUIDE

Refer to advertisements for addresses of companies listed. Advertisers index on page 66

## Acetylene Welding

### Generators

Oxweld Acetylene Co.

### Air Compressors

Bacon Co., Edward R.  
Gardner-Denver Co.  
Garfield & Co.  
Hackley Equipment Co., P. B.  
Harron, Rickard & McCone Co.  
Ingersoll-Rand Co.  
Jenison Machinery Co.  
Leitch & Co.  
Rix Company, Inc., The  
Schramm, Inc.  
Sullivan Machinery Co.

### Asphalt

Gilmore Oil Co.  
Standard Oil Co.  
Union Oil Co.

### Asphalt, Emulsified

American Bitumuls Co.

### Asphalt Plants and Equipment

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Madsen Iron Works  
Peerless Mch. & Mfg. Co.  
Spears-Wells Mch. Co., Inc.

### Asphalt Paving

Warren Bros. Roads Co.

### Back Fillers

Bacon Co., Edward R.  
Bucyrus-Erie Co.  
Caterpillar Tractor Co.  
Cleveland Tractor Co., The  
Garfield & Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Northwest Engineering Co.  
Orton Crane & Shovel Co.  
Spears-Wells Mch. Co., Inc.  
Speeder Machinery Corp.  
Thew Shovel Co., The  
Universal Crane Co., The

### Bars, Steel

Pacific Coast Steel Co.

### Beams, Channels, and Angles

Pacific Coast Steel Co.

### Bins, Storage and Hopper

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Madsen Iron Works

### Blacksmithing—Drop

### Forgings

Payne's Bolt Works

### Blasting Supplies

Giant Powder Co., Cons., The  
Hercules Powder Co.

### Boilers

Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Montague Pipe & Steel Co.  
Peerless Mch. & Mfg. Co.  
Water Works Supply Co.

### Bolts, Nuts and Rods

Claussen & Co., C. G.  
Kortick Mfg. Co.  
Payne's Bolt Works

### Bonds, Street and Road

### Improvement

Pacific Co.

### Bonds, Surety

American Surety Co.  
Associated Indemnity Corp.  
Commerce Casualty Co.  
Detroit Fidelity & Surety Co.  
Fidelity & Casualty Co. of N. Y.,  
The  
Fidelity & Deposit Co. of Maryland

### Bonds, Surety (Continued)

Glens Falls Indemnity Co.  
Globe Indemnity Co.  
Great American Indemnity Co.  
Indemnity Insurance Co. of  
North America  
Maryland Casualty Co.  
New Amsterdam Casualty Co.  
Rolph, James Jr., Landis & Ellis

### Brick, Common

Kartschoke Clay Products Co.

### Bridge Plates, Bronze

### Expansion

Greenberg's Sons, M.  
Western Iron Works, S. F.

### Buckets (Elevator and Conveyor)

Bacon Co., Edward R.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Lakewood Engr. Co.  
Link-Belt Meese & Gottfried Co.

### Buckets, Dredging

Harnischfeger Sales Corp.  
Slick, R. R.

### Buckets, Excavating

Bacon Co., Edward R.  
Bucyrus-Erie Co.  
Garfield & Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Marion Steam Shovel Co.  
Orton Crane & Shovel Co.  
Owen Bucket Co.  
Slick, R. R.  
Williams Co., G. H.

### Buckets, Rehandling

Bacon Co., Edward R.  
Garfield & Co.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Lakewood Engr. Co.  
Orton Crane & Shovel Co.  
Owen Bucket Co.  
Slick, R. R.  
Williams Co., G. H.

### Cableways

Bacon Co., Edward R.  
Jenison Machinery Co.  
Leschen & Sons Rope Co., A.  
Young Machy. Co., A. L.

### Camp Supplies

Thomson-Diggs Company

### Cars, Industrial

Bacon Co., Edward R.  
Jenison Machinery Co.  
Lakewood Engr. Co.

### Carts, Concrete

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Lakewood Engr. Co.

### Castings, Brass and Bronze

Greenberg's Sons, M.

### Castings, Iron and Steel

American Cast Iron Pipe Co.  
Industrial Brownhoist Corp.  
Link-Belt Meese & Gottfried Co.  
U. S. Cast Iron Pipe & Fdy. Co.

### Castings, Street and Sewer

United Iron Works  
U. S. Cast Iron Pipe & Fdy. Co.

### Cement

Portland Cement Association

### Cement Guns

Cement Gun Const. Co.

### Chemicals

Great Western Electro-Chemical Co.

### Chlorinators

Wallace & Tiernan  
Water Works Supply Co.

### Chlorine

Great Western Electro-Chemical Co.

### Chutes, Concrete

Bacon Co., Edward R.  
Garfield & Co.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Lakewood Engr. Co.

### Clarifiers, Water

Dorr Co., The  
Wallace & Tiernan Co.

### Clay Products

Gladding, McBean & Co.  
Pacific Clay Products Co.

### Concrete Buckets

Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Young Machy. Co., A. L.

### Concrete Curing

Concrete Curing Co.  
McEverlast, Inc.

### Concrete Forms

Harron, Rickard & McCone Co.

### Concrete Roads

Portland Cement Association

### Conveyors, Portable

Harron, Rickard & McCone Co.  
Jenison Machinery Co.

### Conveyors, Elevating and Conveying

Bacon Co., Edward R.  
Bodinson Mfg. Co.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.

### Cranes (Electric, Gasoline

### Locomotive)

Bacon Co., Edward R.  
Bucyrus-Erie Co.  
Garfield & Co.  
Hackley Equipment Co., P. B.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Marion Steam Shovel Co.  
Northwest Engineering Co.  
Ohio Power Shovel Co., The  
Orton Crane & Shovel Co.  
Speeder Machinery Corp.  
Thew Shovel Co., The  
Universal Crane Co., The  
Willamette-Ersted Co.

### Cranes, Traveling

Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Thew Shovel Co., The

### Crushers

Bacon Co., Edward R.  
Garfield & Co.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Smith Engineering Works  
Young Machy. Co., A. L.

### Culverts, Concrete

Portland Cement Association

### Culverts, Metal

California Corrugated Culvert Co.  
U. S. Cast Iron Pipe & Fdy. Co.  
Western Pipe & Steel Co.

### Culverts, Part Circle

California Corrugated Culvert Co.  
Western Pipe & Steel Co.

### Culverts, Vitrified

Gladding, McBean & Co.  
Pacific Clay Products

### Curing—Concrete

Concrete Curing Co.  
McEverlast, Inc.

### Dams

Ambursen Dam Co., Inc.

### Derricks

Bacon Co., Edward R.  
Clyde Iron Works Sales Co.  
Garfield & Co.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Young Machy. Co., A. L.

### Ditch Machinery

Bacon Co., Edward R.  
Bucyrus-Erie Co.  
Cleveland Trencher Co.  
Garfield & Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Marion Steam Shovel Co.  
Northwest Engineering Co.  
Ohio Power Shovel Co., The  
Orton Crane & Shovel Co.  
Thew Shovel Co., The

### Draglines

Bacon Co., Edward R.  
Bucyrus-Erie Co.  
Garfield & Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Marion Steam Shovel Co.  
Northwest Engineering Co.  
Ohio Power Shovel Co.  
Sauerman Bros., Inc.  
Spears-Wells Machy. Co.  
Speeder Machinery Corp.  
Thew Shovel Co., The  
Universal Crane Co., The  
Young Machy. Co., A. L.

### Drain Tile

Gladding, McBean & Co.  
Kartschoke Clay Products Co.  
Pacific Clay Products

### Drills, Rock

Bacon Co., Edward R.  
Gardner-Denver Co.  
Harron, Rickard & McCone Co.  
Ingersoll-Rand Co.  
Rix Company, Inc., The  
Sullivan Machinery Co.

### Dump Cars

Bacon Co., Edward R.  
Jenison Machinery Co.  
United Commercial Co.

### Dump Wagons

Le Tourneau Mfg. Co.

### Engineers

Ambursen Dam Co., Inc.  
Burns-McDonnell-Smith Engr.  
Co.  
Hunt, R. W., Co.

### Engineering Instruments

American Paulin System, Inc.,  
The

### Engines, Gasoline and Steam

Bacon Co., Edward R.  
Continental Motors Corp.  
Clyde Iron Works Sales Co.  
Harron, Rickard & McCone Co.  
Hercules Motors Corp.  
Ingersoll-Rand Co.  
Jenison Machinery Co.

### Excavating Machinery

Bacon Co., Edward R.  
Bodinson Mfg. Co.  
Bucyrus-Erie Co.  
Caterpillar Tractor Co.  
Cleveland Tractor Co., The  
Garfield & Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Marion Steam Shovel Co.  
Northwest Engineering Co.  
Ohio Power Shovel Co.  
Orton Crane & Shovel Co.  
Owen Bucket Co.  
Sauerman Bros., Inc.  
Speeder Machinery Corp., The  
Thew Shovel Co., The  
Universal Crane Co., The  
(Continued on page 62)



# OPPORTUNITY PAGE

CONTINUED

## AERIAL PHOTOGRAPHY

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Gasoline Shovels, Draglines, Clamshells, Cranes,  
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San Francisco, Cal.

## OFFICIAL BIDS

Canal Excavation and Structures

UNITED STATES DEPARTMENT OF THE  
INTERIOR

BUREAU OF RECLAMATION

Washington, D. C., November 8, 1929

Sealed bids (Specifications No. 503) will be  
received at the office of the Bureau of Reclama-  
tion, Burley, Idaho, until 2 o'clock p.m., De-  
cember 27, 1929, and then publicly opened, for  
furnishing labor and materials and performing all  
work for the construction of earthwork and  
structures, stations 2315+00 to 3129+00, Main  
Canal, Gravity Extension Division, Minidoka  
project, Idaho. The work is located near Die-  
trich and Shoshone, Idaho, stations on the Ore-  
gon Short Line Railroad. The principal items  
and the estimated quantities involved are as fol-  
low: 1,050,000 cubic yards of all classes of ex-  
cavation; 900,000 station cubic yards of over-  
haul; 3600 cubic yards of back fill about struc-  
tures; 900 cubic yards of concrete; placing 67-  
000 pounds of reinforcement bars; laying 2850  
linear feet of 18 to 36-inch diameter precast con-  
crete pipe; laying 190 linear feet of 21-inch and  
24-inch corrugated metal pipe; erecting 1200  
linear feet of semi-circular metal flume; erecting  
226 M ft. b.m. of timber in structures; and in-  
stalling 32,000 pounds of gates, gate hoists and  
other metal work. This invitation for bids does  
not cover the purchase of materials which are to  
be furnished by the Government. Materials to  
be furnished by the contractor and those fur-  
nished by the Government are described in the  
specifications which will be a part of the con-  
tract. For particulars, address the Bureau of  
Reclamation, Burley, Idaho; Denver, Colorado;  
or Washington, D. C.

ELWOOD MEAD, Commissioner.

## Rock Work

NOTICE TO CONTRACTORS

Sealed proposals will be received at the office  
of the East Bay Municipal Utility District, 512  
Sixteenth Street, Oakland, California, until 5:30  
p.m., December 4, 1929, and will at that hour  
be opened, for furnishing approximately 1440  
cu.yds. of rock in place over or adjacent to the  
crossings of San Joaquin, Middle and Old Rivers.  
Specifications may be obtained upon applica-  
tion to the office of the District.

JOHN H. KIMBALL, Secretary.  
Oakland, California, November 20, 1929.

## Pipe and Specials

NOTICE TO CONTRACTORS

Sealed proposals will be received at the office  
of the East Bay Municipal Utility District, 512  
Sixteenth Street, Oakland, California, until 5:30  
o'clock p.m., December 4, 1929, and will at that  
hour be opened, for construction and furnishing  
f.o.b., Lafayette, California, pipe and specials for  
Lafayette Pumping Plant, and f.o.b., Walnut  
Creek, California, pipe and specials for Walnut  
Creek Pumping Plant, Mokelumne River Project.  
Plans and specifications for this work may be  
obtained from the office of the District.

JOHN H. KIMBALL, Secretary.  
Oakland, California, November 19, 1929.

## HELP WANTED

As listed by the Engineering Societies' Employ-  
ment Service, 57 Post Street, San Francisco.  
Applicants will please apply direct to them.

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on layout of electrical equipment for sub-stations  
and power plants. Must be good draftsman.  
Salary depends upon experience. Location, San  
Francisco. R-2819-S.



# THE BUYERS' GUIDE—Continued from Page 60

## Expansion Joints

Industrial & Municipal Supply Co.  
U. S. Cast Iron Pipe & Fdy. Co.  
Water Works Supply Co.

## Explosives

Giant Powder Co., Cons., The  
Hercules Powder Co.

## Equipment—Rental

Atkinson Construction Co.  
Contractors Mch. Exchange  
Hackley Equipment Co., P. B.

## Filters

Water Works Supply Co.

## Fire Hydrants

Greenberg's Sons, M.  
Industrial & Municipal Supply Co.  
Rensselaer Valve Co.  
United Iron Works  
Water Works Supply Co.

## Floating Roofs

Chicago Bridge & Iron Works

## Flood Lights

Oxweld Acetylene Co.

## Floors, Mastic

Wailes Dove-Hermiston Corp.

## Flumes, Concrete

Portland Cement Association

## Flumes, Metal

California Corrugated Culvert Co.  
Montague Pipe & Steel Co.

## Fluxes

Oxweld Acetylene Co.

## Forms, Steel

Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Lakewood Engr. Co.

## Freight, Water

American-Hawaiian Steamship Co.

## Frogs and Switches

Bacon Co., Edward R.  
United Commercial Co.

## Gas Holders

Chicago Bridge & Iron Works  
Western Pipe & Steel Co.

## Gates, Cast-Iron

California Corrugated Culvert Co.

## Gates, Radial

California Corrugated Culvert Co.

## Gates, Sheet Metal

California Corrugated Culvert Co.

## Governors, Steam Engine

Gardner-Denver Co.  
Young Machy. Co., A. L.

## Governors, Turbine

Pelton Water Wheel Co., The

## Gravel Plant Equipment

Bacon Co., Edward R.  
Bodinson Mfg. Co.  
Bucyrus-Erie Co.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Smith Engineering Works  
Young Mach. Co., A. L.

## Guniting Lining

Cement Gun Const. Co.

## Hammers, Steam Pile

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.

## Hardware, Shelf and Heavy

Thomson-Diggs Company

## Hoists, Hand and Power

Bacon Co., Edward R.  
Clyde Iron Works Sales Co.  
Gardner-Denver Co.  
Garfield & Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.

## Hoists, Hand and Power (Continued)

Ingersoll-Rand Co.  
Jaeger Machine Works, The  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Sullivan Machinery Co.  
Willamette-Ersted Co.  
Young Machy. Co., A. L.

## Hoppers, Steel

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Lakewood Engr. Co.  
Link-Belt Meese & Gottfried Co.  
Madsen Iron Works

## Hose (Steam, Air and Water)

Gardner-Denver Co.  
Ingersoll-Rand Co.  
Leitch & Co.  
Rix Company, Inc., The

## Hydro-Tite

Industrial & Municipal Supply Co.

## Insurance, Casualty

Associated Indemnity Corp.  
Commerce Casualty Co.  
Detroit Fidelity & Surety Co.  
Fidelity & Casualty Co. of N. Y.,  
The  
Fidelity & Deposit Co. of Mary-  
land  
Glens Falls Indemnity Co.  
Great American Indemnity Co.  
Indemnity Insurance Co. of  
North America  
Maryland Casualty Co.  
New Amsterdam Casualty Co.  
Rolph, James Jr., Landis & Ellis

## Jacks, Lifting

Jenison Machinery Co.

## Kettles, Tar and Asphalt

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Littleford Bros. Co.  
Montague Pipe & Steel Co.  
Peerless Mch. & Mfg. Co.  
Spears-Wells Machy. Co.  
Young Machy. Co., A. L.

## Leadite

Water Works Supply Co.

## Lighting Standards

United Iron Works

## Loaders, Power, Truck and Wagon

Industrial Brownhoist Corp.  
Jaeger Machine Works, The  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Spears-Wells Machy. Co.  
Young Machy. Co., A. L.

## Locomotives (Electric, Gas and Steam)

Bacon Co., Edward R.  
Brookville Locomotive Co.  
Garfield & Co.  
Hackley Equipment Co., P. B.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Plymouth Locomotive Works  
United Commercial Co.

## Meters, Venturi

Water Works Supply Co.

## Meters, Water

Industrial & Municipal Supply Co.  
Neptune Meter Co.

## Mixers, Chemical

Dorr Co., The

## Mixers, Concrete

Bacon Co., Edward R.  
Chain Belt Co.  
Foote Company, Inc.  
Garfield & Co.  
Harron, Rickard & McCone Co.  
Jaeger Machine Works, The  
Jenison Machinery Co.  
Lakewood Engr. Co.  
Young Machy. Co., A. L.

## Mixers, Plaster

Chain Belt Co.  
Harron, Rickard & McCone Co.  
Jaeger Machine Works, The  
Jenison Machinery Co.  
Young Machy. Co., A. L.

## Motors, Gasoline

Continental Motors Corp.  
Hercules Motors Corp.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.

## Paints, Acid Resisting

General Paint Corp.  
Wailes Dove-Hermiston Corp.

## Paints, Metal Protective

General Paint Corp.  
McEverlast, Inc.  
Wailes Dove-Hermiston Corp.

## Paints, Technical

American Bitumuls Co.  
General Paint Corp.  
Wailes Dove-Hermiston Corp.

## Paints, Waterproofing

General Paint Corp.  
McEverlast, Inc.  
Wailes Dove-Hermiston Corp.

## Pavers, Concrete

Chain Belt Co.  
Foote Company, Inc.  
Harron, Rickard & McCone Co.  
Koehring Company  
Smith Co., T. L.

## Paving Breakers

Gardner-Denver Co.  
Harron, Rickard & McCone Co.  
Ingersoll-Rand Co.  
Leitch & Co.  
Rix Company, Inc., The  
Sullivan Machinery Co.

## Paving, Contractor

Warren Bros. Roads Co.

## Paving Plants

Bacon Co., Edward R.  
Jaeger Machine Works, The  
Jenison Machinery Co.  
Madsen Iron Works

## Paving Tools

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Littleford Bros. Co.

## Penstocks

Chicago Bridge & Iron Works  
Lacy Manufacturing Co.  
Pittsburgh-Des Moines Steel Co.  
Water Works Supply Co.  
Western Pipe & Steel Co.

## Pile Drivers

Bacon Co., Edward R.  
Bucyrus-Erie Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Ingersoll-Rand Co.  
Jenison Machinery Co.  
Northwest Engineering Co.  
Orton Crane & Shovel Co.  
Thew Shovel Co., The

## Piles, Concrete

Raymond Concrete Pile Co.

## Pipe, Cast-Iron

American Cast Iron Pipe Co.  
Claussen & Co., C. G.  
Industrial & Municipal Supply Co.  
Pacific States Cast Iron Pipe Co.  
U. S. Cast Iron Pipe & Fdy. Co.  
Water Works Supply Co.

## Pipe, Cement Lined

American Cast Iron Pipe Co.  
U. S. Cast Iron Pipe & Fdy. Co.

## Pipe Clamps and Hangers

Kortick Mfg. Co.

## Pipe Coatings

McEverlast, Inc.  
Wailes Dove-Hermiston Corp.

## Pipe, Concrete

Lock Joint Pipe Co.  
Portland Cement Association

## Pipe, Culvert

California Corrugated Culvert Co.  
Gladding, McBean & Co.  
Pacific Clay Products  
Western Pipe & Steel Company

## Pipe Fittings

American Cast Iron Pipe Co.  
Claussen & Co., C. G.  
Industrial & Municipal Supply Co.  
Pacific Pipe Co.  
Pacific States Cast Iron Pipe Co.  
U. S. Cast Iron Pipe & Fdy. Co.  
Weissbaum & Co., G.

## Pipe Line Machinery

Bacon Co., Edward R.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.

## Pipe, Lock-Bar

Western Pipe & Steel Co.

## Pipe, Preservative

Columbia Wood & Metal Preser-  
vative Co.

## Pipe, Pressure Line

Lacy Manufacturing Co.  
Lock Joint Pipe Co.  
Western Pipe & Steel Company

## Pipe, Riveted Steel

Lacy Mfg. Co.  
Montague Pipe & Steel Co.  
Pittsburgh-Des Moines Steel Co.  
Western Pipe & Steel Co.

## Pipe, Sewer

Gladding, McBean & Co.  
Pacific Clay Products

## Pipe, Standard

Claussen & Co., C. G.  
Pacific Pipe Co.  
Weissbaum & Co., G.

## Pipe, Vitrified

Gladding, McBean & Co.  
Kartschoke Clay Products Co.  
Pacific Clay Products

## Pipe, Welded Steel

California Corrugated Culvert Co.  
Lacy Manufacturing Co.  
Montague Pipe & Steel Co.  
Steel Tank & Pipe Co.  
Western Pipe & Steel Co.

## Plows, Road

Bacon Co., Edward R.  
Galion Iron Works & Mfg. Co.  
Hackley Equipment Co., P. B.  
Jenison Machinery Co.  
Spears-Wells Machy. Co.

## Pneumatic Tools

Gardner-Denver Co.  
Ingersoll-Rand Co.  
Leitch & Co.

## Portable Lights

Oxweld Acetylene Co.

## Powder

Giant Powder Co., Cons., The  
Hercules Powder Co.

## Power Units

Continental Motors Corp.  
Harron, Rickard & McCone Co.  
Hercules Motors Corp.  
Jenison Machinery Co.

## Preservative—Wood, Metal, etc.

Columbia Wood & Metal Preser-  
vative Co.

## Pumps, Centrifugal

Byron Jackson Pump Mfg. Co.  
Industrial & Municipal Supply Co.  
Ingersoll-Rand Co.  
Jaeger Machine Works, The  
Pelton Water Wheel Co., The  
Rix Company, Inc., The  
United Iron Works  
Woodin & Little

## Pumps, Deep Well

American Well Works, The  
Byron Jackson Pump Mfg. Co.  
Industrial & Municipal Supply Co.  
Jenison Machinery Co.  
Pelton Water Wheel Co., The  
Woodin & Little

(Continued on page 64)



# OPPORTUNITY PAGE

CONTINUED

## OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE  
INTERIOR

NATIONAL PARK SERVICE

### Grading—Arizona

San Francisco, Calif., November 15, 1929

Sealed bids, in single copy only subject to the conditions contained herein, will be received until 2 o'clock p.m. on the 12th day of December, 1929, and then publicly opened, for furnishing all labor and materials and performing all work for grading project 4 grading, Bright Angel Springs-North Entrance, on the North Rim of the Grand Canyon National Park, Arizona.

The length of the project to be graded is 9.97 miles and the principal items of work are approximately as follows:

Clearing, 17.5 acres.  
Excavation unclassified, 83,450 cu.yd.  
Excavation for structures, 580 cu.yd.  
Borrow, 3200 cu.yd.  
Overhaul, 17,700 sta.yd.  
Dry rubble masonry, 150 cu.yd.  
Pipe culverts, 2830 lin.ft.

Proposals will be received from capable and responsible contractors who must submit with their request for Standard Government Form of Bid an attested statement, on forms to be supplied by the District Engineer, of their financial resources and construction experience. Standard Government Form of Bid will be supplied only to contractors showing sufficient experience and financial resources to properly construct the work contemplated.

Where copies of plans and specifications are requested, a deposit of \$10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Federal Reserve Bank of San Francisco.

Guarantee will be required with each bid as follows: In the amount of five (5) per cent of the bid.

Performance bond will be required as follows: In the amount of one hundred (100) per cent of the total contract price. Performance shall begin within ten (10) calendar days after date of receipt of notice to proceed and shall be completed within one hundred and forty (140) calendar days from that date exclusive of any time that may intervene between the effective date of orders of the Government to suspend operations on account of weather conditions and the effective date of orders to resume work.

Liquidated damages for delay will be the amount stated in the Special Provisions for each calendar day of delay until the work is completed and accepted.

Partial payments will be made as the work progresses for work and material delivered if such work and material meet the approval of the contracting officer.

Article on patents will be made a part of the contract.

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for Road Construction. To be opened 2:00 p.m., December 12, 1929.

Project 4 (Grading). Bright Angel Springs-North Entrance, Grand Canyon National Park, 807 Sheldon Bldg., 461 Market St., San Francisco, California.

C. H. SWEETSER,  
District Engineer, Bureau of Public Roads.

## OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE  
INTERIOR

NATIONAL PARK SERVICE

### Surfacing—Arizona

San Francisco, Calif., November 15, 1929

Sealed bids, in single copy only subject to the conditions contained herein, will be received until 2:00 o'clock p.m. on the 10th day of December, 1929, and then publicly opened, for furnishing all labor and materials and performing all work for surfacing project 3A1, A2, B, C, D (Surfacing), on route No. 3, Bright Angel Point-Cape Royal, located in the Grand Canyon National Park, Arizona.

The length of the project to be surfaced is 25.85 miles and the principal items of work are approximately as follows:

Excavation classified for borrow, 2000 cu.yd.  
Fine grading subgrade and shoulders, 25.85 miles.  
Crushed rock base course, 30,700 tons.  
Oil treated crushed rock, 34,550 tons.  
Supplemental oil treated crushed rock, 1000 tons.  
Stone guard rail, 2300 lin.ft.

Proposals will be received from capable and responsible contractors who must submit with their request for Standard Government Form of Bid an attested statement, on forms to be supplied by the District Engineer, of their financial resources and construction experience. Standard Government Form of Bid will be supplied only to contractors showing sufficient experience and financial resources to properly construct the work contemplated.

Where copies of plans and specifications are requested, a deposit of \$10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Federal Reserve Bank of San Francisco.

Guarantee will be required with each bid as follows: In the amount of five (5) per cent of the bid.

Performance bond will be required as follows: In the amount of one hundred (100) per cent of the total contract price. Performance shall begin within ten (10) calendar days after date of receipt of notice to proceed and shall be completed within two hundred and eighty-five (285) calendar days from that date, exclusive of any time that may intervene between the effective date of orders of the Government to suspend operations on account of weather conditions and the effective date of orders to resume work.

Liquidated damages for delay will be the amount stated in the Special Provisions for each calendar day of delay until the work is completed and accepted.

Partial payments will be made as the work progresses for work and material delivered if such work and material meet the approval of the Contracting Officer.

Article on patents will be made a part of the contract.

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for Road Surfacing. To be opened 2:00 p.m., December 10, 1929.

Project 3A1, A2, B, C, D, Route No. 3, Grand Canyon National Park, Arizona, 807 Sheldon Bldg., 461 Market St., San Francisco, California.

C. H. SWEETSER,  
District Engineer, Bureau of Public Roads.

## OFFICIAL BIDS

UNITED STATES DEPARTMENT OF  
AGRICULTURE

BUREAU OF PUBLIC ROADS

### Grading

San Francisco, Calif., November 9, 1929

Sealed bids, in single copy only subject to the conditions contained herein, will be received until 2:00 o'clock p.m. on the 3rd day of December, 1929, and then publicly opened, for furnishing all labor and materials and performing all work for grading from Sta. 664+50 to Sta. 767+65 on Route No. 72, Idyllwild National Forest Highway, located in the San Bernardino National Forest, County of Riverside, State of California.

The length of the project to be graded is 1.9 miles and the principal items of work are approximately as follows:

Excavation unclassified, 29,400 cu.yd.  
Excavation unclassified (channel changes), 1500 cu.yd.  
Excavation unclassified for structures, 150 cu.yd.

Overhaul, 1500 sta.yd.  
Finishing earth graded roads, 1.9 miles.  
Class B concrete, 84 cu.yd.  
Class C concrete, 11 cu.yd.  
Reinforcing steel, 8900 lb.  
Culvert pipe in place, 545 lin.ft.

Proposals will be received from capable and responsible contractors who must submit with their request for Standard Government Form of Bid, an attested statement, on forms to be supplied by the District Engineer, of their financial resources and construction experience. Standard Government Form of Bid will be supplied only to contractors showing sufficient experience and financial resources to properly construct the work contemplated.

Where copies of plans and specifications are requested, a deposit of \$10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Federal Reserve Bank of San Francisco.

Guarantee will be required with each bid as follows: In the amount of five (5) per cent of the bid.

Performance bond will be required as follows: In the amount of one hundred (100) per cent of the total contract price. Performance shall begin within ten (10) calendar days after date of receipt of notice to proceed and shall be completed within one hundred and twenty (120) calendar days from that date.

Liquidated damages for delay will be the amount stated in the Special Provisions for each calendar day of delay until the work is completed and accepted.

Partial payments will be made as the work progresses for work and material delivered if such work and material meet the approval of the Contracting Officer.

Article on patents will be made a part of the contract.

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for Road Construction. To be opened 2 p.m., December 3, 1929.

North Fork-Forest Boundary Section, Idyllwild National Forest Highway, 807 Sheldon Bldg., 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

# BONDS

*Glens Falls*

INDEMNITY COMPANY  
of Glens Falls, New York

Pacific Coast Department  
R. H. Griffith, Vice-President  
354 Pine Street, San Francisco  
C. H. Desky, Fidelity and Surety Sup't.  
R. Lynn Colomb, Agency Supt.

811 Garfield Building, Los Angeles  
Ben C. Sturges, Manager

Contractors  
Surety  
Fidelity

311-13 Alaska Building, Seattle  
R. G. Clark, Manager



# THE BUYERS' GUIDE—Continued from Page 62

## Pumps, Dredging and Sand

Jenison Machinery Co.  
United Iron Works

## Pumps, Hydraulic

Jenison Machinery Co.

## Pumps, Power

Gardner-Denver Co.  
Jaeger Machine Works, The

## Pumps, Road

Bacon Co., Edward R.  
Chain Belt Co.  
Harron, Rickard & McCone Co.  
Jaeger Machine Works, The  
Jenison Machinery Co.  
Woodin & Little

## Pumps, Sewage

American Well Works, The  
Dorr Co., The  
Fairbanks, Morse & Co.  
Industrial & Municipal Supply Co.

## Pumps, Sewage Ejector

Industrial & Municipal Supply Co.  
United Iron Works

## Pumps, Sludge

Dorr Co., The

## Pumps, Water Works

Fairbanks, Morse & Co.  
Industrial & Municipal Supply Co.  
Jenison Machinery Co.  
Pelton Water Wheel Co., The

## Rails

Bacon Co., Edward R.  
Claussen & Co., C. G.  
United Commercial Co.

## Reinforcing Bars

Pacific Coast Steel Co.  
Soule Steel Co.

## Reinforcing Wire Fabric

Soule Steel Co.

## Reservoirs, Steel

Chicago Bridge & Iron Works  
Western Pipe & Steel Company

## Riveting Machines

Ingersoll-Rand Co.  
Rix Company, Inc., The

## Road Finishers

Bacon Co., Edward R.  
French & Co., A. W.  
Jenison Machinery Co.  
Lakewood Engr. Co.

## Road Forms

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Lakewood Engr. Co.

## Road Graders and Scrapers

Bacon Co., Edward R.  
Brown-Bevis Company  
Caterpillar Tractor Co.  
Galion Iron Works & Mfg. Co.  
Jenison Machinery Co.  
Spears-Wells Machinery Co.  
West Coast Tractor Co.  
Young Machinery Co., A. L.

## Road Oil

Gilmore Oil Co.  
Standard Oil Co.  
Union Oil Co.

## Road Oil, Emulsified

American Bitumuls Co.

## Road Rollers

Bacon Co., Edward R.  
Brown-Bevis Co., The  
Galion Iron Works & Mfg. Co.  
Hackley Equipment Co., P. B.  
Huber Manufacturing Co.  
Jenison Machinery Co.

## Rules, Steel, Wood and Aluminum

Lufkin Rule Co., The

## Saws, Portable

Harron, Rickard & McCone Co.  
Ingersoll-Rand Co.  
Jenison Machinery Co.  
Young Machinery Co., A. L.

## Scarifiers

Bacon Co., Edward R.  
Jenison Machinery Co.  
Le Tourneau Mfg. Co.  
Spears-Wells Machinery Co.

## Scrapers (Dragline, Fresno, Wheeled)

Bacon Co., Edward R.  
Galion Iron Works & Mfg. Co.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Killefer Manufacturing Co.  
Sauerman Bros., Inc.

## Screens, Sand and Gravel

Bacon Co., Edward R.  
Bodinson Manufacturing Co.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Smith Engineering Co.  
Young Machinery Co., A. L.

## Screens, Sewage

Dorr Co., The  
Link-Belt Meese & Gottfried Co.

## Screens, Vibrating

Harron, Rickard & McCone Co.  
Link-Belt Meese & Gottfried Co.  
Smith Engineering Co.

## Second-Hand Equipment

Contractors Mch. Exchange  
Excavating Equipment  
Dealers, Inc.  
Hackley Equipment Co., P. B.  
Harron, Rickard & McCone Co.

## Sewage Disposal Apparatus

Dorr Co., The  
Industrial & Municipal Supply Co.  
Link-Belt Meese & Gottfried Co.  
Wallace & Tiernan  
Water Works Supply Co.

## Sharpeners, Rock Drill Steel

Gardner-Denver Co.  
Ingersoll-Rand Co.

## Shovels (Electric, Gasoline, Steam)

Bacon Co., Edward R.  
Bucyrus-Erie Co.  
Garfield & Co.  
Hackley Equipment Co., P. B.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Industrial Brownhoist Corp.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Marion Steam Shovel Co.  
Northwest Engineering Co.  
Ohio Power Shovel Co.  
Orton Crane & Shovel Co.  
Spears-Wells Machinery Co.  
Speeder Machinery Corp., The  
The Shovel Co., The  
Tractor-Equipment, Incorporated  
Young Machy. Co., A. L.

## Shovels, Hand

Harron, Rickard & McCone Co.  
Jenison Machinery Co.

## Sluice Gates

California Corrugated Culvert Co.  
Water Works Supply Co.

## Spreaders, Gravel and Rock and Asphalt

Bacon Co., Edward R.  
Galion Iron Works & Mfg. Co.  
Jenison Machinery Co.

## Standpipes

Chicago Bridge & Iron Works  
Montague Pipe & Steel Co.  
Pittsburgh-Des Moines Steel Co.  
Western Pipe & Steel Co.

## Steel Bands

Pacific Coast Steel Co.

## Steel, Drill

Gardner-Denver Co.  
Ingersoll-Rand Co.  
Leitch & Co.  
Rix Company, Inc., The

## Steel Plates

Pacific Coast Steel Co.

## Steel Plate Construction

Chicago Bridge & Iron Works  
Lacy Manufacturing Co.  
Montague Pipe & Steel Co.  
Pittsburgh-Des Moines Steel Co.  
Western Pipe & Steel Co.

## Steel, Structural

Pacific Coast Steel Co.  
Western Iron Works  
Western Pipe & Steel Co.

## Street and Road Improvement Bonds

Pacific Co.

## Street Sweepers, Sprinklers, Flushers

Jenison Machinery Co.

## Steel Joists

Truscon Steel Co.

## Steel Windows

Truscon Steel Co.

## Subgraders

Bacon Co., Edward R.  
Blaw-Knox Co.  
Harron, Rickard & McCone Co.  
Lakewood Engineering Co.

## Tanks, Air Compressor

Ingersoll-Rand Co.  
Lacy Manufacturing Co.  
Peerless Mch. & Mfg. Co.  
Rix Company, Inc., The  
Western Pipe & Steel Co.

## Tanks, Corrugated

California Corrugated Culvert Co.  
Western Pipe & Steel Co.

## Tanks, Elevated Steel

Chicago Bridge & Iron Works  
Lacy Manufacturing Co.  
Montague Pipe & Steel Co.  
Pittsburgh-Des Moines Steel Co.  
Western Pipe & Steel Co.

## Tanks, Oil Storage

Chicago Bridge & Iron Works  
Lacy Manufacturing Co.  
Steel Tank & Pipe Co.  
Western Pipe & Steel Co.

## Tapes, Measuring, Steel and Fabric

Lufkin Rule Co., The

## Testing Laboratories

Hunt, R. W., Co.

## Tie Plates

Pacific Coast Steel Co.

## Torches (Welding and Cutting)

Oxweld Acetylene Co.

## Towers, Transmission

Pacific Coast Steel Co.  
Water Works Supply Co.

## Tractors

Allis-Chalmers Mfgs. Co.  
(Monarch Tractors Division)  
Caterpillar Tractor Co.  
Cleveland Tractor Co.  
Tractor-Equipment, Incorporated  
West Coast Tractor Co.

## Tramways

American Steel & Wire Co.  
Bacon Co., Edward R.  
Leschen & Sons Rope Co., A.

## Transmission Machinery, Power

Bodinson Mfg. Co.  
Link-Belt Meese & Gottfried Co.  
United Iron Works

## Transportation, Water

American-Hawaiian Steamship Co.

## Trench Excavators

Cleveland Trencher Co., The  
Garfield & Co.  
Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.  
Thew Shovel Co., The

## Truck Cranes

Harnischfeger Sales Corp.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.  
Universal Crane Co., The

## Trucks

Fageol Motors Co.

## Tunnel Shovels

Bucyrus-Erie Co.  
Jenison Machinery Co.  
Marion Steam Shovel Co.

## Turbines, Hydraulic

Pelton Water Wheel Co., The  
Water Works Supply Co.

## Turntables

Bacon Co., Edward R.  
Harron, Rickard & McCone Co.  
Jenison Machinery Co.

## Unloaders, Car and Wagon

Bacon Co., Edward R.  
Crear and Bates  
Jenison Machinery Co.  
Link-Belt Meese & Gottfried Co.

## Valves

California Corrugated Culvert Co.  
Claussen & Co., C. G.  
Industrial & Municipal Supply Co.  
Pacific Pipe Co.  
Water Works Supply Co.

## Valves, Gate

California Corrugated Culvert Co.  
Claussen & Co., C. G.  
Pelton Water Wheel Co., The  
Water Works Supply Co.

## Valves, Hose Gate

Greenberg's Sons, M.  
United Iron Works

## Valves, Hydraulic

California Corrugated Culvert Co.  
Pelton Water Wheel Co.  
Water Works Supply Co.

## Washers, Sand and Gravel

Jenison Machinery Co.  
Smith Engineering Co.

## Water Purification

Industrial & Municipal Supply Co.  
Wallace & Tiernan  
Water Works Supply Co.

## Water Supply Installations

Industrial & Municipal Supply Co.  
Wallace & Tiernan  
Water Works Supply Co.

## Water Transportation

American-Hawaiian Steamship Co.

## Water Wheels

Pelton Water Wheel Co. The  
United Iron Works  
Water Works Supply Co.

## Water-Works Supplies

American Cast Iron Pipe Co.  
Industrial & Municipal Supply Co.  
Wallace & Tiernan  
Water Works Supply Co.

## Welding Apparatus (see Torches)

Oxweld Acetylene Co.

## Welding Equipment

Oxweld Acetylene Co.

## Welding Rods and Wire

Oxweld Acetylene Co.

## Well Casing

Montague Pipe & Steel Co.

## Wheelbarrows

Harron, Rickard & McCone Co.  
Jenison Machinery Co.

## Wire Rope

American Steel & Wire Co.  
Edwards Co., E. H.  
Jenison Machinery Co.  
Leschen & Sons Rope Co., A.



# PROFESSIONAL DIRECTORY

## A. A. Brown

*Consulting Engineer*

MATSON BUILDING

215 MARKET STREET, SAN FRANCISCO

## Abbot A. Hanks, Inc.

*Engineers and Chemists*

CONSULTING—TESTING—INSPECTING  
CONCRETE—STEEL—MATERIALS

624 SACRAMENTO STREET  
SAN FRANCISCO

## Black & Veatch

*Consulting Engineers*

Sewerage, Sewage Disposal, Water Supply,  
Water Purification, Electric Lighting,  
Power Plants, Valuations, Special Investi-  
gations and Reports.

LOS ANGELES, CALIF., 307 South Hill Street.  
NEW YORK CITY, 230 Park Avenue. KANSAS  
CITY, MO., Mutual Building.

## Brandt & Simmons

*Drafting Service*

Specializing in Illustrating Engineer-  
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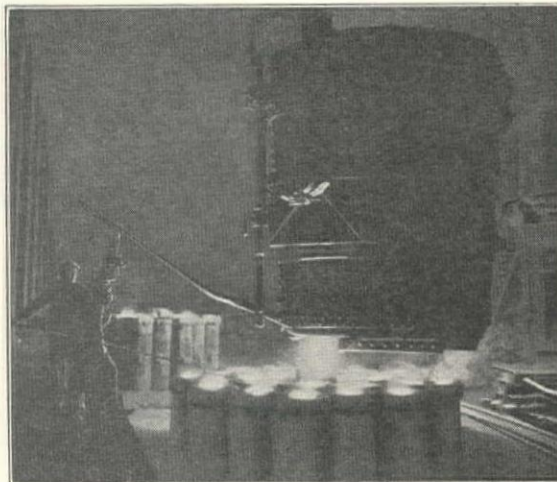
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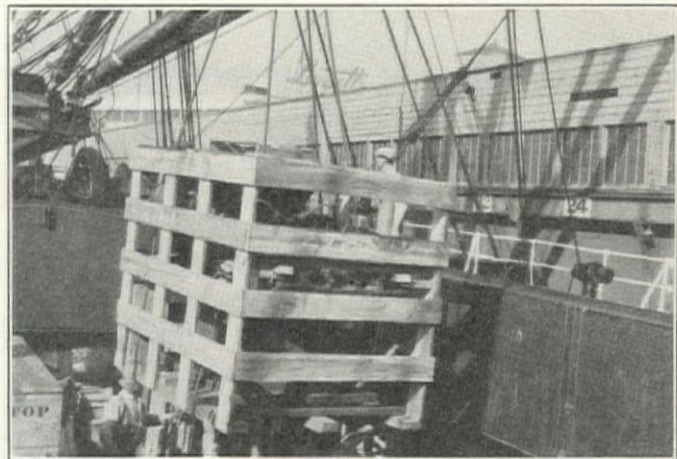
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