trcma—09-1930

WESTERN CONSTRUCTION NEWS

ENGINEERING CONSTRUCTION IN THE FAR WEST

PUBLISHED SEMI-MONTHLY
VOLUME V NUMBER 18

SAN FRANCISCO, SEPTEMBER 25, 1930

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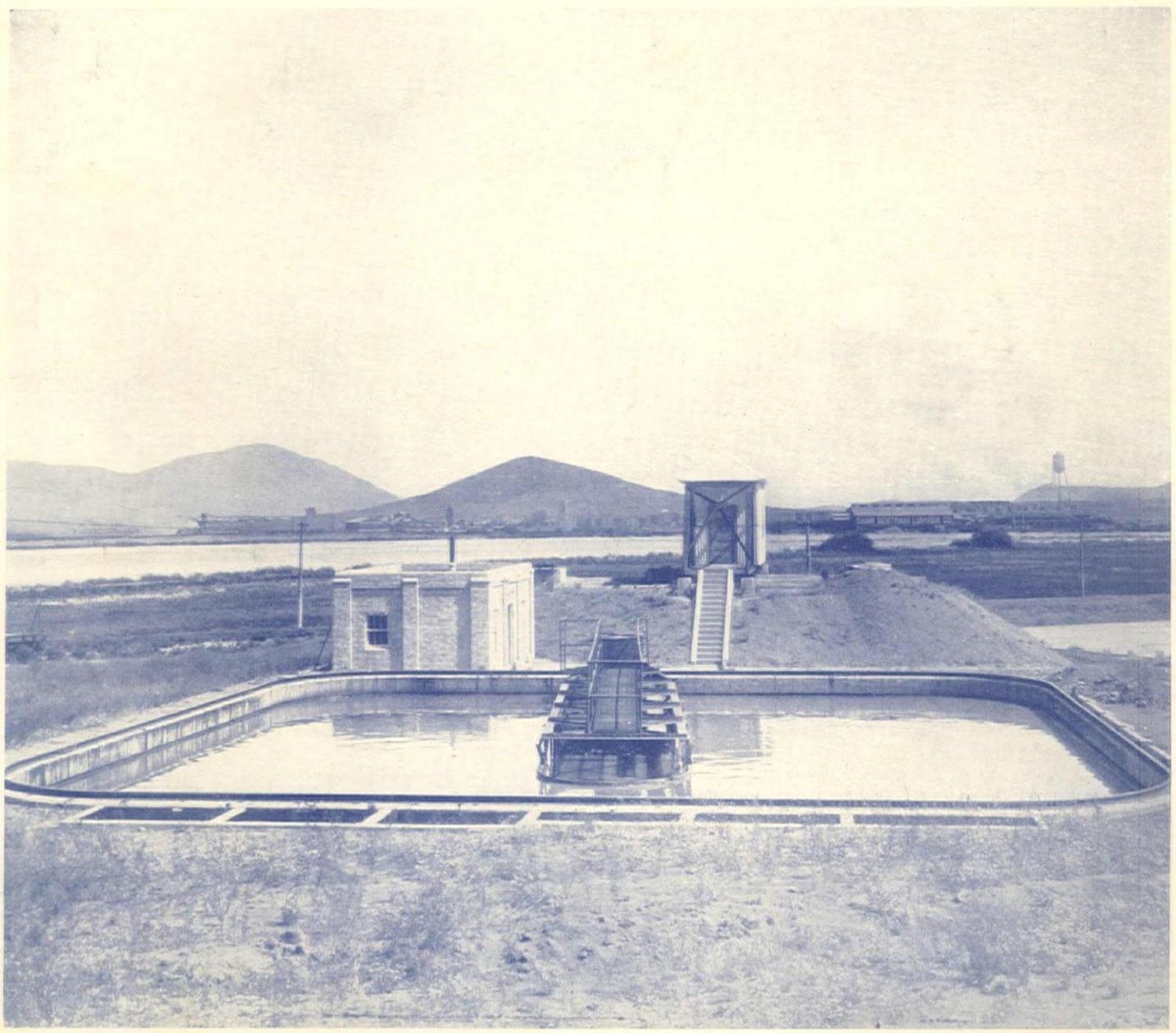
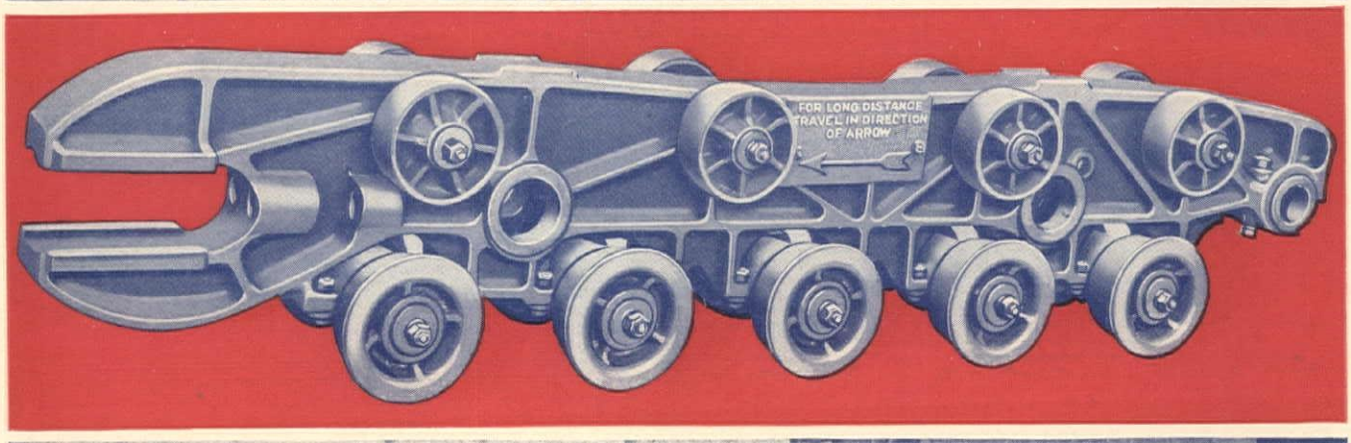
$3.00 PER YEAR



KLAMATH FALLS, OREGON, SEWAGE TREATMENT PLANT. TRACTION TYPE CLARIFIER IN FOREGROUND WITH CONTROL HOUSE IN LEFT CENTER AND DIGESTER IN BACKGROUND. CLYDE C. KENNEDY, CONSULTING ENGINEER; C. C. KELLEY, CITY ENGINEER; HARTENBOWER BROS., CONTRACTORS



The TRACTION FRAMES ARE SINGLE-PIECE STEEL CASTINGS

In line with the P & H principle of unit-cast steel construction, the traction frames of P & H Corduroy crawlers are single-piece steel castings. The whole simple crawler mechanism is held in permanent alignment by them. There can be no weaving . . . no excessive wear and breakage. Bearings and gears last longer.

Notice that the frame shown above is bored to receive the car body axles, which in turn are machined to fit. Thus there can be no play at these important points. For play here would soon seriously affect the operation of the entire machine.

These unit-cast steel Corduroy frames, together with the other unit-cast main frames, comprise one of the outstanding reasons for the great strength, long life and low maintenance of P & H Excavators. Write for special, illustrated bulletins which describe this and other features of P & H construction in detail.

HARNISCHFEGER SALES CORPORATION
Established 1884
4490 W. National Ave., Milwaukee, Wis.
32 Beale St., San Francisco 2025 Santa Fe Ave., Los Angeles
ROBERT M. TAYLOR, Pacific Coast Manager
Service Stations, Complete Repair Part Stocks and Excavators
at San Francisco, Los Angeles and Seattle

P&H

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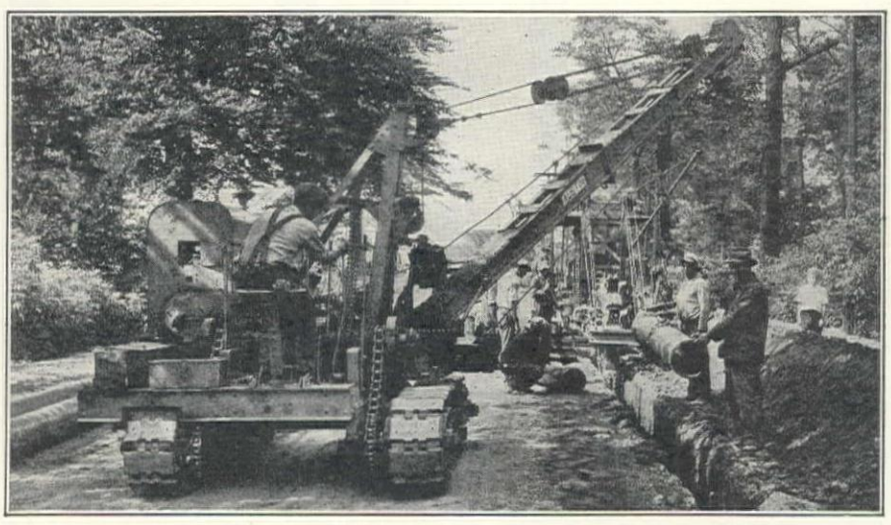
Diesel
CRANES
DRAGLINES

LEADITE

Trade Mark Registered U.S. Pat. Office



Indianapolis Water Company—laying bell and spigot water mains with Leadite Joints.

"Performance"

The following, which are only a few of the many users of Leadite, advise they have laid over 1800 miles of water mains jointed with Leadite:

		SIZES
Crumley, Jones & Crumley Company	200.00 Miles	4-in. to 36-in.
Dayton, Ohio	128.25 Miles	4-in. to 84-in.
Flint, Michigan	237.41 Miles	4-in. to 30-in.
Ft. Worth, Texas	192.85 Miles	4-in. to 36-in.
Indianapolis Water Company	150.00 Miles	6-in. to 36-in.
Louisville Water Company	165.82 Miles	Up to and including 48-in.
New Bedford, Mass.	25.00 Miles	4-in. to 48-in.
Oklahoma City, Oklahoma	94.50 Miles	6-in. to 30-in.
Pennsylvania Water Company	110.00 Miles	4-in. to 42-in.
Philadelphia Suburban Water Co.	230.00 Miles	Up to and including 24-in.
St. Louis, Missouri	90.00 Miles	Up to and including 36-in.
City of Tulsa, Oklahoma	37.00 Miles	6-in. to 36-in.
Washington Suburban San. Dist.	150.00 Miles	Up to and including 24-in.
Total	1810.83 Miles	

This will give some idea of the extensive use of Leadite for jointing water mains.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

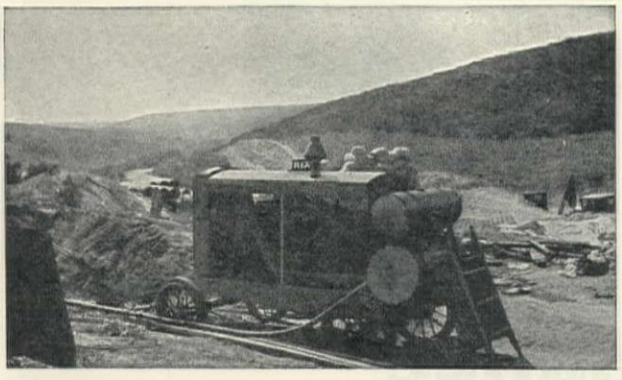
WATER WORKS SUPPLY COMPANY

501 Howard Street, San Francisco — 2326 E. 8th St., Los Angeles
Water Works & Power Equipment Co., White Building, Seattle
THE LEADITE COMPANY—LAND TITLE BLDG., PHILADELPHIA, PA.

No Caulking

This Is the Time for

ACTION



RIX "6" No. 4, with *Super-Charger*, owned and operated by J. G. Wood & Son, San Diego Contractors, providing air for cement guns for lining water tunnels for Water Department of City of San Diego.

THIS is no time for tears and fears. Stiffen up the old backbone and DO something. Business is what you *make* it. If you are not showing the profit you should, don't blame conditions. Improve your methods. Add equipment that will help you figure closer and profit more. RIX "6" *super-charged* air power will save you time and money on a hundred different kinds of work. You *need* this extra *efficiency*, this absolute *dependability*, this rock-bottom *economy*. You've waited long enough. It's time for *Action*. Write for Bulletin 3-M.

THE RIX COMPANY, INC.
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LOS ANGELES....684 Santa Fe Avenue
PORTLAND.....312 E. Madison Street
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RIX *Pioneer* line includes compressors of *all* sizes for *all* purposes. Rix Co. are also agents for COCHISE Drills, and exclusive distributors for THOR Pneumatic Tools in Los Angeles and Seattle territories.

SINCE 1877

..... The Compressor with the *Super-Charger*

RIX "6"

PORTABLE AIR COMPRESSORS

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WESTERN CONSTRUCTION NEWS

DEVOTED TO ENGINEERING CONSTRUCTION IN THE FAR WEST

VOLUME V — SEPTEMBER 25, 1930 — NUMBER 18

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You Will Find . . . .

HYDRO-TITE
EASY TO PREPARE

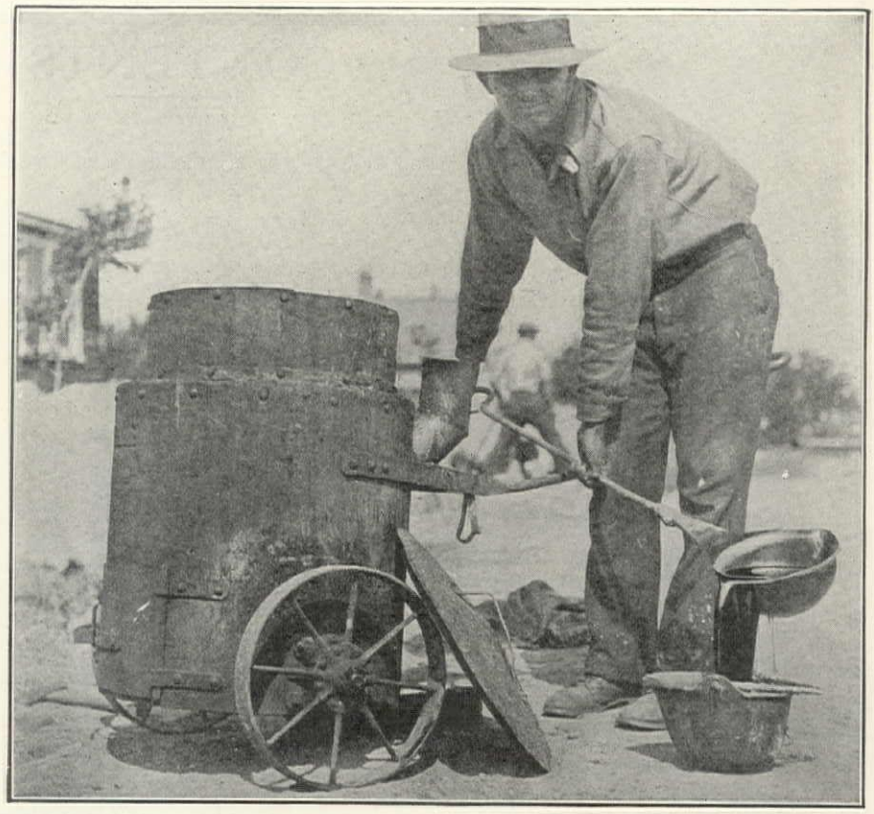
Easy to Prepare

YOU would not install a high pressure boiler simply to furnish heat for a two-room bungalow nor would you get the best of results melting Hydro-Tite with a furnace designed to produce heat enough to melt lead. Hydro-Tite is easy to prepare and easy to apply when the right equipment is used. The photograph above depicts our Style R wood burning furnace and is so simple and effective that it is practically fool-proof.

As Hydro-Tite was specifically compounded twenty years ago to make better bell and spigot joints, so is our furnace designed for the given purpose of melting Hydro-Tite. Neither is a substitute nor adaptation of any material or equipment.

Easy to Pour

The photo is unretouched and was taken on an actual job of over fifty miles of pipe jointed with Hydro-Tite. The melting pot, which fits into the outer shell, contains nearly 200 lbs. of molten Hydro-Tite ready to pour. The draft is controlled by opening or closing the door. It is closed in the picture and for over an hour the smoking wood embers will emit just the right heat to keep the Hydro-Tite ready for pouring. With the door closed the material cannot ignite. Small kindling wood, and very little of that, is all the fuel required.



It is all so simple any intelligent workman can learn to make perfect joints in an hour's time. We will call and teach your men or send you complete instructions with some Hydro-Tite and equipment to test out yourself. Hydro-Tite makes strong, flexible and tight joints as permanent as the cast iron pipe itself. Write now for printed matter and full details.

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General Offices and Works: 80 Boylston Street, Boston, Mass.

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SAN FRANCISCO: 7 Front St. LOS ANGELES: 6800 Avalon Blvd.

Northwestern Distributors:

PACIFIC WATER WORKS SUPPLY CO.

Atlantic Street Terminal, Seattle, Wn.

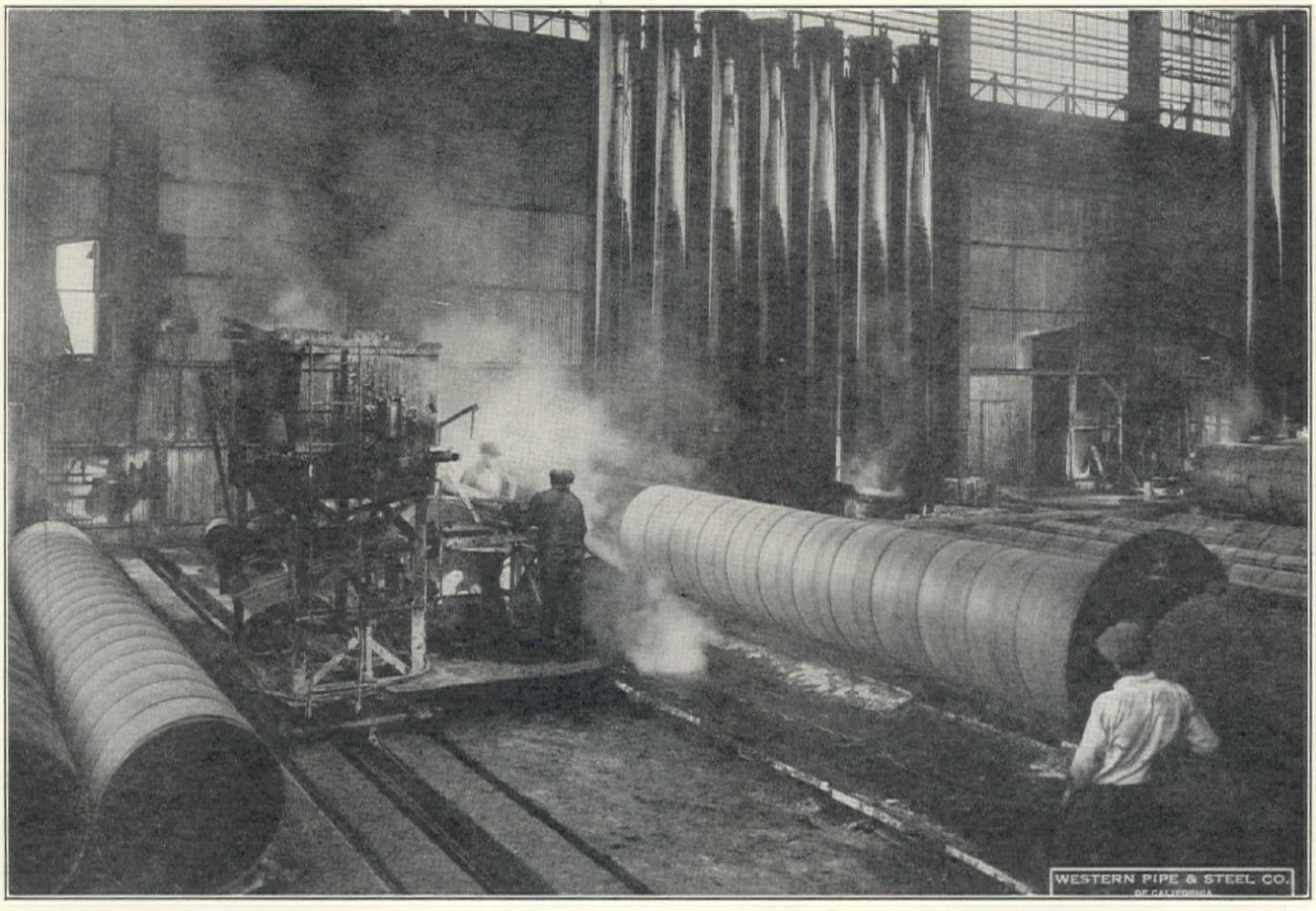
EVER TIGHT
HYDRO-TITE

A symbol of quality

HYDRO-TITE

A DEPENDABLE SELF-CAULKING JOINT COMPOUND

Wrapping 40" Steel Water Pipe For the City of San Diego



THE operation illustrated shows our method of applying soil-proof wrapping of felted fabric to steel pipe, after it has been dipped in hot asphaltum. Against the wall are several sections that have just been taken from the vertical dipping kettle, and are ready for the wrapping machine. The section being wrapped, and the one at the left, show with what smoothness and accuracy the protective fabric is applied. Of the 16 miles of this pipe fabricated for the City of San Diego, every section was wrapped except the pipe in tunnels. The wrapping adds but a few cents per foot to the cost of pipe.

Western Pipe & Steel Co. of California

SAN FRANCISCO • LOS ANGELES
FRESNO • TAFT • PHOENIX

When writing to WESTERN PIPE & STEEL CO., *please mention Western Construction News*

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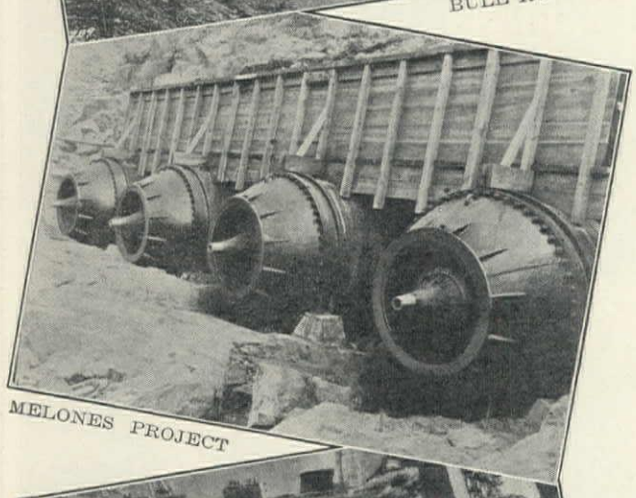
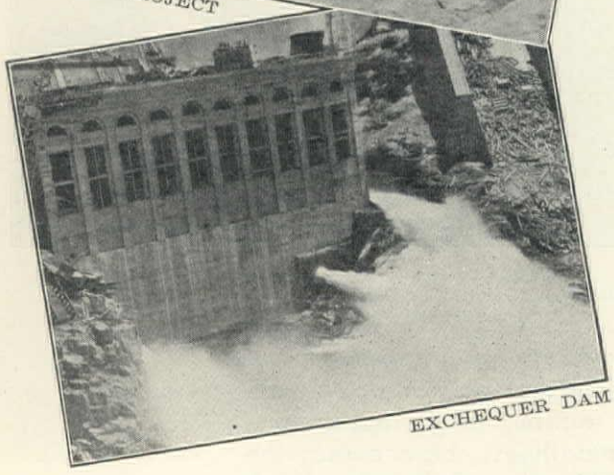
REGULATION —*with* Precision

is the Function of LARNER-JOHNSON Free Discharge Valves

BULL RUN DAM



MELONES PROJECT



EXCHEQUER DAM

GREAT sums of money are expended each year in the West to impound water, for irrigation and power purposes. Accurate means for regulating the release of this water from storage are therefore of utmost importance. Larner-Johnson valves are inherently ideal for the purpose, their design and operating principles having been successfully demonstrated on many large projects. Being cylindrical in form, there is practically no limit as to size and they are equally efficient at all openings. Pressure of the water within the valve provides the operating force.

A few of the larger Western installations are listed below:

Installation	No.	Size
Lake Cushman Dam	1	90″ x 62″
Exchequer Dam	2	60″ x 60″
Exchequer Dam	2	96″ x 72″
Melones Project	4	60″ x 60″
Bull Run Dam	3	48″ x 36″
Pardee Dam	2	72″ x 60″
Diablo Dam	1	96″ x 72″
Big Dalton Dam	1	48″ x 42″
Big Tujunga Dam No. 1	1	72″ x 60″

Applications of this valve principle to other than free discharge service include main inlet valves for hydraulic turbines, control valves in aqueduct lines, check valves in pumping stations and pressure reducing and regulating valves in water works distribution. Many installations throughout the West have proved the special fitness of these units in this wide range of service. Bulletin No. 25 on request.

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

2985 Nineteenth Street, SAN FRANCISCO 33 Rector Street, NEW YORK

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

PELTON

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TRY AND OUTGROW THIS 1-YD. CLAMSHELL!

A Bucyrus-Erie 1035 Clamshell Machine

If your business has grown to where an ordinary clamshell can't keep your aggregates moving — install a Bucyrus-Erie 1035.

With its fast swing, accurate spotting and tremendous lifting power, this thoroughly up-to-date convertible machine revolutionizes material handling for contractors who have big work to do.

Goodbye demurrage — it cleans out a gondola in a few minutes. Goodbye empty batcher — the trucks keep rolling, and if there's a hitch out on the job, you know without checking up that your material yard is not to blame.

It is easily convertible on the job to dragline or shovel. In any capacity, it has the big output and the dependable low-cost operation characteristic of Bucyrus-Eries.

Send for descriptive literature today.

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EMULSE PATCHER and OILER

designed for Emulsified Oils or Asphalts is particularly useful for

City Street and County Highway Maintenance

THE SPEARWELL IS COMPLETELY AIR OPERATED
INCLUDES the LATEST AIR ATOMIZING or JETTING NOZZLE

Showing the 350-Gallon 4-Wheel Trailer. Also can be equipped with 4-Foot Distributor Boot. Another type is the 2-Wheel Trailer, 2-Barrel Size

Spears-Wells Machinery Company, Inc.

Manufacturers and Distributors of

ROAD CONSTRUCTION AND MAINTENANCE EQUIPMENT

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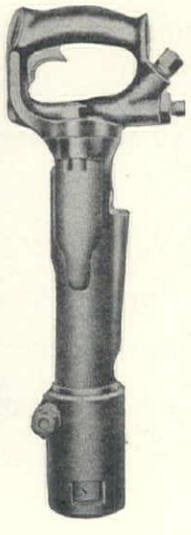
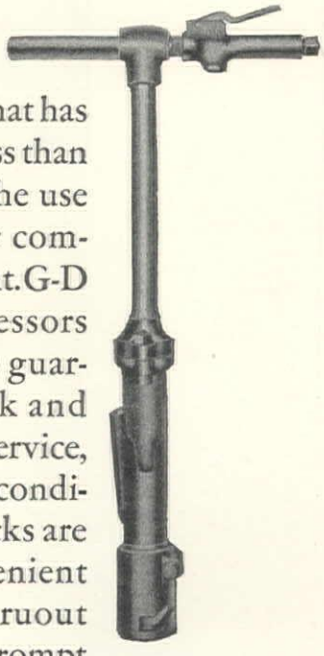
THIS JOB





is only one of many that has been completed in less than estimated time by the use of Gardner-Denver compressed-air equipment. G-D portable air compressors and industrial tools guarantee you fast work and continuous reliable service, even under hardest conditions. Adequate stocks are maintained at convenient shipping points thruout the world insuring prompt delivery no matter where you are located.

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Sales Offices Throughout the World

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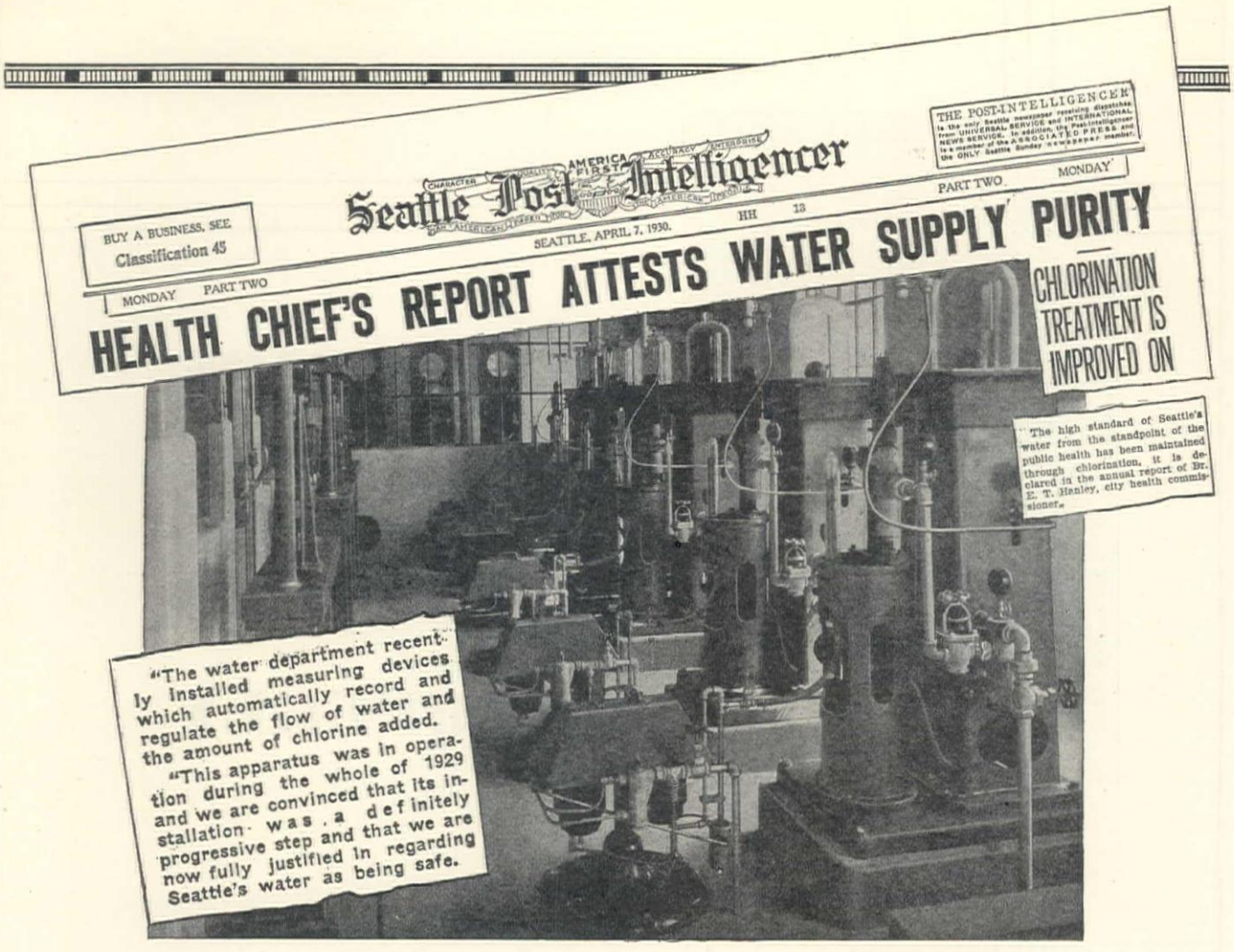
Illustrated... Installation of 36" Clay Pipe for City of Vallejo

Because of its unequalled qualities of permanency, the City of Vallejo chose Gladding, McBean Vitrified Salt-Glazed Clay Sewer Pipe. The order called for 76,000 feet, and the pipe was laid with asphalt joints. George W. Wiles was Engineer in charge, and the contractor was M. J. Bevanda of Stockton. There is no question but that Clay Pipe solves permanently the question of permanency in sewers.

Gladding, McBean & Co. San Francisco Los Angeles Oakland Portland Seattle Spokane

When writing to GLADDING MCBEAN & CO., *please mention Western Construction News*



Automatic Chlorination — Solves Seattle's Problem

"The Only Safe Water is a Sterilized Water"

ACCURATE proportioning of chlorine dosage to a widely varying flow was Seattle's problem. Dependable automatic control apparatus a necessity. « « That the six W & T Automatic Vacuum Chlorinators installed on Young's Lake Supply adequately fill this need is evidenced by Dr. Hanley's report. « « Technical publication 106 (yours for the asking) describes this apparatus in detail.

WALLACE & TIERNAN COMPANY, INCORPORATED

Manufacturers of Chlorine Control Apparatus

NEWARK • NEW JERSEY

Baltimore, Boston, Buffalo, Charleston, Charlotte, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Knoxville, Lexington, Lincoln, Los Angeles, Minneapolis, New York, Ogden, Oklahoma City, Philadelphia, Pittsburgh, Roanoke, San Francisco, Seattle, Spokane, St. Louis, Syracuse. Wallace & Tiernan, Ltd., Toronto, Winnipeg, Canada. Wallace & Tiernan, Ltd., London, England

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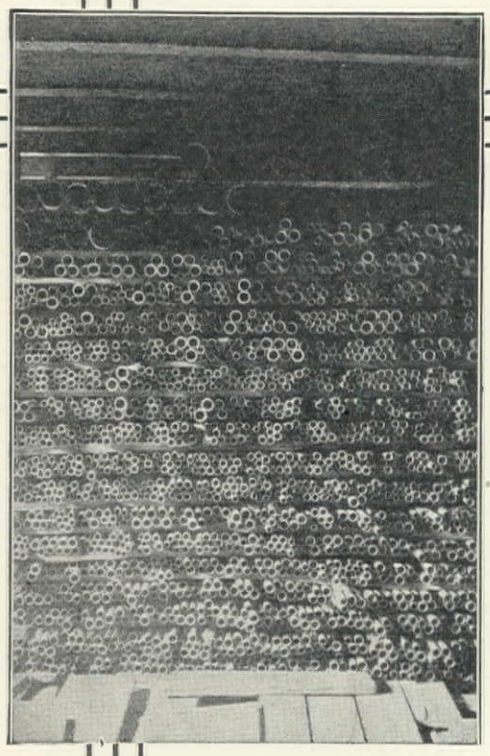


A shipment of PIPE stowed in the hold of an American-Hawaiian ship.

EVEN PIPE MUST BE STOWED PROPERLY

American-Hawaiian cargoes are stowed according to the explicit directions of men long experienced in safe, scientific cargo handling.

Even pipe shipments must receive the same careful treatment. Each layer is separated by dry dunnage to insure proper ventilation and to eliminate the possibility of condensation.

AMERICAN-HAWAIIAN STEAMSHIP CO.

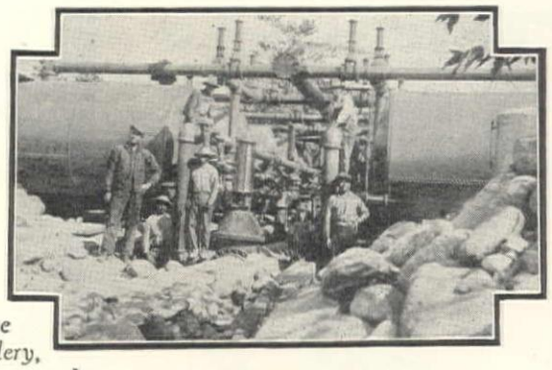
Superior Coast-to-Coast Service

When writing to AMERICAN-HAWAIIAN STEAMSHIP COMPANY, *please mention Western Construction News*

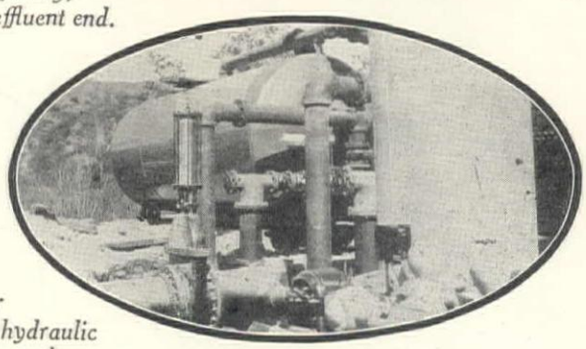
CITY of REDLANDS, California

Installs California Filters

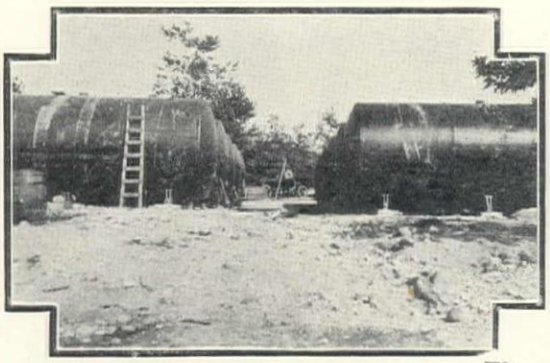
THE Municipal Water Supply of the City of Redlands, California, is purified through a battery of ten 8'x22' horizontal steel pressure filter tanks, fed by a 20-inch steel pipe line from a raw water reservoir. The entire filtration equipment, views of which are shown here, was provided and its installation supervised by California Filter Company, Inc. The plant has a capacity of 5,000,000 gallons per day.



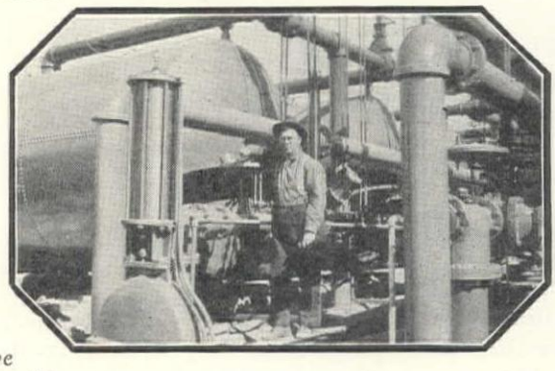
Pipe gallery, effluent end.



Right: Pressure system for operating hydraulic valves.

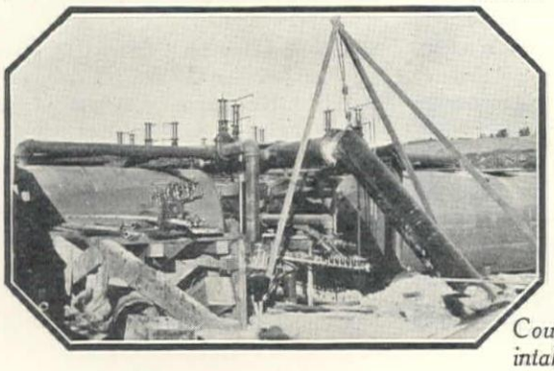


The ten 8x22 steel filter tanks.



Right: Hydraulic effluent valve and rate controller.

Raw water influent trench.



Coupling 20-inch intake pipe.

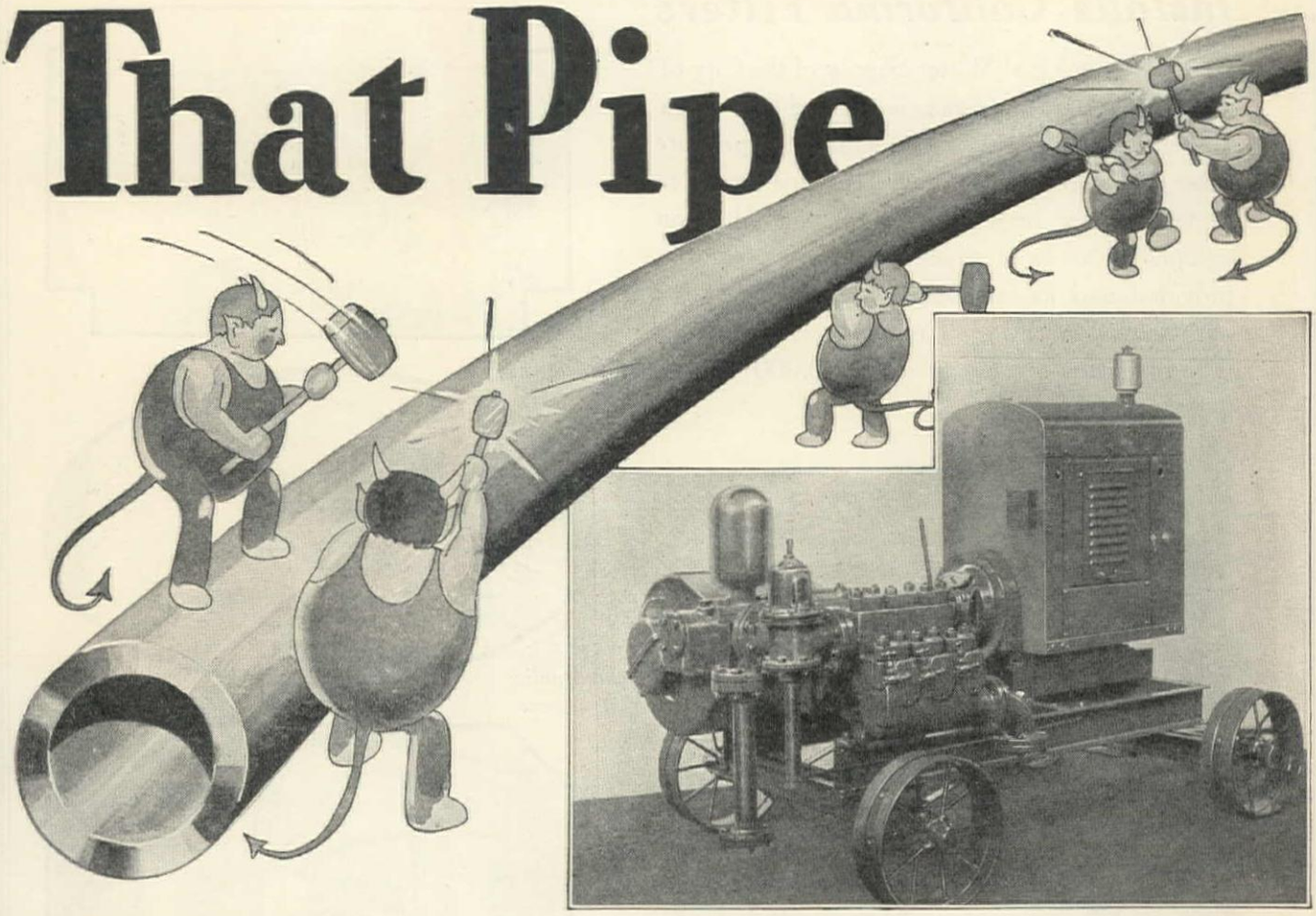
Our Booklet No. 40 provides complete information on Califilter equipment for every type of water purification problem. A copy will gladly be sent on request.

981 Folsom Street, San Francisco

SEATTLE :: LOS ANGELES

CALIFORNIA FILTER COMPANY, Inc.

Don't Hammer That Pipe



WEAR and tear on the pipe line is an exceedingly important item in the cost per gallon of water at the paver.

For the steady pounding of the water, caused by the heavy strokes of the ordinary road pump, wrecks pipe lines long before their time.

But not with the Novo Flud-Oild Triplex Road Pump.

Operating at 200 r.p.m. instead of the customary 65, the Novo Triplex produces *600 water strokes per minute.* This provides a smooth, even flow at a uniform pressure — free from destructive "water hammer."

Another Destructive Force Licked

The Novo patented Water Governor, fluctuating at slight pressure changes, keeps excessive pressures out of the line—yet maintains the proper pressure steadily at the paver. And a second force for pipe destruction is licked. In addition the Water Governor saves as high as 15 to 25% in gasoline.

There are many other exclusive advantages to the Novo Triplex, which make for lower pumping costs and bigger paving profits. The completely enclosed Flud-Oild lubrication system keeps all moving parts constantly flooded with oil.

Powered by the famous four-cylinder, anti-friction Novo Roller Bearing Engines, the Novo Triplex is higher powered than any other road pump.

Mail the coupon for the Novo Pumping Handbook and complete details.

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When writing to NOVO ENGINE CO., *please mention Western Construction News*

The LIMA "101" has an integral ROLLER PATH 73" in Dia.

The LIMA "101" has an integral roller path, accurately machined on the truck frame casting, 73 inches in diameter--largest ever used on a shovel of 1 or 1¼ yard capacity. This oversize construction permits every digging strain to be evenly distributed to the large Timken equipped cone rollers and the possibility of tipping the upper deck, thus causing unnecessary strain on the center pin, is entirely eliminated.

Write today for your copy of bulletin 301

The Ohio Power Shovel Co.

Division Lima Locomotive Works, Incorporated

Lima, Ohio

Western Office
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Chicago

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New York

The rotating gear of the LIMA "101" has machine cut teeth and is shrunk onto the flange of the truck frame casting. It is held rigidly in place by twelve 1¼ inch fitted and driven bolts. This heavy duty construction, plus the advantage of a design that relieves the ring gear of carrying any weight is just another reason why your next excavator should be a LIMA "101".

LIMA "101"

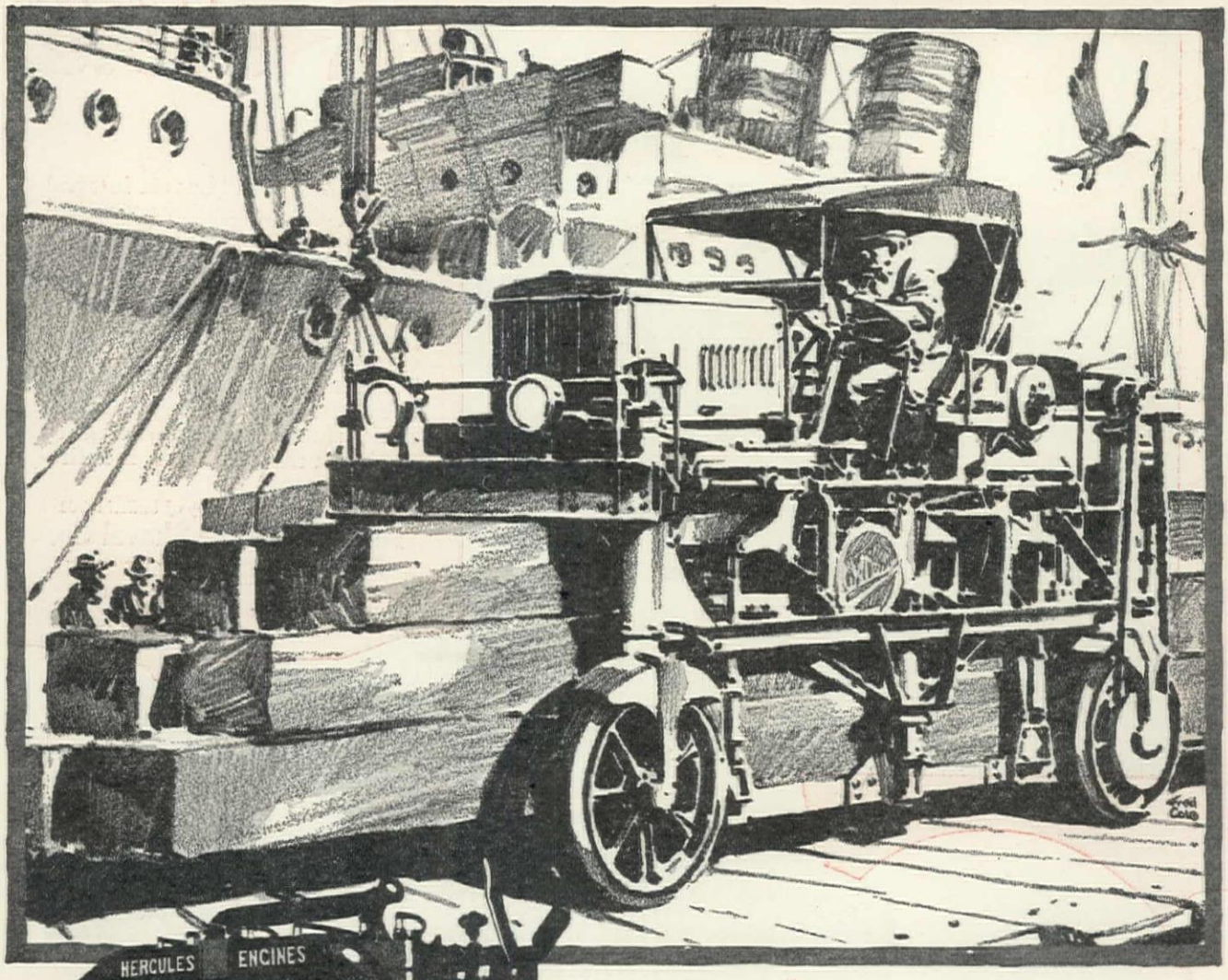
309

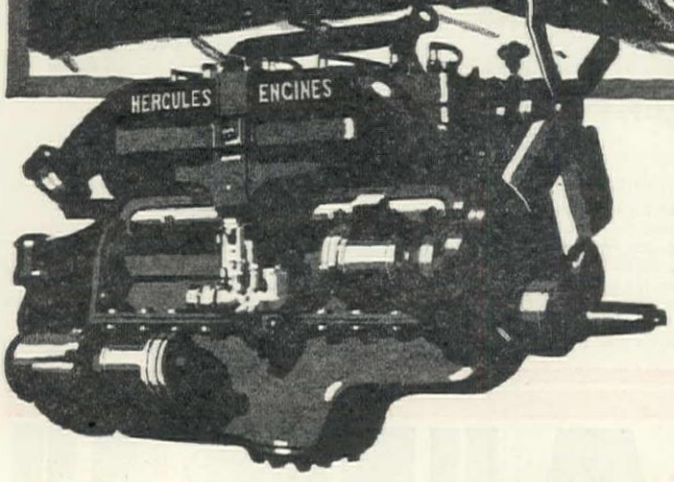
LIMA "101"

West Coast Representatives: WESTERN ROAD MACHINERY COMPANY, Seattle, Portland; TYEE MACHINERY CO., LTD., Vancouver, B. C.; A. L. YOUNG MACHINERY COMPANY, San Francisco; LEIGH M. RAILSBACK, 4880 Alhambra Ave., Los Angeles, Calif.

When writing to THE OHIO POWER SHOVEL CO., *please mention Western Construction News*

HERCULES ENGINES POWER THE WILLAMETTE CARRIER





Hercules Engines are built in a complete line of Four and Six cylinder models ranging in size from 9 to 175 H. P. Hercules engineers understand the power problems of manufacturers of contractor's, road building and general-industrial equipment. These are two of the many reasons Hercules Engines power Willamette "Utility" Carriers—and are standard on a wide variety of heavy-duty power machinery.

HERCULES ENGINES

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Canton, Ohio, U. S. A.
West Coast Branch: San Francisco, Cal.
Mid-Continent Branch: Tulsa, Okla.
Eastern Branch: New York, New York

Distributors: Smith Booth-Usher Co., Los Angeles, Cal.; Edward R. Bacon, San Francisco, Cal.; F. C. Richmond Machinery Co., Salt Lake City, Utah; Worthington Machinery Corp. of Oklahoma, Tulsa, Okla.; Norvell-Wilder Supply Co., Beaumont, Tex.; Bovaird & Co., Bradford, Pa. European Distributor: Automotive Products Co., London, Berlin, Vienna.

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Some jobs call for special equipment---equipment such as we sell. The right equipment in the right place means profit and we have the right equipment---not only that, but we know how to fit the machine to the job. Give us a ring at HEmlock 3700 ---better yet, drop in and see---we enjoy proving our claims that we can be of real help.

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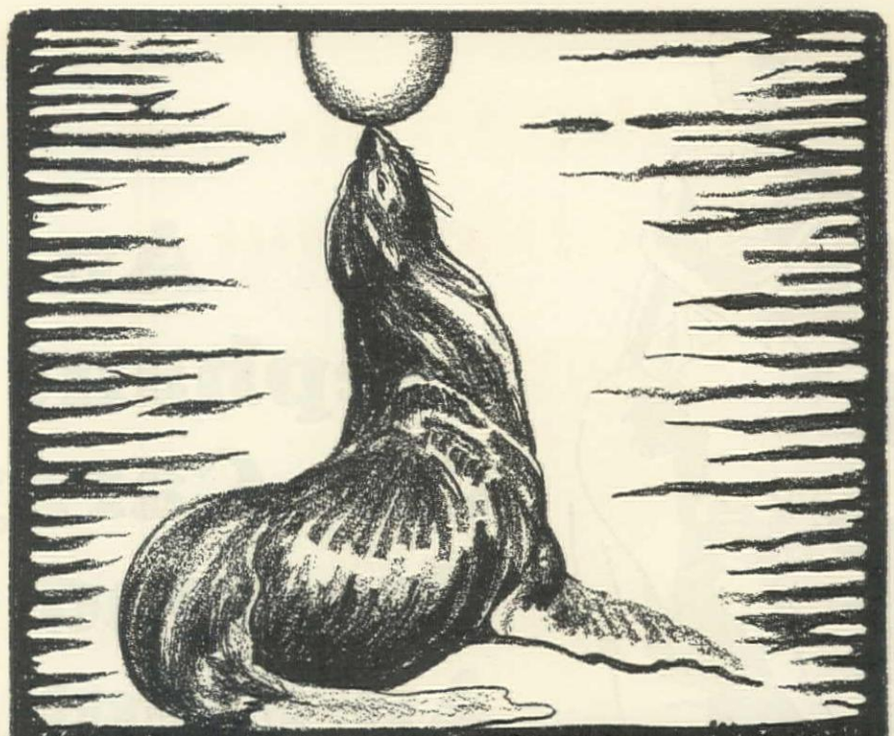
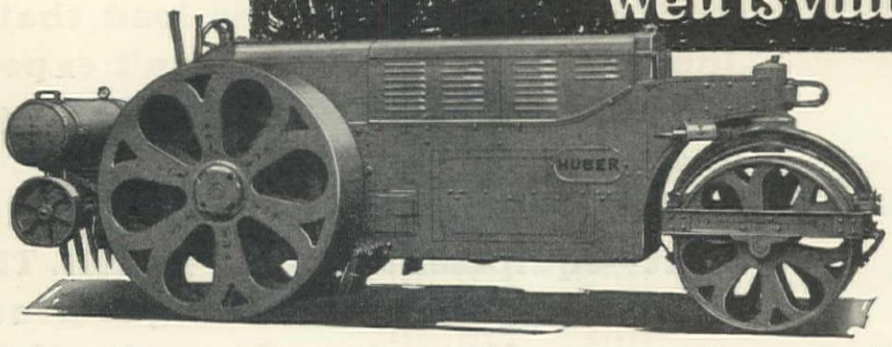


Ability to do many things well is Valuable!



You'll like a *Huber* because of its all-round ability to do all types of road work. It takes the place of a number of different pieces of equipment — and does the work efficiently and economically! A *Huber* with sprinkling attachment is ideal for rolling hot asphalt—with scarifier it tears up old roads and streets to any accurate depth —with grader blade it levels off old roads in a hurry—many operations *with one machine.* Made in sizes from 5 to 15 tons.

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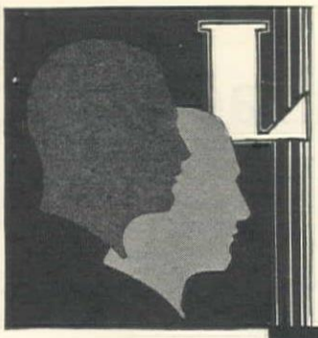
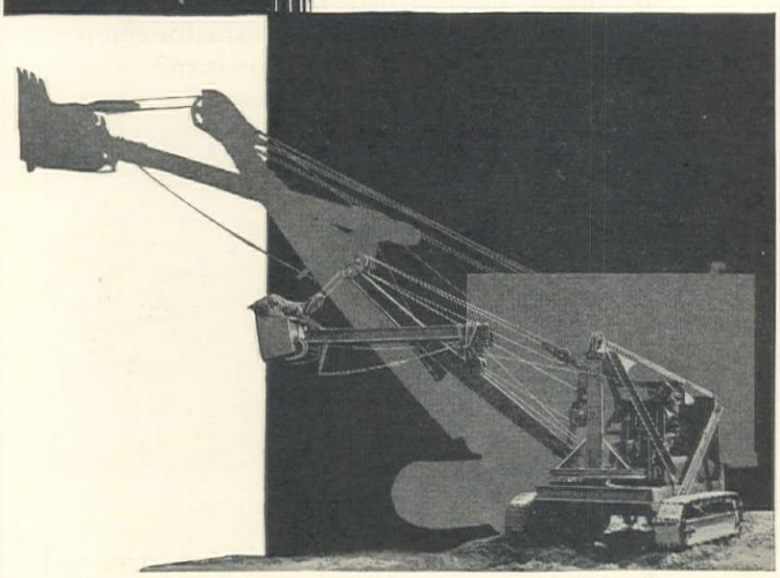


Like father ..like son



Byers Model 40 is Built like Byers Big 1 Yd.

THE low cost of dependable production with Byers Model 40 makes this light utility shovel and crane a winner. On all classes of simpler road work, small general excavating, material handling, trenching, clean-up and follow up behind big rigs *the Model 40 excels.*

It's built like no other less-than-half-yard equipment . . . with exclusive top quality features taken from Byers big rigs. This machine, with any attachment, has proved that it pays its way wherever it goes and stands up day after day under gruelling tasks and rough handling by careless operators. Full information is waiting for you. Get acquainted with this machine today!

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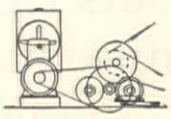
BYERS Model 40

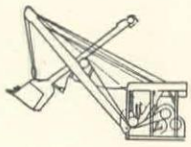
LIKE FATHER ...LIKE SON

Similar direct drive from motor through silent chain to working operations.

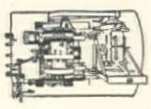


Similar Timken self aligning roller bearings on jackshaft.

Similar independent reversible all-cable crowd. No racks, pinions or chains.

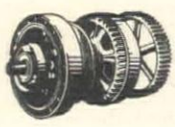


Similar machinery deck arrangement. Operator can walk all around motor, shafts, drums for quick adjustment.

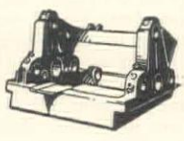


Similar worm driven boom hoist.

Similar "light-touch" power clutches make easy work for operator.

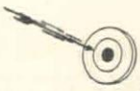


Similar unit steel castings, with wide bearings, hold working shafts in line.



Similar operating levers conveniently grouped at front of machine. Operator has full visibility of job.

Similar accurate control of each operation and speed help Model 40 do a big day's work.



Similar speed and efficiency of all booms and attachments.

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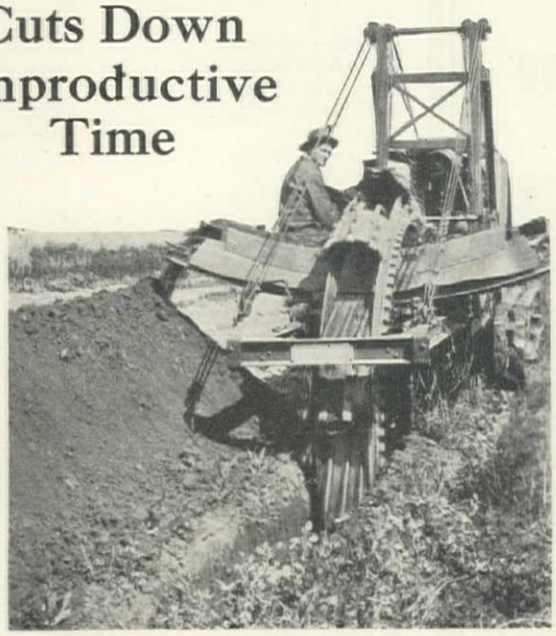
THE CLEVELAND BABY DIGGER

Easy to Transport

Cuts Down Unproductive Time



THE Cleveland Baby Digger carries no excess tonnage, weighing approximately 4 tons, and is most compact, with an overall width of but 58 inches. Here, then, is a trencher that allows, because of its close-knit design and comparative lightness of weight, maximum ease of transportation.

Five minutes, at the most, loads or unloads it on its own specially built trailer for truck speed transportation, any distance to any other location. Think of the saving of unproductive time that this quick, easy moving of the machine means and how many more jobs can have the big advantages to be secured by machine digging.

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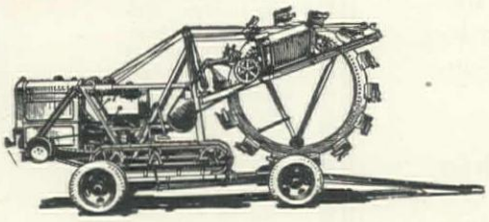
From every angle, the Cleveland Baby Digger saves time and money, through its ready adaptability to working conditions. You will find this trencher a profitable investment. Write today for catalog No. 10 giving full specifications and details.



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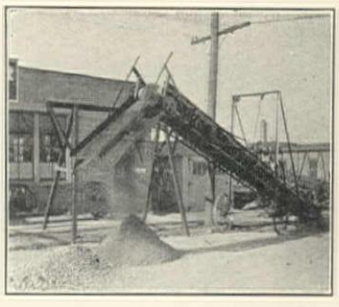

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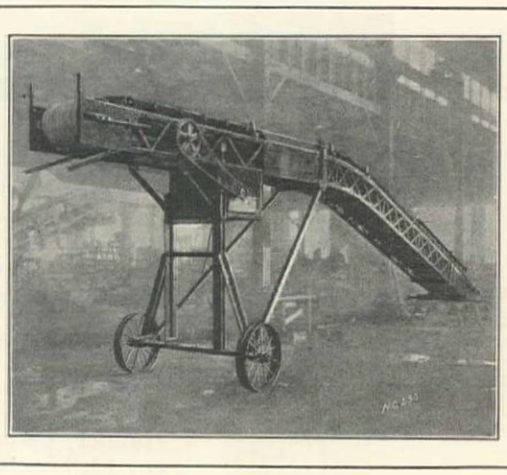

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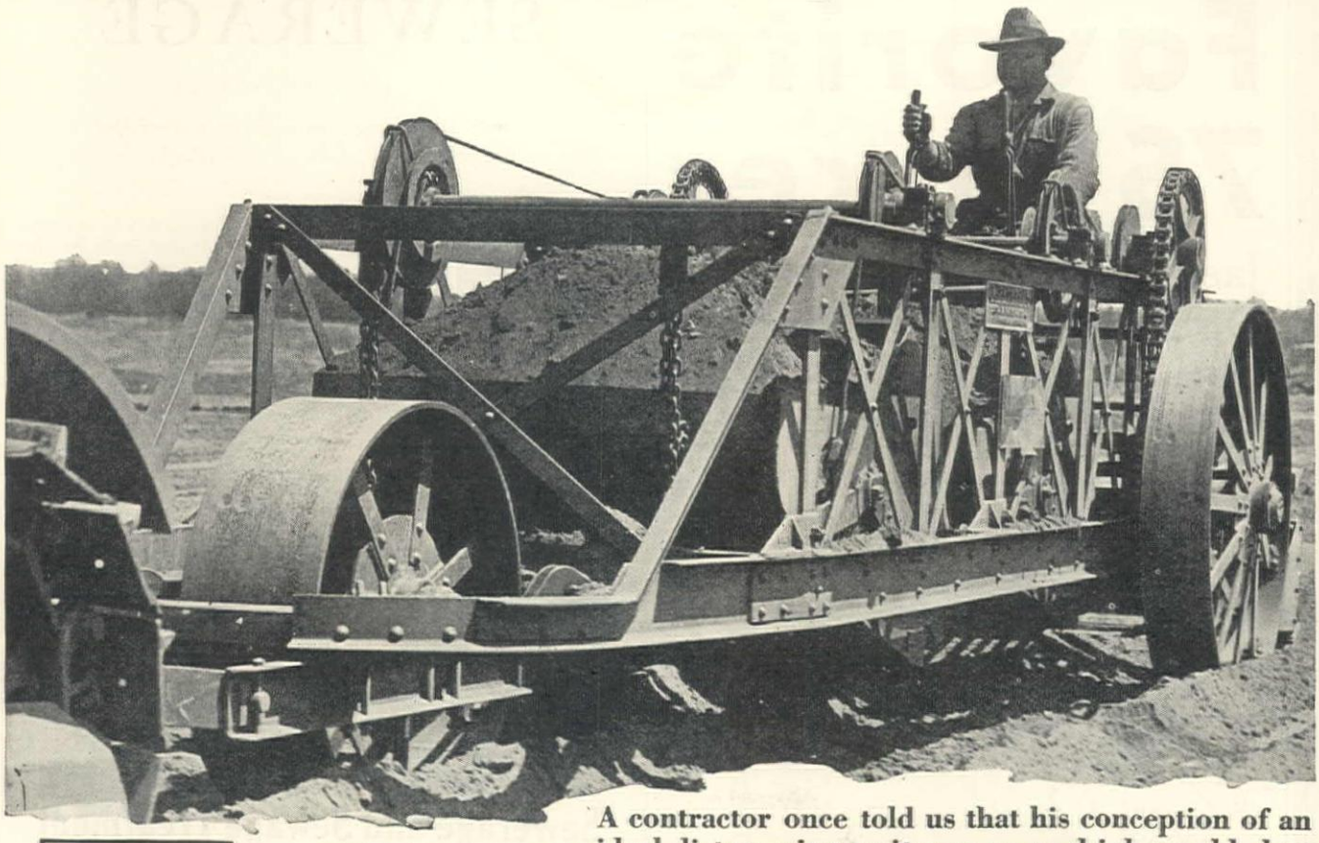

A contractor once told us that his conception of an ideal dirt moving unit was one which would *do a complete job.*

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Jaeger's IMPROVED End Discharge TRAILER ....

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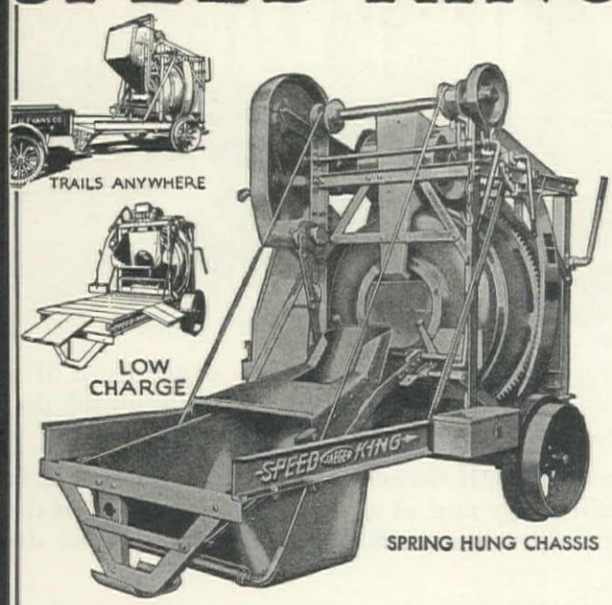

Speed King requires onlv about 6 ft. of street space. Charges in 5 seconds (Jaeger pat'd Skip Shaker), discharges stickiest concrete in 7-10 seconds. Real speed! You get all advantages of a trailer and side discharge outfit plus advantages of an end discharge.

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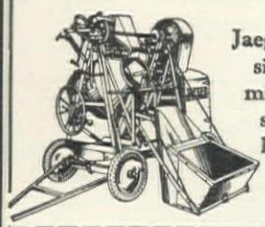

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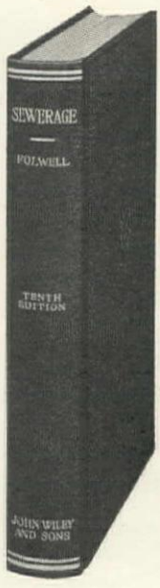

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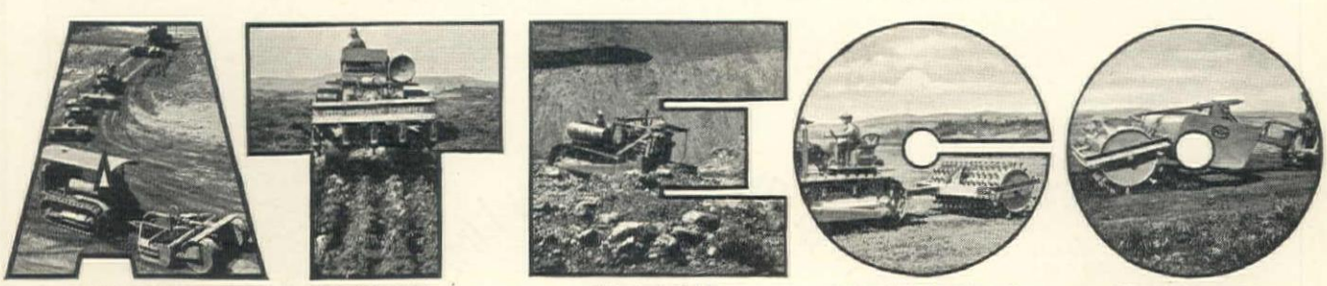

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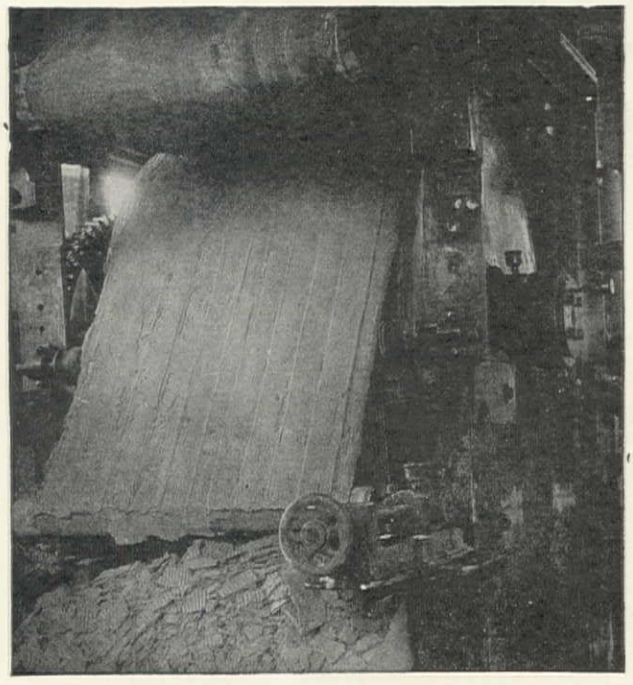

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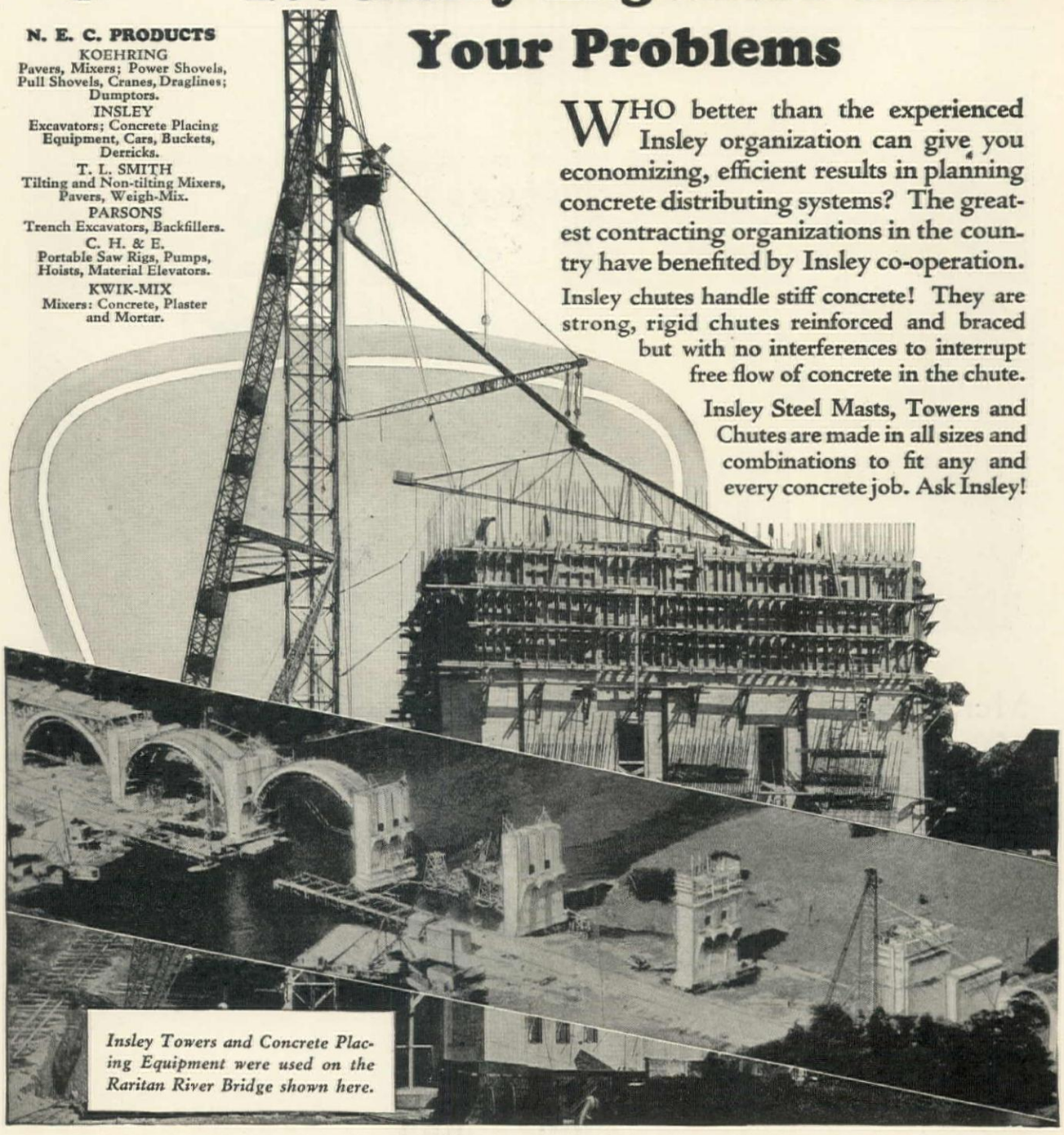
Portable Saw Rigs, Pumps, Hoists, Material Elevators.

KWIK-MIX
Mixers: Concrete, Plaster and Mortar.

WHO better than the experienced Insley organization can give you economizing, efficient results in planning concrete distributing systems? The greatest contracting organizations in the country have benefited by Insley co-operation.

Insley chutes handle stiff concrete! They are strong, rigid chutes reinforced and braced but with no interferences to interrupt free flow of concrete in the chute.

Insley Steel Masts, Towers and Chutes are made in all sizes and combinations to fit any and every concrete job. Ask Insley!



Insley Towers and Concrete Placing Equipment were used on the Raritan River Bridge shown here.

National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

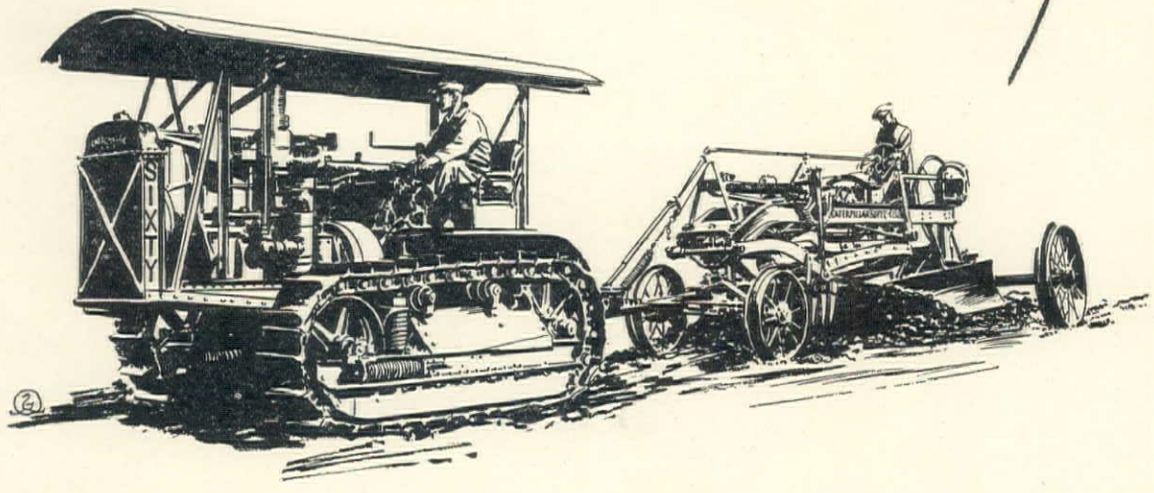
A 5776-I

Harron, Rickard & McCone Co.....1600 Bryant St., San Francisco, Calif.
Harron, Rickard & McCone Co.....2205 Santa Fe Ave., Los Angeles, Calif.
Wilson Machinery Co.....1936 Market Street, Denver, Colorado
Lund & Company.....49 N. Second, West, Salt Lake City, Utah
Northwest Equipment Co., Inc.....Great Northern Tracks, Great Falls, Montana
L. A. Snow Company, 1032 Sixth Ave., S., Seattle, Wash., Portland; Spokane

When writing to NATIONAL EQUIPMENT CORPORATION, *please mention Western Construction News*

"CATERPILLAR" REG. U.S. PAT. OFF.
ROAD MACHINERY

better quicker cheaper



TRACTORS and GRADERS

for

Every Size Contract

West Coast Tractor Company

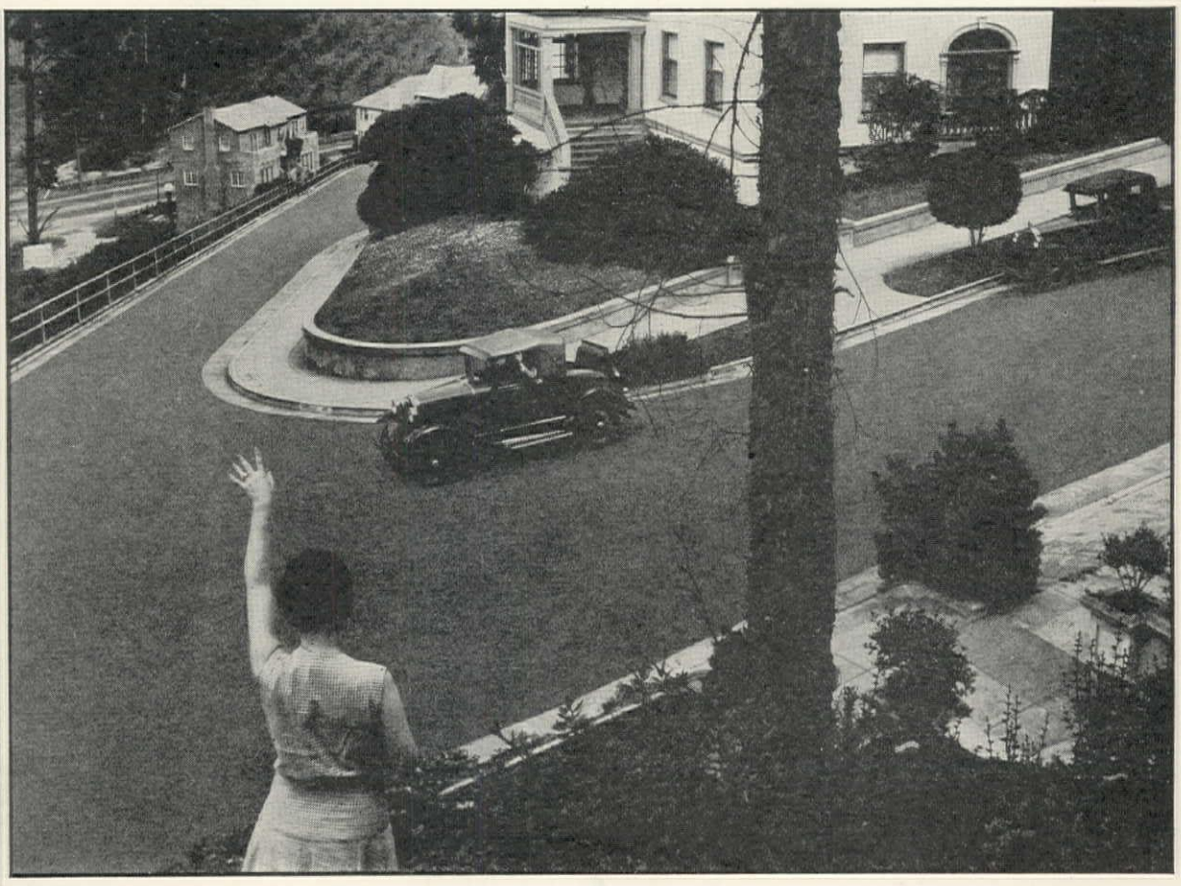
1175 Howard Street, San Francisco

"ATECO" DIRT MOVERS :: KILLEFER IMPLEMENTS
MASTER BACKFILLERS
WILLAMETTE-ERSTED HOISTS

When writing to WEST COAST TRACTOR CO., *please mention Western Construction News*

"LONG LIFE ~ *low maintenance cost*"

Say A HALF BILLION SQUARE FEET OF THIS MODERN PAVEMENT



When your street's up for paving—Just take for granted long service, smoothness, quietness, perfect traction that means *safe driving* rain or shine—if paving petitions specify Non-Skid Asphaltic Concrete.

And on the question of maintenance—over 550,000,000 square feet of Asphaltic Concrete in the Pacific West say—LESS UPKEEP EXPENSE THAN FOR ANY OTHER PAVEMENT.

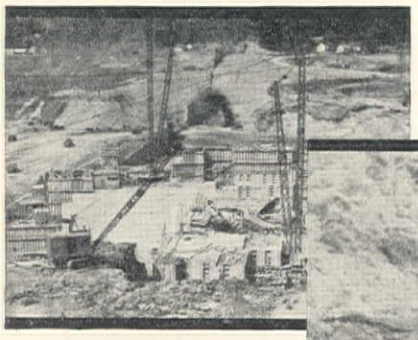
Asphaltic Concrete *lasts!* When you've paid its first cost—usually a little less than other hard-surface pavement—you've taken care of a lot of maintenance—years in advance. Scores of Asphaltic Concrete roads over 10 years old—have cost little or nothing for upkeep. One hundred and twenty-two miles in Fresno County cost only $2.71 per mile per year and stand high-speed traffic—the heaviest kind of trucking to boot.

These records prove Asphaltic Concrete the best pavement for every kind of service. Investigate it before you pave.

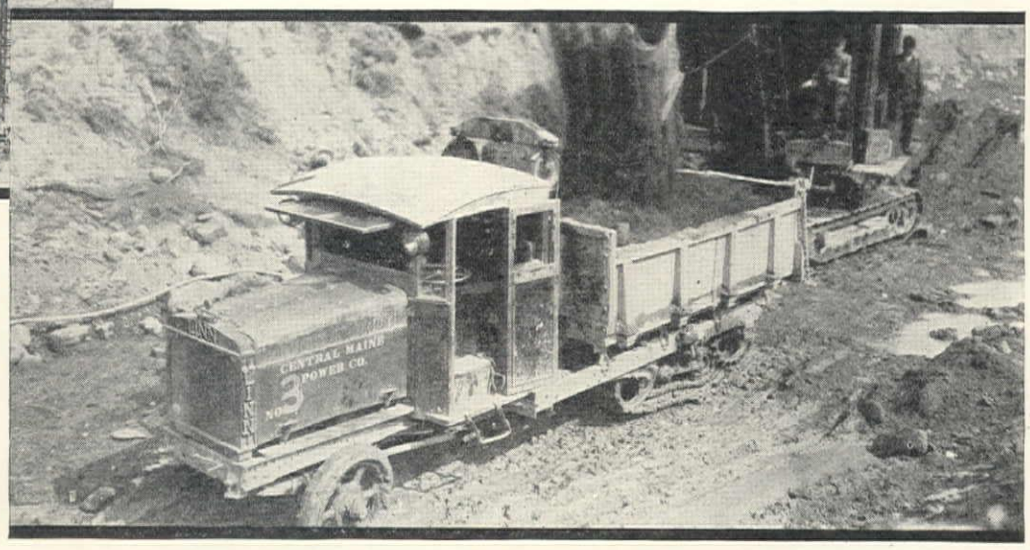
CALOL ASPHALT
A Standard Oil Product
FOR BEST RESULTS

STANDARD OIL COMPANY OF CALIFORNIA

Asphaltic CONCRETE NON-SKID PAVEMENT



LINN TRACTORS ON ANOTHER HYDRO-ELECTRIC PROJECT



One of a fleet of fourteen Linn Tractors purchased by the Central Maine Power Co. of Augusta, Maine. They are being used in moving the 2,500,000 cubic yards of dirt involved in constructing the Wyman Dam at Bingham, Maine.

14 LINN TRACTORS WORKING 24 HOURS A DAY

Only the Linn Offers You All These Advantages

1. *Patented Flexible Traction that* grips any surface under all weather conditions.
2. Tremendous hauling power—100 horsepower to take full advantage of Linn Traction.
3. Ten ton capacity on its own chassis.
4. Extra traction and power for additional tow loads.
5. Easy on men—steers like a truck.
6. Four speeds forward with four speeds reverse optional.

Fourteen Linn tractors working twenty-four hours a day are speeding the completion of the Great Wyman Dam designed to develop 105,000 horsepower.

To stand the gaff of this Herculean labor is a tribute to Linn's exclusive basic design and great chassis strength. To carry a full ten ton pay load under every and all conditions means more than giant power of the engine. It means traction that utilizes every foot pound of energy transmitted from the engine. Linn roller chain assembly transfers the entire weight, distributing it evenly over the full area of the ground contact of its patented flexible traction. There are no weight carrying axles or axle bearings and the traction members of 12 per cent manganese steel—non-clogging, non-slipping, grow harder with use.

Get the recorded facts of Linn low cost per pay load ton mile, on all heavy duty difficult work.

LA FRANCE REPUBLIC LINN TRACTORS

LINN MANUFACTURING CORPORATION

Division of LaFRANCE-REPUBLIC Corporation

Manufacturers of American La-France Trucks, Linn Tractors, Republic Trucks

Factories: Alma, Mich. • Morris, New York

Patent No. 1,270,531
Patent No. 1,521,454
Patent No. 1,685,641
Patent No. 1,685,676
Patent No. 1,701,979
Other Patents Pending

Represented in:

New York City	Boston	Philadelphia	Chicago	Tulsa, Okla.	Salt Lake City	San Francisco
Skowhegan, Maine	Charlotte, N. C.	Pittsburgh	St. Louis	Omaha, Nebr.	Denver	Portland, Ore.
New Haven, Conn.	Memphis, Tenn.	Louisville, Ky.	Kansas City, Mo.	Sioux Falls, S. D.	Jerome, Ariz.	Spokane
Baltimore	Johnson City, Tenn.	Detroit	Little Rock, Ark.	St. Paul, Minn.	Los Angeles	

105 direct distributors located throughout the United States and 49 distributors located in 30 foreign countries

Canadian Linn Distributors: Mussens Limited, Montreal

When writing to LINN MANUFACTURING CORPORATION, *please mention Western Construction News*

Where wear-resisting floors must be also decorative . . .

PABCO MULTIPLE PROTECTION

● For years the outstanding utility flooring for factories, warehouses and other buildings where wear resistance is the chief requirement, MASTIPAVE now is fast coming into its own as a ***decorative*** flooring.

RED MASTIPAVE with its rich dark coloring and its smooth, easily-cleaned surface is much in demand for floors in hospitals, schools and public buildings in which appearance and sanitation, as well as durability, must be considered.

MASTIPAVE is a fiberized mastic with a felt core and is laid in strips by cold cementing to the floor surface. It is waterproof, rot-proof, vermin-proof, resists acids and presents a non-skid surface even when wet.

Consult our local authorized Pabco Mastipave agent or write us for full information.

● ***Upper:*** RED MASTIPAVE installed as a decorative long-lived flooring in the teachers' dining room, corridors and locker rooms of the new Oakland High School, Oakland, Calif.

● ***Lower:*** BLACK MASTIPAVE makes the concrete floor of this auditorium incline resilient, non-slip and extremely resistant to severe traffic.

● **THE PARAFFINE COMPANIES, INC.**

LOS ANGELES • OAKLAND • SAN FRANCISCO • PORTLAND • SEATTLE
KANSAS CITY • SOMERVILLE, N. J. • NEW YORK CITY
LONDON, ENGLAND • SYDNEY, AUSTRALIA

Manufacturers of

Pab-Cote, Pabco Multi-Service Paints, Varnishes, Lacquers and Enamels, Pabco Waterproofing Paints and Compounds, Mastipave, Pabco 10, 15 and 20 Year Roofs, Malthoid Membrane Dampcourse, Pabcobond and Other Products.

PABCO PRODUCTS

PA-072

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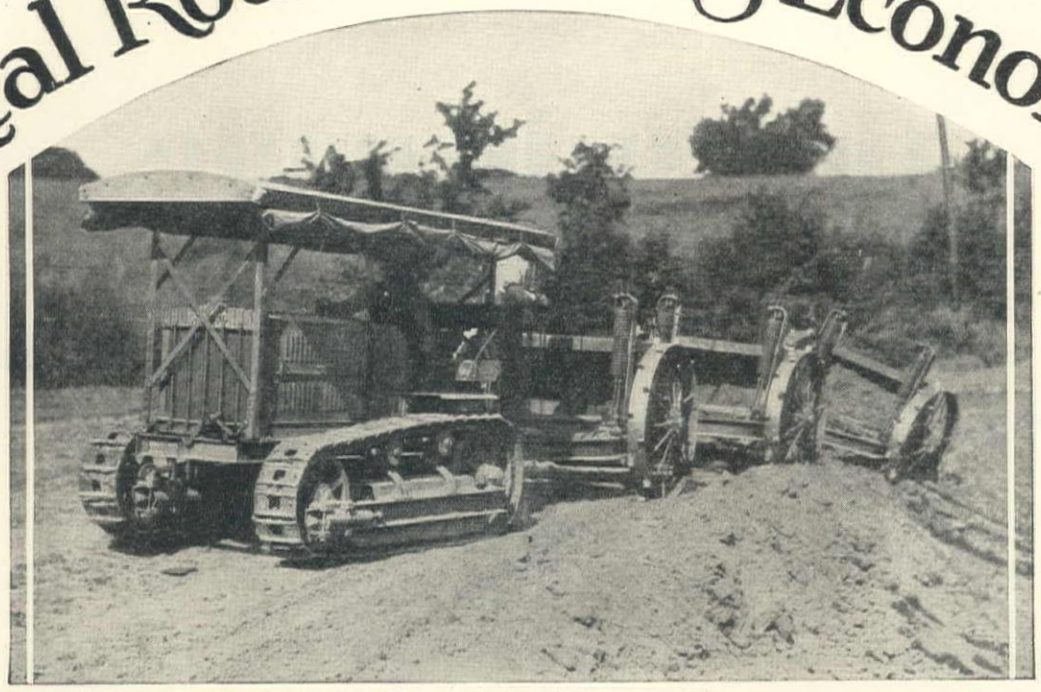
• • PABCO MASTIPAVE • •

Real Road Building Economy



With a BATES Steel Mule

BATES' Tractors are particularly well adapted to working with a train of automatic wheel scrapers. The unusual long tracks give a pull without slipping when loading. The ability to turn short saves time in getting at the bite. The easy riding and easy handling keeps the operator working without fatigue. Oversize working parts and superior quality of construction keeps it on the job without delays. That's why the Bates Steel Mule makes money. *Write for complete description*

Bates Manufacturing Company

A Subsidiary of

FOOTE BROS. GEAR & MACHINE CO.

111 North Canal Street Chicago, Illinois

W. H. Worden Companay

DISTRIBUTORS

355 Fremont Street, San Francisco, Calif.

When writing to W. H. WORDEN COMPANY, *please mention Western Construction News*

Moisture Can't Reach the Subgrade

. . . of a Union D Grade Asphaltic Pavement

DON'T let *water* be the cause of ruining a good pavement and *your* reputation.

Recommend and build Union D Grade Asphaltic pavements and you will forever remove the water menace.

This better grade of asphalt definitely *seals moisture out for all time.*

And in addition Union D Grade Asphaltic pavements give you these advantages:

1. They absorb expansion and contraction... a protection against surface buckling.

2. They resist the wear of heavy traffic.

Union D Grade

Asphalt

UNION OIL COMPANY

W. W. Baer, 7 Harima Machi, *Kobe, Japan*

Duncan Fox & Co., Ltd., *Chile*

C. H. Talbot, 5 Malacca Street, *Singapore*

W. S. Grant, *Manila, P. I.*

Atlantic Union Oil Co., Ltd., *Sydney and Melbourne, Australia... Auckland and Wellington, New Zealand.*

3. They can be opened to traffic soon after laying.

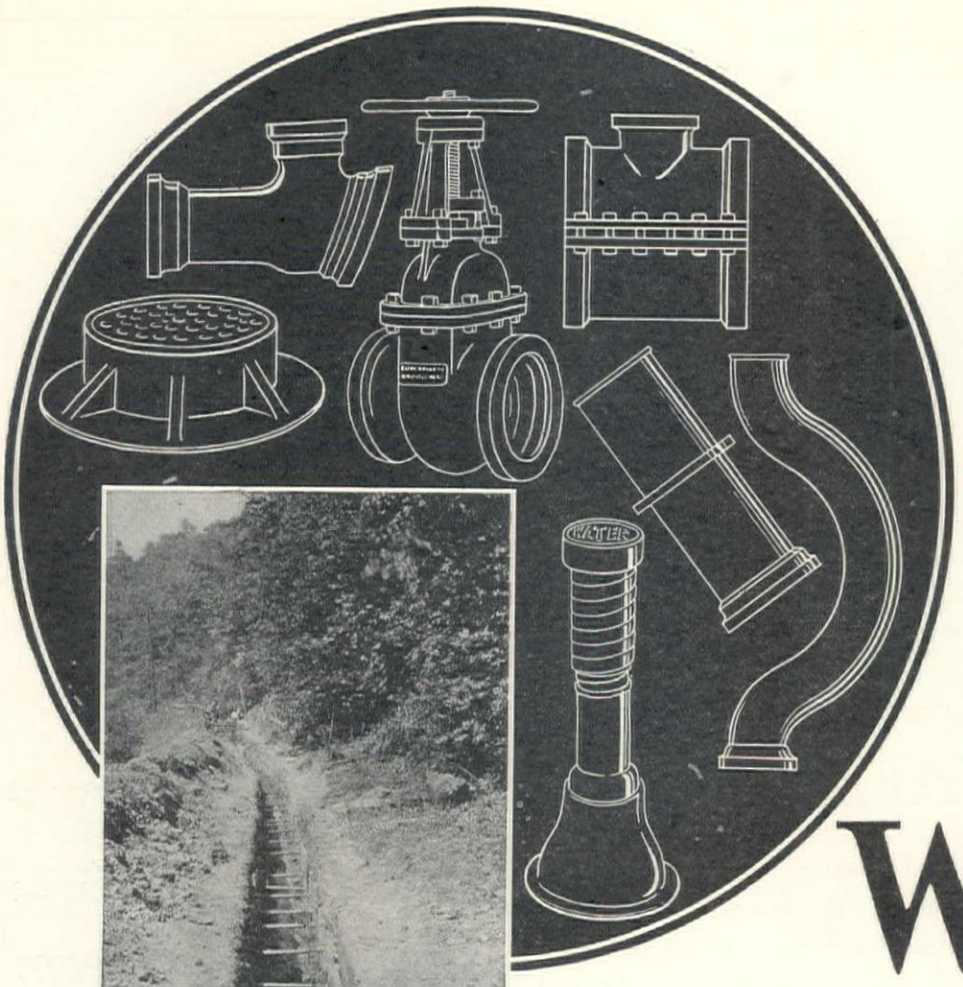
4. They are easily replaced after being cut into for water mains, etc.

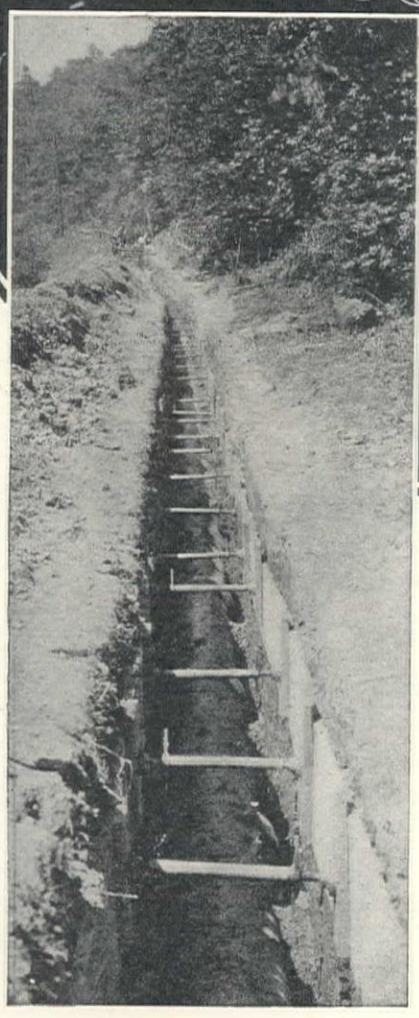
5. They are noiseless, dustless and easily cleaned.

6. They are easily and quickly resurfaced.

Communicate with the nearest distributing station listed below for further details, prices, etc. about Union D Grade Asphalt.

When writing to UNION OIL COMPANY, *please mention Western Construction News*





WHY

WATER WORKS MEN CARRY CLOW-NATIONAL FITTINGS IN STOCK . . . . . .

MANY of these special pipe fittings are often used in emergencies. There is no way to tell exactly when one of them will be needed—and needed promptly. For example, a half circle pipe can be used to go around, over or under an obstruction—perhaps another pipe line you did not know was in the line of your trench until you uncover it.

The cutting-in tee is used to run a branch off from an existing line with a minimum of expense and trouble. You never know when an extra valve or two will be needed. Split sleeves repair breaks, or are used for connecting a branch. Order these specials from Pipe Economy Catalog.

"Pipe Economy", eighth edition, shows complete line of pipe system equipment, 250 pages of valuable information, over 2,000 illustrations, free for the asking. Write either company.

James B. Clow & Sons
Chicago, Illinois

National Cast Iron Pipe Co.
Birmingham, Ala.

CLOW-NATIONAL
CAST IRON PIPE
"Everything for a Pipe System"

When writing to NATIONAL CAST IRON PIPE CO., OR JAMES B. CLOW & SONS, *please mention Western Construction News*

IT PAYS TO SELECT CORRECT EXPLOSIVES

Like many other successful quarries, the Santa Catalina Island Quarry Company, located on the famous island playground, finds that it pays to select explosives which best meet the requirements of its work. That is why this quarry uses 40% Hercules Gelatin Extra L. F., 40% and 60% Hercules Extra L.F., and a bag packed, Hercomite-type explosive in its large, semi-annual shots.

Using the correct explosive not only frequently results in a saving in explosives costs, but production is speeded, labor costs are reduced, and safety is promoted. Proper breakage of rock for the crusher, for example, has a direct effect on all these items.

At the right is the comprehensive list of Hercules explosives which are designed to meet every blasting requirement of the quarrying industry regardless of the factors involved. Hercules service men are always glad to advise in connection with the proper selection and use of these explosives. Check the coupon list for further information.

THE EXPLOSIVE FOR YOUR WORK IS IN THIS LIST

☐ **HERCULES GELATIN EXTRA L. F.**—Dense and strong · plastic and water-resisting · first in fumes · the leading gelatin-type, all-purpose explosive · strengths: 30% to 90% · 190 cartridges.*

☐ **HERCULES GELATIN L. F.**—Dense and strong · plastic and water-resisting · needed only under severest conditions · first in fumes · strengths: 20% to 90% · 184 cartridges.*

☐ **GELAMITES 1 and 2**—Semi-plastic · water-resisting · bulkier than the gelatins · often replaces gelatins up to, and including 60% strength at a saving in cost · No. 1, 220 and No. 2, 240 cartridges.*

☐ **HERCULES STRAIGHT NITROGLYCERIN L. F.**—Strong · fast · water-resisting in higher strengths . strengths: 15% to 60% . 208 cartridges.*

☐ **HERCULES EXTRA L. F.**—For general blasting · strengths: 20% to 60% · 220 cartridges.*

☐ **HERCOMITES 2 to 7**—General purpose explosives · very economical where suitable · 240 cartridges* for No. 2, to 350 for No. 7 · also Hercomite Bag packed in 12½ lb. bags.

☐ **HERCULES TORPEDO GELATIN**—Replaces liquid nitroglycerin for shooting oil, gas, and water wells · strength: 80% · 196 cartridges.*

☐ **HERCULES BLASTING GELATIN**—Water-resisting and powerful · valuable for submarine blasting, shooting gas or oil wells · 100% strength · 200 cartridges.*

☐ **HERCULES CONTRACTORS' DYNAMITE**—Low-strength explosives with strong heaving action · strengths: 5%, 10%, 15%, 20% · 5% packed in 12½ lb. bags only, others 216* cartridges.

☐ **HERCULES BLASTING POWDERS**—"A": 8 granulations (coarse to fine) and dust—"B": 7 granulations and Herco—Herco: used in well-drill holes with Cordeau-Bickford detonating fuse—all powders packed in 25 lb. kegs.

☐ **HERCULES BLASTING SUPPLIES**—A complete series of detonators and blasting accessories.

***NOTE: Cartridge counts refer to the approximate number of 1¼" by 8" cartridges in 100 lbs. of the explosive.**

HERCULES POWDER COMPANY
956 King Street, Wilmington, Delaware
Gentlemen: Please send me pamphlets describing the explosives checked.

Name.....

Company.....

Street.....

P. O.....

D-2

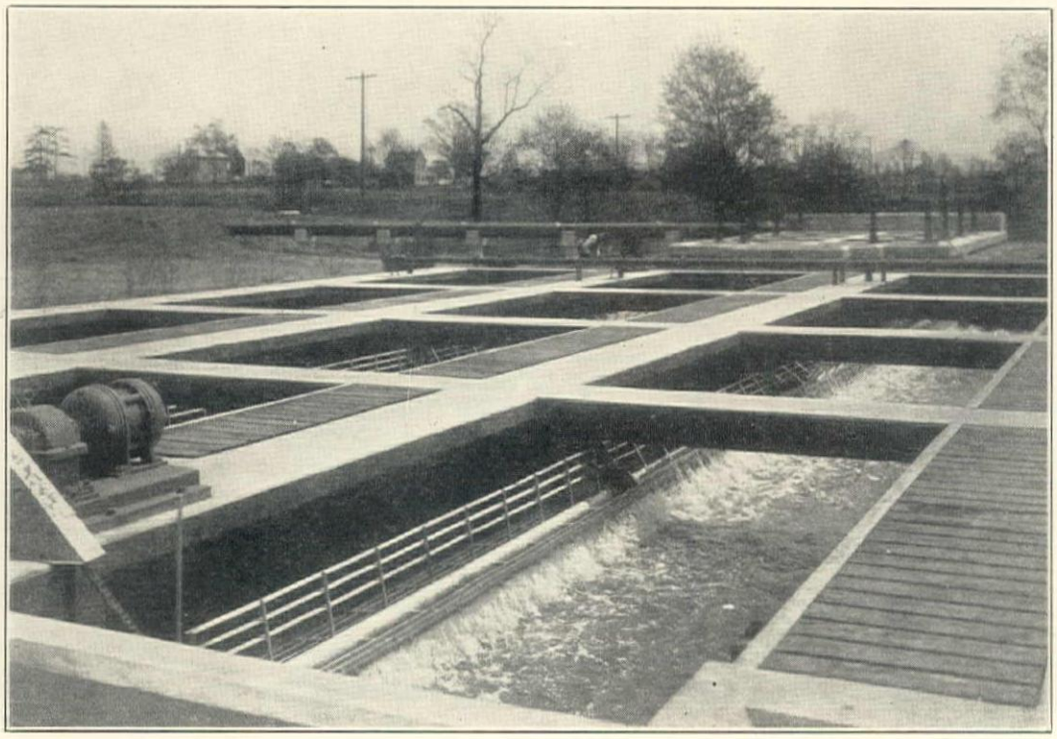
HERCULES POWDER COMPANY

INCORPORATED

Wilmington Delaware

ALLENTOWN, PA.
BIRMINGHAM
BUFFALO
CHICAGO
DENVER
DULUTH
HAZLETON, PA.
HUNTINGTON, W. VA.
JOPLIN, MO.
LOS ANGELES
NEW YORK CITY
NORRISTOWN, PA.
PITTSBURG, KAN.
PITTSBURGH, PA.
POTTSVILLE, PA.
ST. LOUIS
SALT LAKE CITY
SAN FRANCISCO
WILKES-BARRE
WILMINGTON, DEL.

INERTOL



Sewage Treatment Plant at Barrington, N. J.—Engineers: Remington, Vosbury & Goff, Camden, N. J.

THIS plant has been designed to produce a very high degree of treatment and is up to date in every respect. The aeration of the sewage by means of surface agitators is one of the interesting features. The photo shows one of these agitators in operation. INERTOL was specified and widely used for waterproofing and protecting the concrete.

FOR CONCRETE

Fight disintegration of concrete and corrosion of steel with INERTOL

FOR STEEL

INERTOL COMPANY, INC.

HEAD OFFICE
253 Broadway, New York

WESTERN BRANCH
447 Sutter St., San Francisco

When writing to INERTOL COMPANY, INC., *please mention Western Construction News*

Times Wide World Photos

Shamrock V

. . . greatest of an illustrious line of racing sailcraft

WHEN the SHAMROCK V slid gracefully down the ways, in Southampton, England, one of the greatest racing sailcraft of all time was born to the world . . . a contender worthy of the name.

In these costly craft, materials of construction are all-important, along with balanced design. Seventeen hundred pounds of blue annealed Armco INGOT IRON was used in the centreboard casing to oppose the menace of salt corrosion in this vital part of SHAMROCK's hull.

The famous trophy which the Shamrock V will attempt to win in the international race for racing sailcraft.

THE AMERICAN ROLLING MILL COMPANY

Executive Offices, Middletown, Ohio

Export: The ARMCO International Corporation

DISTRICT OFFICES: Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Seattle

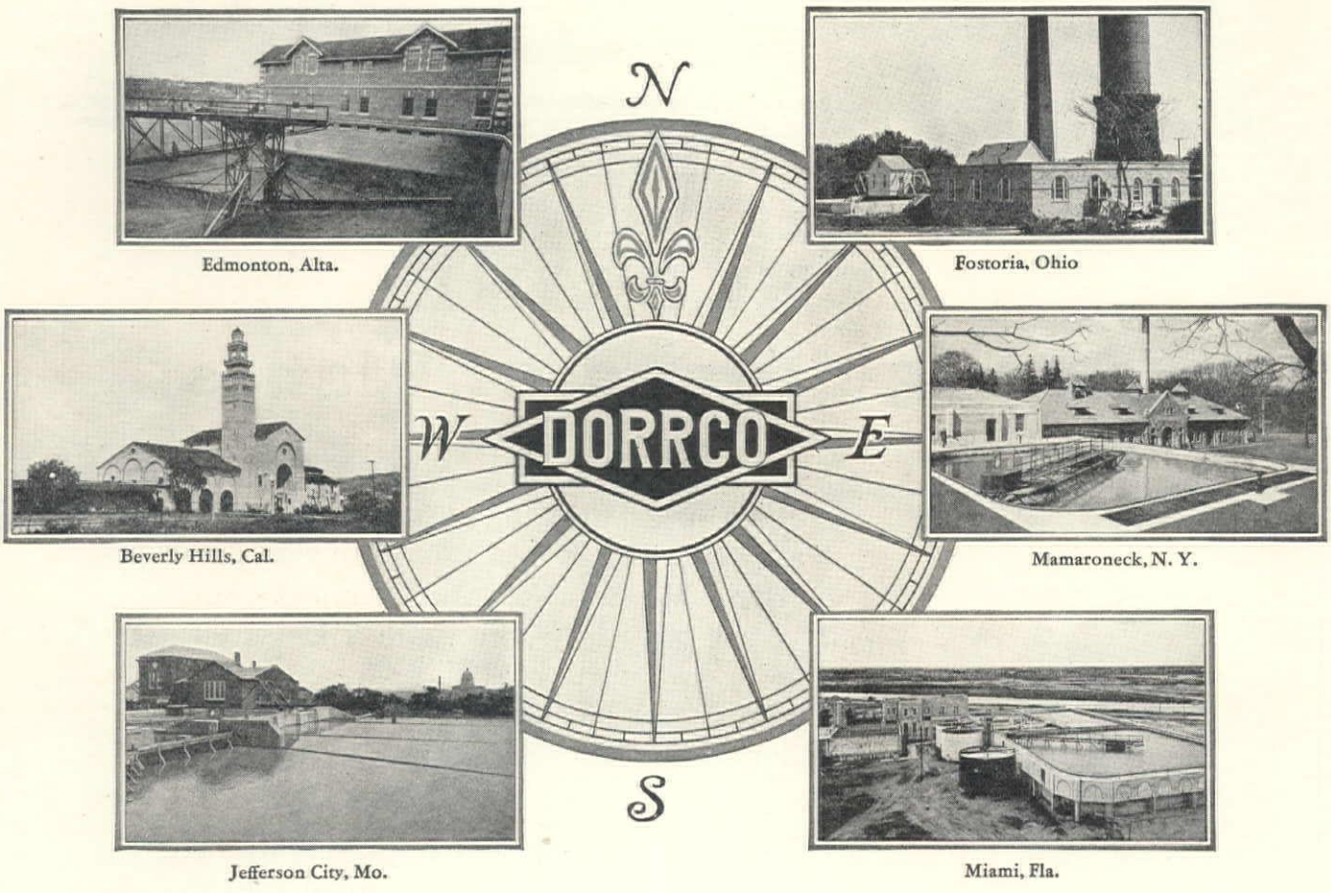
ARMCO

"BE SURE IT'S MADE OF ARMCO INGOT IRON"

When writing to THE AMERICAN ROLLING MILL CO., *please mention Western Construction News*

In WATER TREATMENT PLANTS

all over the country . . .



Edmonton, Alta.

Fostoria, Ohio

Beverly Hills, Cal.

Mamaroneck, N. Y.

Jefferson City, Mo.

Miami, Fla.

Over 50 Dorr Clarifiers are now being operated in water treatment plants in various parts of the world. These installations stretch from that modern Bagdad—Beverly Hills—to the ancient city on the banks of the Tigris. The waters treated vary from the North Saskatchewan River at Edmonton, Alta., to the mighty Nile at Cairo, Egypt.

Dorr Clarifiers for continuous sludge removal in softening, turbid water or iron removal plants

Dorr Mixers for mixing chemicals with water

Dorrco Sludge Pumps

DENVER, COLO.
1009 17th Street

CHICAGO, ILL.
333 North Michigan Avenue

LOS ANGELES, CAL.
108 West 6th Street

WILKES-BARRE, PA.
Miners Bank Building

ATLANTA, GA.
1503 Candler Building

TORONTO, ONT.
330 Bay St.

THE DORR COMPANY

ENGINEERS

247 PARK AVENUE NEW YORK CITY

INVESTIGATION TESTS DESIGN EQUIPMENT

MELBOURNE, AUSTRALIA
Crossle & Duff Pty., Ltd., 360 Collins Street

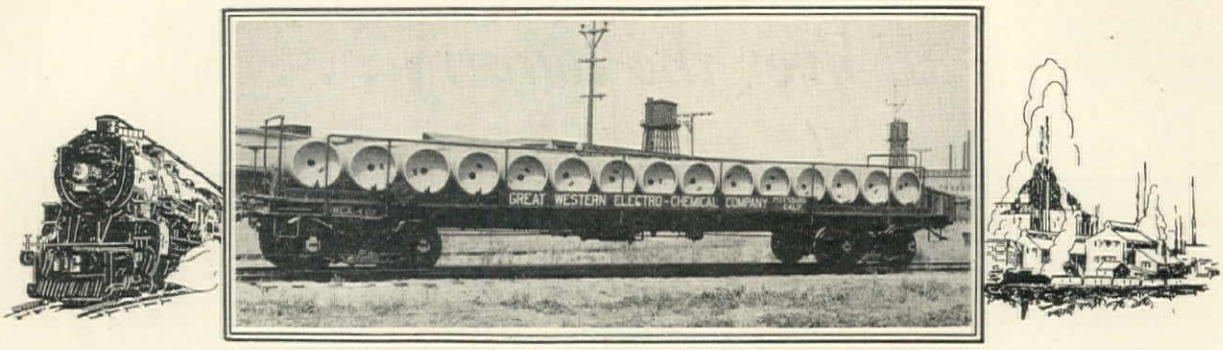
TOKYO, JAPAN
Andrews & George Co., Inc., Central P. O. Box F-23

LONDON
The Dorr Company, Ltd.
Abford House, Wilton Rd., S. W. 1

BERLIN
Dorr Gesellschaft m. b. H.
Kielganstr, 1 W. 62

PARIS
Societe Dorr et Cie
26 Rue de la Pepiniere

JOHANNESBURG, S. A.
E. L. Bateman
Locarno House



CHLORINE
for Sewage Disposal Plants

FOURTEEN years ago the first chlorinating installation for a California sewage disposal plant began operation. In the same year, Great Western Electro-Chemical Company was established. Since that time seventeen more sewage disposal plants have adopted chlorination for sterilizing, six use chlorine for odor control, and five use it for both purposes.

For efficient plant operation it is essential to have sufficient chlorine available, in quantities easily handled. To this end, Great Western provides chlorine in one-ton tanks, loaded on fifteen-unit cars. A ton tank is the most efficient unit for practically every sewage disposal plant—and the per-ton price is naturally more economical.

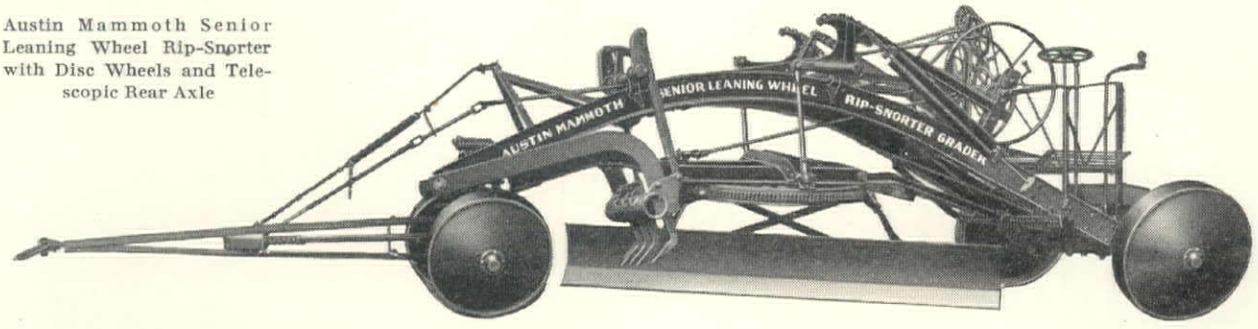
Great Western was the pioneer electrolytic chlorine plant of the Pacific Coast, and during the fourteen years of its activity has gained valuable experience in the problems of sewage sterilization. We shall be glad to help you with your chlorine problems.

Great Western Electro-Chemical COMPANY

Plant at Pittsburg, Calif.

9 Main Street San Francisco

Austin Mammoth Senior Leaning Wheel Rip-Snorter with Disc Wheels and Telescopic Rear Axle



More work per horse power!

This dual purpose Austin Rip-Snorter is typical of the exceptional values in the entire Austin-Western line .....

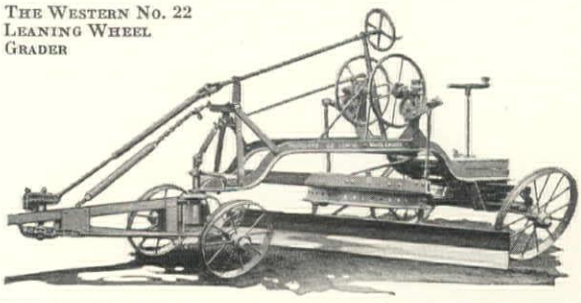
GRADER and scarifier in one—a sturdy and well-balanced outfit that bites into the hardest soil and keeps it rolling before the blade. A machine that tears up worn-out roads or rough sub-grades and regrades in one operation, thus eliminating several slow and expensive operations.

The Austin Mammoth Senior Leaning Wheel Grader, equipped with the Rip-Snorter scarifier as shown above, was the first combination grader-scarifier ever designed and is still the leader in its field. These machines are made in five sizes, ranging in weight from 5,300 to 11,200 pounds. Leaning or straight wheels may be had with all sizes, spoke or disc in the 12′ and 10′ models; spoke wheels only, in the three smaller sizes.

The famous and exclusive Austin Telescopic Axle may be had in all Austin leaning wheel graders. This valuable feature enables work to be done under difficult conditions with much greater efficiency than would be possible with graders having one-piece axles. This is just one of the many improvements to be found in Austin-Western Road Machinery — features which result in better, faster work and at less cost per mile, whatever the operation.

Write for complete information about the equipment you are most interested in. Special bulletins are available which provide much data of interest and value. Address The Austin-Western Road Machinery Co., 435 Brannan Street, San Francisco, California. Chicago Office: 400 North Michigan Avenue.

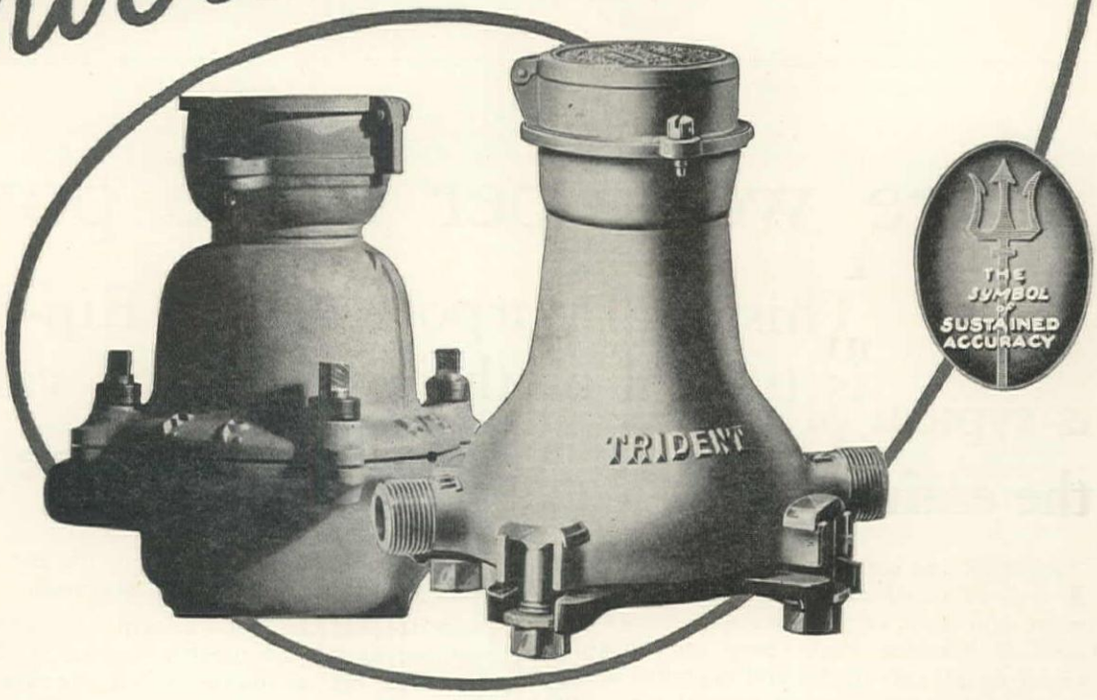
THE WESTERN NO. 22 LEANING WHEEL GRADER



A strong, easily handled patrol grader that is also ideal for finishing shoulders, smoothing rough sub-grades, light grading and ditching. Has leaning wheels, shiftable rear axle and Timken bearings. Six horses or a light tractor can handle it. Can be supplied with a steerable offset engine hitch if desired. Write for details.

Austin-Western
ROAD MACHINERY

Interchangeability



TRIDENT and Lambert Interchangeable Unit Parts are of absolutely uniform accuracy. They are the result of machines and manufacturing methods of minute precision, permanently maintained. That means that they will fit exactly into a Trident or a Lambert main meter casing of a generation ago, of today or of a score of years hence—and that means these meters, in spite of time and improvements, never become obsolete.

Pioneers in Meter Progress
Yesterday, TODAY, Tomorrow

CASH REGISTERS OF THE WATER WORKS FIELD

THE SYMBOL OF SUSTAINED ACCURACY

NEPTUNE METER COMPANY
THOMSON METER CORPORATION

50 EAST 42ND STREET **NEW YORK CITY**

Neptune Meter Co. Ltd., Toronto, Ontario

Pacific Coast Branches:

SAN FRANCISCO: 320 Market Street

LOS ANGELES: 701 East Third Street PORTLAND: 525 Johnson Street

Pioneers in Meter Progress Yesterday TODAY Tomorrow

TRIDENT & LAMBERT METERS

When writing to NEPTUNE METER COMPANY, LTD., *please mention Western Construction News*

PHILIP SCHUYLER
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M. Am. W. W. Assn.
MANAGING EDITOR

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WESTERN CONSTRUCTION NEWS

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ASSOCIATE EDITOR

VOLUME V | SEPTEMBER 25, 1930 | NUMBER 18

A few years ago when a sanitary engineer or the department of public health of any state suggested to the city council of a municipality that the trade wastes from local industries should be kept out of the city sewerage system and treated independently by the industries, the reply was, 'We cannot make them do that—they would move to some other city'.

Trade Wastes and Domestic Sewage

As many trade wastes, especially summer peak loads from canneries, provide a troublesome and expensive load on the municipal sewage treatment plant, they should be treated separately. In many cases, the recovery of by-products will more than offset the cost.

It has taken time to overcome this reluctance on the part of municipal authorities and to educate the industries toward the necessity, from their own economic standpoint, for separate trade waste treatment.

Considerable progress and a number of amicable arrangements, nevertheless, have been made, resulting in lower combined costs of treatment and much better purification. A recent example of a satisfactory working arrangement between the municipality and local industries is the city of Salinas, a description of which appears elsewhere in this issue. Both the city and county of Los Angeles are likewise successfully negotiating with some industries toward separate treatment.

Seldom are city planners and engineers given the privilege of laying out, zoning, and constructing on a barren tide-land all the improvements required for a modern residential community such as Lido island in Newport bay, within the city limits of Newport Beach, California. The development of Lido island, described by R. L. Patterson in this issue, requires channel dredging, a bridge connection to the mainland, sanitary sewers, a sewage pumping plant, a water distribution system, an underground conduit system with electrical and telephone services, ornamental street lights, paving, combination curb and gutter, colored sidewalks, etc.

From Tide-Land to Modern City

The island is provided with safety streets, a new feature in city planning; is restricted to buildings of Mediterranean architecture; and is saved from the common distraction of unsightly overhead pole lines for utility services. This development should be of special interest to delegates to the joint convention of the League of California Municipalities and California Sewage Works Association at Long Beach, which is but twenty miles north of Newport Beach. It is an example of what the city planner can do with extensions or additions to a community when given the opportunity.

Imagine a few years ago someone suggesting that an architect be employed to collaborate with the engineer in the design of a sewage treatment plant! The city council would not only have laughed at the idea but probably would have discharged the engineer, suspicioning lunacy or graft. That was when we were attempting to sidetrack one of the most important functions of municipal government by the ostrich method of hiding. But, no longer do we relegate sewers and sewage treatment to 'out of sight out of mind'. Now we are giving the subject serious consideration from the esthetic as well as the sanitary standpoint.

Attractive Sewage Treatment Works

Most of our recent sewage treatment plants have been designed with considerable attention to the architectural and landscape features. For example: the Salinas plant (described elsewhere in this issue), the Reno plant (to be described in the October 10th issue), and the Santa Cruz and Chico plants (described in previous issues).

Municipal officials as well as engineers should bear in mind that an attractive plant is an incentive to efficient and economic maintenance. Hereafter the slogan of many cities may well be 'Have you visited our attractive sewage disposal plant?' Incidentally, the California Sewage Works Association at its annual meeting in Long Beach will again award prizes for the best maintained and operated plant in the state.

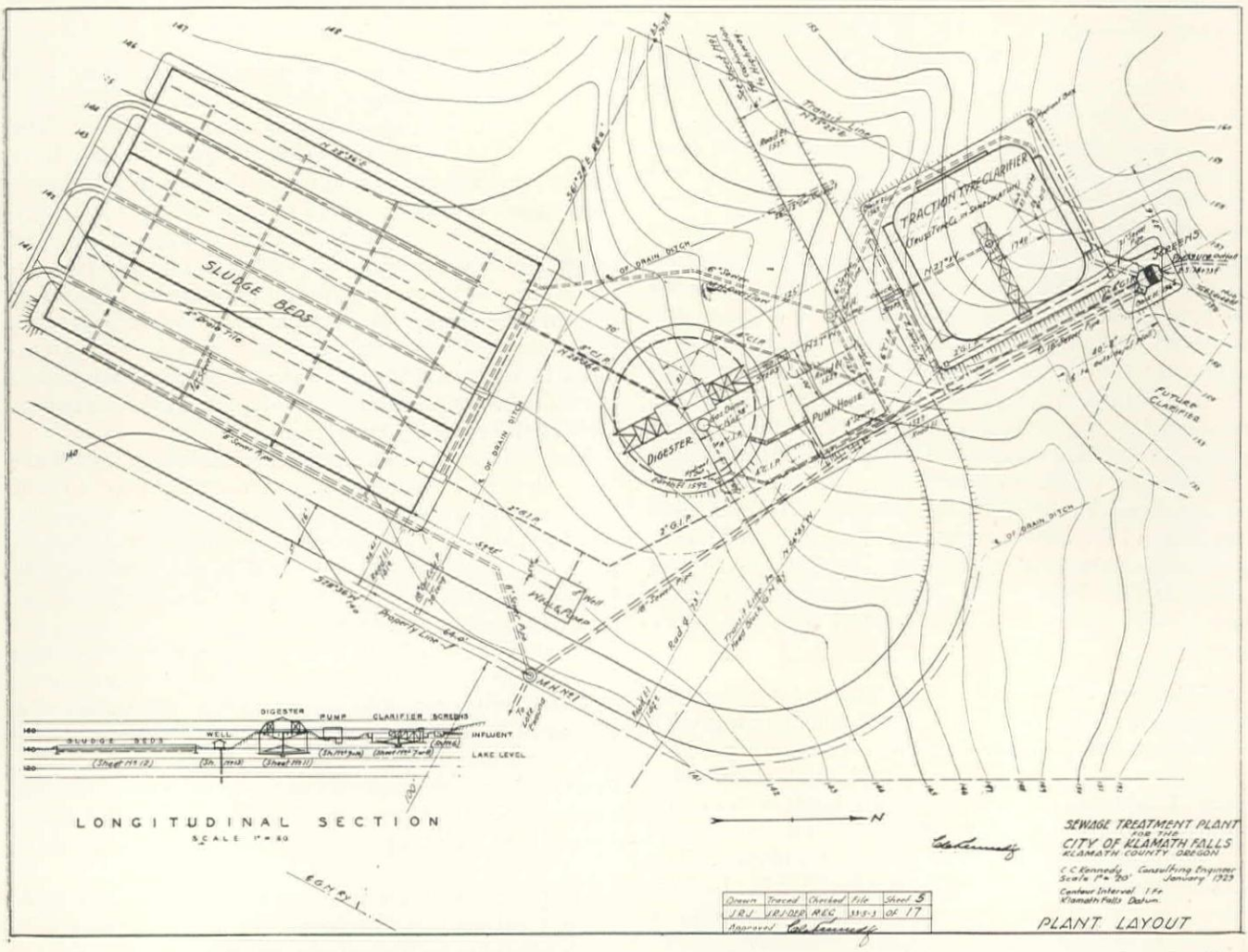
On page 456 those interested in sewage and trade waste treatment and disposal will find a statement by E. A. Reinke on the status of the recently created state-aid bureau, the purpose of which is to assist municipalities and private industries in solving their sewage and trade waste treatment and disposal problems and securing more economic efficiency from operating plants. It is going to take time to 'sell' this opportunity; when once under 'full swing' this bureau should prove of great benefit to all concerned.

California's State-Aid Sewage Research Laboratory

Treatment Plant and Intercepting Sewers for Klamath Falls, Oregon

By CLYDE C. KENNEDY*
Consulting Municipal Engineer, San Francisco

In November, 1929, a modern sewage treatment plant was completed and put in operation at Klamath Falls, Oregon. The completion of this plant, consisting of a primary sedimentation tank with provision for continuous sludge removal and skimming, separate sludge digestion with gas collection and heating of the digesting sludge, and chlorination of the effluent, marked the end of a 5-year campaign to improve the sanitary conditions in Klamath Falls and, at the same time, relieve the burden of pollution in the Klamath river.



Physical Situation—Klamath Falls, with a present population in excess of 16,000, is the most rapidly developing city in the state of Oregon. Situated in the heart of the great pine area of the state on the main Cascade line of the Southern Pacific railway at its junction with the Alturas cutoff to the east and the present southerly terminus of the Great Northern railway in Oregon, it is an important lumbering and milling center. Adjacent to it, also, is the Klamath Irrigation District, one of the major projects of the U. S. Bureau of Reclamation, which produces heavily of alfalfa, grain, potatoes, and dairy products. Because of its location and the influence of these developments, the city has become the commercial center of southeastern Oregon.

The city is situated on the shores of Klamath lake and Lake Ewauna, which are connected by the Link river, less than a mile long. The level of Klamath lake is 60 ft. above that of Lake Ewauna. This difference in elevation, due partly to the natural fall in the river, and partly to dam regulation at the lower end of Klamath lake, provides the head for the reclamation canal as well as for the generation of power at two plants of the California Oregon Power Co., one on each side of the river. About 80% of the territory within the corporate limits is on the eastern side of

*Member, American Society of Civil Engineers.

the river and 20% on the western. Two-thirds of the eastern section is on the flat marginal plain sloping gently away from the lake level. In this are the commercial and industrial districts. The remainder is hilly, some portions quite precipitous, of volcanic origin with considerable areas of lava outcropping.

Improvements Planned—The hilly section of the city definitely divides the watershed area into two sections, one of which drains northerly into the upper lake, the other southerly and westerly into the lower lake.

In March, 1926, my office was engaged to make a study as to the adequacy and extent of the existing sewer collection system, and make recommendations for necessary extensions to the collection system and for treatment of the sewage.

In the spring of 1928, a bond issue for $300,000 was passed, and my office was retained to design and supervise the construction of the sewer system and sewage treatment plant.

The northerly portion of the watershed area was without sewers, as no outlet was available except the shallow margin of the upper lake. The lower portion of the city was only partly served through four systems discharging into Link river and Lake Ewauna; two flowing through primitive and inadequate septic tanks, with no result other than to thoroughly remove the oxygen and septicize the sewage. The sewage from the most heavily populated area discharged im-

J. F. Shea & Co. Laying 15-in. Vitrified Pipe Intercepting Sewer at Klamath Falls. Gladding, McBean & Co. Pipe. Austin Trencher in Background

mediately off shore in the log boom area of three of the largest mills, thereby creating a grave health menace.

The plan, as proposed in the report and subsequently carried out, provides for concentrating all the sewage in the eastern section of the city at a single point on the easterly bank of Lake Ewauna at the point of entrance of Link river. Since this point is opposite the business section of the city, deep sewers in this area provide sufficient fall to the lines leading along the lake to serve the property at the extreme end of the city. A line carried up the river along the precipitous slope of the high land dividing the upper lake from the lower, provides outfall facilities for the northern watershed.

The sewage is carried by gravity across the river 4 to 6 ft. below the bed of the stream through a 24-in. ball joint cast-iron pipe-line to a pumping plant on the western bank. To this plant leads also the main sewer serving the western section of the city. From the pumping plant, the sewage is pumped through a 21-in.

Sewage Pumping House at Klamath Falls Plant. Standpipe at Left Is Specially Designed for Surge

centrifugally cast reinforced concrete pressure line against a combined static and friction head of 35 to 45 ft., to the treatment plant, whence the effluent is discharged through a multiple-outlet effluent line into Lake Ewauna in 6 to 8 ft. of water, 110 to 150 ft. from shore.

The improvement program was divided into four units, as follows:

Unit No. 1—Main collecting system.
Unit No. 2—River crossing and pumping plant.
Unit No. 3—Pressure pipe-line.
Unit No. 4—Sewage disposal plant.

Intercepting Sewers—The contract for the main collecting system (Unit 1) and the river crossing and pumping plant (Unit 2) was awarded in the fall of 1928 to J. F. Shea & Co., of Portland.

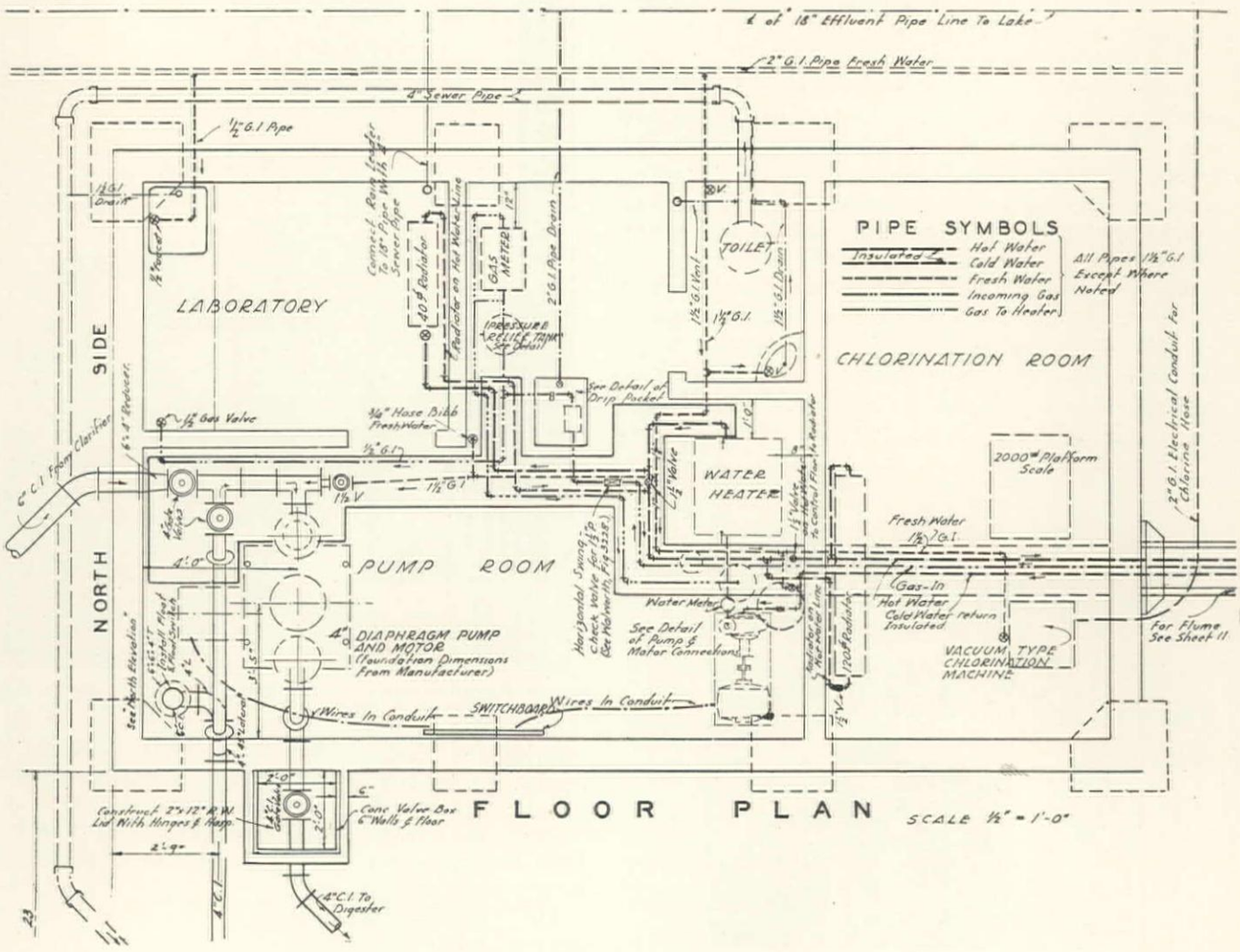
The top soil in all the area contiguous to the lake was of peat overlying clay. This peat soil ranged in depth from 8 to 2 ft., or less, averaging 4 to 5 ft. Because of the proximity of the lake, heavy water flows were anticipated by some of the bidders. The soil was so fine in texture that the amount was greatly below that predicted. The work was begun in October, with the expectation that considerable delay

would be experienced, due to severe cold. The soil froze without extreme cold. The contractor took advantage of this condition to excavate all of the sewer lines across the worst marsh land, excavating by machine without bracing, with practically no water and no difficulty from caving of the trench. By working through the winter without delay, all of the lines were completed in the early summer of 1929, except the river crossing.

Unit No. 1 consists of 11,000 lin.ft. of 12 to 27-in. vitrified pipe sewer laid with Petrolastic asphalt joints at average depth of 17 ft. The major portion follows the shore of Lake Ewauna, with the invert 12 ft. below the lake surface. On three-fourths of the work, 6-in. drain tile and cribbing were necessary. The contract price for this unit was $78,734. Gladding, McBean & Co. furnished the pipe; trenching was done with an Austin trencher and a Thew shovel.

River Crossing—Rock was encountered in a considerable portion of the river crossing, necessitating under-water blasting. The trench was excavated by clamshell dredge. In laying the pipe-line a barge was employed on which the pipe was put together for lowering into the trench. A line of guide piles along the downstream side of the pipe-line was provided to insure a straight line. The pipe was lowered by derrick to grade and gravel was run under and around the pipe and thoroughly tamped while the pipe was still held by cable, after which the pipe was released. After the line was in place, the guide piles were cut off level with the top of the pipe. The trench was then refilled with excavated material to conform to the channel bottom. Check levels run over the top of the pipe after all was placed showed a variation of less than an inch from a true gradient. With the rate of grade allowed in the crossing, free flow was assured throughout the line.

Pumping Plant—The sewage, entering the pumping plant, passes through inclined bar screens with 3-in. spacing between bars. This was a precaution against lumber and other large objects entering the suction



pipes of the pumps. Just ahead of the plant is provided an emergency overflow chamber with pipe leading to the lake at an elevation 30 in. above normal lake level, and equipped with a flood gate against back-flow in extreme high water. This provides an emergency outlet in case of complete break-down of the pumping plant for a considerable period of time. The entrance to the pump sump is equipped with a gate valve for emergency closing in case of stoppage in the pump suction line, with the expectation of creating storage in the sewer line for the short period required.

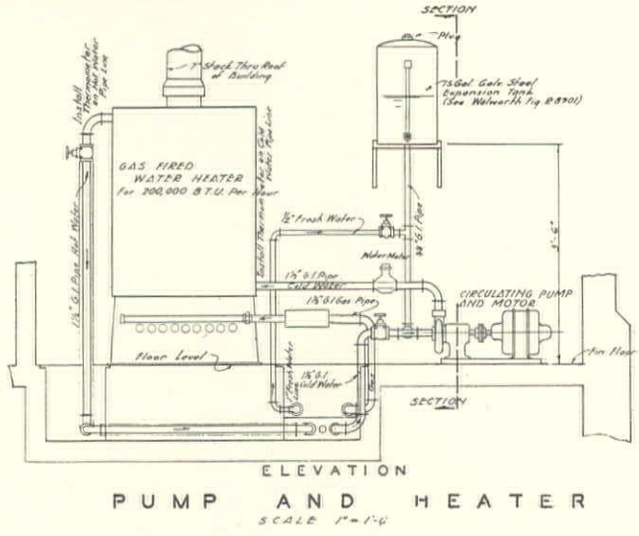
The pumping equipment consists of two 6-in. Fairbanks-Morse Wood trash vertical type pumps with 30-hp. motors on the pump house floor 22 ft. above the level of the pumps. The pumps have a capacity of

1700 g.p.m. each when running singly, and a combined capacity of 3150 g.p.m. against a total head of 42 ft.

On the pump floor is the venturi meter register for indicating, recording, and totaling the flow in gallons. The meter tube is set vertically in the riser from the pumps to the pressure line. An adjunct to the pumping plant is the surge tower which is unique in its method of returning the surge to the sump, through an almost instantaneously acting siphon.

Unit No. 2 consists of a pumping plant and pipe-line crossing of Link river, contract price $32,759. The pump house is set in solid rock. A Thew shovel with clamshell bucket was used for trench excavation in soft ground and water.

Upper Trunk Line—The upper section of the trunk line was awarded to Dunn & Baker, of Klamath Falls, in the spring of 1929. The unique factor of this line, which provides a connection for the sewerage from

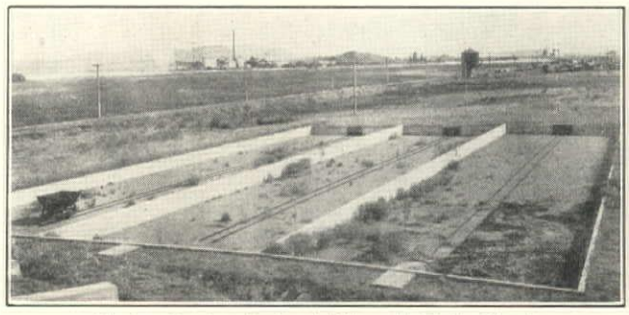


the upper-lake watershed, is the location of the pipe through the forebay of the power company on the headgate structure just above the gate opening and along the river side of the forebay side-wall for a distance of 740 ft. This location was necessary to avoid cutting through the dam at the lower end of the forebay. The pipe for this distance is cast-iron with three expansion joints, and is protected against freezing by moisture-proof insulation which also reduces both expansion and contraction in the line.

Pressure Line and Sewage Treatment Plant—The contract for the concrete pressure line and the sewage treatment plant (Units No. 3 and 4) was awarded to Hartenbower Bros., of La Grande, Oregon, in the spring of 1929, who, in turn, sublet the manufacture and installation of the pipe-line to the American Concrete Pipe Co. No special features are involved in the construction of this line. It might be noted that the line has been designed with a continuous grade to the summit just above the screen chamber, so that, if desired, the line can be drained without showing any pocket.

The screen chamber has fixed bar screens having 1-in. clear openings with a similar platform above to allow the screenings to drain after being removed. The chamber has provision made for dividing the flow, so that half of it may go to a second sedimentation unit when required.

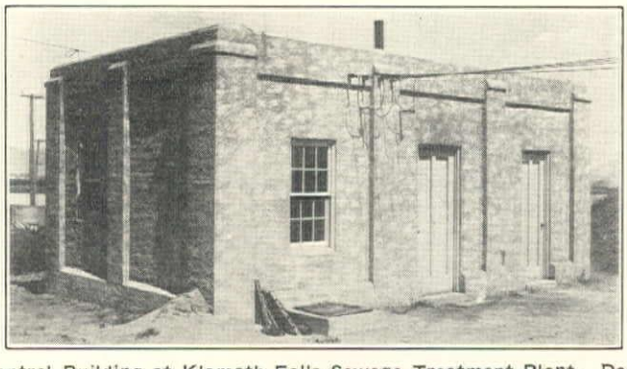
The clarifier, 55 ft. square and 10 ft. center depth, is equipped with Dorr mechanism and skimming equipment. The sludge pump and digester mechanism are, likewise, manufactured by The Dorr Co. The sludge digestion tank is 50 ft. diam. and 24 ft. center depth. The digester is fitted with 480 lin.ft. of 1½-in. diam. heating coils, to provide for increasing the tempera-



Sludge Drying Beds at Klamath Falls Plant

ture of the entering sludge a maximum of 45°. A gas dome is provided to collect the gas, whence it is carried to the control house for fuel.

The control house, situated between the clarifier and digester, provides housing for the sludge pump and boiler for heating the water used in heating the sludge. The room containing the chlorination equipment is a part of this building. In it, also, is the operator's laboratory. The water supply for the plant is provided from a well on the property which is equipped with a Fairbanks-Morse pressure pump and pressure



Control Building at Klamath Falls Sewage Treatment Plant. Door at Left Opens to Sludge Pumps, Hot Water Heating System, and Laboratory. Door at Right Opens to Chlorination Room

tank designed to maintain a pressure of 45 lb. in the line.

The sludge beds, three in number, each 150 ft. long and 33 ft. wide, are conventional in design, with 12-in. depth of rock and sand, and open-joint under-drains at 11-ft. intervals. The beds are equipped with a 24-in. gauge industrial track and car for handling the dry sludge.

The effluent line from the plant site to the outlet end crosses marsh land. Because of poor foundation conditions, this line is corrugated iron, galvanized, and dipped in asphalt. It is at all times flowing full under pressure. In the under-water portion, the line is carried on brackets fastened to the pile before driving and buried in the mud. Three openings, at 20-ft. intervals,

discharge the effluent vertically through the full depth of water to insure diffusion.

Operation Data—Sufficient time has elapsed since the completion of the plant to obtain data on the results which are being secured. The sewage is a fairly strong domestic sewage with little industrial waste, running from 400 to 600 p.p.m. of settleable solids. The average flow is 1,750,000 g.p.d., with peak-flow rates, following rains or melting snowfall, of more than 3,000,000 g.p.d.

With the plant load conditions now existing, removal in excess of 70% is being accomplished.

During the winter and early spring months, stove distillate was burned under the boiler to maintain the temperature in the digestion tank between 70° and 80°. During the early period of operation the lower temperatures were secured, and the higher ones later, after changes had been made in the boiler fire box to secure better combustion. Along with this heating, regular dosage with lime was practiced to help establish early alkaline digestion and prevent explosive action and foaming. This practice has proven successful, as digestion was gradually established without serious trouble. For the past two months the plant has been operating on its own gas production. At the present time 6600 cu.ft. of gas is produced daily. The temperature of the digestion tank is being maintained at 94°, while the pH in the tank is 7.6.

No sludge has been drawn except for observation purposes. It is the intent to hold the sludge as high as possible until late fall of this year, when it will be drawn down to provide for at least three months' use without doing so in the severe winter weather.

The construction of the sewers and treatment plant and its subsequent operation has been under the direction of C. C. Kelley, city engineer, and E. A. Thomas, assistant city engineer. The excellent construction secured and the highly commendable results in operation have been due to their care and interest.

Editor's Note—The unit bid summary for the first two divisions of the project (units No. 1 and 2) was published in the November 25th, 1928, issue, p. 30, with construction progress articles in the May 25th, 1929, issue, p. 289, and February 25th, 1930, issue, p. 118. For units No. 3 and 4, the bids were published in the May 25th, 1929, issue, p. 38.

LETTERS TO THE EDITOR

THE EDITOR: Lewiston, Idaho.

Dear Sir—I noticed in your May 25th, 1930, issue, p. 260, a table of street roadway crowns used by the Department of Improvements & Parks, city and county of Denver, Colorado, and submitted by C. H. Draney, superintendent in charge of plant and paving operations for that department.

I am not in accord with Draney in the crowns shown by the Denver table. As this is a very important phase of paving construction, I have prepared a table of comparisons between the practice of the Denver Department of Improvements & Parks and the city of Lewiston, Idaho. This table, I believe, should be published for comment by engineers.

Of course I want it understood that I am criticizing without knowing the conditions at Denver. However, in the past several years there has been a vast increase in motor transportation and crowns have been greatly reduced to ease riding conditions and to make transportation safer on frosty streets.

Comparison of Pavement Crowns. Lewiston, Idaho. with Denver, Colo.

30 ROADWAY

f	"C" Lewiston	"C" Denver
0.0	0.45	0.75
1.0	0.45	0.71
2.0	0.42	0.66
3.0	0.39	0.62
4.0	0.36	0.57
5.0	0.33	0.53
6.0	0.30	0.48

36' ROADWAY

f	"C" Lewiston	"C" Denver
0.0	0.54	0.90
1.0	0.54	0.85
2.0	0.50	0.79
3.0	0.47	0.74
4.0	0.43	0.68
5.0	0.40	0.63
6.0	0.36	0.59

40' ROADWAY

f	"C" Lewiston	"C" Denver
0.0	0.60	1.00
1.0	0.60	0.94
2.0	0.56	0.88
3.0	0.52	0.82
4.0	0.48	0.76
5.0	0.44	0.70
6.0	0.40	0.64

42 ROADWAY

f	"C" Lewiston	"C" Denver
0.0	0.63	1.05
1.0	0.63	0.99
2.0	0.59	0.92
3.0	0.54	0.86
4.0	0.50	0.80
5.0	0.46	0.74
6.0	0.42	0.67

45' ROADWAY

f	"C" Lewiston	"C" Denver
0.0	0.67	1.125
1.0	0.67	1.06
2.0	0.63	0.99
3.0	0.58	0.92
4.0	0.54	0.86
5.0	0.49	0.79
6.0	0.45	0.72

48' ROADWAY

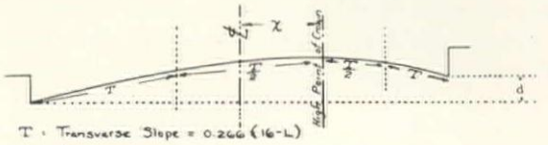
f	"C" Lewiston	"C" Denver
0.0	0.72	1.20
1.0	0.72	1.13
2.0	0.67	1.06
3.0	0.62	0.98
4.0	0.57	0.91
5.0	0.53	0.84
6.0	0.48	0.77

Denver $C = \frac{W(100-6f)}{4000}$

C = Crown in feet. W = Width of Roadway. f = longitudinal grade.

Lewiston $C = \frac{W}{10}(16-L)$

C = Crown in hundredths W = Width of Roadway L = longitudinal grade.



Of course I want it understood that I am criticizing without knowing the conditions at Denver. However, in the past several years there has been a vast increase in motor transportation and crowns have been greatly reduced to ease riding conditions and to make transportation safer on frosty streets.

The Lewiston formula for street crowns is taken from the text book on City Pavements by Frank S. Besson, major, Corps of Engineers, U. S. A., formerly assistant engineer commissioner, District of Columbia, and now district engineer at Nashville, Tennessee.

W. P. HUGHES, City Engineer.

CALIFORNIA FOREST ROADS

California will get $1,897,600 for each of the fiscal years 1931, 1932, and 1933, for construction and maintenance of national forest roads and trails, of which $1,428,000 will be spent annually on major roads. The following national forests will benefit from this Federal appropriation: Eldorado, Klamath, Lassen, Mono, Plumas, Santa Barbara, Sequoia, Sierra, and Stanislaus.

Curtiss-Wright Alameda Airport

The oil treatment of the surface of the Curtiss-Wright airport, situated on the Alameda mole one-eighth mile above the S. P. ferry slip at Alameda, California, involved methods and materials which are considered sufficiently different from those generally used to warrant a description.

Development of this airport was begun in the summer of 1928 and will be completed about 1934. The first unit, now under construction, includes surfacing, pile bulkhead, and a yacht harbor, the cost of the surfacing being about $50,000. The airport is now equipped with one hangar 70 by 100 ft., eight private hangars 35 by 45 ft., one hangar 102 by 120 ft., one hangar 120 by 200 ft., and an administration building with hotel service.

The area of the port is approximately 320 acres and was formed by the hydraulic-fill method by pumping material from the bed of the estuary which separates Alameda from the city of Oakland. The elevation of the surface is 6 ft. above mean high tide of San Francisco bay. The material of which the fill is made is different from the usual type of silt and clay so often encountered in dredging channels or reclaiming low lands by the hydraulic-fill method.

Type of Soil—The soil forming the airport fill is a fairly clean sand of medium size grains, together with a small quantity of broken shells, which were fairly soft. An analysis of the soil showed the following characteristics:

Classification	
Clay	1.2%
Silt	6.8%
Sand	83.9%
Rock	8.1%
	100.0%

Salts	
Calcium Sulphate, $CaSO_4$	= 0.021%
Sodium Sulphate, $NaSO_4$	= 0.001%

With a soil of the type shown by this analysis, it has been the general practice to use a light road oil containing not more than 70% asphalt of 80 penetration, and usually a much lighter grade, mainly for the reason that oils having higher asphalt content and consequently higher viscosities cannot be easily mixed with fine sandy soils.

Mechanical Analysis

Passing	Retained on	%	% retained (cumulative)
½-in.	¼-in. screen	0.1	0.1
¼-in.	10-mesh	8.0	8.1
10-mesh	20-mesh	10.7	18.8
20-mesh	30-mesh	10.1	28.9
30-mesh	40-mesh	12.5	41.4
40-mesh	50-mesh	17.5	58.9
50-mesh	80-mesh	21.4	80.3
80-mesh	100-mesh	5.4	85.7
100-mesh	200-mesh	6.4	92.1
200-mesh	——	7.9	100.0

Special Oil Developed for Runways—The engineers of the Curtiss-Wright Airport Corp., however, were not in favor of the light road oils and, with the cooperation of Shell Oil Co. engineers, a special airport oil was developed which would produce the results desired when used with the existing soil and incorporated by the 'mixed-in-place' method.

The features required of the finished runway were:

1. Dustlessness—the sand must be cemented with the asphaltic oil binder so as not to be displaced by the wind from the propellers.

FIG. 1. CURTISS-WRIGHT ALAMEDA AIRPORT SHOWING SURFACE COMPLETED TO JULY 1, 1930

2. Waterproof—the installation of pipe drains, together with the sandy nature of the subsoil, removes most of the hazard of surface failure from moisture under the surface. It is, however, necessary to provide a waterproof surfacing to shed the water from rains to the drop inlets connected to the pipe drains.

3. Resilient—the surface must act as a cushion to reduce impact of planes when landing.

4. Plastic—tail skids should cut into the surface slightly to assist in stopping landing planes, but the cut surface must heal quickly.

The type of oil developed to comply with these requirements contains about 80% of 80 penetration asphalt, so blended as to possess the characteristics found through experiment to be essential for this treatment.

An asphaltic content of 80% in the oil, presented the problem of incorporating it in the soil to produce a uniform mixture without excessive mixing costs. C. W. Wood, of Stockton, California, who has the contract for the construction, developed a machine for

mixing the oil with the sand without the use of tractors and blade graders. The machine (Fig. 2) was built by Wood in his own shops especially for this work and is essentially a pug-mill mounted on a two wheeled trailer attached to a Caterpillar '60' tractor, the blades being driven from a power take-off. The blades are all mounted on a single shaft which turns at 300 r.p.m. The height of the shaft and blades is adjustable by the two hand wheels and screws. This machine, together with a Spearwell maintainer (Fig. (2) and the spring-tooth harrow forms the mixing equipment for the work.

Method of Construction—In general, the method of construction follows closely that commonly used for 'mixed-in-place' highway construction.

The Shell airport oil was shipped hot in insulated tank cars to the railroad siding in front of the airport. The oil arrived sufficiently hot to permit the contractor to pump it directly through a retort which raised the temperature to 300°F., at which it was loaded into a 1000-gal. tank on the pressure distributor. The set-up is illustrated by Fig. 2 (upper left).

The surface of the field was loosened with a disc harrow drawn by a Caterpillar tractor. The spring-tooth harrow was then attached to the distributor to secure the advantage of a mixing operation while the oil was still hot. The oil was spread at the rate of ½ gallon per square yard per application, until a total of 3 gallons per square yard had been spread. At first, the rate of 1½ gallons per square yard per application was attempted, but it was found that the larger number of spreads, with mixing between spreads, produced the best results.

After each spread, the maintainer was dragged over the surface to mash any balls of oil and sand that were formed by the spring-tooth harrow. The mixing machine was then pulled over the surface, with the blades set to stir the material to a depth of 3 inches. This was followed by the maintainer, after which the next spread of oil was given and the same operations repeated. By the time the sixth spread had been mixed into the surface, the mixture was of uniform color and the oil well distributed, resembling a sheet asphalt mixture.

Due to the high viscosity and asphalt content of the oil, the mixture packed down considerably under the action of the maintainer in the smoothing process. However, for uniform compaction a 5-ton tandem roller was used. The resultant surface is one which will dent slightly under the pressure of tail skids but there is no shearing of the surface. The slight marks thus formed iron out again under the action of the pneumatic tires of the planes' wheels.

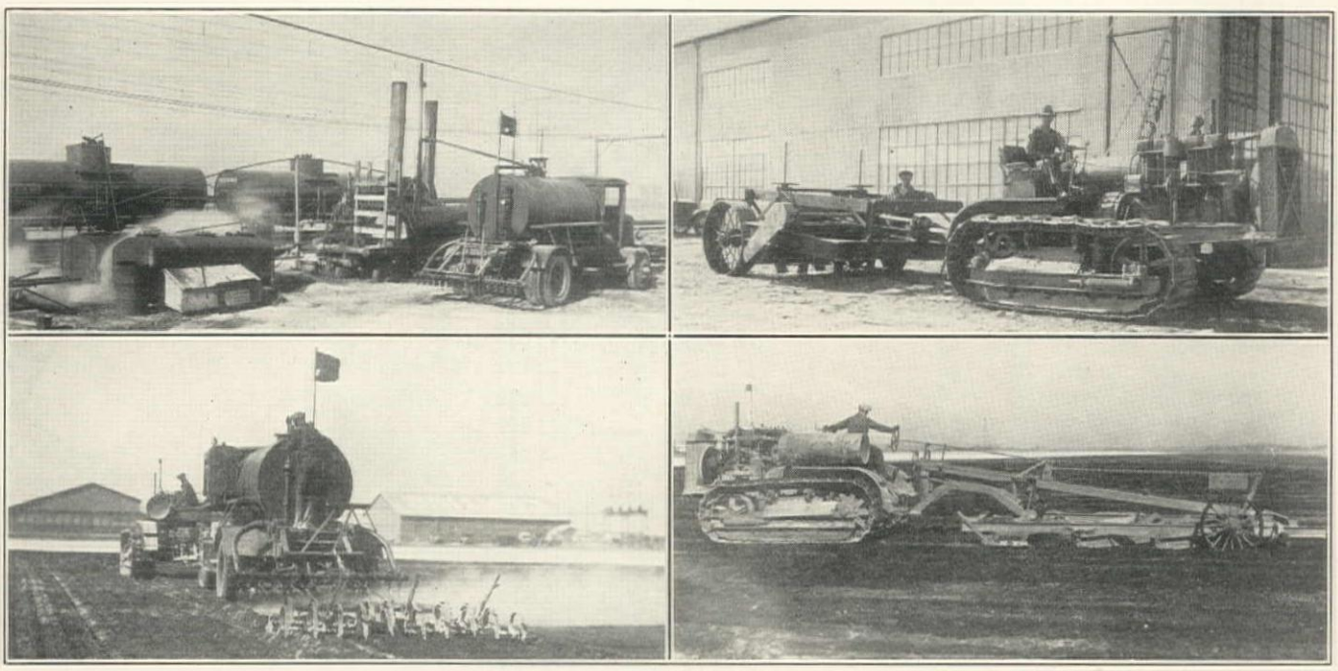


FIG. 2. (UPPER LEFT) OIL HEATING AND DISTRIBUTING EQUIPMENT. (UPPER RIGHT) MIXER MACHINE DEVELOPED BY C. W. WOOD FOR USE WITH CATERPILLAR '60'. (LOWER LEFT) PRESSURE DISTRIBUTOR WITH SPRING-TOOTH HARROWS ATTACHED SPREADING SHELL AIRPORT OIL AT RATE OF ½ GAL. PER SQ.YD. (LOWER RIGHT) SPEARWELL MAINTAINER PULLED BY CATERPILLAR '60' MASHING OIL-SAND LUMPS

Extent of Work—The project provided for the oiling of 1,500,000 sq.ft. of runways this season, requiring approximately 660,000 gal. of Shell airport oil. A 50 by 500-ft. concrete apron had been constructed in front of the administration building and the oiled surfacing adjoins this.

Up to July 1, 700,000 sq.ft. had been completed, using 180,000 gal. of oil. Some of this area is only oiled at the rate of 1½ gal. per square yard for use as parking space for automobiles. The total runway area to be oiled eventually is about 5,000,000 sq.ft. and includes three runways 500 ft. wide and 4600, 3000, and 3500 ft. long, respectively. On September 10 the project was 80% complete.

Supervision—Construction is being done by C. W. Wood, Stockton, California, under the immediate supervision of C. R. Schwanenberg, resident engineer, Alameda airport construction. The work is being done for the Alameda Airport Co., of which C. T. Thompson is president and R. R. Nickerson is treasurer and former field manager of the port. J. B. Tuyls is the division engineer in charge of Curtiss airport construction for the western division.

Garbage Incineration at Portland, Oregon

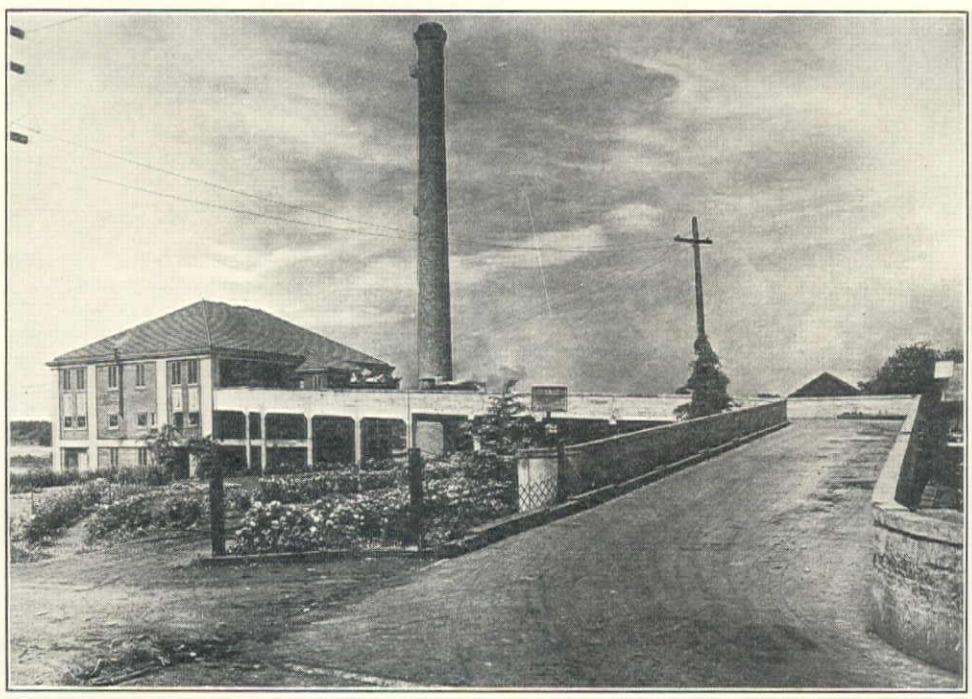
By WILLIAM G. HELBER
Superintendent of Garbage Disposal, Department of Public Affairs, City of Portland

In 1910, the city of Portland decided to abandon the old Engel garbage incinerator, installed in 1897, as it was obsolete and inefficient, and the Public Works Engineering Co., of Portland, was awarded a contract to install Fred P. Smith furnaces. This plant was in operation until May, 1927, when an increase in capacity was necessary; either the plant had to be reconstructed and enlarged, or a new plant built to care for the garbage of Portland's West Side. It was finally decided to abandon the old plant and I was sent on an inspection tour of garbage disposal plants throughout the United States and Canada. Realizing that abandonment of the old incinerator building—a large structure, but unsuitable for housing modern equipment—would meet with considerable opposition, it was decided to purchase equipment that would fit as well as possible, and make the necessary interior alterations. This was a handicap both to the city and the incinerator manufacturers, but was deemed expedient. Bids for incinerator equipment were advertised and the contract awarded to the Nye Odorless Incinerator Co., of Albany, Georgia, for three No. 25 circular units.

Practically the entire interior of the building had to be remodelled; the second floor rebuilt, together with a new beam system to support the second floor and at the same time leave the space necessary for the circular incinerator units.

The plant was completed, thoroughly tested, and put in operation in October, 1927; since which time it has been in constant use.

The type of garbage delivered has not been in accordance with the guarantee of 35% rubbish and 65% garbage, but in most cases the garbage has been about 75%, with the rubbish content 25%. In spite of this departure, during the year 1929, the plant was able to handle garbage at a cost of $0.825 per ton. This cost, nevertheless, included a considerable amount of repairs to the building, resulting from a fire, and these repair costs really should not have been charged against the operation. The cost per ton includes about 90% of labor charges, which has been materially increased by the raise of salaries by the city. It is only fair to state in this case that the salary increase alone has brought the cost of garbage up to $0.825 per ton, or above the Nye guarantee of $0.75 per ton. The guarantee, incidentally, was not only met by the official test but considerably bettered, as the official test showed that 160 tons containing 74½% garbage and 24½% refuse was burned in 12 hours at a cost of $0.6369 per ton.



PORTLAND, OREGON, GARBAGE INCINERATOR CONTAINING THREE NO. 25 CIRCULAR NYE ODORLESS FURNACES

Over a period of three years on a 10-hour per day basis, the plant has consumed on an average of 95 tons per day, which, when the character of the material handled is considered, will show that it is still meeting or bettering the guarantee requirements. Over this same period, the total repair bill to date has not exceeded $300.

The Nye furnaces are circular in section, with center feed from the chute direct from the top floor. They operate on the high-temperature basis, with a unique

feature of the garbage trickling down a center cone within the furnace during the burning process. The fire is raked or tended from doors above the hearth, and ash and refuse are discharged directly into cans beneath the furnace floors. The circular shape of the units, with domed arches, has proven quite satisfactory, in that expansion and contraction appear not to affect the brick work of the shells in any way.

The collection of garbage is not under the supervision of the incinerator management, but is done by contractors in the different sections of the city (similar to conditions obtaining in San Francisco) and combustible material, such as paper, is removed from the garbage before it is delivered to the incinerator. This action, consequently, works a hardship on the burning and is the means of increasing the garbage content up to the point previously mentioned. This, of course, necessitates supplying additional combustible material by the incinerator force to bring the charge up to the standard for combustion. This rubbish represents anything that can be secured, but has to be hauled by the incinerator force and in some cases stored for a day or two for future use. All of this is charged against the operation of the plant and adds in bringing up the cost of incineration. To date, no fuel has been bought for the operation of the plant by the city.

Under favorable conditions, it is possible to consume as high as 135 tons in 12 hours, with garbage and rubbish of the contents mentioned. This consumption was obtained without any injury to the furnace or complaints from the immediate neighborhood relative to odors, etc. These furnaces, if supplied with anything like the proportions in the guarantee of the contract, could be made to handle in excess of the rating and at a cost below the guarantee.

Sanitary Engineering Research in California

State Laboratory and Engineering Staff Available to Cooperate with Municipalities and Private Industries in Economic Operation of Sewage and Trade Waste Disposal Plants

By E. A. REINKE*

Research Engineer, Bureau of Sanitary Engineering, State Department of Public Health, Berkeley, California

Sewage research in California has been proposed from time to time for the past fifteen years, but it was not until the last meeting of the State Legislature that a bill was passed by both houses which would have appropriated funds to carry out the work. The bill had the support and endorsement of the League of California Municipalities (also practically every municipality in the state), the American Society of Civil Engineers, and the California Sewage Works Association, as well as that of many individuals interested in public health activities, manufacturing, and public improvements.

The bill was pocket-vetoed by the Governor on the advice of the State Department of Finance, which from the first consistently opposed the use of state funds for research unless the municipalities or industries benefited could be prevailed upon to contribute a portion of the cost of the work and thus make cooperative studies.

In March, 1930, the State Department of Finance agreed to approve an increased expenditure by the Bureau of Sanitary Engineering of the Department of Public Health to initiate research in cooperation with municipalities. In April, I was appointed research engineer and began a survey of plants in the state where problems were known to exist, and made arrangements with local authorities for carrying out the work. Limited financial support by the state, and also by the municipalities which operate under budgetary allowances, have precluded any extensive studies, but some work has been done with the following cities: Visalia, Modesto, Salinas, Ojai, Escondido, San Bernardino, Los Angeles City, Los Angeles County Sanitation Districts, Fresno, Tracy, and Sacramento. Many other plants have been visited with a view to assisting the sewage works manager or operator, including small treatment works at Santa Barbara County Hospital and California Hot Springs.

It is too early to attempt to give any results of studies or to outline detailed plans for the future. Certain observations have been made, however, which—although not new—will bear repetition.

All who have carefully studied sewage disposal works have been impressed with the general lack of operation of plants which have obviously been carefully designed. It is easy to say "We should have better operation", but the important question is "How shall we get it?" In general, the plant which is started well and carefully operated can get the support of authorities to keep up the work, but if a plant 'gets by' for a time with a minimum of attendance and expense, it becomes very difficult to persuade the town board that they cannot 'get by' a little while longer. Unfortunately, too many plants are given just enough attention to avoid complaints, and many of our best plants receive what support they get because of pressure by plant 'neighbors'.

However 'operation' is not entirely at fault. Many plants are built within bond issues and certain parts are left out, to be added from current revenue, if and when it is available—half the rock in a sprinkling filter; stand-by pumps and motors; sand filter beds; sludge drying beds; a water system; chlorinators; levelling and grading; fencing, etc., are some of the items frequently found missing, and occasionally they remain missing for long periods. Sometimes the engineers will minimize the necessity for proper supervision, and say that one hour twice a week is sufficient, when experience later proves that two to four hours a day are necessary provided nothing goes wrong in the shape of clogged pumps, a shot of oil in the sewage, or some similar occurrence which may take much longer. This makes the operator's task harder and makes the town board members wonder if the operator is lazy or the engineer didn't know what he was talking about; and in either case leaves an unhappy impression on his mind.

This is the present situation. The State of California has provided the nucleus of an organization which may be called upon by municipalities and private industries to assist in solving waste disposal problems. It is up to the municipalities and industries to cooperate toward securing this worthwhile service.

*Associate Member, American Society of Civil Engineers.

A City Without Lights

By F. J. WELLHOUSE
Street Lighting Specialist, Westinghouse Electric & Manufacturing Co., San Francisco

Imagine if you will, a city without lights. Not a street corner lighted up nor a boulevard outlined with illuminated pearls. In the business districts, the store windows serve as candles for the spaces directly in front of them, or perhaps an occasional electric light sign fights the gloom, but in the suburban parts there is not a solitary light gleaming in the darkness of the streets.

Picture the mantle of night settling down over such a city. One can almost see the thriving streets of late

Modern Trend in Lighting Standards, Showing Graceful Lines and Correct Proportions in Petaluma Installation

afternoon getting darker and darker and slowly being deserted by pedestrians and vehicles. Less and less are sounds heard in the gloom, until when darkness does descend, there is not a footfall to break the silence.

Feeble lights begin to shine in homes, yellow beacons in a world of blackness, which serve only to accentuate the gloom around them. Lights flash in tiny points like fireflies, but they, too, only seem to make more dense the darkness of the night.

As darkness falls, thousands and thousands of policemen begin to walk their solitary beats. The city-without-street-lights needs twenty times the number of police officers as are necessary in the well lighted city. All the policemen carry lanterns or flashlights.

A street car comes slowly down the street. Of course, it cannot go too swiftly on a dark street. Its blinding headlight is powerful enough to light the streets for many hundreds of yards in its path. The lights in the car seem to increase the gloom about it. Two passengers alight from the car.

They carry flashlights. As they alight, a policeman steps from the curb and flashes his light on them. One of the passengers is a woman and the policeman politely offers to escort her to her home, as he is obliged to do by city ordinance. She is half afraid to accept the officer for an escort for it is only a week since a gang of criminals which had been preying on women at night under the guise of official escorts had been broken up by the police. Several of the town's leading society women had been kidnapped by members of the robber gang posing as escorts and held for heavy ransom before they were returned to their families. This is the reason the woman passenger experiences a feeling of relief when she finally reaches home. She politely thanks the officer, who goes back to his street corner to wait for the next woman passenger. There are, of course, official escorts at every street car stop. Their expense as well as that of the augmented police force, is a considerable item in the city budget.

The man passenger who alighted at the same time as did the woman does not fare so well as she. By law he can demand the service of an escort but this evening he prefers to go alone. He starts down the street with his searchlight making a waving pencil of

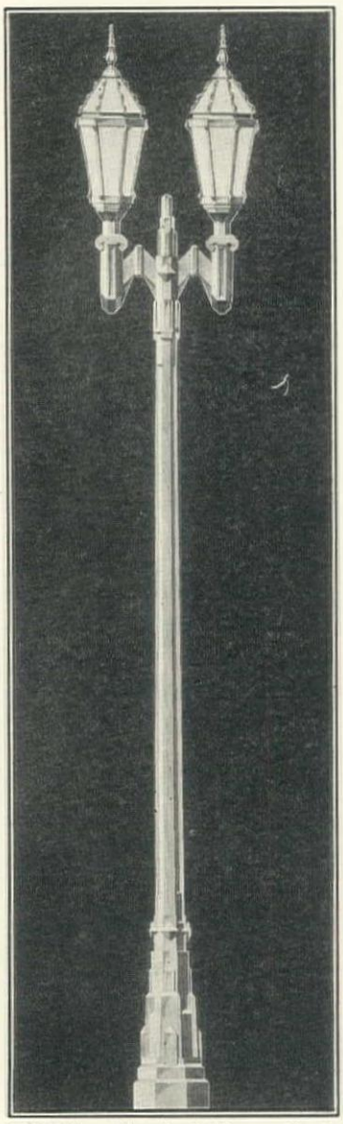
Recent Installation of Hollowspun Granite Lighting Standards in South San Francisco

light in the darkness. The beam goes from side to side in the effort to pick out objects ahead. Impediments in the paving blocks, curbs, uneven brickwork, etc. However, the pencil of light stops suddenly, then snaps off.

The cause is easily explained. The pedestrian has been held up. A thug hiding behind a large tree, with ample time to see before being seen, merely waited until his victim was a trifle past him and then struck

the flashlight out of his hand. The rest was simple. He directed the victim to stand still while his pockets were picked. After which the wayfarer was allowed to go on his way in peace. Holdups, however, are common in this city-without-street-lights and no one pays much attention to them. The police although comprising nearly a quarter of the city's population are unable to capture them in the darkness.

Down the street of this gloomy town comes a large motor truck. In front is a gleaming headlight which waves from one side of the street to the other. It is part of the police department and its purpose is to



Type of Lighting Standard Chosen for Buildings

sweep the streets with light at intervals much as the street cleaning department flushes them with water. It is remarkable the number of holdups this truck has broken up. Of course, it is expensive to keep a fleet of these trucks operating all night, but at least they act as a sort of protective measure against thuggery. Do not think that there are many people on the streets at night! There are not and all who go out are forced to do so by circumstances. They belong to the hardy class, so to speak. The citizens of this town-without-street-lights keep close to their homes at night. There are no movies, for there are not enough people who will brave the dangers of night to support them. There is no night life, and few restaurants are open in the evening, for there is no one to patronize them after six o'clock. There are no theaters for the same reasons as for the lack of motion picture houses. In fact, to all intents and purposes business and social life cease with the setting of the sun.

Of course, a city like the one that has been pictured does not exist. There is no reason for its existence in this enlightened age when we have all the benefits of electricity and other factors of civilization. It does not exist, of course, but it easily could. Any city in the United States would fall into the paralytic state of the one just described, were its street lighting system suddenly torn up and cast away.

Imagine the city you are living in with no street lighting and then picture some of the things happening to it that have been related above. No city can exist today without street lighting—and good street lighting at that.

Good street lighting is perhaps the most necessary adjunct in bettering the moral tone of a city and promoting its prosperity. Where light is, there is confidence and activity. People naturally avoid the dark places and follow the well lighted areas.

Just as the merchant makes his windows more inviting with bright lights, so the cities are learning that beautifully lighted streets draw more people to that locality. Today's business competition is a competition of cities rather than of individual stores. In the old days when transportation was more difficult, each storekeeper was concerned principally with the activities of his competitor. But today the prospective customer with his quick, economical means of getting about has the choice of many communities.

Mayors and other city officials, naturally greatly interested in civic welfare, are becoming more active in this important part of their responsibility.

IRRIGATION AND POWER PROJECT, TEXAS

The Maverick County Water Control and Improvement District No. 1 of Eagle Pass, Texas, is constructing an irrigation and power project along the Rio Grande at a total cost of $8,000,000. Water will be diverted by gravity through a 1650-c.f.s. canal to a power plant 32 miles below the intake; thereafter the canal capacity will be 500 c.f.s. The water cross-section will vary from 360 sq.ft. in concrete-lined sections to 620 sq.ft. in earth sections, the depth of water being 10 ft. with a 2-ft. freeboard. Stream crossings will be made by inverted concrete siphons consisting of two parallel barrels 10½ ft. diam., each barrel having a capacity of 565 c.f.s. About 12,000 gross horsepower will be developed with a static head of 87 ft. The Central Power & Light Co., San Antonio, has contracted to install and operate the power plant. The District canals will irrigate 60,000 acres.

The work will be done in two contracts, the first of which has been let to Ulen & Co., of Lebanon, Indiana. Earthwork has been subcontracted to the Trinityfarm Construction Co., of Dallas, and concrete work to Bart Moore, Inc., of San Antonio. William L. Rockwell, San Antonio, is engineer for the District.

Sewerage Improvements at Salinas, California

By MARION L. CRIST*
Associate Engineer, Burns-McDonnell-Smith Engineering Co., Los Angeles

The city of Salinas, 100 miles south of San Francisco, recently completed one of the most modern sewage treatment plants in the far west. The problems of this community, constantly intensified by the development of the surrounding valley and the growth of the city itself, involved expansion and improvements to storm and sanitary sewerage systems and the treatment of domestic and trade wastes.

Storm Sewers—The floor of the valley in the vicinity of Salinas is extremely flat. The Salinas river follows a meandering course typical of agrading streams, while the valley floor is broken with shallow winding sloughs. For this reason, storm sewers became imperative at Salinas earlier than in the average California community. A storm sewer system was constructed in the major portion of the city some years ago, the storm water being carried to one of the adjacent sloughs.

The southeastern portion of the city was too low to be served by this system, and until recently it had remained without drainage. The cheapest plan for providing storm sewers in this territory was to carry a pipe-line to a lower slough some distance west of the city. However, in order to correlate the solution of industrial wastes, as discussed later, with the disposal of surface water, the storm sewer was constructed to the river.

The new storm sewer is 25,000 ft. long, consisting of 12 to 36-in. centrifugally spun Hume concrete pipe, the major portion being of the larger size.

Disposal of Trade Wastes—The cannery waste problem at Salinas is typical of such problems under California conditions. Two or three years ago, the Salinas Valley Canning Co. established a plant at Salinas with a daily capacity of 120 tons. This plant cans peaches, apricots, pears, spinach, tomatoes, and artichokes; each in its particular season. At that time, a drain was constructed to carry the cannery waste to a nearby slough. Subsequent odors and considerable nuisance resulted in many complaints from adjacent property owners.

Because of the diversity of the wastes in the different canning seasons, pretreatment and satisfactory disposal is a difficult problem. Some of these wastes, when quite fresh, are susceptible to screening, others to sedimentation, and still others to chemical precipitation. Accordingly, the plan adopted was the installation of a 3 by 3-ft. self-cleansing, drum type, 20-mesh Monel metal cloth sewage screen, followed by a 20-ft. circular clarifier with mechanism for sludge removal. Provision has been made for by-passing the screen and for measuring both screenings and settled sludge. Screenings and sludge are to be removed in trucks along with pits, cores, peelings, and other waste that can be hauled away.

The liquid wastes after passing through this plant will be pumped to the storm sewer and discharged on a 20-acre tract of sandy land at the river, this land having been used in the past as a natural sand filter for domestic sewage. The noteworthy feature of the present plan is complete separation of the cannery waste from domestic sewage.

SALINAS SEWAGE TREATMENT PLANT, SHOWING PRIMARY CLARIFIER, BLOWER HOUSE, FINAL CLARIFIERS, AND AERATION BASINS

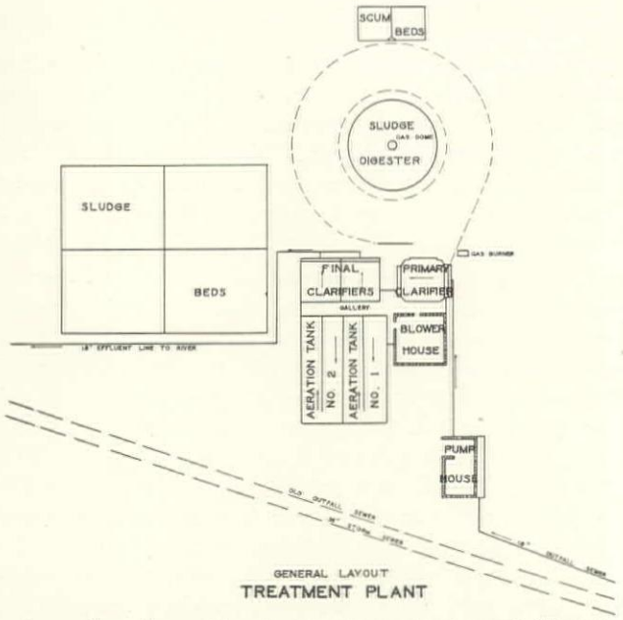
The city constructed the cannery waste pretreatment plant and pumping plant to elevate the liquid cannery wastes into the storm sewer and bears the cost of operating the pumping plant and maintaining the natural sand filter beds of the river. The cannery deeded the city the necessary plant site and will operate the screening and sedimentation plant under municipal supervision.

Sanitary Sewerage—The original system of sani-

*Junior, American Society of Civil Engineers.

tary sewers at Salinas was installed some 30 years ago. Flat topography necessitates pumping plants for further expansion of the collection system and two such plants have been constructed.

The original method of sewage disposal was to discharge the domestic sewage onto the sandy tract of



GENERAL LAYOUT
TREATMENT PLANT

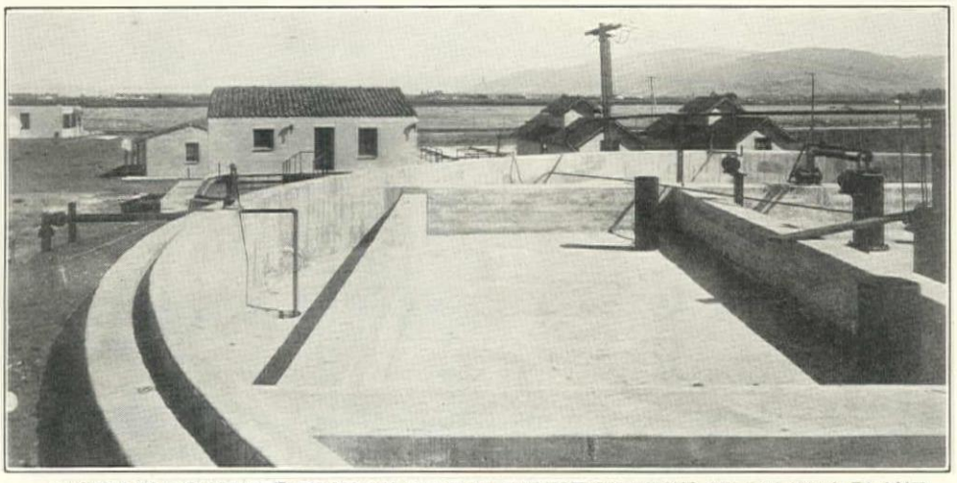
land at the river where an attempt at sand filtration was made on crude natural sand filters. The quantity of sewage had become too great for natural sand absorption of raw sewage on the limited area, resulting in large pools of sewage which were separated from the river by sand dikes. These dikes sometimes broke and allowed the sewage to flow directly into the Salinas river, which, like so many California streams, is subject to periods of very low flow. With insufficient diluting water, the river turned dark from lack of dissolved oxygen and bore evidences of heavy pollution. These conditions made fishing and bathing at the mouth of the river intolerable, and made necessary the construction of a high-grade treatment plant for domestic sewage.

The sewage treatment plant is designed to treat an average daily flow of 875,000 gal. The new 18-in. vitrified clay pipe outfall sewer enters the plant site at low elevation and the sewage is lifted into the preliminary clarifier by three Fairbanks-Morse, Wood trash, horizontal pumps, direct-connected to electric motors. The pump capacities are 300, 400, and 500 g.p.m. and are automatically controlled by floats and contacts to vary the pumping rate in steps of 300, 400, 500, 700, 800, 900, and 1200 g.p.m. to accommodate the sewage flow. The pump pit and suction sumps are of ample dimensions and capacity to provide for future enlargement of this portion of the plant.

The preliminary clarifier into which the sewage is lifted is a 26 by 26-ft. tank, equipped with a Dorr traction type mechanism for constant sludge removal and skimming. This tank provides a theoretical one-hour detention period and is rated at 800 g.p.m. per square foot of area at average design flow.

Sludge from the preliminary clarifier is lifted with a Barnes pump into a 55-ft. circular separate sludge digestion tank having a capacity of 3 cu.ft. per design capita. This digester is covered with a floating concrete roof provided with a gas collection dome at the center. For the present, the collected gas passes through a meter and is then burned as a means of odor control. However, heating coils have been provided in the digester, and later when it becomes necessary or desirable to augment the capacity of the tank, the gas will be used for heating the digesting sludge.

The floor of the digestion tank is divided into four hoppers. Piping is arranged so that sludge can be drawn separately from any hopper. Each hopper is provided with a permanent sludge sampling device, enabling the operator to take samples at any depth desired. Sludge can be drawn to a sludge sump and there limed or mixed with raw sludge and returned to the digester through the central inlet. This plan affords efficient mixing and flexible control of the contents of the digestion tank without expensive mechanical stirring apparatus.

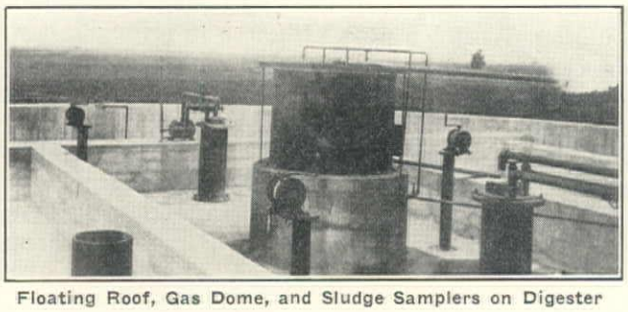


FLOATING CONCRETE ROOF ON SLUDGE DIGESTION TANK AT SALINAS PLANT

Digested sludge will be dried on conventional, under-drained sludge drying beds. Small auxiliary scum beds have been provided for skimmings from the preliminary clarifiers when they contain a high percentage of oils and grease. Scum from the gas dome in the digester roof can also be drawn to these auxiliary beds.

The settled sewage from the preliminary clarifier passes into two spiral-flow aeration tanks. Each tank is 26 by 66 ft. and divided into two compartments by a lengthwise center-wall, the flow being around the end of this wall. The water depth in the aeration tanks is 12½ ft., giving a detention period of slightly over six hours at average design flow with 20% return sludge. Air diffusion is accomplished through filtros diffuser plates mounted directly over longitudinal air ducts. The air supply is furnished by three compressors of the Connersville type.

The effluent from the aeration tank goes to two final clarifiers having 29-ft. diameter bottoms. These tanks are equipped with Dorr central drive, clarifier mechanisms for constant sludge removal. The activated sludge from the final clarifiers is drawn into



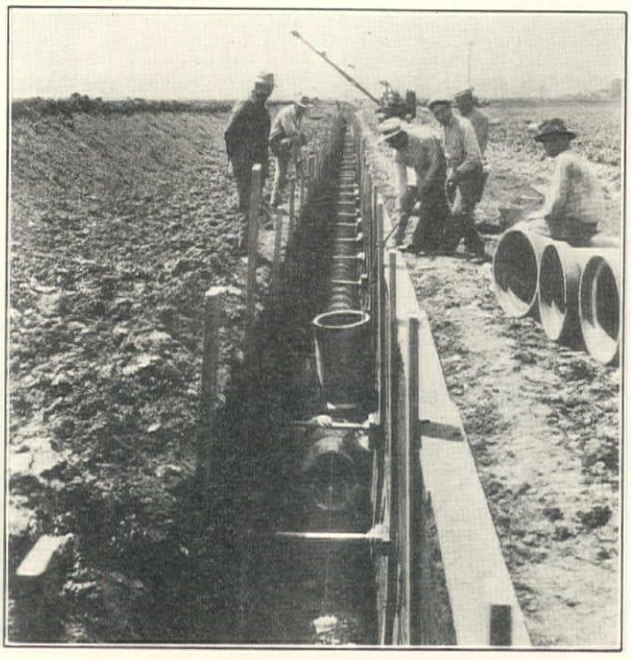
Floating Roof, Gas Dome, and Sludge Samplers on Digester

the sludge sump and then returned without reaeration to the aeration tanks by centrifugal pumps direct-connected to slow, variable speed motors. Excess activated sludge is discharged into the digester with the sludge from the preliminary tank.

An 18-in. Hume pipe-line has been constructed to carry the effluent from the plant to the river. This line parallels the larger storm sewer, but was built in order to keep the effluent separated from the cannery wastes and so reduce the volume of liquids to be discharged on the natural sand filter areas.

Particular attention in the design of the plant was given to ease of operation. All valves and piping for both water and air are arranged in a single pipe gallery with entrance from the floor of the blower house. On this same floor are the blowers and sludge pumps, with the switchboard and all electrical controls. Thus, the whole plant can be manipulated from two connected adjacent points. The upper floor of the blower house contains the laboratory, a toilet and shower room, and a third room for storage of chemicals or equipment. This floor is at the level of the surface of the aeration tanks and clarifiers, which makes sampling and inspection easy. Architectural features of the plant were designed to make it neat and pleasing in appearance.

Costs and Personnel—The whole project was financed with the proceeds from a general liability bond issue. The cost of various portions of the work



Gogo & Rados Laying 18-in. Vitrified Pipe (Gladding, McBean & Co.) on Salinas Outfall Sewer

exclusive of land and incidental expense was:

Storm sewer	$130,420
Pretreatment plant for cannery waste	11,915
Industrial sewer and pump station	6,572
Additions to domestic sewage collection system	19,370
Vitrified outfall to plant (8400 ft. of 18-in. line)	16,250
Effluent line from plant (7223 ft. of 18-in. Hume)	22,785

PUMPING STATION, BLOWER HOUSE, PRIMARY CLARIFIER, AND DIGESTER TANK
SALINAS SEWAGE TREATMENT PLANT

Sewage treatment plant (including wells, water supply, main sewage pumping station, fencing, roadways)	86,010
Total	$293,322

The construction was divided into two contracts; Gogo & Rados, Los Angeles, constructed the storm, industrial, and domestic sewers. E. M. Funk, Arcadia, California, constructed the sewage and cannery waste treatment plants, and the pumping plants. Burns-McDonnell-Smith Engineering Co. of Los Angeles were designing engineers and were assisted by Howard Cozzens, city engineer of Salinas. Contracts were let in July, 1929, and completed in March, 1930.

Editor's Note—The unit bid summary for the Salinas project was published in the July 10th, 1929, issue, p. 40 and 42, and a short progress article in the February 25th, 1930, issue, p. 117.

City Manager Plan of Municipal Government

By R. M. DORTON
City Manager, Monterey, California

The city manager plan of municipal government, which has long since passed the experimental stage, is the natural sequence of the extension of the functions of municipal government. In recent years much has been heard of the increasing cost of government. This increase has been common to all the units of government, including municipal, and is directly due to the increased service of government.

The functions of municipal government may be classified, first, as ordinary, and, second, as paternal. The ordinary functions of municipal government may be generally classified as three: first, protection of life and property; second, levying and collection of taxes; third, engineering. The paternal function may be generally classified as: first, health and sanitation; second, recreation; third, charities and correction; fourth, hospitals and hygiene. It is perfectly obvious to anyone who has lived during the past twenty-five years that the paternal functions of municipal government have been greatly extended and that with this extension has come the proportionate increase in cost.

Under both the ordinary and paternal functions of municipal government, costs have increased primarily because of the increase of the density of population within limited areas. The modern municipal program embraces many subjects which were not comprehended a generation ago.

I have outlined briefly the functions of modern city government for the purpose of emphasizing the need for modern political machinery.

When the commission form of government was first adopted at Galveston, Texas, it was thought to be a panacea for municipal maladjustments. Although it eminently justifies its existence at Galveston, it failed in numerous other instances to improve to any marked extent the forms of government which it supplanted. The city manager plan was first tried in Staunton, West Virginia, although in principle it was employed in the conduct of private business and in the government of European cities. Since 1908, more than four hundred cities have adopted the manager plan and with very few exceptions the plan has been uniformly successful. As the problems of city government become more complicated and the functions which it performs more varied, the merits of the city manager plan will become more apparent. The growth of the manager plan has been due to the failure of obsolete political machinery to cope with modern municipal problems.

It is unnecessary to give the reasons for the failure of the mayor-council or commission types of city government when an attempt is made to comprehend human nature and the necessity for increasing efficiency in the conduct of public business.

California Sewage Works Association Program

Long Beach, October 8 to 10, Hotel Virginia

Third Annual Convention in Conjunction with League of California Municipalities which Meets October 6 to 11 at Long Beach

Wednesday, October 8

FORENOON

Visit Hyperion screening plant.

Visit Poggi ranch plant of L. A. County Sanitation Districts.

Demonstration of sewer cleaning at Wilmington.

Lunch at Long Beach. City engineers and street superintendents section of League of California Municipalities invited.

AFTERNOON

Papers. (Session at Breakers Hotel.)

1. Handling of Sludge and Screenings.
   a. Digestion—C. R. Haseltine and Herbert Patterson. Discussions by R. F. Goudey, M. C. Polk, D. C. McMillan, and Raymond Burgess.
   b. Fertilizer—A. W. Wyman or A. C. Daley. Discussion by Thornton and Kellogg.
2. Grease Removal.
   a. Imhoff Method—W. A. Allen.
   b. Los Angeles Method—G. A. Parkes.
   c. Grease Traps—G. C. Zuckweiler.

Thursday, October 9

FORENOON

Business meeting and election of officers (Breakers Hotel).

Papers.

1. Odor Control.
   a. Design and Operation—John Jacobson. Discussions by H. B. Hommon, H. N. Jenks, and Alva J. Smith.
   b. Chlorination—Rose. Discussions by F. S. Currie, R. L. Patterson, and R. F. Goudey.
2. General Discussion.

Luncheon—guests of Pacific Clay Products Co. at Los Nietos plant.

AFTERNOON

Visit Pasadena activated sludge plant.

Visit Griffith Park experimental plant of Los Angeles City water department.

EVENING

Banquet, Hotel Virginia.

Friday, October 10

Boat trip to Catalina island.

Construction Review

SEWERAGE

By S. J. SANDERS
Editor, Daily Construction News Service

Progress is being made on important sewerage projects as follows:

BERKELEY STORM DRAIN SYSTEM

J. C. Hickey, Alhambra, has completed his contract for unit No. 4 of the Berkeley, California, storm drain system, the acceptance date being August 12. The total cost of the work, including engineering and other incidental expenses, was $234,075, of which $13,000 is payable in cash and the balance under the 1911 Act. The contract price was $221,666.

Trenching was done with an Austin model 42-15 and a Barber-Greene ditcher. Pavement was removed by Ingersoll-Rand air tools operating from a Rix 120 compressor. For laying centrifugal pipe 30-in. and larger, a Universal truck crane was used. Backfilling was done with an Austin model BF-4. Gladding, McBean & Co. furnished the vitrified pipe and the American Concrete Pipe Co. and the California Concrete Products Co. furnished the Hume pipe.

Harry Goodridge is city engineer and C. C. Fisk assistant city engineer of Berkeley.

GUSTINE OUTFALL SEWER

John Pestana, Oakland, has completed his contract for 6200 lin.ft. of 24-in. vitrified pipe outfall sewer and 14 manholes for the city of Gustine, California, contract price $17,496. The unit prices were $2.70 per lin.ft. for 24-in. vitrified pipe and $54 each for manholes. The depth of trench ranged from 5 to 10 ft., averaging 6 ft. in loam beneath a gravel-surfaced road. This line connects the city sewer with an existing 24-in. outfall leading to a 100-acre sewer farm and replaces a 12-in. line in good condition and a 10 by 20-in. redwood box sewer serving an industrial plant. The new sewer was made necessary by increased dairy wastes.

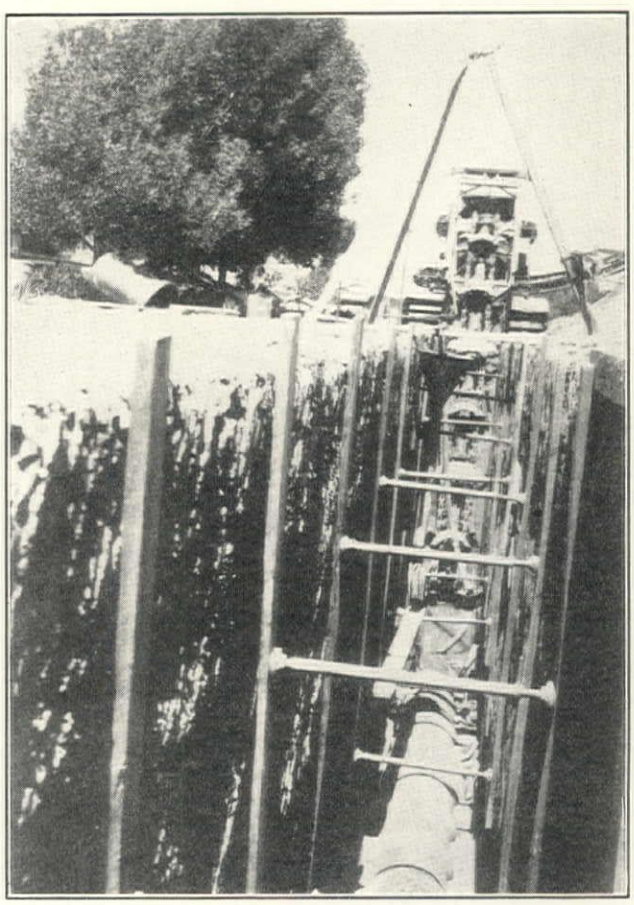
Arthur E. Cowell is city engineer of Gustine.

ISLAIS CREEK RECLAMATION DISTRICT, SAN FRANCISCO

M. B. McGowan, San Francisco, will complete his contract about November 1 for a wooden drain, the first unit of the Islais Creek Reclamation District in San Francisco, contract price $120,586. This project includes the following items: piling below cutoff—45,000 lin.ft. at $0.45; wooden box drain, consisting of Oregon pine stringers and redwood lining—3465 lin.ft. of 14 by 8-ft. at $27; center partition—1000 lin-ft. at $1.25; wooden drain—50 lin.ft. of 14 by 10-ft. at $23; Southern Pacific trestle—$3283; manholes—14 at $60; and side ports—16 at $15.

An earth-fill dam has been placed at the lower end of Islais creek to prevent the tide from flowing up the channel. Two Armco culverts with 30-in. Calco flood gates have been installed through the dam and the area of operations thus drained of all surface water. Test piles (20 ft. at Oakdale ave. and Selby St. and 100 ft. at Selby st. and Galvez ave.) have been driven for the entire length of the drain and the driving of foundation piles is well along. Trench excavation has been started, as has carpenter work, the carpenter crew following the excavator.

Equipment includes two piledriver rigs, one with

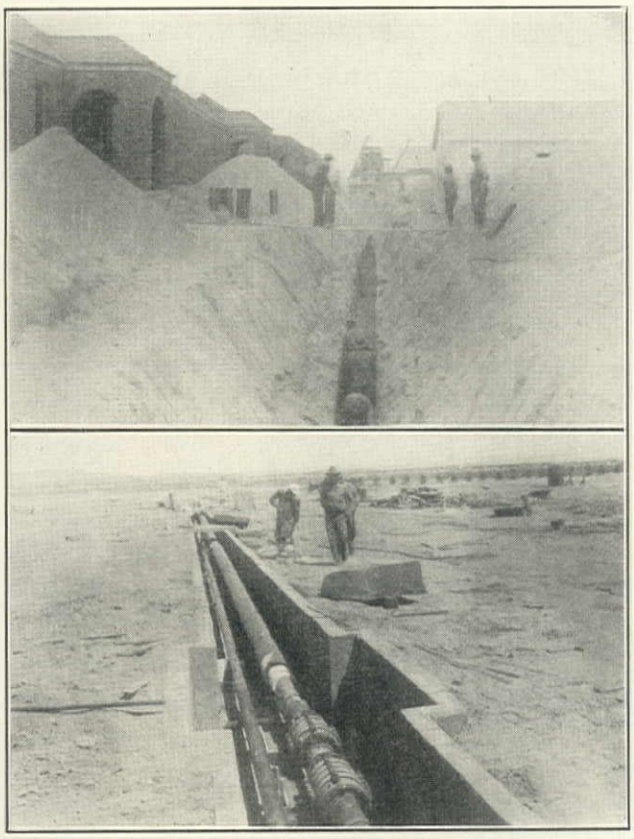


Austin Ladder Trencher in 18-ft. Cut on Solano County Sewers; 24-in. Pipe Supported by Concrete Cradle; M. J. Bevanda, Contractor

60-ft. leads and one with 100-ft. leads, each equipped with No. 1 Vulcan steam hammers. The smaller rig has a 2-drum American hoisting engine and the larger a 3-drum Lidgerwood hoist. Excavation is being done under subcontract by McClure & Chamberlin, using a Northwest clamshell crane. Electric-powered 'Skilsaws' are used for wood cutting. All boring is being done with Thor electric drills. A specially constructed derrick mounted on a Ford truck is used for placing and handling the heavy longitudinal stringers and caps. The remainder of the lumber is being deposited at convenient locations by Ross carriers and thence

placed by hand. Sheet piling will be driven with McKiernan-Terry air hammers. Piling was furnished by the McCormick Lumber Co., Oregon pine timbers by the Loop Lumber Co., and redwood timbers by the Union Lumber Co.

M. H. Levy is engineer for the Islais Creek Reclamation District and Burt West is resident engineer.



(Upper) Installing Sewers West of Civilian Quarters at Hawthorne Naval Ammunition Depot, Buckeye Traction Ditcher in Background. (Lower) Completed Heating Duct East of Barracks. Insulated 6-in. Steam Line and 4-in. Fuel Oil Line in Position. Thos. Haverty Co., Contractor

O. H. Suderman is job superintendent for M. B. McGowan and F. J. Burrows is piledriver foreman.

LOS ANGELES SEWER PROJECTS

Jefferson St. Storm Drain System, Section 3—Chas. H. Johnston, Los Angeles, will complete his contract by March 14, 1931, for section 3 of the Jefferson st. storm drain system from 7th and Bixel st. to Jefferson blvd. and McClintock st., contract price $334,920. The work involves 16,329 lin.ft. of 12 to 21-in. cement pipe, 21,459 lin.ft. of 24 to 69-in. reinforced concrete pipe, 29 lin.ft. of 60 and 63-in. monolithic concrete drain, 438 lin.ft. of 76 by 79-in. concrete box section, 4730 lin.ft. of 6 and 8-in. sanitary sewer pipe, and 44 lin.ft. of 7 and 10-in. cast-iron pipe.

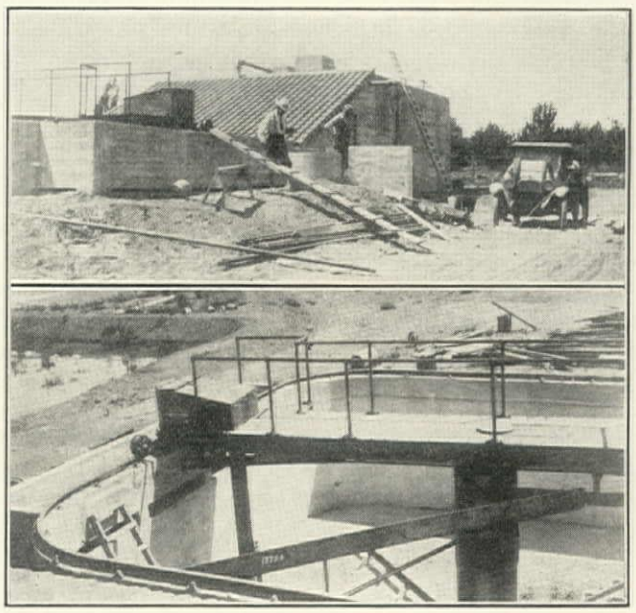
Major activity is now concentrated on the box section, where excavation is being done with a 1-yd. dragline. Operations will be kept within certain boundaries and everything within those boundaries completed before moving along the line of construction. The order of construction will be: 35th st. and McClintock ave. lateral, Jefferson st. and Tallman ave. lateral, and Hoover st. lateral. Large pipe is being furnished by the United Concrete Pipe Co., and small pipe by the Collins Concrete Pipe Co. of Hynes.

L. W. Armstrong is storm drain engineer for the city of Los Angeles.

North Outfall Sewer, Section 34A—Dalmatin & Nikcevich, Los Angeles, will complete their contract by February 27, 1931, for section 34A of the north outfall sewer. The contract price is $203,634 and involves: 5520 lin.ft. of 57-in. pipe and 138 lin.ft. of 57-in. pipe in tunnel, 153 lin.ft. of 57-in. pipe in three curves, 5034 lin.ft. of 51-in. semi-elliptic concrete sewer, 142 lin.ft. of 51-in. curved section in tunnel, 50 lin.ft. of 51-in. tangent section in tunnel, 2449 lin.ft. of 39-in: semi-elliptic concrete sewer, 9 manholes, 86,700 sq.ft. of resurfacing with waterbound disintegrated granite.

Equipment includes one 1930 model Austin trencher with extensions for digging 32 ft. deep and 10 ft. wide, one 1-yd. clamshell, one 1¼-yd. dragline, one Austin backfiller, one 27-E Rex paver, Blaw-Knox combination forms. The semi-elliptical 57-in. sewer is tile-lined. The tiles are first laid over a form, after which forms for concrete are placed around them and the concrete poured. The tile joints will be plastered with Bitument.

North Outfall Sewer, Section 34B—M. Simunovich, Los Angeles, recently started work and will complete his contract by February 27, 1931, for section 34B of



(Upper) General View of Sebastopol Sewage Treatment Plant. (Lower) Dorr Clarifier Equipment at Sebastopol

the north outfall sewer, contract price $171,800. The work includes the following: semi-elliptic concrete sewer —1299 lin.ft. of 57-in., 6208 lin.ft. of 51-in., 2547 lin.ft. of 39-in., and 2394 lin.ft. of 36-in.; tangent section in tunnel—76 lin.ft. of 45-in. and 228 lin.ft. of 36-in.; waterbound disintegrated granite resurfacing —91,262 sq.ft.; class 'A' (2-in.) resurfacing—25,607 sq.ft.

J. J. Jessup is city engineer of Los Angeles, R. W. Stewart is chief deputy, and D. M. True is office engineer. H. G. Smith is engineer of sanitary sewer design and W. T. Knowlton is engineer for the metropolitan section.

RICHMOND, CALIFORNIA, 10th ST. OUTFALL

Jasper-Stacy Co., San Francisco, will complete a contract about December 1 for the 10th st. sewer outfall for the city of Richmond. This sewer is on Dock ave., Hall ave., 14th, and 10th st. The contract price is $139,946 and involves the following major items: centrifugally cast reinforced concrete pipe on reinforced concrete cradle—3041 lin.ft. 42-in. at $19.60; centrifugally cast reinforced concrete pipe—1350 lin.ft. 39-in. at $15.40; vitrified pipe sewer—24 lin.ft. 21-in. at $5.20 and 64 lin.ft. 10-in. at $4.10; vitrified pipe on timber cradles—2030 lin.ft. 18-in. at $9.20; reinforced concrete pipe jackets—30 lin.ft. at $7.60; manholes, class 'B' on piles—8 at $197; manholes, class 'B'—3 at $145; manholes, class 'G', on piles—4 at $124; douglas fir piling—35,000 lin.ft. at $0.85; creosoted timber piling—840 lin.ft. at $2.50; overflow structure and outlet—$5550.

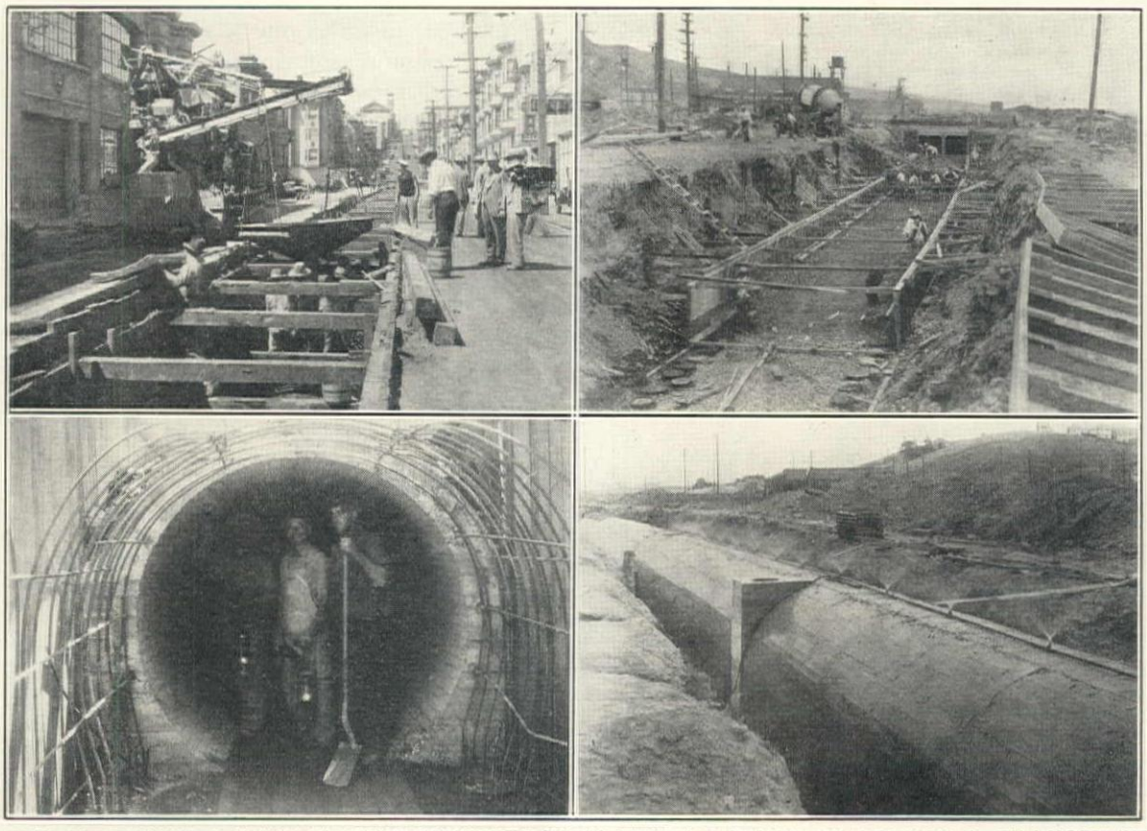
Construction began August 15 and on September 2 the job was about 10% complete. Pipe will be furnished by the American Concrete Pipe Co. and lumber and piling by the Tilden Lumber Co. and the McCormick Lumber Co. The Santa Cruz Portland Cement Co. will furnish the cement. Major equipment includes one P&H model 206A clamshell and dragline, one 80-ft. skid type, steam-hammer piledriver rig, one No. 3 McKiernan-Terry air hammer with 'Tugger' hoist, one 9 by 8-in. Ingersoll-Rand portable compressor, two Ford trucks, one shop outfit with Dewalt saw, two pumps. E. A. Hoffman is city engineer, John O. Miller is sanitary engineer, and A. T. Schunk is superintendent for the contractor.

SAN FRANCISCO SEWER PROJECTS

Alemany Blvd. Storm Drain System—Eaton & Smith, San Francisco, completed their contract about September 15 for section B of the Alemany blvd. storm drain system, contract price $271,255. The equipment included one 1¼-yd. Osgood dragline, one 1-yd. Thew-Lorain clamshell, one 5000-lb. Vulcan pile hammer in 85-ft. leads, one Caterpillar '10' for dragging piles. Concrete was supplied from a central mixing plant.

Fifteenth St. Sewer, Section A—L. J. Cohn, San Francisco, completed his contract August 15 for section A of the 15th st. sewer between Harrison and Howard st., contract price $59,334.

Equipment included one Northwest convertible crane with ¾-yd. dragline and clamshell buckets, one 5000-lb. Vulcan hammer in 84-ft. leads, one Rix compressor with No. 1 Ingersoll-Rand air hammer for driving lagging. Concrete was supplied from a central mixing plant.



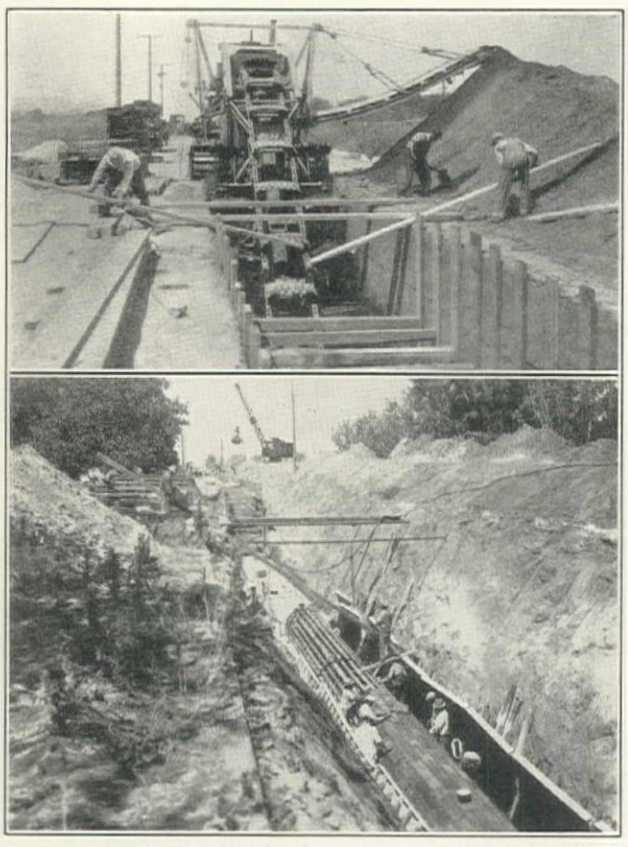
(UPPER LEFT) MacDONALD & KAHN PLACING CONCRETE WITH REX 21-E PAVER ON SECTION C, FILLMORE ST. SEWER. (UPPER RIGHT) EATON & SMITH USING TRANSIT-MIXED CONCRETE ON SECTION B, ALEMANY BLVD. STORM DRAIN. (LOWER LEFT) SECTION B OF FILLMORE ST. SEWER, L. J. COHN, CONTRACTOR. (LOWER RIGHT) CURING CONCRETE WITH SPRINKLER SYSTEM ON SECTION B OF ALEMANY BLVD. STORM DRAIN

Fillmore St. Sewer, Section B—L. J. Cohn, San Francisco, will complete his contract about February 1, 1931, for section B of the Fillmore st. sewer between Harrison st. and Van Ness ave. on 10th and Fell st., contract price $112,031. To August 20, the excavation was 57% complete, the concreting 24%, and the entire job 20% complete. The work includes: reinforced concrete sewer—3084 lin.ft. 6.75-ft. circular section at $34.40 and 41 lin.ft. 2.5 by 3.75-ft. box section at $18.25; 30 lin.ft. 2.25-ft. circular section with vitrified invert lining at $11; vitrified culvert—55 lin.ft. 10-in. at $1.78; manholes—14 on new sewer at

$83 and 3 on existing sewer at $108; vitrified underdrain—2984 lin.ft. 6 to 12-in. at $0.95 to $1.33.

Principal equipment follows: one convertible Northwest with 1¼-yd. dragline and ¾-yd. clamshell, one Rix compressor, two Ingersoll-Rand air hammers for driving lagging, one MultiFoote 21-E paver.

Fillmore St. Sewer, Sections C and D—MacDonald & Kahn, San Francisco, will complete their contracts



Section 34A, North Outfall Sewer, Los Angeles, Dalmatin & Nikcevich Contractors. (Upper) Austin 1930 Trencher Excavating Section 32 ft. Deep and 10 ft. Wide. (Lower) Placing Tiles on Blaw-Knox Forms for 57-in. Elliptical Concrete Sewer. Trencher and Clamshell in Background

about January 1, 1931, for sections C and D of the Fillmore st. sewer.

Section C, extending from Fell st. to Van Ness ave. and from Laguna to Grove st., was 35% complete on August 20 (60% for excavation and 45% for concrete). The contract price is $75,976, including: 6 by 9-ft. reinforced circular sewer—1408 lin.ft. at $30; reinforced concrete sewer 6½-ft. diameter—1116 lin.ft. at $26; reinforced concrete sewer, 2½ by 3¾-ft.—50 lin.ft. at $15; taper connection—$300; vitrified sewer—220 lin.ft. 15 and 10-in. at $4 and $2; manholes—12 concrete or brick at $80 and 4 at $70; and 2500 lin.ft. of vitrified underdrain.

Section D of the Fillmore st. main sewer was awarded for $93,002 and includes: circular reinforced concrete sewer—2698 lin.ft. 6½-ft. at $26.40 and 515 lin.ft. 6-ft. at $24.90; reinforced concrete sewer—115 lin.ft. 3 by 4½-ft. at $18 and 111 lin.ft. 2½ by 3¾-ft. at $15; brick sewer—10 lin.ft. 3 by 5-ft. at $26; vitrified sewer—150 lin.ft. 10 to 21-in. at $2 to $5; assorted manholes—20 at $80 and $90; taper connection—$300; vitrified underdrain—3205 lin.ft. 6 to 12-in. at $0.50 to $1.25.

The same equipment is being used on both jobs, namely: one P&H with 1¼-yd. dragline and ¾-yd. clamshell; one Insley with 1¼-yd. dragline and ¾-yd. clamshell; one Rix compressor; two Ingersoll-Rand guns for driving lagging, one Rex 21-E paver.

Geary St. and 23rd Ave. Sewer—Peter J. McHugh, San Francisco, had his contract for the Geary st. and 23rd ave. sewer system from 27th ave. and Geary st. to 23rd ave. and Lake st. 27% complete on August 20. The contract price is $66,751, and includes 48 lin.ft. 21-in. vitrified pipe at $5; reinforced concrete box sections—4046 lin.ft. 2 by 3-ft. to 4 by 6-ft. at $10.50 to $23.65; two reinforced concrete taper connections totalling $425; three junction structures at $100, $200, and $1000; and 14 manholes at $75.

Equipment includes one Rix compressor, one Ingersoll-Rand compressor, four Ingersoll-Rand air hammers for driving; two ½-yd. Universal clamshell cranes mounted on trucks.

Ingalls St. Sewer—J. Varano, San Francisco, completed his contract August 1 for sewers on Ingalls st. from Carroll to Bancroft ave. and on Bancroft ave. from Jennings to Ingalls st., contract price $20,105. Equipment included one 5000-lb. Vulcan hammer and one ½-yd. Universal clamshell mounted on a truck. Concrete was mixed at the job.

M. M. O'Shaughnessy is city engineer of San Francisco and Clyde Healy is assistant city engineer. L. G. Tegtmeyer is sewer engineer.

SAN MATEO SEWER SYSTEM

The Oakland Sewer Construction Co., Oakland, will complete its contract about October 1 for a sewer

Gustine 24-in. Vitrified Pipe Outfall Sewer, John Pestana, Contractor

system in the southern portion of the city of San Mateo, California. The contract price is $54,715 and involves: 47,400 lin.ft. of 4 to 21-in. vitrified sewer, 697 wye branches, 122 manholes, one pumping plant, etc. The vitrified pipe on this contract was furnished by N. Clark & Sons and Ric-Wil joint compound was used on all joints.

This is an outfall line carrying all sewage from the southerly city limits and Community Hospital northerly along El Camino Real to 16th ave. outfall.

The Oakland Sewer Construction Co. also has a subcontract from the Union Paving Co. and is install-

ing 25,000 lin.ft. of 4 to 18-in. vitrified pipe sewer in connection with three paving projects in the Homestead tract and in East San Mateo, this work to be completed about October 1.

E. P. Wilsey is city engineer and city manager of San Mateo.

SEBASTOPOL SEWAGE TREATMENT PLANT

A. F. Anderson, Oakland, completed his contract early in September for the Sebastopol sewage treatment plant, contract price $21,260. The plant was put in operation about September 15, at which time the digester was heavily seeded from the existing plant. The following work and equipment was involved in the contract: 2150 lin.ft. 15-in. vitrified pipe sewer; 2 manholes; 183 cu.yd. structure and 5300 cu.yd. common excavation in sandy loam; one operating house; one 26-ft. Dorr traction clarifier and skimmer; one 4-in. Dayton-Dowd sewage pumping system; one 4-in. Barnes sludge pumping system; a separate sludge digester with gas collection and sludge heating, using Byers wrought-iron pipe in the heating coil; one effluent distributor system. Pipe was laid with 'Hydro-tite' joints and the plant was equipped with Rensselaer valves and 'Mono-cast' cast-iron piping.

M. J. Bevanda Contract for Solano County Sewers, Showing 36-in. Vitrified Pipe Outfall and Two 1¼-yd. Northwests and One ¾-yd. Buckeye. Line Rests on Piles, Bents Spaced 9 ft., Stringers 8 by 12 in.

C. E. Mueller, city engineer of Sebastopol, was in charge of construction and John A. Mitchell, city engineer of St. Helena, was consulting engineer.

VALLEJO SEWER SYSTEM, SOLANO COUNTY, CALIFORNIA

M. J. Bevanda, Stockton, is completing his contract for a sewer system covering 300 acres to the north and south of Vallejo and along Benicia road, Acquisition and Improvement District No. 1, Solano county. The contract price is $141,460 and includes 73,028 lin.ft. 6 to 36-in. vitrified pipe sewer, 3090 lin.ft. cast-iron pressure mains, 1169 lin.ft. 24 and 30-in. pipe cradle, 3931 lin.ft. pile trestle for 21, 30, and 36-in. sewer, 7 assorted manholes, 57 inspection holes, and one complete pumping plant. The job varies from marsh land to rocky hill country and includes 24-ft. cuts for 30 and 24-in. pipe.

Gladding, McBean & Co. is furnishing the vitrified pipe, which is being laid with Ric-Wil joint compound. Equipment includes one ¾-yd. Buckeye shovel, two 1¼-yd. Northwest shovels, two Austin ladder-type trenchers (22 and 12-ft.), two Buckeye trenchers (9 and 12-ft.), one Caterpillar '30' and one Caterpillar '60', one 10-ft. Russell blade, three 3-ton trucks.

Oakland Sewer Construction Co. Pouring Petrolastic Joints

George W. Wiles is engineer of work.

HAWTHORNE NAVAL AMMUNITION DEPOT

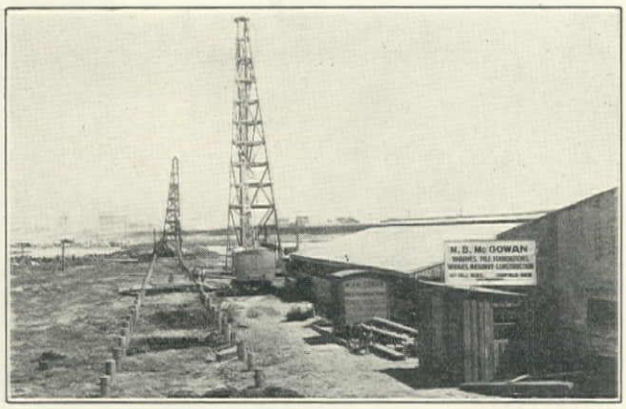
The Thos. Haverty Co., Los Angeles, is completing a contract for the following improvements at the U. S. Naval Ammunition Depot, Hawthorne, Nevada: sewer system, sewage disposal plant, steam, oil, and electrical systems, sidewalks, and concrete and bituminous macadam roads.

On June 8, all work in connection with the sewer system was completed, including 7500 lin.ft. of 8 to 12-in. vitrified pipe sewer, 3000 lin.ft. of 3 to 6-in. vitrified pipe sewer, 34 pre-cast concrete manholes, and 7000 lin.ft. of 3-in. drain tile at the disposal field. Vitrified pipe and drain tile were furnished by Gladding, McBean & Co. and the concrete manholes by the American Concrete Pipe Co. Trench excavation for sewer pipe and ducts is being done by a gas-driven Buckeye traction ditcher, the trench reaching a maximum depth of 10 ft. A Caterpillar '30', equipped with a 9½-ft. bulldozer, was used for backfilling the sewer.

The underground electrical distribution system has been completed, including installation of transformers and cables. Transformers were furnished by the General Electric Co. and cables by the Standard Underground Cable Co. The ducts for electrical and telephone cables have been completed and the latter cable installed. The electrical distribution system includes

26,000 lin.ft. of fibre duct in concrete, 14 telephone manholes, 10 power manholes, and 5 transformer vaults. Electric street lighting standards, furnished by the American Marbelite Co. of Chicago, have been installed.

Excellent progress has been made on installation of the underground heating system. This work includes 4200 lin.ft. of steam line 3 in. and larger and 4300 lin.ft. of steam line 2½-in. and smaller, 14 non-return steam traps, and 68 expansion joints. The Youngstown Sheet & Tube Co. is furnishing the steam pipe, Crane tilt traps are being used, and the Badger Co., of



M. B. McGowan Constructing First Unit on Islais Creek Reclamation District, San Francisco. Northwest Clamshell and Vulcan Steam Hammer Piledrivers in Background

Boston, supplied the expansion joints. The steam line is being insulated with 85% magnesia pipe covering. The condensate return lines are of chrome nickel cast-iron, buried in the soil without insulation or the use of duct. Included in the Haverty contract is a 3-in. cast-iron soft water line from the zeolite water softeners at the boiler plant to the laundry building. The U.S. Pipe & Foundry Co. supplied the pipe for the soft water line. A 4-in. fuel oil line is required between the railroad track and two 10,000-gal. storage tanks at the boiler plant, with branch lines to two 4000-gal. tanks at the stores and refrigerating building and barracks. Pipe for this work was furnished by the Youngstown Sheet & Tube Co.

Concrete for the transformer vaults and ducts was mixed in a 7-S Rex mixer and distributed in a dump bucket on the rear of a model AA Ford truck. Weighed batches of aggregates are being hauled in 1½-ton multi-compartment Ford trucks.

A. L. Parsons is chief of the Bureau of Yards and Docks, Navy Department, Washington, and C. H. Cotter, lt.-com. (CEC), U. S. Navy, is the officer in charge of construction at Hawthorne. E. A. Jensen is superintendent for the Thos. Haverty Co.

SPARKS, NEVADA, OUTFALL AND TREATMENT PLANT

H. A. Teget, Ontario, California, completed his contract early in September for construction of a vitrified pipe outfall sewer and sewage disposal plant for Sparks, Nevada, involving: vitrified pipe sewer—1391 lin.ft. 21-in. at $3.50 and 150 lin.ft. 10-in. at $2; concrete pipe sewer—3271 lin.ft. 21-in. at $4.25 and 1275 lin.ft. 12-in. at $2.25; manholes—7 standard at $100 and 6 special at $65; concrete in pipe crossings—960 cu.yd. at $0.55; inverted siphon crossings—1 at $80; tee branches, 6-in., on 21-in. pipe—18 at $2; treatment plant complete—$44,800; grading aeration maze —2300 cu.yd. at $0.60; extra concrete at $18 per cu.yd.; extra reinforcing steel at $0.045 per lb. The contract price was $69,933.

The outfall line consists of 3300 lin.ft. of 21-in. concrete pipe and 1350 lin.ft. of 21-in. vitrified pipe. Separate sludge digestion is afforded in the following plant: one 50-ft. diameter Dorr clarifier, one 30-ft. digester tank, four sludge beds, and an aeration maze. The sewage is chlorinated before entering the clarifier. Considerable difficulty was encountered during construction, as the water table is within 5 ft. of the surface.

The Sparks plant is the first sewage treatment plant to be installed in Nevada, although Reno is now constructing a plant of the same type. C. C. Kennedy, San Francisco, is the consulting engineer on this project and C. C. Taylor is city engineer of Sparks.

KLAMATH FALLS SEWER SYSTEM

Fourteenth Sewer Unit—W. J. Tobin, Oakland, is completing his contract for the fourteenth sewer unit for the city of Klamath Falls, Oregon, contract price $61,000. This unit comprises portions of Buena Vista, Lakeview, North Klamath Falls, and Fairview additions. The work includes 55,000 lin.ft. of 6 to 10-in. concrete pipe, 124 concrete manholes, 25,000 cu.yd. excavation, and 120 concrete lampholes. Equipment includes one Austin trencher, one 8-ft. Barber-Greene

Oakland Sewer Construction Co. Using Baker Backfiller on Fordson to Cover 30-in. Vitrified Pipe in 5-ft. Trench

trencher, two Rix compressors, one Caterpillar '30' with Killifer bulldozer.

C. C. Kelley is city engineer and E. A. Thomas is assistant city engineer of Klamath Falls.

SEATTLE SEWER PROJECTS

Lakeside Trunk Sewer—The Queen City Construction Co., Seattle, will complete a contract about February 1, 1931, for the Lakeside ave. trunk sewer, using Gladding, McBean & Co. vitrified pipe. Excavations for pumping plants at e. Pine st. and Charles st. have been completed and over 1200 lin.ft. of 21-in. and over 1000 lin.ft. of 12-in. sewer has been laid. Equipment includes two Northwest gas shovels, one Austin trencher, and one Buckeye trencher.

University Way—The Queen City Construction Co., Seattle, has started construction on sewers in University way.

R. H. Thomson is city engineer of Seattle and O. A. Piper is assistant city engineer.

Lido Island Improvements, City of Newport Beach

Griffith Co. Completing $1,171,000 General Contract for Approach Fills, Bridge, Sewers, Sewage Pumping Plant, Water Distribution System, Underground Conduit and Ornamental Street Lighting Systems, Warrenite Paving, Combination Curb and Gutter, Colored Sidewalks, and Pleasure Piers

By R. L. PATTERSON*
City Engineer, Water and Street Superintendent, Newport Beach, California

The development of Lido island in Newport bay from a barren tide land to a model and high-class residential district incorporating several new features in city planning will be completed about October 15 by the Griffith Co., general contractor, of Los Angeles. Included in the general contract which was awarded January 6, 1930, are: dredging for approach fills, bridge connecting to mainland, sewers, a sewage pumping plant, a water distribution system, an underground conduit system with electrical and telephone services, ornamental street lights, Warrenite paving, combination curb and gutter, colored sidewalks, and pleasure piers—in fact, all the requirements for a modern city. Improvements are being made to the 105 acres comprising Lido island and to 23 acres of adjacent mainland.

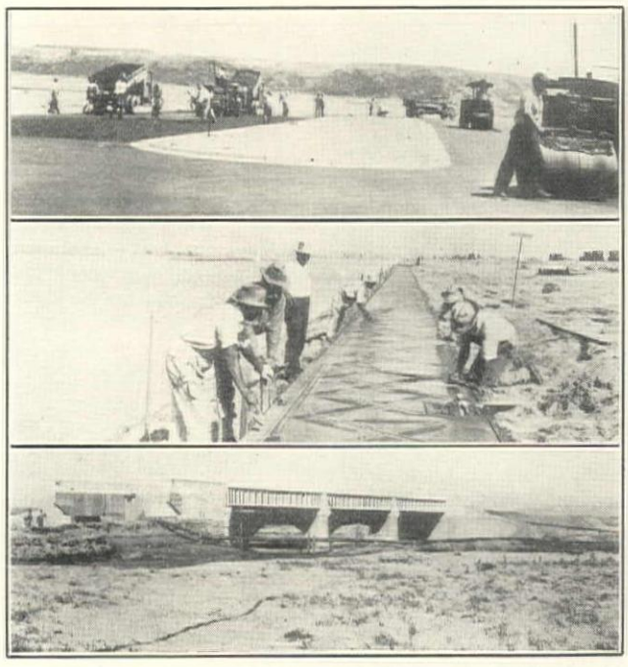
Lido island, owned by the Consolidated Trading Co., is situated within the city limits of Newport Beach and has a length of 540 ft., with a maximum width of 1400 ft. Newport Beach is a popular Southern California summer resort and is rapidly becoming a year-round playground for water sports and yachting, as it has the only salt water pleasure bay in the region. Improvements to the harbor entrance were completed in July at a cost of $200,000.

When Lido island was originally taken under state patent as swamp and overflow land, it had an average elevation of 5 ft. above m.l.l.w. and two-thirds of the surface was submerged at high tide. A channel was dredged around the island in 1922 to a depth of 10 ft. below m.l.l.w. and the dredged material, mainly sand, was used to raise the elevation of the island an additional 7 ft., making this area about 12 ft. above m.l.l.w. at all places. The development program now in progress will add an attractive and restricted beach community to the Los Angeles area.

Planning and Zoning—The arrangement of streets and zoning for Lido island was planned by Franz Herding, planner and architect. Safety streets, one of the new features in city planning, are included in this development, all traffic being routed through 'vias' or alleys at the rear of the houses. All buildings will front on a 10-ft. 'strada' or walk. With building restrictions requiring a 4-ft. setback for all garages, the 24-ft. vias have a practical width of 32 ft.

Via Lido, a 100-ft. illuminated boulevard, affords the main entrance to the island from Central ave. in Newport Beach. The Government channel separating the island from the mainland is crossed by an 80-ft. causeway, formed of dredged material, and a gunited plate-girder bridge having a roadway width of 22 ft. A 45-ft. street (Via Lido Soud and Via Lido Nord) skirts the island, being separated from Newport bay by a single tier of lots. A 100-ft. north and south street (Via Genoa) near the center of the island will serve the business district.

At several points around the island, provision has been made for community beaches. All buildings in the development will be restricted to Mediterranean architecture. There are 1214 lots in the subdivision, average inside lots having a 30-ft. frontage.



(Upper) Griffith Co. Laying Warrenite Pavement on Via Antibes, 5-ton Moreland Trucks in Background. (Center) Finishing Section of Colored Sidewalk on North Promenade. (Lower) South Elevation of Gunite-Encased Lido Island Bridge, Showing Dredged Fill Being Placed in Approaches

All utilities are being placed underground to eliminate unsightly poles and overhead lines, and all streets and alleys are being paved. Street lights are being placed along all the vias as well as the stradas. Newport Beach is extending its facilities to the new area, the water supply coming from the city's deep wells situated in the Santa Ana river basin, and the sewage, for the present, is routed through an existing disposal plant. Plans are now being prepared for a

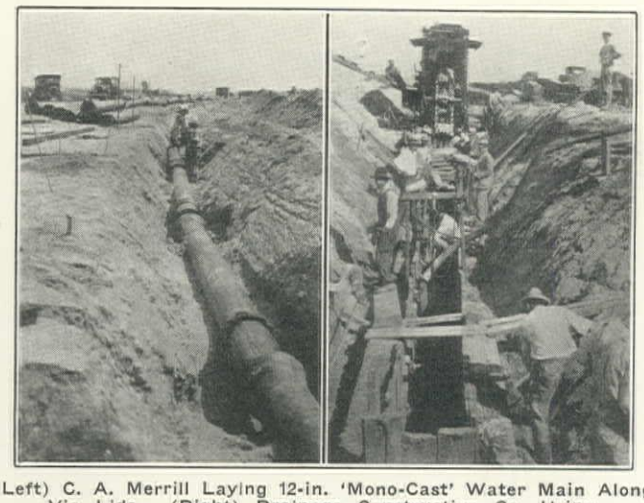
*Associate Member, American Society of Civil Engineers.

new and modern sewage disposal plant to serve Newport Beach, including Lido island.

Work on the $1,170,950 general contract was begun February 3, the improvements being under the 1911 Improvement Act. All construction is under the direction of my department and the Griffith Co. has subcontracted several divisions of the work, as described hereafter.

Approach Fills to Bridge—Government harbor lines were established in Newport bay during 1912. These lines bound the subdivision, including Lido island and that portion on the mainland. The channel, which has a width of 600 ft., is navigable only at extreme high tides and is being dredged to a depth of 10 ft. below m.l.l.w. at an estimated cost of $80,000. Part of the dredged material (47,710 cu.yd.) is being placed in the bridge approaches and the remainder used to fill the tide lands west of Lido island.

The approaches are 80 ft. wide, with side slopes of 2:1. Surfacing consists of 20 ft. of 6-in. Warrenite (12,250 sq.ft.), with 10 ft. of 6-in. disintegrated granite shoulder on each side (13,250 sq.ft.). These approaches will probably be beautified with shrubs and trees when



(Left) C. A. Merrill Laying 12-in. 'Mono-Cast' Water Main Along Via Lido. (Right) Drainage Construction Co. Using Parsons Trencher on 16-ft. Cut for Vitrified Sewer Along Via Lido Soud

the development is turned over to Hugh Evans & Co., who will market the subdivision.

A 6000-yd. temporary fill between the island and mainland and a 3-mile dirt-surfaced road on the beach sand were required for construction use.

Bridge to Mainland—The bridge over the Government channel at the easterly end of the island has three 62-ft. steel plate-girder spans encased in gunite and resting on concrete piers and abutments. This bridge has a clearance of 20 ft. above m.l.l.w. and a roadway width of 22 ft., with 5-ft. sidewalks on each side. Floodlights are used to illuminate the structure.

Construction of the bridge was begun February 3 and completed July 24. The following quantities were involved: 1226 cu.yd. of excavation, 434 cu.yd. of concrete in footings, 824 cu.yd. of concrete in abutments, 236 cu.yd. of concrete in piers, 250 cu.yd. of concrete in superstructure, 82 tons of reinforcing steel, 150 tons of structural steel, 9200 lin.ft. of foundation piling, and 4000 sq.ft. of 2 and 3-in. cement gunite.

All concrete work on the bridge was done by Oberg Bros. of Los Angeles, subcontractors for this structure, who also made the excavation and placed the foundation piles. This firm used the following major equipment: one 25-ton Link-Belt crane with dragline and clamshell, one pile driver with 45-ft. leads and 4000-lb. hammer, one Byron-Jackson 4-in. centrifugal pump, one Byron-Jackson 3-in. centrifugal pump direct-connected to a 10-hp. Westinghouse motor.

Steel girders were furnished and erected by the Consolidated Steel Co. of Los Angeles; reinforcing steel was supplied by the Pacific Coast Steel Corp.; and guniting was done by the California Gunite Construction Co. of Los Angeles.

Cofferdams were constructed around each abutment and pier and wooden foundation piling driven to 20-ft. penetration, generally in coarse sand and shells. For the abutments the cutoff was 2 ft. below m.l.l.w. and for the piers 13½ ft. Dry footings were obtained on the abutments by draining and pumping. The pier cofferdams were sealed by placing 3 ft. of concrete to within 1 ft. of cutoff. Thereafter, with ample pumping capacity installed, no difficulty was experienced from groundwater. A waterproofing cement was used in all concrete to a point 7 ft. above m.l.l.w.

Sewers—A sewerage system, including house connections to each lot, covers the entire subdivision. With flat topography and high groundwater plane, light sewer grades were necessary. All sewers on the island drain to a pumping station in the western portion of the tract, from which sewage is pumped through an 8-in. cast-iron line across the approaches and bridge to the mainland. Thence the sewage flows by gravity to an existing treatment plant.

The sewerage system includes 29,000 lin.ft. of 6 to 15-in. vitrified clay pipe furnished by Gladding, McBean & Co., 2571 lin.ft. of 8-in. cast-iron pipe furnished by the U. S. Cast Iron Pipe Co., 110 manholes, 23 flushtanks, 8 lampholes, and 1214 house connections, types 'A' to 'E'.

This system, including the pumping plant, was completed June 1 by the Drainage Construction Co. of Lynwood, California, subcontractors. About 4600 lin.ft. of the pipe is below the groundwater level and in these sections Weston gaskets for pipe jointing were used. Where water was encountered in trenching, the excavation was carried below grade and crushed rock used to bring the trench up to grade. Diaphragm pumps were employed to lower the groundwater level so that the pipe could be laid in dry trench. For about 1200 ft. of sewer, the depth of trench was 13 to 16 ft. and much difficulty was encountered from tidal movement of the groundwater, this section being excavated to grade with the trencher. Where sheeting was required, a steel cage was attached to the trencher.

Equipment on the sewerage system included three Parsons trenchers (No. 40, 30, and 21), two No. 32 Parsons backfillers, one Rix air compressor mounted on a Ford truck, sixteen Fairbanks-Morse diaphragm pumps, one 4-in. self-priming 'Humdinger' pump, and one Rex 27-E paver.

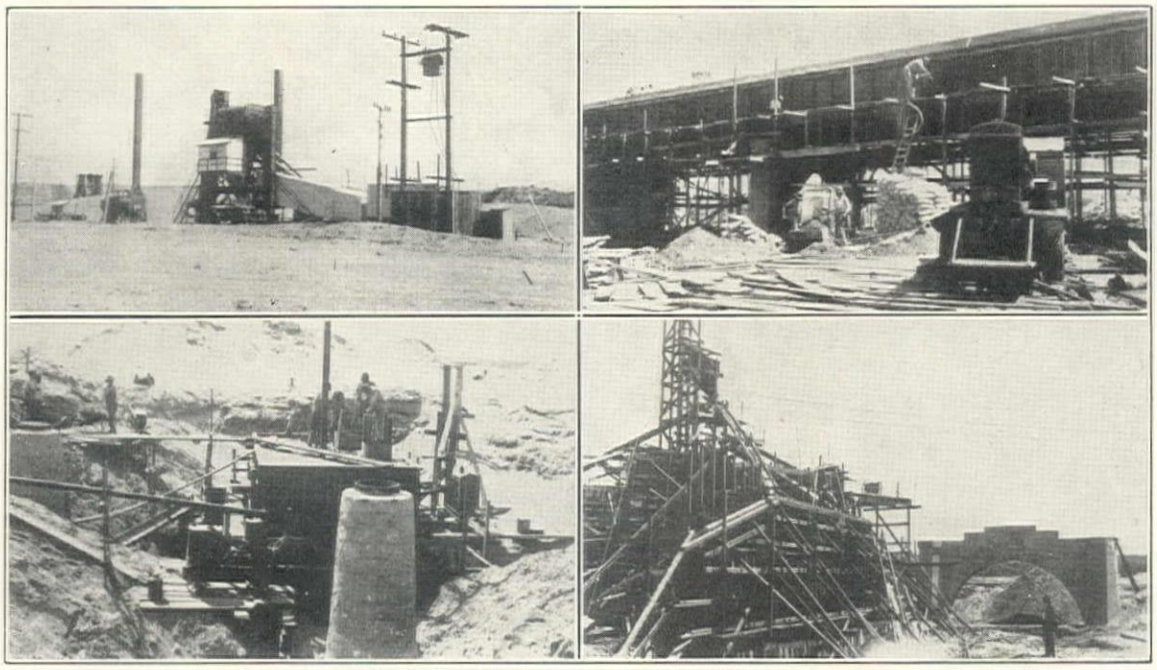
Sewage Pumping Plant—The sewage pumping plant is equipped with two 500-g.p.m. Byron Jackson centrifugal pumps powered by 7½-hp. G.E. motors and operating against 25 ft. head.

This plant is 18 ft. 8 in. by 10 ft. 8 in. by 21 ft. deep, the bottom of the pump pit being 22 ft. below street grade and 13 ft. below the groundwater plane. A tongue-and-groove sheet pile cofferdam was required for plant construction. This cofferdam was sunk 7 ft. below the bottom of the plant, the piling being driven with a No. 5 McKiernan-Terry air hammer and jetted. Air was supplied by an Ingersoll-Rand compressor and excavation was handled by a Link-Belt clamshell crane and dragline. The excavation was carried to 2 ft. below subgrade and then brought to subgrade with a layer of crushed rock. Open tile was laid 15 in. below subgrade around the sides and drained to a sump in one corner. The water level was kept down with a 4-in. centrifugal pump. This proved a satisfactory method, as the plant was constructed under dry conditions. This work was done under the direct supervision of L. H. McIntire, superintendent for the Drainage Construction Co.

Water Distribution System—C. A. Merrill, of Santa Monica, completed a subcontract June 15 for 38,094 lin.ft. of 4 to 12-in. Mono-cast iron pipe, class 150, 46,500 lb. of cast-iron pipe specials and fittings, 44 Kennedy fire hydrants, 156 Crane gate valves (4 to 12-in.), and 138 house connections. A No. 30 Parsons trencher was used on this work, the pipe laying starting April 9. Centrifugal cast-iron pipe was supplied by the American Cast Iron Pipe Co.

Underground Conduit System and Ornamental Lights—An underground conduit system has been provided to carry all light, power, and telephone cables. This system includes 70,000 lin.ft. of 3-in. fiber duct enveloped in concrete, 164,500 lin.ft. of 1 to 2-in. conduit, 150,000 lin.ft. of cable, 123 combination concrete manholes, and 17 concrete vaults. Work on this system and on the ornamental street lighting system was begun by the Griffith Co. on April 15 and will be completed September 30.

An electrical yard was established on the mainland where all conduit was cut and bent and given a protective asphalt dip. 'Sheraduct' conduit was used entirely, furnished by the Line Material Co. of Los Angeles. Duct sections between manholes vary with the number of cables required. Service pipes were installed from the manholes to each lot so that whenever a service is required the cable may be quickly stretched between these points.



(UPPER LEFT) GRIFFITH CO. 3000-LB. TOTMAN PORTABLE ASPHALT PLANT FOR WARRENITE PAVING. (UPPER RIGHT) CALIFORNIA GUNITE CONSTRUCTION CO. ENCASING STEEL GIRDERS ON BRIDGE TO MAINLAND, INGERSOLL-RAND TRUCK-MOUNTED COMPRESSOR IN FOREGROUND. (LOWER LEFT) DRAINAGE CONSTRUCTION CO. ON SEWAGE PUMPING PLANT. (LOWER RIGHT) OBERG BROS. PLACING CONCRETE IN WEST BRIDGE ABUTMENT

The ornamental lighting system includes 284 King Ferronite standards, of special design to be in keeping with the Mediterranean type of architecture. These standards were furnished by the Western Lighting Co. of Los Angeles.

Grading and Paving—The Griffith Co. began the street improvements February 3. Rough grading started June 14, using 60 head of stock and a 2½-yd. Towner-Martin subgrader powered by a Caterpillar '60'. The subgrader moved an average of 500 cu.yd. of material per day. Construction of the combination curb and gutter began June 23, using a 6-sack Koehring mixer with 25-ft. boom and four 1½-ton Ford trucks for hauling aggregates from a central yard to the mixer. A small tractor was used to pull the trucks through the sand and after they left the dirt construction road.

Paving of streets and alleys was started July 24, using a Totman portable asphalt plant. With a 3000-lb. batch mixer, the plant has a daily capacity of 700 tons. A fleet of 5-ton Moreland trucks is used to deliver the paving material. Spreading of the base is accomplished by trucks backing in on boards and then

spreading by depositing material on the sand and backing over the mixture. This method has worked out satisfactorily. A 12-ton roller is used on the top course.

The construction of curb and sidewalks was completed September 12. Laying of pavement will be completed about October 12.

Pleasure Piers—As part of the development, five pleasure piers consisting of concrete piling with wooden superstructure, are being constructed by the Newport Boat Builders, Inc., of Newport Beach. Each pier will be provided with a 14 by 20-ft. landing float.

Personnel—The construction is being directed by the engineering department of the city of Newport Beach. T. W. Clark is assistant engineer, J. A. Siegel in charge of inspection, and J. A. Wooley in charge of surveys. John Holmstrom, vice-president of the Griffith Co., has general supervision of the project, with C. C. Bong as field superintendent.

Editor's Note—The unit bid summary on the Lido island project was published in the January 25th, 1930, issue, p. 42, and a short progress article in the March 25th, 1930, issue, p. 173.

COHN ADAPTS PAVER TO SEWER PROJECT

L. J. Cohn, San Francisco contractor, has adapted a standard MultiFoote paver to concreting on his contract for section B of the Fillmore st. sewer between Harrison st. and Van Ness ave. on 10th and Fell st.,

L. J. Cohn Placing Concrete on Section B, Fillmore St. Sewer, San Francisco, with MultiFoote Paver

San Francisco, contract price $112,031. The main item in this work is 3084 lin.ft. of 6 ft. 9 in. circular reinforced concrete sewer.

The paver has a regular boom and bucket but a receiving hopper is suspended from the boom beneath the bucket. To this receiving hopper has been attached a flexible chute which enables the workmen to place each batch of concrete where it is needed, and with the minimum of handling.

M. M. O'Shaughnessy is city engineer of San Francisco and L. G. Tegtmeyer is sewer engineer.

Spokane Water Improvements

Alex Lindsay, superintendent of water for the city of Spokane, Washington, is completing plans and will soon receive bids for a pipe-line and standpipe, total cost $175,000.

ASSOCIATIONS

International City Managers Association—The 17th annual meeting will be held in San Francisco September 24 to 27.

A. W. W. A. California Section, 11th Annual Convention

The eleventh annual convention of the California Section, American Water Works Association, will be held in Pasadena, October 29 to November 1, at the Hotel Huntington. A particularly fine program has been arranged, starting with the water works golf tournament on Wednesday, October 29, at the Flint Ridge Golf Club under the supervision of W. F. Goble; including the regular manufacturers' dinner dance 'de luxe' on Friday night with Fanchon and Marco entertainment; and some interesting inspection trips on Saturday.

This convention is assured of success under the untiring leadership of J. R. Barker, chairman of the exhibits committee, R. W. Martindale, chairman of the entertainment committee, S. B. Morris, chairman of the local committee on arrangements, and Charles S. Olmstead, president, and Louis L. Farrell, secretary. There will be 60 exhibitors—10 more than heretofore.

Be sure to attend this convention.

Engineering Societies Employment Service—This service, a cooperative enterprise supported by four of the founder societies with a combined membership of over 50,000, was started in New York in 1918. Its success was such that offices were opened in Chicago and San Francisco in 1925. The manager of each office works under the general direction of an advisory board appointed by the local sections of the cooperating societies.

The service to employers covers the entire field of engineering and chemistry, with men available for any position from beginner to chief executive. Members of the supporting societies are given preference in filling positions, but an active register of non-members is also maintained. Weekly bulletins giving information regarding positions open are mailed from the New York and San Francisco offices to subscribing members. A special file containing the names and addresses of consulting engineers practicing in the western states was opened in 1928 in the San Francisco office, 57 Post street, of which Newton D. Cook is manager.

The San Francisco office received notices of 3142 positions in the period 1926-1929, had a total registration of 3433, and made 1688 placements.

Sacramento Section, American Society of Civil Engineers—At recent weekly meetings of this section, the following programs were presented:

May 20—'Continuous Mill Process as Developed by the American Rolling Mills Co.' (motion picture) by Wallace Mason, California Corrugated Culvert Co.

May 27—Discussion of proposed $450,000 bond issue for repairs to filtration plant and development of municipal airport at Sacramento.

June 3—'Snow Removal' (illustrated paper) by T. H. Dennis, maintenance engineer, California Division of Highways. Section refused to endorse measures discussed at meeting of May 27.

June 10—'Engineering Education and Conditions Under Which Engineers Work in Russia' (address) by Ivan M. Nelidov, California Division of Water Resources.

June 17—'Water Resources Investigations by the State of California' (address) by Edward Hyatt, state engineer.

June 24—'History of the Development of Concrete Arch Dams' (paper) by G. E. Goodall, State Division of Engineering. This was the 350th regular weekly meeting of the Section.

July 1—'Evolution of the Locomotive' (illustrated paper) by D. L. Joslyn, locomotive designer, Sacramento shops, Southern Pacific Co.

July 8—'Deep Water Channel to Stockton' (address) by J. R. D. Matheson, major, Corps of Engineers, district engineer, Sacramento.

Los Angeles Successfully Reclaims Sewage for Replenishment of Underground Water Supplies

By CARL WILSON
Director of Sanitation, Los Angeles Department of Water and Power

Because all the water which naturally belongs to semi-arid Southern California, together with the supply which has been imported from other basins, and that which is still available for importation, will not suffice for the ultimate needs of this rapidly developing area, it is necessary that intensive conservation of all waters be immediately inaugurated. In a general way, conservation in industry has meant the transformation of wastes into by-products, and the industry of purveying water is not an exception to this rule.

The first by-product which the water works engineer turned to advantage was hydroelectric power, but there remains a waste from his enterprise which has thus far been neglected, even though its disposal has cost in the aggregate untold millions of dollars. This burdensome waste is sewage, and its principal by-product is reclaimed water which may be given many useful applications. Realization of the impending need caused the officials of the Department of Water and Power of the City of Los Angeles several years ago to undertake an investigation of the possibilities. It was realized from the outset that successful reclamation, if used to replenish underground storage, either directly or through return water from irrigation, offered the possibility of serious consequences. One part of phenol in 500 million parts of water may cause annoying taste troubles, while half that amount of salicyl compounds may be even worse. Because of the complicated reactions which might be anticipated, and also because the earlier studies were so promising, it was decided late in 1929 to place the investigation upon an experimental basis so that authoritative data applicable to Southern California conditions might be made available. The program adopted is ambitious, but to have made it less comprehensive would have been to defeat the purpose.

Any scheme of sewage reclamation must necessarily begin with sewage reduction, a subject around which there has been developed a voluminous literature during recent years, but valuable as this fund of information is, it stops far short of the present goal. It concerns itself with sewage disposal, and carries treatment only to the minimum degree which will insure freedom from nuisance.

Our problem in Southern California compels us to make sewage treatment a special business, for we must produce an effluent which is useful and attractive, although we can easily conceive that here, as in other industries, we may turn out products of various grades, implying different costs and different selling values, which shall be applicable for different uses. At present, the activated sludge process is in the ascendency, perhaps because it is based upon the utilization of natural forces, which are accelerated and controlled by scientific adaptation of environment to secure the most efficient operation of biological processes. Therefore, it was decided to construct an activated sludge plant to treat 200,000 g.p.d., and this plant has been in uninterrupted service since May 12, 1930. It is situated on the edge of Griffith park, upon property belonging to the Department of Water and Power, adjacent to a playground camp, the municipal golf course, and close to a well-travelled highway, so that no odor nuisance can be tolerated.

Sharp criticism from some quarters has been directed at the activated sludge process as being unable to handle industrial wastes, but it is believed by those conducting the present experiments that careful attention to the fundamentals underlying the process will secure success with all types of organic wastes. We are utilizing the activities of bacteria, fungi, and protozoans, and we know they are very sensitive to acids and alkalies—therefore we must carefully control the hydrogen-ion concentration (or pH) in our plant. They function best at their optimum temperature, hence we must preserve temperatures within certain limits. We know that up to a certain point in our process, aerobic action is preferable to anaerobic reduction, although this condition is reversed in the case of separate sludge digestion, especially if gas collection is a part of the scheme. Therefore, we must constantly provide air to inhibit anaerobic action and promote aerobic processes in the aerators and clarifiers. Lastly, we know that certain inorganic salts interfere with the treatment.

Inorganic salts in excess of certain concentrations, must therefore be kept out of the sewers, and that seems an entirely feasible thing to accomplish. By satisfying these conditions, it is practicable to treat all organic wastes, and peach cannery wastes have already been successfully treated at the experimental plant.

An important feature of the study now being conducted is a determination of the maximum concentration of certain inorganic compounds, such as salt and alkalis, which may be permitted in industrial wastes which are allowed to enter the sewers. Of equal moment is an investigation of the degree of purification necessary in effluents destined for different purposes. Reclaimed water intended for irrigation need not be so highly purified (consequently the cost may be less) as for some other use. Therefore, a correlation between treatment costs and proposed uses is of great importance.

The complete program of the Department's reclamation studies is published herewith to show the extent of the enterprise, and also in the hope that it may save

some unnecessary duplication of effort, with its accompanying expense.

A completely equipped laboratory has been provided at Crystal Springs for the exclusive study of sewage treatment and its allied problems, including the feasibility of introducing sewage effluents into the groundwater by infiltration through the sand and gravel deposits, overlying or tributary to the underground basins.

The work thus far accomplished sounds a warning which seems unavoidable—that if disaster is to be averted, the disposition of sewage effluents where they may reach waters used for domestic supply, must be under the control of the authorities responsible for the quality and safety of the water. The potential possibility of seriously affecting present and future supplies destined for human consumption is such that constant control of the quality of the effluent must be exercised, and the effect of the effluent upon underground waters must be continuously studied if the quality of our domestic supplies is not to be jeopardized. It would seem that only those officials who are held responsible for the safety and quality of public water supplies are likely to appreciate the importance of such studies, or the many conditions which must be guarded against. Moreover, the technology of water quality has become so complex that only the water works laboratories are likely to be equipped for the conduct of the necessary control, or to adequately interpret the laboratory findings.

PROGRAM OF WATER RECLAMATION STUDIES

The following outline covers items under investigation on the subject of 'Reclamation':

1. **Volume of municipal waste water available.**
   - (a) Location of all sewers, 24 in. diam. and larger.
   - (b) Average, maximum, and minimum daily and seasonal flows both for the present and the future, determined at the principal gathering points of intercepting sewers.
   - (c) Elevations at which adequate volumes can be secured.
   - (d) Possible rerouting of existing or proposed intercepting sewers to favor the various projects under consideration.
2. **Character of waste waters.**
   - (a) Strength of waste waters at different points.
   - (b) Checking mineral contents from each intercepting sewer and, if any exceed working limits, continue studies to either find means of control or separate disposition.
   - (c) Study of industrial loads for different areas.
   - (d) Effect of future industrial loads on character of combined wastes.
   - (e) Selection of those intercepting sewers which, from the standpoint of the character of their wastes, the best combination for each scheme under consideration is obtained.
3. **Treatment of municipal waste waters.**
   - (a) Complete knowledge on the most up-to-date developments in sewage treatment, including that for industrial wastes.
   - (b) Research into the proper methods of treatment as adapted to our type of sewage and climatic influences.
   - (c) Determination of installation and operation costs for that degree of treatment required by each project under consideration and industrial wastes to be handled.
   - (d) Selection of suitable treatment plant sites or pumping plants and force mains to known sites best fitting in with each project.
   - (e) Cost of sewage works to ocean versus reclamation.
   - (f) Cost of additional treatment required at the ocean end, which may be avoided if some scheme of reclamation is adopted.
   - (g) Determination of what part of the additional treatment required for reclamation is chargeable to sewage disposal.
   - (h) Analysis of so-called aesthetic and social objections.
4. **Types of reclamation under consideration and research involved.**
   - (a) Augmentation of domestic supplies.
   - (1) Addition to large reservoirs in times of extreme emergency involving studies on the sufficiency of complete treatment and the effect on the biological balance in the reservoirs.
   - (2) Replenishment of underground water supplies above wells and galleries involving studies as to where this can best be accomplished; experiments in spreading of such waters in galleries or on the surface; percolation experiments; purification effected by filtration resultant from spreading; travel of underground pollution; study of chemical transformations during its period of underground travel; and the percentage recoverable in different basins.
   - (b) Exchange with large irrigation companies using their water for domestic purposes.
   - (c) Sale to irrigation companies in Los Angeles and other counties, involving: study as to location of such companies; acres under cultivation; types of crops grown; what safe return value could be secured from the water; extent to which their systems might have to be modified to ensure safe drinking water for them; and, the cost of transportation, storage, and distribution costs.
   - (d) Development of new acreage in Los Angeles and other counties and the determination of treatment necessary for such projects.
   - (e) Irrigation of golf courses, large estates, parks, etc., involving studies of location, acreage, and water duty.
   - (f) Industrial and commercial use of reclaimed water involving study of present and future requirements of such industries that might be able to use reclaimed water.
5. **Resources available in reclamation.**
   - (a) Value of water for domestic use both direct and indirect.
   - (b) Value of water for irrigation of various crops or purposes.
   - (c) Value and demand of water for industrial use.
   - (d) Value of reclaimed water in underground reservoirs in stopping inroads of salt water from the ocean, lowering pumping costs because of the higher water table, and guaranteeing water for valuable crops.
   - (e) Value of gas reclaimed from treatment works or sold to consumers.
   - (f) Value of fertilizer in sludge from the treatment works and in the water used for irrigation.
   - (g) Efficiency of various projects comparing production costs with reclaimed values.
   - (h) Comparison of reclaimed costs with existing and future aqueduct supplies.
6. **Cooperation with agencies outside the City of Los Angeles.**
   - (a) Collection of sewage from other districts.
   - (b) Utilization of flood control spreading and storage works if practical.
   - (c) Joint use of private pipe-lines, storage, or distribution works.
7. **Definite recommendations.**
   - (a) Reduction of all projects to a comparable basis, including first cost, labor, power, chemicals, depreciation, and maintenance for additional treatment works over that needed for present disposal, pumping plants, pipelines, storage reservoirs, and distribution facilities.
   - (b) Whether reclamation is warranted.
   - (c) What constitutes the most efficient method of reclamation, who should do it, and how it should be financed.

Editor's Note—This experimental plant and results obtained therefrom will be described in detail in the October 25th issue.

Ocean Outfall Sewers for Avalon, California

Installation of a 12-in. 150-lb. Cast-Iron Pipe-Line on Ocean Floor at Pebbly Beach, Santa Catalina Island

By S. E. CARPENTER*
Engineer, Santa Catalina Island Co., Avalon, California

The city of Avalon, located on Santa Catalina island, about 25 miles off the coast of California, south of Los Angeles Harbor, outgrew a portion of its sewer system. This necessitated replacing the last 1600 ft. of the old 10-in. vitrified clay sewer with 15, 18, and 24-in. vitrified clay pipe. The gradient of the sewer is flat, and, in order to get the outfall a sufficient distance from the city, a collecting well and system of pumps is required.

The 24-in. line carries the total sewage from the city to a large concrete collecting well. A battery of three pumps lifts the sewage from this well and boosts it to the high point in the outfall line, which is about 14 ft. above the inlet to the collecting well and 460 ft. distant from it. This outfall line from the pumps was formerly an 8-in. screw pipe but has been replaced with a class 'B', 16-in. cast-iron line about 4450 ft. long.

There are two 12-in., 150-lb., type 'T' Universal cast-iron outlets into the ocean from the 16-in. outfall sewer, one 2100 ft. from the end, the other at the end. The installation of these two 12-in. lines was the one part of the work which presented real problems. To be sure, 8-in. welded steel lines had been put in at these locations by being shoved out from shore with only a catamaran at the outer end to make certain they were free of the bottom. It was possible that the same method could be used, but the first thing to be guarded against with the cast-iron lines was broken joints, where the pipe could not conform to an irregular ocean floor. Other things to be overcome were the extreme weight and resistance to sliding of the collars.

Soundings which had been taken at 25-ft. intervals showed a rather uniform bed, with about 200 ft. depth at the ends of the lines, 700 ft. from shore. It was decided to put in the outlet at the end of the line first, as the beach at this location was quite flat and offered much better working conditions. The profile at this location, however, showed one rather abrupt change in grade about 100 ft. from shore.

It was found that the pipe weighed about 50 lb. per 6-ft. length in the water, with the water expelled. This meant less weight than the steel line, but the resistance to sliding of the collars and possibility of breaking of joints was still present. A scheme was then evolved (see Fig. 2) to give more buoyancy and at the same time fair assurance against the breaking of any joints as a result of undue strain. The pipe was reinforced by wiring a continuous row of 2 by 12-in. planks on top of it, using long enough splices in most cases to get a tie at each end in addition to good spiking. Secure wrappings of No. 6 wire were placed at each joint, copper wire alternating with iron; the copper to assure the plank remaining in place until the line was thoroughly bedded. Wedges were driven under the wires to cinch them up.

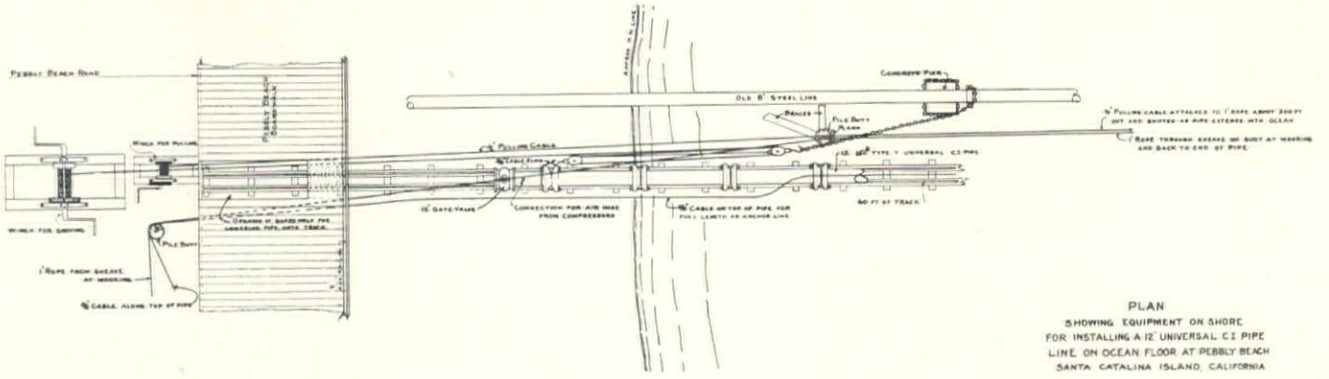


Fig. 1

It was decided to try to install the line by shoving and then resort to a pull, if necessary. To keep the end of the line going in the direction desired, a small anchor with marker was placed on line about 800 ft. from shore, with a line to shore. The catamaran at the end of the line followed along this anchor line but also had bridle lines to shore to counteract the strong current which is usually present at this location.

Fig. 1 shows the arrangement provided for installing the pipe. After a wooden plug was placed in the end of the line and tested for tightness, everything was ready for the installation.

In Fig. 2 is shown the frame and hoist for lowering the pipe through the boardwalk onto the track. At first, four lengths (24 ft. at a time) were bolted up, but later five lengths (30 ft.). The first 330 ft. slid into the ocean before any mishaps or delays of any kind occurred. It was then found that water was

*Associate Member, American Society of Civil Engineers.

leaking into the line, making the end very heavy and, hence, not free of the bottom. As a consequence, when the next shove was taken the pipe began buckling and showed on the surface close to shore. Despite the fact that the pipe seemed to be rigid laterally, the current carried this floating portion to one side. Bridle lines were attached and these, together with a pull from shore, soon straightened the line and had it settled on the bottom again.

It was now evident that the plug had been lost from the end of the line, which meant that the air would have to be expelled by using compressors. As shown in Fig. 1, a 12-in. gate valve was bolted onto the shore end of the line and the hose from two compressors connected to the fitting in the short length of pipe caulked into the valve. In order to avoid buckling the pipe again, a large anchor with buoy was placed on line about 1000 ft. from shore, so that a pull could be made on the end of the line. A sheave was fastened to the buoy and a line from the end of the pipe passed through it and then to shore to the pulling winch.

Shortly after the compressors were started, a leak appeared in about 6 ft. of water. Observation through a glass-bottom box showed that the pipe was disengaged on the top side at one joint. The line was picked up at a point several lengths inshore, thus engaging the pipe again and making it possible to tighten the bolts. A young Mexican, Andrew Hernandez, a capable diver, was called into service, and with a large crescent wrench soon had the leak stopped. Several joints in this vicinity which were leaking slightly he also tightened, but, to cap the climax, another leak showed up in 30 ft. of water. The diver went down and found the joint to be engaged, so low tide was awaited. Then the compressors were started and a shove put on the pipe. This brought the joint within 15 ft. of the surface and the diver soon had it tightened up. In all this work, he used no helmet of any sort.

These leaks, which were the last ones, were probably a result of the buckling of the line, insufficient contact, and the strain on the upper side of the joints while passing over the rough place on the ocean floor. The remainder of the line had every joint driven up with a large wooden mallet, which gave much better contact and eliminated all further trouble from leaks. This portion was installed almost entirely by pulling, the shoving equipment being used only to assist after the line started moving. No further difficulties of any kind were encountered.

A second catamaran was installed about 200 ft. from the end of the line to assist in easing the pull required to start the pipe moving. Bridle lines to shore from both catamarans enabled the line to be held in position despite the strong current.

Observation of the line for several days after completion showed it rapidly settling into position on the ocean floor, thus eliminating the danger of broken joints due to lack of support at various places. A sounding at the end of the line about 700 ft. from shore showed a depth of 195 ft.

Cadmium plated bolts, recommended by the Central Foundry Co. for use in salt water, were used throughout, and red lead in the metal to metal joints.

The Santa Catalina Island Co., of which D. M. Renton is vice-president and general manager, was the contractor. John Botello, public utility foreman for the city of Avalon, was directly in charge of the work.

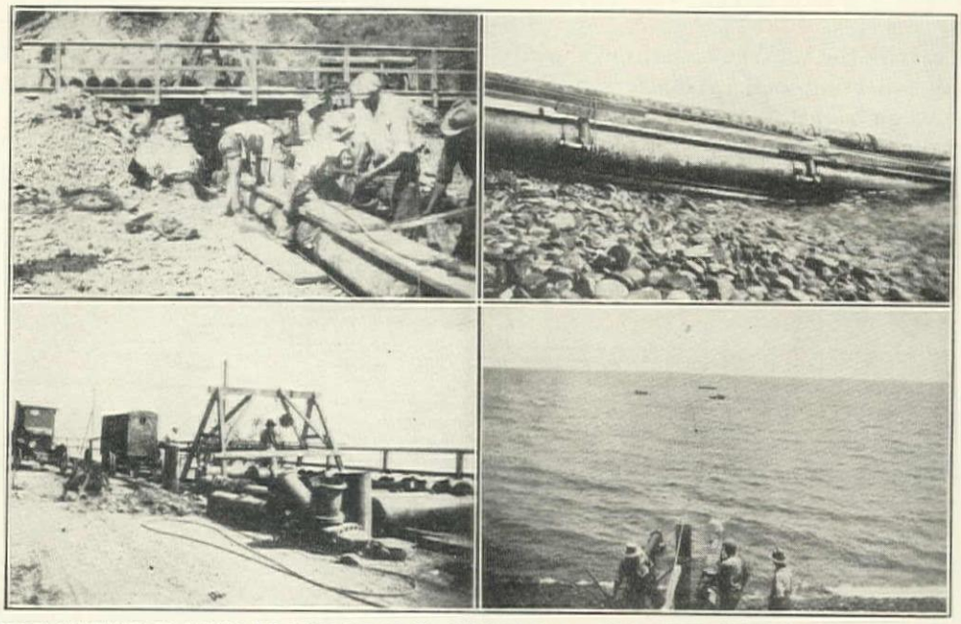
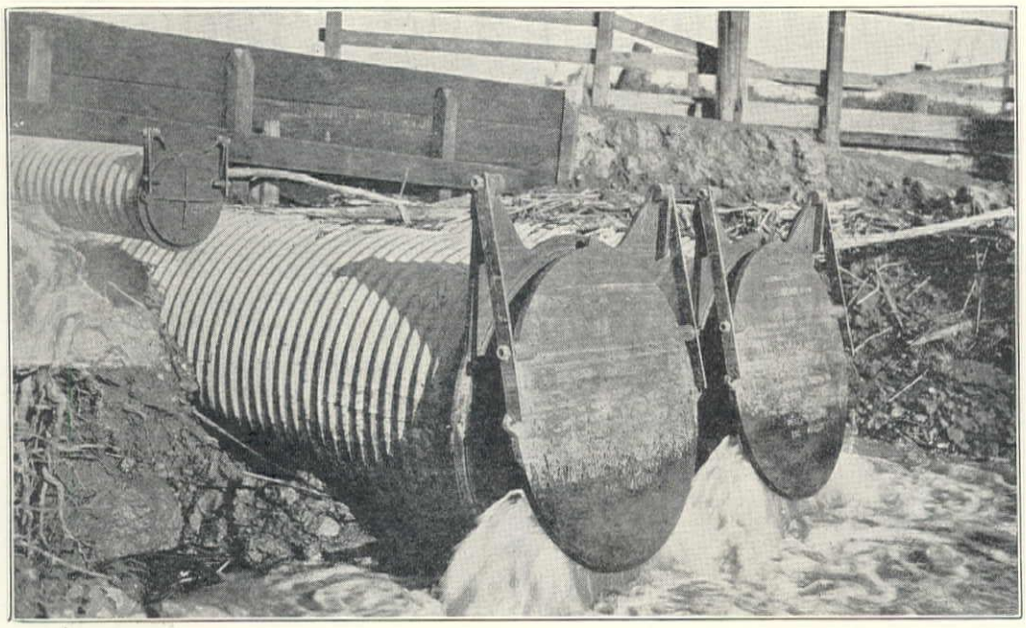


FIG. 2. (UPPER LEFT) WIRING PLANKS TO TOP OF 12-IN. UNIVERSAL CAST-IRON OCEAN OUTFALL SEWER FOR CITY OF AVALON. (UPPER RIGHT) DETAILS OF NEW OCEAN OUTFALL SEWER, OLD LINE IN BACKGROUND. (LOWER LEFT) LOWERING HOIST, SHOWING WINCH, AND ONE COMPRESSOR; 12-IN. GATE VALVE IN FOREGROUND. (LOWER RIGHT) LETTING AIR OUT AFTER LAST 30 FT. OF OUTFALL HAD BEEN PULLED OUT

B. C. Water Power Resources

The water power branch of the Provincial Government of British Columbia is completing its investigations of three potential power sites (Taseko-Chilko-Homathko project) totalling 3,000,000 hp. The major plant includes an 8.88-mile tunnel from Chilco lake under Chilco pass to operate at 2440 ft. head, followed by a tunnel 6 miles long with a 700-ft. head. F. W. Knewstubb, chief hydraulic engineer, is directing the investigations.



Take Cost and Care Out of Drainage

YOU'VE absolute assurance of out-flow and no fear of back-flow, when Calco Automatic Drainage Gates are on your job. The slightest change in water level operates these gates, giving control of drainage free from cost and care.

Calco Automatic Drainage Gates, attached to lengths of rust-resisting Armco Corrugated Pipe, are practically water-tight, dependable and durable. Together with these qualities and the ease in transportation and installation, these unique gates assure a most effective and economical drainage system.

Information and prices on Calco Automatic Drainage Gates will be sent gladly upon request

California Corrugated Culvert Company

LOS ANGELES: 424 Leroy Street **BERKELEY: 417 Parker Street**

calco products

37

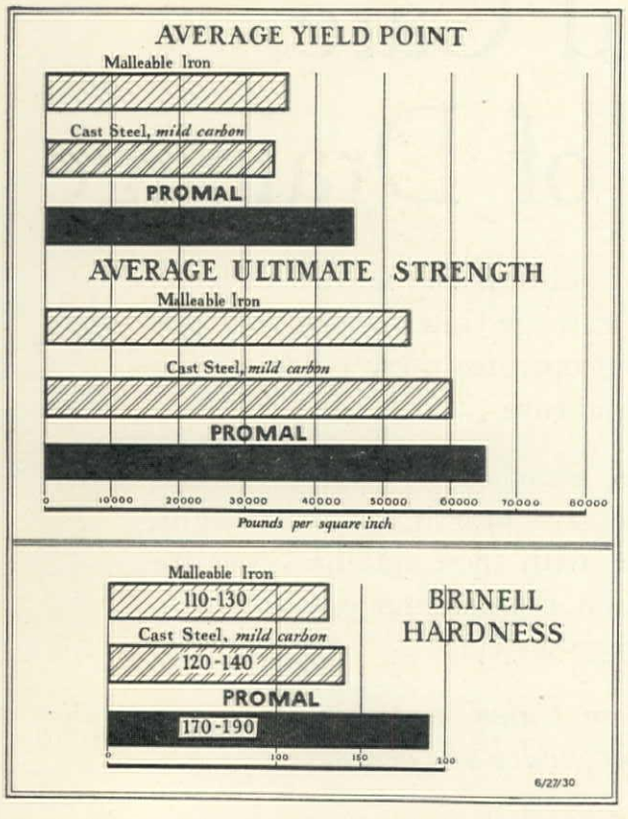
New Equipment and Trade Notes

METAL BASE HIGHWAY NEAR SPRINGFIELD

Construction has been started on an experimental metal-base highway 150 ft. long in Sangamon county, Illinois, near Springfield. This experiment will furnish the first actual test under field conditions for three different designs for permanent highways. The road will have a carefully rolled and prepared subgrade, on which an Armco ingot iron base and curb—selected for rust-resisting qualities—will be laid. A mastic sand cushion will follow, upon which will be placed a layer of 2½ or 3-in. brick with asphaltic filler poured into the interstices of the brick. The iron base will consist of three 50-ft. sections: one being blue annealed flat sheets ¼ in. thick, one of galvanized 10-ga. metal with corrugations parallel to the road, and the last of galvanized 10-ga. metal with transverse corrugations. The sheets will be joined in the field by spot or tack welding.

LINK-BELT ANNOUNCES 'PROMAL' CHAIN METAL

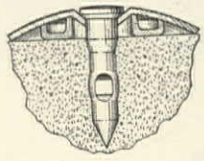
Culminating four years of effort to make longer lasting chains for conveying and power transmitting, Link-Belt Co. has developed and patented 'Promal' metal. Discovery of a new method for processing malleable iron has so altered its physical characteristics as to make a distinctly new metal. Some characteristics of this 'Promal' are shown in the accompanying chart. The average elongation is 14% as against 18% for malleable iron and 26% for mild cast steel, annealed.



To a high degree 'Promal' has the qualities desirable in sprocket chain material—great toughness to resist extreme tension without permanent stretch, high strength in proportion to weight and size, and hardness affording resistance to abrasive wear. With temperatures up to 1000° F., 'Promal' will not become brittle. In the past three years, a considerable quantity of all sizes of 'Promal' chain has been placed in actual service and performance data have been obtained covering practically all classes of duty. As a result, 'Promal' chains are now particularly recommended for chain drives, elevators, and conveyors operating under gritty or abrasive conditions; chain drives where greater strength is required than the corresponding size of malleable iron chain provides; drag, scraper, and flight conveyors where the chain drags and is subject to abrasion; and heavy-duty drives of comparatively high speed, short centers, and large sprocket ratios.

SHUNK TRAFFIC LANE MARKERS

The Shunk Manufacturing Co., Bucyrus, Ohio, has produced a traffic lane marker made from a special, rustless, heavy-gauge metal, for use on asphalt, macadam, concrete, and other types of roads and streets. The complete marker includes a forged pin or anchoring spike for a drive fit, an annular disc support or washer, and a marker plate. The marker plate can be used for outlining traffic safety restrictions and for indicating control letters such as 'stop', 'school', etc.



GILL AXIAL FLOW PUMPS

The Washington Iron Works, Seattle, has issued an 8-page pamphlet describing its line of Gill axial flow pumps for land drainage, sewage disposal, irrigation works, condenser circulation, flow boosting, handling storm water, dry dock service, and the pulp industry. The Gill axial flow pump consists essentially of a scientifically designed impeller running between fixed guide vanes in a portion of the pipe employed to convey liquid. This construction effects a saving in weight and decreases the required installation space; it permits a high specific speed and is said to be ideal for conditions involving wide variations of head.

VAULTED CONCRETE SIDEWALKS

The Portland Cement Association, a national organization to extend and improve the uses of concrete, recently issued a 12-page pamphlet on 'Vaulted Concrete Sidewalks'. The text of this pamphlet tells clearly how strong, durable, watertight concrete for vaulted concrete sidewalks may be obtained; includes a set of specifications; and is illustrated with detailed drawings.

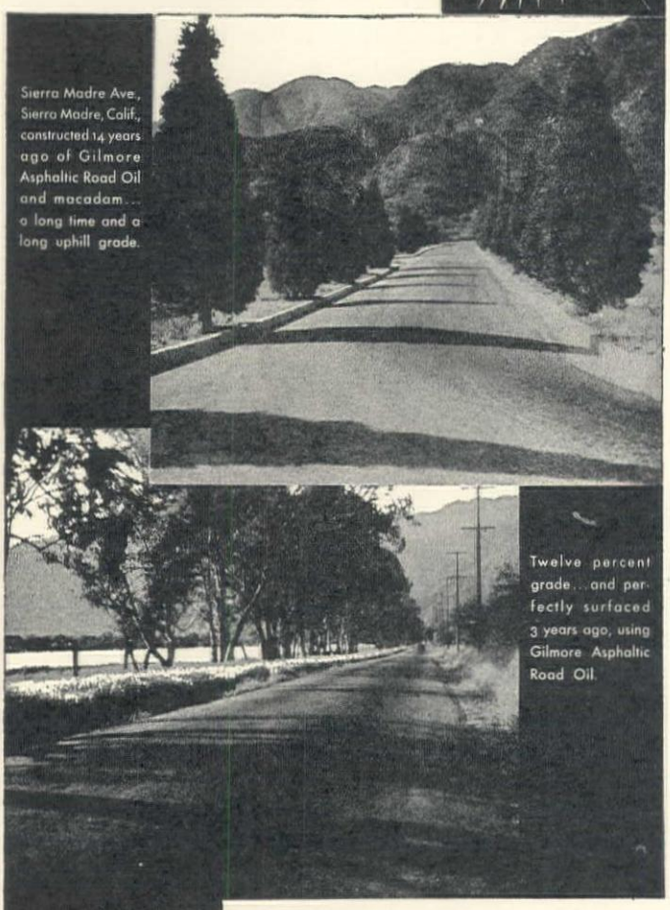
W & T AMMONIA CONTROL EQUIPMENT

Wallace & Tiernan Co., Inc., describes its line of ammonia control equipment in Technical Publication No. 138. The use of ammonia and ammonia compounds with chlorine in water treatment is attracting wide interest.

C. W. Lemmerman and Carl Harrington have left the Ric-Wil Co., of Cleveland, Ohio, manufacturers of underground conduit systems and sewer joint compound. The New York office of the company at 101 Park ave. is now in charge of H. A. Wicks.

LAUGHS AT GRADES

GILMORE OIL PRODUCTS
MONARCH OF ALL



Steep grades are being successfully surfaced with the use of Gilmore Roadamite Asphaltic Road Oil

Knowledge based on 25 years of experience enable Gilmore Engineers to specify the grade of oils and methods of construction that will stand the test of hillside roads. Address, Gilmore Oil Company, Ltd., 2423 East 28th St., Los Angeles, California.

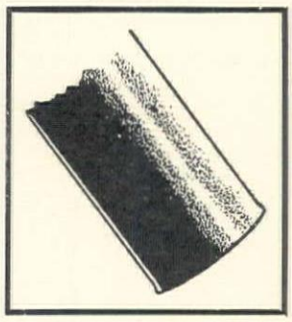
GILMORE

Roadamite **ASPHALTIC ROAD OIL**

217-R

MONO-Cast

has the bead cast on the spigot end



CERTAIN refinements in the manufacture of Mono-Cast centrifugal cast iron pipe make it superior to other cast iron pipe of its class. Among these refinements, none is more important that the *bead, which is cast on the spigot end of Mono-Cast!* This feature offers these advantages:

- . . . ***it assures quick, accurate centering in the bell***
- . . . ***it makes a tight joint that won't blow off***
- . . . ***it protects the spigot end against breakage in shipping and handling.***

Consider these advantages in specifying pipe for your next job. We can cite you many unpaid testimonials testifying to the worth of this "bead" feature—unique with Mono-Cast!

JUST OUT!

NEW EDITION OF THE "AMERICAN PIPE MANUAL," CONTAINING VALUABLE FORMULAS AND DATA FOR PIPE MEN EVERYWHERE. WRITE FOR YOUR COPY!

AMERICAN

CAST IRON PIPE COMPANY

BIRMINGHAM, ALABAMA

BRANCHES: NEW YORK CITY, CHICAGO, MINNEAPOLIS, CLEVELAND, KANSAS CITY, DALLAS, DETROIT, SAN FRANCISCO, LOS ANGELES, SEATTLE

UNIT BID SUMMARY

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

STREET AND ROAD WORK

SACRAMENTO, CALIF.—STATE—GRADING—BAYSHORE HIGHWAY—SAN MATEO COUNTY

Contract awarded to Basich Bros. Construction Co., 3788 S. Vermont St., Los Angeles, who bid $83,416 to California Division of Highways, for 4.1 miles grading, SAN MATEO COUNTY, from Redwood City to Willow Road. Bids received from:

(1) Basich Bros. Const. Co., L. A. ..... $ 83,416
(2) J. F. Knapp, Oakland 96,126
(3) Meyer Rosenberg, S. F. 98,253
(4) Fredrickson & Watson & Fredrickson Bros. 100,889
(5) Granfield, Farrar & Carlin, S. F. $104,738
(6) Peninsula Paving Co., S. F. 97,017
(7) J. P. Holland, Inc., S. F. 169,782

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
86,520	cu.yd. roadway excavation	.30	.30	.35	.26	.28	.30	.49
77,060	cu.yd. imp. borrow	.50	.60	.63	.73	.73	.624	1.36
2,050,000	sta.yd. overhaul	.004	.005	.0038	.005	.005	.005	.005
2,890	cu.yd. str. excavation	.70	1.00	.75	.90	1.00	.70	.75
223	cu.yd. conc. (struct.)	20.00	20.00	20.00	20.00	22.00	20.00	20.00
20,670	lb. rein. steel	.05	.05	.04	.05	.05	.05	.04
744	ft. 15-in. corr. pipe	.20	.50	.35	.40	.46	.40	.50
3,150	ft. 18-in. corr. pipe	.30	.60	.35	.40	.58	.40	.50
120	ft. 24-in. corr. pipe	.40	.70	.35	.40	.86	.50	.75
15	remove trees, size 1	4.00	5.00	2.00	2.50	2.00	1.00	4.00
23	remove trees, size 2	5.00	10.00	3.00	3.50	8.00	7.00	6.00
14	remove trees, size 3	6.00	20.00	5.00	4.50	20.00	21.00	10.00
216	sta. finish roadway	3.00	5.00	8.00	4.00	3.00	7.00	2.00
3.1	mi. property fence	350.00	400.00	300.00	350.00	550.00	500.00	650.00
20	monuments	4.00	2.50	2.50	3.00	3.00	3.00	3.00

PHOENIX, ARIZ.—STATE—GRADING AND STEEL BRIDGE—TUCSON-NOGALES HIGHWAY

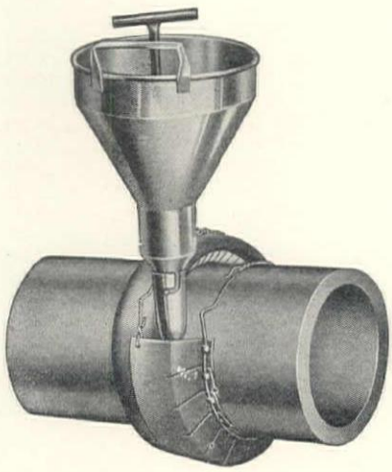
Contract awarded to Skeels & Graham, Tucson, Arizona, who bid $78,028 to the Arizona State Highway Commission, for improvement of 8.7 miles of the Tucson-Nogales Highway, by grading, draining and placing subgrade stabilizer, and constructing bridge. Bids received from the following concerns:

(1) Skeels & Graham Co., Tucson $78,028
(2) Dudley & Amesbury, El Paso 79,797
(3) Hietsch & Bitten, Pontiac, Mich. 80,524
(4) Lee Moor Contracting Co. 81,667
(5) Packard & Tanner, Phoenix $89,781
(6) William Peper, Phoenix 89,925
(7) Schmidt-Hitchcock, Phoenix 92,425

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
15	sqrs. cleaning and grubbing	10.00	20.00	12.00	6.00	17.00	100.00	16.00
23,460	cu.yd. roadway excavation	.35	.35	.32	.39	.45	.42	.54
7,462	cu.yd. drainage excavation	.35	.80	.40	.34	.52	1.00	.75
714	cu.yd. structure excavation	1.50	.50	.80	.75	2.00	1.00	1.60
63,283	cu.yd. borrow excavation	.22	.20	.26	.25	.24	.25	.28
10,000	sta.yd. overhaul earthwork	.02	.05	.025	.01	.05	.05	.05
2,972	cu.yd. subgrade stabilizer	.35	.50	.40	.38	.80	.90	.25
4,532	cu.yd.mi. subgrade stabilizer haul	.18	.20	.25	.24	.18	.25	.23
350	cu.yd. 'A' concrete	23.00	22.50	22.00	23.50	24.00	20.00	23.00
111	cu.yd. 'B' concrete	26.00	22.50	21.00	22.00	24.00	17.00	22.00
24,027	lb. reinforcing steel	.05	.055	.05	.045	.06	.06	.055
730	ft. 24-in. corr. metal pipe	3.00	2.56	2.50	3.00	3.15	3.25	2.95
56	ft. 30-in. corr. metal pipe	3.75	3.24	3.00	3.60	3.96	4.00	4.00
202	ft. 36-in. corr. metal pipe	5.80	5.00	5.00	5.82	6.40	6.00	6.00
17,200	ft. reconstruct fences	.06	.05	.06	.025	.05	.04	.11
990	ft. cable guard fence	.80	1.00	.90	.95	.90	1.00	1.10
225	ft. rail bank protection	4.00	1.50	4.00	5.00	4.00	8.00	4.20
20	ft. reset 18-in. corr. metal pipe	.75	.50	.60	1.00	2.00	1.50	.95
60	remove 18-in. corr. metal pipe	.75	.20	.50	.75	1.32	.50	.50
180	ft. remove 24-in. corr. metal pipe	1.00	.25	.60	.75	1.42	.50	.55
140	ft. remove 30-in. corr. metal pipe	1.25	.30	.70	1.00	1.52	.50	.65
60	ft. remove 36-in. corr. metal pipe	1.50	.30	.80	1.00	1.68	1.00	.75
	Remove concrete bridge	300.00	150.00	350.00	400.00	700.00	250.00	550.00
	Remove deck and east abutment old bridge	200.00	150.00	350.00	450.00	500.00	250.00	500.00
350	ea. cutting and grubbing trees	5.00	5.00	5.50	5.00	5.50	3.00	8.50
915	cu.yd. excavation	1.50	2.50	2.50	1.50	2.24	1.00	1.60
14	cu.yd. 'AA' concrete	70.00	60.00	80.00	70.00	80.00	75.00	75.00
606	cu.yd. 'A' concrete	23.50	22.50	22.00	25.00	24.00	24.00	23.00
241	cu.yd. 'A' concrete channel lining	21.75	22.50	25.00	23.50	24.00	21.00	21.00
123	cu.yd. 'B' concrete	20.50	22.50	21.00	23.00	24.00	17.00	22.00
75,490	lb. reinforcing steel	.05	.055	.05	.045	.06	.06	.055
12	fixed plate bridge seats	3.50	4.00	20.00	15.00	4.00	3.00	20.00
8	expansion plate bridge seats	23.00	60.00	50.00	20.00	28.00	28.00	30.00
4	expansion rocker bridge seats	56.00	80.00	65.00	69.00	80.00	60.00	50.00
849	sq.yd. electric welded wire fabric	.28	.40	.30	.47	.50	2.50	.10

Weston's Gasket and Form

The Perfected Joint for Sewer Pipe



The Weston System for Leakproof and Rootproof Pipe Joints

A Perfect Joint Under All Conditions

Manufactured by

L. A. WESTON

Adams, Mass.

The Deming Corporation

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Pacific Coast Distributors

4227 Whiteside Avenue

Los Angeles -:- -:- Calif.

IN THE OWEN ALPHABET "S" MEANS SWIFTER OUTPUT

Count on these large, wide-spreading Owen Type "S" Rehandlers to make fast time on the job. And how! A full Owen-sized load every time . . . overloads where the material is deep . . . quick, clean dumping . . . nothing left for clean-up. A Bigger Day's Work—yes sir, that's under guarantee.

THE OWEN BUCKET CO.

6018 **Breakwater Ave., Cleveland, Ohio**

OWEN BUCKET CO.....Oakland, Calif.
BROWN-BEVIS CO.....Los Angeles, Calif.
CLYDE EQUIPMENT CO.....Portland, Ore.
H. J. ARMSTRONG.....Seattle, Wash.

MILL VALLEY, CALIF.—CITY—CONCRETE

Contract awarded to McDonald & Maggiora, 236 Second St., Sausalito, who bid $89,677 for the improvement of portions of Corte Madera Ave., Summit Ave., Magee Ave., etc., work for the City of Mill Valley, Marin County. Bids from:

(1) McDonald & Maggiora, Sausalito.....$89,677
(2) N. M. Ball, Stockton..... 90,497
(3) Union Paving Co., S. F..... 93,430
(4) Clark & Henery Const. Co., S. F.....$ 99,950
(5) A. G. Raisch, San Francisco..... 106,146

		(1)	(2)	(3)	(4)	(5)
17,180	cu.yd. excavation	.65	.80	.60	.60	.70
14,140	lin.ft. concrete curb	.30	.35	.40	.40	.50
300	sq.ft. scope gutter	.186	.20	.30	.229	.25
261,130	sq.ft. 7-in.x5-in.x7-in. conc. paving	.186	.18	.21	.229	.23
4,500	sq.ft. oil macadam paving	.13	.12	.14	.12	.15
5,980	ft. 8-in. vitrified sewer	1.08	1.05	1.00	1.00	1.00
6,575	ft. 6-in. vitrified sewer	.84	.85	.85	.85	.85
1,255	ft. 4-in. vitrified sewer	.60	.75	.60	.60	.60
90	ft. 10-in. vitrified conduit	1.20	1.50	1.15	1.25	1.25
470	ft. 10-in. corrugated conduit	1.86	1.40	1.25	1.40	1.35
426	ft. 12-in. corrugated conduit	1.92	1.40	1.50	1.75	1.50
85	ft. 15-in. corrugated conduit	2.28	1.70	2.00	2.00	2.00
132	ft. 24-in. corrugated conduit	3.60	3.25	3.00	3.50	3.50
28	manholes	60.00	67.00	55.00	60.00	70.00
77	lampholes	12.00	15.00	10.00	10.00	20.00
6	handholes	36.00	20.00	10.00	25.00	40.00
28	conduit inlets	36.00	30.00	20.00	40.00	50.00
38	monuments	12.00	15.00	10.00	10.00	10.00
155	cu.yd. concrete (wall)	19.00	17.00	18.00	20.00	25.00
46	cu.yd. concrete (arch culvert)	20.00	25.00	18.00	22.00	30.00
5,600	lb. reinforcing steel	.05	.05	.04	.06	.05
300	ft. 4-in. drain tile	.50	.75	.30	.40	1.00
385	ft. wire guard fence	.90	1.25	1.00	1.00	1.00
161	ft. concrete sewer protection	.50	.60	.40	.35	1.00

DENVER, COLO.—GOVT.—GRADING—COLORADO

Award of contract recommended to L. T. Lawler, Lewishon Bdg., Butte, Montana, who bid $437,178 to the U. S. Bureau of Public Roads for 10 miles grading Fall River Project (Section 1C-Fall River West) in Rocky Mountain National Park, LARIMER COUNTY, Colorado. Bids from:

(1) L. T. Lawler, Butte, Montana.....$437,178
(2) V. P. Strange, Salt Lake City..... 442,919
(3) Cook & Ransom, Ottawa, Kansas..... 447,462
(4) E. H. Honnen, Colorado Springs.....$491,127
(5) Morrison-Knudsen Co., Boise 446,770
(6) Engineer's estimate 454,498

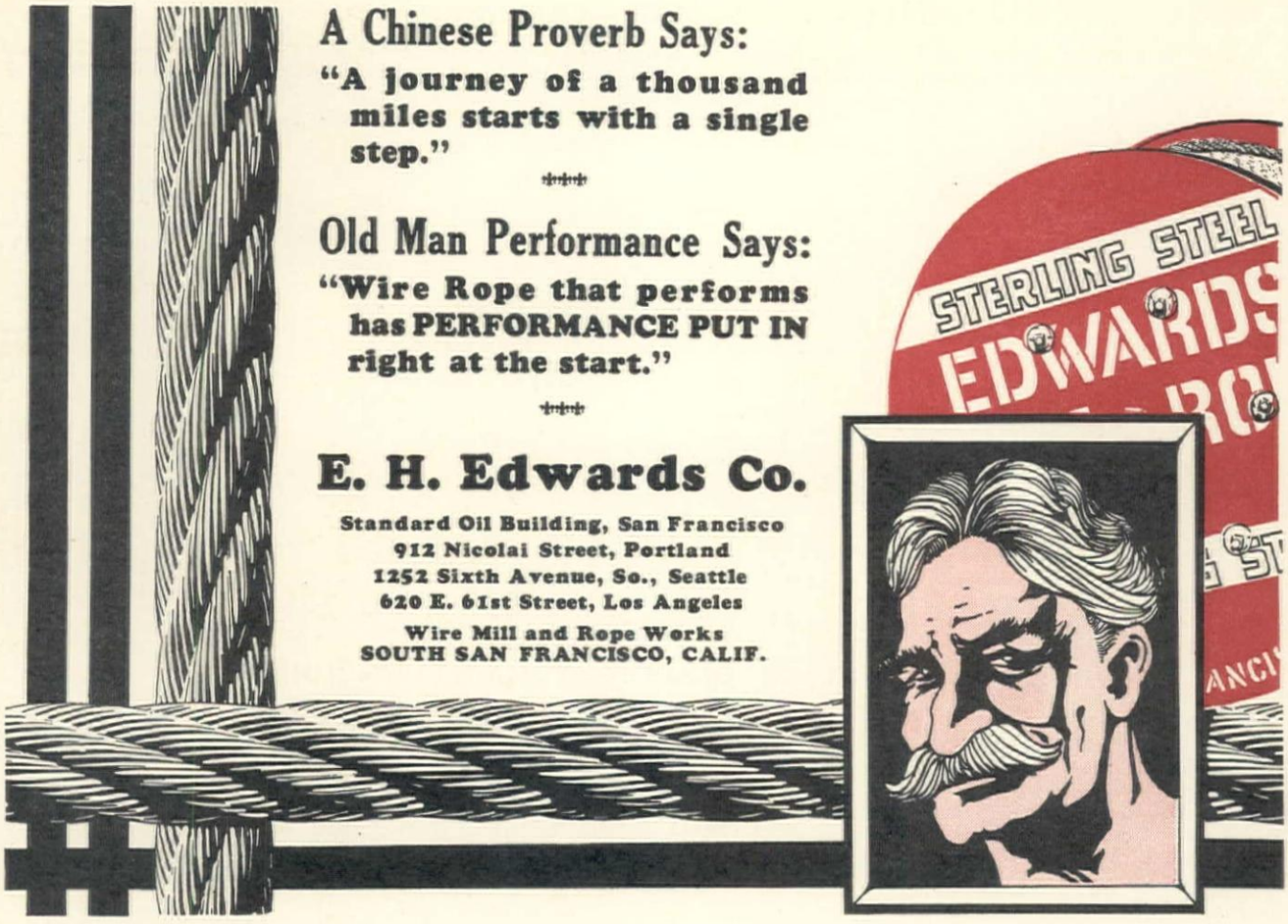
		(1)	(2)	(3)	(4)	(5)	(6)
67	acres clearing	275.00	200.00	150.00	200.00	300.00	250.00
36	acres grubbing	200.00	200.00	50.00	100.00	200.00	150.00
287,800	cu.yd. unclassified excavation, type 'A'	.85	.90	.94	1.05	.88	.90
27,789	cu.yd. unclassified excavation, type 'B'	1.30	1.40	1.50	1.40	1.20	1.63
5,600	cu.yd. unclassified excavation, structures	2.00	1.60	2.00	2.00	1.50	2.00
63,000	sta.yd. overhaul	.03	.03	.03	.03	.03	.03
10,865	miles finishing	300.00	200.00	200.00	300.00	300.00	300.00
425	cu.yd. 'A' concrete	37.50	35.00	28.00	30.00	40.00	37.00
46,080	lb. reinforcing steel	.07	.08	.055	.10	.07	.10
2,695	cu.yd. cement rubble masonry	20.00	20.00	18.00	17.00	21.00	18.00
600	ft. 18-in. corr. metal pipe culvert	2.25	2.00	2.00	2.00	2.00	2.00
6,400	ft. 24-in. corr. metal pipe culvert	2.60	2.50	2.75	3.00	2.50	2.50
340	ft. 30-in. corr. metal pipe culvert	4.25	4.00	3.50	4.00	3.50	3.50
15,000	cu.yd. handlaid rock embankment	1.35	1.25	1.50	2.00	1.50	1.50
300	ft. blind underdrain (rubble)	2.00	1.50	5.00	1.50	2.00	1.50
Lump sum	maintenance of detours	$1000	$1000	$1000	$1000	$1000	$1000
1	mile plowing old road	100.00	150.00	200.00	300.00		500.00

CARSON CITY, NEVADA—STATE—GRADING AND SURFACING—CLARK COUNTY

Contract awarded to A. D. Drumm, Jr., Fallon, Nevada, $47,838 for 12.6 miles grading and surfacing in CLARK COUNTY from California State Line to Jean, work for the Nevada State Highway Commission. Bids from:

(1) A. D. Drumm, Jr., Fallon.....$47,838
(2) J. N. Tedford, Fallon, Nevada..... 51,937
(3) Dodge Bros., Inc., Fallon..... 52,256
(4) Hodgman & MacVicar, Pasadena..... 55,540
(5) Martin Bros., Trucking Co..... 55,828
(6) Gibbons & Reed Co., Salt Lake City..... 56,235
(7) General Const. Corporation and R. A. Wattson, Las Vegas, Nev. $56,717
(8) Fleming Const. Co., Pomona..... 59,010
(9) Utah Construction Co., Ogden..... 59,194
(10) Triangle Rock & Gravel Co..... 59,839
(11) Engineer's estimate 73,898

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
60,500	cu.yd. excavation, unclassified	.22	.25	.25	.22	.26	.22	.275	.26	.24	.28	.40
17,689	sta.yd. overhaul	.02	.04	.03	.05	.03	.04	.02	.02	.05	.03	.04
12.62	mi. prepare subgrade and shoulders	$100	$50	$75	$60	$150	$375	$100	$100	$250	$200	$100
40,800	cu.yd. cr. rock or gravel	.68	.75	.75	.85	.75	.79	.84	.92	.84	.84	1.00
600	cu.yd. cr. rock or cr. gravel stockpiles	.68	.75	.75	.85	.75	.79	.83	.80	.84	.84	1.00
105	cu.yd. 'B' concrete	30.00	30.00	32.50	35.00	30.00	27.00	22.50	24.00	36.00	32.00	40.00
706	ft. 18-in. corr. metal pipe	.50	.40	.50	.50	1.50	.45	.50	.30	.60	.60	.75
1,052	ft. 24-in. corr. metal pipe	.50	.40	.50	.60	1.50	.65	.50	.30	.80	.60	.75
92	ft. 30-in. corr. metal pipe	.50	.50	.50	.75	1.50	.75	1.00	.30	1.50	1.00	.75
60	ft. 36-in. corr. metal pipe	.50	.50	.75	.90	1.50	.80	1.00	.30	3.00	1.50	.75
34	monuments	4.00	2.50	3.00	3.00	3.00	5.00	3.00	4.00	4.00	3.00	4.00
2	posts, Federal Aid markers	10.00	5.00	10.00	5.00	4.00	3.00	10.00	10.00	5.00	10.00	5.00
Remove and reconstruct	buildings	$500	$400	$100	$500	$500	$650	$200	$400	$350	$350	$550



A Chinese Proverb Says:

"A journey of a thousand miles starts with a single step."

****

Old Man Performance Says:

"Wire Rope that performs has PERFORMANCE PUT IN right at the start."

****

E. H. Edwards Co.

Standard Oil Building, San Francisco
912 Nicolai Street, Portland
1252 Sixth Avenue, So., Seattle
620 E. 61st Street, Los Angeles

Wire Mill and Rope Works
SOUTH SAN FRANCISCO, CALIF.

Steel *for* Reinforcing

REINFORCING steel products manufactured by Pacific Coast Steel Corporation include the following:

REINFORCING BARS
ELECTRIC WELDED MESH
DOWELS—SLEEVES
HIGHWAY BAR SUPPORTS
(to comply with State Specifications)

PACIFIC COAST STEEL CORPORATION manufactures a complete line of bars and other reinforcing steel for highway building and construction work.

For contract work, we are prepared to submit figures on reinforcing bars sheared to lengths, bent to specifications, delivered on the job, ready for forms. These bars can be furnished Plain, Deformed and Special, in Squares and Rounds.

Contractors will find our preferred service and ability to make prompt shipments of reinforcing steel a decided help in maintaining construction schedules.

PACIFIC COAST STEEL CORPORATION

Subsidiary of BETHLEHEM STEEL CORPORATION

General Offices: Matson Building, San Francisco

Portland: American Bank Building
Seattle: 28th Avenue Southwest and West Andover Street
Honolulu: Schuman Building
Los Angeles: Pacific Finance Building

Plants at Seattle, San Francisco and Los Angeles

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City

OGDEN, UTAH—GOVT.—GRADING—IDAHO

Award of contract recommended to W. L. Geist, St. Maries, Idaho, who bid $89,645 to U. S. Bureau of Public Roads, Ogden, Utah, for 7.091 miles grading and draining Elk City Highway, Nez Perce National Forest, IDAHO COUNTY, Idaho. Bids received from:

(1) W. L. Geist, St. Maries, Idaho $89,645
(2) Ryberg-McHugh & Co., Boise 93,469
(3) Siems-Spokane Co., Spokane, Wash. 94,164
(4) Max J. Kuney Co., Spokane $110,735
(5) Engineer's estimate 112,201

		(1)	(2)	(3)	(4)	(5)
35	acres clearing	225.00	90.00	110.00	200.00	125.00
20	acres grubbing	100.00	50.00	130.00	100.00	125.00
80,000	cu.yd. unclassified excavation	.84	.90	.92	1.00	1.10
2,600	cu.yd. solid rock excavation	1.50	3.00	1.35	1.50	2.50
320	cu.yd. excavation for struc.	1.50	1.50	2.00	3.00	1.50
20,000	sta.yd. overhaul	.05	.05	.04	.05	.06
7.091	mi. finishing earth graded road	125.00	100.00	300.00	1000.00	250.00
2	ea. 11-ft. span cedar log bridge	330.00	600.00	220.00	400.00	220.00
1	ea. 17-ft. span cedar log bridge	510.00	700.00	400.00	700.00	340.00
100	lin.ft. cedar logs in bents	.50	1.00	1.00	1.00	.80
16	cu.yd. 'B' concrete 4x4-ft. culvert	34.00	40.00	35.00	35.00	36.00
10	cu.yd. 'C' concrete pedestal	34.00		35.00	35.00	30.00
1,500	lb. reinforcing steel	.10	.10	.12	.10	.12
80	cu.yd. cement rubble masonry headwalls	10.00	14.00	12.00	15.00	15.00
1,132	ft. 18-in. corr. metal pipe	2.00	1.80	2.30	3.00	2.66
26	ft. 24-in. corr. metal pipe	3.00	3.00	4.00	4.00	3.75
20	ft. 30-in. corr. metal pipe	3.90	3.65	5.00	6.00	4.25
72	ft. 36-in. corr. metal pipe	6.25	6.00	7.50	7.00	6.00
200	cu.yd. handlaid riprap	1.50	3.00	3.00	3.00	3.00
20	ea. dangerous trees or snags	4.00	10.00	5.00	10.00	5.00

PHOENIX, ARIZ.—STATE—GRADING—YUMA-WELLTON HIGHWAY

Contract awarded to Canion & Francis & Royden, 2012 W. Van Buren St., Phoenix, Ariz., who bid $77,693, to Arizona State Highway Commission, for construction of the Yuma-Wellton Highway, from 3 miles east of Ligurta east 5.6 miles, by grading and clearing. Bids received from:

(1) Canion & Francis & Royden $77,693
(2) V. R. Dennis Const. Co., San Diego 78,564
(3) Skeels & Graham Co., Tucson 79,575
(4) Packard & Tanner, Phoenix 88,739
(5) Yglesias Bros., Inc., San Diego ..... $ 83,951
(6) N. G. Hill & Co., Phoenix, Ariz. 86,161
(7) Hodgman & MacVicar, Pasadena 89,979
(8) Tenney & Black, Clifton, Ariz. 93,698
(9) Hall-Johnson Co., Alhambra 101.859

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
50	sqrs. clear and grubbing	6.00	25.00	5.00	9.00	20.00	10.00	12.00	21.00	15.00
3,865	cu.yd. roadway excav.	.22	.30	.35	.33	.35	.30	.30	.30	.60
1,717	cu.yd. drainage excav.	.20	.30	.20	.36	.25	.30	.25	.30	.40
421	cu.yd. structure excav.	.75	1.50	1.25	1.80	.75	1.00	.90	1.00	1.00
63,962	cu.yd. borrow excav.	.20	.20	.20	.22	.23	.30	.25	.25	.30
5,000	sta.yd. earthwork overhaul	.03	.06	.03	.05	.04	.03	.05	.05	.03
13,895	cu.yd. subgr. stabilizer	.60	1.20	.60	.80	.75	.60	.60	.80	1.00
85,729	cu.yd. mi. subr. stab. haul	.18	.06	.15	.18	.14	.15	.18	.18	.18
259	cu.yd. A concrete	20.00	22.00	21.50	22.00	22.00	22.00	24.00	25.00	25.00
55	cu.yd. B concrete	20.00	25.00	27.50	22.00	22.00	22.00	24.00	24.00	24.00
16,432	lb. reinforcing steel	.05	.05	.05	.06	.05	.055	.07	.07	.07
78	ft. 24-in. corr. metal pipe	2.80	3.50	3.00	3.15	3.00	3.50	3.00	3.20	3.00
36	ft. 30-in. corr. metal pipe	3.50	4.50	4.00	3.96	4.00	4.50	4.00	3.90	4.00
152	ft. 36-in. corr. metal pipe	5.40	7.00	5.50	6.40	5.00	5.50	5.00	5.90	5.00
2,000	ft. new line fence	.05	.10	.10	.06	.10	.10	.07	.08	.25
525	ft. rail bank protection	4.50	6.00	5.00	4.00	7.00	4.00	5.00	3.50	4.00
	STRUCTURES OVER 20 FT. CLEAR SPAN									
1,612	cu.yd. excavation	.75	1.00	1.25	1.80	.75	1.00	.90	1.00	1.00
1,157	cu.yd. A concrete	20.00	19.00	21.50	22.00	22.00	22.00	24.00	25.00	25.00
81,020	lb. reinf. steel	.05	.045	.05	.06	.05	.055	.0675	.06	.07

GILROY, CALIFORNIA—ASPHALT—CITY

Contract awarded to Hanrahan Company, Standard Oil Bdg., San Francisco, who bid $77,774 to City of Gilroy, Santa Clara County, for improving Hanna, Rosanna and other streets. Bids on:

(1) 500,882 sq.ft. 5-in. asphalt paving
(2) 41,515 sq.ft. 2-ft. gutter
(3) 3,734 lin.ft. concrete curb
(4) 4,555 sq.ft. cement sidewalk
(5) 3,052 ft. 6-in. concrete storm sewer
(6) 9 catchbasins
(7) 10,518 cu.yd. excavation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
Hanrahan Company, San Francisco	.129	.15	.36	.13	.50	35.00	.30	$77,774
Union Paving Co., San Francisco	.139	.139	.40	.10	.50	50.00	.01	79,424
Peninsula Paving Co., S. F.	.138	.20	.50	.17	.60	60.00	.42	86,865

ALTURAS, CALIF.—CITY—ASPHALT

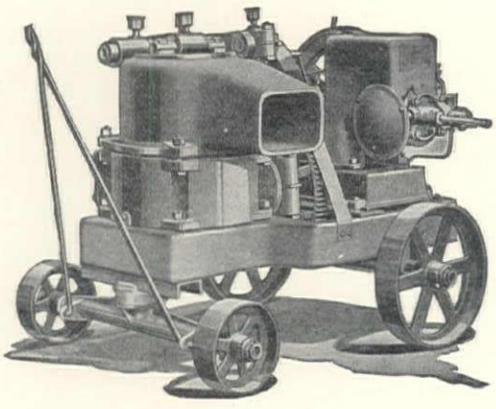
Contract awarded to Valley Paving & Construction Co., Visalia, who bid $123,861 to the City of Alturas, Modoc County, for paving Main Street from Carlos Street to 12th Street. Bids on:

(1) 29.000 sq.yd. asphaltic concrete pav.
(2) 4,600 cu.yd. crushed rock sub-base
(3) 8,000 lin.ft. curb
(4) 8,000 lin.ft. gutter
(5) 4,600 sq.yd. sidewalk
(6) Constructing corrugated culverts

	(1)	(2)	(3)	(4)	(5)	(6)	TOTALS
Valley Paving & Const. Co., Visalia	258	4.48	.60	1.10	.22	2.70	$123,861
A. Teichert & Son, Sacramento	293	3.25	.70	.90	.20	3.00	127,848
Hanrahan Company, San Francisco	318	3.00	.50	.75	.20	2.00	128,495
Clark & Henery Const. Co., San Francisco	305	4.15	.50	.90	.20	1.20	129,932

CH&E "Mud Hen"

Diaphragm Trench or Bilge Pumps

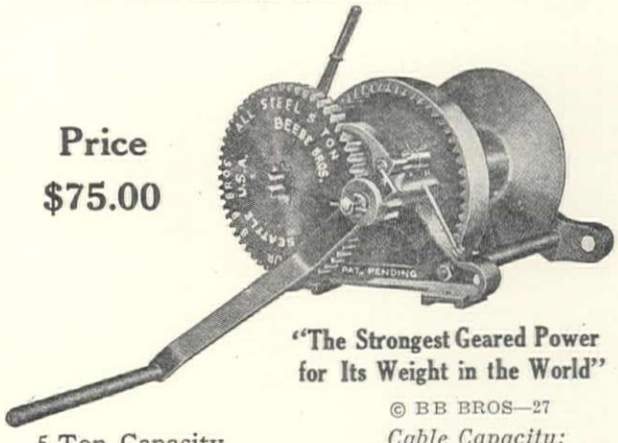


No Splashing of Water from Top of Pump
Light Weight, Compact and Sturdy
CARRIED IN STOCK

B. B. ALL STEEL HAND HOIST Bros.

TRADE MARK
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

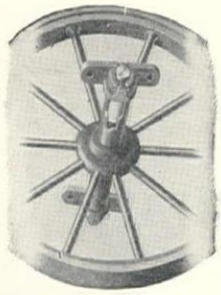
Cable Capacity:
160 ft. of 5/8 in. Rope
250 ft. of 1/2 in. Rope
445 ft. of 3/8 in. Rope
Two Speeds 4-1 and 24-1
Positive Internal Brake

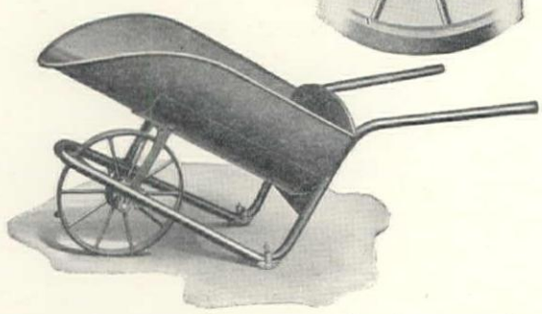
Harron, Rickard & McCone Co.

2205 Santa Fe Avenue, Los Angeles — *"SINCE 1875* — 1600 Bryant St., San Francisco
JEfferson 4191 — UNderhill 3740

Sterling Carts and Barrows

The wheel alone is worth the price of a barrow. It has 10 spokes, flush rivets, steel hub, self-lubricating bearings, malleable brackets, keyed axle.





Note the extra tray support for bottom and back. Also the malleable arch brace and continuous frame. Malleable shoes protect the legs. In stock for immediate delivery.

Harron, Rickard & McCone Co.

SAN FRANCISCO
1600 Bryant Street

LOS ANGELES
2205 Santa Fe Avenue

CONFIDENCE

Confidence—Built on a foundation as secure as MacArthur's own sturdy piles.

Confidence—Ever-increasing because the MacArthur method of casting piles in place, of dry concrete (just sufficient water to hydrate), under seven tons compression gives extra load-bearing value.

You may find detailed information of distinct value when next you have a pile job under consideration.

MacARTHUR

CONCRETE PILE CORPORATION

58 Sutter Street San Francisco, California
Telephone: KEarny 3058

SAN FRANCISCO, CALIF.—SUNSET BOULEVARD—SECTION D

California Construction Co., Standard Oil Bdg., San Francisco, who bid $97,890, low bid to Board of Public Works, City Hall, San Francisco, for the improvement of Sunset Boulevard, Section "D," from Noriega St. to Irving St. Bids from:

(1) California Const. Co., San Francisco ..... $ 97,890
(2) Charles Harney, San Francisco 109,362
(3) E. J. Treacy, San Francisco 120,517
(4) Granfield, Farrar & Carlin, San Francisco 122,156
(5) James Smith, San Francisco $107,539
(6) Fay Improvement Co., San Francisco 111,210
(7) Meyer Rosenberg, San Francisco 105,113

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
133,600	cu.yd. excavation	.15	.19	.20	.25	.18	.20	.19
61,700	cu.yd. imported borrow	.15	.19	.20	.25	.18	.20	.17
192,900	sq.ft. 2½-in. asph. surf. 10-in. macd. base	.14	.13	.167	.14	.155	.135	.125
38,600	sq.ft. 2½-in. asph. surf. 6-in. F conc. base	.20	.24	.22	.22	.25	.2135	.20
242	tons asphalt conc. conform paving	5.00	6.00	6.00	7.00	6.50	5.50	6.00
90,700	sq.ft. 4-in. waterb. macadam paving	.03	.03	.04	.03	.025	.028	.04
45,700	sq.ft. 6-in. waterb. macadam paving	.04	.04	.045	.05	.033	.042	.05
13,500	sq.ft. concrete sidewalk	.13	.12	.12	.12	.10	.12	.12
13,400	lin.ft. unarmored conc. curb	.45	.70	.70	.60	.47	.60	.70
470	lin.ft. reset concrete curbs	.20	.25	.40	.25	.25	.17	.50
18,200	lin.ft. 2-in. x 6-in redwood headers	.07	.08	.10	.06	.08	.09	.08
240	lin.ft. 18-in. vitrified pipe sewers	2.75	2.00	2.25	2.50	1.90	2.82	2.00
240	lin.ft. 15-in. vitrified pipe sewers	2.00	3.50	2.00	2.00	1.40	2.40	1.50
120	lin.ft. 12-in. vitrified pipe sewers	1.50	2.00	1.50	1.50	1.00	1.62	1.50
570	lin.ft. 10-in. vitrified culvert	1.50	1.00	1.50	1.00	.80	1.50	1.00
5	brick manholes	$100	75.00	80.00	85.00	70.00	95.00	80.00
10	brick catchbasins	$100	75.00	80.00	85.00	75.00	88.00	80.00
5	brick catchbasins reset	30.00	50.00	60.00	40.00	25.00	45.00	50.00
650	lin.ft. 3-in. black pipe conduit	.80	.60	.40	.75	.55	.72	.50
2,100	lin.ft. 1½-in. black pipe conduit	.40	.30	.30	.40	.20	.32	.30
3	9-unit reflectors on pipe posts	20.00	25.00	30.00	15.00	25.00	17.00	25.00
2	keep-to-right signs	7.00	10.00	40.00	13.00	50.00	6.50	25.00
9,920	cu.yd. loam	.90	1.00	1.00	1.00	1.00	1.00	.85
1,860	cu.yd. manure	2.50	2.50	3.20	3.00	2.50	3.00	2.50
3	tons hay, slope protection	40.00	50.00	40.00	20.00	50.00	38.00	50.00

LOS ANGELES, CALIF.—COUNTY—CONCRETE—AVALON BOULEVARD

G. W. Ellis, 404 Bradbury Bdg., Los Angeles, who bid $203,440, low bid to County for improving Avalon Blvd., 2.8 miles. Eight lowest bids from:

(1) G. W. Ellis, Los Angeles $203,440
(2) John Papac, Los Angeles 204,146
(3) Basich Bros., Los Angeles 206,809
(4) P. P. Janich, Los Angeles 211,775
(5) Kovacevich & Price, L. A. $215,501
(6) J. A. Thompson, Los Angeles 217,889
(7) Geo. R. Curtis Paving Co., L. A. 222,911
(8) J. L. McClain, Los Angeles 227,444

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
62,843	cu.yd. excavation	.2775	.235	.22	.25	.43	.35	.42	.33
805,298	sq.ft. 9 by 7-in. conc. pav.	.18	.17	.19	.193	.173	.189	.185	.188
48,944	sq.ft. 8-in. conc. paving	.195	.18	.20	.2025	.177	.21	.196	.20
882,297	sq.ft. 5-in. dist. rk. subba	.033	.0475	.03	.0315	.043	.035	.04	.049
73	ft. 15-in. corr. iron pipe	1.82	2.40	1.90	1.75	1.75	2.00	1.65	1.75
248	ft. 18-in. corr. iron pipe	2.05	2.25	2.15	2.00	2.00	2.20	1.80	2.00
68	ft. 24-in. corr. iron pipe	2.50	2.80	2.65	2.75	2.75	2.70	2.70	2.75
48	ft. 30-in. corr. iron pipe	3.45	3.90	3.75	4.00	4.00	4.00	3.85	4.00
315	ft. 36-in. corr. iron pipe	4.00	4.20	4.40	5.00	4.75	5.00	4.90	5.00
1	15-in. automatic drain. gate	10.20	12.50	20.00	15.00	15.00	25.00	12.25	15.00
1	24-in. autom. drainage gate	22.90	26.00	30.00	30.00	30.00	50.00	27.50	30.00
1	30-in. autom. drainage gate	42.50	47.00	55.00	50.00	50.00	75.00	51.00	50.00

SEWER CONSTRUCTION

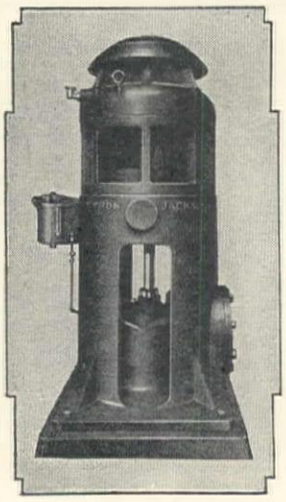
SAN FRANCISCO, CALIF.—CITY—COLLEGE HILL TUNNEL SEWER

T. E. Connolly, Sheldon Bdg., San Francisco, who bid $251,617, low bid to Board of Public Works, City Hall, San Francisco, for the construction of the College Hill Tunnel Sewer. Bids received from the following concerns:

(1) T. E. Connolly, San Francisco $251,617
(2) Hanrahan Company, San Francisco 256,618
(3) MacDonald & Kahn, San Francisco 289,987
(4) Healy Tibbitts Construction Co., S. F. 309,746
(5) Youdall Const. Co., San Francisco $312,603
(6) W. S. Mead, Oakland 295,904
(7) J. C. Hickey, Berkeley 327,574

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
4,319	lin.ft. 4 by 6 ft. 6 in. rein. conc. tunnel	43.00	41.00	48.00	50.00	55.00	52.45	56.00
1,508	lin.ft. 4 by 6 ft. rein. conc. sewer	28.00	29.40	36.50	39.50	31.00	31.80	35.00
318	ft. 3 ft. 6 in. by 5 ft. 3 in. rein. conc. sewer	22.00	34.75	31.00	35.00	25.00	18.00	30.00
315	ft. 6 ft. circular rein. conc. sewer	30.00	49.65	34.00	40.00	40.00	25.00	42.00
75	lin.ft. 18-in. vitrified sewer	5.00	4.50	6.00	15.00	8.00	5.60	6.00
1	rein. conc. junc. struc. 29th and San Jose Sts.	$500	$827	$600	$1000	$600	$750	$1000
1	rein. conc. junc. struc. San Jose and Army Sts.	$500	$900	$650	$1000	$600	$650	$1200
1	rein. conc. junc. struc. Valencia and Army Sts.	$500	$1000	$750	$1100	$600	$675	$1100
7	manholes	$100	$135	80.00	$200	$100	75.00	$200
3,800	lin.ft. 6-in. vitrified underdrain	.60	.60	.50	.50	.60	.75	.70
1,900	lin.ft. 8-in. vitrified underdrain	.75	.75	.70	1.00	.80	.70	.80
500	lin.ft. 10-in. vitrified underdrain	1.00	1.00	.90	1.25	1.00	.70	1.00
300	lin.ft. 12-in. vitrified underdrain	1.50	1.00	1.25	1.50	1.00	.90	1.10

WATER SUPPLY



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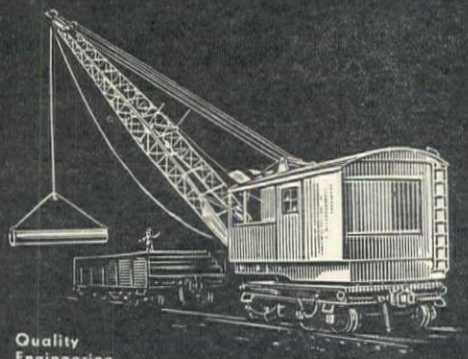

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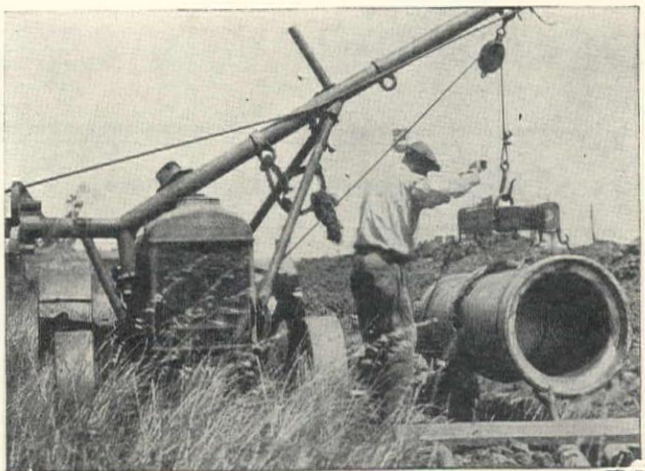

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CONSTRUCTION NEWS SUMMARY

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

Dam and conduit for City of Pasadena, Calif., $10,000,000.

Pumps, wells, pipe-lines, reservoirs, etc., for Camelback Irrigation District, Phoenix, Ariz., $425,000.

Pump plant, pipe-lines, etc., for Howard Flat Irrigation District, Seattle, Wash., $300,000.

Airport improvements at Mills Field for City and County of San Francisco, $4,000,000.

Sewer system and treatment plant for City of Palo Alto, Calif., and Stanford University, $295,000.

Dam, reservoir, pipe-line, etc., for City of Santa Barbara, Calif., $2,480,000.

Wells, pipe-lines, treatment plant, tank, and reservoir for City of Torrance, Calif., $400,000.

Dam, earth and gravel fill, at Cle Elum Lake, Washington, for Bureau of Reclamation.

Tunnel and grading last unit of Wawona Road into Yosemite Valley for Bureau of Public Roads, $750,000.

BIDS BEING RECEIVED

State Office building at Los Angeles, $650,000, bids on General Contract to Sept. 30.

Grading Torrey Pines Road for City of San Diego, Calif., bids to Sept. 29.

CONTRACTS AWARDED

Railroad, 22 miles (Boulder Dam Branch Line) from main line to Summit, Nev., for Union Pacific RR., to Merritt, Chapman & Scott, San Pedro.

Grading, Fall River West project, Rocky Mt. Forest, Colorado, for U. S. Bureau of Public Roads, to L. T. Lawler, Butte, Mont., $437,178.

Yard improvements at Cheyenne, Wyoming, for Union Pacific RR. Co., to Utah Const. Co., Ogden, Utah, $1,885,000.

Concrete and Warrenite paving Broadway for City of Los Angeles, to Griffith Co., Los Angeles, $486,270.

Pipe-lines, reservoir, etc., for City of Anacortes, Wash., to Puget Sound Machinery Depot, $459,471.

STREET and ROAD WORK

WORK CONTEMPLATED

GLENDALE, CALIF.—Plans by City Engr. Protests Sept. 25 for improving of Carlton Drive, and portions of Chevy Chase Drive and other streets, involving 4-in. asphalt concrete pavement; curbs, gutters, sidewalks. 9-16

MENLO PARK, CALIF.—Plans by City Engineer Bert Mehl, for 450,000 sq.ft. 6-in. asphalt paving. 1911 Act. $75,000. 9-13

SAN FRANCISCO, CALIF.—Call for bids will be issued at once by the U. S. Bureau of Public Roads, 461 Market Street, Sheldon Bdg., San Francisco, for the construction of the last unit of the Wawona Road into the floor of Yosemite Valley. This unit will be approximately 4 miles in length and will include a tunnel about one mile in length. $750,000. 9-15

BIDS BEING RECEIVED

BURBANK, CALIF.—Bids to 7:30 p.m., Oct. 7, by City Clerk, for improving Winona St., involving 8-in. cement concrete pavement 30 ft. wide with 5-in. disintegrated granite shoulders, 8-in. cast iron water mains. 9-13

LONG BEACH, CALIF.—Bids to 2 p.m., Sept. 30, by City, for improving 67th Way, involving: 8982 lin.ft. concrete curb, 647 lin.ft. curb armor, 44,451 sq.ft. concrete sidewalk, water mains, sewers, etc. 9-15

MARTINEZ, CALIF.—Bids to 11 a.m., Oct. 6, by County for improving streets in Dist. 3, paving with Durite. $6400. 9-5

MONTEREY, CALIF.—Bids to 7:30 p.m., Sept. 29, by Monterey Union High School District, for eight tennis courts and improvement of girls' athletic field, including fencing, corrugated culverts, etc., at High School grounds, $18,000. Plans from architects, Swartz & Ryland, Spazier Building, Monterey. 9-12

OROVILLE, CALIF.—Bids to 2:30 p.m., Oct. 6, by County, for: (1) Grading one-half mile of Oroville-Pentz-Magalia Highway from Lockermans Place to Parish Home Camp, involving: 11,000 cu.yd. excavation, (2) grading one-half mile of La Porte Road from Farrington Ranch to Turner Ranch, west of Bangor, involving: 9000 cu.yd. excavation. 9-12

SACRAMENTO, CALIF.—Bids to 10 a.m., Sept. 29, by County for asphalt shoulders on H St. Road. 9-8

SACRAMENTO, CALIF.—Bids to 2 p.m., Oct. 8, by California Division of Highways for: (1) SANTA BARBARA COUNTY—0.6 mile grading and concrete paving north of Santa Maria, involving 1520 cu.yd. concrete, 4000 cu.yd. roadway excavation, 34,000 lb. reinf. steel, 44 tons asphalt road oil, etc.; and (2) SAN BERNARDINO COUNTY—0.3 mile grading and concrete paving at Malaga St., involving 3000 cu.yd. roadway excavation, 2450 cu.yd. concrete, 76,700 lb. reinf. steel, pumping equipment. 9-10

SACRAMENTO, CALIF.—Bids to 2 p.m., Oct. 15, by California Division of Highways for 0.4 mile at Highrock Hill, HUMBOLDT COUNTY, involving 25,000 cu.yd. roadway excavation, 750 cu.yd. screened gravel base, 750 cu.yd. gravel or stone surfacing, etc. 9-17

SAN DIEGO, CALIF.—Bids up to 10 a.m., Sept. 29, by Purchasing Department of the City of San Diego, A. V. Goeddel, Supt., 524 F St., Room 205, San Diego, for grading Torrey Pines Road. Work involves: 220,526 cu.yd. excavation, 314,314 cu.yd. embankment, 497 ft. 18-in. reinf. conc. culvert, 513 ft. 24-in. reinf. conc. culvert, 443 ft. 30-in. reinf. conc. culvert, 1 headwall, 16 standard curb inlets. 9-10

SAN FRANCISCO, CALIF.—Bids to Oct. 1 by Board of Public Works for: (1) Improving San Mateo Ave. from San Diego to Niantic Ave., curbs, vitr. sewers, 6-in. conc. base and 2-in. asphalt surface, $800; and (2) Portions of 26th Ave., 41st Ave., etc., near Ortega St., paving with 6-in. concrete base with 1½-in. asph. surface, $6000. 9-17

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., Oct. 1, by Board of Public Works: (1) Improvement of the south one-half of Trumbull Street near Craut Street, by the removal of sand from the roadway and sidewalk area, and the construction of a bulkhead, 3 ft. in height. Cost $100. (2) Sidewalks and walls on Grand View Avenue between the northernly and southernly intersections with Market Street. $6000. 9-15

SAN JOSE, CALIF.—Bids to Oct. 6 by County for: (1) Improving Glen Eyrie and Carolyn Ave.; and (2) Asphalt paving Monterey St. in Gilroy. 9-18

STOCKTON, CALIF.—Bids to 11 a.m., Sept. 29, by County for: (1) 3.1 miles paving Lower Sacramento Road near Acampo Road, involving: 328,000 sq.ft. sub-grading, 32,800 lin.ft. headers, 6600 tons asphaltic concrete, 123 tons finish coat, $42,000; and (2) improving 40 miles of road near Stockton, involving: 30 miles shaping existing gravel, 3800 tons pea gravel, 300 tons asphaltic oil, 1260 bbl. fuel oil, $20,000. 9-12

STOCKTON, CALIF.—Bids to 11 a.m., Oct. 6, by County for 2.67 miles grading and surfacing Bacon Island Road, $19,000. 9-18

VENTURA, CALIF.—Bids to 11 a.m., Oct. 7, by County, for improving seven-eighths of a mile of Ventura Ave., involving 34,350 cu.yd. excavation, 1800 cu.yd. concrete paving, corr. pipe, etc. 9-12

VENTURA, CALIF.—Bids to 11 a.m., Oct. 7, by County, for paving Hueneme Road, Saviers Road, etc., involving 14,000 tons asphaltic surfacing. 9-10

DENVER, COLO.—Bids to 2:00 p.m., Sept. 24, by U. S. Bureau of Public Roads for 8.7 miles Salt Creek-Smoot National Forest Highway, Wyoming National Forest, Lincoln County, WYOMING, involving 93,300 cu.yd. roadway excavation, concrete structures, timber work, etc.

BOISE, IDA.—Bids to 2 p.m., Sept. 26, by State Highway Comm. for: (1) 8.7 miles from Bonners Ferry north, BOUNDARY COUNTY, involving 10,350 cu.yd. gravel surfacing; and (2) 2 miles from Greer north in LEWIS COUNTY, involving 9200 cu.yd. rock surfacing.

HELENA, MONT.—Bids to 9:30 a.m., Sept. 26, by State Highway Commission for: (1) 13 miles Miles City-Terry Road, Sect. C, involving 14,200 cu.yd. gravel top course and 16,454 cu.yd. gravel base course, etc.; (2) 19 miles Sect. B and C, Gildford-Chester Road, Liberty and Hill Counties, involving 275,138 cu.yd. roadway excavation, reinf. conc. pipe, etc.; (3) 8 miles Sect. C, Butte-Boulder Road, Jefferson County, involving 93,542 cu.yd. rock excavation, 180,725 cu.yd. special excavation, reinf. conc. culverts, concrete structures, etc. (4) 5 miles Ravalli-St. Ignatius Road, Lake County, involving 110,115 cu.yd. excavation, 12,400 cu.yd. gravel surface, culverts, etc.; and (5) 14 miles Sect. E, Billings-Hardin Road, involving 186,934 cu.yd. roadway excavation, reinf. concrete pipe, concrete structures, etc.

MISSOULA, MONT.—Bids to 10 a.m., Sept. 30, by U. S. Bureau of Public Roads for 5 miles grading Helena National Forest, POWELL AND CLARK COUNTIES, Montana, involving 50 acres clearing, 25 acres grubbing, and 166,350 cu.yd. roadway excavation.

CARSON CITY, NEV.—Bids to 2 p.m., Sept. 24, by the Nevada State Department of Highways for LANDER COUNTY from the town of Austin to 12 miles east, 11.70 miles. Work involves 235,100 cu.yd. excavation, unclassified, 174,713 sta.yd. overhaul, 22,900 cu.yd. selected material surface, corr. pipe, fencing, etc. 9-11

SANTA FE, N. M.—Bids to 10 a.m., Oct. 1, by State Highway Comm. for 3.2 miles grading and surface; steel, concrete, and timber overpass; and one timber bridge over Rio Grande near La Joya, to have 48 25-ft. spans.

PORTLAND, ORE.—Bids to 10 a.m., Sept. 24, by U. S. Bureau of Public Roads, for 5 miles Inland Empire Highway, Colville National Forest, Pierce County, Washington, involving 145,800 cu.yd. roadway excavation, etc. 9-15

PORTLAND, ORE.—Bids to 10 a.m., Sept. 25, by Oregon State Highway Commission, for LAKE COUNTY—13.53 miles on Silver Lake-Picture Rock Pass Section of Fremont Highway, involving: 131,000 cu.yd.

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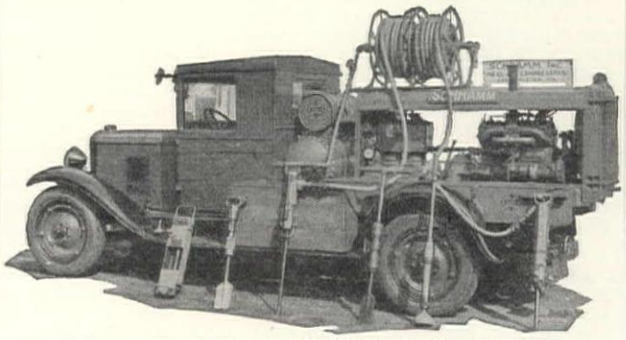

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excavation. LANE COUNTY—9.27 miles of broken stone or crushed gravel surfacing, broken stone or crushed gravel in stockpiles on Hendricks Bridge-Doyle Hill Section of McKenzie Highway, involving: 42,000 cu.yd. broken stone or crushed gravel. MALHEUR COUNTY—6.0 miles of highway roadbed on Sperry-R. R. Tunnel Section of Central Oregon Highway, involving: 137,000 cu.yd. excavation. WASCO COUNTY—Mt. Hood-Bear Springs Section of Wapinitia Highway, furnishing 14,000 cu.yd. broken stone in stock piles. 9-12

EPHRATA, WASH.—Bids to 2 p.m., Oct. 6, by County for 3 miles of highway 3 miles north of Quincy, involving 16,000 cu.yd. roadway excavation, 3400 cu.yd. rock surfacing.

OLYMPIA, WASH.—Bids to 10 a.m., Oct. 7, by Washington Dept. of Highways for: SKAGIT COUNTY—2.9 miles of the Cascade Wagon Road, Forest Line East (approx. 5.5 miles east of Marblemount), work: 24 acres clearing, 187,000 cu.yd. excavation. PIERCE COUNTY—Paving with concrete 7.5 miles of the Old Pacific Highway (Valley Road), second Milwaukee Crossing to King County Line. ASOTIN COUNTY—1.1 miles of the Asotin-Oregon State Line Road, Anatone South, Section 2, involving: 10.6 acres clearing, 61,610 cu.yd. excavation. SNOHOMISH COUNTY—Widening existing pavement 4 ft. with concrete on approximately 1.5 miles of State Road No. 1, from Skagit County Line to Dahlgren's Crossing. KING COUNTY—Paving with concrete 1.8 miles of State Road No. 1, Seattle South. KITTITAS COUNTY—2.1 miles of State Road No. 3, Swauk Creek East and West, Fed. Aid Proj. 165-F, work involves: 300,060 cu.yd. excavation, 1,659,480 cu.yd. overhaul, 9000 cu.yd. riprap. LEWIS COUNTY—4.9 miles of State Road No. 5, Divide to West Fork, involving: 68 acres of clearing, 44,410 cu.yd. excavation. KITSAP COUNTY—5.0 miles of State Road No. 21, Silverdale North, Fed. Aid Proj. 175-B, involving: 18.5 acres clearing, 112,060 cu.yd. excavation, 21,130 cu.yd. crushed stone surfacing. 9-12

OLYMPIA, WASH.—Bids to 10 a.m., Oct. 14, by State Director of Highways for: (1) KITTITAS COUNTY—From Teanaway to Bristol, involving 124,790 cu.yd. excavation, etc.; and (2) OKANOGAN COUNTY—7.3 miles near Twisp, involving 112,090 cu.yd. excavation, and 18,400 cu.yd. stone surfacing.

SEATTLE, WASH.—Bids to 10 a.m., Sept. 29, by County Commissioners for: (1) 1.3 miles grading and graveling west side of Vashon Road; (2) 1 mile grading Maple Valley road revision, involving 104,000 cu.yd. excavation; and (3) 3 miles grading and graveling Military Road near Des Moines Highway.

BIDS RECEIVED

LOS ANGELES, CALIF.—G. M. Duntley, 778 South San Pedro, Los Angeles, Calif., who bid $4469, low bid to Department of Public Works, Division of Highways, District VII, Los Angeles, for applying heavy fuel oil to shoulders on 8.6 miles between Tunnel Station and Santa Clara River Bridge, Los Angeles County. 9-18

LOS ANGELES, CALIF.—G. W. Ellis, 404 Bradbury Bdg., Los Angeles, $203,440 low bid to County for improving Avalon Blvd., grading, concrete paving, corr. pipe, etc. (See Unit Bid Summary.) 9-18

OAKLAND, CALIF.—Paris Bros., 2415 Oregon St., Berkeley, only bid to City for improving Hermosa Ave. and Broadway Terrace, involving grading, curbs, gutters, sidewalks, reinf. conc. pipe conduit, etc. 9-11

SACRAMENTO, CALIF.—Yglesias Bros., Spreckels Theatre Bdg., San Diego, $149,461 low bid to California Division of Highways for 4.3 miles grading and surfacing from Amador City to Martell, AMADOR COUNTY.

SACRAMENTO, CALIF.—F. W. Nighbert, Box 436, Bakersfield, $14,996 low bid to California Division of Highways for 15.4 miles oiling from 1.7 miles west of Shandon to east boundary, SAN LUIS OBISPO COUNTY. 9-11

SACRAMENTO, CALIF.—Low bids as follows by Engr. Dist. 3, California Division of Highways: (1) COLUSA COUNTY—H. Sykes, Patterson, Calif., $4650, low for constructing about 5.0 miles of pit run gravel borders between one mile south of Arbuckle and Genevra. (2) YOLO COUNTY—Harms Bros., Galt, Calif., $4216, low for constructing pit run gravel borders on about 5.9 miles between Cache Creek and Zamora. (3) BUTTE COUNTY—C. Mankel, 2924½ 35th Street, Sacramento, $4470, low for constructing pit run gravel borders on about 5.0 miles between the north city limits of Chico and the northerly county boundary. 9-15

SACRAMENTO, CALIF.—Clark & Henery Construction Co., Ochsner Bdg., Sacramento, $5000 low bid to County for asphalt shoulders on Marconi Ave. 9-10

SACRAMENTO, CALIF.—Clark & Henery Construction Co., Ochsner Bdg., Sacramento, $12,000 low bid to County for widening and resurfacing 9th St. from the North Sacramento city limits to the Arcade Creek bridge with asphalt. 9-10

SAN BERNARDINO, CALIF.—G. M. Duntley, 778 S. San Pedro, Los Angeles, who bid $2328, low bid to Division of Highways, District Engineer, for oiling about 1.9 miles in SAN BERNARDINO COUNTY from the Pass down Waterman Canyon. 9-8

SAN BERNARDINO, CALIF.—California Road Oil Service Co., Alameda and Willow Sts., Wilmington, Calif., $10,357, low bid to Division of Highways, District Engineer, for oiling about 6.7 miles from 4½ mi. west of Running Springs Park to Squirrel Inn; about 0.77 mi. from Pine Crest to Strawberry Peak; about 0.84 mi. Squirrel Inn to Pine Crest. 9-8

SAN FRANCISCO, CALIF.—California Const. Co., Standard Oil Bdg., S. F., $97,890 low bid to Board of Public Works for improving Sect. D, Sunset Blvd., from Noriega St. to Irving St., grading, paving with asphalt surface on macadam and concrete base, vitrified sewers, etc. (See Unit Bid Summary.) 9-17

SAN LUIS OBISPO, CALIF.—Granite Construction Co., Watsonville, Calif., $4932 low bid to District Engineer, California Division of Highways, for 2.7 miles rock borders and bituminous surface from 2 to 4.7 miles north of Salinas, MONTEREY COUNTY. 9-15

SAN LUIS OBISPO, CALIF.—M. J. Bevanda, 312 Savings and Loan Bank Bdg., Stockton, $5597, only bid to Division of Highways, District V, for 1.8 miles of bituminous macadam borders from Yerba Buena Creek, south in SAN LUIS OBISPO COUNTY. 9-8

DENVER, COLO.—Low bids as follows by State Department of Highways: (1) Chas. B. Owens, Denver, Colo., $60,700 low for gravel surfacing from Sterling and Julesburg; (2) J. H. Miller Construction Co., $50,275 low for grading and surfacing near Cimarron; and (3) Driscoll Const. Co., Pueblo, Colo., $49,200 low for surfacing 5 miles near La Jara.

DENVER, COLO.—Taggart Const. Co., Cody, Wyo., $51,113 only bid to Bureau of Public Roads for 7 miles grading, Granite Creek-Shell Project, Bighorn County, Wyoming.

SEATTLE, WASH.—Low bids as follows by County: (1) Hallstrom & Hallstrom, Leary Bdg., Seattle, $55,000 low for grading and constructing bridge on Marine View Drive; and (2) J. B. Bonny, Alaska Bdg., Seattle, $37,100 low for grading Meadowbrook-Snoqualmia Road.

CONTRACTS AWARDED

PHOENIX, ARIZ.—Awards as follows by State: (1) To Skeels & Graham, Tucson, Ariz., $78,028 for improvement of 8.7 miles of the Tucson-Nogales Highway, grading, draining, and placing subgrade stabilizer, and constructing bridge; (2) To Canion & Francis and H. L. Royden, Phoenix, who bid $77,693 for Yuma-Wellton Highway, about 3 miles east of Ligurta and extending easterly 5.6 miles, consisting of grading, clearing, and placing subgrade stabilizer. (See Unit Bid Summary.) 9-5

PHOENIX, ARIZ.—To J. C. Steele Const. Co., Phoenix, Ariz., $17,700 for improving Third Ave. for City, concrete paving, concrete pipe, etc.

TUCSON, ARIZ.—To White & Miller, Tucson, Ariz., $7990 for asphalt paving Mountain Ave. for City.

ALTURAS, CALIF.—To Valley Paving & Const. Co., Visalia, $123,640 for asphalt paving Main St. from Carlos St. to 12th St. for City. (See Unit Bid Summary.) 9-8

BERKELEY, CALIF.—To Oakland Paving Company, 5000 Broadway, Oakland, Calif., who bid $19,300 to the University of California, Berkeley, for the construction of asphalt concrete cross-campus road to connect Allston Way and Oxford Street. 9-11

GILROY, CALIF.—To Hanrahan Co., Standard Oil Bdg., S. F., $77,774 for asphalt paving Hanna, Rosanna Sts., etc., for City. (See Unit Bid Summary.) 9-5

KING CITY, CALIF.—To A. J. Raisch, Burrell Bdg., San Jose, who bid $4060 for grading, 5-in. concrete paving, curbs, etc., on First St., in King City. 9-12

LAWNDALE, CALIF.—To Pacific Pavements Co., 1755 San Bruno Ave., San Francisco, who bid $4394 for improvement of Jewell Avenue for City, grading; paving 5-in. granite-waste macadam base with oil and screening surface; concrete pipe storm sewers; and reinf. concrete box culvert. 9-10

LOS ANGELES, CALIF.—To Griffith Co., Los Angeles Railway Bdg., Los Angeles, who bid $486,270 to the Board of Public Works, City Hall, Los Angeles, for improving Broadway from Pico Boulevard to 41st Street, work consisting of grading, paving with concrete, paving with 2-in. Warrenite Bit. surface, curbs, gutters, sidewalks, storm drain system, sanitary sewer, water system, lighting system, etc. 9-17

MARYSVILLE, CALIF.—Awards as follows by County: (1) To A. Teichert & Son, 1846 37th St., Sacramento, $4294, for placing seal coat on road extending from Horstville to and across Wheatland. (2) To Hemstreet & Bell, Marysville, who bid $1306 for placing oil surface (road mix) on Main and Second Sts., in Town of Wheatland. 9-12

MILL VALLEY, CALIF.—To McDonald & Maggiora, 236 Second St., Sausalito, $89,677 for concrete paving Corte Madera Ave., Summit Ave., vitr. sewers, corr. pipe, concrete work, etc., for City. (See Unit Bid Summary.) 9-11

OAKLAND, CALIF.—To Heafey-Moore Co., 344 High St., Oakland, $6000 for improving Bullard Drive near Estates Drive, grading, paving with asphalt base and surface for City. 9-18

RIVERSIDE, CALIF.—To Matich Bros., Elsinore, $148,156 for improving west entrance to City, grading, concrete and asphalt paving, rubble masonry retaining walls, cast iron water system, lighting system, reinf. conc. bridge for City. 9-12

SACRAMENTO, CALIF.—Awards as follows by California Division of Highways: LOS ANGELES AND ORANGE COUNTIES—To T. M. Morgan Paving Co., Edwards-Wildey Bdg., Los Angeles, who bid $191,604 for 3.1 miles grading, concrete and macadam paving from Anaheim to Seal Beach; and ORANGE COUNTY—To T. M. Morgan Paving Co., Edwards & Wildey Bdg., Los Angeles, who bid $98,432 for 3.3 miles grading and concrete paving from Seal Beach to Sunset Beach. (See Unit Bid Summary, Aug. 25th issue.) 9-5

SACRAMENTO, CALIF.—To Basich Bros. Construction Co., 3788 S. Vermont St., Los Angeles, who bid $83,416 to the California Division of Highways, Public Works Bdg., Sacramento, for 4.1 miles grading in SAN MATEO COUNTY from Redwood City to Willow Road. (See Unit Bid Summary.) 9-8

SALINAS, CALIF.—To A. Teichert & Sons, 1846 37th Street, Sacramento, $10,500 for crushing and stockpiling broken stone at Greenfield for County. 9-16

SAN FRANCISCO, CALIF.—(1) To Chas. L. Harney, 74 New Montgomery St., S. F., $11,992, for improving 17th Ave. from Moraga St. to Noriega, grading, vitr. sewers, asphalt and concrete pave. (2) To Chas. L. Harney, 74 New Montgomery St., S. F., $7800 for improving 31st Ave. from Lawton to Moraga, etc. (3) To J. F. Dowling, 251 Kearny St., S. F., $11,317 for improving 12th, 29th, 14th Aves., etc., vitr. sewers, paving with asphalt surface on concrete base. (4) To E. J. Treacy, Call Bdg., S. F., $1734 for improving crossing of 45th Ave., and Lawton St., paving with 6-in. concrete base, and asphalt surface, vitr. culvert. (5) To F. J. McHugh, 474 17th Ave., S. F., $1060 for improving 42nd Ave., from Judah to Kirkham, conc. base and asph. surf. (6) To M. J. Lynch, 478 30th Ave., S. F., $650 for stone or bit. rock sidewalks on Deming St., Manor Drive, etc. 9-12

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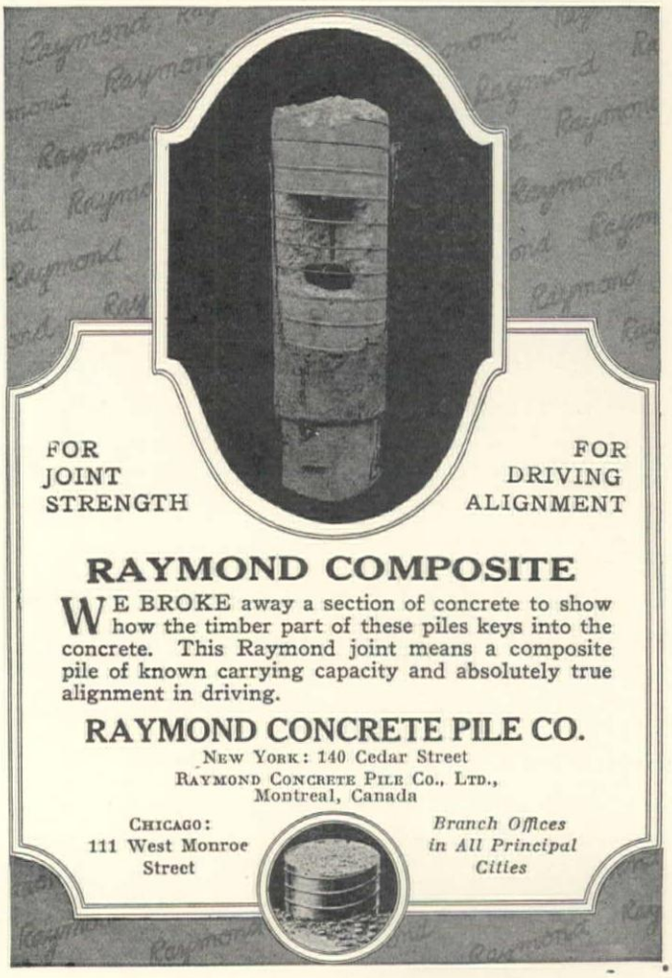

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SAN FRANCISCO, CALIF.—To A. J. & J. L. Fairbanks, Inc., Box 475, San Francisco, who bid $87,452 for grading portions of Section 1-B, Generals Highways, Hospital Rock to Giant Forest, Sequoia National Park, TULARE COUNTY, Calif., a distance of 4.514 miles. Work for U. S. Bureau of Public Roads. (See Unit Bid Summary, Sept. 10th issue.) 9-6

SAN FRANCISCO, CALIF.—To M. Rosenberg, 1755 San Bruno, S. F., who bid $83,766 to Board of Public Works for improving Section B, Sunset Blvd., grading, asphalt surf. and waterb. macadam and conc. base, sewers, etc. (See Unit Bid Summary, Sept. 10th issue.) 9-10

SAN JOSE, CALIF.—To A. J. Raisch, Burrell Bdg., San Jose, who bid $4188 to County for improvement of Peach Court and Bonita Avenue in Supervisor District No. 2, San Jose. 9-18

SAN RAFAEL, CALIF.—Awards as follows by City: (1) To P. S. Harless, PO Box 594, San Rafael, $19,136 for concrete paving, vitr. sewers, corr. culverts, etc., on Second St.; and (2) To A. G. Raisch, 46 Kearny St., S. F., $8045 for concrete paving, vitrified sewers, etc., on Mission Ave. and Belle Ave. 9-15

STOCKTON, CALIF.—To Moreing Bros., Hotel Stockton Annex, Stockton, $10,029 for grading, surfacing and oiling 1.47 miles of Bruml Road for County. 9-16

DENVER, COLO.—Award of contract recommended to L. T. Lawler, Lewisohn Bdg., Butte, Montana, $437,178 for 10 miles grading Fall River Project (Section 1C-Fall River West) in Rocky Mt. National Park, Larimer County, COLORADO, for U. S. Bureau of Public Roads. (See Unit Bid Summar.) 9-15

HOLLY, COLO.—To Const. Service Co., Tramway Bdg., Denver, Colo., $12,200 for constructing curbs and gutters in Dist. 1 for City.

SANDPOINT, IDAHO—To G. Arnett, Sandpoint, Ida., $20,000 for paving Lake St. for City.

BOISE, IDA.—Awards as follows by State: (1) To Olof Nelson, Logan, Utah, $103,725 for 8 miles oil treated rock or gravel surfacing Yellowstone Park Highway from Preston to Utah Line, FRANKLIN COUNTY; (2) To I. R. Goodrich, Jerome, Idaho, $7950 for 4 miles placing gravel surfacing from Jerome west, JEROME COUNTY; (3) To L. R. Goodrich, Jerome, Ida., $4823 for placing gravel surface on 9 miles from Eden to Greenwood School, JEROME COUNTY; (4) To Joslin & McAllister, Spokane, Wash., for 4 miles gravel surfacing from Weiser to Jonathan, WASHINGTON COUNTY; (5) To Triangle Const. Co., Spokane, Wash., $10,980 for 2 miles rock surfacing from Ketchum south, BLAINE COUNTY; and (6) To Clifton, Applegate & Toole, Spokane, Wash., $30,079 for grading 1 mile at Carlin Bay, KOOTENAI COUNTY.

CARSON CITY, NEV.—To Basalt Rock Co., Napa, Calif., who bid $30,387 to State Dept. of Highways for 11.85 miles oiling from Hay Ranch to Eureka in EUREKA COUNTY. 9-11

CARSON CITY, NEV.—To A. D. Drumm, Fallon, Nevada, $47,838 for 12.6 miles grading and surfacing in CLARK COUNTY from California State line to Jean, for Nevada State Highway Commission. (See Unit Bid Summary.) 9-4

COQUILLE, ORE.—To Linch & Tofte, Marshfield, Ore., $27,802 for grading 2.5 miles of Empire Cutoff Highway for County.

NEWBERG, ORE.—To United Contracting Co., Portland, Ore., $14,900 for asphalt resurfacing streets for City.

PORTLAND, ORE.—Award of contract recommended to Morrison-Knudsen Co., Boise, Ida., $45,831 for 4 miles grading Tonasket-San Poil Project, Colville National Forest, Okanogan and Ferry Counties, WASHINGTON, for U. S. Bureau of Public Roads.

OGDEN, UTAH—To W. L. Geist, St. Maries, Idaho, $89,645 for 7 miles grading Elk City Highway, Nez Perce National Forest, IDAHO COUNTY, Idaho, for Bureau of Public Roads. (See Unit Bid Summary.) 9-8

OLYMPIA, WASH.—To Clifton, Applegate & Toole, Spokane, Wash., $39,958 for grading and surfacing Stevens Pass Highway from Summit east for State.

SEATTLE, WASH.—Awards as follows by City: (1) To W. J. Gallagher, Seattle, $7915 for grading Brandon St.; (2) To Moceri Bros., Seattle, $67,980 for paving 36th Ave. N.E.; and (3) To Moceri Bros., Seattle, $51,080 for paving East 47th St.

SEATTLE, WASH.—To M. Espeland, 4415 Corliss Ave., Seattle, $39,775 for grading Issaquah Road Revision for County.

SEATTLE, WASH—Awards as follows by City: (1) To Fiorito Bros., Seattle, $15,730 for paving West Dravus St., and (2) to R. J. Odman, Seattle, $3282 for grading 40th Ave.

BRIDGES and CULVERTS

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 2 p.m., Oct. 6, by County for bridge on Avalon Blvd. over Nigger Slough, involving 850 cu.yd. concrete, 4350 ft. untreated piling. 9-18

MONTEREY, CALIF.—Bids to 10 a.m., Oct. 6, by County for reinf. conc. bridge over Elkhorn Slough on Salinas-Watsonville Road. 9-18

RED BLUFF, CALIF.—Bids to Sept. 29, by County, for a wooden superstructure bent bridge 175 ft. in length on concrete piers and abutments, over Dry Creek; $3000. 9-16

SACRAMENTO, CALIF.—Bids to 10 a.m., Sept. 29, by County for reinf. conc. culvert under Big Fill at Folsom. 9-8

SACRAMENTO, CALIF.—Bids to 2 p.m., Oct. 16, by California Division of Highways for widening bridge between Dixon and Vacaville, SOLANO COUNTY, involving 280 cu.yd. concrete, 270,000 lb. reinf. steel, 9100 lb. structural steel, etc. 9-17

SAN RAFAEL, CALIF.—Bids to 11 a.m., Oct. 1, by County for bridges on Inverness-Point Reyes Road, involving 135 cu.yd. concrete and 12,600 lb. reinf. steel. 9-12

STOCKTON, CALIF.—Bids to 11 a.m., Sept. 29, by County for steel and timber bridge over Little John Creek, $4000. 9-12

STOCKTON, CALIF.—Bids to 11 a.m., Oct. 6, by County for culverts on J. R. Russell Road, involving 53 cu.yd. concrete. 9-18

YUBA CITY, CALIF.—Bids to 2 p.m., Sept. 29, by County for reconstructing portion of Nicolaus Bridge over Feather River. 9-5

YUBA CITY, CALIF.—Bids to 2 p.m., Sept. 29, by County for reconstructing Nicolaus Bridge over Feather River at Nicolaus. Work consists of two 80-ft. steel deck truss spans with concrete deck and concrete piers. 9-12

BOISE, IDAHO—Bids to 2 p.m., Sept. 23, by State Highway Commission, for concrete bridge at Lardo, VALLEY COUNTY, involving 950 cu.yd. concrete and 123,000 lb. reinf. steel.

HELENA, MONT.—Bids to 9:30 a.m., Sept. 26, by State Highway Commission for 297-ft. bridge over Little Powder River, POWDER RIVER COUNTY, involving 202,400 lb. structural steel, 250 M treated timber, timber piles, etc.

BIDS RECEIVED

OAKLAND, CALIF.—Schnoor Bros., 6016 Claremont Ave., Oakland, low bid to City for concrete culverts on Fish Ranch Road near Claremont Hotel. 9-18

LOS ANGELES, CALIF.—Oberg Bros., 3470 Hollenbeck Ave., Los Angeles, submitted low bid to the Board of County Supervisors, Hall of Records, Los Angeles, for the construction of a steel or concrete bridge over the Los Angeles River at Atlantic Avenue. Bids received as follows on: (1) Reinf. conc. arch bridge; (2) Steel girder bridge with reinf. concrete deck; or (3) Steel bridge with concrete and steel railings:

	(1)	(2)	(3)
Oberg Bros.	$183,400	$164,230	$167,800
Merritt-Chapman & Scott Corp.	203,800	184,856	185,581
J. T. Scarlett	208,000		
M. H. Slocum	214,000	188,492	194,442
General Engr. Co.	228,000	221,000	221,000
Gist & Bell	232,000	207,000	210,000
Torson Const. Co.	242,000	224,300	223,900
Gutleben Bros.		197,200	199,200
Bodenhamer Construction Co.	253,694	215,500	219,800

9-17

OLYMPIA, WASH.—Union Bridge Co., Porter Bdg., Portland, Oregon, who bid $84,175, low bid to State Highway Dept. for bridge 494 ft. 6 in. long over Hoh River, JEFFERSON COUNTY, consisting of steel cantilever with a main span of 249 ft. 8 in. and two 71-ft. 4-in. anchor arms and two 50-ft. rein. concrete approach spans. 9-4

CONTRACTS AWARDED

AUBURN, CALIF.—To Palm Iron & Bridge Works, Sacramento, who bid $6985 for furnishing 666 lin.ft. of 2¾-in. bright steel cable and 43 tons of structural steel, for suspension bridge over American River for County. 9-4

MARYSVILLE, CALIF.—Awards as follows by County: (1) To Pheal Bros., 412 6th St., Marysville, $1047, for concrete bridge on the Bit House Road at Mrs. Blake's Farm. (2) To M. A. Jenkins, 36th and Y Streets, Sacramento, $438 for concrete culvert across ditch at Higgins and Lubman's. (3) To Pheal Bros., 412 6th Street, Marysville, $1499, for two concrete bridges on the Dobbins Road near Scott's place. 9-12

MERCED, CALIF.—Awards as follows by County: (1) To United Concrete Pipe Co., Merced, $3600, for the Bridge No. 207 over Edendale Creek on Cox Ferry Road, and Bridge No. 208 over Canal Creek, on Cox Ferry Road. (2) To E. K. Angle, Dos Palos, who bid $1250 (only bid submitted) for Bridge No. 209. 9-12

REDWOOD CITY, CALIF.—To L. N. Pollard, 55 Brewster, Redwood City, $1645 for reinf. concrete retaining wall on Stafford St. for City. 9-16

SACRAMENTO, CALIF.—To Carpenter Brothers, 457 North Canyon Drive, Beverly Hills, who bid $31,149 to California Division of Highways for reinf. concrete bridge one-half mile north of Castaic Junction, LOS ANGELES COUNTY. 9-10

SACRAMENTO, CALIF.—Awards as follows by California Division of Highways: LOS ANGELES COUNTY—To J. F. Knapp, Financial Center Bdg., Oakland, who bid $113,977 for a reinf. concrete bridge over San Gabriel River at Seal Beach; and BUTTE COUNTY—To G. O. Griffith & H. Gunther, Sacramento, who bid $6577 for reinf. concrete bridge over the State Highway about 1 mile east of Oroville. (See Unit Bid Summary, Aug. 25th issue.) 9-5

SAN LUIS OBISPO, CALIF.—To Irving L. Ryder, San Carlos and Dupont Sts., San Jose, who bid $18,709 to City for concrete bridges as follows: (1) French Street Bridge; (2) Santa Rosa Street Bridge; and (3) Rebuild Chorro Street Bridge. 9-5

UKIAH, CALIF.—To Smith Bros. Co., Eureka, who bid $5744 for Four Pile Bent Bridge, over the Eel River, three miles north of Potter Valley. 9-12

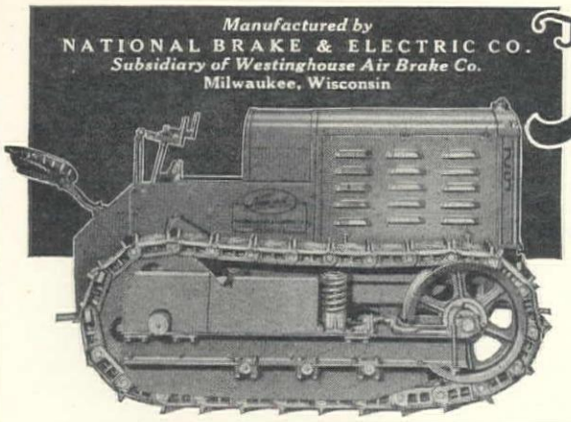
VISALIA, CALIF.—Awards as follows by County: (1) To L. C. Clark, Visalia, $7873 for concrete bridges 91A, 91B, and 91C over Outside Creek; and (2) To L. C. Clark, Visalia, $2443 for concrete bridge 89 over Deep Creek. 9-8

SEATTLE, WASH.—To Joe Paduano & Co., Seattle, Wash., $15,670 for Princeton Ave. Bridge for City.

SEWER CONSTRUCTION

WORK CONTEMPLATED

BAKERSFIELD, CALIF.—Plans by City Engr., protests Sept. 26, for 1333 ft. 6-in. vitr. sewer in alleys of blocks 241, 246, and 249; $1156. 9-15



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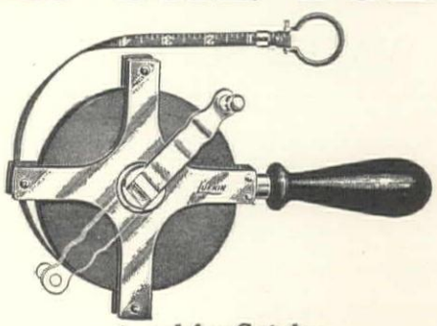

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CAPISTRANO BEACH, CALIF.—Plans by Engrs., Burns-McDonnell-Smith Engineering Company, Western Pacific Bdg., Los Angeles, for sanitary sewer system and sewage treatment with ocean outfall for the Capistrano Beach Sanitary District, Orange County. Work involves: (1) Following work to be done under $40,000 bond issue, bonds voted: 500 lin.ft. 8-in. sewer, 2100 lin.ft. 8-in. cast iron force main; pumping plant, sedimentation basins and 2000 ft. ocean outfall. (2) District sewers as follows: $50,000. 1911 Act: 22,000 lin.ft. 6-in. pipe sewer, 22,300 lin.ft. 8-in. pipe sewer. 9-13

GONZALES, CALIF.—Plans by Engrs., Burns-McDonnell-Smith Engineering Co., Western Pacific Building, Los Angeles, for the construction of sanitary sewer system and sewage treatment plant. Work involves: Sewage treatment plant, 10,775 lin.ft. 12-in. pipe sewers, 1675 lin.ft. 10-in. pipe sewer, 2330 lin.ft. 8-in. pipe sewer, 21,045 lin.ft. 6-in. pipe sewer, $55,000. 9-13

NEWPORT BEACH, CALIF.—Plans by Currie Engineering Co., Anderson Building, San Bernardino, for 8500 ft. outfall sewer and treatment plant for 15,000 population for the City. $165,000. Work under 1925 Act. 9-13

PALO ALTO, CALIF.—Preliminary plans by Engineers, Burns-McDonnell-Smith Engineering Co., Western Pacific Building, Los Angeles, for the construction of Joint Outfall sewer system and treatment plant with bay outfall and disposal for the City of Palo Alto, Santa Clara County and Stanford University. Work involves: Sewage treatment plant with sedimentation tank with separate sludge digestion, capacity of 3,000,000 gallons per day. 1720 lin.ft. 10-in., 1580 lin.ft. 12-in., 1420 lin.ft. 15-in., 5360 lin.ft. 18-in., 4025 lin.ft. 21-in., 2350 lin.ft. 24-in. and 4500 lin.ft. 27-in. pipe sewer, 7700 lin.ft. 24-in. Bay outfall line, 2400 lin.ft. 24-in. cast iron force main, $295,000, to be done under bond issue, bonds not yet voted. 9-13

REDWOOD CITY, CALIF.—Plans by County Surveyor, Geo. A. Kneese, protests Oct. 6, for vitr. outfall to serve San Bruno, Lomita Park, Capuchino and part of South San Francisco; $126,000. 1925 Act. 9-15

SAN DIEGO, CALIF.—Plans by State Architect, Sacramento, for sewage disposal plant at the San Diego State Teachers College; $25,000. 9-15

SAN FRANCISCO, CALIF.—Plans by City Engr., call for bids to be issued about October 15, for Army Street main sewer from Pennsylvania Avenue to Mississippi Street. Work involves: 895 lin.ft. 2 ft. 6-in. x 3 ft. 9-in. reinf. concrete sewer; $15,000. 9-16

BIDS BEING RECEIVED

MADERA, CALIF.—Bids to 8 p.m., Oct. 1, by City for 20,000 ft. 6-in. to 15-in. vitr. pipe, sewage ejector, etc., $20,000. A. M. Jensen, 68 Post St., S. F., is Engr. 9-17

REDWOOD CITY, CALIF.—Bids to 3 p.m., Oct. 6, by City Mgr. for 2000 ft. 12-in. to 18-in. concrete sewers in El Camino Real. 9-18

BIDS RECEIVED

SAN FRANCISCO, CALIF.—T. E. Connolly, Sheldon Bdg., San Francisco, $251,617 low bid to Board of Public Works for College Hill Tunnel Sewer, involving reinf. concrete sewer in tunnel, vitr. pipe, etc. (See Unit Bid Summary.) 9-17

WESTMORELAND, CALIF.—Miracle Construction Co., 1604 Dale St., San Diego, who bid $13,966, low bid to Westmoreland Sanitary District, Westmoreland, Imperial County, for construction of an Imhoff tank and main outfall sewer.

CONTRACTS AWARDED

TUCSON, ARIZ.—To Borderland Const. Co., Tucson, Ariz., $9500 for sewers in University Dist. for City.

YUMA, ARIZ.—To Seccombe Bros., $18,311 for vitrified pipe sewer system in Dist. 8 for City.

OAKLAND, CALIF.—To Robt. B. McNair, 3745 Rhoda Street, Oakland, for concrete, steel and creosoted wood-stave sewer on Oakland waterfront, southwesterly of Fifth Ave. 9-12

ORANGE, CALIF.—To John Artukovich, 4928 West Blvd., Los Angeles, who bid $75,291 for constructing centr. spun and reinforced concrete storm drain for City. 9-10

SAN FRANCISCO, CALIF.—Awards as follows by City for sections of Alemany Blvd. Storm Drain: (1) SECTION C—Contract awarded to Healy-Tibbitts Construction Co., 64 Pine Street, San Francisco, who bid $128,493 for reinforced concrete storm drain; and (2) SECTION D—Contract awarded to C. B. Eaton, 715 Ocean Avenue, San Francisco, who bid $41,970 for wooden storm drain. (See Unit Bid Summary, Sept. 10th issue.) 9-10

ELKO, NEV.—To Gabby & McNeil, Boise, Idaho, who bid $18,318 (using Dorr equipment) for constructing sewage treatment plant for City. 9-10

SEATTLE, WASH.—To J. Coluccio, Seattle, $2240 for constructing sewers in Sixth Ave. for City

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

BRAWLEY, CALIF.—Bond election Sept. 23, by the City to vote $180,000 for the construction of water filtration plant. Work will consist of settling basins, filter units and clear water storage reservoir and low lift pumping equipment. Plans by Engineers, Burns-McDonnell-Smith Engineering Co., Western Pacific Bdg., Los Angeles. 9-15

PASADENA, CALIF.—Plans by S. B. Morris, Chief Engineer, Pasadena City Water Department, will be filed shortly with the State Engineer for approval of the project. Plans call for: DAM—To be located at Pine Canyon Site in San Gabriel Canyon, to be about 295 ft. high above canyon floor and 377 ft. high above foundation base, involving in the main 720,000 cu.yd. concrete, 682,000 bbl. portland cement, 1,500,000 lb. reinforcing steel, 1,000,000 lb. structural steel, 1,250,000 lb. gates, valves, etc; CONDUIT—17.8 miles long from Pine Canyon to Mountain Street reservoir, consisting of 14,000 lin.ft. concrete pressure tunnel, 56,000 lin.ft. 60-in. pipe-line (probably steel), 24,100 lin.ft. pipe-line (probably reinforced concrete). Bonds in the amount of $10,000,000 have been voted. 9-6

SANTA ANA, CALIF.—Plans by W. K. Hillyard, County Surveyor, Drawer C, Santa Ana, and bids will be called for during October for water system improvements to serve the Westminster District. Work involves: One water well and pumping equipment, one 100,000-gallon elevated steel tank, 17,000 lin.ft. of 2-in., 4-in. and 6-in. cast-iron pipe; $32,000. Work under bond issue. 9-16

SANTA BARBARA, CALIF.—Report has been filed with the City by Consulting Engineers, Quinton, Code & Hill, 605 W. 10th St., Los Angeles, with reference to water system improvements as follows, to cost $2,480,000: New Gibraltar dam (rockfill type), $2,000,000; underground water development, $200,000; El Cielito and La Mesa reservoirs with necessary connections thereto and therefrom, $90,000; Sheffield reservoir repairs, $80,000; replacement of 24-in. Redwood line, $60,000; tunnel repairs, $50,000. Cost of the above work will be covered by proposed $2,100,000 bond issue; balance of the work to be paid for from Water Department earnings. 9-13

SAN JOSE, CALIF.—Plans by City Engr., W. L. Popp, for the construction of an earth fill dam in Alum Rock Park at Cherry Flats. Call for bids will be issued by the City Council about November 15. $50,000. 9-10

TORRANCE, CALIF.—Plans by City Engr., F. R. Leonard, bond election Sept. 25, to vote $400,000 for: drilling three wells, 1¾ miles of incoming water pipe lines, 33 miles of distribution lines, concrete lined and covered reservoir, water treatment facilities, 250,000-gallon elevated tank. 9-15

LONGVIEW, WASH.—Plans by Engineers, Stevens & Koon, Spalding Bdg., Portland, Ore., for water improvements at Longview, Wash., for the Washington Gas & Electric Co., Stuart Bdg., Seattle. Work involves: 6000 lin.ft. 20-in. steel pipe-line; one 3,000,000-gallon per day mechanical filter plant; constructing river intake; high and low service pumping plants of 5,000,000-gallon per day capacity. Project will not mature until early in 1931. 9-6

MALIN, ORE.—Plans by Engr., W. Garrett, for water supply system for City. Work consists of installation of one deep well, tank, booster pump, fire plugs, pipe, etc. Bonds voted, $25,000. 9-6

BIDS BEING RECEIVED

FORT MASON, CALIF.—Bids to 11 a.m., Oct. 6, by Constructing Quartermaster, Fort Mason, San Francisco, for one 50,000-gallon steel tank and one 55-ft. steel tower, at Fort Miley. 9-16

LAKEPORT, CALIF.—Bids to 7:30 p.m., Oct. 3, by City Clerk, for reinf. concrete reservoir adjacent to present reservoir. 9-15

BIDS RECEIVED

IONE, CALIF.—Guth & Fox, 1516 27th Street, Sacramento, $8376, low bid to State Architect for two concrete tanks and piping for domestic water system at Preston School of Industry. 9-16

WHITTIER, CALIF.—Bids on following items by the City of Whittier for furnishing pumps and motors: (1) One horiz. split cast centrifugal booster pump, having a capacity of 150 cu.ft. per min., against a head of 290 ft.; (2) One horiz. split cast booster pump to operate against a head of 290 ft. and a 50-hp., 440-volt, 3-phase, 50-cycle motor; and (3) One horiz. split cast booster pump to operate against a head of 130 ft. and a 100-hp., 440-volt, 3-phase, 50-cycle motor:

	(1)	(2)	(3)
Smith Booth Usher Co.	$ 568	$ 645	$1103
Fairbanks Morse Co.	1227	649	1243
The Worthington Co.	960	1310	1475
Pacific Pump Works	990	917	1333
Kimball-Krogh Pump Co.	975	899	1194
Buffalo Steam Pump Co.	498	536	1330
DeLaval Steam Turbine	1875	970	1360
Byron Jackson Pump Co.	857	998	1290
American Pump Co.	670	1035	1285
Simonds Machinery Co.	420	860	1290
Sprado Engrg. Co.	997	1040	1230
Calif. Pipe & Supply Co.	1519	1270	1240

9-11

WHITTIER, CALIF.—Bids on following items by Whittier for furnishing gate valves: (1) Two 30-in. hub end 150-lb. valves; (2) One 30-in. hub end 100-lb. valve; and (3) Two 24-in. hub end 100-lb. valves:

	(1)	(2)	(3)
Chapman Valve Mfg. Co.	$650	$525	$325
Ducommon Corporation	665	665	420
Water Works Supply Co.	771	614	290
Rensselaer Valve Co.	645		375
Calif. Pipe & Supply Co.	714		384
National Cast Iron Pipe	860		480
Crane Company	700		360

9-11

CONTRACTS AWARDED

BEVERLY HILLS, CALIF.—To F. B. Gridley, 256 So. Lake Street, Pasadena, who bid $31,489, to City, for furnishing and installing 6980 ft. 16-in. cast iron water pipe. 9-13

WHITTIER, CALIF.—Awards as follows by City: (1) To Pernal Barnett, 751 W. Chapman St., Orange, for trenching: 54¢ ft. for 6180 ft. ditch for 30-in. pipe; 44¢ ft. for 5340 ft. ditch for 24-in. pipe; and 46¢ ft. for 1270 ft. ditch for 16-in. pipe; (2) To American Concrete Pipe Co., Los Angeles, $5.35 ft. for 6180 ft. 30-in. concrete pipe; $3.15 ft. for 5340 ft. 24-in. concrete pipe; and $2.15 ft. for 1270 ft. 16-in. concrete pipe; and (3) To American Cast Iron Pipe Co., Los Angeles, for Class 150 cast-iron pipe: 39.1¢ ft. for 5000 ft. 4-in.; 56.2¢ ft. for 5000 ft. 6-in.; and $2.515 for 1280 ft. 16-in. 9-11

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CANON CITY, COLO.—To F. B. Orman Const. Co., Pueblo, Colo., $45,000 for constructing steel and redwood pipe line for City.

GREAT FALLS, MONT.—Awards as follows by City: (1) To National Cast Iron Pipe Co., $58,137 for cast-iron pipe; and (2) To J. P. Humphrey, Great Falls, Montana, $8525 for laying cast-iron pipe.

HAWTHORNE, NEV.—To Brooks of California, Inc., 142 So. La Brea, Los Angeles, who bid $53,482 to Bureau of Yards & Docks, Navy Dept., Washington, D. C., for piping and sprinkler system at the Naval Ammunition Depot, Hawthorne, Nevada. 9-13

ANACORTES, WASH.—To Puget Sound Machinery Depot, Seattle, Washington, who bid $459,471 to the City of Anacortes, Wash., for the construction of water system improvements, involving 16 miles of steel pipe-lines, some cast-iron, reservoirs, etc. 9-17

OLYMPIA, WASH.—To Queen City Const. Co., Seattle, Wash., $10,010 for laying cast-iron pipe for City.

POWER DEVELOPMENT

CONTRACTS AWARDED

HOOD RIVER, ORE.—Awards as follows by City: (1) To J. C. Roberts, Spokane, $25,985 for distribution and street lighting system; and (2) To Pelton Water Wheel Co., San Francisco, $6609 for furnishing 1 turbine and generator with exciter, governor, and accessories. 9-10

IRRIGATION and RECLAMATION

WORK CONTEMPLATED

PHOENIX, ARIZ.—Plans by Engrs., Reed & Baker, Fleming Bdg., Phoenix, Arizona, for works for the Camelback Water Conservation District of Arizona. Work involves: eight 20-in. diameter drilled wells, to be equipped with deep well turbine pumps and motor, 150-hp. capacity; seven booster pumps from 10-hp. to 200-hp. capacity; eight miles of 11,000-volt transmission line; 100,320 lin.ft. of plain and reinforced concrete pipe, 12-in. to 24-in. diameter; 12,540 lin.ft. 10-in. and 12-in. wrapped and dipped welded steel pipe; two reservoirs of approximately 50,000 gallons capacity each. $425,000. The project is now before the State Certification Board for approval. Acreage of the District is 3314. Bonds for the above work have not yet been voted. 9-6

CRANMORE, CALIF.—Permit to James R. Sutter, Cranmore, Sutter County, for the appropriation of 2 cu.ft. per second water from the Sacramento River for irrigation of 154 acres of land in Sutter County. Work involves: PUMPING PLANT—Capacity of 5000 g.p.m.; DITCH—To be 2100 ft. long, 16 by 4 by 3 ft. $5000. 9-6

LITTLEROCK, CALIF.—Application filed by Littlerock Creek Irrigation District, Littlerock, Los Angeles County, for the appropriation of 3000 ac-ft. water per annum from Little Rock Creek in Los Angeles County for irrigation of 3059 acres of land. Work involves earth and rock fill dam with a concrete face, to be 55 ft. high, 1419 ft. long on top, and 258 ft. long on the bottom, with top width of 25 ft. $65,000. It is planned to start construction of the above dam about July 1, 1931. 9-6

MARYSVILLE, CALIF.—Permit granted to the Estate of California E. Hale, Marysville, Yuba Co., for the appropriation of 1.75 cu.ft. per second water from the Feather River in Sutter County for the irrigation of 140 acres of land. Work involves: pumping plant, 5000 gallons per minute, $3000; concrete pipe line, $1200. 9-16

CLE ELUM, WASH.—Preliminary designs have been prepared by the U. S. Bureau of Reclamation, Wilda Building, Denver, Colorado, for Cle Elum Dam at the outlet of Cle Elum Lake near Cle Elum, Washington. The structure as now contemplated with an earth and gravel fill dam 135 ft. high above streambed, involves: 1,200,000 cu.yd. of material. Outlet control will be through a 14-ft. internal diameter concrete-lined tunnel in the right abutment. Spillway will be provided in a concrete-lined open structure at the right end of the dam. Maturity of project is indefinite, as this is dependent upon the completion of satisfactory contracts with the irrigation districts involved, covering the repayment for construction cost. 9-16

SEATTLE, WASH.—Plans by Engrs., Willis T. Batcheller, Inc., 929 Dexter-Horton Bdg., Seattle, for work for the Howard Flat Irrigation District of Chelan County, Washington, to irrigate 1400 acres of land by pumping from Lake Chelan. Work involves: PUMPING PLANT—Electrically driven, to have a capacity of 11,000 g.p.m. and to be constructed at Lake Chelan; SUPPLY LINE—Consisting of 5¼ miles of 30-in. steel pipe; DISTRIBUTION SYSTEM—Work involves 1350 lin.ft. 22-in., 2700 lin.ft. 20-in., 8500 lin.ft. 16-in., 12,700 lin.ft. 12-in., 4380 lin.ft. 8-in., and 1970 lin.ft. 6-in. steel pipe, also necessary valves and fittings. Bond election will be held by the District during September to vote $300,000. 9-6

BIDS BEING RECEIVED

MERCED, CALIF.—Bids to Oct. 7 by Merced Irrigation District, Merced, California, for: (1) Lining 34,000 lin.ft. or 524,000 sq.ft. 2-in. concrete lining; (2) Purchase of 4000 bbl. of cement; (3) Furnishing three drainage pump units complete; and (4) Drilling and casing three drainage wells. Plans from A. Blakesley, Chief Engineer, Merced Irrigation District, Merced, Calif. 9-18

REDMOND, CALIF.—Bids to 2 p.m., Sept. 30, by Central Oregon Irrigation District, Redmond, Ore., for constructing 1878 lin.ft. of 12-ft. creosoted wood stave flume. Plans from Engineers, Baar & Cunningham, Spalding Building, Portland, Oregon. 9-12

TERRA BELLA, CALIF.—Bids to 11 a.m., Oct. 7, by the Terra Bella Irrigation District, Tulare County, for cleaning and covering with protective coating, the inside of the District's 8000-bbl. standpipe, 5 miles east of Terra Bella, and 20,000 ft. of 26 to 30-in. riveted pipe, laid in the ground with approximately 18 in. of covering. Pipe-line is located from about 1½ miles east of Terra Bella to about 1 mile north and 1½ miles west of Terra Bella. Separate bids on the tank work and pipeline are required. 9-17

RIVER and HARBOR WORK

BIDS BEING RECEIVED

SAN DIEGO, CALIF.—Bids to 11 a.m., Oct. 2, by the Public Works Office, Headquarters, 11th Naval District, Foot of Broadway, San Diego, Calif., for constructing Quay wall for Marine Railway, Naval Operating Base (Destroyer Base), San Diego, Calif. 9-10

SAN FRANCISCO, CALIF.—Bids up to 12 M., September 29, by Park Commissioners, Golden Gate Park, for work for Yacht Harbor extension at the Marina, San Francisco: (1) Two creo. timber wharves; (2) 100 yacht berths. 9-16

PORTLAND, ORE.—Bids to 3 p.m., October 16, by the U. S. Engineer's Office, 321 Custom House, Portland, Oregon, for furnishing stone for the repair and extension of jetty at entrance to Tillamook Bay, Oregon.

BIDS RECEIVED

LA JOLLA, CALIF.—Wm. M. Ledbetter Co., 5351 Valley Blvd., Los Angeles, $50,200, low bid to Miss Scripps, La Jolla, for reinf. concrete breakwater and seawall 300 feet long. 9-15

SANTA BARBARA, CALIF.—Shanahan Bros., 406 S. Main St., Los Angeles, low bid to City of Santa Barbara for revetment (portion of E. Cabrillo Blvd.). 9-13

CONTRACTS AWARDED

SAN DIEGO, CALIF.—To W. H. Golden, California Bank Bdg., San Diego, who bid $101,000 to Bureau of Yards and Docks, Navy Dept., Washington, D. C., for extension of a reinforced concrete pier at the Naval Operating Base (air station), San Diego, Calif. 9-5

LIGHTING SYSTEMS

WORK CONTEMPLATED

SAN RAFAEL, CALIF.—Plans by City Engr., protests Oct. 6, for 24 electroliers on Fourth St. from E to H St. 9-16

WOODLAND, CALIF.—Plans by City Engr., protests Sept. 25, for installation of 218 Union Metal Mfg. Co. electroliers on various streets. 9-15

BIDS BEING RECEIVED

REDWOOD CITY, CALIF.—Bids to 3 p.m., Oct. 6, by City Manager, for the installation of 17 two-light electroliers on portions of Broadway and Brewster Avenue. 9-16

CONTRACTS AWARDED

GUSTINE, CALIF.—A. C. Rice, 540 Alcatraz Ave., Oakland, $4850, low for street lighting system for City. 9-10

OAKLAND, CALIF.—To Butte Elect. & Mfg. Co., 956 Folsom St., S. F., $24,432 for 77 electroliers on 12th St. from Lakeshore Ave. to 13th Ave. for City. 9-16

PALO ALTO, CALIF.—To Butte Electric & Mfg. Co., 956 Folsom St., S. F., $4185 for lighting system improvements at U. S. Veterans Hospital, Palo Alto. 9-13

RAILROAD CONSTRUCTION

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Merritt, Chapman & Scott, P.O. Box 698, San Pedro, by Union Pacific Railroad, 610 S. Main St., Los Angeles, for the construction of 22.71 miles of main trackage, Boulder Canyon Dam Branch Railroad project, to run from main line of the Union Pacific RR. Co. in Nevada to Summit, Nevada. Work involves in the main: 218,000 cu.yd. common excavation, 23,400 cu.yd. loose rock excavation, 64,600 cu.yd. solid rock excavation. Government will construct 7.17 miles from Summit to damsite. 9-11

SOUTH SAN FRANCISCO, CALIF.—To Granfield, Farrar & Carlin, 67 Hoff Street, San Francisco, for fill for industrial tract for the Southern Pacific Railroad Company at South San Francisco, Subway. Work involves: 25,000 cu.yd. fill. 9-12

CHEYENNE, WYO.—To Utah Const. Co., Ogden, Utah, $1,885,000 for grading, yard improvements and bridge over Crow Creek for Union Pacific Railroad Co. at Cheyenne, Wyoming.

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WORK CONTEMPLATED

MONTEREY, CALIF.—Plans by Architects, concrete and tile, filtering system, open air swimming pool for the Monterey Union High School District, $20,000. 9-13

MUNICIPAL IMPROVEMENTS

WORK CONTEMPLATED

SAN FRANCISCO, CALIF.—Bond election Nov. 4 by City to vote $4,000,000 for development of the Mills Field Municipal Airport in San Mateo County. Work involves: purchase of 1002 acres of land from Mills Estate, $945,000; purchase of 1080 acres of tidelands, $108,000; constructing 11,000 lin.ft. riprap protected earth dike, $440,000; constructing fill involving 13,510,000 cu.yd., $1,351,000; constructing 2,200,000 sq.ft. of runways, $308,000; dressing, grading, and planting, $270,000; roads and parking areas, 400,000 sq.ft., $56,000; concrete aprons and strips, 338,000 sq.ft., $102,000; hangars and shops, 30,000 sq.ft., $90,000; administration building, $100,000; sub-drains and pumps, etc., $105,600; night lighting field and hangars, $125,000. 9-6

MACHINERY and SUPPLIES

BIDS BEING RECEIVED

KLAMATH FALLS, ORE.—Bids to 8 p.m., October 6, by U. S. Ballentine, Police Judge, City Hall, Klamath Falls, Ore., for one street sweeper. 9-19

CONTRACTS AWARDED

LOS ANGELES, CALIF.—Awards as follows by City Purchasing Agent for furnishing cast-iron pipe: (1) Contract awarded to National Cast Iron Pipe Co., Los Angeles, who bid 95¢ per ft. for 20,000 ft. 8-in. cast-iron pipe f.o.b. Slauson and Compton Ave.; (2) Contract awarded to American Cast Iron Pipe Co., Los Angeles, who bid $1.73 per ft. for 20,000 ft. 12-in. cast-iron pipe f.o.b. Ducommon Street; (3) Contract awarded to U. S. Pipe & Foundry Co., Los Angeles, who bid $1.70 per ft. for 1000 ft. 12-in. cast-iron pipe f.o.b. Slauson Avenue and Compton Avenue; and (4) Contract awarded to Pacific States Cast Iron Pipe Co., Los Angeles, who bid .941¢ per ft. for 30,000 ft. 8-in. cast-iron pipe f.o.b. Ducommon St. 9-18

FLOOD CONTROL WORK

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 2 p.m., Sept. 29, by County Clerk, Hall of Records, Los Angeles, for the construction of spreading grounds on Big Dalton wash at mouth of Big Dalton Canyon. Work involves 8500 lin.ft. spreading ditches, 70 ft. 8-in. pipe with headgates complete, installed, 38 ft. wet rubble masonry check dams, 3 lateral diversion structures. E. C. Eaton, 202 N. Broadway, Los Angeles, is Chief Engineer. 9-18

LOS ANGELES, CALIF.—Bids to 2 p.m., Sept. 29, by County Clerk, Hall of Records, Los Angeles, for supplying 325 sheets of galvanized iron grout stops, 80 grout pipes and 1430 half grout pipes for Big Tujunga Dam No. 1. 9-18

MISCELLANEOUS

BIDS RECEIVED

EUREKA, CALIF.—Roy Lind, 54 Stanton St., San Francisco, who bid $970, submitted low bid to the Public Works Officer, Navy Yard, Mare Island, Calif., for fire protection pipe-lines, hose housings, and a septic tank. 9-11

POINT REYES, CALIF.—Joe Piasecki, 666 Mission St., San Francisco, who bid $1303, low bid to the Public Works Officer, Navy Yard, Mare Island, California, for a septic tank, repairs to plank road, and a fire protection system at the U. S. Naval Radio Compass Station, Point Reyes. 9-11

CONTRACTS AWARDED

ANTIOCH, CALIF.—To Anchor Post Fence Co., 460 5th Street, San Francisco, who bid $3197 for protection fence, 8736 ft., around the Antioch Municipal reservoir. 9-11

SAN DIEGO, CALIF.—To R. E. Hazard Contracting Co., 2528 Kettner Blvd., San Diego, who bid $33,781 to U. S. Bureau of Yards & Docks, Washington, D. C., for one 55,000 bbl. steel tank and piping at the Naval Operating Base (Fuel Depot) San Diego. 9-13

BUILDING CONSTRUCTION

BIDS BEING RECEIVED

FORT MASON, CALIF.—Bids to 11 a.m., Sept. 29, by Constructing Quartermaster, Fort Mason, for reinf. concrete Social Hall at Nurses' Dormitory, Letterman General Hospital. $15,000. 9-11

LOS ANGELES, CALIF.—Bids to 2 p.m., Sept. 30, by George B. McDougall, State Architect, at the office of the Division of Architecture, 1025 Associated Realty Bdg., Los Angeles, on General Contract only, for the construction of the State Office Building at Los Angeles. The State Office Building at Los Angeles will be a limit height Class 'A' structure faced with granite and terra cotta. It will be located at the new Civic Center on property bounded by First, Spring, Broadway, and Court Sts., all in the City and County of Los Angeles, Calif. Weymouth Crowell Co., Los Angeles, $639,000, low bid on General Contract Aug. 5, bids rejected. 9-11

MONTEREY, CALIF.—Bids to 7:30 p.m., Sept. 29, by Monterey Union High School District for reinf. concrete and stucco classroom and shop building, $40,000. Swartz & Ryland, Monterey, are Architects. 9-13

BIDS RECEIVED

CAMINO, CALIF.—Guth & Fox, 1516 27th St., Sacramento, $16,636, low bid to the Camino School District for concrete and stucco grammar school. 9-16

IONE, CALIF.—Low bids as follows by State Architect for brick and steel shop building and residence at Preston School of Industry: GENERAL—Lindgren & Swinerton, California State Life Bdg., Sacramento, $36,499 low; ELECTRICAL—Collins Elect. Co., 708 E. Market St., Stockton, $1931 low; HEATING and PLUMBING—L. H. Dallman, 517 J St., Sacramento, $9935 low. 9-16

UKIAH, CALIF.—L. Halvorsen, 128 Dutton Ave., Santa Rosa, $13,166 low bid to Calif. Division of Highways for frame and corrug. iron maintenance station near Ukiah, Mendocino County. 9-18

CONTRACTS AWARDED

SAN JOSE, CALIF.—Awards as follows by State Architects Office, Sacramento, for reinforced concrete and brick veneer base Gymnasium at the State Teachers College: GENERAL CONTRACT—To H. L. Peterson, 731 Treat St., San Francisco, $114,836. HEATING, PLUMBING AND VENTILATING—To Hately & Hately, 1710 10th St., Sacramento, $26,488. ELECTRICAL WORK—To Gilbert Bros., 286 W. Santa Clara St., San Jose, $7403. 9-16

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THE BUYERS' GUIDE

Refer to advertisements for addresses of companies listed. Advertisers index on page 74

Acetylene, Dissolved
Prest-O-Lite Co., Inc., The

Acetylene Generating Apparatus
Oxweld Acetylene Co.

Air Compressors
Bacon Co., Edward R.
Gardner-Denver Co.
Ingersoll-Rand Co.
Jenison Machinery Co.
Leitch & Co.
National Brake & Electric Co.
Rix Company, Inc., The
Schramm, Inc.
Sullivan Machinery Co.
West Coast Tractor Co.

Air Compressors—Engines
Atlas Imperial Diesel Engine Co.

Asphalt
Gilmore Oil Co.
Seaside Oil Co.
Shell Oil Co.
Standard Oil Co.
Union Oil Co.

Asphalt, Emulsified
American Bitumuls Co.
Shell Oil Co.

Asphalt Plants and Equipment
Bacon Co., Edward R.
Jenison Machinery Co.
Link-Belt Co.
Spears-Wells Mchy. Co., Inc.
Standard Boiler & Steel Works
Union Tank & Pipe Co.

Asphalt Paving
Warren Bros. Roads Co.

Back Fillers
Austin Machy. Corp.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Cleveland Tractor Co., The
Harnischfeger Sales Corp.
Jenison Machinery Co.
Link-Belt Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Spears-Wells Machy. Co., Inc.
Speeder Machinery Corp.
Thew Shovel Co., The
Universal Crane Co., The
West Coast Tractor Co.
W-K-M Company, Inc.
Worden Co., W. H.

Beams, Channels, and Angles
Pacific Coast Steel Corp.

Bins, Storage and Hopper
Bacon Co., Edward R.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Heltzel Steel Form & Iron Co., The
Jenison Machinery Co.
Link-Belt Co.

Blades—Fresno and Graders
Solano Iron Works

Blasting Supplies
Giant Powder Co., Cons., The
Hercules Powder Co.

Boilers
Montague Pipe & Steel Co.
Water Works Supply Co.

Bolts, Nuts and Rods
Claussen & Co., C. G.
Kortick Mfg. Co.

Bonds (Street) Bought
W. P. Bullock

Bonds, Surety
Aetna Casualty & Surety Co.
Associated Indemnity Corp.
Commerce Casualty Co.
Consolidated Indemnity & Insurance Co.
Detroit Fidelity & Surety Co.
Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
Glens Falls Indemnity Co.
Great American Indemnity Co.
Indemnity Insurance Co. of North America
Maryland Casualty Co.

Bonds, Surety (Continued)
Massachusetts Bonding & Insurance Co.
New Amsterdam Casualty Co.
Rolph, James Jr., Landis & Ellis

Brick, Common
Gladding Bros. Mfg. Co.

Buckets, Elevator and Conveyor
Bacon Co., Edward R.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Lakewood Engr. Co.
Link-Belt Co.

Buckets, Dredging
Haiss Mfg. Co., Geo.
Harnischfeger Sales Corp.
Owen Bucket Co.

Buckets, Excavating
Bacon Co., Edward R.
Bucyrus-Erie Co.
Haiss Mfg. Co., Geo.
Harnischfeger Sales Corp.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Marion Steam Shovel Co.
Orton Crane & Shovel Co.
Owen Bucket Co.
Taylor & George
Williams Co., G. H.
Worden Co., W. H.

Buckets, Rehandling
Bacon Co., Edward R.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Lakewood Engr. Co.
Orton Crane & Shovel Co.
Owen Bucket Co.

Cableways
American Steel & Wire Co.
Bacon Co., Edward R.
Jenison Machinery Co.
Leschen & Sons Rope Co., A.
Worden Co., W. H.
Young Machy. Co., A. L.

Carbide
Union Carbide Sales Co., The

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.
Ransome Concrete Machinery Co.

Castings, Iron and Steel
American Cast Iron Pipe Co.
Link-Belt Co.
U. S. Cast Iron Pipe & Fdy. Co.

Castings, Street and Sewer
U. S. Cast Iron Pipe & Fdy. Co.

Cement
Portland Cement Association

Chemicals
California Filter Co., Inc.
Great Western Electro-Chemical Co.

Chlorinators
California Filter Co., Inc.
Wallace & Tiernan
Water Works Supply Co.

Chlorine
Great Western Electro-Chemical Co.

Chutes, Concrete
Bacon Co., Edward R.
Haiss Mfg. Co., Geo.
Jenison Machinery Co.
Lakewood Engr. Co.
Ransome Concrete Machinery Co.

Clarifiers, Water
Dorr Co., The
Wallace & Tiernan Co.

Clay Products
Gladding, McBean & Co.
Pacific Clay Products Co.

Concrete Buckets
Jenison Machinery Co.
Young Machy. Co., A. L.

Concrete Curing
Concrete Curing Co.
Inertol Company, Inc.
McEverlast, Inc.

Concrete Forms
Blaw-Knox Co.

Concrete Roads
Portland Cement Association

Conveyors, Portable

Conveyors, Elevating and Conveying
Bacon Co., Edward R.
Bodinson Mfg. Co.
Jenison Machinery Co.
Link-Belt Co.

Cranes, Electric, Gasoline Locomotive
American Hoist & Derrick Co.
Austin Machy. Corp.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt 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
W-K-M Company, Inc.

Cranes, Tractor
Harnischfeger Sales Corp.
West Coast Tractor Co.

Cranes, Traveling
Harnischfeger Sales Corp.
Jenison Machinery Co.
Thew Shovel Co., The

Crushers
Austin Western Road Machy. Co., The
Bacon Co., Edward R.
Diamond Iron Works, Inc.
Jenison Machinery Co.
Smith Engineering Works
W-K-M Company, Inc.
Young Machy. Co., A. L.

Crushers—Engines
Atlas Imperial Diesel Engine Co.

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.
Inertol Company, Inc.
McEverlast, Inc.

Cutting Apparatus
Jenison Machinery Co.
Diamond Iron Works, Inc.
Haiss Mfg. Co., Geo.
Oxweld Acetylene Co.
Victor Welding Equipment Co.

Cutting Edges
Solano Iron Works

Dams
Ambursen Dam Co., Inc.

Derricks
Bacon Co., Edward R.
Jenison Machinery Co.
Young Machy. Co., A. L.

Diesel Engines
Atlas Imperial Diesel Engine Co.

Ditch Machinery
Bacon Co., Edward R.
Bucyrus-Erie Co.
Cleveland Trencher Co.
Harnischfeger Sales Corp.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Co.
Marion Steam Shovel Co.
National Equipment Corp.
Northwest Engineering Co.
Ohio Power Shovel Co., The
Orton Crane & Shovel Co.
Thew Shovel Co., The

Draglines
Austin Machy. Corp.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Co.
Marion Steam Shovel Co.
National Equipment Corp.
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
Worden Co., W. H.
Young Machy. Co., A. L.

Dragline—Diesel Engines
Atlas Imperial Diesel Engine Co.

Drain Tile
Gladding, McBean & Co.
Gladding Bros. Mfg. Co.
Pacific Clay Products

Drills, Rock
Bacon Co., Edward R.
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Company
Rix Company, Inc., The
Schramm, Inc.
Sullivan Machinery Co.

Dump Cars
Bacon Co., Edward R.
Jenison Machinery Co.

Dump Wagons
Le Tourneau Mfg. Co.
West Coast Tractor Co.

Engineers
Ambursen Dam Co., Inc.
Burns-McDonnell-Smith Engr. Co.
Hunt Co., R. W.
Porter, Geo. J.

Engines, Diesel, Gasoline and Steam
Atlas Imperial Diesel Engine Co.
Bacon Co., Edward R.
Continental Motors Corp.
Hercules Motors Corp.
Ingersoll-Rand Co.
International Harvester Co.
Jenison Machinery Co.
Le Roi Co.
Novo Engine Co.

Excavating Machinery
American Tractor Equipment Co.
Austin Western Road Machy. Co., The
Bacon Co., Edward R.
Bodinson Mfg. Co.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Cleveland Tractor Co., The
Excavating Equipment Dealers, Inc.
Haiss Mfg. Co., Geo.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Co.
Marion Steam Shovel Co.

(Continued on page 70)

OPPORTUNITY PAGE

CONTINUED

SHOVELS CRANES DRAGLINES PULLSHOVELS

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We have a limited number of these machines which have been completely rebuilt in our factory and carry the same guarantee as our new equipment!

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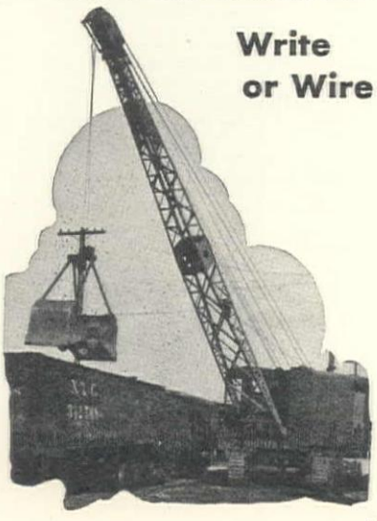

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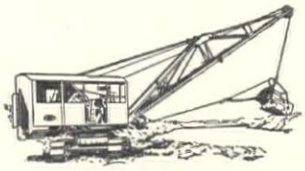

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1—Bucyrus Diesel, 2-cu.yd. 50-B.

1—P&H Gasoline, 1½-cu.yd., 700.

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THE BUYERS' GUIDE—*Continued from Page 68*

Excavating Mchy.(Continued)
National Equipment Corp.
Northwest Engineering Co.
Ohio Power Shovel Co.
Orton Crane & Shovel Co.
Owen Bucket Co.
Sauerman Bros., Inc.
Shaw Excavator & Tools Co.
Speeder Machinery Corp., The
Thew Shovel Co., The
Universal Crane Co., The

Excavating Mchy.—Diesel Engines
Atlas Imperial Diesel Engine Co.

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 Mchy. Exchange
Tieslau Bros.

Filters, Water
California Filter Co., Inc.

Fire Hydrants
Industrial & Municipal Supply Co.
Rensselaer Valve Co.
Water Works Supply Co.

Floating Roofs
Chicago Bridge & Iron Works

Flood Lights
Oxweld Acetylene Co.
Taylor & George

Flooring, Industrial
Paraffine Companies, Inc., The

Floors, Mastic
Wailes Dove-Hermiston Corp.

Flumes, Concrete
Portland Cement Association

Flumes, Metal
California Corrugated Culvert Co.
Montague Pipe & Steel Co.

Fluxes
Victor Welding Equipment Co.

Forms, Steel
Blaw-Knox Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Form Ties
J. M. Willard Co.

Freight, Water
American-Hawaiian Steamship Co.

Frogs and Switches
Bacon Co., Edward R.

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

Grader Blades
Solano Iron Works

Gravel Plant Equipment
Austin-Western Road Mchy. Co., The
Bacon Co., Edward R.
Bodinson Mfg. Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Harnischfeger Sales Corp.
Jenison Machinery Co.
Link-Belt Co.
Smith Engineering Works
Young Mach. Co., A. L.

Hammers, Steam Pile
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Kratz & McClelland, Inc.
Union Iron Works, Inc.

Hoists, Hand and Power
Bacon Co., Edward R.
Gardner-Denver Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Ingersoll-Rand Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Link-Belt Co.
Novo Engine Co.
Sullivan Machinery Co.
West Coast Tractor Co.
Worden Co., W. H.
Young Machy. Co., A. L.

Hoppers, Steel
Bacon Co., Edward R.
Blaw-Knox Co.
Haiss Mfg. Co., Geo.
Jenison Machinery Co.
Lakewood Engr. Co.
Link-Belt Co.

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
Aetna Casualty & Surety Co.
Associated Indemnity Corp.
Commerce Casualty Co.
Consolidated Indemnity & Insurance Co.
Detroit Fidelity & Surety Co.
Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
Glens Falls Indemnity Co.
Great American Indemnity Co.
Indemnity Insurance Co. of North America
Maryland Casualty Co.
Massachusetts Bonding & Insurance Co.
New Amsterdam Casualty Co.
Rolph, James Jr., Landis & Ellis

Iron, Plates and Sheets
American Rolling Mill Co., The

Jacks, Lifting
Jenison Machinery Co.

Kettles, Tar and Asphalt
Bacon Co., Edward R.
Montague Pipe & Steel Co.
Spears-Wells Machy. Co.
Young Machy. Co., A. L.

Leadite
Water Works Supply Co.

Loaders, Power, Truck and Wagon
Haiss Mfg. Co., Geo.
Industrial Brownhoist Corp.
Jaeger Machine Works, The
Jenison Machinery Co.
Link-Belt Co.
Spears-Wells Machy. Co.
Young Machy. Co., A. L.

Locomotives, Electric, Gas and Steam
Bacon Co., Edward R.
Jenison Machinery Co.

Lumber
McCormick Lumber Co.

Metal Lath
Truscon Steel Company

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.
Foote Company, Inc.
Garfield & Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Lakewood Engr. Co.
National Equipment Corp.
Ransome Concrete Machinery Co.
Young Machy. Co., A. L.

Mixers, Plaster
Jaeger Machine Works, The
Jenison Machinery Co.
Young Machy. Co., A. L.

Motors, Gasoline
Continental Motors Corp.
Hercules Motors Corp.
Jenison Machinery Co.
Le Roi Co.

Oxy-Acetylene Apparatus
Oxweld Acetylene Co.

Oxygen in Cylinders
The Linde Air Products Co.

Paints, Acid Resisting
Columbia Wood and Metal Preservative Co.
Inertol Company, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Paints, Metal Protective
Columbia Wood and Metal Preservative Co.
Inertol Company, Inc.
McEverlast, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Paints, Technical
American Bitumuls Co.
Columbia Wood and Metal Preservative Co.
Inertol Company, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Paints, Waterproofing
Columbia Wood and Metal Preservative Co.
Inertol Company, Inc.
McEverlast, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Pavers, Concrete
Foote Company, Inc.
Harron, Rickard & McCone Co.
Kratz & McClelland, Inc.
National Equipment Corp.
Ransome Concrete Machinery Co.

Paving Breakers
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The
Schramm, Inc.
Sullivan Machinery Co.

Paving, Contractor
Warren Bros. Roads Co.

Paving Plants
Bacon Co., Edward R.
Jaeger Machine Works, The
Jenison Machinery Co.
Standard Boiler & Steel Works

Paving Tools
Bacon Co., Edward R.
Harron, Rickard & McCone 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.
Kratz & McClelland, Inc.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Thew Shovel Co., The
Union Iron Works, Inc.

Piles, Concrete
Raymond Concrete Pile Co.
MacArthur Concrete Pile Corp.

Piling
Pacific Coast Steel Corp.

Piling, Redwood
Union Lumber Co.

Pipe, Bell and Spigot
National Cast Iron Pipe Co.

Pipe, Cast-Iron
American Cast Iron Pipe Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
National Cast Iron Pipe 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.
National Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.

Pipe, Centrifugal
National Cast Iron Pipe Co.

Pipe Clamps and Hangers
Kortick Mfg. Co.

Pipe Coatings
American Concrete Pipe Co.
Inertol Company, Inc.
McEverlast, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Pipe, Concrete
American Concrete Pipe Co.
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.
National Cast Iron Pipe Co.
Pacific Pipe Co.
Pacific States Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.
Weissbaum & Co., G.

Pipe, Flanged
National Cast Iron Pipe Co.

Pipe Line Machinery
Bacon Co., Edward R.
Harnischfeger Sales Corp.
Jenison Machinery Co.
W-K-M Company, Inc.

Pipe, Lock-Bar
Western Pipe & Steel Co.

Pipe, Preservative
Columbia Wood & Metal Preservative Co.

Pipe, Pressure Line
Lacy Manufacturing Co.
Lock Joint Pipe Co.
Western Pipe & Steel Co.

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.

Pipe, Vitrified
Gladding Bros. Mfg. Co.
Gladding, McBean & Co.
Pacific Clay Products

Pipe, Welded Steel
California Corrugated Culvert Co.
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Steel Tank & Pipe Co.
Union Tank & Pipe Co.
Western Pipe & Steel Co.

Plows, Road
Austin-Western Road Mchy. Co., The
Bacon Co., Edward R.
Jenison Machinery Co.
Spears-Wells Machy. Co.

Pneumatic Tools
Gardner-Denver Co
Ingersoll-Rand Co.
Leitch & Co.
Schramm, Inc.

Po'es, Redwood
Union Lumber Co.

Powder
Giant Powder Co., Cons., The
Hercules Powder Co.

Power Units
Continental Motors Corp.
Hercules Motors Corp.
International Harvester Co.
Jenison Machinery Co.
Novo Engine Co.

Preservative, Wood, Metal, etc.
Columbia Wood & Metal Preservative Co.
Paraffine Companies, Inc., The

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
Washington Iron Works
Woodin & Little

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OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

NOTICE TO CONTRACTORS

Surfacing and Bridges

Sealed proposals will be received at the office of the State Highway Engineer, Public Works Building, Sacramento, California, until 2:00 o'clock p.m., on October 15, 1930, at which time they will be publicly opened and read, for construction in accordance with the specifications therefor, to which special reference is made, of portions of State Highway, as follows:

Humboldt County, at High Rock Hill (I-Hum-1-D), about four-tenths (0.4) mile in length, to be graded and surfaced with untreated crushed gravel or stone.

Solano County, five concrete bridges between Vacaville and Dixon (X-Sol-7-D), to be widened to a clear roadway width of twenty-eight feet (28').

Proposal forms will be issued only to those Contractors who have furnished a verified statement of experience and financial condition in accordance with the provisions of Chapter 644, Statutes of 1929, and whose statements so furnished are satisfactory to the Department of Public Works. Bids will not be accepted from a Contractor to whom a proposal form has not been issued by the Department of Public Works.

Plans may be seen, and forms of proposal bonds, contract and specifications may be obtained at the said office, and they may be seen at the offices of the District Engineers at Los Angeles and San Francisco, and at the office of the District Engineer of the district in which the work is situated. The District Engineers' offices are located at Eureka, Redding, Sacramento, San Francisco, San Luis Obispo, Fresno, Los Angeles, San Bernardino and Bishop.

A representative from the district office will be available to accompany prospective bidders for an inspection of the work herein contemplated, and Contractors are urged to investigate the location, character and quantity of work to be done, with a representative of the Division of Highways. It is requested that arrangements for joint field inspection be made as far in advance as possible. Detailed information concerning the proposed work may be obtained from the district office.

No bid will be received unless it is made on a blank form furnished by the State Highway Engineer. The special attention of prospective bidders is called to the "Proposal Requirements and Conditions" annexed to the blank form of proposal, for full directions as to bidding, etc.

The Department of Public Works reserves the right to reject any or all bids or to accept the bid deemed for the best interests of the State.

DEPARTMENT OF PUBLIC WORKS,
DIVISION OF HIGHWAYS
C. H. PURCELL, State Highway Engineer.
Dated September 17, 1930.

HELP WANTED

As listed by the Engineering Societies' Employment Service, 57 Post Street, San Francisco. Applicants will please apply direct to them.

HELP WANTED—By reliable manufacturer of construction equipment, competent factory sales representative for West Coast. State qualifications and full experience in first letter. Box 425, Western Construction News.

WANTED—First-class mechanic having wide experience on gas shovels, trucks, compressors, pumps, and electrical equipment. To take complete charge; salary open; long road job in the mountains, A-1 camp conditions. References required. Write full details of experience in first letter. Box 400, W.C.N.

ENGINEER, not over 35, graduate in chemical or mechanical engineering, with four-seven years' experience preferably as designer or estimator and a record indicating considerable initiative and executive ability. Oil refinery experience desirable. Salary open. Permanent opportunity for right man. Apply by letter. Location, Northern California. R-3303-S.

SALES ENGINEER, graduate in civil engineering, not over 30 years old, to develop the sale of steel bars and building materials. Experience must be in construction or sales, preferably both. Apply by letter with details of experience, education, etc., including photo. Salary open. Location, Pacific Coast. Headquarters, San Francisco. R-3190-S.

ENGINEER, specialist in forestry engineering, with long experience in logging operation, with knowledge of ice roads and construction of same, horse and mechanical transfer, construction of chutes, flumes and logging railroads. Should be capable of planning the felling of trees in a mountainous region, as well as the handling and transportation of the logs to the sawmills. Work will be on an area of about 1,500,000 acres. Apply by letter. Location, foreign. K-318-W-1461-C-S.

CONSTRUCTION SUPERINTENDENT, 35-40, to take charge of the building of a fertilizer plant. This experience essential. Salary $450 a month and expenses. Apply by letter. Location, British Columbia. W-1628.

WATER PUMP ENGINEER. Must have a number of years' experience in this line of work and must be able to design finished products as well as have creative ideas. Must have college training and pleasing appearance. Opportunity. Salary, approximately $3600 a year to start. Apply by letter. Location, West. K-311-W-1603-C-S.

ENGINEER, mechanical or electrical, not over 30 years, with three to five years' experience on hydroelectric plant operation for service and testing work. Must have mechanical skill, agreeable personality and be willing to travel. Salary about $175 month and expenses in the field. Apply by letter. Headquarters, San Francisco. R-3309-S.

SAFETY ENGINEER, single, graduate mining engineer with actual mine underground experience and a general knowledge of mining, milling and smelting; also general knowledge of electricity and railway practices, the safety policies of large corporations and the channels of information. Should be able to plan and execute safety programs and instruct foreman and laborers in safety and first aid. Several years' experience as safety engineer with good references required. Salary open. Apply by letter with photo. Location, South America. Headquarters, New York. R-3251-S.

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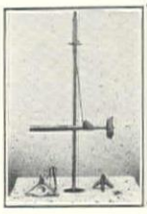

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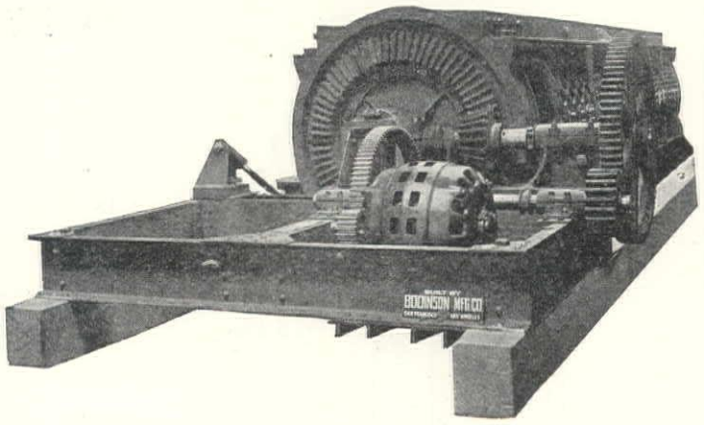

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