WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

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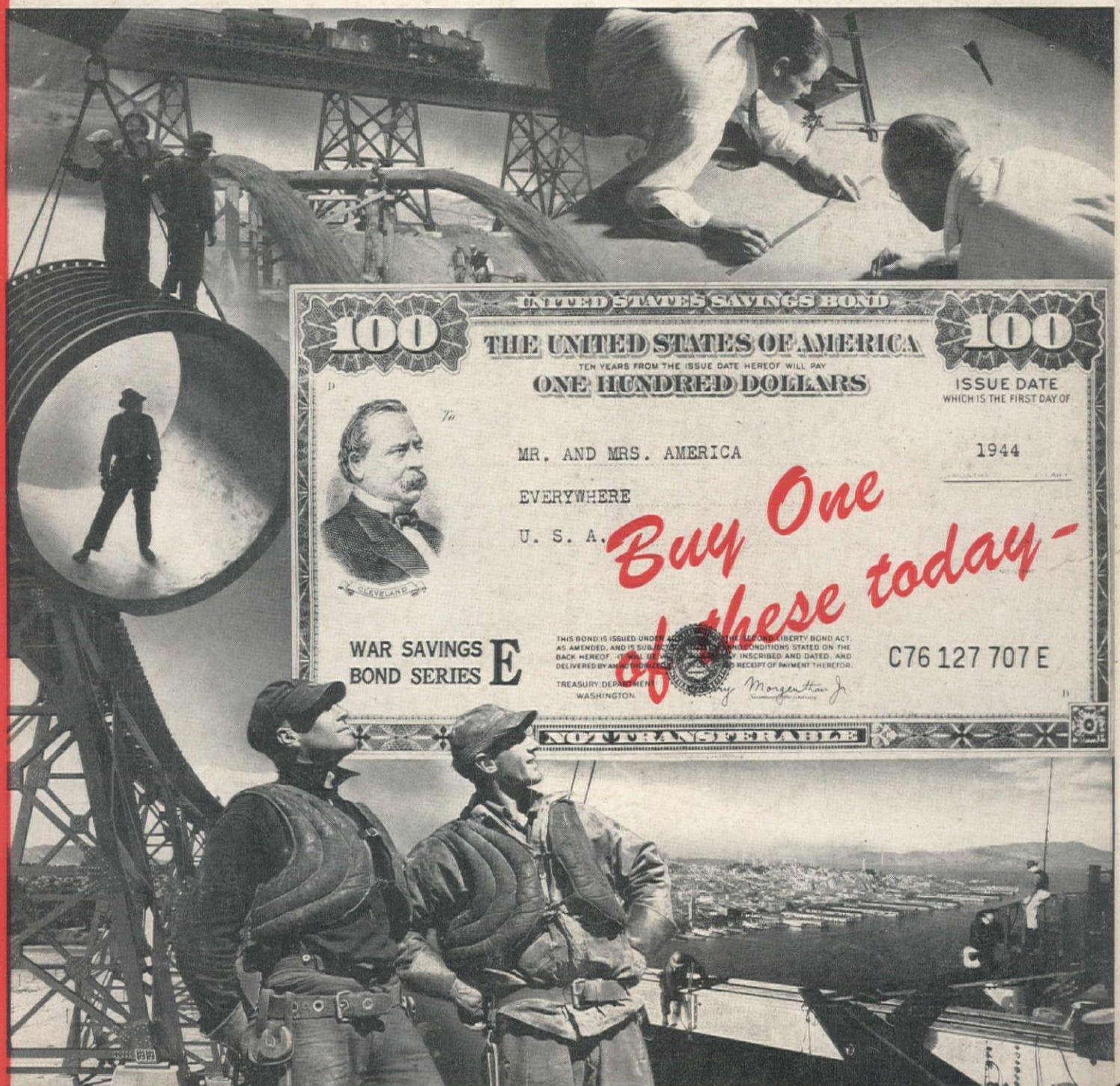


Groundwork for Air Power

BATTERIES of Tournapulls, dozers, scrapers almost overnight transform the rough terrain of invaded areas into emergency flying fields. This high-yardage dirt moving needs the rugged power of *heavy-duty* engines.

To maintain continuous, hard-hitting performance of Diesels and heavy-duty gasoline engines, contractors everywhere have found definite help through *effective* lubrication...Texaco.

Texaco Ursa Oil X★★, for example, is an additive type heavy-duty oil that is both detergent and dispersive. Its detergency keeps piston rings free and engine parts clean. Its dispersive ability holds deposit-forming materials in suspension until drained at oil change. *Ursa Oil X★★* protects alloy bearings and prevents scuffing of rings, pistons, cylinders.

For quieter-running, longer-lasting transmission and differential gears, use Texaco gear lubricants.

Texaco lubricants have proved so effective in service that they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

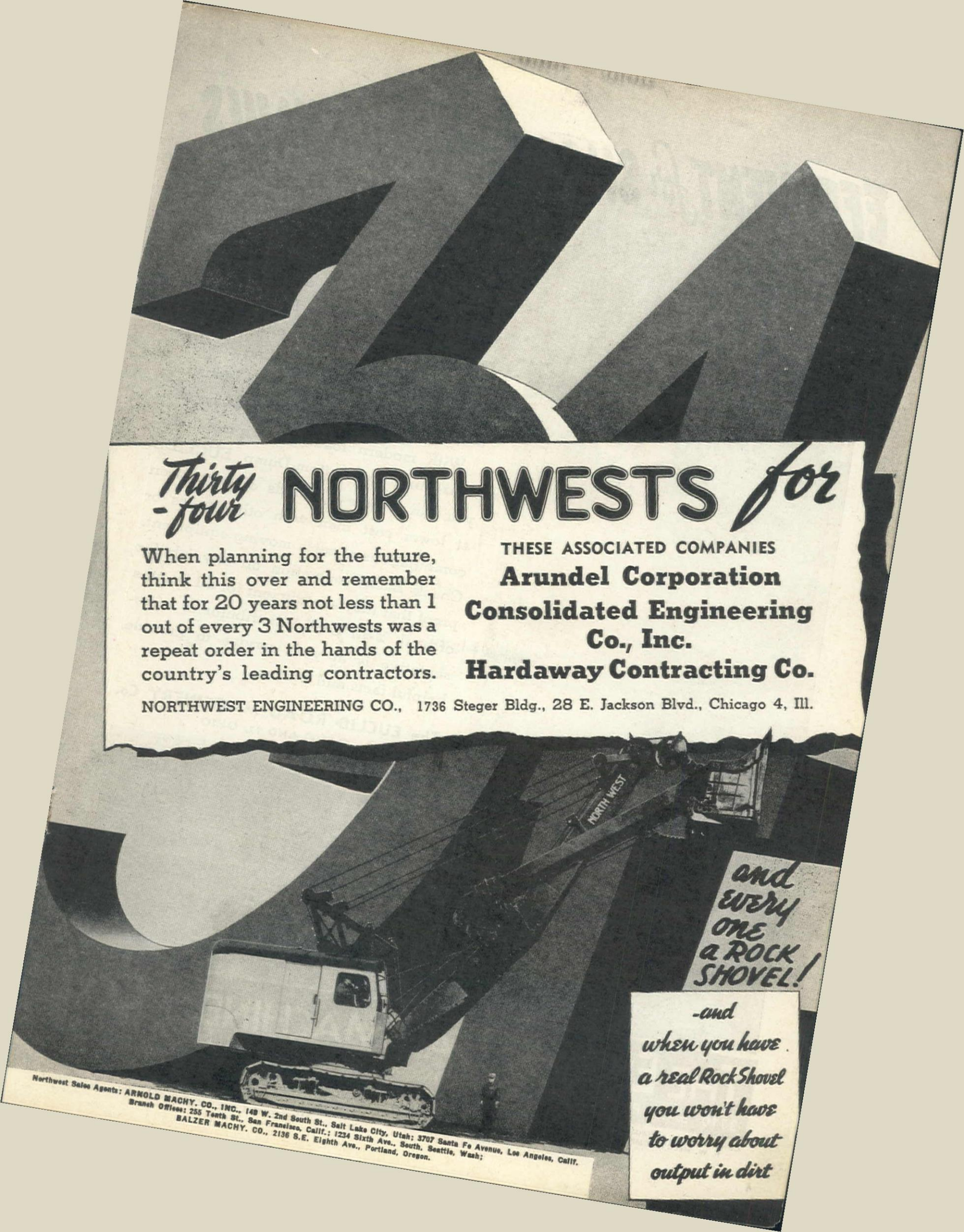
TEXACO

REG. T. M.

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT – CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY


Thirty-four NORTHWESTS for
When planning for the future, think this over and remember that for 20 years not less than 1 out of every 3 Northwests was a repeat order in the hands of the country's leading contractors.
THESE ASSOCIATED COMPANIES
Arundel Corporation
Consolidated Engineering Co., Inc.
Hardaway Contracting Co.
NORTHWEST ENGINEERING CO., 1736 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.
NORTH WEST
and EVERY ONE a ROCK SHOVEL!
-and when you have a real Rock Shovel you won't have to worry about output in dirt
Northwest Sales Agents: ARNOLD MACHY. CO., INC., 149 W. 2nd South St., Salt Lake City, Utah; 3707 Santa Fe Avenue, Los Angeles, Calif.
Branch Offices: 255 Tenth St., San Francisco, Calif.; 1234 Sixth Ave., South, Seattle, Wash;
BALZER MACHY. CO., 2136 S.E. Eighth Ave., Portland, Oregon.

EFFICIENT for SHORT and LONG HAULS

WHETHER your contract is large or small, the hauls short or long, Euclids will do the job faster at lowest cost per yard. Their overall speed, efficiency and large capacity have cut hauling costs for hundreds of contractors and industrial users on all types of off-the-highway jobs.

With modern loading equipment and Rear-Dump or Bottom-Dump EUCLIDS you can handle all kinds of excavation at lower cost than with other types or combinations of earth moving equipment. Check Euclid operation on any job for proof that they are efficient for all lengths of haul. Your Euclid distributor or representative is at your service to provide helpful facts and figures.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

THE EUCLID ROAD MACHINERY CO.
3710 SAN PABLO AVENUE — PIEDMONT 8046 — EMERYVILLE, CALIFORNIA

CONTRACTORS' EQUIPMENT & SUPPLY CO., Albuquerque; INTERMOUNTAIN EQUIPMENT COMPANY, Boise; HALL-PERRY MACHINERY COMPANY, Butte; F. W. McCOY COMPANY, Denver; COLUMBIA EQUIPMENT COMPANY, Portland; A. H. COX & CO., Seattle; LANG COMPANY, Salt Lake City.

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

Covering the Western Half of the National Construction Field

Contents for June, 1944

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Answers to Everyday Questions about PREformed WIRE ROPE

1 ***Is PREformed a lay of rope?***

2 ***Is PREformed a special construction?***

3 ***Just what does PREformed mean?***

4 ***How shall I mark my orders to get PREformed?***

These are questions wire rope users are asking. Here are answers to everyday questions we receive.

First, let us be reminded that there are two kinds of rope. One is non-preformed wire rope, the kind that has served users for many years. Then there is PREformed, the kind which is newer, better, and longer lasting. Because it is a newer type rope, because it does a much better job for users, there are many questions asked about it. Let's consider a few.

FIRST . . . *"Is PREformed a lay of rope?"*

No. PREformed does not refer to a lay of rope. Lay refers to the twist or helical form which is characteristic of *all* wire rope. A rope may be Lang Lay, Right Lay, Left Lay, Reverse Lay . . . and each of these lays may be made either PREformed or non-preformed.

Lang Lay ropes should always be PREformed to counteract the tendency towards twisting, because wires and strands are both laid in the same direction in Lang Lay ropes. Further information on Rope Lay is given in the new Macwhyte Wire Rope Catalog, G-15.

SECOND . . . *"Is PREformed a special construction?"*

No, PREformed is not a special construction. Construction refers to the number and arrangement of wires in the rope . . . such as 6 x 17 (six strands of 17 wires each), 8 x 19 (eight strands of nineteen wires each), and so on. These constructions can refer to either PREformed or non-preformed wire rope. (For complete data on constructions, see Catalog G-15.)

THIRD . . . *"Just what is PREformed?"*

Macwhyte PREformed wire rope is the proper size, grade and construction you need, *PLUS*. This *plus* refers to the PREforming, a process which forms the wires and strands into a spiral, so that wires and strands lie naturally in place with a minimum of internal stress.

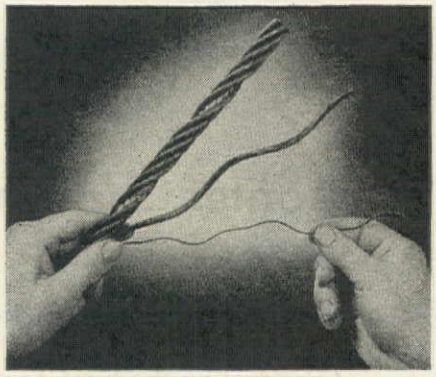


Illustration above tells the story. Notice how the wire has a special shape? It has been PREformed. When the rope is closed (put together in the closing machine), both wires and strands naturally fall into position in the rope.

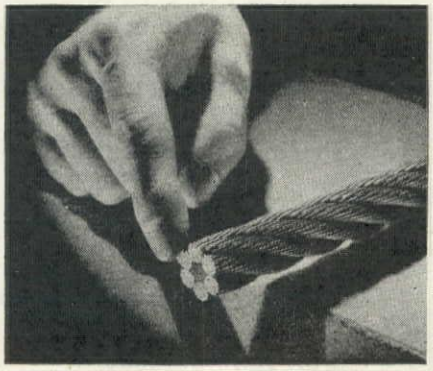


Illustration above points to the end of a PREformed rope showing how wires lie naturally in place even though no seizing is there to hold them.

The result is a wire rope that is more flexible and that more quickly adapts itself to the equipment on which it is used. Thus, literally, PREforming means better PER-forming on the job.

A PREformed rope is safer to handle, too, because broken wires (which will happen after *long* usage) do not wicker out as in non-preformed wire rope.

FOURTH . . . *"How should I mark my orders to get PREformed?"*

Just add the words "Macwhyte PREformed" to your specifications. Like this, for example:

1,250 feet 1" 6 x 19 Lang Lay with IWRC, Macwhyte PREformed Monarch Whyte Strand wire rope.

If you leave out "Macwhyte PREformed," the specification then becomes a non-preformed wire rope specification. The reason? When PREformed is not mentioned on the order, it is a standard practice to supply non-preformed.

FIFTH . . . *Internal Lubrication, too!*

And a bonus *Plus* feature of Macwhyte PREformed wire ropes is *internal lubrication*. Not only are wires and strands PREformed, but each wire in the strands is coated with an elastic, non-drying film of lubricant, as explained on pages 10 and 11 of G-15 catalog.

We have been making wire rope for equipment like yours for many, many years. The benefit of that experience is yours for the asking. You can be assured, too, that when you select Macwhyte you are not only getting "the correct rope for your equipment," but also a personal interest in helping you get the *most* out of *your* rope.

The correct rope for your equipment

NO. 741

MACWHYTE COMPANY

Wire Rope Manufacturers

2909 FOURTEENTH AVENUE KENOSHA, WISCONSIN

Mill Depots: New York · Pittsburgh · Chicago · Fort Worth · Portland · Seattle · San Francisco. Distributors throughout the U.S.A.

MACWHYTE PREformed and Internally Lubricated Wire Rope · MONARCH WHYTE STRAND Wire Rope · MACWHYTE Special Traction Elevator Rope · MACWHYTE Braided Wire Rope Slings · MACWHYTE Aircraft Cables and Tie-Rods · MACWHYTE Stainless Steel Wire Rope · MACWHYTE Monel Metal Wire Rope

How TOURNAPULL SPEED cuts Costs and increases Profits

You can profitably handle both long and short hauls . . . move more yardage with fewer units . . . save on equipment cost and get lower net cost per yard.

Tournapulls, like all big-capacity scrapers, are designed for pusher loading. They load quickly, haul and spread their own loads, are one-man operated. Because of their large diameter pneumatic tires of large cross section — plus low pressure and greater ground area — Tournapulls operate over concrete without surface damage, travel between jobs under their own power, thus save on freight.

TOURNAPULLS operate from 2.6 to 14.9 m.p.h. — that's 2 to 3 times faster than the fastest tractors. Chart here shows what this greater speed can mean to you in extra yardage.

ONE-WAY HAUL DISTANCE—CU. YDS. PER HOUR*

Tractor-drawn Scrapers:	400′	600′	800′	1,000′	2,000′	3,000′	4,000′	5,000′	6,000′
30-Yd. Capacity	—	—	175	153	97	71	56	46	39
23-Yd. Capacity	—	187	162	142	89	65	51	—	—
18-Yd. Capacity	196	163	139	122	74	—	—	—	—
15-Yd. Capacity	170	142	121	106	65	—	—	—	—
With 15-Yd. Super C Tournapull you get:	200	180	168	156	116	91	76	65	55

*All units pusher loaded on level.

Note that even on short hauls — 400 to 1000 feet one-way — Tournapulls compete very favorably with larger tractor-scraper outfits. While on longer hauls — 2000 to 6000 feet — Tournapulls move from 19% to 41% more than even a 30-yard tractor-scraper outfit — with less first cost and less cost per yard.

Figure 10,000-Hour Profit

As an example, take the extra yardage a Tournapull will move over a 10,000-hour working life on a 2000-foot, one-way haul. It varies from 190,000 to 510,000 pay yards, depending on comparative scraper size. *Estimate the profit to yourself on this extra yardage at your own usual bid price!* Can you afford to use more expensive, slower-moving rigs, when this *extra yardage* can be yours with the fast-moving, rubber-tired power of Tournapulls? Figure NOW to use job-proved Tournapulls on your postwar jobs. It will pay you—in first cost, lower cost per yard and greater profit each working hour.

LeTOURNEAU TOURNAPULLS

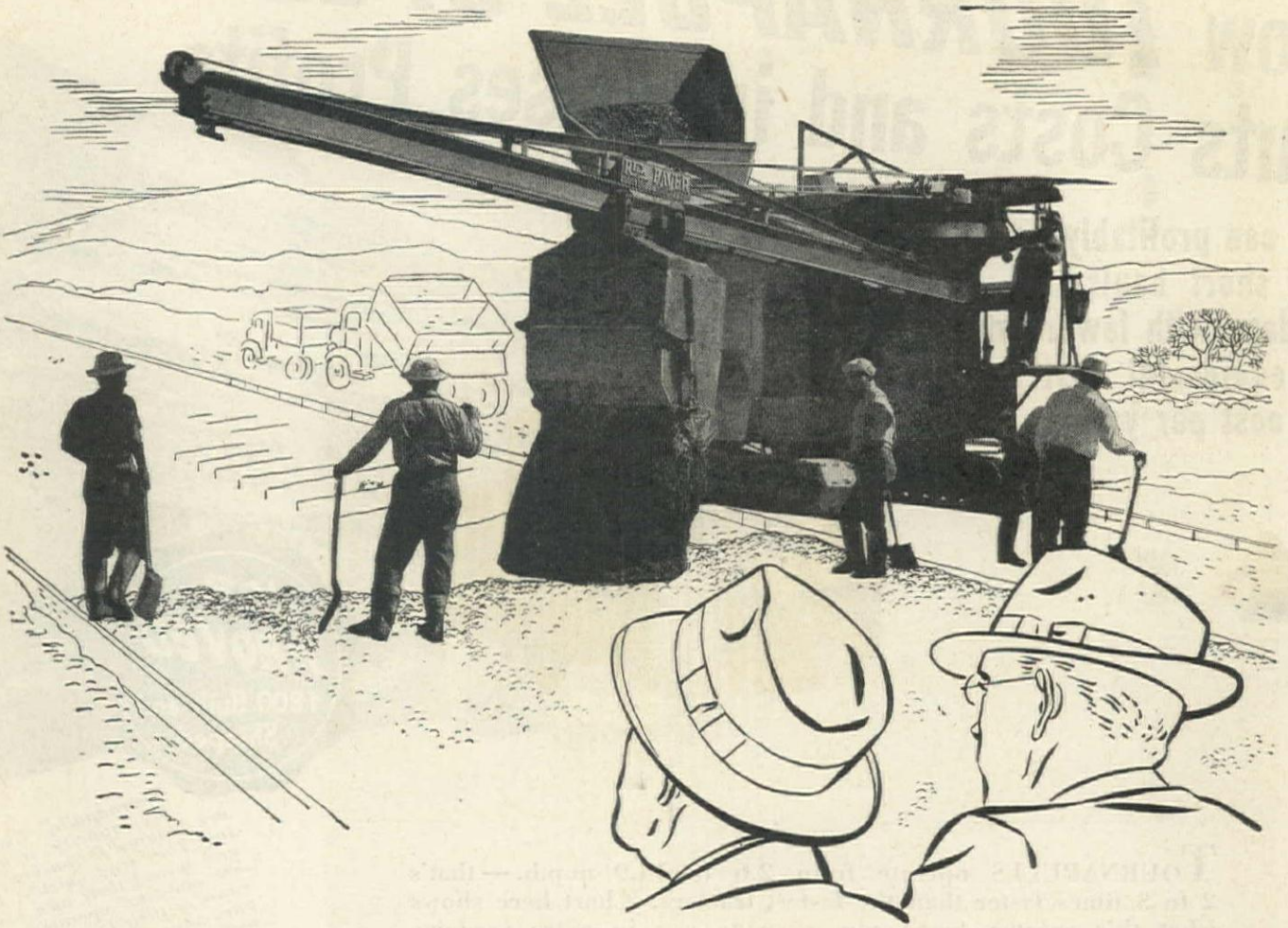
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Also, LeTOURNEAU (Aust.) Pty., Ltd., Rydalmere, New South Wales, Australia

RUBBER-TIRED POWER FOR FASTER EARTHMOVING

Mfrs. of TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*.

*Trade Mark Reg. U. S. Pat. Off.



2,000,000 square yards *is a lot of concrete!*

. . . Enough to build a 20-foot highway from Chicago to Milwaukee and back again. That's what my Rex Paver placed. And that's not all. In addition to placing that concrete, my Rex 34E Double Drum Paver helped me keep up to schedule—and in many cases beat it! And it's still going strong. I'm sure glad I bought it.

There's another thing, too. I thought you were kidding about that Rex Mechanical Man you said every Rex Paver had. Well I'm convinced he's in that paver now. We get batch after batch with never a lost motion.

The entire batch cycle of 7 different operations is mechanically controlled. That means every batch goes through with clocklike regularity—saving seconds every batch. And those *saved* seconds mean extra batches every day. It's by far the fastest performer I've ever owned.

RELY ON YOUR Rex Distributor. *He handles the complete line of Rex equipment for speeding up the mixing, hauling and placing of concrete and the moving of water. See him for Pumps, Mixers, Pavers, Moto-Mixers and Pumpcretes. You'll find him always ready and willing to help you locate new and used equipment, and to help you keep your present equipment in top running order.*

Arnold Machinery Co., Salt Lake City, Utah; Brown-Bevis Equipment Co., Los Angeles, California; Brown-Bevis Equipment Co., Phoenix, Arizona; Construction Equipment Co., Spokane, Washington; Contractors Equipment and Supply Co., Albuquerque, New Mexico; Corson Machinery Co., Ray—Denver, Colorado; Hall-Perry Machinery Co., Butte, Montana; Intermountain Equipment Co., Boise, Idaho; Loggers & Contractors Machinery Co., Portland, Oregon; Star Machinery Co., Seattle, Washington; Industrial Equipment Company, Emeryville, California.

REX

CONSTRUCTION MACHINERY

PUMPS PAVERS PUMPCRETES MOTO-MIXERS MIXERS

The LaFayette — 1837. One of the earliest B & O locomotives to haul the trains of the Presidents of the United States.

PREFACE OF A NEW ERA

GM Diesels have the exacting job of hauling B&O's highest-class freight, including trains of perishables and other foodstuffs for the armed forces as well as for civilian markets.

KEEP AMERICA STRONG BUY WAR BONDS

DAY in and day out, General Motors Diesel Locomotives are proving their ability to haul huge loads far, fast, with little attention and at low cost. In any vision of the future of transportation, these tireless giants must loom large. Already they have won a place of rare importance by their unprecedented performance in the work of the railroads at war.

GM
GENERAL MOTORS
DIESEL POWER

LOCOMOTIVES . . . . . ***ELECTRO-MOTIVE DIVISION,*** *La Grange, Ill.*

ENGINES . . *150 to 2000 H.P. . . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio*

ENGINES . . . . . *15 to 250 H.P. . . . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.*

QUICKEST WAY TO END AIR HOSE TROUBLE

IF your air hose isn't standing up, if you want an air carrier that can take the brutal punishment of speeded-up wartime production, change to Goodyear Redwing H Cord Air Hose.

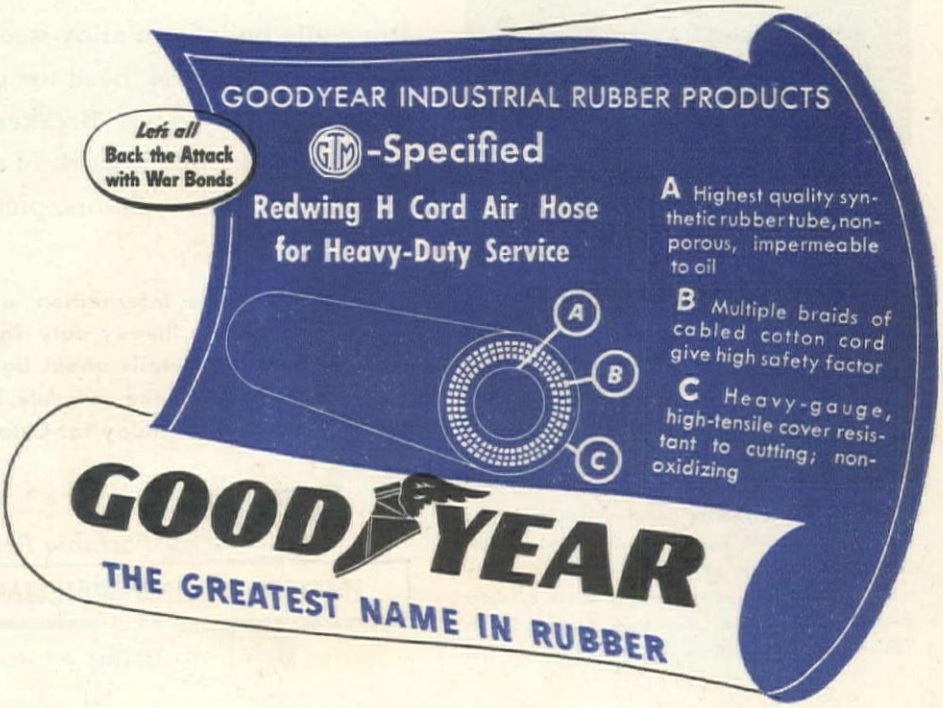
This famous hose is even better today than it was before Pearl Harbor, because it is now built with top-grade synthetic rubber—the finest material known for resisting the deteriorating action of both oil and weather. Redwing's tube won't flake off and clog tools. Its cover won't crack from heat or cold.

In addition, the type of synthetic Goodyear uses in Redwing is highly resistant to abrasion and cutting, giving you a hose that can withstand the rough, tough abuse of heavy-duty service.

Redwing—T.M. The Goodyear Tire & Rubber Company

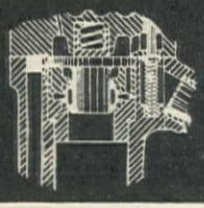
Many thousand feet of Goodyear Redwing H Cord Air Hose are now being used in shipyards, mines and other heavy war industries. It's preferred on these hose-killing jobs because of its long life, extreme flexibility, strength and non-kinkability. You'll buy it again and again for the same reasons.

Made in continuous lengths, in seven sizes up to 1½" diameter. Order from the G.T.M.—Goodyear Technical Man—or phone your nearest Goodyear Industrial Rubber Products Distributor.

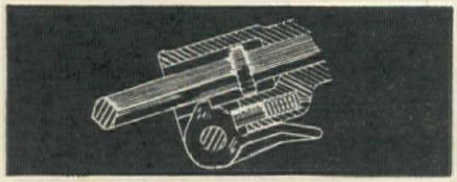


Thor No. 25 PAVING BREAKER

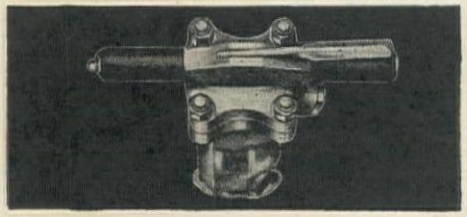
These THOR Features *Speed* Heavy Demolition Jobs!



• **Positive Short-Travel Tubular Valve**—Gets every ounce of power from every foot of air entering the machine. Actuates a block type piston that minimizes vibration to provide handling ease. Provides low air consumption.



• **Latch Type Retainer**—Simple, fast and easy to operate. Spring detent holds retainer in closed position . . . Pressing with the foot releases the tool. No adjustment is required during insertion of the tool.



• **4-Bolt Back Head**—Special design maintains rigidity between the back head and cylinder, eliminating air leakage and excessive bolt breakage when machine is used for prying. Made of drop forged, heat treated alloy steel. Equipped with rubber grips that keep the handle cool at all times.

BUILT for Heavy Duty . . . DESIGNED for Fast, Easy Handling

The Thor No. 25 Paving Breaker is the heavy duty "boss" of the Thor demolition crew . . . *built* for the hardest kind of jobs, yet *designed* to provide handling ease that gets those jobs done faster.

Ruggedly built from alloy-steel drop forgings, equipped with a sturdy 4-bolt back head for maximum strength and rigidity, this heavy duty Thor Breaker combines *operating ease* with *power* to make quick work of the toughest demolition jobs in pavement, walls, columns, piers, foundations and the like.

For more information about this powerful, easy operating, heavy duty Thor No. 25 Paving Breaker and full details about light and medium duty Thor Breakers in the *complete* Thor line of contractors air tools write today for Catalog 42-A.

Thor *Portable Pneumatic and Electric Tools*

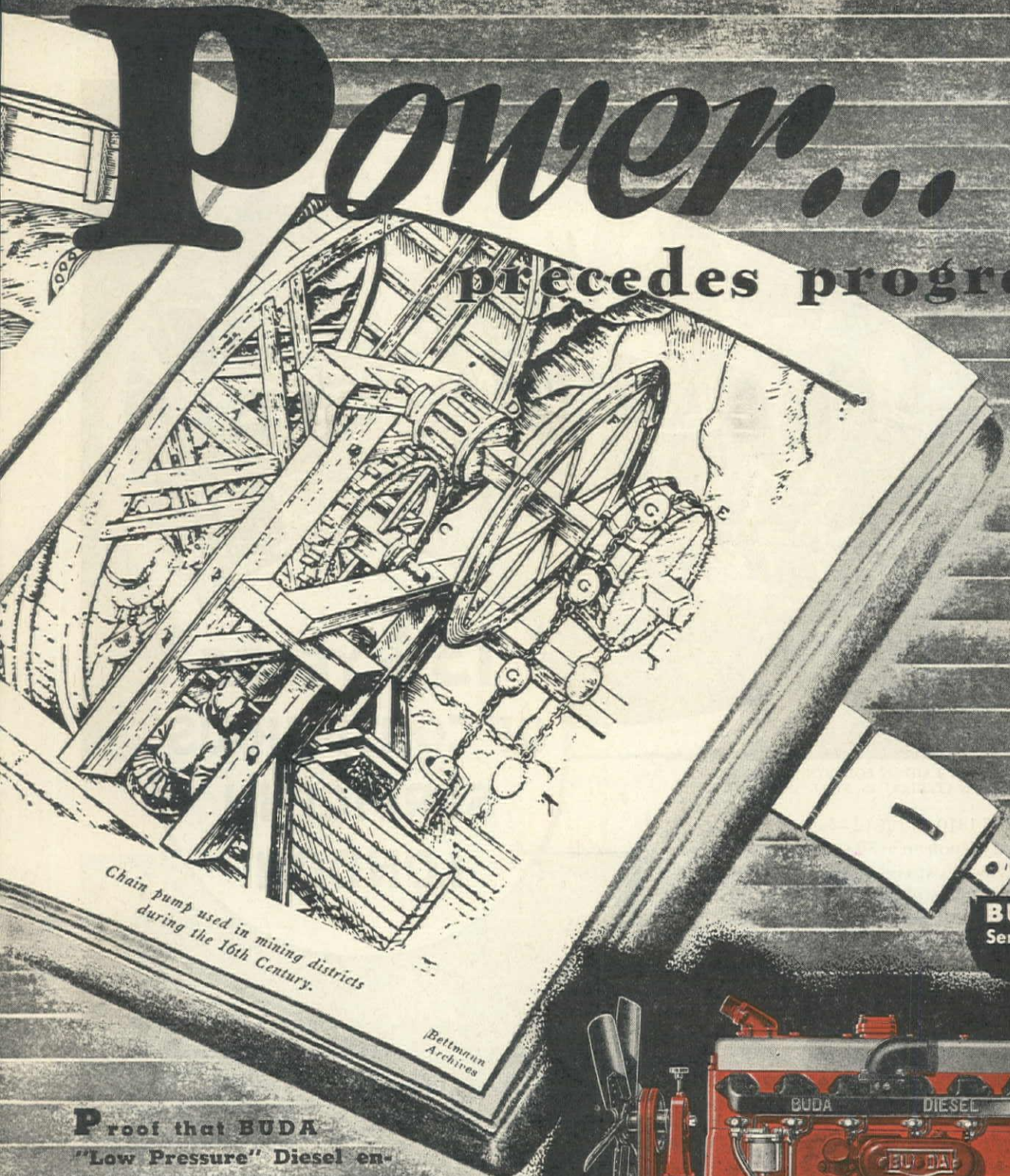
INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

Power...

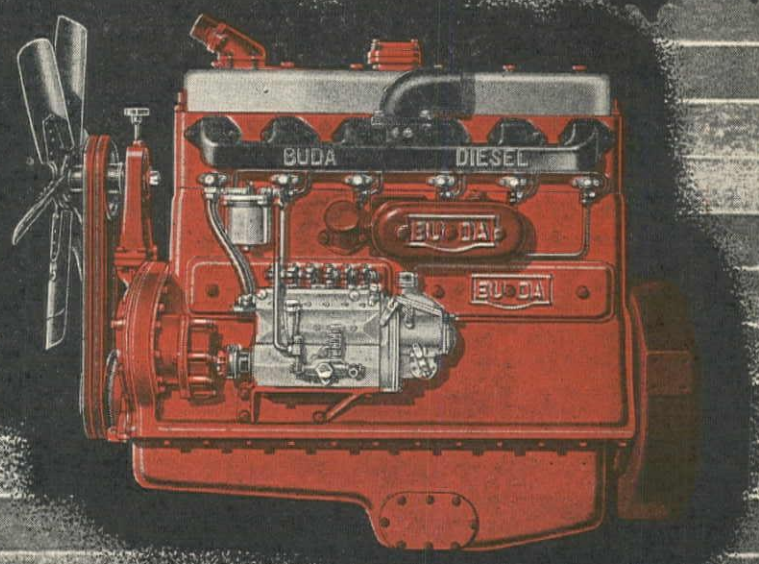
precedes progress



Chain pump used in mining districts during the 16th Century.

Bettmann Archives

BUDA
Service is Nation-Wide



Proof that BUDA "Low Pressure" Diesel engines deliver steady, reliable, economical power, month after month, is found in their years of dependable service. For lower operating and maintenance costs, less down time and longer engine life — specify BUDA - Power.

Write for bulletin.

ARMY NAVY

BUDA

HARVEY (Chicago Suburb) **ILLINOIS**

CAST IRON PIPE LAID IN LONDON BEFORE THE BATTLE OF WATERLOO IS STILL IN SERVICE.

134 YEARS OF CONTINUOUS SERVICE IN LONDON

BETWEEN 1810 and 1812—before Wellington defeated Napoleon at Waterloo—the cast iron water main, shown at right, was installed in London, England. It is still in service (unless recently bombed out). For when it was uncovered for inspection, and photographed, a few years ago, engineers pronounced it "as tight as when new." Before the war, 200-year-old cast iron water mains were known to be in service throughout Europe.

So when you specify cast iron pipe for current or postwar construction, you know one thing for certain—it will serve for centuries, in its original location or elsewhere. If the line has to be relocated or abandoned or replaced by larger diameters, you also know that cast iron pipe can be taken up and relaid, or salvaged for cash. You may also know that cast iron pipe costs far less to maintain than any other pipe used for water distribution mains, as proved by a survey conducted by a prominent engineering publication.

[Section of a cast iron water main laid in London between 1810 and 1812 and still functioning (at last report) after 134 years of continuous service.]

CAST IRON

Cast Iron Pipe Research Association
Thomas F. Wolfe, Engineer, Peoples Gas Building, Chicago 3

CAST IRON PIPE *SERVES FOR CENTURIES*

AFTER THE WAR—WHAT?

OWNERS of "Caterpillar" Diesel equipment have every reason to ask what they can expect from "Caterpillar" when the war is over.

Long before Pearl Harbor and through every month since, the vast bulk of "Caterpillar" production has gone to war; first for defense, then direct to the fighting fronts. Few new machines have been available for civilian use.

What kind of "Caterpillar" Diesels are being turned out? Basically, they are the same tough, reliable machines that were doing the nation's heavy work when war began. No plant-wide conversion was required to put the factory on 100% war production. *It will not have to be reconverted for peace.*

The "Caterpillar" Diesel Tractors, Motor Graders, Engines and Electric Sets that will roll off the line on their way to "Caterpillar" dealers will be the best we know how to build—war-proved models, as modern as victory itself. They will be *worth waiting for.*

While the war goes on, and older machines must carry the load at home, no owner of a "Caterpillar" Diesel can afford to neglect his equipment. Enlist the "Fighting Four" for the duration—and depend on your "Caterpillar" dealer for able counsel and service.

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

THE "FIGHTING FOUR"

INSPECT Look your equipment over frequently. For expert "internal" inspection of operating parts or functions, call in a trained "Caterpillar" service man. Read your Operator's Instruction Book.

LUBRICATE Use the right oil at the right time in the right place and in the right quantity. Keep the oil clean—change before it becomes dirty and deteriorated. Follow the Operator's Instruction Book.

ADJUST Tighten all bolts. Keep fan belt and tracks at proper tension. Read the Operator's Instruction Book. For fuel injection valves and other precision adjustments, let your experienced service-dealer do the work. He'll do it well.

REPLACE Have your service-dealer replace or repair worn bearings, track rollers, pins and bushings, sprockets, cylinder liners, clutch linings. His service helps restore power and extend equipment life. Saves critical materials, too.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

TO WIN THE WAR: WORK—FIGHT—BUY MORE WAR BONDS!

Peterbilt

A "HE-MAN'S" TRUCK

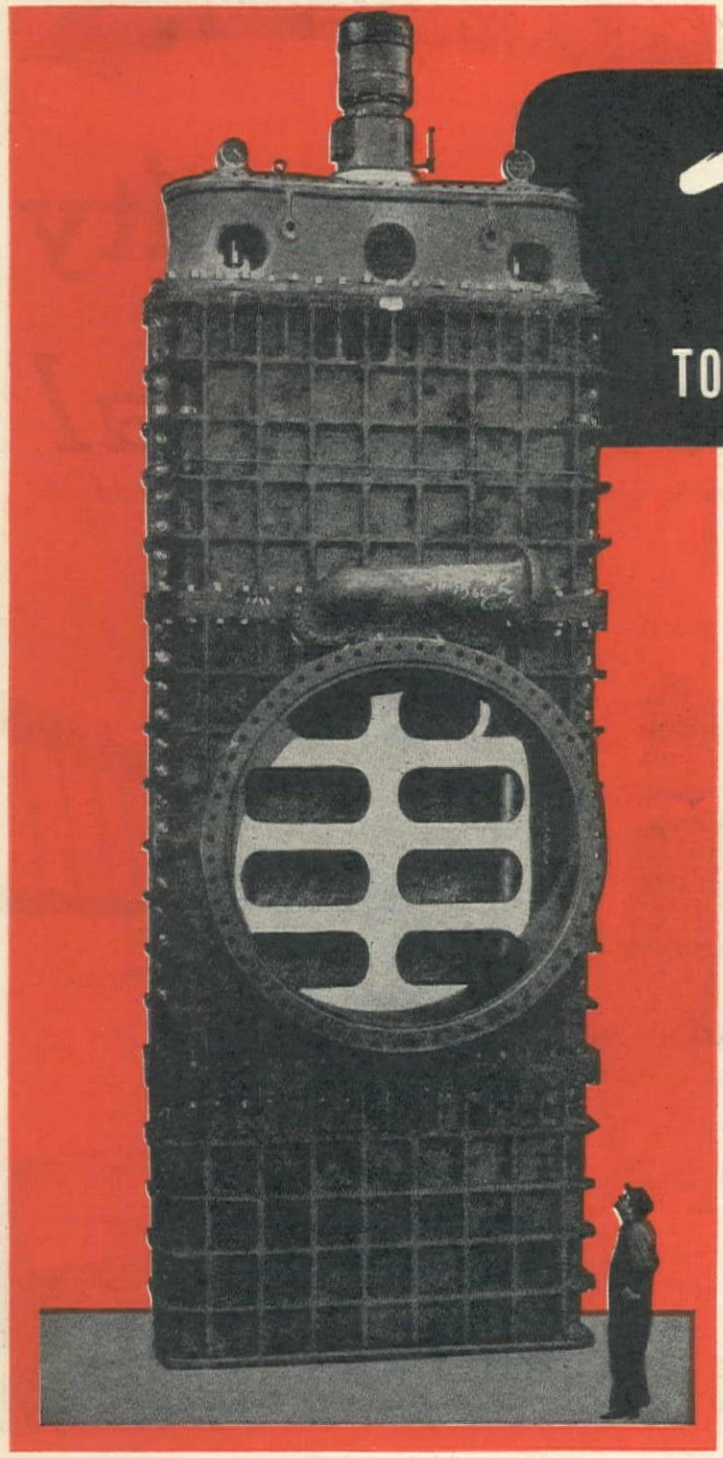
☆ **You know how you feel** after you have been swimming in deep water and as you approach the shore you find that you have solid ground under you? Truck drivers who have been used to operating much lighter equipment enjoy the same feeling when they climb into the cab of a *Peterbilt.*

When you drive a *Peterbilt* you really feel like you have a truck under you—a regular "he-man's" truck. You know that you've graduated from the "delivery boy" class and you are operating a vehicle that can take everything that comes.

Peterbilt Trucks are especially designed and ruggedly built to meet predetermined conditions—that is why they have been so uniformly successful in such gruelling service as logging, excavating, oil transportation, and cross country freight hauling.

Peterbilt Motors Company

17th AVENUE AND MacARTHUR BOULEVARD · OAKLAND · CALIFORNIA



Pressing a Button TO SHUT A GIANT'S MOUTH!

No monstrous ogre of fable is this mighty giant—but a valued device of the engineer's craft, skillfully built to control the powerful flow of life-giving water. Built to order by Hendy for a reclamation power and water project, this ring-seal gate is one of a wide variety of special gates and valves installed throughout the West, in Latin America and in the far East.

The "giant's" mouth is an outlet 86 inches in diameter. Yet the construction of this huge gate is so precise that a 40-hp electric motor powers its closing and opening. One man operates it with a push-button control located at the master control station.

For more than four decades Hendy has built to carefully drawn engineering specifications hundreds of hydraulic flow-control units—needle valves, butterfly valves, ring-seal gates, high-pressure gates and sluice gates—for the dams and the power, water and reclamation projects of this and many foreign countries.

Submit your flow-control problems to Hendy—for recommendations based on seasoned experience.

Standing 38 feet high and weighing 105,000 pounds, this huge, ring-seal gate valve is shown prior to dis-assembly for shipment. It is one of two delivered in recent months to Puerto Rico.

JOSHUA HENDY IRON WORKS

ESTABLISHED 1856

SUNNYVALE, CALIFORNIA

EST. 1856

30-V

Branch Offices: BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • ST. LOUIS • WASHINGTON • LOS ANGELES

TURBO-GENERATORS

REDUCTION GEARS

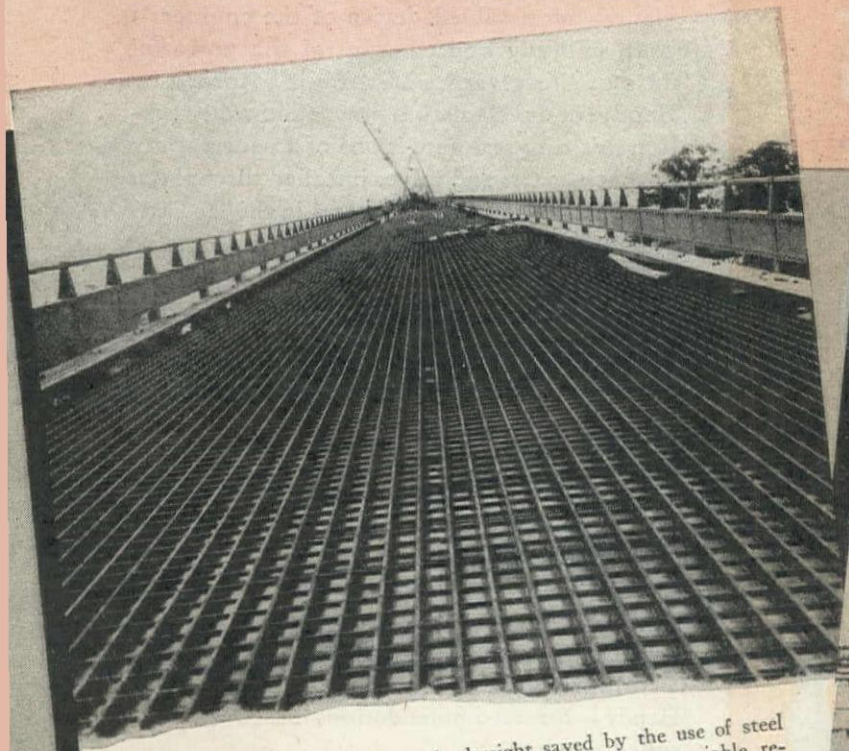
STEAM TURBINES

DIESEL ENGINES

One thing the war hasn't changed...

the basic superiority

as a structural



4,545,000 lbs. of floor deadweight saved by the use of steel I-Beam-Lok Flooring (concrete filled) resulted in appreciable reduction in number of piles, size of piers and weight of superstructure, saved thousands of dollars in the cost of the famous Potomac River Bridge at Ludlow Ferry, Md. In addition to saving 720 lbs. per lineal foot as compared to weight of ordinary reinforced concrete slab of equivalent strength, I-Beam-Lok also assures long life, low maintenance, and fire safety. Is smooth, yet safe for high-speed traffic. More than 4,000,000 sq. ft. of U·S·S I-Beam-Lok steel flooring is now in use adding new life to old bridges, insuring longer life to new.

Where high load-bearing capacity and dependable protection against flood water and scour are needed, U·S·S Steel H-Beam Bearing Piles supply them. These strong, permanent, easily driven H-Beam Piles offer the most practical and economical solution to many foundation problems. They have proved their ability to provide a secure means of supporting substructures in unstable materials of great depth, have shown themselves highly efficient in hard-driving materials which, while possessing adequate load-supporting power when undisturbed, are subject to erosion and wash under extreme run-off conditions. More than 1000 *miles* of U·S·S Steel Bearing Piles have been driven in the last 10 years.

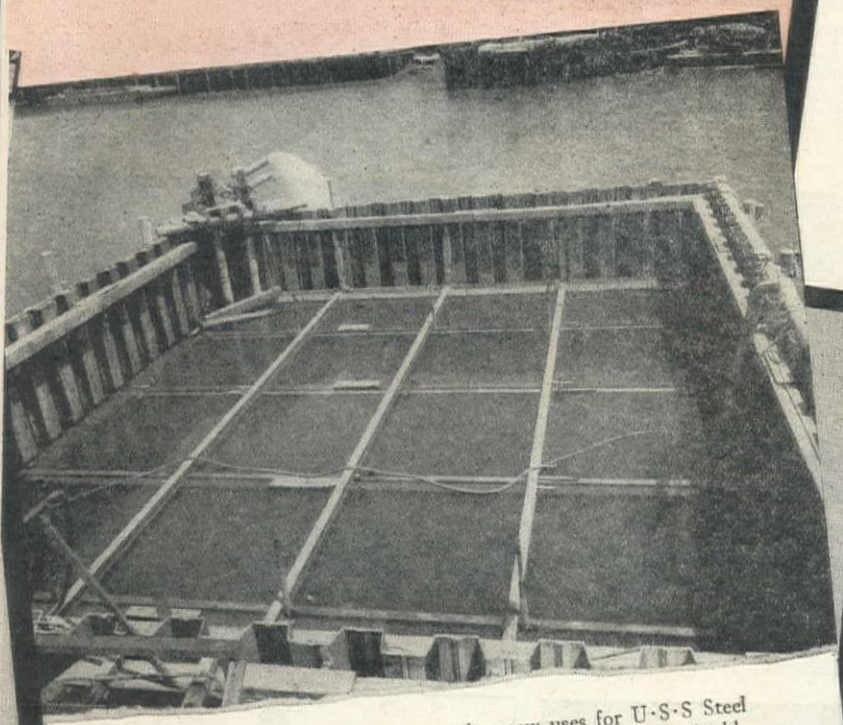
ONLY STEEL
CAN DO SO MANY
JOBS SO WELL

USS

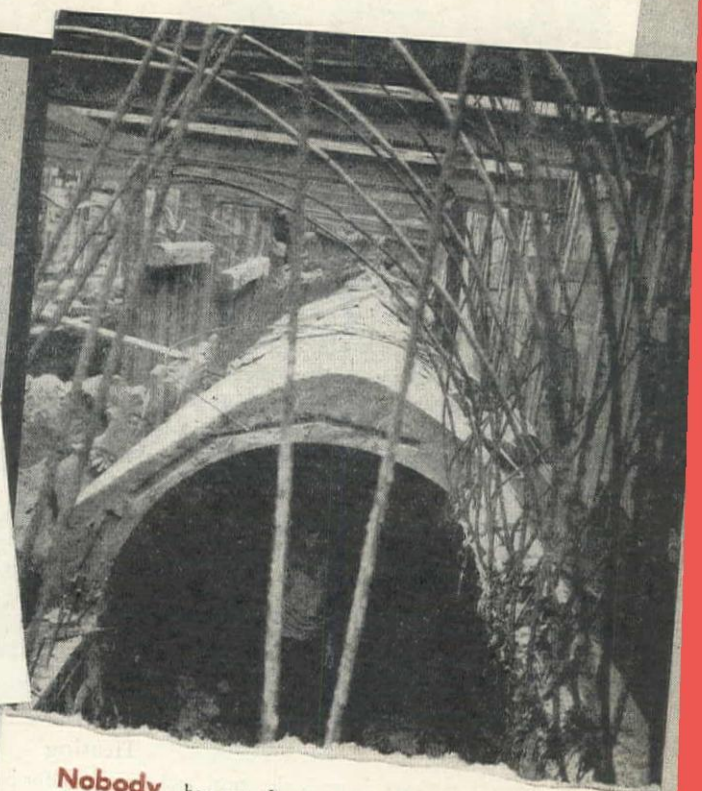
UNITED

# of STEEL *material*

No matter how well you build your roads, airfields, playgrounds, etc., they will give you trouble unless you provide for proper drainage. In U·S·S Corrugated Metal Pipe you will find the economical answer for most drainage problems. Light, strong, easily handled, it withstands vibration and impact without ill effect. Accidental dropping won't break it, neither will the pounding of the heaviest traffic. Also available in large sectional plates for small bridges.



Engineers are constantly discovering new uses for U·S·S Steel Sheet Piling. This superior and versatile piling has proved invaluable in projects involving the retention or control of earth or water. Available in straight-web, arch-web and in "Z" sections, it drives easily, can be readily pulled and salvaged for re-use. Each unit, positively interlocked to the next, offers a minimum strength of from 48 to 72 tons per foot against rupture or tension. In the building of bridge piers and abutments, this piling can be used as an easily driven coffer dam which can be left in position to act as a permanent form for the concrete fill.

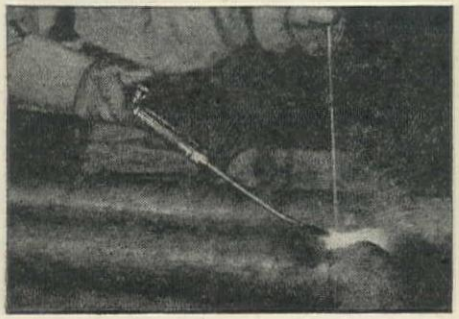


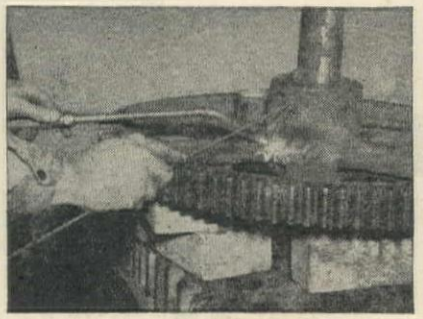
Nobody has ever found a better, easier or more economical way to add lasting strength to concrete construction than by reinforcing with steel. U·S·S Concrete Reinforcing Bars—rolled from new billet steel to standard specifications—are indispensable where strength is needed in bridge piers, abutments, retaining walls, storm sewers, etc. Distributors located in all principal cities insure least delay in delivery.

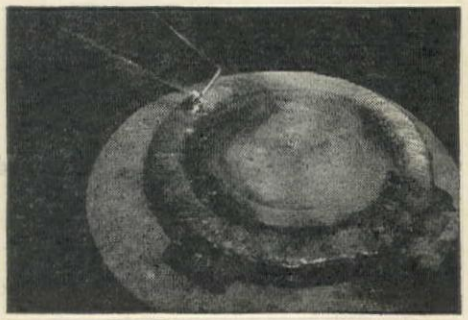
COLUMBIA STEEL COMPANY
San Francisco · Los Angeles · Portland · Seattle
CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
United States Steel Export Company, New York

STATES STEEL

These LINDE METHODS *Reduce Costs of* MAINTENANCE OPERATIONS

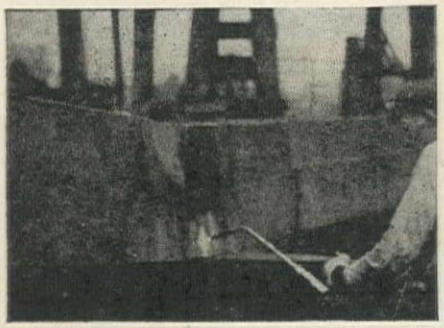






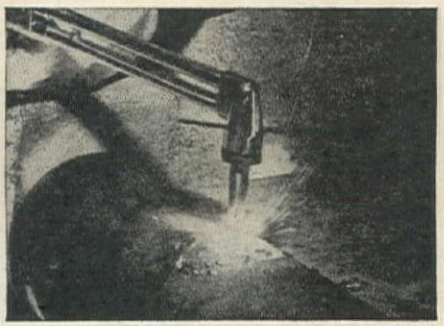
OXY-ACETYLENE WELDING

The oxy-acetylene flame makes possible the joining of practically any metals—like or unlike—so that the weld is as strong as the base metal itself. *Welded piping systems* in plants and refineries use less fittings, occupy less space, and remain leakproof indefinitely. *Bronze-welding* and resurfacing speed the repair of worn or broken parts. *Hard-Facing* with Haynes Stellite alloys makes parts subjected to abrasion, heat, or corrosion last from two to twenty-five times longer.



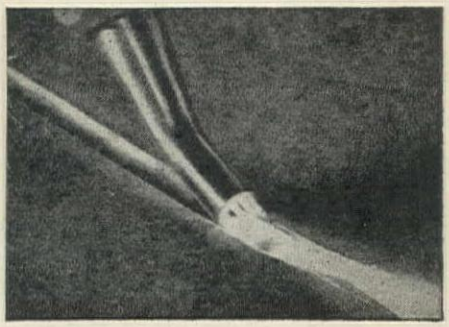
Straightening

Structural steel, shafts, pipe, plate, and other metal parts and structures that have become bent or warped can often be trued up in the shop or on the job by applying the intense heat of oxy-acetylene flames at the right points.



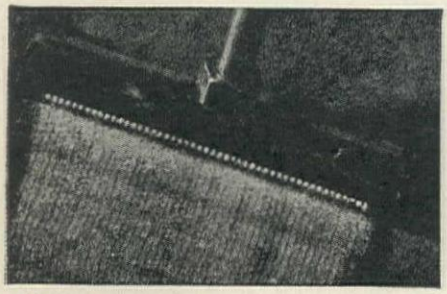
Hand-Cutting

Flame-cutting with manually operated blowpipes is useful for cutting pipe in the fabrication of piping systems. Hand-cutting also is used to cut structural steel in construction or alteration work—to reclaim old pipe—and to cut scrap to length.



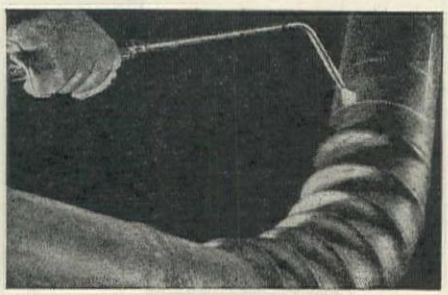
Gouging

With Oxweld hand-cutting blowpipes equipped with gouging nozzles, surface metal—such as faulty or temporary welds—can be removed quickly leaving a groove, without need of grinding or chipping, and without harm to the adjacent areas.



Flame-Priming

This process removes loose scale, rust, and surface moisture from steel prior to painting—making paint go on faster, bond tighter, and last longer.



Heating

Heating for bending, straightening, and forming operations is facilitated by the oxy-acetylene flame. Shown here, a pipe is being wrinkle-bent.

Oxygen, Acetylene, Carbide

A booklet describing use of Linde oxygen, Prest-O-Lite acetylene, Union Carbide, and Oxweld apparatus in these and other processes will be sent without charge on request. Ask for Form 5268A.

BUY U. S. WAR BONDS AND STAMPS

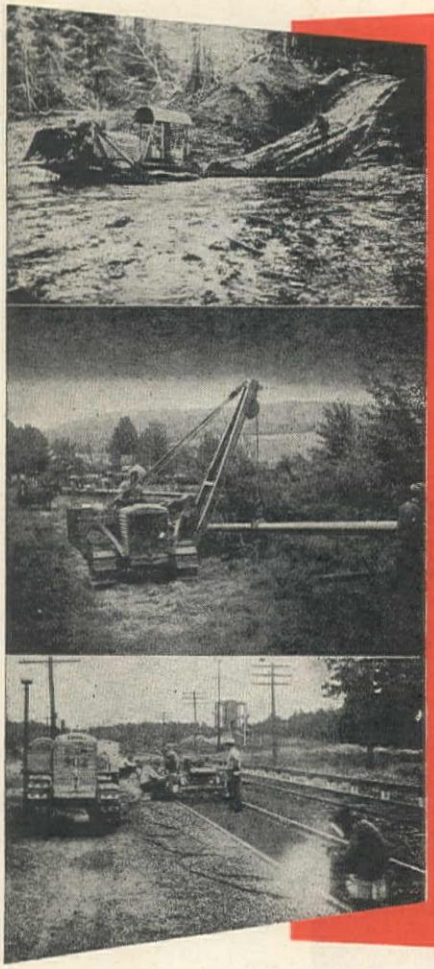
THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 E. 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

The words "Haynes Stellite," "Linde," "Oxweld," "Prest-O-Lite," and "Union" are trade-marks.



War Demands all Sorts of Material

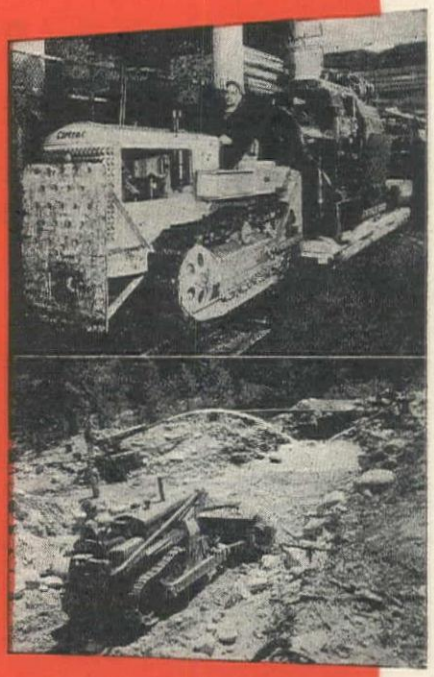
LUMBER

STEEL

OIL

MINERALS

TRANSPORTATION



at the right place at the right time

BACK of the battle lines throughout the world, Cletrac Tru-Traction tractors are helping to produce the sinews of war in sections long distances from civilization. In logging camps—on oil fields—in mines—on new highways—wherever heavy hauling, bulldozing or earth moving must be accomplished, Cletracs are doing the job economically and dependably.

In war plants of the United States and in the industrial centers of the United Nations, Cletracs perform yeoman service in steel mills, on docks, and in warehouses, handling huge loads of war goods in process of production or shipment to fighting forces.

The Cletracs that have been working on these jobs were nearly all produced before the war began, because since war engulfed us, 92% of Cletrac production has been to meet military needs.

While we are still producing to meet the demands of war, with a large part of Cletrac standard production running into 1945 required to complete present contracts, the over-all production of Cletracs has been so greatly increased, that a substantial number of Cletracs are being released for essential civilian use. These tractors are allocated according to government regulations. Your Cletrac dealer will gladly assist you in making application for a new Cletrac if you can qualify as an essential user.

•

CLETRAC REPORTS ON ITS WAR EFFORT

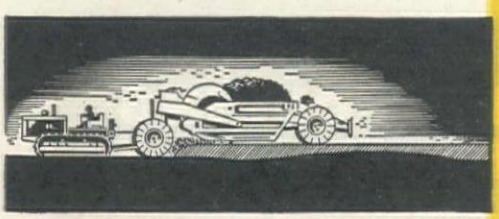
This folder, recently published, tells briefly of Cletrac's part in the war effort. A copy will be mailed on request.

THE CLEVELAND TRACTOR COMPANY • CLEVELAND 17, OHIO

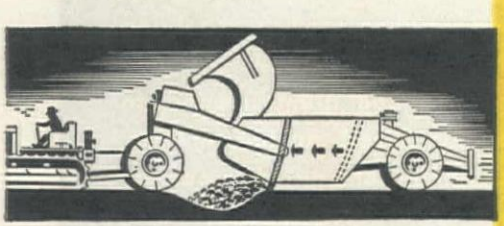
CLETRAC *Tru-Traction* TRACTORS

STATE OF CALIFORNIA—Gustafson Tractor Co., Eureka; Mechanical Farm Equipment Dist., Inc., San Jose; Raymond L. Comber, Modesto; Nelson Equipment Co., Los Angeles; Tractor & Equipment Co., San Leandro. STATE OF WASHINGTON—Burrows Motor Company, Yakima; A. C. Haag & Co., Spokane; Pacific Hoist & Derrick Co., Seattle. STATE OF OREGON—A. C. Haag & Co., Portland; Loggers & Contractors Machinery Co., Portland. STATE OF IDAHO—Idaho Cletrac Sales Co., Lewiston; The Sawtooth Company, Boise. STATE OF MONTANA—Western Construction Equipment Co., Billings, Montana. VANCOUVER, B. C.—A. R. Williams Machinery Co., Vancouver.

How to Save Equipment and Manpower on LEVELING and GRADING JOBS



To carry an even spread, the operator must lower the cutting edge to compensate for the extra height as the scraper's rear wheels climb onto the material spread ahead. The cutting edge in this manner acts as a strike-off in controlling the spread.



A reasonably good job of rough finishing can be accomplished with a scraper by pulling the rear gate to the front of the bowl and using it as a dozer blade to drift the material ahead into low spots. Try this money-saving idea on your next job; it works!

Wherever big yardages of dirt are involved, more and more contractors are finding it profitable to handle the complete job of leveling and rough grading with LaPlant-Choate "Carrimor" scrapers. On airports, highways, large building and irrigation projects, "Carrimors" permit more flexible operation because they dig, haul and spread their own loads. In addition, "Carrimors" carry the grade straight through in lifts of any desired depth, compacting the material as they travel over it. Result: your job is completed faster with fewer men—often without need for extra hauling, spreading and rolling equipment. See your LaPlant-Choate "Caterpillar" distributor today for complete details, or write for additional information. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

New Developments Coming!

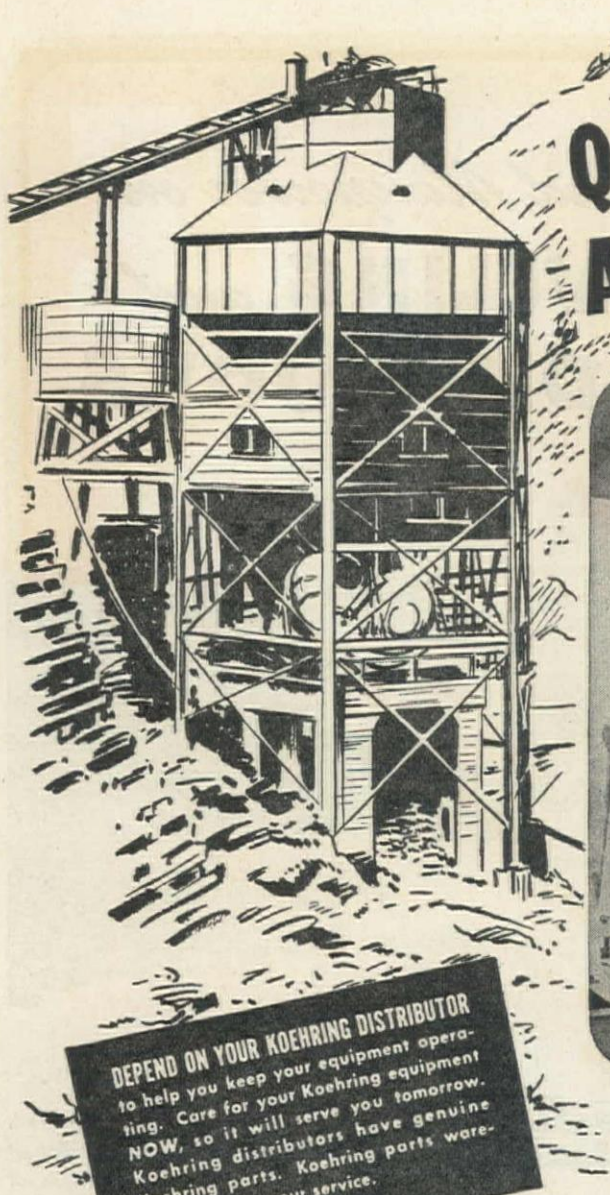
In the near future, LaPlant-Choate will announce a new line of improved cable and hydraulic scrapers, engineered exclusively for all sizes of "Caterpillar" track-type and rubber-tired tractors. These new LaPlant-Choate units will offer improvements never before dreamed of in the earth-moving industry—faster loading . . . quicker, cleaner dumping . . . lower costs per yard of material moved. Tomorrow more than ever before, you'll find that "you profit more with a Carrimor."

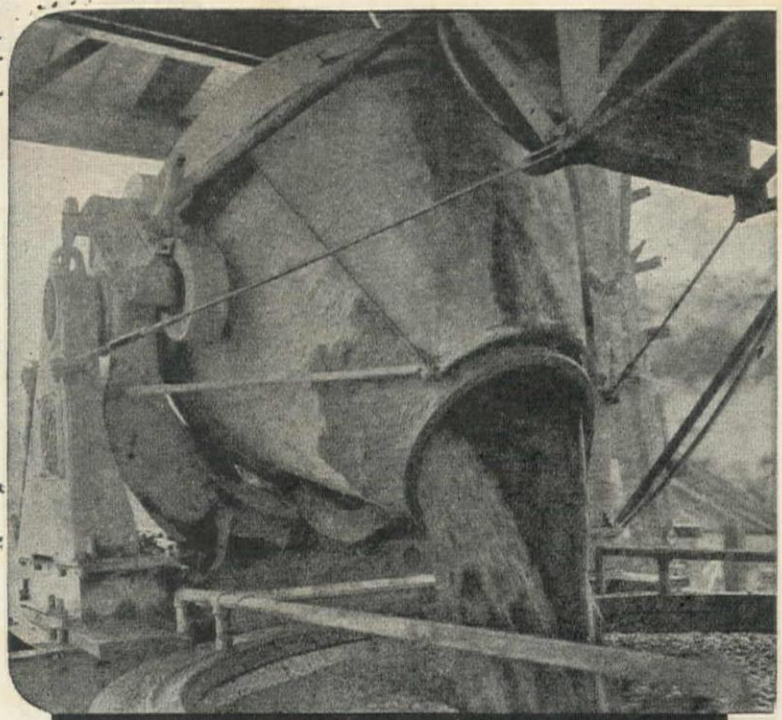
ARMY-NAVY E

LaPLANT-CHOATE

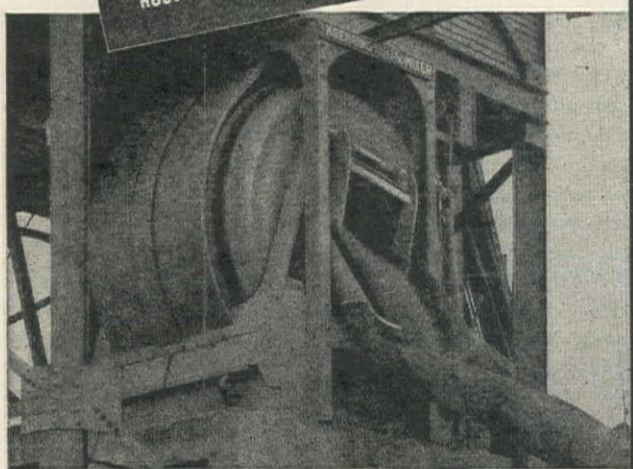
Earthmoving and Land Clearing Equipment

QUALITY CONCRETE AT RECORD SPEED





DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.



RECORD POURING WITH KOEHRING

Koehring Tilting and Non-Tilting Mixers have established pouring records on many large volume concrete jobs . . . dams, spillways, locks, bridges, power plants, drydocks, etc. for both peace and wartime projects. Koehring Construction Mixers have specially designed non-clogging drums and drum interiors to produce thoroughly mixed, quality concrete. They are substantially constructed to operate day and night continuously for maximum yardage production. ***Plan now*** for a Koehring Mixer for postwar construction. Consult our distributor or write to us for information.

KOEHRING COMPANY
Milwaukee 10, Wisconsin

KOEHRING HEAVY DUTY

ARMY E NAVY

Member Mixer Bureau Affiliated with A. G. C.

HEAVY-DUTY CONSTRUCTION EQUIPMENT

HARRON, RICKARD & McCONE CO., San Francisco-Los Angeles • PACIFIC HOIST & DERRICK CO., Seattle, Wash. • WESTERN CONSTRUCTION EQUIPMENT CO., Billings • CONTRACTORS EQUIPMENT CORP., Portland • LUND MACHINERY CO., Salt Lake City • NEIL B. McGINNIS CO., Phoenix, Ariz. HARRY CORNELIUS CO., Albuquerque, New Mexico • KOEHRING COMPANY WEST COAST PARTS WAREHOUSE, San Francisco, 10, California.

TAMPTITE

SAVES TIME

SAVES LABOR

PACKS SNUGLY

GIVES BETTER BREAKAGE

1 **FASTER LOADING** of bore holes is possible with Tamptite because there is no wasted time splitting cartridges, no fuss or bother. You simply insert a Tamptite cartridge and tamp.

2 **TIGHTER CHARGING** is bound to result because both dynamite and the Tamptite wrapper expand to fill the bore hole tightly, snugly. Virtually no air space remains around the charge.

Order your favorite Hercules explosives in Tamptite cartridges. All the customary grades and sizes of Hercules Gelamites*, Hercomites*, Extra Gelatins, Gelatins, and Extra Dynamites are available in this time-saving wrapper.

3 **BETTER BREAKAGE** of the ore or rock occurs because the entire charge is concentrated exactly where you want it. The result is speedier mucking and a faster mining cycle.

HERCULES
EXPLOSIVES

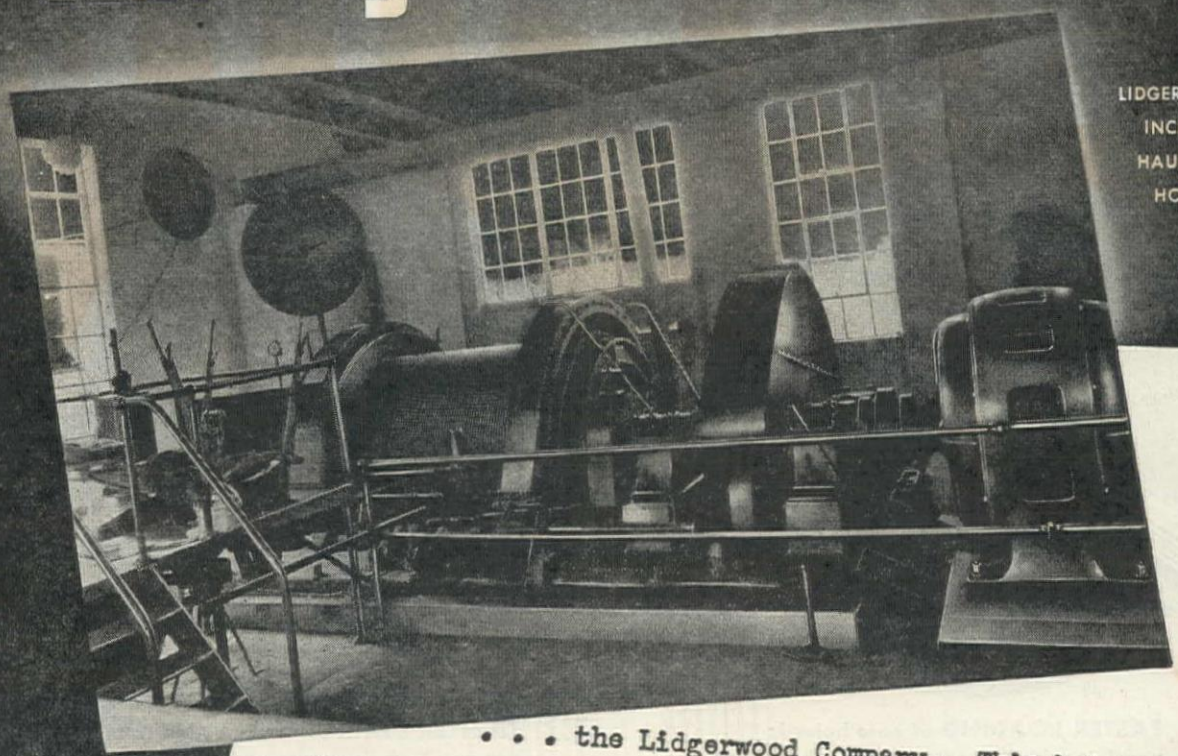
HERCULES POWDER COMPANY INCORPORATED .....994 KING STREET • WILMINGTON 99, DELAWARE

*REG. U. S. PAT. OFF.

XR-42

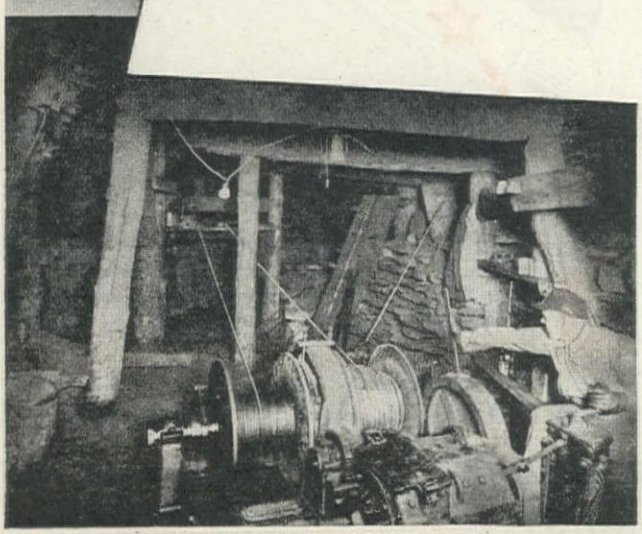
ORDER HERCULES EXPLOSIVES IN TAMPTITE CARTRIDGES

Hauling a Million Tons of Coal



LIDGERWOOD INCLINE HAULAGE HOIST

• • • the Lidgerwood Company. This hoist was installed in 1923. The drum coils 10,000 feet of rope, and has operated on an underground haul 7,000 feet long and has given very good performance. We think that in the years since 1923 we have hauled about a million tons of coal with this hoist. The maintenance costs have been very low, the operation smooth, and the hoist has been in every way satisfactory. It hauls coal from a mine which was opened in 1882 and has been in steady operation.



LIDGERWOOD SCRAPER LOADER HOIST

PROOF by performance over the years is the soundest recommendation of Lidgerwood hoists, which have a 70-year record of dependable, efficient and economical operation in mine, quarry and construction service. Lidgerwood hoists are built to *fit the job* —and at present Lidgerwood is supplying gasoline, steam, electric and Diesel hoists to the government and war-related industries.

LIDGERWOOD

ESTABLISHED 1873

Manufacturing Company

MAIN OFFICE AND WORKS · ELIZABETH, NEW JERSEY

160 FT. BOWSTRING TIMBER TRUSSES FOR SOUTHWEST AIRCRAFT PLANT... Glued and laminated upper and lower chords. Teco split rings and shear plates in joints... Project included 66 of the 160' bowstrings and 233—35' Timber Connector Howe Trusses... Fabrication and erection by Summerbell Roof Structures of Los Angeles, California.

HEAVY STRUCTURAL DIMENSION AND TIMBERS ARE AVAILABLE

War Production Board Material Substitutions and Supply List, Issue No. 12, which indicates the relative availability of the most important materials essential to the war, states:

GROUP III

"Supplies of Group III materials except for local shortages are readily AVAILABLE for essential uses. They should be used instead of those in Groups I and II wherever possible.

"(III) D. LUMBER

"Cedar, Red, Western: Timbers.
"Cypress: Pecky; Timbers.
"Douglas-Fir: Dimension (3" & 4" thicknesses only); Timbers.
"Hemlock, Western: Dimension (3" & 4" thicknesses only); Timbers.
"Larch, Western: Dimension (3" & 4" thicknesses only); Timbers.
"Pine, Southern: Dimension (3" & 4" thicknesses only); Timbers
"Redwood: Timbers."

The lumber manufacturing industry recommends that 3-inch and thicker lumber be specified for essential construction uses as a stimulus to the production of the much needed 1-inch and 2-inch lumber, which generally is produced along with structural and timbers.

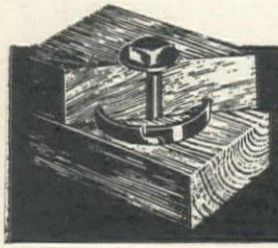
Specifying and design officers can help by specifying timber construction using these available sizes and dimensions . . . Well balanced orders facilitate maximum production of lumber.

Nation-Wide Timber Fabricators Can Serve You

Experienced timber fabricators have large production facilities throughout the country to aid the war effort promptly... And these facilities are ready to serve private industry in postwar planning . . . Consult them now or write us.

TIMBER ENGINEERING COMPANY

Washington, Chicago, Minneapolis, New Orleans, Portland

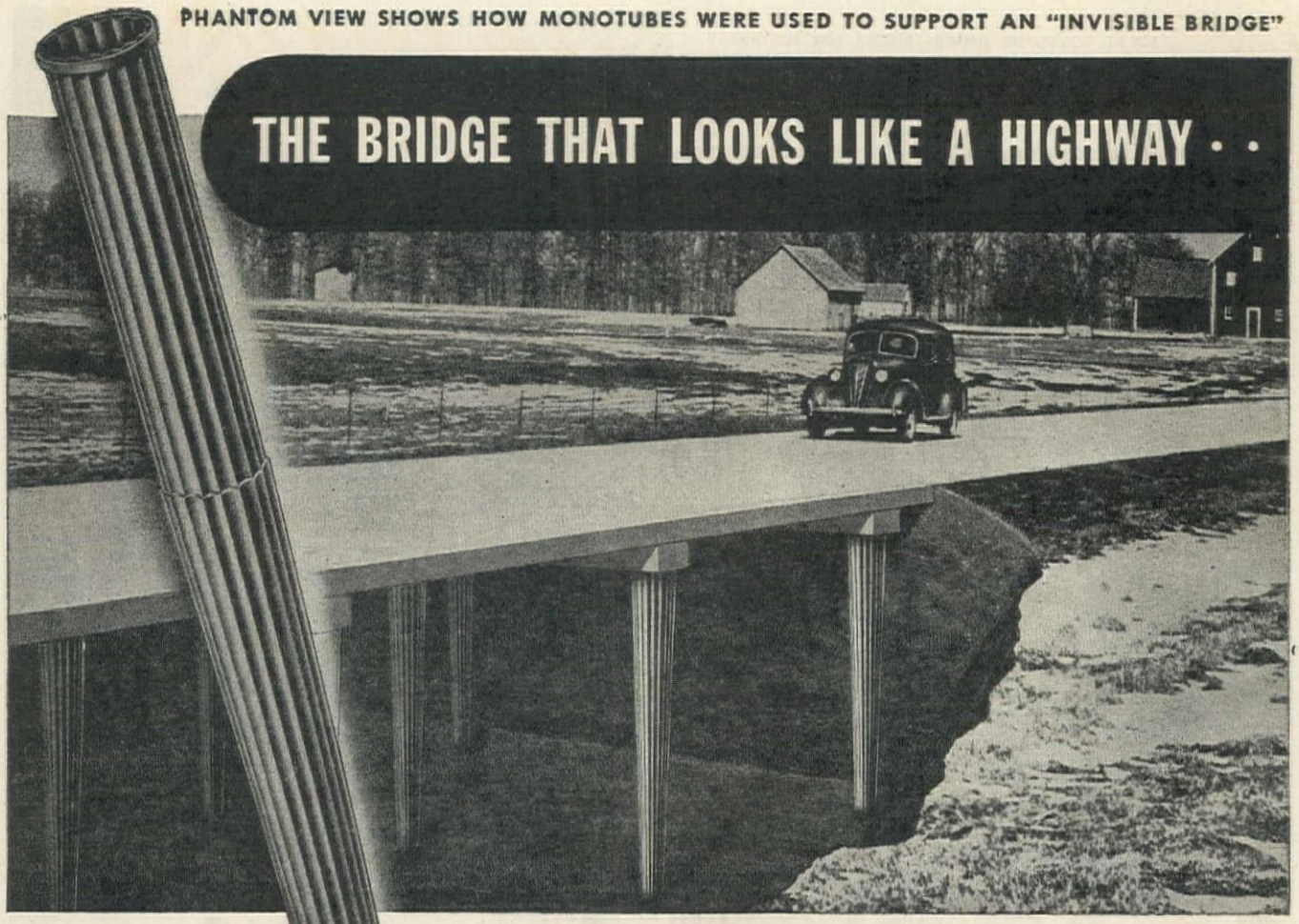


Specify **TECO CONNECTORS AND TOOLS**

Endorsed by Leading Lumber Manufacturers and Fabricators

PHANTOM VIEW SHOWS HOW MONOTUBES WERE USED TO SUPPORT AN "INVISIBLE BRIDGE"

THE BRIDGE THAT LOOKS LIKE A HIGHWAY . . .



Contractor: Gradle Brothers, Inc., Carmel, Ind. Engineer: Paul Sawyer.

. . . Built on Extendible Monotubes

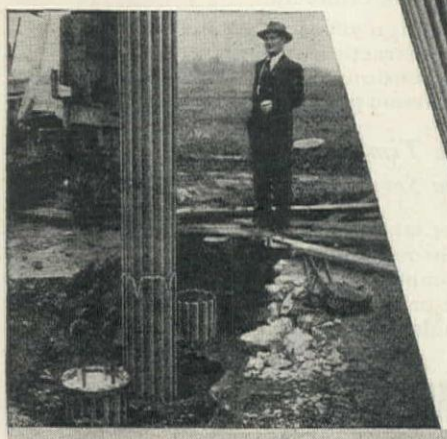
TO the casual observer, there is nothing unusual about the stretch of highway pictured above. But to the engineers and contractors who built it, here is a very unique project.

On U. S. Highway 31, near Kokomo, Indiana, a troublesome muck pocket condition exists that is much too soft to support an ordinary concrete road. Indiana State Highway Commission's answer to the problem was to drive Union Metal tapered steel Monotubes to refusal at 20 to 65 ft. depths. These Monotubes were then filled with concrete, and capped, and bridge slabs were built directly on the fill. Result: an invisible bridge consisting of 32 spans and stretching for 583 feet . . . a highway that will not break up or sink, a highway that will last for years without costly repairs.

The ease with which Monotubes can be driven and extended to meet varying depth requirements without delay or waste, contributed in a large measure to the success of this achievement.

Tapered, all-steel Monotubes are light yet sturdy—easy to handle and drive, simple to inspect. And they are available in a gauge, size, and taper to meet the most exacting requirements in any soil condition. Write for your free copy of the Monotube Catalog 68A to The Union Metal Mfg. Co., Canton 5, Ohio.

Detail showing how Monotubes are extended in the field to make possible the installation of varying pile lengths quickly and economically.



UNION METAL

Monotube Pile Casings

when SUPERHIGHWAYS are built again...

Ewing Galloway Photo

LOOK AHEAD

Records show that 75% of unemployment during the depression came from the durable goods industries. Construction is an important part of this. The $3,000,000,000 postwar road program recommended by the American Road Builders Association will meet the nation's highway transportation needs, put war-neglected roads back in shape and provide sufficient employment to help maintain economic balance. Are you behind this plan?

Will You Be Among the LOW BIDDERS?

A TREMENDOUS backlog of critically needed road construction is building up for the postwar period. Are you getting ready now to meet it? Today is a good time to investigate the advantages of Buckeye R-B Power Finegraders for faster work, lower costs, better grades, reduction of loss of yield. These machines eliminate delays on the grade which hold up the paving crew, do away with fussing with high and low spots, assure you of a gradeline that meets specifications. No other existing equipment can prepare subgrade as quickly, accurately or cheaply. Send for a descriptive bulletin today and be ready to be among the successful low bidders tomorrow.

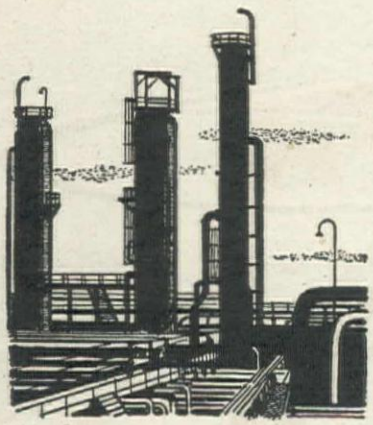
BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

Buckeye

Tractor Equipment
Road Wideners
Power Finegraders
Trenchers
Convertible Shovels
Spreaders

RB POWER FINEGRADER

Why is a Diesel engine like a "cracking" plant?



During the operation of Diesel engines, unburned fuel residues are almost always formed. These residues are the product of cracking. The larger molecules in the fuel are broken down into smaller ones—just as oil is cracked in the commercial production of gasoline.

But while cracking is desirable in gasoline manufacture, it is a constant headache in Diesel engines. In Diesels, cracking produces varnishlike bodies that bind soot, dust, and oil residues into a sticky mass called *sludge.* Sludge, in turn, causes stuck rings and blow-by.

The only way this problem can be licked is by using a *motor oil* that takes care of these unburned *fuel oil* residues.

Dieso-Life—made by Union Oil Company—contains a special detergent compound that washes off and removes unburned fuel residues and other impurities. *Then it holds these impurities in suspension where they can't precipitate to form sludge.* When you drain the oil, all foreign matter flushes out with it and your engine is *clean!*

In other words, Dieso-Life *cleans as it lubricates*—a mighty valuable

quality for an engine oil to possess these days.

Dieso-Life is a tough, stable, full-bodied oil—built to reduce engine wear and increase the performance and life of your equipment.

So next time you need lubricating oil, get a supply of Dieso-Life from your Union Oil Resident Manager.

And remember—Dieso-Life is but one in a complete line of quality petroleum products made by Union Oil Company for the construction industry.

DIESO-LIFE

Another
UNION OIL
Success-Tested Product

IN THE high tide of invasion, east and west, thousands of International Diesel Tractors are serving the Army, the Navy, the Marine Corps, and the Air Forces. On many a battle-front these tractors play a fighting part in the drama of tanks and ships and fighting men.

Take Guadalcanal. In the tense hours of that first invasion it was *do or die* on the airstrip. International Diesels went ashore with their bull-dozers . . . filled in craters as fast as enemy bombs dug them . . . did combat duty to help the Marines cling to the toehold that gave us Henderson Field. Many a tractor operator died there, under fire, but the great Pacific Offensive was on.

It is the year of decision—overseas and over here. This year many thousands of tractor operators on the home front will come to close grips with the warning: *Take care of that equipment! Make it last! Make it do!* Harvester and the International Industrial Power Distributors stand ready to see you through. If your need for new equipment is vital to the war effort, we will have equipment for you. If your need is less vital, we will safeguard your present International Power with every service aid at our command.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL INDUSTRIAL POWER DISTRIBUTORS:

Arizona—O. S. Stapley Co., Phoenix; **California**—Smith Booth Usher Co., Los Angeles; J. G. Bastian, Redding; Brown Tractor Co., Fresno, Madera, Reedley; J. H. Degnan, Inc., Hanford; Exeter Mercantile Co., Visalia and Exeter; Farmers Mercantile Co., Salinas, Hollister, Watsonville; Gallagher Tractor & Implement Co., Merced; Lohman Tractor and Implement Co., Napa; North Valley Tractor & Equipment Co., Chico; Stanislaus Implement & Hdwe. Co., Modesto; Stevenson Farm Equipment Co., Santa Rosa; Sutton Tractor & Equipment Co., Sacramento; Thompson-Sage, Inc., Stockton, Lodi, Tracy; Valley Equipment Co., San Jose and San Francisco; **Colorado**—H. W. Moore Equipment Co., Denver; **Idaho**—Intermountain Equipment Co., Boise; **Montana**—Industrial Equipment Co., Billings; **Nevada**—Allied Equipment, Inc., Reno; Clark County Wholesale Mercantile Co., Inc., Las Vegas; **New Mexico**—Hardin & Coggins, Albuquerque; **Oregon**—Howard-Cooper Corp., Portland and Eugene; **Utah**—The Lang Co., Salt Lake City; **Washington**—Howard-Cooper Corp., Seattle, Spokane, Walla Walla; Glenn Carrington & Co., Seattle (for Alaska); **Wyoming**—Wilson Equipment & Supply Co., Cheyenne.

INTERNATIONAL HARVESTER

FLOAT FINISHING *Mechanized*

JOHNSON *FLOAT* FINISHER

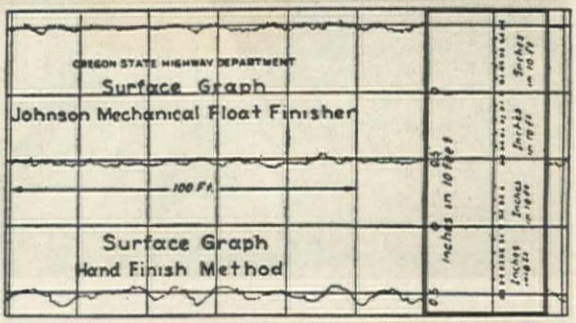
READY FOR EDGING and jointing! That's the way the Johnson *Float* Finisher works. It duplicates the action of the hand float or trowel. Has a troweling surface of more than 8000 square inches. It cuts off the high spots . . . fills in the voids . . . consolidates the mortar . . . and with mechanical efficiency leaves a finished surface with a variation of .05 inch, or less, in 10 feet—better than any state highway specification requirements.

You get speed, too, with the Johnson *Float* Finisher. Roy Houck, Oregon contractor, finished 3065 lineal feet in an 8-hour day. Mountain States Construction Company finished 6.37 miles of 22-foot highway in 33 days. These reports are not necessarily "top speed" for the Johnson *Float* Finisher—its capacity is far greater than present day requirements.

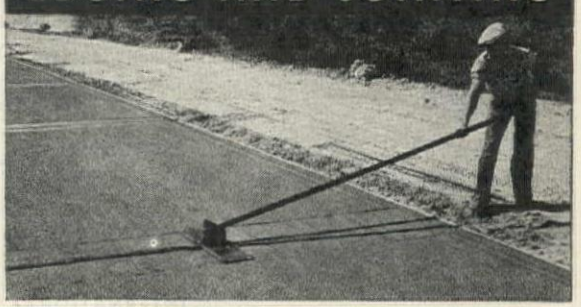
Write for catalog! You'll want to know about the easy adjustments to all highway curves from the vertical to the transverse spiral; the accurate control features; the motive power; the water supply tanks, and many other features.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA

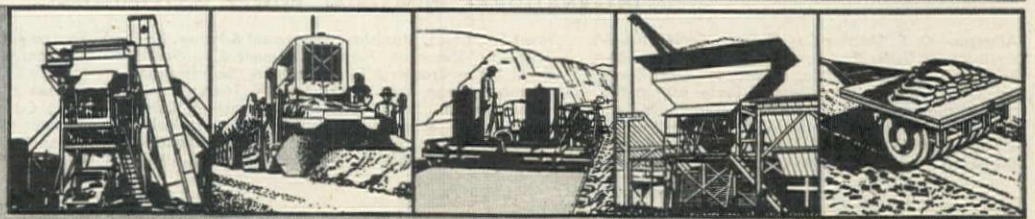
SMOOTHNESS TEST SHOWS IMPROVEMENT UPON THE BEST HAND FINISHING



ELIMINATES ALL HAND FINISHING EXCEPT EDGING AND JOINTING



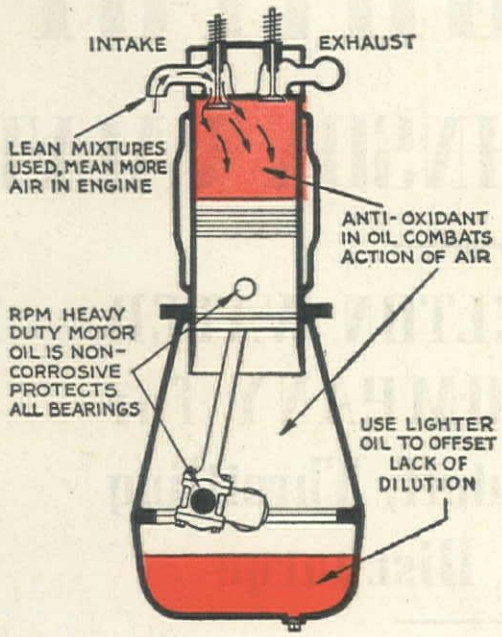
Built by MADSEN



ASPHALT PLANTS • ROAD PUGS • CEMENT FINISHERS • BATCHERS • COMPACTORS

STANDARD ENGINEERS NOTEBOOK

VOL. 1-CO NO. 3



Lubricating problems of butane engines

Since the fuel mixture used in butane engines is frequently leaner than in other types, the excess of oxygen makes sludge formation a major problem. The extreme stability of RPM Heavy Duty Motor Oil has solved this problem for many operators.

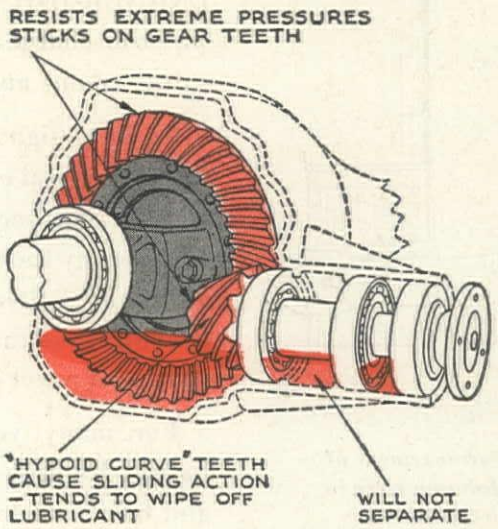
Natural inhibitors and a special added anti-oxidant in this oil reduces oxidation to a minimum.

Because there is no crankcase dilution in butane engines, one grade lighter RPM Heavy Duty Motor Oil is recommended for these engines than for corresponding gasoline engines.

Lubricant "for all hypoids" simplifies gear servicing

Better availability of certain critical war materials has made possible the development of a gear lubricant that may be used in both truck and passenger car hypoids.

RPM Hypoid Lubricant "for all hypoids" is available in three weights, SAE 80, 90 and 140. The special extreme-pressure additive used in this lubricant is stable and provides protection at all operating temperatures. It will not separate from the lubricant. No salts are precipitated, even after hard service. It fully protects the gear teeth against extreme sliding pressure that develops through their "hypoid curve" design.



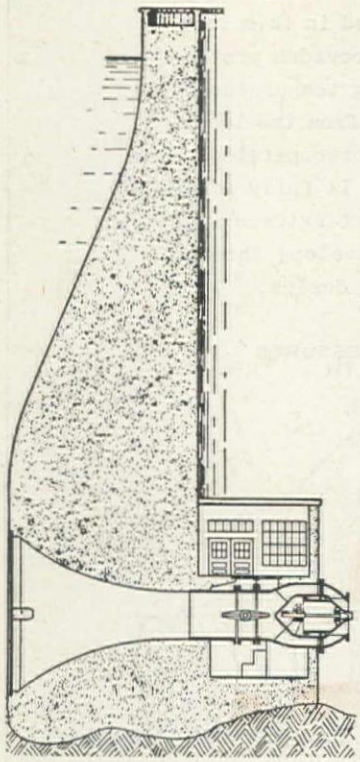
Because the protective additives are gradually used up in service, RPM Hypoid Lubricant should be drained and replaced at 5000-mile intervals or following unusually hard service.

STANDARD OF CALIFORNIA

Positive Water-Flow Control

with LARNER-JOHNSON VALVES

Built by PELTON WATER WHEEL COMPANY for Pipeline Shutoff, Throttling or Free Discharge



Typical arrangement of Larner-Johnson valve in arch-type dam.

LARNER-JOHNSON VALVES are widely used for water-discharge regulation at hydro-electric and water-storage dams and at the end of penstocks.

Their design provides easy hand operation or remote electrical control of all sizes without cumbersome control rods because the plunger is water balanced at all times by the pipe-line pressure present in the body of the valve. Being streamlined, Larner-Johnson valves provide smooth flow at any given opening without change of water direction and thus eliminate vibration.

For many years Pelton has designed and built Larner-Johnson valves for pipeline shutoff, throttling and free-discharge service. Ask for full details.

THE PELTON WATER WHEEL COMPANY

Hydraulic Engineers

2929 NINETEENTH STREET SAN FRANCISCO, 10

Other Sales Offices in the United States: Paschall P. O., Philadelphia 42, Pa.; 627 Railway Exchange, Chicago 4, Ill.; 1010 Pine Street, St. Louis 1, Mo.; 1036 Investment Building, Washington 5, D. C.; 120 Broadway, New York 5, N. Y.; 10 High Street, Boston 10, Mass.; 1817 Second National Bank Building, Houston 2, Texas; 2405 Terminal Tower Building, Cleveland 13, Ohio.

Foreign Sales Office: THE BALDWIN LOCOMOTIVE WORKS, Paschall P. O., Philadelphia 42, Pa.

BLW THE BALDWIN GROUP

PELTON

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

Speaking of Speeds

ADAMS MOTOR GRADERS *Have* THEM

One of a series of ads on Adams motor grader features

AVAILABLE working and travel speeds have a lot to do with what you can accomplish with a motor grader in a day whether it be on construction work, maintenance or snow plowing . . . First, you want a motor grader that will travel to the job quickly. Adams Motor Graders have high travel speeds which cut down travel time . . . When you get on the job you want to make each cut at the fastest practical speed. Adams wide and flexible range of working speeds permits you to get the fastest practical speed for each cut to be made.

On surface maintenance Adams rigidity and balanced weight distribution permit maintaining at speeds higher than satisfactory with most machines. The grader pictured above is maintaining crushed stone roads at 5 to 6 m.p.h. . . . On all work, from bank to bank, Adams ease and economy of operation and quick adaptability to all kinds of cuts make Adams Motor Graders your best buy—always. Talk them over with your local Adams dealer—and use his services in keeping your present equipment rolling.

J. D. ADAMS COMPANY · INDIANAPOLIS, IND.

At war's end we'll need many new roads and many jobs for returning service men. Plan post war projects now and meet both needs.

Let These Distributors Service Your Equipment

ALASKA—Glenn Carrington & Co., Fairbanks
ARIZONA—O. S. Stapley Company, Phoenix
CALIFORNIA—J. D. Adams Co., San Francisco, Los Angeles
Sutton Tractor & Equip. Co., Sacramento
J. G. Bastain, Redding
COLORADO—McKelvy Machinery Co., Denver
IDAHO—Intermountain Equipment Co., Boise, Pocatello
MONTANA—Industrial Equipment Company, Billings
NEVADA—Allied Equipment, Inc., Reno
NEW MEXICO—Hardin & Coggins, Albuquerque
OREGON—Howard-Cooper Corp., Portland, Eugene
UTAH—The Lang Company, Salt Lake City
WASHINGTON—Howard-Cooper Corp.,
Seattle, Spokane, Walla Walla
WYOMING—Industrial Equip. Co., Billings, Mont.
The Lang Company, Salt Lake City, Utah

ADAMS ☆ ROAD-BUILDING AND ☆ EARTH-MOVING EQUIPMENT

Old "Forty Per Cent" Has Been a Good Handyman...

But..

For years, many a blaster has depended on "Old Forty Per Cent" dynamite for the job, regardless of conditions involved—with the old reliable handy, no need to monkey with new-fangled dynamite. "Old Forty Per Cent" has turned in a reasonably satisfactory performance, too.

But like all handymen, "Old Forty Per Cent" does not always measure up to the job. Special conditions call for special qualities that the old handyman dynamite does not possess. The blaster needs the right explosive and the right method to do the job right.

After all, explosives are tools of production. As in any precision operation, the right tool must be used in the right way to achieve the best results. Blasters are learning that blind dependence on "Old Forty Per Cent" is not necessarily the way either to get the best blasting result or the lowest costs of operation.

To insure the right explosive for the job, Atlas provides more than one-hundred and twenty grades and types of explosives in over 300 sizes to choose from. And Atlas representatives always are ready to apply synergistic* thinking to your blasting problems to produce better results at lower costs. Consult us.

***Synergism**—*a growing habit in American industry. Men bring problems and ideas together so that minds "click" to produce a result far greater than the sum of ideas expressed. So to speak, they make 2 plus 2 equal 5.*

Offices in Principal Cities

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

SAN FRANCISCO 4, CAL. ATLAS POWDER COMPANY **SEATTLE 1, WASH.**

THOUSANDS TRANSITE PIPE

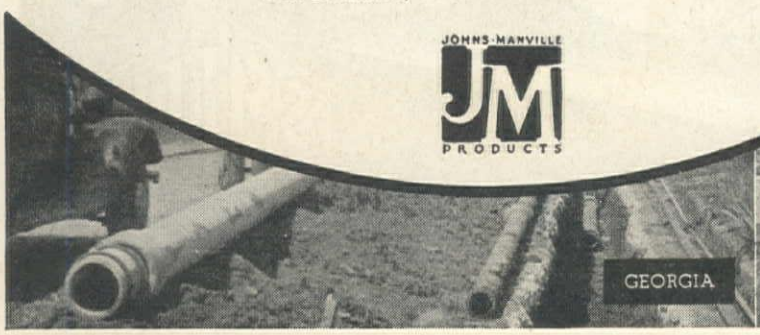
"Blueprint Now!"

ONE WAY to provide immediate jobs for our fighting men when they return—and at the same time permanently benefit our cities, towns and villages—is through the improvement and expansion of our water and sewerage systems. Such a program, to be effective, must be ready to put into operation as soon as wartime restrictions are lifted.

That means getting the planning done now. As an aid to post-war planners, the Committee on Water and Sewage Works Development has prepared a booklet entitled "Blueprint Now!" If you have not received a copy, one may be obtained by writing the Committee at Suite 2110, 500 Fifth Avenue, New York 18, New York.

OF MILES OF

... are providing efficient, dependable, economical water transportation throughout the nation



IN THE THOUSANDS OF MILES of Johns-Manville Transite Pipe in service today, you will find installations of almost every size and type. In big cities, small villages, in military camps and bases both here and abroad, Transite Pipe is serving efficiently in the transmission and distribution of water.

There are definite reasons for this wide acceptance. Made of asbestos and cement, Transite Pipe provides these important advantages:

Easy Handling. Light-weight Transite Pipe requires fewer men for handling. Only the larger sizes need mechanical handling equipment.

Tuberculation No Problem. Non-metallic in composition, Transite cannot tuberculate. Its initial high-flow coefficient (C=140) can never be reduced by tuberculation.

Low Maintenance. Made of asbestos-cement, Transite's corrosion-resistance and maintained strength contribute to its low maintenance costs.

Tight, Flexible Joints. Wide sweeps can be made with straight lengths because the Simplex Coupling stays tight even when the line is deflected as much as 5° at each joint.

Rapid Assembly. Even unskilled crews form tight joints easily, quickly with the Simplex Coupling.

For the complete facts, write to Johns-Manville for Transite Pipe Booklet TR-11A. For details on Transite Sewer Pipe for more efficient sewage disposal systems, ask for TR-21A. Write Johns-Manville at Los Angeles, San Francisco or Seattle.

TRANSITE PIPE IS AGAIN AVAILABLE FOR PROMPT SHIPMENT

JOHNS-MANVILLE

Asbestos

TRANSITE PIPE

FOR EFFICIENT, ECONOMICAL WATER AND SEWER LINES

JOHNS-MANVILLE JM PRODUCTS

SMITH MARCHES ON...

Continuous Program of Improvements Throughout the Years

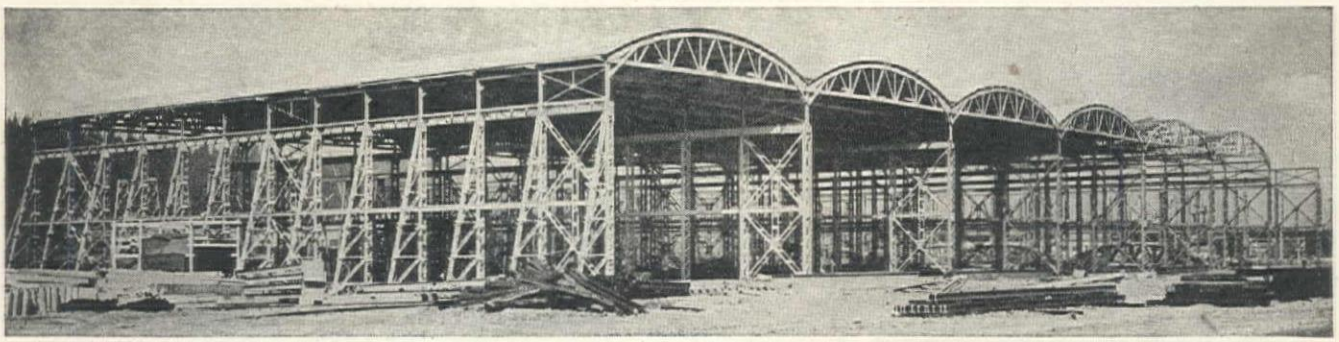
Wars may come and wars may go, but Smith continues uninterruptedly with its program of designing and building BETTER concrete mixers for the construction industry.

The Smith duo-cone tilting-type mixer made its initial appearance immediately following the Spanish-American War. Forerunner of the famous Smith line of concrete mixers, this first machine made history in the construction industry. Year after year, important improvements were made: such as pneumatic or hydraulic tilting mechanism — anti-friction bearings — automotive type transmission — front-end-charging — welded box girder frame and pedestals — forged steel rollers — machine cut drum drive gear, etc. Today, Smith is carefully laying the groundwork for further improvements in concrete mixer design—refinements that will result in even greater mixing speed and efficiency.

LOOK TO SMITH for your post-war concrete mixer requirements. Remember, every machine is backed by almost a half-century of specialized mixer building experience.

THE T. L. SMITH COMPANY
2871 N. 32nd St., Milwaukee 10, Wis.

CONCRETE MIXER MANUFACTURERS SINCE 1900



THE MARITIME COMMISSION found wood a highly satisfactory construction material in its shipyard program. This huge assembly building at a record-breaking Liberty yard is 240'x860' and contains 143 trusses prefabricated and erected by Timber Structures, Inc.

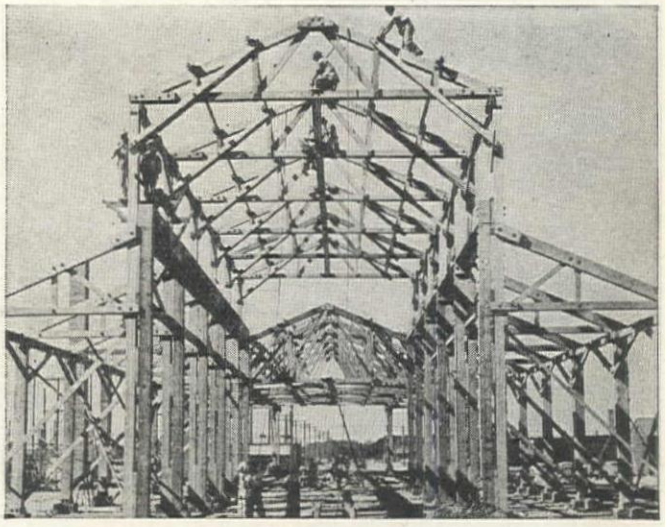
MATERIALS ARE IMPORTANT-

...BUILD WITH TIMBER STRUCTURES

THE WAR has spotlighted the virtues of wood in heavy construction. Shortages in other structural materials have served to emphasize what many engineers and architects already know—that wood, properly designed and prefabricated, is often a sensible answer to construction requirements.

Fulfilling these requirements for timber trusses and heavy framing has been Timber Structures job for years. The virtues of wood—strength, economy, speed in erection, permanence, ready source of supply—have been brought together through the engineering know-how of this organization.

We welcome inquiries on the use of wood or other structural materials for your construction projects. Write to the nearest Timber Structures office for illustrated book on the work we have done, are doing.



ORIGINALLY DESIGNED FOR STEEL by the U.S. Army Engineers, this ordnance repair shop was redesigned by Timber Structures engineers for wood. For this building (60'x220') 28 trusses, columns and bracing were prefabricated and erected. Approximately 50,000 bd. ft. of lumber was used in the building.

MORE THAN 2000 TONS OF STEEL WERE SAVED when Timber Structures supplied trusses and heavy framing for this navy blimp dock. 72% of the Navy's timber requirements for its comprehensive L.T.A. hangar program was entrusted to this organization, involving more than 30 million board feet of fireproofed timber.

TIMBER
WARD MAYER
STRUCTURES
INCORPORATED

Portland 8, Oregon
Eugene, Oregon
New York 17, N.Y.
Seattle 4, Washington

Engineering in Wood

MAIL COUPON FOR LITERATURE

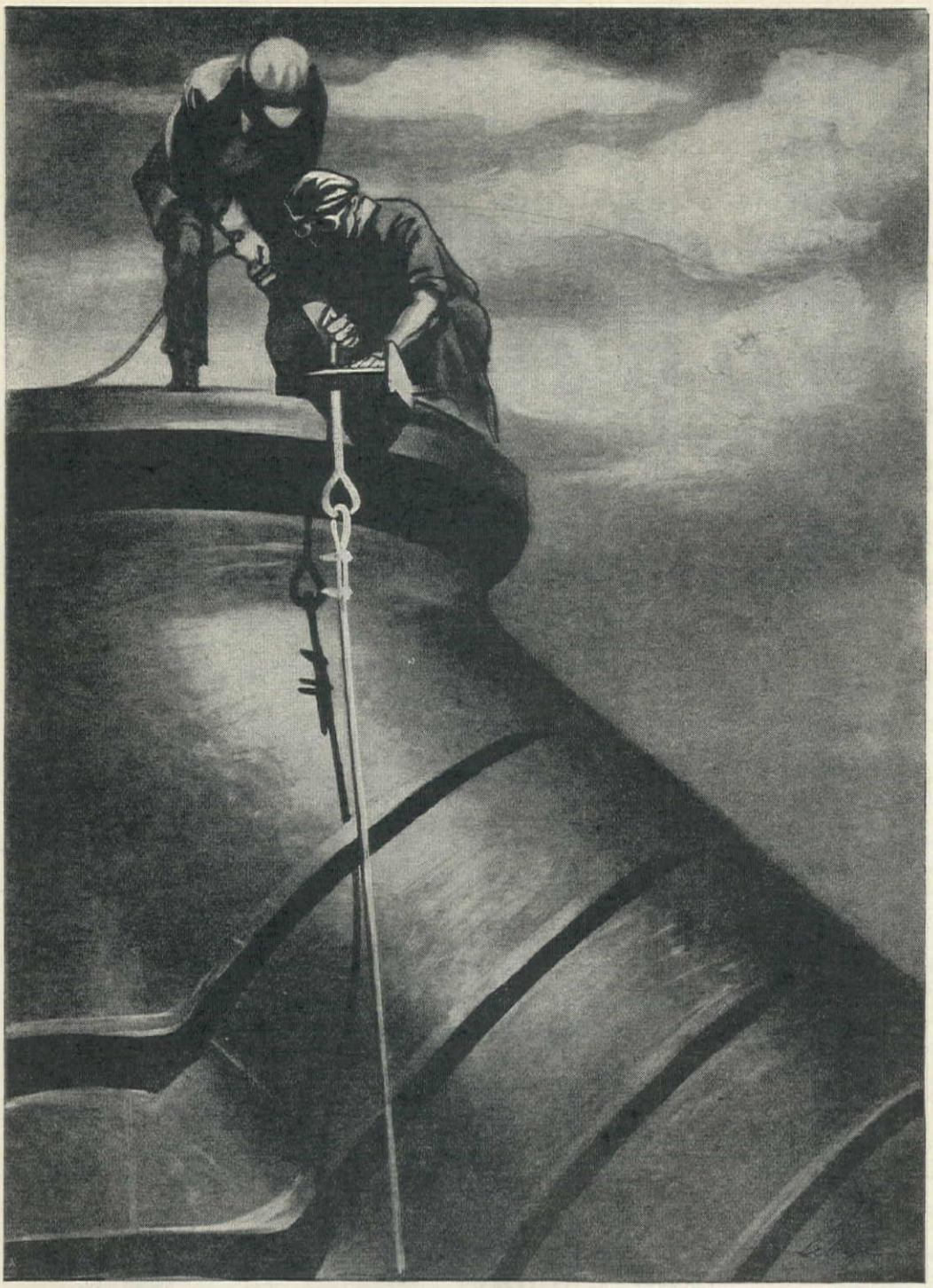
TIMBER STRUCTURES, Inc.
Send Book "Engineering in Wood"

Name_____

Address_____

Type of building or business . .

If *west* of the Mississippi, send to Portland 8, Oregon. If *east* of the Mississippi, send to 535 Fifth Avenue, New York 17, N. Y.



72-inch flanged Y-Branch weighing 17 tons being secured to special underslung car for rail shipment to a War Project. Drawn by Rico Lebrun for U. S. Pipe & Foundry Co.

Our facilities for producing fittings and castings in large sizes are adequate for any requirement. An experience of more than forty years in designing pipe and fittings, as well as special castings, for out-of-the-ordinary requirements, is at your service. Inquiries receive prompt attention and entail no obligation.

U.S. cast iron PIPE

U. S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
Plants and Sales Offices throughout the U. S. A.

Still PUSHIN'

SIGNAL CORPS PHOTO

They're going big over there as they did over here! The same 2-cycle Diesel tractors that helped rush through the huge home front construction program the last few years are showing they still have plenty of service left . . . are now handling and licking even more difficult work for the Armed Forces overseas.

After tough day and night shifts on the big ordnance jobs here, they were put in tip-top operating condition in a hurry and shipped to distant areas of activity. Much of the overhauling was handled by Allis-Chalmers dealers whose skill, proper tools and genuine parts made A-1 repairs a certainty.

Now is the time to plan your future dirt-moving methods. Now is the time to investigate 2-cycle Diesel power . . . see what it will do for you! Why not talk it over with your Allis-Chalmers dealer! Write for literature.

↓ During the days of action here, 2-cycle Diesel tractors in great numbers helped lay the groundwork for the Arsenal of Democracy.

↑ Now in active theaters of the war, the same 2-cycle Diesel tractors help prepare the bases and airfields for use against the enemy.

ALLIS-CHALMERS

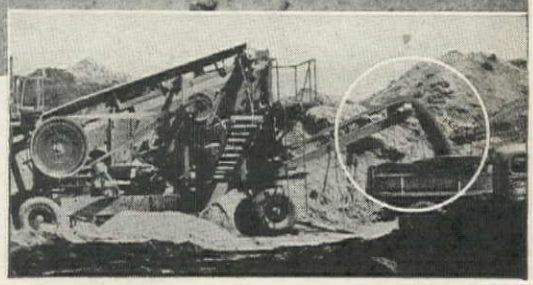
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

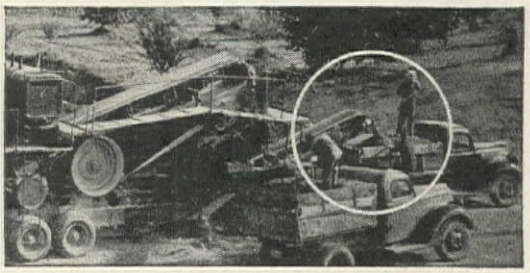
2-CYCLE THE MODERN DIESEL POWER

It's Aggregate IN THE BIN that Counts

. . . and you can't beat a DIAMOND for putting it there!

DIAMOND NO. 65 Portable Rotor-Lift Plant producing over 300 tons per hour of stabilized base on a Southwestern Airport job.





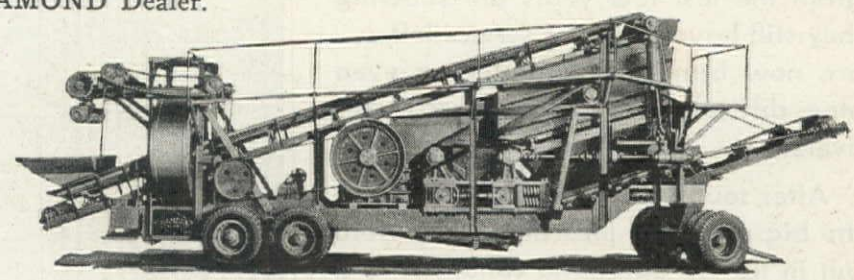
High Output at Lower Cost per Ton because-- NO BOTTLENECKS in a DIAMOND Plant

DIAMOND Portable Rotor-Lift Plants consistently turn out highest production of true-to-size aggregate because the whole plant is compact, not a foot of material travel is wasted — no by-passing — and every unit is of proper size for balanced output.

The main conveyor takes pit run material in a straight line through center of Rotor-Lift up to top deck of the vibrator. Crushed oversize is distributed EVENLY by the Rotor-Lift onto the main conveyor, preventing overloads on the screens or crushers. All units — vibrator, jaw crusher, roll crusher, conveyors — are rugged veterans proven by years of heavy duty service. It all adds up to smooth, uninterrupted production at low cost per ton — and at a profit for you! Ask for new Bulletin D-43-G, or see your DIAMOND Dealer.

Made in many sizes and types:

Quarry Plants—portable and stationary
No. 36—Portable, rotor-lift
No. 65—Portable, rotor-lift
No. 95—Portable, rotor-lift
Portable washing-screening plants
Portable and stationary Crushers
Vibrating, rotary and scalping Screens
Conveyors, bins, feeders



Contact One of These* DIAMOND *Dealers:

COAST EQUIPMENT COMPANY, San Francisco 1, California
GARLINGHOUSE BROS., Los Angeles 21, California
A. H. COX & CO., Seattle 4, Washington
LOGGERS' & CONTRACTORS' MACHY. CO., Portland 14, Oregon
CONSTRUCTION EQUIPMENT COMPANY, Spokane, Washington
CONTRACTORS' EQUIPMENT & SUPPLY CO., Albuquerque, New Mexico
WESTERN EQUIPMENT COMPANY, Boise, Idaho
C. H. JONES EQUIPMENT COMPANY, Salt Lake City, Utah

DIAMOND **DIAMOND IRON WORKS, INC.** DIAMOND
ESTABLISHED 1880
AND THE MAHR MANUFACTURING CO. DIVISION

1818 SECOND STREET NORTH MINNEAPOLIS 11, MINN.

There's a lot of *Endurance* in CARCO HOISTS Too!

Ability to "take it" often depends on hidden strength. Carco Hoists get theirs from Carcometal—Pacific Car and Foundry Company's patented alloy steel which has an elastic strength almost twice that of ordinary steel.

Carco Hoists have proved on many a tough lumbering and construction job that they have endurance to spare, capacity to handle the biggest loads. Today they're proving it again on war fronts the world around.

Rugged one-piece sealed cases give Carco Hoists permanent rigidity for precise alignment, plus protection against grit, dust and water. All gears run in a continuous bath of oil.

Pacific Car and Foundry is turning out huge quantities of durable, efficient, economical hoists for overseas duty today. But—because production has been almost tripled since Pearl Harbor—Carco Hoists are still available for war-essential jobs at home.

PACIFIC CAR AND FOUNDRY COMPANY

SEATTLE 4, WASHINGTON

Carco's "know-how" and production are going (in whole or part) into: bridges, hoists, cargo ships, corvettes, cranes, aircraft carriers, lighters, mine sweepers, gun emplacements, yarders, power line equipment, aircraft, railroad equipment, structural steel, logging equipment, motor coaches, diesel engines, machine guns, dry docks, steel castings, seaplane tenders, trucks.

then he said to himself

"I hope they don't ask me HOW!"

Pierre Laval, on being handed the mouthpiece by Adolf, promptly broadcast to the French people:

> "In the New Europe, it is socialism that will be installed . . . In the New Cities, labor will be protected, honored and magnified, as well as those spiritual and moral values that may blossom there."

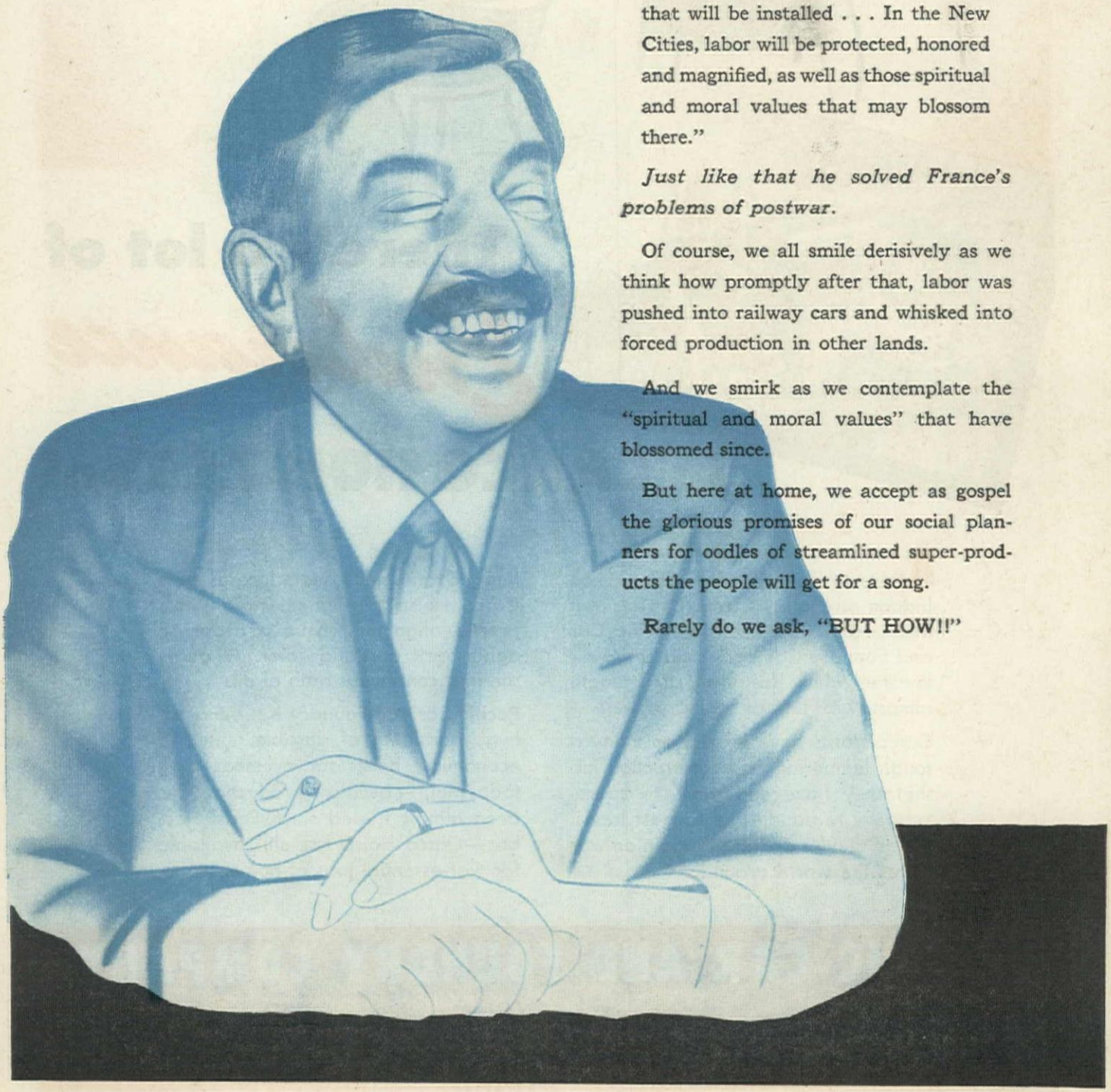
Just like that he solved France's problems of postwar.

Of course, we all smile derisively as we think how promptly after that, labor was pushed into railway cars and whisked into forced production in other lands.

And we smirk as we contemplate the "spiritual and moral values" that have blossomed since.

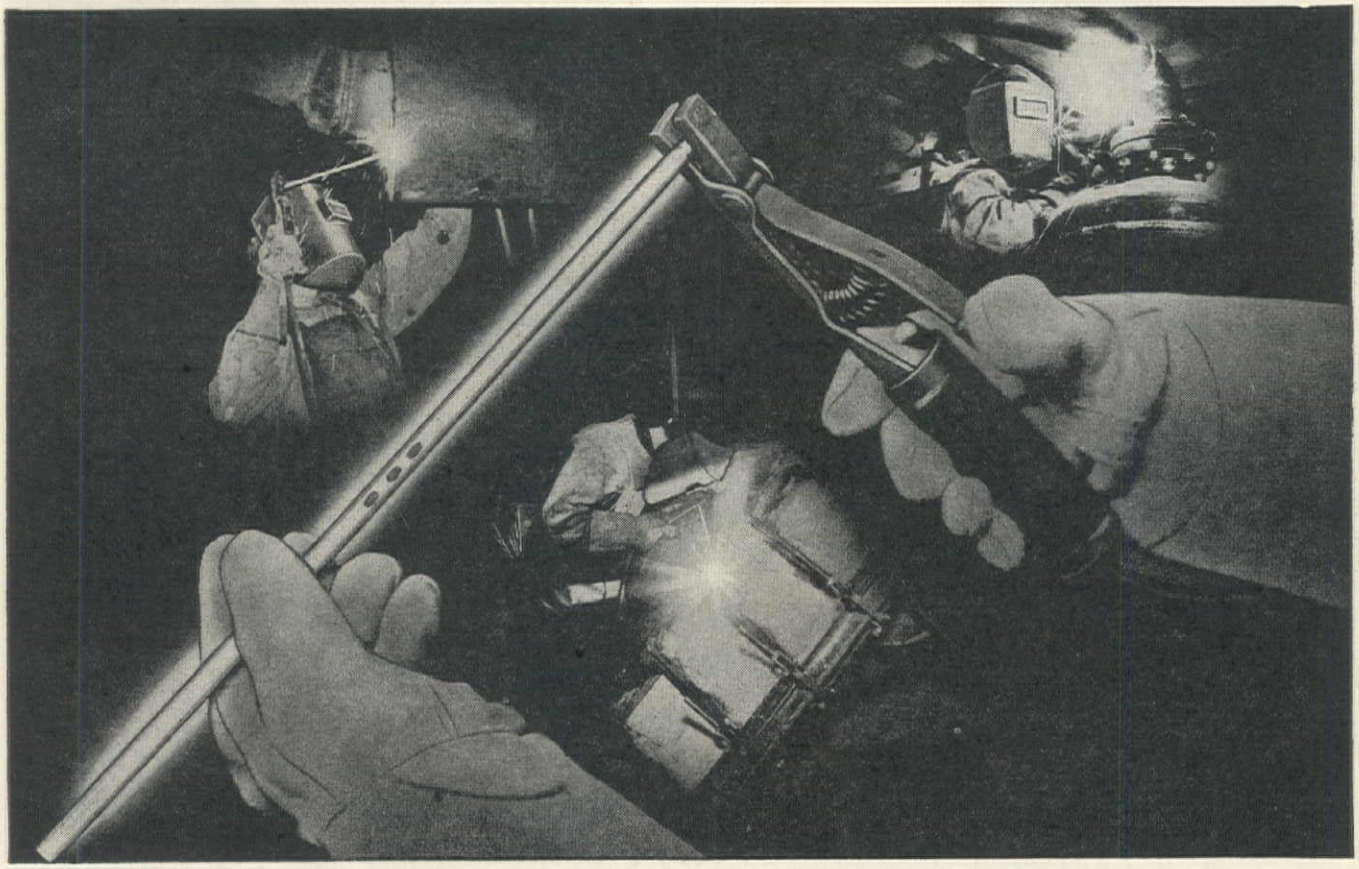
But here at home, we accept as gospel the glorious promises of our social planners for oodles of streamlined super-products the people will get for a song.

Rarely do we ask, "BUT HOW!!"



"Protected, Honored and Magnified"—*he says*

Look, Pierre, under your own or any *new social order,* a small group of soft-handed *theorists* like yourself could never give a *practical* answer to the challenge: "BUT HOW?" Yet under an old American *free enterprise* system . . . where protection, honor and magnification are in every man's grasp—*workmen* down in most metal working plants can themselves answer: *HERE'S HOW!!* (How to get MORE products. — How to get BETTER products. — How to get products AT A LOWER COST —so that more people can *afford* to buy).



HOW TO IMPROVE YOUR A. C. WELDING

NEW *"FLEETWELD 35"* . . . latest arrival to the "Fleetweld" family . . . brings to A. C. arc welding the same excellent performance which has made "Fleetweld" the standard of welding quality and economy in every field throughout the world.

This general purpose shielded arc electrode (A.W.S. class E-6011) for welding mild steel in flat, vertical and overhead positions is intended primarily for A.C. but also gives excellent results with D.C. It has a high burn-off rate and minimizes spatter and slag loss in all welding positions.

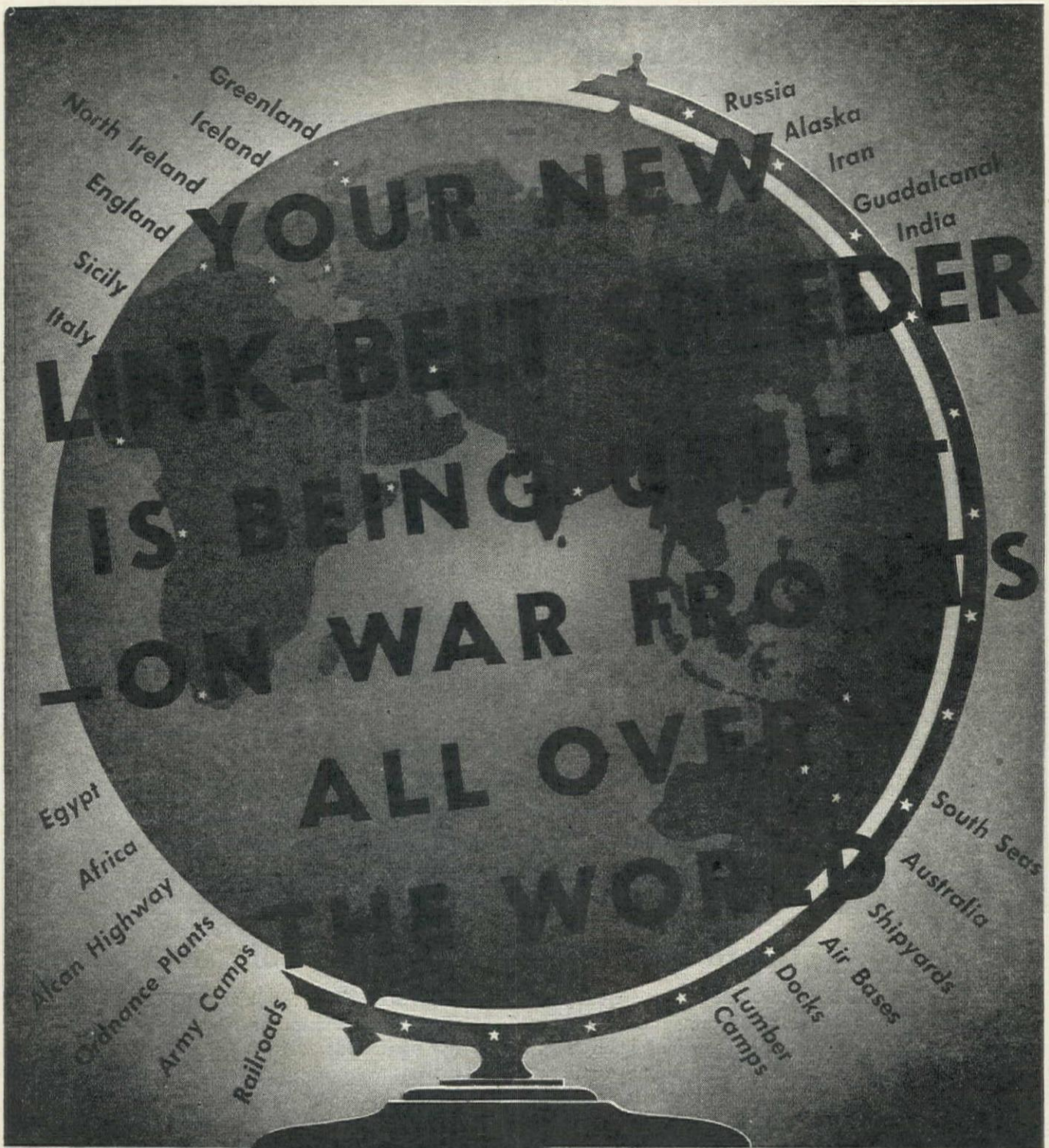
Properties of all weld metal specimens, as welded: Tensile strength 62,000 to 70,000 p.s.i.; yield strength 52,000 to 57,000 p.s.i.; ductility 23% to 30% elongation in 2".

Procedure will be sent free on request.

THE LINCOLN ELECTRIC COMPANY • Cleveland 1, Ohio

America's greatest natural **recourse**

ARC WELDING



They are lifting, digging, pulling, stacking—performing the many heavy-duty jobs that must be done to get war material to the front. Whether it is building a logging road in Oregon, a thoroughfare to Alaska or docks, camps, roads and bridges, in Iran, these Link-Belt Speeders are giving yeoman service—showing up at its best the precision engineering—the massive, though light-weight, rugged construction of these easy-to-handle machines.

9575

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
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1894-1944

Pioneers for 50 Years

For half a century, The Cleveland Pneumatic Tool Company has devoted itself to serving many major industries.* Skilled technicians and experienced engineers within our organization have pioneered and perfected many products for each of these fields. Thus initiative and resourcefulness have enabled us to keep abreast of this country's remarkable industrial progress . . . We are commemorating our golden anniversary by continuing to put all our talents and energies in the fight to preserve the American way of life. We are proud to have grown with our nation for 50 years, and look forward to serving in the great future that lies ahead.

Buy U. S. War Bonds and Stamps

**CLECO Pneumatic Tools speed production in metal-working plants. AEROLS (the shock absorbing landing gear used so universally on aircraft) insure safe, smooth landings and take-offs. CLEVELAND Rock Drills are widely used in the mining and contracting fields. CLE-AIR Shock Absorbers protect buses, trucks and trailers from road shocks.*

THE CLEVELAND PNEUMATIC TOOL COMPANY
AND SUBSIDIARIES
THE CLEVELAND ROCK DRILL DIVISION — CLEVELAND PNEUMATIC AEROL, INC.
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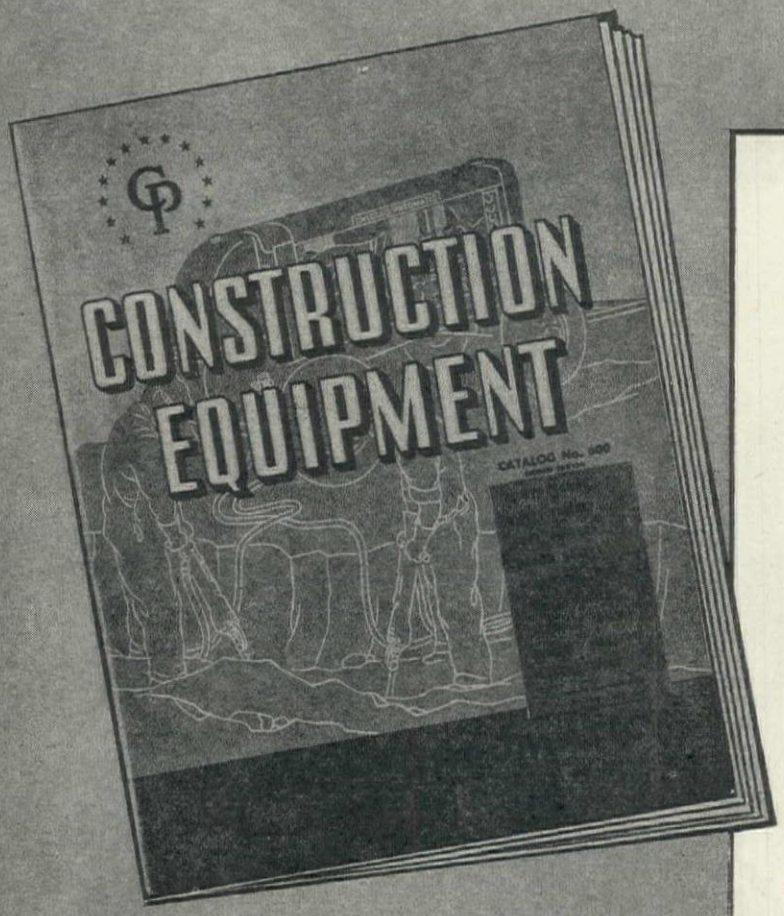
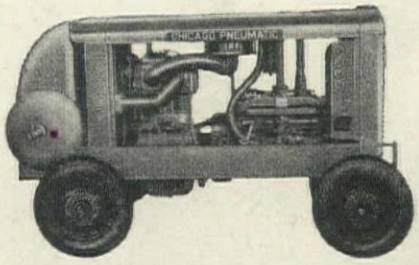
Compare Your Equipment with



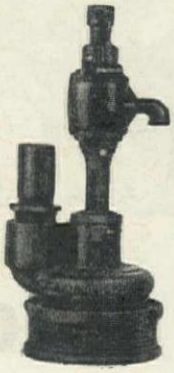
CP "Construction Equipment" (Catalog No. 600) describes and illustrates the advantages of using CP tools on your contracts. Efficient, dependable air compressors . . . low air consumption and low maintenance rock drills, concrete vibrators . . . clay spades . . . backfill tampers . . . time-saving wagon drills . . . these and many other items of money-saving equipment for contractors are described in Catalog No. 600.

Backing up Chicago Pneumatic's very complete line of contracting equipment are many years of successful, profitable use by contractors everywhere. Write for your copy of "CP Construction Equipment."



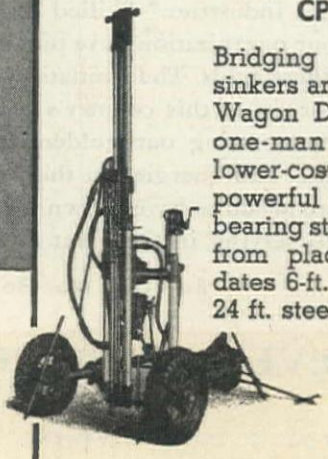
CP PORTABLE COMPRESSORS

Many refinements of design and manufacture give CP Two-Stage, Air-Cooled Portable Compressors exceptionally high efficiency and dependability. They are available with Hercules gasoline engines in sizes of 60, 105, 160, 210 and 315 c.f.m.; with Caterpillar Diesel engines in sizes of 105, 160, 210, 315 and 500 c.f.m.



CP SUMP PUMP

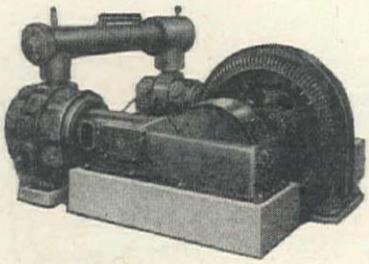
Removes water from manholes, ditches, tanks or pits quickly and cheaply. Requires no priming. Watertight casing; muck cannot get into motor. CP Sump Pumps will operate from any air compressor delivering 100 or more cubic feet per minute.



CP WAGON DRILL

Bridging the gap between hand sinkers and the Heavy Duty G-500 Wagon Drill, the G-200 provides one-man operation and faster, lower-cost drilling with the most powerful CP Drifter Drills. Roller bearing steel wheels; easily moved from place to place. Accommodates 6-ft. steel changes and 18 to 24 ft. steels are easily handled.

these CP Profit-Makers!

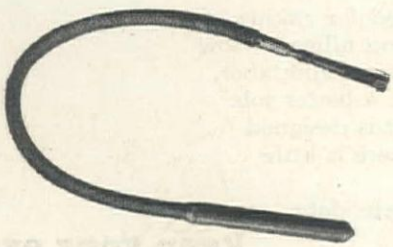


CP CLASS O-CE STATIONARY COMPRESSORS

Ruggedly built and conservatively rated, CP Class O-CE Horizontal-Duplex Motor-Driven Air Compressors meet every requirement of heavy duty, day-after-day service. Available in capacities up to 10,000 c.f.m. Other CP stationary compressors are available in vertical and horizontal designs for steam, belt and electric motor drive in wide variety of capacities and pressures.

CP 219 PNEUMATIC VIBRATOR

For light, reinforced concrete, 3" slump and over, there is no vibrator faster, cheaper to operate than the CP-219. Ideal for walls and columns under 15" thick, light floor and roof slabs.



CP 3 CLAY SPADE

Light in weight, fast, CP No. 3 Clay Spade is ideal for general digging in soft and medium clay. For digging in hard clay, shale, etc., CP No. 5 Clay Spade is recommended.

CP-MM BACKFILL TAMPER

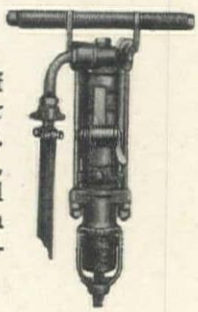
In trench work particularly, CP Backfill Tampers quickly earn their cost by savin the time and labor of hauling surplus excavated material. For general tamping, CP-3 Tamper is recommended; for heavy tamping, CP-MM; for extremely heavy tamping, CP-4.

CP-117 DEMOLITION TOOL

The most popular demolition tool in the entire Chicago Pneumatic line. The CP-117 delivers a hard blow but it is so well balanced it has no kick-back and is easy to handle. Recommended for heavy duty work in hard, dense concrete and similar medium-to-extremely hard materials.

CP-42 SINKER DRILL

The low air consumption of CP-42 Sinker makes it ideal for use with portable compressors. Because of its fast drilling speed, strong rotation and exceptional hole-cleaning qualities it is a favorite drill for general excavation and road work.



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...how to spread highway materials

The Buckeye Spreader is the ideal machine for spreading sand, gravel, or crushed stone—from a fine trickle of sand to a 1½" layer of rock. It spreads the material with almost absolute uniformity, wasting no material through scattering and leaving no thin spots to cause trouble later. The spread can be tapered, thick on one edge and thin on the other. Width of strips is easily controlled to fit your needs.

With a Buckeye Spreader, there's no need for raking and brooming, no patching, no cleaning up edges, no filling in low spots. Many users report savings up to 50% in time and labor, and 20% on materials—and in addition—they get a better job.

Buckeye Spreaders are easy to use. Every part is designed for maximum strength and treated to resist wear so there is little lost time for repairs.

Write today for illustrated bulletin giving complete data and specifications.

BUCKEYE TRACTION DITCHER CO.
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CONVERTIBLE SHOVELS
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Buckeye

TRENCHERS
TRACTOR EQUIPMENT
ROAD WIDENERS

QUICK QUIZ FOR CONSTRUCTION MEN

Three Answers that May Save You Hundreds of Dollars!

Q Are your machines capable of "M. P. T."?*

A Not if they're stopped too long or too often for lubrication. For instance: Alemite Lubrication Specialists showed one contractor how to reduce lubricating time on a group of 5 machines by 50%—actually gaining 100 minutes "M. P. T." per day. This new method paid for itself in a short time. (Interested in details about the New Alemite Portable Service Stations?)

* *More Productive Time*

Q Can track roller and other bearing failures be reduced?

A Certainly! One contractor suspected that many of his bearing failures were unnecessary. Alemite Lubrication Specialists proved him right with an "on the job" method of lubrication. Track roller and other bearing expense was reduced by 25%. Time was saved for much needed production. In addition, consumption of lubricants was reduced 10%. (An example of the efficiency of Alemite Portable Service Stations.)

Q Have your greases and oils the "versatility" your jobs call for?

A "Yes," if they're Alemite's. The reason: Alemite builds an extra-wide operating range into every grease and oil. The result is amazing toughness that fights friction successfully in the hottest summer operating temperatures. Alemite #33, an exclusive Alemite grease, is extremely water-repellent, endures tremendous loads, can't clog grease guns or bearing lubricant grooves. Ask about it.

"LUBRI-*chaos*" Takes Its Toll In Money, Machines and Production

Even the best managed construction set-ups can have "Lubri-*chaos*." Today's "impossible" schedules, far-flung projects and increase of inexperienced help has shown up "Lubri-*chaos*" for the costly evil it is.

Alemite, as the pioneer in pressure lubrication, has worked for years to end the nightmare of "Lubri-*chaos*." Now, when the "heat" is on, the Alemite method of handling and application of lubricants and oils is providing the answer to "Lubri-*chaos*" and is proving its worth on construction projects everywhere.

The Alemite method will play an important role in peacetime competition. That's why foresighted operators are getting together with Alemite Lubrication Specialists *now* to gain the competitive advantage of the world's most modern lubricating methods. For consultation without obligation, write Alemite, 1819 Diversey Parkway, Chicago 14, Illinois, or Belleville, Ontario.

Alemite Portable Service Stations are complete power lubrication departments on wheels that carry lubricants to machines on the job. They include high- and low-pressure Alemite Barrel Pumps, Alemite Motor Oil dispenser, hose reels and gas engine air compressor. Write for catalog.

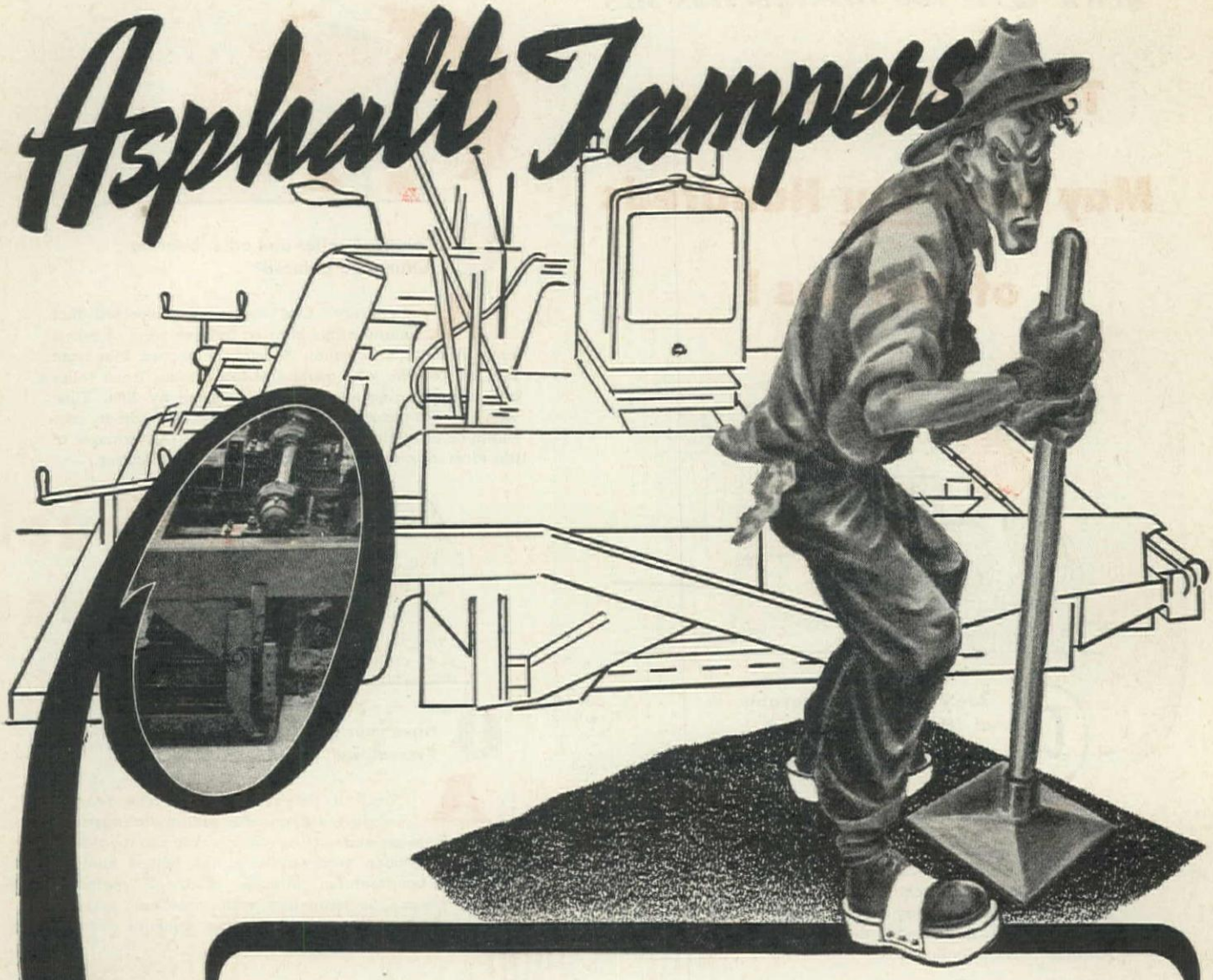
Another Product of STEWART WARNER

ALEMITE

First in Modern Lubrication

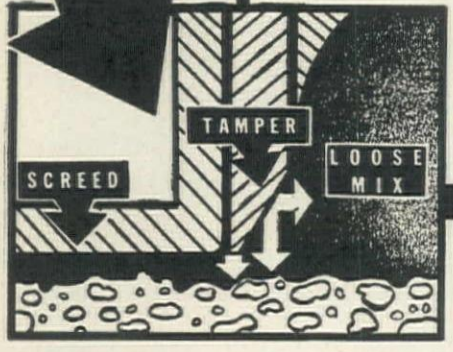
CONSULTATION • LUBRICANTS • MAINTENANCE • EQUIPMENT • ENGINEERING

Asphalt Tampers



Joe was an early model asphalt tamper. Wearing his heavy wooden shoes, Joe got out on the hot, steaming mat and pounded down the spots around manholes and gratings that had to have tamping while the mix was hot. His boss used to wisecrack that Joe knew asphalt from the ground up. That's why he's running a Barber-Greene Finisher today—Joe knows the value of tamping while the mix is hot.

Joe is tamping 1200 strokes a minute now. Tamping the mix hotter than he could walk on it, even with his wooden clogs, while it is in the best workable condition. The roller that follows Joe and his B-G Finisher adds about an eighth inch final compaction. And the depressions are full of compacted material, not struck off material that will compress under traffic and repeat depression on new surface.



The bevelled face of the tamping bar does the actual compacting. It pushes the material forward as well as down, forcing the hot mix into the voids and produces a dense mat. The travel of the tamper imparts a rolling movement to the loose mix in the spreading chamber which prevents any segregation of material. The follow-up screed is level with the bottom stroke of the tamper bar and adds its weight to compacting the mat.

44-9

BARBER GREENE

ARMY E NAVY

AURORA, ILL., U. S. A.

Brown-Bevis Equip. Co., Los Angeles, Phoenix; Columbia Equip. Co., Portland, Spokane, Seattle, Boise; Contractors Equip. & Supply Co., Albuquerque; Jennison Machinery Co., San Francisco; Lund Machinery Co., Salt Lake City; Western Construction Equip. Co., Billings; Ray Corson Machinery Co., Denver.

ANNOUNCING

a new P&H truck crane

A Modern Mobile Unit . . . Speeds a Variety of Work

In this new truck crane, P&H presents a completely new conception of modern materials handling equipment. It's designed for quick and easy mobility with standard road-width clearances — easier to handle in traffic.

Outstanding features include:

- Lowest center of gravity increases stability — enables you to handle a wider range of work.
- No sway at boom point — P&H's weave-proof carrier frame solves this problem.
- Complete hydraulic control with planetary lowering mechanism — gives you smooth accuracy for "inching" loads.
- Triple-safe, planetary boom hoist gives positive protection against accidents — the boom can't fall suddenly
- Tractive power is transmitted through double-drive axles in tandem . greater tugging power, with 10 speeds forward and 2 reverse.

For handling structural steels, concrete, and other materials to and from high levels, this unit can be easily equipped to work with hook, clamshell, magnet, etc. Rugged, powerful, modern in every respect, this new P&H truck crane offers more operating advantages than you have ever known in a unit of this type. . . . Write for complete information.

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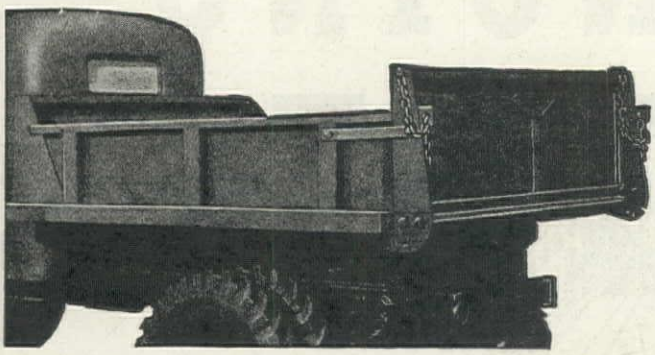
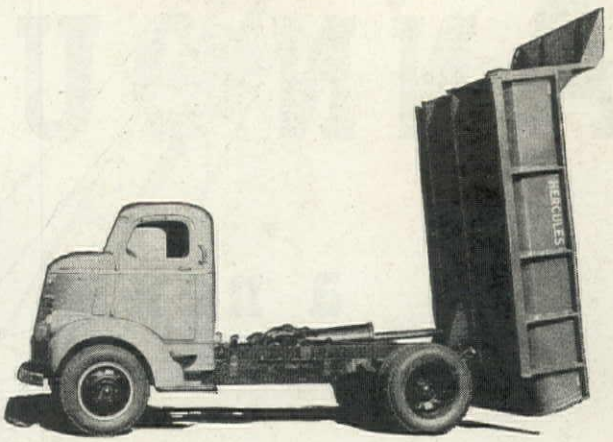
HERCULES

HYDRAULIC HOISTS and DUMP BODIES

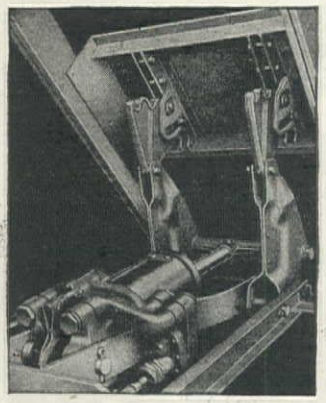
GIVE DEPENDABLE SERVICE ON ALL KINDS OF JOBS



Hercules Removable Side Rub Rail Body with hinged rear corner posts. Available in many sizes.



Hercules High Dumper—Power up, power down with 78° dumping angle. Equipped with 12 ton capacity hoist.



HERCULES HYDRAULIC BOOSTER HOIST

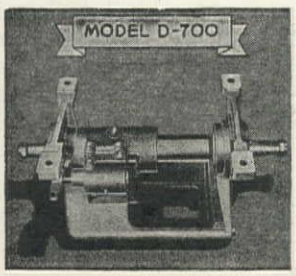
Makes any truck a Dump Truck

Install HERCULES DOUBLE-ARM HYDRAULIC HOISTS under your platform, stake, express or special bodies, which are now idle. Unload the easy way!

This is the Model KXE Hoist, with 6" cylinder, for bodies up to 12 feet long. Body reinforcing plate and steel sills included. Control valve is operated from driver's seat.

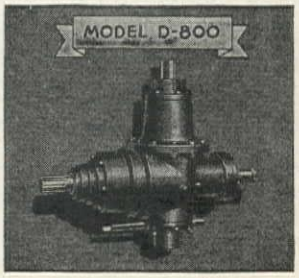
USE THE HERCULES SPLIT-SHAFT POWER TAKE-OFF

To operate any truck-mounted equipment



Direct (D-700 Series), Side (D-800 Series) and Dual Drive (B) models are available for operation of almost every possible type of truck-mounted equipment, either singly or in combination.

Recommendations and complete specifications upon request.



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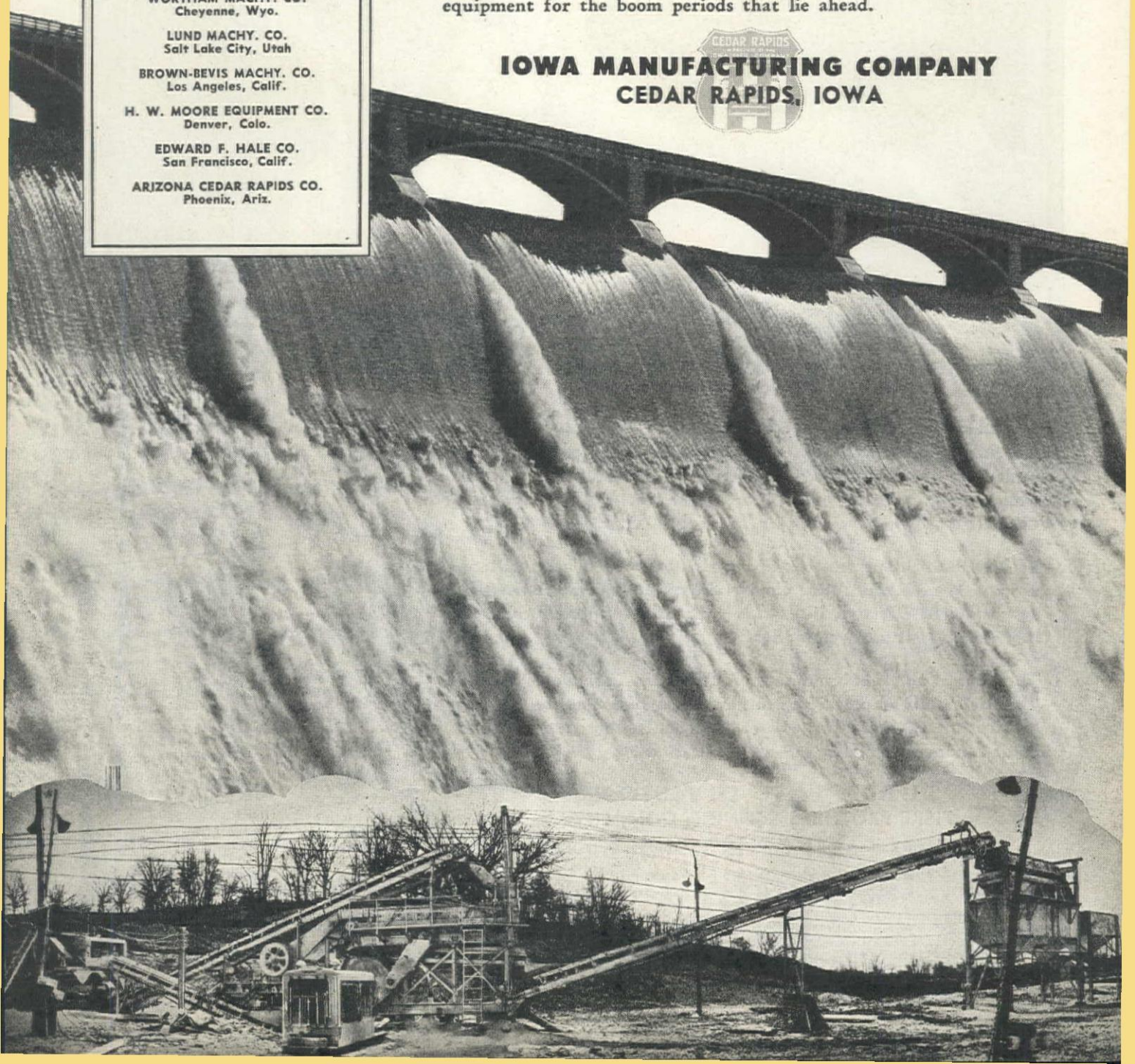
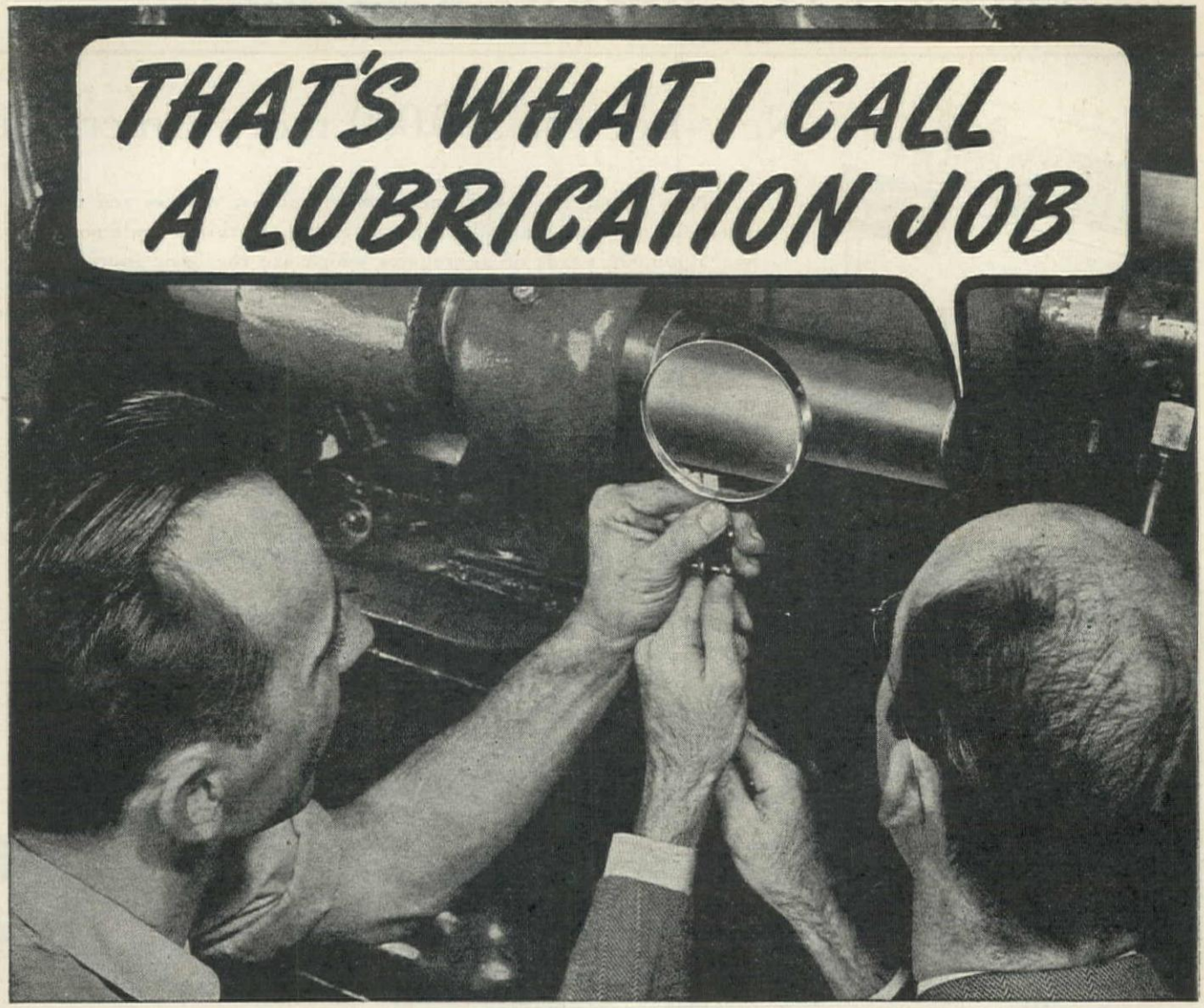
New power for new farms, new industries, villages and cities, water for more than a million thirsty acres—all this is made possible by 15,000,000 yards of aggregates which are the basic ingredients of mammoth Grand Coulee Dam. Even more fundamental, specially where the contractor is concerned, is the cost of producing aggregates for dams like this, or for highways, airports, industrial or residential building. The difference of even a few cents a ton, on the cost of producing that aggregate, may mean the difference between profit and loss or between getting the contract or not getting it.

Tomorrow's construction projects hinge on low cost aggregates! IOWA, devoted exclusively to the manufacture of Cedarapids equipment, will be more than ever Headquarters for aggregate producing equipment for the boom periods that lie ahead.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA





The LUBRIPLATE film is tough...the toughest lubricating film you have ever used. It holds contacting surfaces apart, even under the heaviest loads, thus effectively preventing progressive wear. Examination of a bearing surface lubricated with LUBRIPLATE always shows a mirror finish.

LUBRIPLATE is a most exceptional lubricant. It keeps friction down to a minimum, thus conserves power. It prevents rust and corrosion. Its effective life is longer than conventional lubricants, therefore it is more economical to use.

The remarkable achievements of LUBRIPLATE are told in the "LUBRIPLATE FILM." It contains case histories and general lubricating information written especially for your industry. Send for a copy today.

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Rx FOR YOUR MACHINERY

No. 3—Ideal for general oil type lubrication. Ring oiled bearings, wick feeds, sight feeds and bottle oilers.

No. 8—Because of its high film strength and long life reflects outstanding performance in most types of enclosed gears (speed reducers).

No. 107—One of the most popular grease type products for general application by pressure gun or cups.

No. 70—For a wide range of grease applications, especially at temperatures above 200 degrees F.

No. 130-AA—Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.

BALL BEARING—This is the LUBRIPLATE lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.

LEADING THE "DIRT RUSH" THROUGH ALASKA

WHERE TIME WAS WORTH MORE THAN GOLD

Back in 1941 Wooldridge Scrapers started working on a 24 hour a day schedule in Alaska leveling the ground for CAA Airports. It was from these advanced landing fields that American planes took off in June of 1942 to repel the Jap invasion, thus saving Alaska and the Aleutians. At the same time, Wooldridge heavy duty earthmoving equipment was blazing a trail overland which was to become the Alaskan Highway. Wooldridge Bulldozers mowed down trees, moved rocks, cleared fallen timber and led the way through rough and rugged country. Following in their wake were 17-yard Wooldridge Scrapers carrying fuel oil, supplies and parts to advance camps where they began moving worlds of earth around the clock in their race against time. Here again Wooldridge Scrapers maintained their established reputation for heaping yardage loads, trip after trip—day after day, with less wear and less down time for repair. Write today for details on Wooldridge Earthmoving Equipment.

Top view shows Wooldridge Terra Clipper Scraper working for Utah Construction Co. on Alaska Highway in the Western Yukon.

★

Bottom view shows Wooldridge heavy duty Scraper on the Alaska Highway just west of White Horse. Govan & Adler, Contractors.

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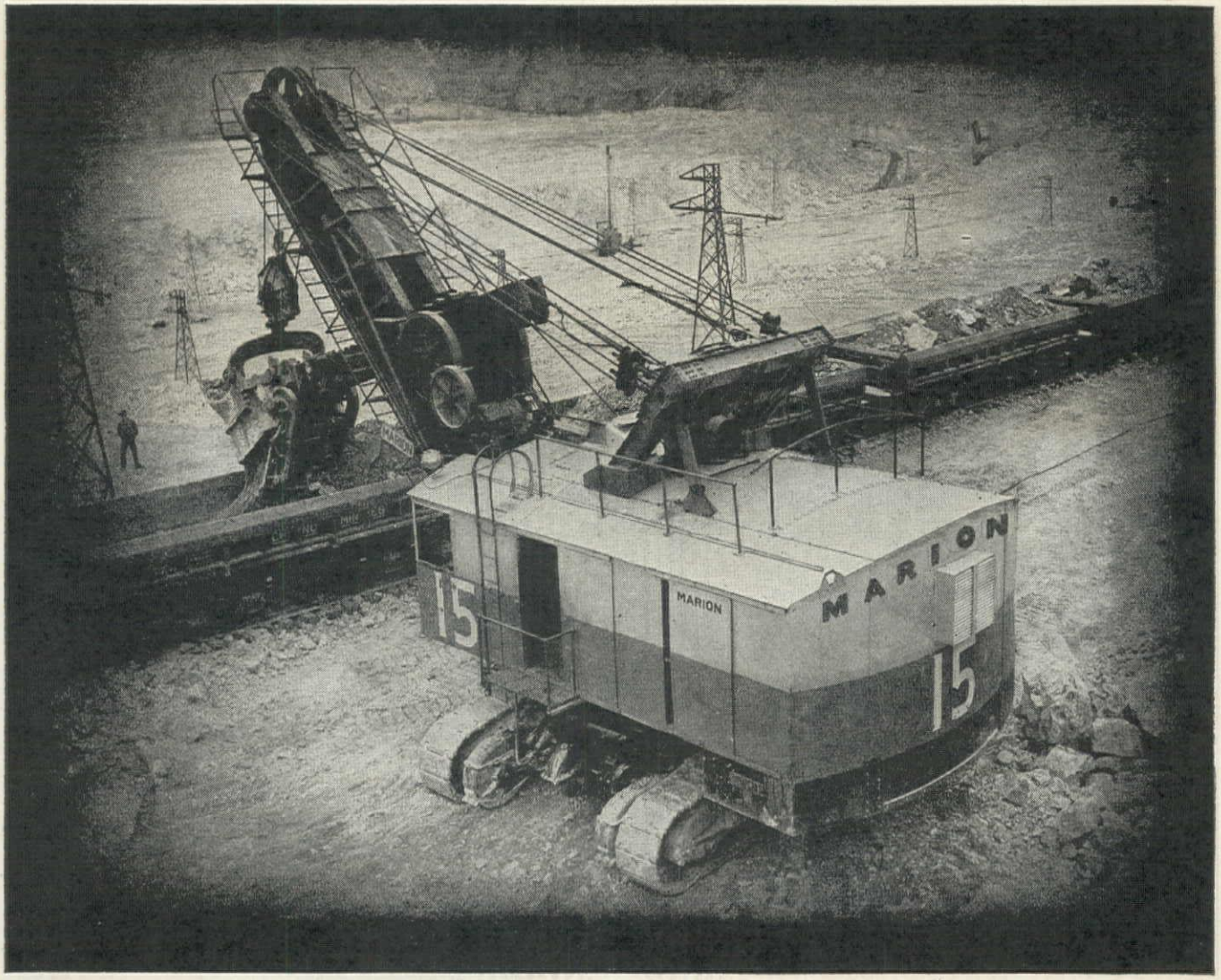
BOILING BOWL TERRA CLIPPER PRINCIPLE

SCRAPERS



MARION'S Job After Victory

Raw Materials For the Better Things in Life

Postwar developments recognize as fundamental to progress such basic raw materials as iron, copper, bauxite, nickel, etc., which MARION shovels pioneered years ago and have been digging on full twenty-four hour schedules since we went to war. MARION will continue to wield a powerful influence in producing these materials, economically and in needed quantity, so that all of us may share the better things in life after Victory is ours.

MARION is prepared to help you with your postwar plans.

CRANES ★ PULL-SHOVELS
CLAMSHELLS ★ SHOVELS
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For Every Material Handling Job
3/8 cu. yd. to 35 cu. yds.

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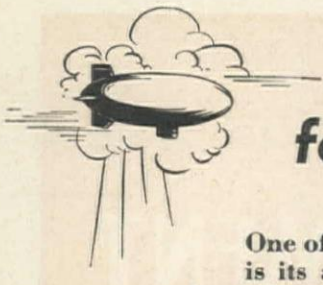

Naval Base uses HORTONSPHERE *for the storage of helium . . .*

One of the characteristics of helium is its ability to readily escape into atmosphere. Hence, to harness this "Houdini" of inert gases—to keep it in a state where it will be useful to man—it must be stored in "escape-proof" containers. Hortonspheres provide this type of storage. In addition to being vapor-tight these spherical pressure vessels have other features that make them desirable for storing various gases and volatile liquids. For example, Hortonspheres have no moving parts to get out of order, hence constant supervision is unnecessary . . . and being spherical in shape they occupy a small amount of space and have a minimum of area to paint.

Hortonspheres are available in a wide range of sizes from 20 to 65 ft. in diam. and for pressures from 20 to 100 lbs. per sq. in.

If your postwar plans for expansion and modernization include the provision of efficient storage facilities for gases or liquids, investigate the possibilities of the Hortonsphere. Write our nearest office outlining your requirements.

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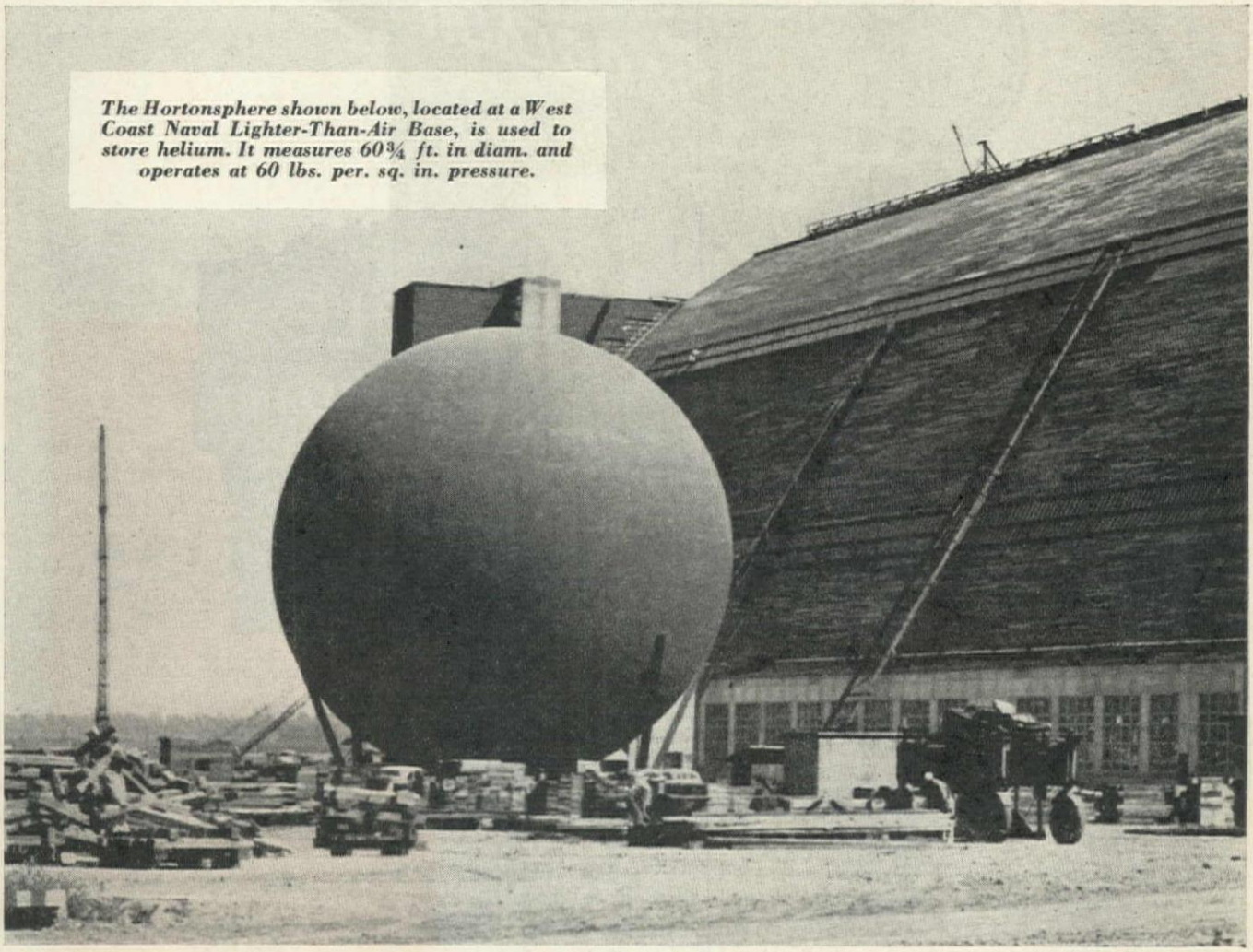

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WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

June, 1944 Vol. 19, No. 6

Army vs. City Laws

MORE SMOKE came out of a recent Army warehouse fire in San Francisco than was caused by the flames, and it served to illustrate an important problem of war-time construction in metropolitan areas. The row between city and federal officials that was touched off by the incident brought charges, denials, and name-calling that furnished spirited newspaper copy and editorials for the Bay Area public.

One of the charges held that the contractors were violating the San Francisco building code with impunity behind the protection of the federal government and suggested that the city could withdraw the private contractors' license, to say nothing of fine and imprisonment, once the city laid hands on them. In Richmond, California, "chiseling construction methods" were blamed as responsible for loss of lives and continued fire hazards. There was one recommendation that the federal government organize bucket brigades among its own personnel if it cared to remain aloof from municipal safety requirements.

It was unfortunate that a controversy should reach such extremes as a lot of linen was hauled out that didn't need washing. As could be expected, nothing was accomplished until the public barrage was lifted. Now that the affair has settled down it might be well to review the problem in general from a construction man's point of view, and see what lessons can be applied here and in similar cases:

Technically, these war-increased federal holdings are little islands within the normal province of local government and as such are not subject to laws affecting contiguous private property. Carried to the logical extreme, there is nothing on the books to prevent the construction of any kind of structure—or shack—the armed services think will benefit the prosecution of the war. As it turned out, in the case of the Army warehouse fire, certain delay reportedly caused by fire hydrants not uniform with city equipment, suggests there must be a middle ground on which cooperation is profitable to all concerned.

The federal agencies point out that no fire hazard is greater than can be avoided within the limitations of material authorized for temporary construction. There is some apprehension as to how "temporary" some of these buildings may be. The Lanham Act, for example, requires that all temporary or emergency structures be torn down within two years after the war. The city of Oakland has already concerned itself to see that the law is carried out to the letter. But not all war construction is under the Lanham Act. For now, the answer appears to be one of doing the safest job possible with materials and space available, particularly in the matter of wiring, use of fire walls and doors, placement of buildings, location and type of hydrants, etc. Then to be of value, complete knowledge of these installations should be available to local officials concerned with the protection of this and adjacent property.

Something of this sort now seems to have been worked out, for under an existing agreement, the federal services will notify the city (San Francisco) when new work or remodeling is contemplated. Jobsite inspection by city officials will be invited during the course of construction, and attempts will be made to comply with local building regulations, or modifications thereof as may be suggested. Building plans and specifications will be made available in advance of construction. In return, the city will waive formal application for building permits, inspection fees, and many of its regulations where their enforcement is not compatable with military expedience or available materials. And the city will render all possible assistance.

This should keep a lot of official toes out of each other's way if San Francisco has another fire on a federal project. It may serve as a guide to other communities.

Vision Is Lacking

ENGINEERING COLLEGES generally fail to carry out their full responsibility to their students. The representative of an important engineering trade association was speaking to this editor recently about important research opportunities available with that organization for young engineers who have talent, combined with imagination and curiosity. He has no difficulty at all in finding engineers well versed in facts and figures, but those with a vision of the wide field of research still open before us as a profession are few indeed.

A case in point is that of T. D. Judah, who died in 1863 at the age of only 37, but who had the vision, the initiative, and the courage to design, survey and promote the first transcontinental railroad in the United States, the almost fabulous construction story of which is outlined in succeeding pages of this issue.

Not only did Judah conceive the need for and possibility of a transcontinental railroad, use his engineering training to survey the route and design the grades, structures, and so forth, but "sold" his plan to four San Francisco financiers and to the Congress of the United States. He was then prepared to direct actual construction of the monumental undertaking, but his unfortunate and untimely death occurred soon after the ground-breaking at Sacramento.

While it is true that Judah would probably have been an outstanding character in any time or company, it is unfortunate that colleges today are so busy with the technical perfection of their studies that the other phases of an engineering career are overlooked.

Too many exemplary engineering students become mechanical calculating machines hunched over a drafting board. Development of new projects, exploration of the regions beyond the bounds of present knowledge either never occurs to them, or they lack the peculiar spark of ingenuity which will enable them to carry out such activities. It is a regrettable fact that so many great engineering structures are first dreamed up by professional promoters, who then hire technically-trained brains to do the more or less routine job of putting the steel and concrete in place.

WITH SORROW

We announce the death on May 17 of **William Albert Davis,** assistant editor of *Western Construction News* since July 1, 1943. He was 34 years of age. Mr. Davis was formerly associated with the U. S. Soil Conservation Service, and with a firm of building contractors. He leaves his wife, Roxey, and his parents, Mr. and Mrs. W. W. Davis of Yerington, Nev. Funeral services were held at Burlingame, Calif., and interment was at St. George, Utah.

Mr. Davis was responsible for some of the finest features in this magazine, and his passing will be sorely felt in the months to come. Thus far no successor has been appointed.

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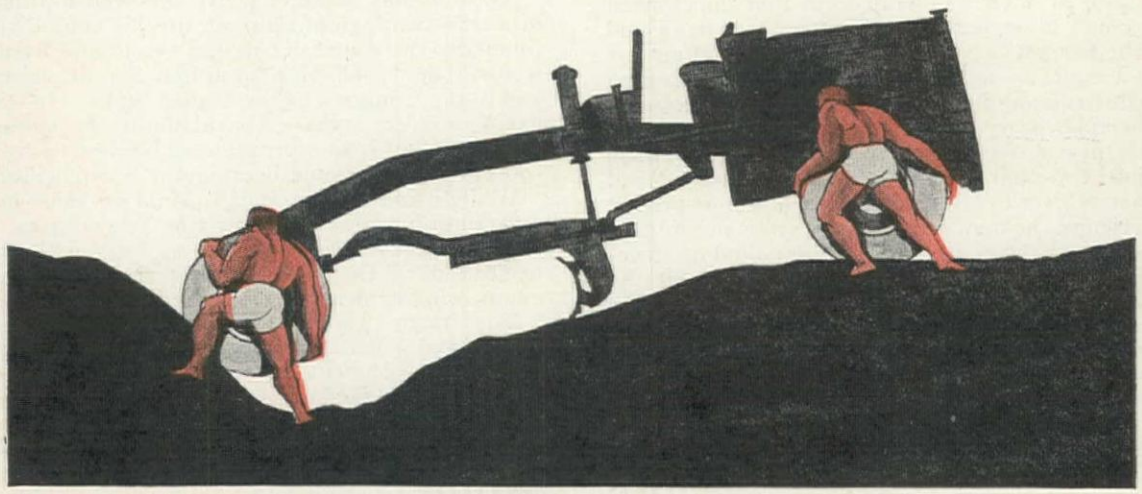

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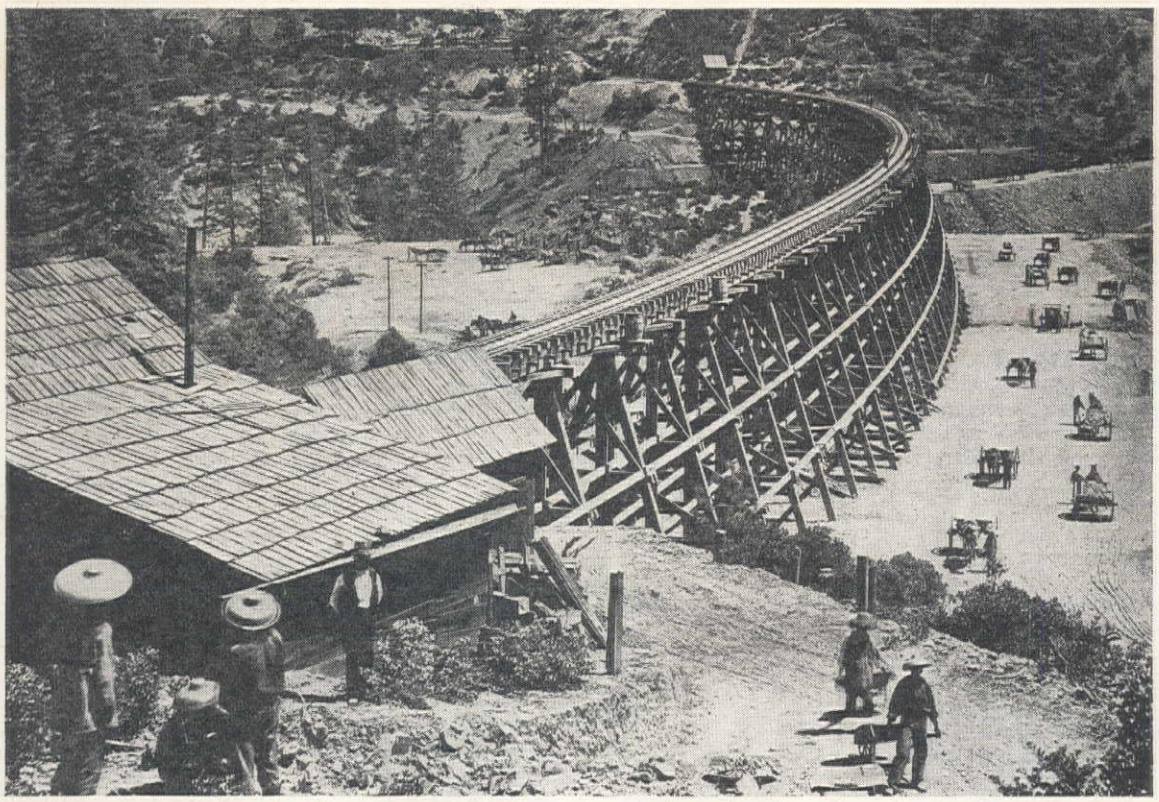
WESTERN CONSTRUCTION NEWS
JUNE • 1944



ONE OF THE TRESTLES built on the mountain section of the Central Pacific, by hand labor and with the crudest of tools. All work was performed by Chinese coolies, with wheelbarrows and one-horse carts. Lumber was sawed along route of the road.

Pioneer Construction—
The First Transcontinental Railway

The vision of a young engineer became reality by the efforts of Irish foremen and Chinese laborers who braved seemingly insurmountable difficulties to cross the Sierra Nevada, and then finished their work by setting a track-laying record which has never since been equalled

ONE OF THE GREATEST construction feats of all time, rivalling the Great Wall of China, and the pyramids of Egypt, was the completion of the first transcontinental railroad which conquered the Sierra Nevada 75 years ago and today is the Overland Route of the Southern Pacific Railroad.

With an insufficiency of white labor —because digging for gold was more attractive than the steady, backbreaking job of hacking a roadbed over the tremendous mountains—the job was done mostly by Chinese. They had not even the crudest kind of horse-drawn scraper. All earth and rock was loaded by hand into dump carts. Some was carried in wheelbarrows, some on heads of the workers. The methods had not improved greatly since their ancestors built the Great Wall. The railroad's "China Boys" conquered the mountains by sheer numbers, courage and persistence. The foreman and a considerable number of those who did the finishing job of track construction were Irish and other whites. At peak of construction there were some 14,000 Chinese, 2,000 whites and 6,000 horses.

The railroad builders

The route was conceived and laid out by an enthusiastic young engineer, Theodore D. Judah, who died at the age of 37 in 1863, the year construction began. His vision inspired the so-called "Big Four" Sacramento merchants—Leland Stanford, Mark Hopkins, Collis P. Huntington and Charles Crocker—and they pooled their resources and efforts to carry the job to completion despite terrific financial and physical difficulties. Crocker, with a genius for handling large numbers of men, led the actual construction. Never an obvious driver, he won the loyalty of his men through his force of character and his cheerful personality.

After Judah's death, S. S. Montague became Chief engineer and served in that capacity for the entire construction period. J. H. Strobridge was construction superintendent.

Leland Stanford, newly elected governor of California and president of the

railroad, turned the first shovelful of earth at Sacramento, January 8, 1863. With hand tools the grading began. On October 8 the ship "Herald of the Morning" arrived with 100 tons of railroad iron. Steel rails were not developed until later.

It was suggested that some kind of celebration be held at the laying of the first rail, but Huntington objected. "These mountains look too ugly and I see too much work ahead," he said. "The last spike is the one we'll celebrate."

Materials from east

All the iron rail as well as locomotives and most of the rolling stock had to be manufactured in the Atlantic states. The country was at war and most Eastern plants able to supply the needs of the railroad were already working to their capacity on government orders.

After the material was manufactured it had to be transported by sea and river 15,000 miles around the Horn, running the risk of shipwreck and the gauntlet of Confederate cruisers. The journey required eight to ten months, so that unusual foresightedness was necessary to get these supplies to California as the builders required them. At one time 30 ships were on the seas with supplies for the railroad.

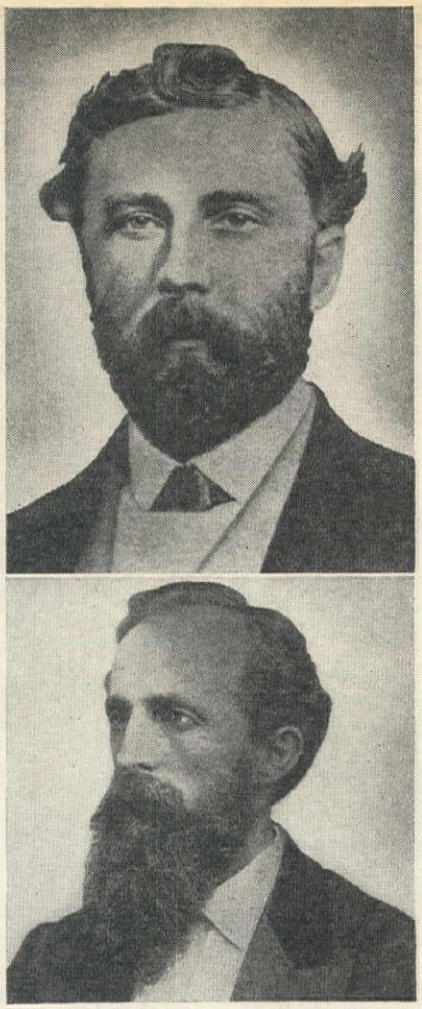
When the first few miles of railroad track was pushing eastward from Sacramento, locomotives shipped from the East in knock-down condition were put together in the Sacramento shops which were themselves made of the packing cases in which the lathes and other tools were shipped.

The winter of 1864-65 was of unusual mildness, but the railroad builders were unable to take advantage of it. They lacked funds. The force at work in the mountains was only 300 in December, 1864. A wagon road was constructed over the summit into Nevada, but the heavy and costly construction of the railroad right of way was out of the question.

Chinese employed

An additional federal loan, thanks to President Lincoln, made it possible to have a force of 1,200 men on the job by April, 4,000 by July. But there were not enough white men. After passing Auburn, in the early part of 1865, the first Chinese were employed. Altogether more than 10,000 of them were brought across the Pacific, and near the end of the job 14,000 were on the payroll. Many of them became expert in drilling, blasting and other departments of rock work.

The only major project completed before the augmented crews got on the job was the Heaby cut at Bloomer Divide. This was one of the heaviest pieces of grading on the first division and involved a cut more than 800 ft. in length through boulders cemented solidly together for a depth of 63 ft. Every foot of the way had to be blasted with gunpowder. The steep sides of this rock cut stand today practically as the builders left them. The cement that dulled drills and broke picks more than 75 years ago shows no signs of disintegration even now.



T. D. JUDAH, top, and S. S. MONTAGUE, engineers responsible for the Central Pacific construction. It was conceived by Judah, but he died early in the work at the age of 37. Work was carried to completion under direction of Montague.

Blasting powder

When mountain construction was at its height more than 500 kegs of powder a day were used by the builders. When the work began powder cost $2.50 a keg. During the period of greatest activity the price advanced to $15 a keg.

In the use of powder as in many other operations connected with building the railroads, the builders had no precedents to guide them and very often a great deal more was used than necessary to do the work.

In the vicinity of Cisco the rock was so hard that it seemed impossible to drill into it a sufficient depth for blasting purposes. Shot after shot blew out as though fired from a cannon.

Nitro-glycerin had been invented in 1846. It was not produced commercially until 1862 (in Sweden). None of this was available for use on the railroad over the Sierra. The builders established a nitro-glycerin factory near the summit tunnel; glycerin, nitric and sulphuric acids being hauled to the factory by team from Cisco. Some of this nitro-glycerin was used on the summit tunnel and two tunnels to the eastward, but it had a tendency to run out of the drill holes and also was considered too unstable for safety. Although no one actually was killed by it, there were several disastrous accidents, and Charles Crocker finally ordered the men to "bury that stuff."

Dynamite, made from nitro-glycerin, had not yet come into use, although invented in 1866.

Grading operations

The rock was drilled with double jack hammers, striking steels held and rotated by hand. Stanford saw great possibilities in a newly invented steam drilling machine, but the men on the job would have nothing to do with it.

Grading above Colfax began August 1, 1865. Cut excavation was by the so-called bench method, in which the Chinamen worked on various levels so that greater numbers could be on the job at once. They loaded the rock and earth by hand into one-horse dump carts.

The increase in the working force made it possible to extend the line of operations to the very summit. Camps were established at all tunnels and heavy points. Work was begun at both ends of the summit tunnel. At Cape Horn workers were lowered over the cliff in "bosun's chairs" and did the preliminary cutting suspended 2,500 ft. above the American River.

It had been the original plan to bridge the deeper ravines and gaps between Newcastle and Colfax with timber structures. Whenever possible, however, embankments were built instead and in an entire stretch of 25 mi. over broken country the only wooden structures were the Newcastle trestling, 60 ft. high and 500 ft. long; a smaller structure near Auburn, 38 ft. high and 400 ft. long; two of the same height at Lovell's Gap; one near Clipper Gap station, 50 ft. high and 400 ft. long; two in Clipper Ravine, 350 and 500 ft. long, respectively, and one trestle of four bents at Lower Illinoistown Gap.

Donner Summit tunnel

Early in 1866 it was decided to work the summit tunnel, which was to be 1,659 ft. long, from four faces. The work was already begun at the east and west portals, headings having been started, in August of the previous year. An adit-shaft near the center was driven through rock so hard that seven inches a day was the progress average. On December 19, 1866, the shaft was deep enough to begin the laterals and it took another year to complete the tunnel.

In order to get a hoisting engine to this summit shaft, a small Hinkley engine that had been used by the Sacramento and Placerville Railroad Co. was secured. It was taken to the end of the line at Gold Run, where it was jacked up, and the wheels taken out. By the use of traveling jacks it was moved 14 in. at a time to a logging truck, a clumsy contrivance with wheels 2 ft. wide, so designed to travel the muddy roads of the rainy season. "Missouri Bill" hitched on his ten yoke of oxen, and they started a six weeks' journey, arriving in August, 1866.

To cross the Sierra, a total of 15 tunnels were driven, the longest being that at summit. Work on the tunnels had been stopped entirely during the winter of 1865-66. To avoid another such delay, John J. Gillis, the engineer in charge of that work, kept three shifts of men at work day and night on the approaches of the tunnels during the summer of 1866.

When winter began the headings were underground so that the work could go on uninterruptedly, though it was necessary to dig snow tunnels 200 ft. long to keep the entrances open. That winter there were 44 snowstorms, in some of which 10 feet of snow fell. In March, 1867, there was still 15 feet of snow in Summit Valley.

Grading to the east

The Union Pacific, which was building westward in a race with Central Pacific to see which railroad could open up the most territory before the rails met, sent scouts west to see how Central Pacific was progressing in the winter of 1866-67. They reported that Central Pacific was stuck.

Word of the Union Pacific's confidence reached Sacramento. Crocker and his associates replied by sending the force not engaged in tunnel work to the Truckee River canyon, where lighter snowfall made grading possible.

This was a tremendous undertaking. There was a stage road to Truckee, upon which a large force of men were kept busy clearing snow. Over this road, steep and difficult in many places, through blinding storms, the construction forces hauled material for 40 mi. of track. This was followed by three locomotives and 40 cars.

A motion picture company 60 years later tried to duplicate one phase of this great accomplishment by hauling the smallest locomotive in captivity over a trail near the summit tunnel. They had unlimited manpower, steel cables, block and tackle of the latest type and stoutest make, and a big Mallet engine to supply power. The pioneers, with ropes, oxen, mules, and Charles Crocker to encourage them, hauled three large locomotives and a lot of other equipment over 28 mi. of road and mountain trail. The motion picture people were glad to quit at 500 yd.

The arrival of snow in the mountain sections did not immediately stop work, even in the open. The ground was kept bare for the graders by shoveling. After storms, the entire grading force shoveled snow. Snow had to be cleared away not only for excavations but from embankments, or the fills would have washed away when the snow melted under them. This shoveling was kept up until the snow began to fall so heavily and so continuously that clearing became impossible.

In addition to tunnel work, the construction of retaining walls in the canyons was carried on through the winter. A great dome was excavated in the snow where the wall was to be built, and the wall stones were lowered through a shaft in the snow to the men working inside the dome.

Snow sheds constructed

It was in 1867 that the decision to build snow sheds was reached in order to keep trains running after the snows fell. The expense of building a shed nearly 40 mi. in length was almost appalling, and unprecedented in railroad construction, but 2,500 men were put on the job, with six trains to distribute materials. There were not enough sawmills, so much of the work had to be done with rough-hewn lumber. At first the roofs were peaked, and steep, but the force of snow moving sideways downhill against them pushed the sheds out of line. Later the snowsheds were built with almost flat roofs, strong enough to bear the weight of the snow.

The spring of 1868 found Central Pacific over the summit. From 12,000 to 16,000 men and from 5,000 to 6,000 horses were employed and between 500 and 600 tons of material were used daily in a feverish race to beat Union Pacific to the heart of the Great Salt Lake district, some 500 mi. away.

The country east of Wadsworth was a desert. With the exception of a few cords of stunted pine and juniper trees all the fuel used had to be hauled. There was no water after leaving the Truckee and Humboldt rivers. In the mountains east of Wadsworth may still be seen the tunnels bored into the hills by the builders of the Central Pacific to develop small springs.

About 3,000 men were sent 300 mi. in advance of the track, being supplied by teams over the desert, the haul without water being as much as 40 mi. in places. These men performed the preliminary grading of this roadbed. They worked so fast they didn't wait for ground to thaw, but blasted it out, much trouble resulting when the fills thawed.

Rail-laying records

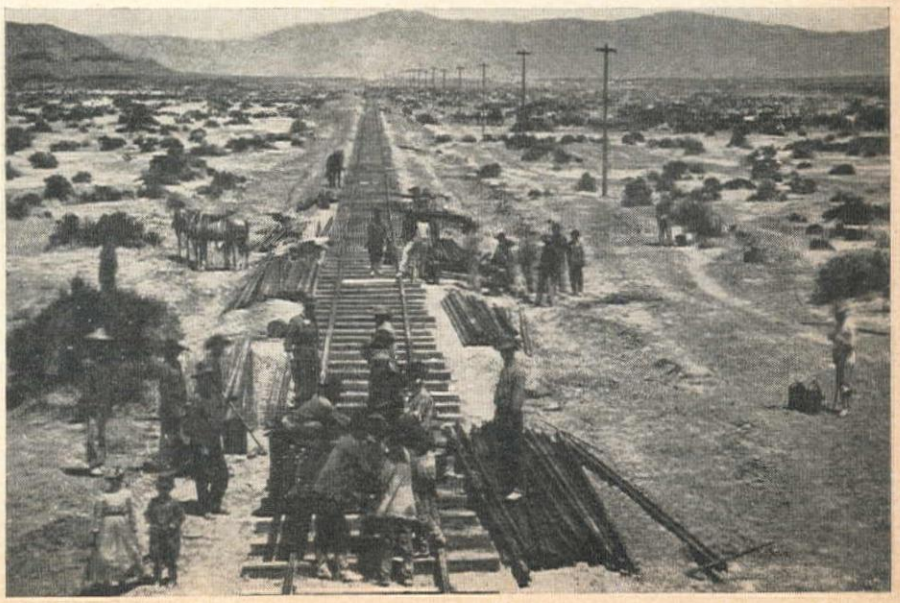
Closely following the grading crews across the desert sections came the track-laying gangs. The rivalry between the two railroads inspired some records of six, seven, and seven and a half miles of track in a day. Finally, Crocker bet Vice-president Durant of Union Pacific $10,000 that his men could lay 10 mi. of track in a working day. The feat was accomplished on April 28, 1869, by a squad of 11 Irishmen and a small army of Chinese coolies, who layed 10 mi. and 56 ft. of track in 12 hours, bringing the railroad to within 3½ mi. of Promontory, Utah, where the final closure was made a few days later.

The story, told by a reporter on the San Francisco Bulletin, who witnessed the performance, and verified by records of engineers on the job, follows:

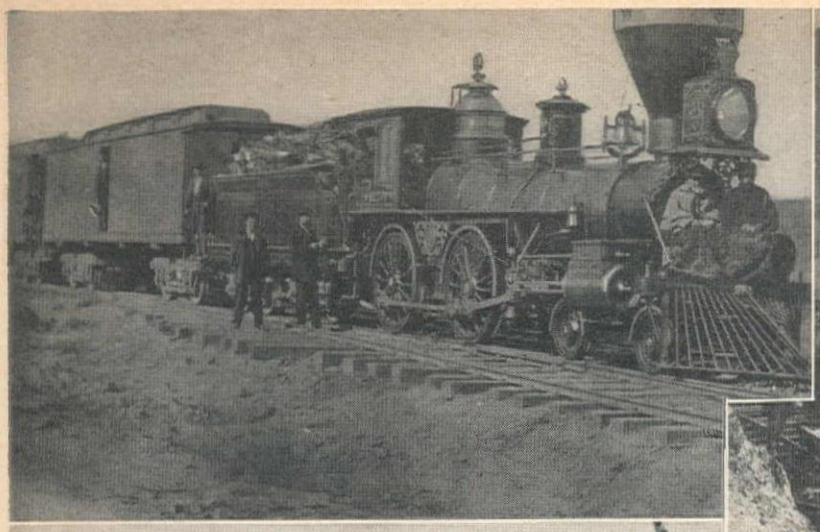
A train of sixteen cars loaded with iron rail and materials for two miles of track was pushed up to the front. Men climbed on top and threw off the fish plates and kegs of bolts and spikes. Others punched side stakes out of the right and left alternate cars. The rails were then rolled off and in eight minutes the sixteen cars were cleared. The train was then pulled back and another train of rails brought into position.

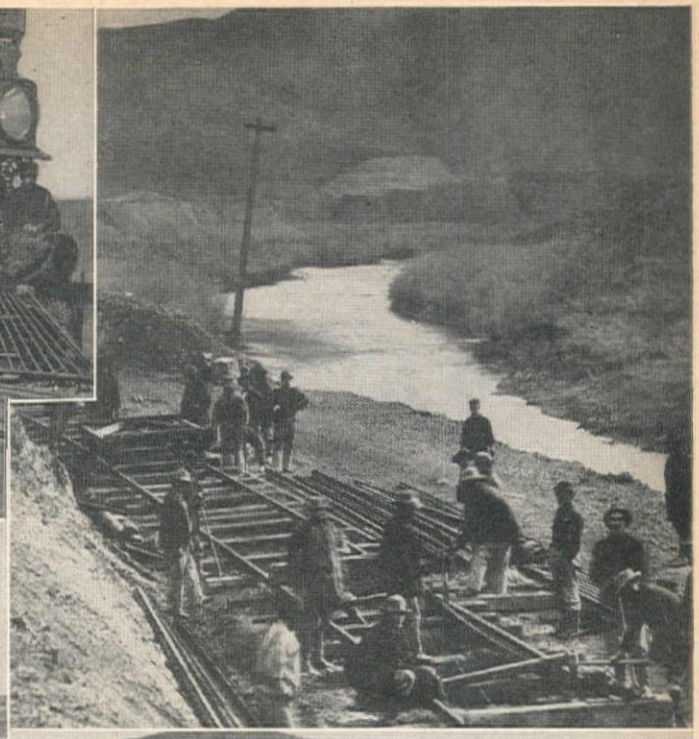
As soon as the material train was gone, small hand cars were put on the tracks. Each had a crew of six Chinese working under white bosses. Sixteen rails were loaded on each car, together with a keg of bolts, a keg of spikes, and a bundle of fish plates. Two horses with riders were attached to the car in tandem by a long rope. As soon as the car was loaded and the crew on top, the horses were off on the jump. One side of the roadway was kept clear for the horses racing ahead with the material cars. On a down-grade the horses were detached and the car went flying along with one of the crew acting as a brakeman. The horses ran alongside and, when a level was reached, the nearest rider hooked on again. The first car out from the material dump only had to go a short

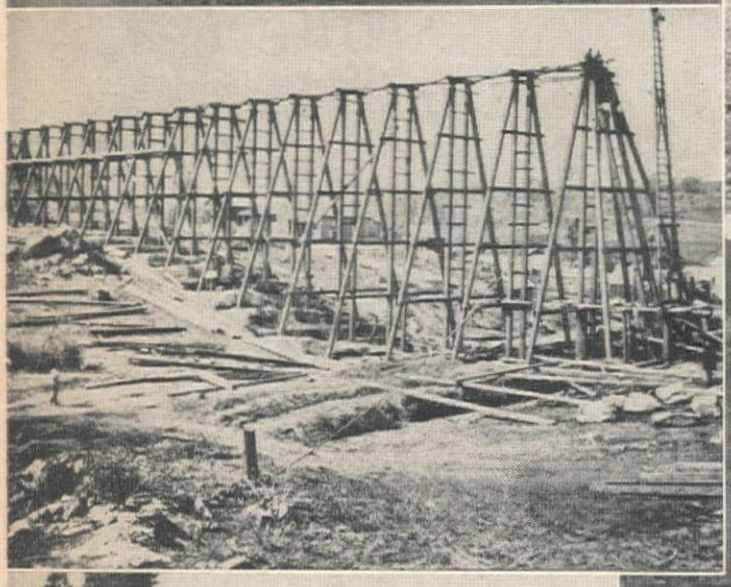
TRACK WORK in Nevada during 1868 as the Central Pacific was racing to meet the Union Pacific forces working from the East. A telegraph was built simultaneously. Rail-layers (foreground) were followed by Chinese spikers and ballast tampers. It was this type of work at which a record of 10 mi. of track in a day was set.

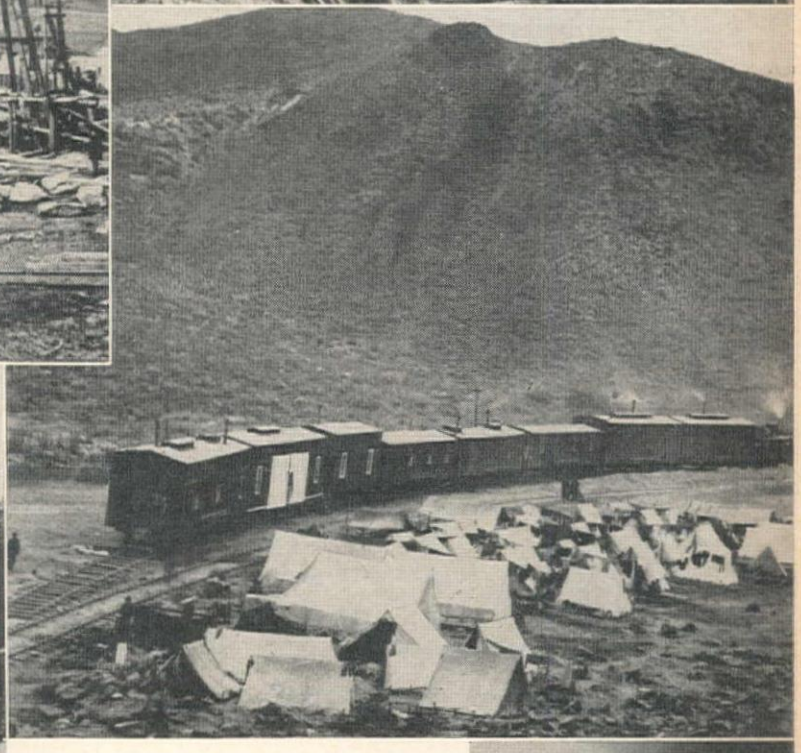


TYPICAL CONSTRUCTION scenes in the mountain section of the Central Pacific railroad epic. Upper left, the Bloomer Cut, still standing today; Upper right, hand excavation of a hard rock cut by Chinese hand labor; Lower left, erection of the snowsheds to protect 40 mi. of the extremely difficult summit section, where snow sometimes falls to a depth of 10 ft. in a day. Later snowsheds were built of very heavy timbers with a flat roof. Sawmills were set up close at hand to furnish the timbers for this monumental undertaking; Center right, first opening of one of the 15 tunnels on the trans-mountain route. In the foreground is a tea-boy, whose duty was to pass among the Chinese laborers, supplying them with tea; Lower right, construction of a fill by use of a steady train of one-horse carts moving from a cut being excavated by the bench method. The loaded carts approach the end of the fill along one side while empties return on the other. Foreman watches on horseback.

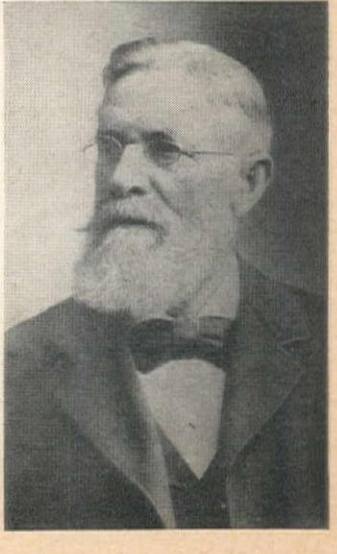


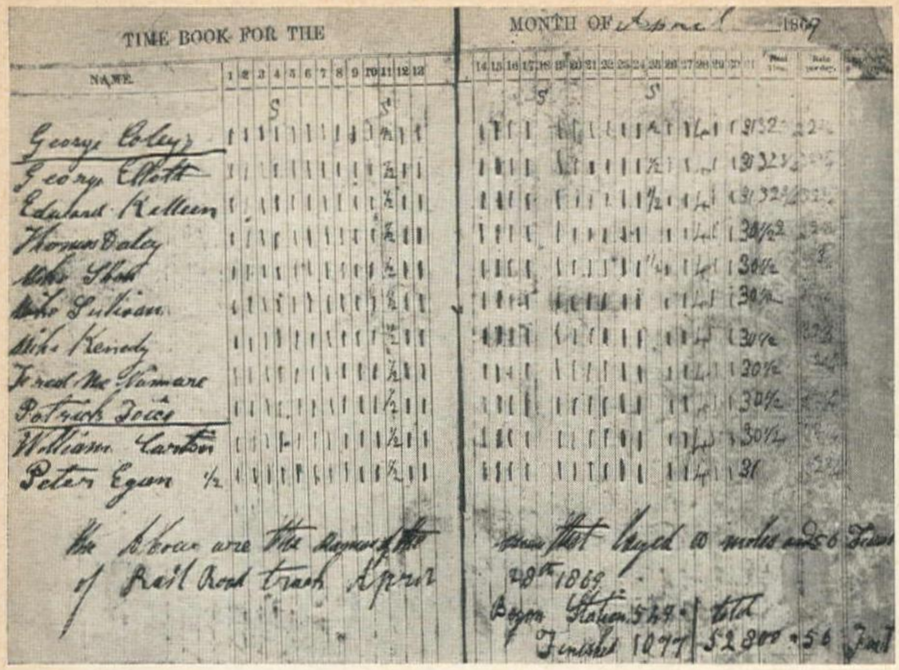






CONSTRUCTION SCENES, top to bottom, left side: Federal railroad inspectors examined the track from a seat on the cowcatcher; Bridge construction near Colfax; a work train backed up to the railhead to deliver supplies, while excavation continues at the cut. Right side: Rail bending by hand in Ten Mile Canyon, Nevada; A camp of Chinese laborers —these camps moved every few days to keep abreast of the construction; J. H. STROBRIDGE, superintendent of construction during the building of the railroad from Sacramento, California, to Promontory, Utah.





A PAGE from the time book kept by George Coley, foreman of the crew which set the track-laying record of 10 mi., 56 ft., in one 12-hr. day. The foreman's notations for April 28, 1869, the record day, show the mileage stations between which track was laid, the names of the men, and the fact that they received four days' pay for the job.

distance while the last cars had to go perhaps two miles.

Stream of iron

As full cars approached returning empties, the crew on the empty car jumped off and lifted their car from the rails, while the loaded car went past without slacking speed. There was no halt in the continuous stream of materials to the front.

When the loaded car neared the railhead, a gang jumped on with picks. They broke open the kegs and cut the fastenings on the fish plates. The keg of bolts was thrown to one side to men who filled their buckets and distributed the bolts. Other men distributed the fish plates. The spikes were poured out over the rails and as the rails were removed the spikes dropped through the floorless car and distributed themselves.

At this point the picked crew of Irish rail handlers came into the picture. A single horse pulled the car up to a railhead, where it was blocked by a wooden-framed iron track gauge. Four men worked on each side of the track. Two men seized the forward end with their tongs while the two rear men slipped the rail to the side of the car so it rested on iron rollers. The two forward men trotted ahead of the length of the rail, thirty feet, the rear men dropping the rail in place, where it was bolted and spiked by the track gang. The car was then pulled forward to the next track gauge and the procedure repeated.

The track went forward at the rate of almost a mile an hour. One time 240 ft. of rail was laid in one minute and twenty seconds; another time 240 ft. was laid in one minute and fifteen seconds. This is about as fast as a leisurely walk and as fast as the early ox teams used to travel over the plains.

At the front

But the rail handlers were only eight of several hundred men at the front, everyone of whom was an important cog in the smooth-working machinery. Ahead were three "pioneers," the most advanced men, who, with shovel and by hand, butted the ties to a tape line measured from the track-center spikes set by the surveyors. About half the regulation number of ties were placed at first to insure having sufficient for the ten miles.

Just behind the rail layers came the spikers, bolters, and those who distributed the materials. Then came the gang that surfaced the track by raising the ends of the ties and shoveling enough ballast to hold them firm. Immediately following was a "reverend looking old gentleman" who sighted the line of the rails and, by motion of his hands, directed the track straighteners. Then the tampers, 400 strong, with shovels and tamping bars.

The scene was an animated one. From the first "pioneer" to the last tamper, about two miles, a line of men was advancing a mile an hour; cars with their load of rails and humans dashed up and down the newly-laid track; foremen on horseback were galloping back and forth. Keeping pace with the track layers was the telegraph construction party. Alongside the moving force, teams were hauling tool and water wagons. Chinamen with pails dangling from poles balanced over their shoulders were moving among the men with water and tea.

Grades and curves

After lunch the work went on, but not so rapidly. The ascending grade on the west slope of Promontory Mountain was more difficult than the section covered during the morning and there were many curves. Considerable time was lost in bending rails, which was done by placing the rail on two blocks and forcing it into the desired curve by blows of a heavy hammer.

When the forward march was halted at 7 o'clock, ten miles and 56 ft. of new track had been added to the Central Pacific. Jim Campbell, later superintendent of the division, jumped into a locomotive and ran it back over the new line at 40 mi. an hour just to prove that the job had been well done.

The task had involved bringing up and putting into position 25,800 ties, 3,520 rails averaging 560 lbs. each, 55,000 spikes, 14,080 bolts, and other material making a total of 4,462,000 lbs.

Gas Pipeline for West Texas Being Considered

TO EFFECT A SUBSTANTIAL increase in the production of carbon black, an essential raw material in the synthetic rubber program, plans are being considered for constructing a 60-mi. pipe line to carry natural gas to existing channel carbon black plants now operating below capacity in the Panhandle area of Texas, the Chemicals Bureau of the War Production Board reports.

It is estimated that an additional 30,000,000 lb. a year of the easily processed channel black can be obtained from present facilities if sufficient gas is available to enable the plants to run at capacity. The proposed pipe line would furnish at least 60,000,000 cu. ft. of gas a day, which would be sufficient to produce the 30,000,000 lb. W. P. B. officials have been told that an additional 100,000,000 ft. of gas a day is available in the West Texas area.

The increased production that would result from construction of the pipe line would be enough to meet the 1944 requirements of the rubber program, however, W. P. B. officials said. They estimated that for the first quarter of 1945 it will be imperative to produce at least 100,000,000 pounds of additional channel carbon black, which will require expansion of existing plants or the construction of new ones.

Cities in Los Angeles Area Request Funds for Sewerage

THE LOS ANGELES county division of the League of California Cities has despatched a resolution to the parent body for transmittal to Governor Warren, asking that the State allocate $20,000,000 to assist on a fifty-fifty basis some 32 cities or districts now urgently in need of sewage treatment or disposal plants. The estimated cost of these 32 plants is $40,823,500.

Practically every city along the California coastline is depositing untreated sewage into the ocean, or the bays, harbors and rivers adjacent to it, and in some instances these unsanitary conditions have caused the State Department of Health to take action to abate them by quarantine.

Progress in Construction Equipment

NEVER HAVE THE STRIDES taken by the construction equipment industry in recent years been emphasized better than in the story on the preceding pages concerning construction of the Central Pacific (now Southern Pacific) railroad over the towering Sierra Nevada mountains to a junction with the Union Pacific at Promotory, Utah.

This heroic project, completed 75 years ago last April, was constructed almost entirely by the hand labor of Irish foremen and Chinese coolies. Motive power was furnished by wood-burning steam locomotives and the faithful horse. There can be no limit to the praise due the engineers and supervisors of the project, nor to the strong-backed, faithful workmen. The courage and success with which they tackled seemingly unsurmountable obstacles is perhaps best illustrated by the motion picture company which in 1929 attempted to re-enact the hauling of a locomotive over the top of Donner Summit, so that it might be used in construction work on the east slope. With steel cable and modern machinery, the makers of colossal epics were barely able to move the engine 500 yards. Yet, using only ropes, oxen and mules, the "old-timers" transported three such locomotives over the summit on unpaved roads and trails.

While maintaining deepest respect, even awe, for the great feat of construction, one compares in imagination the methods employed then with those in use today. On page 68 of this issue are pictures of various construction phases in the mountains. A fill is being constructed inch-by-inch with material hauled in one-horse dump carts, of perhaps ½-cu. yd. capacity, from a cut being excavated in benches so that more coolies could work simultaneously. What a difference if that line of horse-drawn vehicles were replaced by a few 20-cu. yd. dump trucks, or even a conveyor belt, fed by mechanical shovels handling 5 cu. yd. at a bite!

On the same page is pictured excavation of a cut through hard rock. Holes were drilled by the hand steel and double jack method, filled with black gunpowder, exploded by a fuse lit with a match. The broken material was then shoveled into wheelbarrows and dumped over the outer edge of the cut. Consider a moment the difference which might have been experienced with pneumatic drills, high-powered blasting powder, electric detonators, and bulldozers for clearing. It is interesting to dream about the acceleration of tunnel progress had it been possible to use a pneumatically operated drilling jumbo, a mucking machine, and an electrically operated string of mine cars instead of the hand-drilled, hand-mucked and mule-hauled single car system then employed.

Pictured, too, on page 68 is the erection of a portion of the snowsheds which wind for 40 mi. over the highest part of the mountain crossing. Each timber was sawn nearby, cut to size by hand, hoisted by block and tackle and secured by carpenters working at its final position. Today the trusses, and probably the wall sections would be pre-fabricated and treated at a mill perhaps many miles away, and after hauling to the site, would be quickly erected by a mobile crane. Flame-proofing would eliminate one of the greatest dangers of that particular construction and chemical treating would assure longevity far beyond that secured in the structure erected by the Chinese carpenters.

Instead of six-weeks' trip by ten yoke oxen to haul a steam hoisting engine to the shaft entrance to the Donner Summit tunnel, it would today be transported in a few hours by a diesel semi-trailer.

What a track-laying record might be set today if the same vigor and determination displayed by those who laid 10 mi. and 56 ft. in one 12-hr. day could be reinforced by mobile cranes and pneumatic spike drivers, bolt tighteners and ballast tampers! Even using small handcars drawn by horses and all hand operations in tie-setting, rail-laying and ballast-tamping, these men built a track that a locomotive could safely traverse at 40 m.p.h.

These are, of course, only the idle contemplations of a dreaming editor, but they lead inevitably to reverence for the technicians of an industry which has advanced so far in but 75 years.

These improvements have come gradually, step-by-step. As an example, the chain of conveying equipment has run something like this: wheelbarrow, horse cart, fresno, bulldozer, tractor-drawn carrier scraper. The advances have come almost always from the experiences and suggestions of operators on the job, such things as are pictured monthly in the "How It Was Done" pages of this magazine. As they used a given piece of equipment, they have pictured in their minds how a little change here or an added gadget there would make the machine work better or faster. They have passed these ideas on and the technical training and mechanical insight of the engineers employed by the equipment manufacturers has gradually evolved them into our present-day construction machinery.

Not only would the total time consumed on building the first transcontinental rail links have been shortened by several years had modern equipment been available in 1863, but we must consider the additional values which have accrued to our civilization through the efforts of progressive technicians and manufacturers. Hours of labor have been much reduced; total construction costs have been materially lowered, while the pay envelopes of the workers have been substantially fattened; projects have been erected which it simply would not have been possible to consider previously; deserts have blossomed into the nation's food larder; life has become full.

We cannot pass over lightly, however, the fact that in bringing about these accomplishments, the development of the machine has proceeded faster than the intellect of man, and the debasement of some of the finest of our new tools has brought untold suffering, death and horror to the world. We have faith, however, that this is but a passing phase and one day the developing conscience and knowledge of men will do away with war and we shall enjoy solely the wonderful benefits of our technological advance.

Incidentally, we of the West may take justifiable pride in the fact that by far the majority of both the technical and practical advances in the design of construction machinery have come from this region. It has been brought about because of the magnitude of the undertakings here, by the difficulties of aridity, withering heat, biting cold, mountainous terrain and poor transportation encountered in this area, and by the progressiveness of our contractors and their employees.

Just as our praise is unstinted for the accomplishments of the builders of the first transcontinental railroad in 1863-69, so must be our respect for the men who have made construction equipment what it is today. And who will say it has now reached its zenith of efficiency? Experiences by users of construction equipment in the armed forces are already bringing about further improvements, and doubtless more will come in the years following. Credit must be given where credit is due—to the operators, the mechanical engineers, and the manufacturers.

—THE EDITOR.

Fish Conservation at Shasta

Construction of 500-ft. dam acts as unsurmountable dam to salmon migration, and to preserve the value of the annual run, traps and hatcheries have been installed at two places on the river and hatchery facilities set up on tributary creeks by the Bureau of Reclamation

By SPEED S. LEONARD
Chief Inspector, U. S. Bureau of Reclamation, now at Friant Dam, Calif.,
and
HARRY A. HANSON
Project Supervisor,
U. S. Fish and Wild Life Service,
Coleman Station, Calif.

BY ESTABLISHING an insurmountable barrier to the migration of fish, construction of Shasta and Keswick dams on the upper Sacramento river by the Bureau of Reclamation has made all salmon spawning areas above them inaccessible.

As it was anticipated that the natural spawning grounds of the salmon would not be available due to the construction of these two dams—the former with a height of 500 ft. and the latter with a height of 100 ft. above normal tailrace levels—it became necessary to provide facilities to conserve the runs of this valuable and vital food fish. The present and planned needs for canned and processed salmon for military and lend-lease purposes, as well as for domestic consumption, have emphasized the value of all salmon runs.

At present, the supply of canned salmon is inadequate, thus every effort is being made to increase the supply of this valuable food as well as to conserve the great natural resources that provide it.

The average annual commercial catch of salmon for the past six years in the river below Sacramento, California, has amounted to one and one-quarter million pounds. During the same period, in the ocean outside the Golden Gate, an average catch of about 5,000,000 lb. a year has been taken. A large portion of both the ocean and river caught fish originated in the Sacramento river above Shasta dam.

Ladders impractical

Fish lifts and ladders would not be a practical or economical solution to the problem at Shasta dam, as neither has proved successful for heights over 70 ft. A fish ladder capable of permitting salmon to pass over a dam 500 ft. high with a fluctuating forebay level as great as Shasta reservoir would involve costly design and construction and its success or failure could not be predicted on the basis of past experience.

The only alternative is, therefore, the collection of the fish below the dam and transferring them to other waters for natural reproduction or removing their eggs artificially for incubation in a hatchery. A combination of both these methods has been adopted by the Bureau of Reclamation for the conservation of the salmon runs at Shasta dam.

No provision was made to transfer adult salmon above the dam by trucks or lifts because it is doubtful whether the fish would migrate through the relatively still water of the reservoir to the entering tributaries, it being the natural instinct of chinook salmon to swim against a strong current during their spawning migrations.

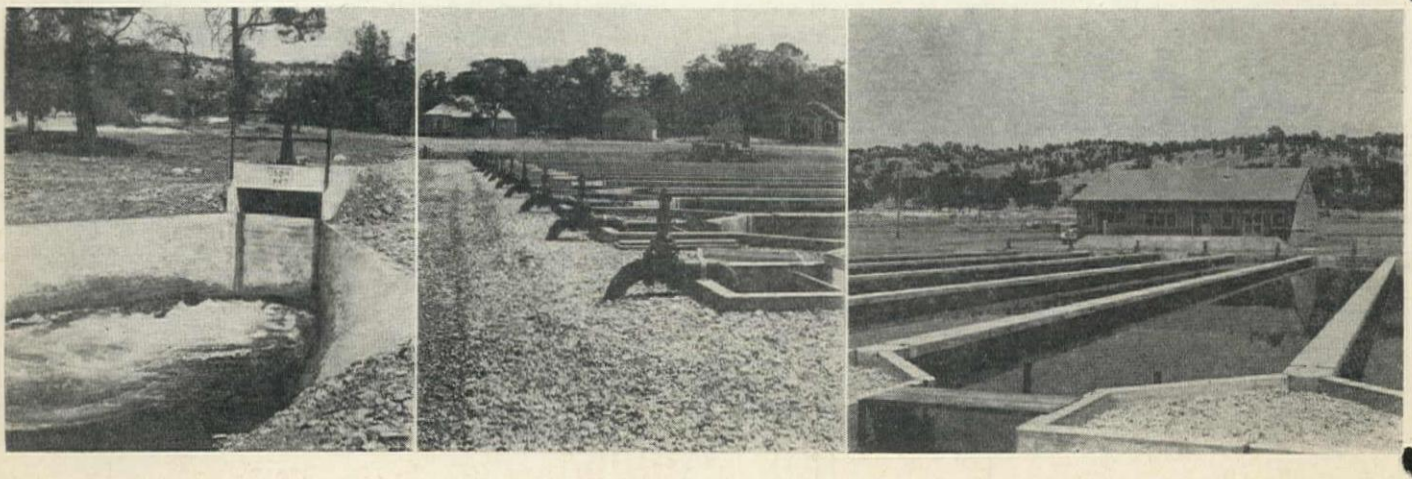
Furthermore, if the adult salmon were transferred around the reservoir to the entering tributaries, there would still remain the problem of passing small young seaward migrating fish through the reservoir on their journey to the sea. During much of this migration there will be no spill over the dam, consequently, the migrants would have to pass through the turbines or the river outlets below the crest of the dam. Either of these routes would probably prove fatal to migrating small salmon (their average length is about 1½ in.).

Trap incorporated in Keswick

The first structure necessary to maintain control of the salmon in the river is a trap and lift incorporated in Keswick dam, 9 mi. below Shasta dam. It is at this location that salmon arriving in the spring and early summer are trapped and loaded into specially designed tank trucks. The first five or six thousand are hauled to Deer creek, a lower tributary of the Sacramento river, about 65 mi. from Keswick, and there released. These fish swim upstream in Deer creek and remain in the cool pools of the creek above the foothills until late September when they reach sexual maturity and spawn.

The progeny of these fish emerge from the gravel spawning beds about four months later and begin their seaward migration down through Deer creek and the lower Sacramento river to the ocean. To prevent the possible return of adult fish hauled from Keswick dam, a rack has been constructed across Deer creek a short distance below the point of release. The rack is designed to allow normal migrations of fish upstream through it but prevents those transferred from returning to the Sacramento river.

After the spring and early summer fish have been transferred to Deer creek, the late spring and early fall fish are trapped and transferred to Battle creek, another tributary entering the Sacramento river about 30 mi. below Keswick dam. The Coleman Salmon Hatchery, with capacity of fifty million eggs, together with rearing ponds have been constructed by the Bureau of Reclamation on Battle creek to provide facilities for artificial



WATER SUPPLY system at Coleman Hatchery. Left, outlet of the 46-in covered conduit; Center, feed valves introducing water into the rearing ponds; Right, the rearing ponds, with cold storage building in back.

propagation of that portion of the run which is not released in Deer creek for natural propagation.

Coleman salmon hatchery

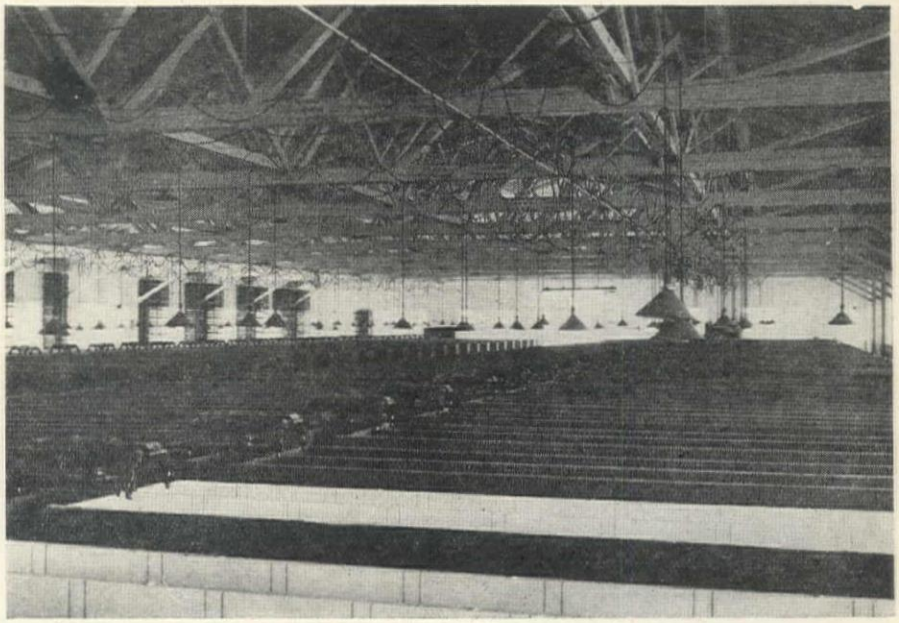
The Coleman Salmon Hatchery, located on Battle creek about three miles upstream from its confluence with the Sacramento river, consists of a main hatchery building, a cold storage and refrigeration plant, a combination garage and warehouse, and six dwellings for operating personnel. In addition to these buildings, the remaining structures are the main water supply system, the domestic water system, and holding and rearing ponds.

The hatchery building is 231 ft. long and 88 ft. in width, containing 144 redwood troughs, offices, laboratories, and storage rooms. Each redwood trough is 16 ft. in length, 3 ft. in width, and 16 in. in depth, supported by three concrete pedestals providing a slope of 2 in. in 16 ft. Water is supplied to this building from the main water supply system and the flow in each trough is regulated by the operation of a 2 in. molasses valve at the entrance end.

The salmon eggs are placed in wire mesh baskets and suspended in the troughs, after which small dams are secured in special designed notches in the troughs between each basket, impelling the flow of the water upward against the bottom of the baskets so as to keep the eggs in a state of suspension.

The cold storage building, located west of hatchery building, is 64 ft. in length and 55 ft. in width. It contains three cold storage rooms and one sharp freezing room, each being insulated with rock wool. There are also rooms for machinery, tools and supplies, food preparation and ice manufacturing.

The temperatures of the cold storage rooms can be maintained as low as —5 deg. F. However, the normal operating temperature of these rooms will be about +20 deg. F. The temperature of the sharp freezing room will be maintained at —15 deg. F., and will be used for the initial freezing of fish carcasses prior to storage in the cold rooms. The carcasses of the adult fish, combined with other prepared fish food, are fed to the young salmon.



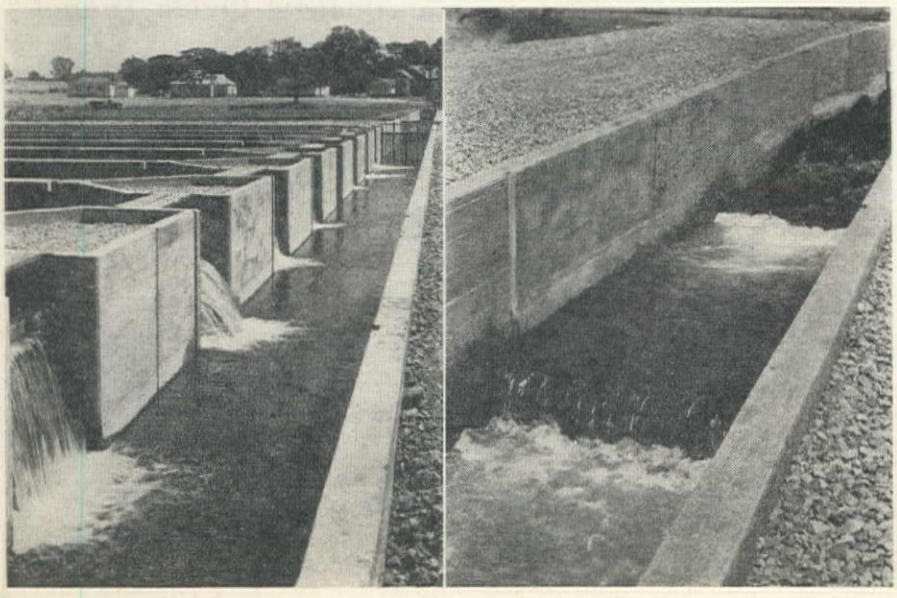
INTERIOR VIEW of the hatchery building at Coleman station. The troughs are of redwood, 16 ft. long, 3 ft. wide and 16 in. deep, sloped 2 in. in the 16 ft. There are 144 of the troughs. Eggs are hatched here in small baskets suspended in the trough.

Five, ten and fifteen hp. compressors operating independently or in series provide sufficient flow of liquid ammonia throughout the system to maintain the temperatures that are required in the different cold storage rooms.

Three thousand pounds of ice can be manufactured in each 24-hr. period with the use of calcium chloride as the refrigerant. The ice is stored in one of the cold storage rooms and used when required in the fish tank trucks for maintaining a water temperature approximating that of the stream in which the fish were trapped.

The garage and warehouse is a one story structural steel and concrete building, 136 ft. in length and 89 ft. in width. There is garage space for all fish hauling trucks and other automotive equipment necessary for operation of the station. In addition, there is a large warehouse space for tools, hatching equipment, paint shop, blacksmith and welding shop, and facilities for washing, greasing and repairing the trucks within the building.

DISCHARGE SYSTEM at the hatchery. Left, the spillways from the rearing ponds; Right, upper fish ladders and drainage channel from the 28 concrete rearing ponds.

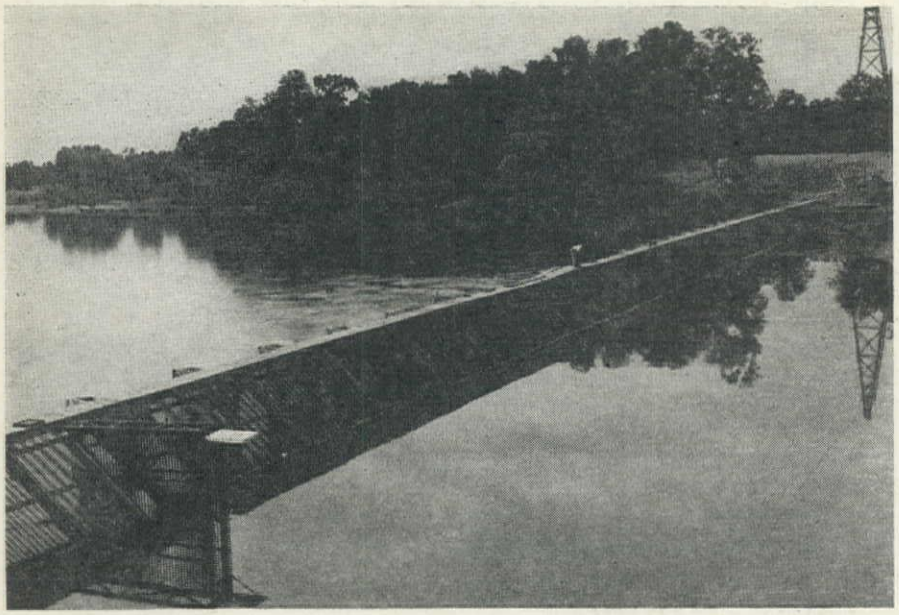


Water supply system

The main water supply system which supplies water for the hatchery building and rearing ponds has two intakes, one from the tailrace of the Coleman power house and the other from Battle creek. Either intake is designed to provide sufficient water for the operations of the hatchery building and the rearing ponds, a maximum of 55 c.f.s. This system is 6,700 ft. in length. For 2,800 ft. the water is conveyed through a 46-in. reinforced concrete covered conduit, the remaining section being an open canal with a 10 ft. bottom width. The conduit was designed not only to carry the water under Battle creek but because the particular area in which it was constructed is inundated yearly by seasonal rains, and an open canal would be impracticable.

There are 28 reinforced concrete ponds south of the hatchery building where the young salmon are transplanted after the period of incubation in the hatching troughs, and also where a portion of the transferred adult salmon are held until they are ripe for removing the spawn. The rearing and holding ponds are 140 ft. in length, 15 ft. in width, and 4 ft. deep at the intake and 4 ft. 9 in. at the discharge end. Water from the ponds is released through the spillway section into the drainage canal whence it returns to Battle creek.

The hydraulic properties of the conduit and canal are given in the following table:



BALLS FERRY FISH RACK in the Sacramento River. The pickets are made of ¾-in. pipe with 2-in. clearance. In the foreground is a fish counter. Overhead is a cableway used in installation and removal of picket sections. Trap is off-picture left.

Section	*A*	*V*	*Q*	*r*	*n*	*s*
46 in. Conduit	11.54	4.77	55	.968	.014	.0023
Canal	41.62	1.32	55	2.08	.025	.0002

Nomenclature used: *A*—area in square feet, *V*—average velocity in feet per second, *Q*—discharge in cubic feet per second, *r*—hydraulic radius, *n*—coefficient of roughness, and *s*—slope.

One c.f.s. is required for the operation of each rearing pond during the periods of holding the young salmon for future growth. A series of grooves has been designed in the rearing ponds in which metal screens may be inserted, thereby permitting further segregation if desired.

Construction work on the Coleman Fish Station was completed in the fall of 1943 and the plant was immediately placed in operation.

Balls Ferry fish trap and rack

An auxiliary structure, the Balls Ferry rack and fish trap, has been constructed across the Sacramento river near the Balls Ferry bridge, 20 mi. southeast of Redding, Calif. Its functions are: first, to collect and trap adult salmon migrating upstream during the late summer and early fall when all danger of flood has passed; and second, to exercise control over the late fall migrants during their spawning activities. Furthermore, when trapping facilities at this location are in operation, the distance of hauling is greatly reduced from that required from the Keswick dam trap.

The rack has a length of 496 ft. plus 66 ft. on the east abutment which incorporates the trap and truck bridge, and 31 ft. of rock filled crib which comprises the west abutment.

Thirty round timbered pile bents driven at 16-ft. intervals across the river form supports for the upper ends of a series of removable metal picket sections. A row of 9-in. Wakefield piling projecting approximately 1 ft. above the river bed, forms a continuous sill across the river 12 ft. upstream from the pile bents, and acts as a support for the lower ends of the picket sections.

The picket sections are made of standard ¾-in. pipe welded to steel cross bars with 2-in. clearance between each pipe. Each section is 16 ft. wide and 12 ft. long. Each is placed on an angle inclined downstream with the lower end or toe resting on the Wakefield piling and the upper end hinged to steel plates secured to the pile bent platform.

An overhead cableway system has been constructed to handle the picket sections during installation and removal. The system incorporates a headtower 65 ft. high and a tailtower 85 ft. high with a 1½-in. carrier cable suspended between the two. It is provided with an electrically driven hoist operating a movable carriage supported by the carrier cable.

The facilities for trapping and removing salmon consist of a sweep bay section, a brail lift section, and a 1,000-gal. fish tank elevator to hoist the fish to the tank trucks. A 45,000-g.p.m. pump installed in the upstream end of the trap structure is used to maintain a suitable flow of water through the trap to attract the fish.

Organization

Construction of the Coleman Station Fish Hatchery was under the supervision of the Bureau of Reclamation. In the field, the men in charge were Ralph Lowry, construction engineer, Kennett Division, Central Valley Project, and Speed S. Leonard, chief inspector, Coleman Station Fish Hatchery.

The contractors and superintendents engaged in constructing the various units of the Coleman Station Fish Hatchery were:

Rearing ponds and drainage and water systems—David A. Richardson, Yakima, Wash.; superintendent, J. Tolley.

Hatchery building and residences—Grant L. Miner, Palo Alto, Calif., the contractor supervising the work himself.

Cold storage building—Harry J. Schmiedeskamp, San Francisco, Calif.; he supervised the work himself.

Garage and warehouse—Foster and Dills, Oakland, Calif.; superintendent, Fred Foster.

Furnishing and installing refrigeration equipment—Baker Iron Works, Los Angeles, Calif.; superintendent, William Axman.

Balls Ferry fish trap and rack—R. G. Clifford Contracting and Engineering Co., San Francisco, Calif.; superintendent, H. J. Kennedy.

New Mexico Water Cost Estimated at $26,000,000

SEVEN IMPORTANT water projects are planned by the New Mexico State Engineers Office. The total estimated cost of the several projects is $26,000,000, of which the largest single item is the San Juan-Chama Transmountain Diversion Project, which would cost about $22,000,000. This project contemplates the diversion of about 350,000 ac. ft. of water annually from the San Juan river into the Rio Grande basin, where the added water will be used as a supplemental irrigation and power supply.

Other projects in the total program are the Hondo flood control work at Roswell; the La Plata state line dam and reservoir; rehabilitation of Maloya dam, which is the water supply source for Raton; rehabilitation of Ramah dam south of Gallup; rehabilitation of the Cerro ditch and the Hammond project near Bloomfield. It is anticipated that additional projects may also be planned for postwar construction, but the seven constitute the first step of the state's water development.

Movies Show Construction of Continental Divide Tunnel

HOW THE 13.1-mi. Continental Divide Tunnel in Colorado is being driven is shown in an Ingersoll-Rand motion picture. It is a 16-mm. Kodachrome film with sound track, and is reputed to be one of the first colored motion pictures ever made underground. It was made by Thos. J. Barbre, *Western Construction News* photographer in Denver. The projection time is about 40 minutes. It is available to technical schools, engineering societies, private concerns, and other interested organizations for use without charge upon application to the company's general office at 11 Broadway, New York 4, N. Y., or any of its engineering service branches in the United States. To insure obtaining the films when they are wanted, applicants are asked to request them as far as possible in advance of the date they are to be shown.

Warehouse Kept Dry by Well Points

Stores building at Vancouver shipyards saved from destruction by percolating ground water in sand fill foundation by installation of well point system when concreting or surface pumping proved infeasible. Installation accomplished with little interference with business activities

By WILLIAM KAUFFMAN
Manager, John W. Stang Corporation
Portland, Ore.

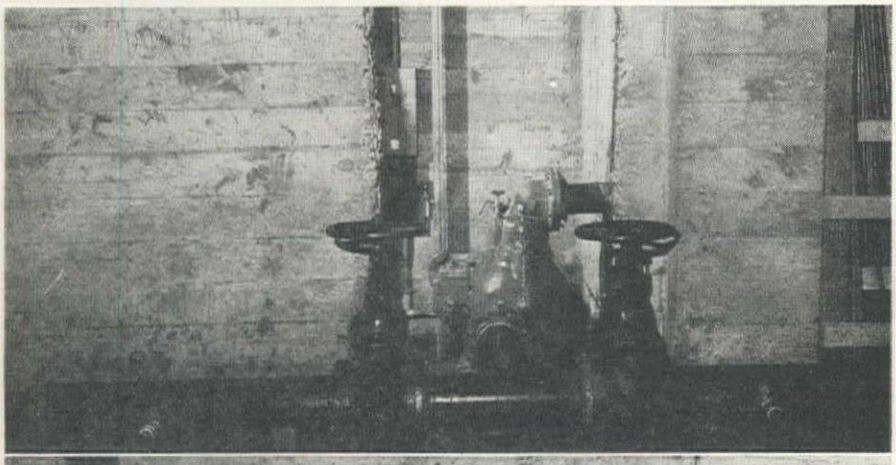
A TROUBLESOME ground water condition which existed at the Vancouver shipyard of the Kaiser Company, Vancouver, Washington, was ingeniously remedied by the use of a well point system installed in the basement of a building threatened by percolating water.

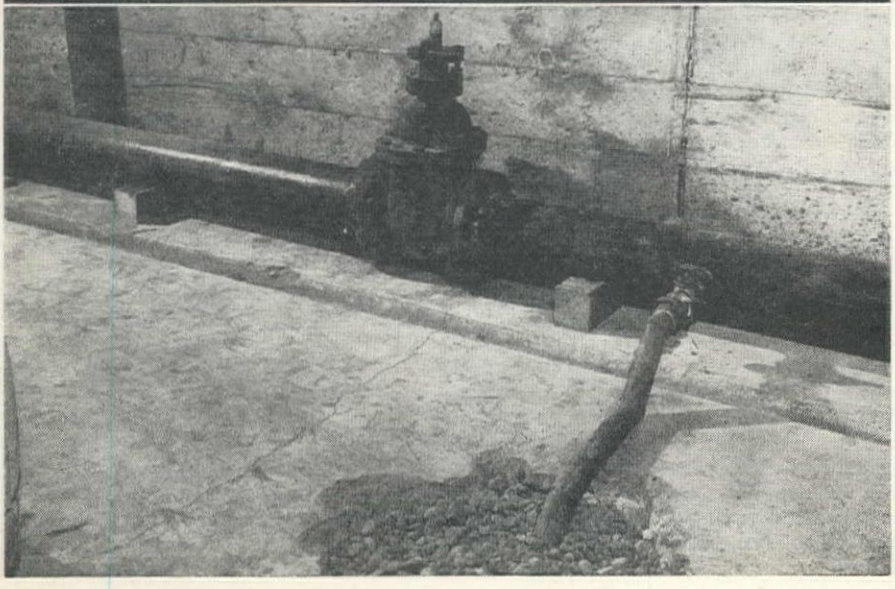
This shipyard was constructed on a mud flat on the north bank of the Columbia river about a mile east of Vancouver. The general yard level was maintained at an elevation of plus 26, being built of river sand of a more or less pervious texture, which was placed by hydraulic methods. At certain times during the year the Columbia river on this section rises to levels threatening to inundate the banks below elevation plus 23, necessitating the use of dykes at some locations.

The general stores building in this yard is 400 ft. long and 180 ft. wide. It was built with a cellar floor at an elevation of plus 17.88 and a driveway through the cellar at an elevation of plus 14.38. The concrete basement floor averages 8 in. in thickness and is reinforced with 4 x 4-in. mesh. The entire basement construction is of a type not designed to withstand hydrostatic head.

PAUL LATTNER, facilities engineer at the Vancouver shipyard, who designed the well point system for the stores warehouse.

OPERATION of the system. Top, one of the 8-in. motor-driven pumps set in a wall recess. Below, 1½-in. well point pipe and 8-in. header pipe for collection of water. Valves were set on each 1½-in. pipe, also in the headers, for repair purposes.





Normally, the river elevation is lower than that of the driveway, but during extreme flood conditions, the basement floor is subjected to a head of almost 6 ft. and the driveway floor has to withstand the uplift from almost a 9½-ft. head of water. No provision was made in the building design to withstand this head, either by volume of concrete or any other means of waterproofing. Needless to state, the basement floor is an extremely busy place, with endless streams of materials used for ship construction coming and going. Practically every square foot of the entire floor is in constant use.

In June, 1943, rising water in the river caused sufficient seepage through the river sand that the general stores basement became flooded. It was found necessary to relieve the uplift on the concrete floor by punching holes in it through which the ground water escaped into the basement. An attempt was made to pump the cellar dry by means of ordinary pumps. This led to the danger of undermining the floor and footings by pumping out the sand fill underneath. The operations in the building were all but stopped for the duration of the flood.

Corrective methods studied

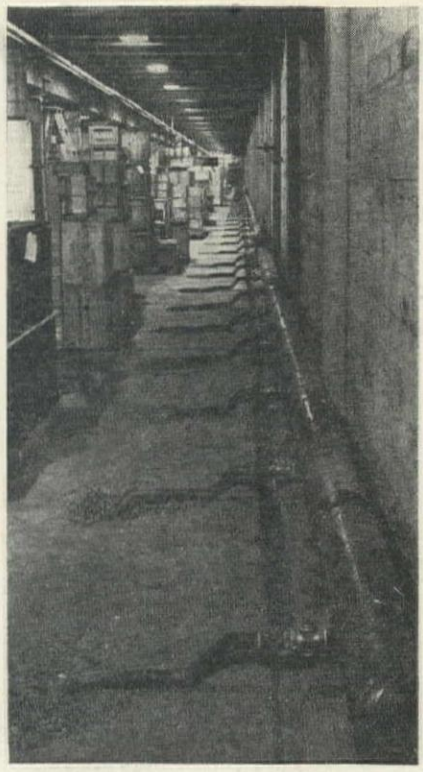
After the river subsided, correctional methods were considered for use during future flood periods. Surface pumping was out of the question, because of the danger of settlement of the structure. It was also inadvisable to do any concreting or waterproofing, since the floor and driveway could not be occupied by construction equipment without endangering the shipbuilding program.

The Facilities Engineers of the Kaiser Company adopted a novel application of

well points as the solution. In ordinary practice, well points are used to dewater wet soil so that excavations may be carried on in the dry. Very often the discharge from well points is used for water supply purposes. In this case, however, a pervious dry material existed and had to be kept that way, excluding any water tending to enter the area.

Openings were chipped through the floor by the use of jack hammers, and holes 12 in. in diameter were dug in the sand, using home made post hole augers. The holes were about 8½ ft. deep, the material penetrated averaging 7 ft. of pervious river sand and 1½ ft. of clayey sand. The screen of the well points was placed at such elevations that the line of flow was about half-way up on the well points, which were set at a uniform level. The holes were spaced three to the 16-ft. bay in the north and south ends of the structure, and the spacing was similar in the first four bays on the long sides. For the balance of the perimeter the well points were placed on 8-ft. centers. This spacing can be modified by the addition of points where necessary. A minimum distance of 2 ft. from concrete footings was maintained on the inside perimeter of the building.

The material excavated had enough moisture content to stand up during excavation, although a 12-in. casing was provided to take care of sloughing. An 8-in. standard pipe header was used for the ends and 6-in. ones for the middle section. Opposite each well point a hole was made in the header to which was welded a 1½-in. nipple threaded to take a 1½-in. stop valve. This was connected to the riser pipe by a union. The riser pipe was bent so as to lie along the floor, this being a departure from the ordinary swing joint, there being no need for flexibility, as this was a permanent installation. When the well point was centered in the hole, the fill was made with gravel which would pass a ¾-in. screen. The whole line was hooked up to two 8-in. motor driven well point pumps, installed at the north and south ends of the building out of the way in the elevator pits. Valves were spaced along the line so that parts of the system may be shut down while other sections are in operation, for the purpose of adding points, etc. Each individual point may be shut off by means of the stop valve. The union connection to the stop valve was used for easy replacement in case of breakage. All other joints, except in a few special instances, were welded; valves were flange connected. At the point where the header was constructed under the driveway, air vents were provided.



WELL POINT suction lines were placed on 8-ft. centers through holes chipped in the floor of the basement. The holes were about 8½ ft. deep, and the pipes were bent to prevent work interference.

This system was installed with a minimum of interference with the steady rush of operations in this area. It will operate in the usual manner as the water rises in the soil, dewatering the ground so that danger due to head of water will be eliminated. The entire system is salvageable, although in this case no consideration was given to salvage, permanence of the system having been in mind.

It may be suggested that flood conditions in structures of this character could be readily overcome with well point installations. Where the time of floods is predictable, as in this case, the installation could be made for short periods of time and then removed for use elsewhere.

This system is part of the construction at Vancouver shipyard, for which Edgar J. Kaiser is general manager. The actual design was under the direction of the facilities engineer, Paul Lattner, assisted by Wm. Wyman. The installation was made by yard forces under the supervision of the writer. The pumps and well points were supplied by the John W. Stang Corporation—all other parts of the system being standard pipe and fittings.

Producers' Council Predicts Building Soon After War End

SUFFICIENT SUPPLIES of most building materials and equipment will become available to permit large-scale resumption of residential and other civilian construction within three months after the end of the war with Germany, according to a prediction of the Producers' Council.

The production of most building materials has continued in large volume throughout the emergency to fill the requirements of the huge war construction program, with the result that relatively little reconversion is required to meet civilian construction needs after the war. Consequently, materials manufacturers can resume the filling of non-war orders as soon as the war production program is cut back. It is anticipated by the Council that lumber will remain longest on the critical list, in view of the heavy requirements for crating of war supplies, but the end of the war with Germany should make it possible to release fairly large quantities of lumber for use in urgent civilian construction.

The situation is somewhat different in the case of fabricated building products, inasmuch as many manufacturers have been producing goods other than their normal civilian lines during the emergency. With the exception of plumbing, heating, and electrical equipment, however, most companies report that they will be producing large quantities of products required for civilian building within three months after reconversion begins.

A recent survey of the current production of building product manufacturers in the Council indicates that only 15% have discontinued their normal lines entirely, in favor of war goods. Over 26% have continued to make pre-war products exclusively in order to meet the demands of the war construction program and of essential maintenance, and 85% of the manufacturers have continued production of pre-war lines along with other products being made exclusively for war use.

Information is not yet available with respect to the number and nature of new building products to be available for early postwar use. Many manufacturers have indicated that their distinctly new postwar products will not be generally available until quite some time after the end of the war, owing to the fact that there has not been sufficient time to perfect and test many of the new developments and because considerable time will be needed to tool up for the new lines.

Los Angeles Plans For An Agricultural College

THE CITY of Los Angeles, Calif., has prepared plans for immediate start of a junior college of agriculture and animal husbandry to be located on a 392-ac. site in the San Fernando valley near Encino. The total investment in the new school is estimated at $850,000, of which $100,000 has already been spent in the acquisition of the property. Educational facilities will be provided for 2,000 students and quarters will be built for faculty members.

Enrollment in the college will be available to graduates of Los Angeles county high schools and owners of farms or other land in the county.

San Francisco Ferries Again in Use

Picturesque vessels which were replaced by San Francisco Bay bridges have been renovated and are performing an important war-time service in carrying shipyard workers to the yards. Project included construction of new docking and fueling facilities at each end of the runs

WHAT HAPPENED to the old Bay Ferries?"

This is the Number 1 question, according to R. B. Hansen, transportation engineer for the U. S. Maritime Commission in the San Francisco Bay area, when he runs into fellow engineers.

In the answer to that question lies one of those quiet salvage and construction stories that are lost in the thunder of the more spectacular jobs of a war-time West Coast.

The answer is that the ferries are now working around the clock, making longer runs than ever—some of them had to be equipped with larger fuel tanks—all in the business of getting men who turn out ships from San Francisco to Richmond and Sausalito.

The story has its beginning in a conference held on May 18, 1942. The war was nearing its sixth month. Present were members of the Maritime Commission, the transportation companies, and the shipbuilders. These men were confronted with the problem of getting thousands of shipyard workers—pipe fitters, welders, riggers, crane operators, and green hands from the prairies—from San Francisco to the booming yards. There weren't housing projects on every spare acre in those days, and the labor supply was pouring into San Francisco. Road traffic to the yards was jammed, and even then the shortage of rubber, spare parts, and gasoline was beginning to tell.

The story of how a 14-mi. electric railway was assembled from the scrap heaps of a nation, including abandoned L-cars from New York City, was told in the *Western Construction News* in March, 1943. But this was only part of the solution to the urgent transportation problem. San Francisco with her impressive bridges had all but forgotten the little fleet of ferry boats tied up at her docks. All of them had been tied up and out of service for from three to eight years. None of them had seen any maintenance work for some time prior to that. Two of the boats had gone to Portland.

This is what they had to start with when the meeting was held on May 18, 1942. This, and an estimate by the shipyards of how many passengers could use transportation, if they had transportation.

Transportation contract let

Accordingly, the USMC let a contract to the Wilmington Transportation Company with instructions to proceed. The company that had counted among its peacetime enterprises the operation of palatial steamers carrying ogle-eyed tourists from Los Angeles harbor to Santa Catalina Island set about its serious wartime assignment.

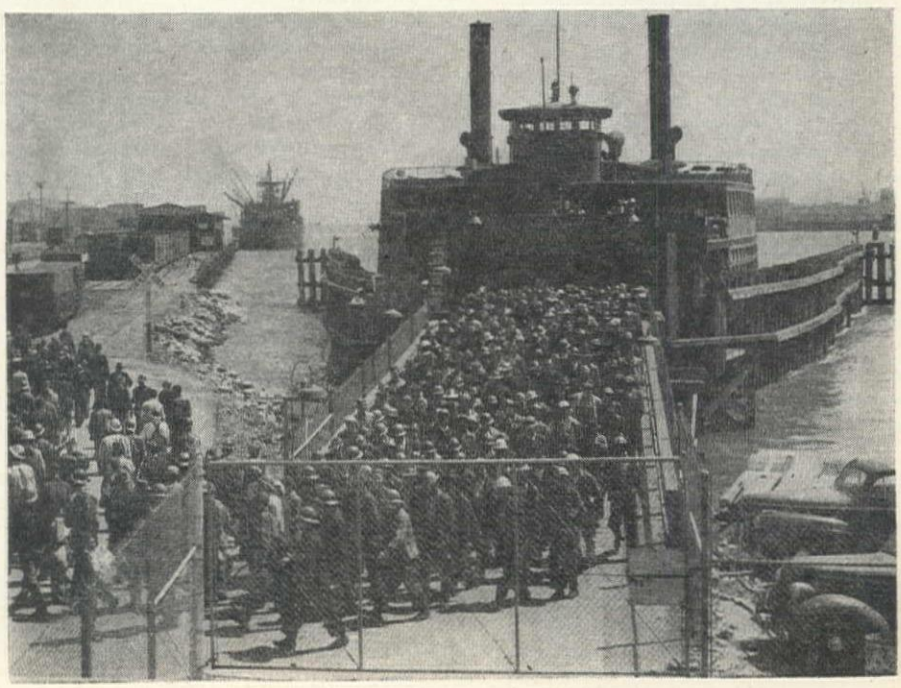
While boilers, main engines, auxiliaries and other machinery were being overhauled, the shipyards constructed suitable slips at their end of the line. In this job they were accorded the technical assistance of the Wilmington company. At Richmond it was necessary to drive piling for two full-sized slips whereas the more quiet waters of the Marin side permitted a more simple construction, using pile dolphins. The San Francisco job was simply one of touching up existing facilities secured on lease from the State Harbor Commission, and the construction of docking facilities at the foot of Hyde Street. The Hyde Street stop makes it possible to drop at least half the Marinship passengers at a time when the main terminal is already congested. This same problem is eased by staggered work shifts of the Richmond "commuters."

The boats themselves required more than an overhaul. Additional life preservers were necessary, increased wash room facilities, dimout equipment, and the conversion of old dining rooms to snack bars and commissary storage space.

Assembling crews

Getting a crew together, and keeping it rounded out so the "never miss a trip" schedule can be maintained, was and is as tough a problem as any mechanical obstacle. Bus drivers and street car pilots can be turned out with reasonable dispatch, but locating old bay and river boat hands was a problem not covered by any engineering text book or front office blue print. Each boat carries a skipper, first mate, second mate, and six deck hands. In the black gang (below deck to landlubbers) is a chief engineer, an assistant engineer, two firemen, and one oiler. It was natural that some of the old-timers should return to their beloved boats. But with most of the crew material holding an ocean-going license, the competition of adventure and war-time bonuses on the open sea has kept the personnel section on the alert to keep the roster filled. Nevertheless, the old-timers and the old boats are together again. Among the old time engineers is Lonny Graves, chief engineer of the Yerba Buena, who was an old-timer on the Key System ferry boats, also E. B. Lowery, engineer on the San Leandro, who joined the "Ferry Command" in 1905. His son, Ted, is now assistant chief on the Yerba Buena.

A BAY FERRY returned to use for the benefit of shipyard traffic discharges its passengers at the Kaiser yards in Richmond. It was necessary to construct pile slips and wharves for use of the overhauled ferries, both at Richmond and Sausalito.



Among the captains are as colorful an assembly of bay and river characters as ever sailed the harbor, and the names of the oldest deserve mention in passing. They are: H. F. Strother, over 40 years in service; V. L. Verdellett, 40 years; J. C. Rodrigues, 38 years; Herbert Elson, about 30 years; Edward Hallin and D. F. Petzinger, youngsters, with only 20-odd years to their credit.

Even the crew is not without its color. Take Conrad Eklund, an able seaman now aboard the San Leandro. Eklund served 12 years in old sailing ships. In five circuits of the globe, he had the pleasure of rounding the Horn in mid-winter on a windjammer. Riding the San Leandro is duck soup after kicking the ice off the halyards, and going aloft to clew up the sails of the Mary F. Barrett, a five-masted American schooner.

So with this complement, Wilmington Transportation Company made the first scheduled run, to Richmond Yard No. 3, on September 18, 1942. The service was actually started before the completion of shore facilities due to its urgency. Other runs were established in November and December of the same year, to include Marinship at Sausalito, and Kaiser's Richmond Yards 1 and 2.

Fuel and facilities

In time, it was found that fueling facilities were catch as catch can, and the problem is being solved by construction of a 1,500-ft. 6-in. pipe line from the Standard Oil plant at Jefferson and Leavenworth Sts., San Francisco, to the Hyde Street slip. The ferries use about 100,000 bbls. of regular bunker fuel a year. Construction of this line was subcontracted for Wilmington by Barrett and Hilp of San Francisco, at a cost of approximately $10,000.

Other facilities include the Shipyard Ferry Terminal Building, a two-story temporary structure at the foot of Mission Street. Offices, shops, and store room for the Wilmington Transportation Company and USMC are housed under its 94 by 118-ft. roof.

To attract as many passengers as possible (each boat can accommodate about 4,000 passengers), the fare was held at 10c each way for the nearly 10-mi. journey. The service was set up to handle 30,000 workers, with four boats in action and one in reserve. At present, about 10,000 are carried by the four boats. This reduction is due in part to the increased housing facilities near the yards. However, more yard workers could use the service instead of banging fenders on the highway, and steps to publicize the water route are being taken.

Aboard for their convenience are concessions to provide hot coffee, soft drinks, sandwiches, pie and box lunches. The helpings are generous and the cost almost non-profit. Those that care to learn can attend classes while travelling, in blue print reading and shipfitting, conducted by W. D. Allison, a shipfitting foreman at Richmond. The theory picked up on the boats is demonstrated in shore classes at the yard.

Other passengers, who prefer to take their sea-faring life easy, can sprawl on the ample seats. Women, even the lady welders, knit. All passengers can see the results of their handiwork, as the ferries ply between the new vessels in the busy harbor.

Organization

Heading up this revived ferry boat activity is C. F. Fennema, vice-president and general manager, and A. C. Piercy, operating manager, for the Wilmington Transportation Co. Both were formerly associated with the old Southern Pacific Golden Gate Ferry Co. Mr. Fennema divides his time between his San Francisco office and his Wilmington office, as the Wilmington Transportation Company operate the largest fleet of tugboats in the Los Angeles-Long Beach and San Diego harbors.

Carl W. Flesher is regional director, D. W. Fernhout is chief plant engineer, and J. Montgomery is coordinator of housing and transportation for the West Coast Regional Office of the Maritime Commission in Oakland. USMC men spotted on the jobsite are F. M. Scarboro, resident auditor, and R. B. Hansen, transportation engineer. Hansen was formerly with the Southern Pacific Company and Western Pacific Railroad Company.

What happened to the bay ferries? Look at this list:

S.S. Alameda, built in	1913
S.S. City of Sacramento, built in	1903
S.S. Hayward, built in	1923
S.S. San Leandro, built in	1923
S.S. Santa Clara, built in	1915
S.S. Sierra Nevada, built in	1913
S.S. Yerba Buena, built in	1927

All of them are ready to go again. Four of them are churning the Bay waters day and night.

Research Engineer Will Conduct a Study of Reinforcing Bar Design

A BASIC STUDY of the uses of steel bars for concrete reinforcement is being inaugurated by a Committee on Reinforced Concrete Research recently organized by the American Iron and Steel Institute. Membership of the committee includes representatives of 21 producers of both new billet and rail steel concrete reinforcing bars.

To plan and supervise the investigations, R. R. Zipprodt has been employed as research and consulting engineer. He has had long experience in concrete research and design.

The committee has outlined an initial program of work covering a minimum of three years. In general, it is planned to study the extent of any gaps which may exist in the technical data on which design regulations and specifications are customarily based. It is then proposed to initiate programs of research for the purpose of developing new test data or of supplementing existing data.

Work is already under way on a comprehensive investigation of problems relating to the proper design of square and rectangular footings. No research work pertaining to the design of footings has been reported since 1913. Since then many major improvements have been made in materials utilized in reinforced concrete construction.

A second project will involve the investigation of unit stresses permissible in the design of reinforced concrete slabs and beams. The study aims to determine the extent to which the ratio of slab thickness to span affects the unit stresses in the slab and consequently its deflection. It will also investigate the extent to which the span of slabs or beams should be limited by the size or type of reinforcement used. A collateral phase of that project will be a study of the effect of plastic flow, particularly on structural members subject to their own dead weight as well as uniformly distributed live loads.

Classification of all types of deformed bars which may be developed as a result of the concrete reinforcing bar industry's purpose of developing a standard or universal type of deformed bar will be covered in a third project.

Metal Lath Standards Revised For Post-War

A REVISION of Simplified Practice Recommendation R3-41, Metal Lath (Expanded and Sheet) has been approved for promulgation, according to an announcement of the Division of Simplified Practice, National Bureau of Standards. It will be identified as R3-44 and the title will be changed to "Metal Lath (Expanded and Sheet) and Metal Plastering Accessories."

This revision further simplifies the types, weight and sizes of items in the issue which it supersedes, and broadens the coverage of the recommendation to include bullnose corner bead, corner lath, strip lath, base screeds, metal casings, concealed picture mould, tie wire, hanger wire, and metal studs for hollow partitions. This places all metal plastering accessories within the scope of the recommendation and explains the change in title as mentioned above.

Use of the critical materials needed in the production of the commodities covered by R3-44 is now restricted by War Production Board order. The new recommendation will, therefore, become effective when the critical materials become available for this purpose.

Until printed copies are available from the Superintendent of Documents, Government Printing Office, a limited supply of free mimeographed copies may be obtained by applying to the Division of Simplified Practice, National Bureau of Standards, Washington 25, D. C.

1944 Water Resources Low in North; Good in Other Areas

SUPPLIES OF WATER in the western states as evidenced by rainfall and snow cover during the past winter will vary from about 70 percent of normal in the Northwest to well over normal in the southern section of the West.

The final snow survey issued by the Division of Water Resources of the State of California indicates precipitation in all sections of the state north of the Tehachapi Range is decidedly subnormal. Seven stations of the upper Sacramento, Pit and McCloud Rivers report precipitation about 66 percent of normal. On the Feather and Yuba Rivers twenty-one stations show a similar average. In the Truckee-Tahoe Basin the average was about 70 percent. Continuing southerly, the record improves slightly. Five stations on the Tuolumne River indicate an average precipitation of about 76 percent of normal. The Merced and upper San Joaquin River Basins were at approximately the same level as the Tuolumne. Stations on the Kings, Kaweah and Kern Rivers show slightly more improvement with precipitation averaging about 80 percent of normal.

However, the rainfall record south of the Tehachapi shows a decided improvement. Eight stations in the Los Angeles River Basin show precipitation there to be about 130 percent of normal. Fourteen stations on the San Gabriel River report precipitation about 120 percent of normal. The Santa Ana Basin reports just about normal water conditions and the San Diego County Pacific Slope Basins are one or two percent less than normal.

On the basis of these reports, the Division of Water Resources forecasts stream runoffs in Northern California will average between 55 and 70 percent of the fifty-year mean.

Other western states

Oregon and Washington irrigation authorities are becoming increasingly concerned with water supplies in the reclamation areas of their states. Snowfall in these states was reported much less than in 1943, and the water content of the snow was considerably sub-normal. Oregon irrigationists anticipate less water this year than for any of the past ten years.

Idaho reports indicate that irrigation supplies for that state will be about 75 percent of normal. Indications about the end of March were that available water in that state would be only about 60 percent of the mean but April rains have increased the supplies somewhat. Farmers have been warned by Mark K. Kulp, state reclamation engineer, that the 75 percent mentioned in the reports refers to the normal, rather than to last year's supply, which was very large.

In Utah, water prospects are good with the exception of one local area. In the Cache valley, the snow cover was very light and the runoff forecast is for less than one-half of that available in 1943. However, other sections of the state will be well supplied with water throughout the year. The Provo River and other tributaries to Utah Lake will have slightly reduced runoffs but a considerable holdover in Deer Creek Reservoir and Utah Lake will prevent any shortages to farmers in the area. In the Uinta Basin, Virgin River Valley and Coal Creek, watershed supplies will be well above those of last year.

Water supplies in Colorado are indicated as ample by snow surveys made by the Denver Water Board. Water content of the snow is much higher than in 1943, and throughout the state rainfall and snowfall have been normal or over.

Adequate water supplies are also indicated in the Rio Grande Valley, Gila River Basin and other watersheds in Arizona and New Mexico.

Northwest Water, Sewage Men Convene at Olympia

THE NORTHWEST section of the American Water Works Association and the Pacific Northwest Sewage Works Association met jointly in Olympia, Washington, on May 11 to 13. Speakers included Samuel B. Morris, president of the national A.W.W.A.; Arthur E. Gorman, director of the water division of the Office of War Utilities; Major G. E. Arnold, San Francisco area engineer for WPB; and E. L. Filby, field director of the Committee on Water and Sewage Works Development.

A considerable portion of the discussion at the convention dealt with postwar construction in the two fields. Some of the sessions were held jointly, but business meetings were held separately by the two groups. On the 11th the meeting was in charge of the Sewage Works Association, and M. S. Campbell, president, opened the session at which 102 were present.

New officers of the sewage groups are C. V. Signor, city engineer of Grants Pass, Ore., president; C. M. Howard, engineer of Seattle, Wash., first vice-president; H. C. Clare, director of sanitary engineering for the state of Idaho, second vice-president; W. P. Hughes, city engineer of Lewiston, Idaho, secretary-treasurer; and Campbell, who is chief engineer of the Washington State Department of Health, a director.

The attendance at the Water Works session was 239, and officers elected at their business meeting were: R. F. McLean, water superintendent of Walla Walla, Wash., as chairman; Charles Williams, city engineer of Olympia, as vice-chairman; Fred Merryfield, associate professor of civil engineering at the University of Washington, as secretary-treasurer; James Morrison, superintendent of utilities at Renton, Wash., and S. J. Benedict, of the Portland Water Department, as directors.

Long Beach Seeks Permission To Erect New Concrete Wharf

THE BOARD of Harbor Commissioners of Long Beach, Calif., have applied to the War Department for permission to construct a reinforced concrete wharf 2,529 ft. long, 73.5 ft. wide and 16 ft. above mean lower low water. The structure will consist of an open concrete pile wharf 32.5 ft. wide, a sheet steel pile bulkhead and earth fill under the remainder. It will be located in the vicinity of the area presently being diked and filled on the westerly and southerly sides of Victory Pier in the Long Beach outer harbor. Plans are already drawn for the structure, and it probably will be submitted for bid as soon as War Department clearance is secured.

Model Studies Will Aid Design of Fish Ladders

MILO BELL, who was in charge of construction of the fish ladders at Bonneville dam, has been appointed chief engineer of a similar project on the Fraser River in British Columbia by the International Pacific Salmon Fisheries Commission. An engineering staff under his direction has opened offices in New Westminster, B. C.

A model of the Fraser River obstructions is now under construction in the laboratories of the University of Washington, and important studies on the designs to be employed will be carried out there. The need for the new fish ladders, which it is estima ed will cost $2,000,000, was brought a' out by a rock slide at Hell's Gate whic i created such an obstruction in the channel that the salmon are now unable to ascend the stream.

Glass Factory Will Be Built At Longview After the War

A GLASS FACTORY which will cost about $3,500,000 is planned for construction at Longview, Wash., by Owens-Illinois Glass Corp., as soon as the European phase of the war is ended. Plans for the structure have been prepared by the Oakland, Calif., office of the Austin Company, and W. P. B. priority applications have been prepared.

A site has been purchased covering an area of 35 ac. and it is planned to erect fourteen connected buildings of steel and concrete. These will be warehouses, production and office structures, and two glass furnaces, somewhat similar in construction to the open hearth furnaces of a steel mill.

Construction has been urged by the War Food Administration because one of the principal products of the new plant will be glass food containers.

Preliminary Design Chart . . . XIII

Selection of Gantry Cranes

Gantry cranes are divided into two general classifications, those with fixed booms, and those with whirley cranes on a gantry frame—Each has special features, rendering it useful for special work—Cost and capacities considered in charts

By A. E. NIEDERHOFF
Marine Engineer
Bellingham, Washington

GANTRY CRANES on dams and in shipyards are outdoor weight lifters adapted for service where the range of movement, clearance, loads, and flexibility of operations demand a machine that is less expensive than an overhead bridge crane. The gantry, mounted on rails placed on top of a dam or on the finished grade of outfitting docks in shipyards, can easily be made to serve additional areas by merely laying more tracks. Since the cranes run on the ground outdoors they can be modified by track extension at little expense and without being restricted by building dimensions or clearances.

The construction of gantry cranes used on dams is not essentially different from bridge cranes. The exception is that the wheels are on legs and the trolley movement may be extended beyond the rails by cantilevering the girders. Shipyard gantries are more complex, consisting of a whirley crane mounted on a gantry frame. The boom length on these whirlies allows a circular field of operation having a maximum radius of 125 ft. from the vertical centerline of the crane.

Design questions

The preliminary design of gantries falls into three distinct phases which, if properly understood, allows the planning engineer to answer most of the questions that the owner may propound. First is the suitability of the crane for the purpose intended. As above mentioned, the gantry may either be a simple structure, as for instance, the crane used at Bonneville powerhouse for moving the bulkhead gates from the turbine draft tubes. Here the hoist is fixed on a gantry frame with sufficient vertical clearance above the rail to permit raising and transporting the draft tube gates parallel to the longitudinal axis of the powerhouse. Contrasted to this is the shipyard whirley crane on a gantry mounting. Not only has it a horizontal movement along the rails but also a vertical movement from the end of a boom which can swing through 360 deg. in a horizontal circle and about 50 deg. in a vertical circle. Cost increases with the number of motions, with larger load capacity and with greater horizontal and vertical clearances. Thus, the first step in preliminary design is to decide exactly what the functions of the machine are to be.

The second phase involves capacity, operating speeds and minimum clearances. With a description of a few typical installations at powerhouses and shipyards the engineer can quickly proportion his job with certainty that final selection will not be materially different from his recommendations.

The third phase is a review of the details of design to the extent that critical structural points are realized and taken care of in an adequate manner and the mechanical set-up is sufficient to give the speeds and capacities upon which there has been a previous determination.

Suitability

Vertical crest gates on dams may be raised, lowered, or transported by gantry cranes operating from an overhead service bridge spanning the gate piers. The function of the crane is to lift the crest gate clear of the service bridge and high enough to place upon a track or railroad car. The main hoist is mounted on a trolley allowing some movement in an up or downstream direction. This is a definite requirement if two pair of gate slots are provided for insertion of an upstream emergency gate or bulkhead during repairs to the regular gate.

Still a further refinement is to cantilever the trolley girders up or downstream to make the hoist serve an increased area outboard from the rails. Increased range of crane hoist movement is often desirable to place trash racks in front of turbine intakes or to remove floating debris from crest gates. The loads to be handled are considerably lighter than the weight of the gate,

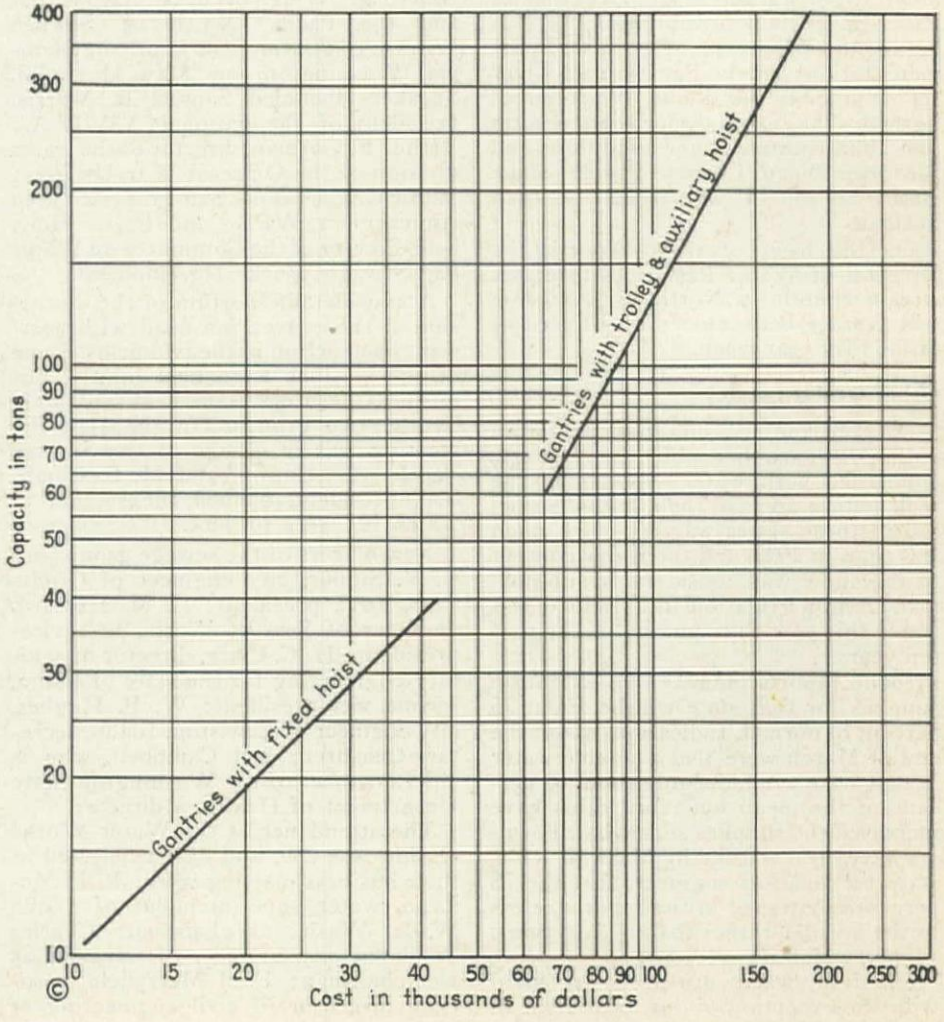


CHART NO. 1 is used in determination of the cost of spillway cranes, those with fixed boom or with a trolley and auxiliary hoist for raising and lowering crest gates.

which permits the use of an auxiliary monorail hoist as an economical substitute. This auxiliary hoist is very handy in servicing a gate when it is held in a raised position by the main hoist.

A swinging boom of short radius (about 12 to 15 ft.) fastened to one upstream corner of a gantry frame has been substituted at times for the monorail hoist. The boom is used to spot a grapple upstream from the gate to pick up floating debris of 10 tons or less. Free swing in a horizontal plane is limited to 180 deg., which is just enough to pick up material from in front of the crest gate, hoist it over the service bridge and then drop it downstream after a semi-circular swing.

Whirley cranes mounted on gantry frames as used in West Coast shipyards are probably more familiar than the gantry cranes used on dams. In addition to horizontal travel in one direction the whirley swings through a full horizontal circle and the hinged boom swings through approximately one-eighth of a vertical circle. Loads exceeding the capacity of one crane at long boom are handled by two parallel cranes with raised booms using a lifting beam or trussed framework to equalize the load and stiffen the section. Working as a team these gantries can hoist and transport onto shipbuilding ways completely prefabricated sections of vessels. Loads of 90 to 100 tons are handled quickly and accurately by these high speed machines.

Cost determination

The item of cost varies with the capacity, complexity and dimensions of the crane. A prudent engineer, therefore, analyzes the functions and movements required in selecting the type most suitable for the work. It is important that the crane have sufficient capacity, speed and mobility, but it is just as vital from an economic standpoint that these factors be reduced to a minimum commensurate with the type of service desired. For instance, there would be no point in placing an expensive, high speed whirley gantry on a dam to take care of very intermittent loads.

As an aid in making an approximate estimate of cost for either a dam or industrial crane, two cost charts have been prepared. Chart No. 1 yields the cost of gantries designed for use on dam spillways and in hydro-electric power stations. A spillway crane, in place, with a capacity of 100 tons would cost $86,000 during 1940 according to this chart. The main hoist would be mounted on a trolley and be movable in a direction parallel to the flow of the river. An auxiliary hoist is always included in this cost. Draft tube cranes having fixed hoists are less expensive. The chart indicates that a 20-ton machine would cost $21,000.

Whirley cranes on gantry mountings are usually rated at a specified number of tons at a certain radius from the crane centerline. The tonnage rating is based upon maximum load for the main hoist machinery and the radius is the maximum safe reach of the crane for that tonnage. Thus the cost is based upon the product of the load multiplied by the radius. A crane having a rating of 42 tons at 48 ft. yields a number applicable in Chart No. 2 of 2016. The cost indicated is $42,000. As another example a crane with a rating of 60 tons at 60 ft. would cost $76,000 since the product of 60 by 60 is 3600, the number to be used in Chart No. 2. These costs do not include freight charges.

Capacity

The capacity of gantry cranes for dams or powerhouses can be closely approximated if the sizes of crest gates, intake or draft tube gates are known. The weight of vertical lift gates on spillways has been noted in the February, 1944, issue of *Western Construction News* in the form of a chart. For a general formula covering the weight of any steel vertical lift gate, either on the crest of a dam or submerged in a draft tube, the following expression gives good results:

$$\text{Wt. in kips} = 0.4 \left(\frac{L^2Hd}{1000} \right)^{.87} \quad \text{.....(1)}$$

where L = length of gate in feet (clear distance between piers)

H = height of gate in feet

d = head of water acting on the center of pressure of the gate measured in feet.

The weight of the gate is but part of the load lifted by the gantry. A lifting beam must be included in the load calculations. Still another quantity to be added in lifting capacity determinations is that of breaking the water seal. For usual method of sealing employing "music note" rubber strips and assuming the gate to ride on rollers, about 10 per cent of the total water pressure against the gate will be enough force to start it up from a sealed position. Rolling friction thereafter, on bronze bushed bearing wheels, is only 3 per cent of the wheel loads. If the lifting beam weighs 5 tons the capacity of the crane should not be less than:

$$\text{Capacity in tons} = 0.2 \left(\frac{L^2Hd}{1000} \right)^{.87} + .00312LHd + 5 \quad \text{....(2)}$$

Capacity of shipyard gantries, whirley type, is dependent upon the type and number of ships to be built and the production schedule to be met. The rating of one typical crane used by Oregon Shipbuilding Corporation while building over 300 vessels of the 10,000-ton Liberty class at an average rate of one complete ocean going cargo ship every 3.1 days is shown in Table 1.

Operating speeds and clearances

In the interest of reducing motor size and cost the spillway and powerhouse gantries are designed as slow moving machines. Table 2 lists information on eight different gantry cranes used on well known dams and hydro plants in United States.

From Table 2 it appears that hoisting speeds between 5 and 7 ft. per min. are fast enough. Trolleys traveling at 20 ft. per min. and gantry travel of 100 ft. per min. represents good practice. Faster speeds would mean larger motors, stronger machinery and an unjustified higher initial cost.

The 60-ton whirley crane at 60 ft. previously described has a hoisting motor of 125 hp., capable of lifting a 60-ton load at a speed of 23 ft. per min. A 25-hp. motor used for swinging can safely complete one full circle in less than a minute. Gantry travel along the rails is accomplished with four 15-hp. syn-

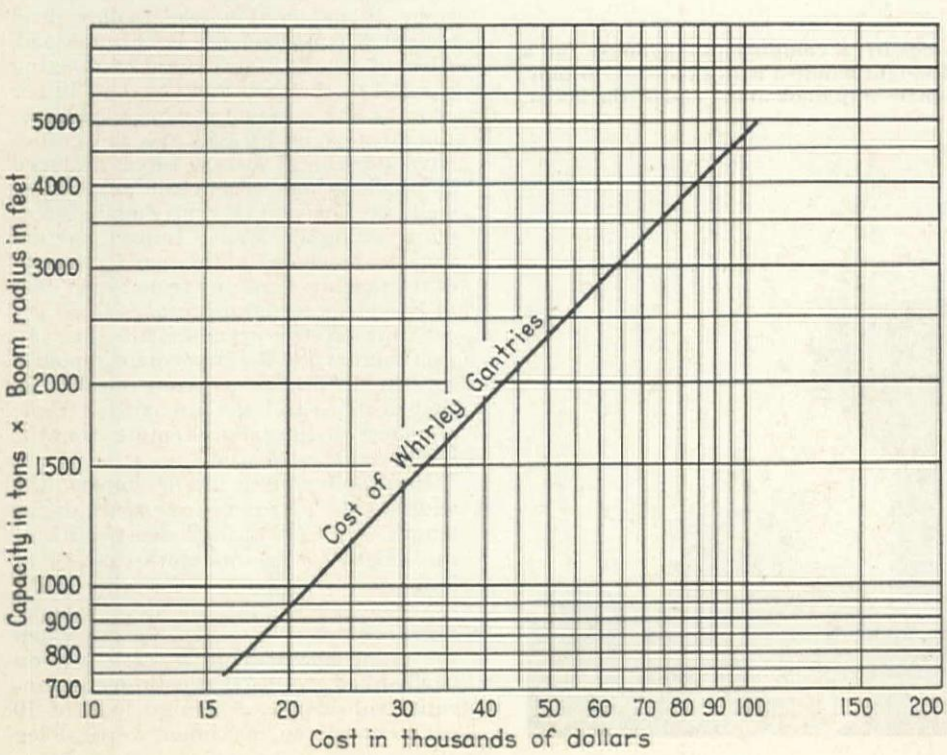


CHART NO. 2 is used for determining the cost of whirley type gantry cranes, those used most frequently in industrial installations. Boom radius must be considered.

chronous motors yielding a speed of 200 ft. per min. These are heavy duty cranes, used 24 hr. per day.

Clearances on spillway gantries are usually sufficient to accommodate a two lane highway between the rails. At Bonneville the rails are 34 ft. on center, allowing a clear roadway of 28 ft. This width is necessary to serve both gate slots, which are 17 ft. apart. At Chickamauga spillway the gantry track gage is 27 ft. 6 in., while at Pickwick Landing the rails are 32 ft. on center. A 32-ft. center-to-center distance of rails gives the necessary width of gantry portals on shipyard cranes.

The distance between legs of the gantries measured parallel to the axis of the dam varies with the center to center spacing of the spillway gate piers. Thus at Bonneville this distance is 60 ft., while at Pickwick Landing and Chicamauga it is only 47 ft.

Vertical clearance above the service bridge is also governed by the framing and size of vertical lift gates. At Bonneville, where one-half of a gate section is 30 ft., maximum, the distance from gantry rail to trolley rail is 44 ft. At the Tennessee Valley dams above mentioned this distance is only 29 ft. for a 20-ft. deep gate section. Most shipyard whirely cranes have sufficient room at the portals, both horizontally and vertically, to clear standard railroad locomotives. Additional height is provided for cranes on the building ways to allow the operator in his cab to see the main deck of the ship.

TABLE 1

Whirley crane rating with counterweight of 72 tons.

Radius in feet	*Capacity in tons*		*Radius in feet*	*Capacity in tons*
45 (Min.)	60			
60	60		85	34
65	52.5		90	31.5
70	46.5		95	29
75	41.5	(Max. for main hook)	100	27
80	37.5	(Max. for whip hook)	125	26

This crane is known as a 60 ton crane at 60 ft.

TABLE 2

Crane capacities, motors and speeds

	Bonneville Spillway	*Chicamauga Spillway*	*Chicamauga Draft-tube*	*Wheeler Intake*	*Wheeler Powerhouse*	*Wheeler Draft-tube*	*Pickwick Spillway*	*Pickwick Draft-tube*
Capacity, main hoist, tons	350	80	20	85	270	20	80	30
Hoisting speed, ft. per min.	2	10	10	7	4	10	10	9
Motor size, H.P.	60	75	15	60	2@60	20	75	30
Trolley travel, ft. per min.	20	15	—	25	25	—	15	—
Motor size, H.P.	30	7½	—	5	2@15	—	7½	—
Crane weight with load, tons	282	190	—	160	—	—	246	60
Gantry travel, ft. per min.	75	100	70	100	72	100	100	100
Motor size, H.P.	30	75	15	60	2@60	20	75	30

Design details

Certain preliminary considerations in design of a crane should be investigated by the engineer in order to arrive at a true appraisement of its value. A good machine will have certain plus values that are inbuilt and many times hidden from superficial observation. It is only by going into design details that the true value of endurance, suitability and integrity of a tool is distinguished from one that has been cheapened by substitution of materials, sloppy workmanship and poor engineering.

Structurally the gantry portals are rigid frame structures with the corners subject to some very unique critical load combinations. To take care of fatigue the basic design stresses are kept low, usually limited to a maximum of 16,000 lb. per sq. in. for the most critical combination of dead, live and impact loads. In whirely crane design, provision must be made for the torsional effect on the frame of unbalanced loads.

The U. S. Navy Department *Standards of Design for Steel* has been used for the design of gantry cranes. Pertinent parts of this publication are summarized herewith. Under a definition of loads it is brought out that live loads to be considered are hook loads, trolleys, blocks, rope load, loads on machinery house floors not occupied by fixed equipment and stairs, catwalks and ladders.

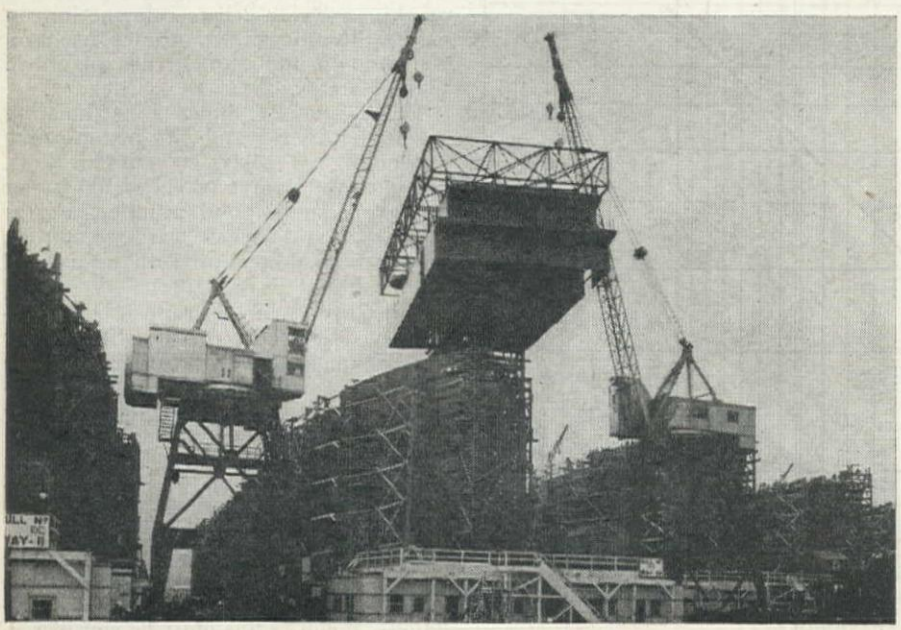
The hook load is the maximum rated capacity load applied at the hook. Rope tension resulting from this hook load is increased 2 per cent for each 180 deg. turn to compensate for strain in bending the rope around sheaves and for friction. Machinery house floors are designed for a live load of 100 lb. per sq. ft., while stairs, catwalks and ladders are either designed for 50 lb. per sq. ft. or a concentrated 350 lb., whichever produces the greatest stress. Ladders are designed with rungs and risers at 14 in. on center wherever possible.

Certain horizontal live loads (in addition to wind loads) should be considered in design. Common practice is to assume 10 per cent of the trolley dead weight plus its load as a horizontal load. Also an assumed horizontal load acting parallel to the rails and equal to 10 per cent of the maximum wheel loads results from gantry travel. Whirley cranes have horizontal lateral forces induced by acceleration during crane rotation as well as horizontal centrifugal forces from swinging loads. Impact factors vary inversely with the rated capacity of the machine, ranging from 50 per cent of live loads for 20-ton cranes to 30 per cent for 120-ton cranes. These are impact factors for the immediate supports for the trolley or rotating circle and they decrease to less than half for frame members that are more remote from the initial load application.

In proportioning crane booms, the width at the foot pin is one-tenth of the length up to 60 ft. and one-twelfth of the length for booms more than 60 ft. long.

Secondary stresses of large proportions are taken by gantry portals when the crane operates on a track laid on newly filled ground that is subject to unequal subsidence. A design load of 10 per cent of the maximum vertical leg

TWO WHIRLEY CRANES on gantry mountings lift a completed deck house for a victory ship at shipyard, Portland, Ore. Total weight handled is in excess of 90 tons. Maximum reach of these cranes is 125 ft. to small whip hook at the end of the boom.



load acting transversely at the top of the rail has been found sufficient insurance against damage from this source.

No matter how thorough the engineering and design of the crane, the final and conclusive sign of quality is in the fabrication and manufacture. Workmanship should be of such a grade that the result is a machined job and not a hastily thrown together structural frame. This contemplates members that are initially square and perfect in alignment, complete absence of twist and distortion, and drilled rivet and bolt holes.

Either bronze or roller bearings can be used on cranes, depending upon the magnitude of the loads and the character of service the machine is to render. For high speed machines having frequent movement, roller bearings are preferable. Double flanged wheels with chilled, tapered treads are standard for cranes. Tapering makes the machine self squaring and reduces wear on the flanges and on the rail. The diameter of the wheel can be approximated from the expression below:

$$\text{Wheel diameter in inches} = 8\,(W)^{0.3} \quad \ldots\ldots (3)$$

Where W is the maximum wheel load in kips.

The size of rail to be used is dependent upon the spacing and size of ties or other support as well as the speed of the crane. For a first approximation the weight of rail in lb. per yd. may be taken from formula below:

$$\text{Rail size} = 18.5\,(Wt.)^{0.37} \quad \ldots\ldots (4)$$

Where $Wt.$ = crane weight in tons.

The closest standard rail section to that indicated by this formula should be chosen.

Horsepower of hoist motors is given by the standard formula:

$$\text{H.P.} = \frac{F \times S}{33 \times E} \quad \ldots\ldots (5)$$

Where F = total hook load in kips.

S = hoisting speed in ft. per min.

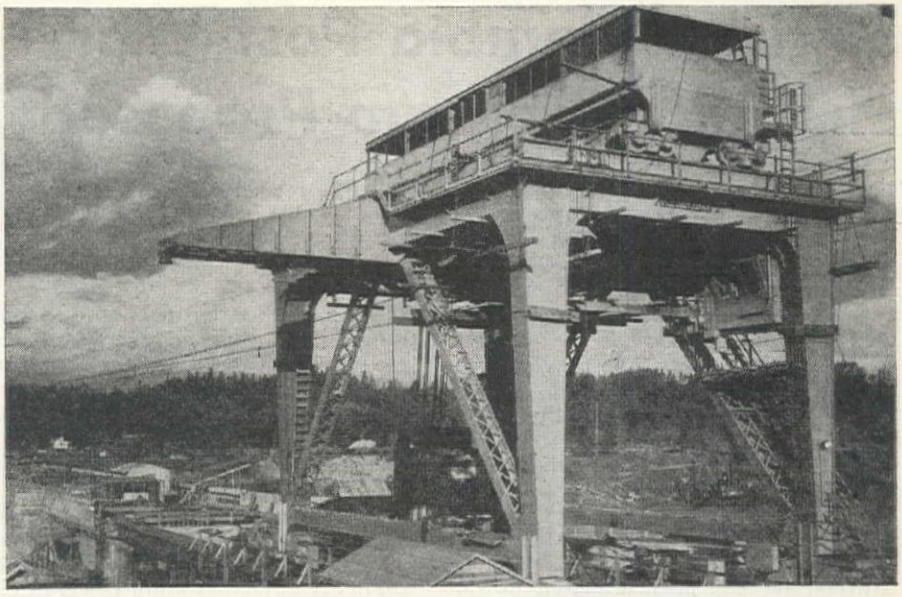
E = overall efficiency which depends upon type of bearings, number of gear reductions and type of reeving. The variation is from .57 to .90 with a conservative average of .66.

Similarly the horsepower of drive motors on trolleys and for gantry travel can be approximated by the expression:

$$\text{H.P.} = \frac{T \times S}{20{,}600} \quad \ldots\ldots (6)$$

Where T is traction and has a value determined by taking the product of 5 per cent of the weight of trolley or crane in pounds multiplied by the diameter of the axle in inches and dividing by a divisor consisting of three-quarters of the wheel diameter in inches.

Brakes and electrical control fixtures are important in the final design of the machine but are outside the scope of preliminary considerations. The above charts and formulae will furnish enough material to the engineer to facilitate preliminary selection and proportioning of a gantry crane.



SPILLWAY GANTRY at Bonneville dam during erection. This crane has a capacity of 350 tons and handles main spillway gates. The crane operates on tracks in the concrete-covered structural steel deck spanning the main dam piers of the structure.

States Asked to Minimize Delay in Handling Asphalt Tanks and Trucks

THE GOVERNORS of all States have been urged to eliminate "every possible delay" to asphalt-carrying tank cars and tank trucks, by the Office of Defense Transportation.

Cooperation of State highway officials in speeding up asphalt transportation will be more important this year because of expected increases in highway construction and repair. Last year, asphalt moved only under a permit system set up by the Public Roads Administration. This system will not be in operation during 1944, and States may schedule highway work as desired. Manpower shortages, however, may be the limiting factor in some parts of the country.

ODT asks that State highway officials streamline testing processes so that tank cars and trucks will not be held up pending certification of their contents. It requests also that suppliers of the material be notified if weather or other conditions interfere with operations so that material will not accumulate at project locations.

Three methods of adapting testing procedure to meet requirements of war-pressed transportation facilities, already in use by some State highway departments, were suggested by ODT:

1. Stationing State inspectors at the refineries for on-the-spot testing of asphalt shipments.

2. Accepting certified tests of refineries or commercial testing laboratories in lieu of State laboratory tests.

3. Dispatching samples by express to State laboratories before shipment by tank car or truck.

Tank cars are assigned in accordance with a priority list issued by the War Production Board. On that list, paving materials are below other commodities required by military and civilian programs. Consequently, unless the tank cars are utilized at their full capacity by highway engineers and contractors, there can be no assurance of an adequate supply of tank cars to meet the demand.

Boise Meet to Consider Columbia River Future

IDAHO IRRIGATION men have been called to meet in Boise June 22, at the request of Col. Ralph A. Tudor, U. S. District Engineer, of Portland, Ore., in charge of Columbia River development, to consider the problems of irrigation and navigation.

The relative claims of the two uses have caused a furore in Idaho reclamation circles, which contend that irrigation should have absolute priority on all waters of the Columbia basin.

Announcement of the meeting was made at the closing session of the Idaho Reclamation Association at Twin Falls May 13.

In his request for the meeting, Col. Tudor told the reclamationists that "army engineers do not plan to carry out any projects that will damage reclamation."

N. V. Sharp of Filer was re-elected president, and William E. Welsh, Boise, secretary, of the Reclamation group. John Kelly of Shelley was elected a director to succeed the late P. B. Dance of Blackfoot. All other directors were re-elected. In addition to the officers, other directors are Ephraim Ricks, Sugar City; William H. Tuller, Boise; George W. Davidson, Caldwell; D. L. Evans, Malad; A. R. Babcock, Moore; Ben Darrah, Shoshone; Burl Hagedone, Coeur d'Alene.

British Columbia Post-War Highway Program Proposed

By Hon. Herbert Anscomb
Minister of Public Works
Province of British Columbia, Canada

IT IS FULLY REALIZED that after the war it will be necessary to vastly expand the highway construction program for the Province of British Columbia with a view to meeting the demands of advance transportation for home needs, which will immediately become apparent after the population of the province settles down to normal routine. A very great deal of investigation and tentative planning has been undertaken and whilst it may be some time before the details of postwar work are finally decided upon, a public highway program of vast proportions covering nearly 6,000 mi. and estimated to cost in the neighborhood of $210,000,000, has been prepared by the Provincial Public Works Department, and has been submitted for approval to the Dominion Government for inclusion in its postwar reconstruction program.

The program, briefly summarized, covers nine major projects, each in itself possible of being divided into many lesser undertakings. The nine projects together with their estimated costs are as follows:

Trans-Canada Highway—$44,167,000.
Southern Trans-Provincial Highway —$53,508,000.
Island Highway—$18,623,300.
Northern Trans-Provincial Highway —$24,661,100.
B. C.-Yukon-Alaska Highway—$23,-709,300.
Cariboo Highway—$15,458,800.
North Thompson Highway—$7,034,-300.
Vancouver-New Westminster Express Highway—$11,237,000.
Parks Highways—$11,858,900.

The projects have been carefully studied and estimated and the cost of the above outlined program is placed at approximately $210,257,700. Expenditures on labor alone will provide an annual income of $1,800 for each of nine thousand men for many years. This is exclusive of the labor created by the purchase of materials, which in itself involves enormous expenditures.

The undertakings presented total 5,864 mi. of highway. This mileage, divided into the total estimated cost, makes an average cost of $35,852 per mi.

A breakdown divides the cost of this work as follows: For the purchase of land, $3,260,000; labor, $113,882,200; materials, $83,270,000, and administration, $9,845,500.

The development of the highway system is designed to open up vast new resources, encourage settlement and make the various communities to some degree self-sustained.

In the introduction to the report it is pointed out that the outstanding features of British Columbia's highway problem are: The very high cost of construction and maintenance; the great mileage of main roads necessary to connect centres of population; the concentration of a large proportion of population in Greater Vancouver, the sparse settlement or no settlement at all over vast areas, and the necessity for an east-west development over a north-south mountain system.

In addition to the major projects that have been outlined herein, it will be necessary to carry out much reconstruction work and new construction on settlement, farm and mining roads, to accommodate rehabilitation needs in various parts of the province. This work, of course, will depend upon circumstances in various localities.

Alcan Road Studied By B. C. Government

RELATIONSHIP of the Alaska Highway to British Columbia has been the subject of much discussion in Government and other circles. At the recent session of the British Columbia Legislature, Premier John Hart announced that construction of the Pine Pass route was being inaugurated this year by the Provincial Government. This involves development of 274 mi. of road between Prince George and Dawson Creek and will provide direct connection for British Columbia with the Alaska Military Highway.

To put the route in shape, it will be necessary to reconstruct 165 mi. of old road and construct 157 mi. of new road. The width of the right-of-way will be between 66 and 80 ft., with a travelled way between 18 and 20 ft. Proper drainage will be provided, culverts installed and all bridges of a major character will be built on a permanent basis.

The Premier stated $250,000 will be spent immediately on the location of this route and for construction work to be carried out this year.

This action by the Government, however, is far from solving the question of a British Columbia - Yukon - Alaska Highway, and the subject is dealt with at considerable length in the supplementary report of the Post-war Rehabilitation Council of the B. C. Government. The Provincial Department of Public Works has submitted to this committee a brief of post-war construction and reconstruction of main highways in which the B. C.-Yukon-Alaska Highway is listed as Project No. 5.

Extracts from the brief touching on the subject of this project are as follows:

"The present Alaska Highway was designed and is being built as a necessity for war, and it may be that before the war is over direct connection with British Columbia and West Coast States will be required and built, and this project can then be struck from the list. However, in a complete program of highway development this connection should not be omitted.

"It is quite clear that if a connection is not made during the war it should be put in hand promptly thereafter, for the reason that if the Alaska Highway is justified as an international enterprise, then adequate connection with British Columbia and West Coast states becomes a necessity.

"The proper route for such a connection will be a matter for discussion and consideration. Much will depend upon the results of the survey of resources being made by the International Resources Planning Board. The Peace River block is developing rapidly and a direct connection therewith is a necessity. As soon as traffic to Alaska becomes of prime importance, then the shortest route thereto will be justified.

"For direct connection with the Peace River block three routes have been considered, namely, (1) Hansard-Monkman Pass-Dawson Creek; (2) Prince George-McLeod Lake - Pine Pass - Dawson Creek; and (3) Vanderhoof-Fort St. James-Finlay Forks-Fort St. John. For direct connection by the shortest route to Alaska the B-route from Prince George-Finlay Forks to Watson Lake was recommended by the Alaska Highway Commission.

"For the purpose of this program it will be noted that the estimates cover two routes, both passing through Finlay Forks. From Prince George to Finlay Forks they pass through widely separated areas. From there the first goes directly into the Peace River block and the second northwest to Watson Lake. It would appear that the choice will have to await developments.

"It is of particular relevance to the area as a direct connection between Alaska, Yukon, British Columbia and the West Coast states both for defense and peace-time purposes."

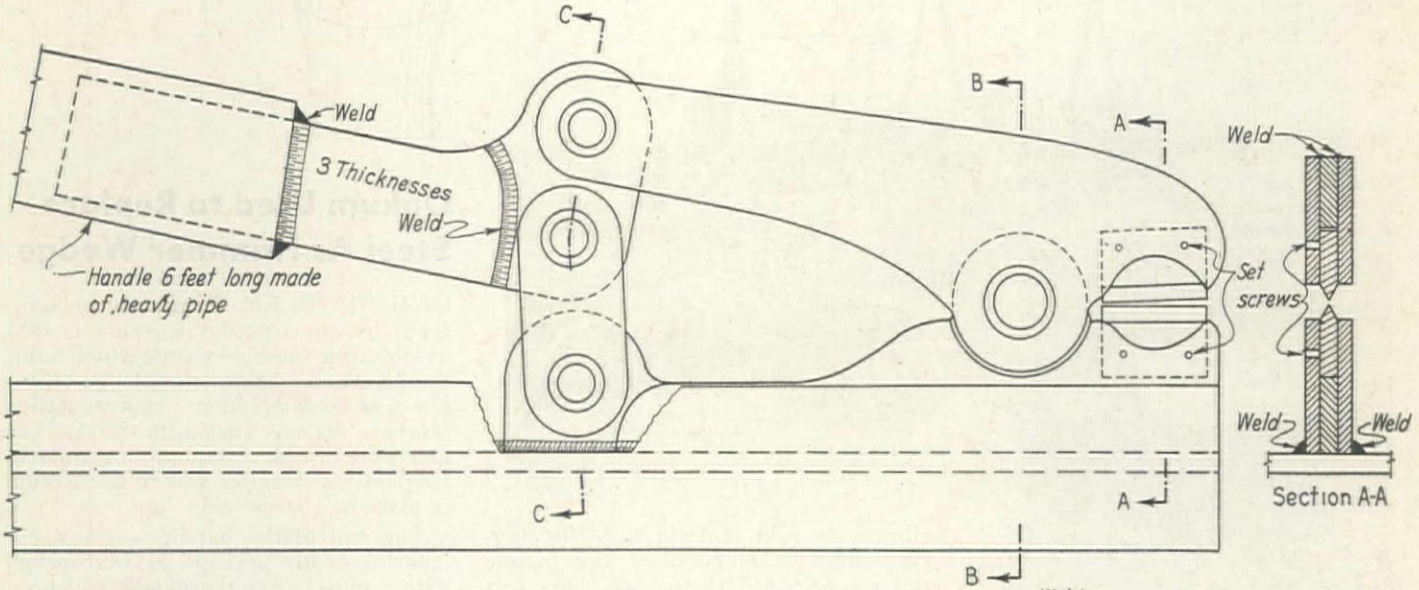
It is pointed out in the brief that this is one project of a post-war nature where local labor would not be sufficient, even if local industry were inactive. In this connection it is also explained that unemployment in British Columbia in the past has developed in the winter months when work on this Alaska Highway project would be hardly practicable.

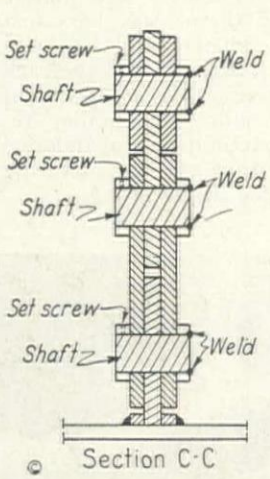
The total estimated cost of this project is set forth in the brief as $23,709,300, of which it is estimated labor costs would be $14,677,400. Of this sum approximately 50 per cent would be spent in labor secured from local sources and 50 per cent of labor from outside sources.

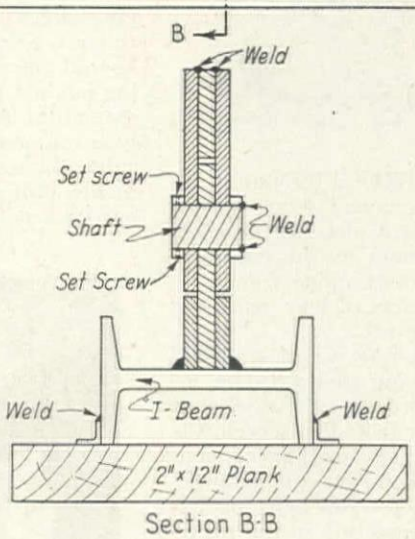
The brief points out that this is a project where surveys and plans should be very carefully prepared and supplies brought in in the fall and winter so that work on the sections selected for each summer's activities can be pressed forward to completion in a single season. By repeating this process annually, it is estimated that the whole project could be completed in five years.

HOW IT WAS DONE

JOB AND SHOP TIPS FROM THE FIELD EDITOR'S NOTEBOOK







Reinforcing Cutter Built in College Maintenance Shops

By H. R. EMMERSON
Superintendent of Buildings
Walla Walla College
College Place, Washington

WHEN NEW construction work at Walla Walla College took place in 1942, it was necessary to secure an inexpensive hand operating cutter for reinforcing bars used on the job. In view of the market conditions and priority regulations, the purchase of such a machine was out of the question and a suitable device was designed and built in the shops of the college.

The machine was simply made by arc welding the parts, and by providing the men working on the job with adequate and easily operated tools, effected considerable saving in time, money and efficiency. The previous design of such machines usually consisted of a heavy cast iron frame and parts difficult to transport on the job, but this device can easily be carried by two men to whatever place its services are required.

The materials incorporated in the machine and their costs were as follows:

100 lbs. structural steel plates and and miscellaneous pieces, mostly scrap	$ 4.50
10 lbs. welding rod	.80
9 set screws	.40
Tool steel jaws	.50
Labor, 12 hours	12.00
	$18.20

The average market price of a comparable machine when available was about $125.

The machine consists of two steel cutters held by welded steel jaws so arranged that adequate pressure can be applied by hand to cut the reinforcing iron easily.

A center section of ½-in. structural steel has a piece of ⅜-in. steel welded to each side; a space to fit the blades was cut out of the ½-in. steel before welding. Holes were bored as shown and pins or shafts were put in the holes. The pins had heads welded on one end; the other end was held by a collar and a set screw.

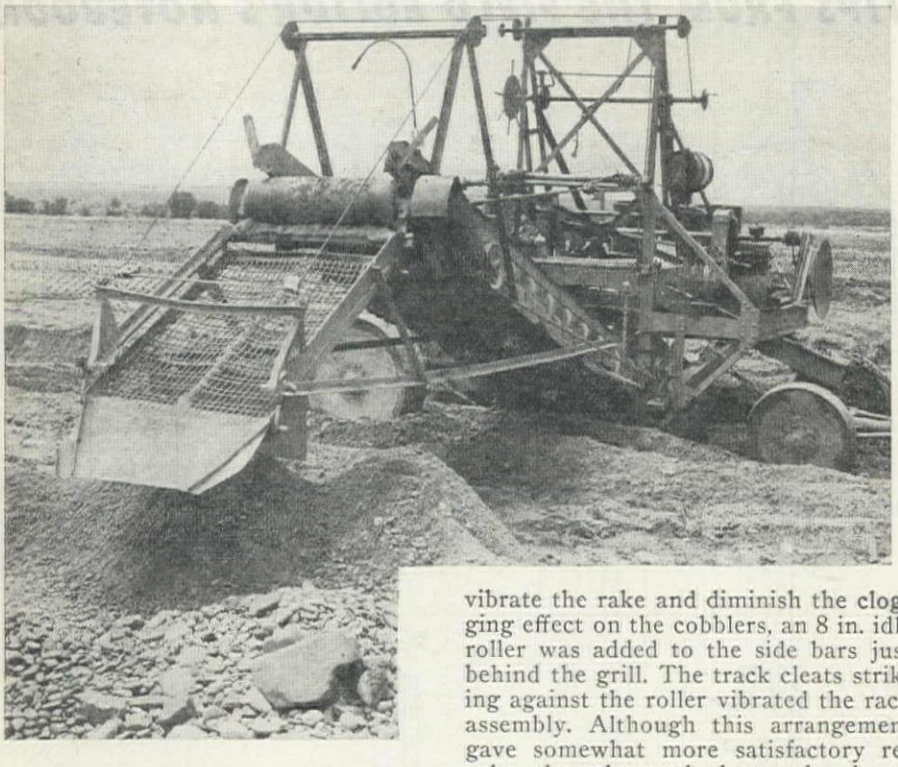
The blades were made 2 x 3 in. sharpened on the 3-in. edge. They are held in place by set screws. To allow for wear and sharpening of the blades, shims to place under the blades are provided.

The handle consists of a piece of 3-in. pipe 3 ft. long, with a piece of 2½-in. pipe 6 ft. long running through it. The 3-in. pipe is to reinforce the 2½-in. pipe at the end next to the cutter. A wooden handle was turned out and driven into the upper end of the pipe to give a better grip on the handle.

The machine was welded to a piece of 7-in. I-beam. A channel bar would have served as well. The whole device was then bolted down to a plank.

NOTE: Data and illustrations are from a study submitted by the author to The James F. Lincoln Arc Welding Foundation in its recent Industrial Progress Award Program for reports of advancements and improvements made by the application of arc welding in design, fabrication, construction and maintenance.

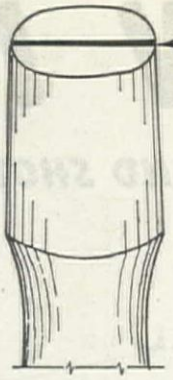
Elevating Grader Made Into Cobble Screen at Martin Dam



IN THE CONSTRUCTION of Caddoa dam (later renamed John Martin dam), near Caddoa, Colo., for the U. S. Engineer Department by the contracting group known as Caddoa Constructors, a cobble selector was used for screening fill material.

The cobble machine was a standard elevating grader equipped with an inclined vibrating screen, at the discharge end of the elevator belt. The screen was supported by four loose-jointed supports and was shaken by a cam arrangement from the conveyor belt mechanism. Prior to compaction of the pervious material placed in the outer reaches of the embankment, several grader cuts were made through the newly-placed material. Cobbles too large to pass the 2-in. inclined screen were deposited on the slope of the embankment, and the fine material which passed the screen was deposited in windrows to be later spread out and compacted as pervious fill.

Prior to the use of the elevating grader type of cobble machine, unsuccessful attempts were made to segregate the cobbles with "rock rake" bulldozer attachments. The first attempt was with a grill constructed of ¾ x 2 in. vertical bars, spaced approximately 3 in. apart, mounted on a bulldozer frame. It was found that the cobbles clogged the grill, causing the rake to act like a normal bulldozer. The rake was then modified by pivoting the grill at the point of connection with the side arms so that it was rigid when the tractor was pushing, but would swing free when the motion was reversed. This arrangement proved to be equally unsatisfactory. In order to vibrate the rake and diminish the clogging effect on the cobblers, an 8 in. idle roller was added to the side bars just behind the grill. The track cleats striking against the roller vibrated the rack assembly. Although this arrangement gave somewhat more satisfactory results, the rake method was abandoned in favor of the more efficient elevating grader type cobble machine.

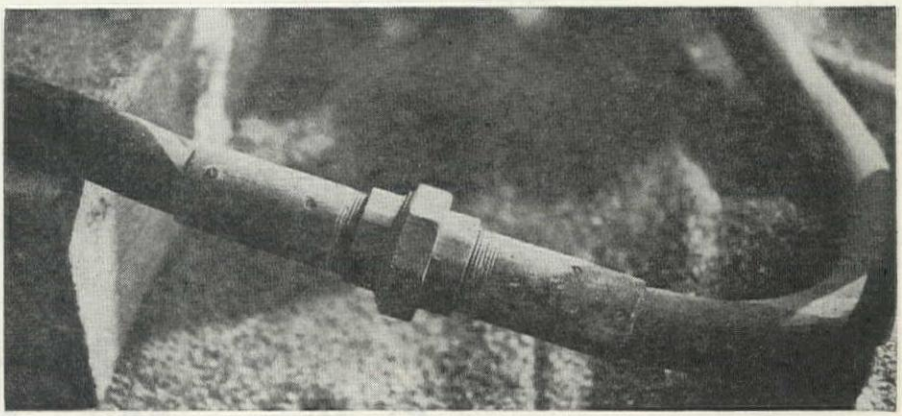


Saw cut before or open up with a chisel after handle driven in place.

Oakum Used to Replace Steel As Hammer Wedge

ONE PROBLEM frequently encountered by construction workers is that of loosening the steel wedge which holds the handle in a hammer or sledge. *Western Construction News* representative Herbert Dale is the authority for the fact that in older shipbuilding days in England the practice was to use oakum in place of a steel wedge.

The end of the handle was saw-cut lengthwise for perhaps ½ in., opened with a chisel after the handle had been driven home. Then oakum, or if not available, rope ravelings may be substituted, is caulked into place until the space is completely and tightly filled. If a little excess wood is allowed, the end can be battered over the caulked material.



Sandblast Hose Junctions Made by Attaching Standard Pipe to Ends

A BLOWOUT-PROOF coupling for sand-blasting hose was developed at Friant dam, during construction of the important Central Valley project unit. The hose was 2 in. in diameter, and was supplied in varying lengths. The ends of the hose sections were inserted in short pieces of standard 2.5 in. pipe, and secured in place with bolts through the hose into metal liners. It was then possible to connect these standard pipe ends with regular pipe connections, either couplings or unions, depending on conditions. By means of this coupling system it was a simple matter to unite the short pieces of heavy hose into lengths of 300 ft. or more.

Friant dam is now practically completed, but the Madera canal, through which impounded water will be conducted to needy farm lands, is just under construction. The ceremony of turning the water into this canal took place on June 10. The Friant-Kern canal, the distribution system southerly from the structure has just been approved for construction by the War Production Board. Contractors on the dam were Griffith Co. and Bent Bros., both of Los Angeles, Calif.

NEWS OF WESTERN CONSTRUCTION

JUNE, 1944

Portland Approves Huge Bond Issue; Plans River Clean-up

THE CITY OF PORTLAND on May 19 approved a total bond issue program of $24,000,000 for postwar development. The largest item was a $12,000,000 program of sewage disposal and river clean-up.

Also approved by the voters were a dock improvement bond issue of $3,000,000; a Multnomah County roads and bridges bond issue of $4,000,000; and a school tax levy of $5,000,000 for the construction of 8 new school buildings.

There was a wide-spread interest in the sewer program which was one of the features of the Moses plan of postwar development for Portland. At the present time there are more than 50 sewer outlets into the Willamette and Columbia Rivers. A great deal of the discharge accumulates in the stagnant waters of Columbia slough, making a very unsanitary and unhealthy situation.

The new sewer system is being designed by John W. Cunningham & Associates and Stevens & Koon, Portland consulting engineers, and will accommodate both sanitary and storm sewage. Storm water diversion regulators will be installed at the junctures between the various outfalls and the trunk interceptor, which is principal feature of the project, is to divert excess storm water directly into the Willamette. This will relieve the pressure on the treatment plant but will not create unsanitary conditions in the river since the Willamette itself is higher during storm seasons and therefore will carry the excess storm sewage away. Also included in the plan is complete diversion of sewage from Columbia slough.

The unsanitary conditions in the Willamette River are of course aggravated by discharge from other cities upstream, and the following programs have been made by these other offenders: Oregon City will finance a sewage disposal project by a general tax levy after the war. Salem has sold $200,000 worth of bonds to cover preliminary engineering studies and will construct a disposal system by means of a sewer use charge. Albany has accumulated a fund of $60,000. Corvallis is considering a sewage use charge equal to 15 percent of city water bills. This is estimated to yield $12,000 a year. Eugene has completed plans and has approximately $100,000 on hand. The storm and sanitary sewer proposals will cost about $325,000. Springfield approved a $250,000 bond issue in 1941. Plans are completed. Cottage Grove is working out a fiscal plan.

FWA Offers Diesel Plant but Ketchikan Asks Hydroelectric

THE FEDERAL WORKS Agency has proposed a diesel stand-by electric plant for Ketchikan, Alaska. This proposal counters an application from the city for permission to construct a dam and hydroelectric plant at Beaver Falls. The principal basis for the counter proposal is the length of time consumed in the construction of a hydroelectric development.

The Ketchikan Public Utilities Board, however, feels that the Beaver Falls project could be constructed in six months, thereby meeting the requirements for emergency needs and would have the additional advantage of being a permanent installation.

Walter Stuart, manager of the Board, has appeared before the F.W.A. in San Francisco and Washington to present the city's side of the argument.

Structural Timber Now Available in Quantity

GEORGE T. CUNNINGHAM, president of the Wyoming Engineering Society, has announced the appointment of a Wyoming Engineering Society Planning Committee.

The membership of the committee includes: O. P. Reed, Superintendent of the Cheyenne Light, Fuel and Power Co., Cheyenne, Chairman; Paul F. Anderson, City Engineer of Sheridan and County Engineer of Sheridan County; Howard F. Bell, County Engineer of Park County, Cody; Paul H. Berg, Engineer, United States Bureau of Reclamation, Cheyenne; David P. Miller, County Engineer of Sweetwater County, Rock Springs; H. T. Person, Chairman, Civil Engineering Division, University of Wyoming, Laramie; Floyd M. Roush, Superintendent of the Goshen Irrigation District and Mayor-elect of Torrington; W. B. Schilling of the Wyoming State Highway Department, Casper; Charles M. Smith, Contractor and Vice-President of the Society, Thermopolis; and George T. Cunningham, Wyoming Plant Engineer of the Mountain States Telephone and Telegraph Co., Cheyenne.

This committee has been appointed to:

1. Lend the Wyoming Engineering Society's cooperation to the State Post-War Planning Committee appointed by Gov. Lester C. Hunt.

2. Stimulate interest in and assist with planning in the cities and counties of Wyoming.

3. Furnish local planning groups with a workable and effective planning procedure.

4. Assist and cooperate with all private and governmental agencies and organizations interested in the agricultural, mining and industrial development of Wyoming.

5. Develop a post-victory employment program for the Wyoming Engineering Society that will assist members of the Society returning from the armed forces and war industries.

Committee for Planning Appointed in Wyoming

ALTHOUGH DEMAND exceeds supply of lumber for boxing and crating, there is available an ample supply of structural timber. The West Coast Lumbermen's Association has announced that from 15 to 20 million board feet of structural items 3 in. or thicker are available every week.

This situation arises because when logs are cut into lumber only a relatively

small percentage can be converted into boards for crating and boxing. The sawmills of the Douglas fir region are not equipped to put all, or even a major proportion, of their cut into thin lumber. Practically all mills are designed to produce principally heavy timbers.

Prior to the war, Douglas fir trees were converted into no more than 10 percent of one-inch boards and 20 percent of two-inch boards. War requirements increased these schedules to 16 percent for thin boards and 30 percent for the 2-in. dimension. This still permits cutting of more than 50 percent into the structural sizes. Therefore, not only are heavy timbers available but their disposal is being actively sought by the lumber industry.

Navy Increases Contract On Nevada Airport Work

THE CONTRACT of the Dinwiddie Construction Company of San Francisco, Calif., to construct buildings, hangars and other structures at the Fallon, Nevada, Auxiliary Naval Air Station has been practically doubled. The original contract called for structures to handle approximately 1,000 trainees at the station, and under the new proposal about 2,500 will be accommodated.

The Dodge Construction Company of Fallon is simultaneously constructing the airport facilities, widening runways from 150 to 250 ft.

The principal handicap encountered in using the station is the lack of an adequate domestic water supply. Three attempts to develop a sufficient flow have failed; and at the present time water from neighboring irrigation ditches is being used after filtration and chlorination.

Ed Keilberg is superintendent for the Dinwiddie Company on their portion of the work, and E. J. Maupin Jr. is project manager for the Dodge Construction Company.

WPB Relaxes Rules for Highway and Street Work

THE BASIC WPB construction order known as L-41 has been relaxed so far as the construction of public highways and streets is concerned. The original order limits all types of construction work, and the new amendment, known as L-41-e, prescribes limits under which highway construction work may be undertaken without WPB permission.

According to the new order highway and street construction may be started without specific WPB authorization if the work falls in one of the following classifications: (1) Projects costing $5,000 per mile or less, providing the aggregate cost does not exceed $25,000, (2) A project costing $10,000 or less, (3) A project providing access to sources of raw materials when such project is certified by WPB as essential to the war effort, (4) Highway construction owned by the Army, Navy, Maritime Commission, C.A.A., Coast Guard, Coast and Geodetic Survey, Panama Canal and certain other government agencies.

With the exception of permitted maintenance or repair, all public highway and street construction not included in the above four classifications is forbidden without specific WPB authorization.

Metropolitan Water District Issues Report of Activities for Year 1943

THE FIFTH ANNUAL report of the Metropolitan Water District of Southern California has been issued by the Board of Directors. It covers the first full year of operation of the Colorado River aqueduct and rather proudly points to the part played by the water and power production of the district in the phenomenal industrial and population growth of Southern California. The total delivery of water during the year averaged 12,732,000 gal. per day, being delivered to the cities of Beverly Hills, Burbank, Compton, Fullerton, Long Beach, Los Angeles and Santa Monica. All water passed through the filtering and softening plant of the district near La Verne.

Under the original Boulder Dam contract the district is entitled to purchase approximately 1½ billion kilowatt-hours of electrical energy developed at Boulder Dam. During the year just completed about 66,000,000 kilowatt-hours were used by the district in the operation of its pumping stations and other facilities. The entire balance of the district's power allotment was resold to power users in the southwest, the largest single purchaser being the plant of Basic Magnesium, Inc., at Las Vegas, Nev.

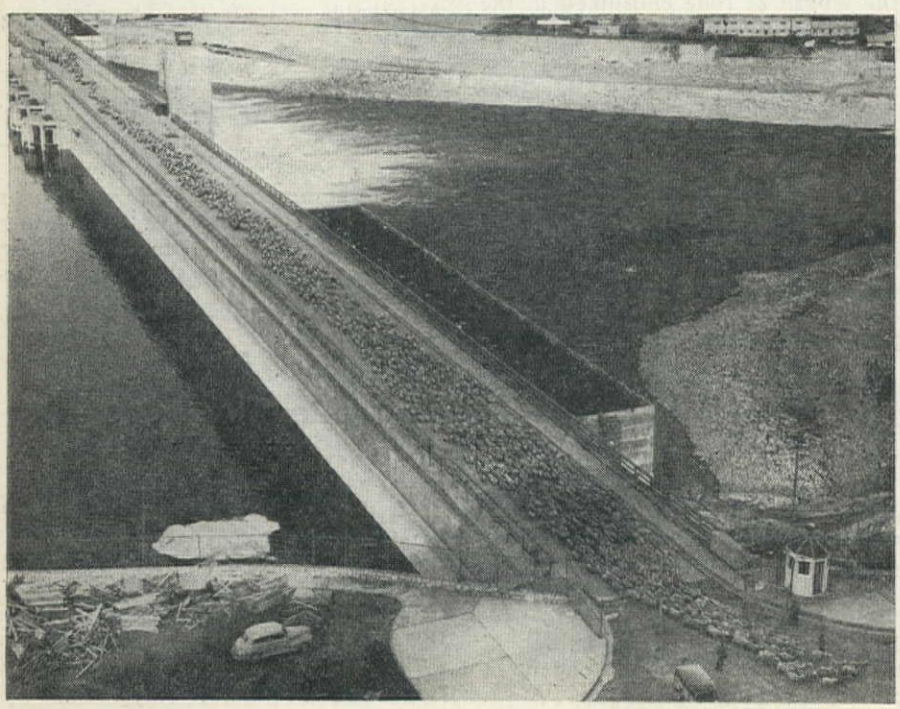
The principal new construction carried out during the past year was the extension of the original water pipeline to deliver water to the newly annexed territory of the Coastal Municipal Water District. This line was constructed from pipe salvaged from a line between Morris Dam and the city of Pasadena. The project was discussed in *Western Construction News* for November, 1943.

Operating revenues for the year totaled $271,677, while operating expenses amounted to $843,557. Interest and other financing costs brought the net deficit for the year to $8,461,645.

THE DENVER, COLO., Water Board has authorized construction of cut-off walls at the spillway of Ralston dam, one of the principal units of the city's water system. Seepage has been undermining the spillway and it is believed this will be corrected by addition of the cut-off walls.

GRAND COULEE DAM USED AS HIGHWAY BY SHEEP BOUND TO RANGE

EACH SPRING the 550-ft. Bureau of Reclamation structure on the Columbia river is used by thousands of sheep on their annual pilgrimage from winter feeding sheds to northern forest ranges. This photo shows 5,000, the largest single group ever to cross at one time, traversing the 30-ft. highway along the crest of the dam. Powerhouses at Grand Coulee are now producing 600,000,000 kw. hr. of energy monthly.



WASHINGTON NEWS

. . . for the Construction West

By ARNOLD KRUCKMAN

WASHINGTON, D. C.—We have been more conscious of the West the past month than for a long time past. The Missouri River debate in the House and Senate has been one of the outstanding subjects of consideration by Congress; and we have been persistently aware of the several-sided discussion over the treaty with Mexico for the allocation of the waters of the Colorado River.

In the committees there has been much debate about appropriations for the Department of the Interior, and Ickes the Irritable got a sound verbal trouncing by some members of the House Appropriations Committee, as was forecast in these columns. But after they unloaded their accumulated and collective dislike upon him they remembered there were people back home who needed attention, and they voted a reasonably generous slice of funds for Reclamation, Land Office, Indian Bureau, Geological Survey, Bureau of Mines, and other sections of the Department of Interior of interest to the West slope.

At this writing there is every likelihood that upwards of $5,000,000 will be available for purely investigatory work by the Reclamation Bureau, which spells a continuity in the program for irrigation of the West. The total Interior appropriations will probably be somewhere between $100,000,000 and $125,000,000.

Mexico water dispute

The fuss over the 1,500,000 ac. ft. of water which our generous national Government wishes to bestow upon Mexican Lower California seems to lie doggo for the time. Congressman Carl Hinshaw, the two-fisted fusser from the rocky hills around Pasadena, and head of the California Society in the District of Columbia, has been rather engrossed with campaign problems, and has flown back and forth, from Coast to Coast, several times. The Hinshaw bills, which put the issue squarely up to Congress, have been slumbering in the subcommittee of the Judiciary Committee of the House because Elder Statesman Hatton W. Summers, chairman, also has a great desire to keep his relations with his fellow Texans on an even keel these tumultuously uncertain months when no one quite knows who may be elected. Texans would not like another Texan to be responsible for any action that would deprive them of the advantages they would garner from the treaty as it was formulated by Judge Clifford H. Stone and his fellow Coloradoans on the Colorado River Committee of 14, and Cordell Hull, the Secretary of State.

In due time, if the Judiciary Committee continues to drowse over the Hinshaw bills, the blunt-tongued Californian will undoubtedly wake 'em up with appropriate words and gestures.

Water fights are deadly

The folks in Southern California are ready to settle for 750,000 ac. ft., and other contributions; but it might be wise to suggest to the people in the upper river States that it will not help the cause of the budding amity in the West if they reproach the Los Angeles area about the water it is getting by diversion from the Colorado River basin. After all, this water, according to the Californians, pays the upper river people $1,500,000 cash, annually, and drains back into the Pacific water system, while the water the Colorado people are diverting across the Continental Divide is taken entirely away from the West slope without payment, and slips down into the Atlantic, where it has no natural reason to go.

This reporter has listened to quite a number of water fights the past 30 years, and has had first hand participation in some of the most horrendous of them; and he knows that you can absolutely guarantee to set back the promising hope of Western unity for another quarter century if you start an inter-regional water fight. If you wish the West to profit by the great opportunities immediately ahead, wash your spotted linen in private, settle your differences in the family, and get together on water as on other general issues. It will pay a very fat percentage.

Nicholson in Washington

This trend to sectional unity is becoming more clearly marked. We had the dashing Rex Nicholson with us for a week or so in May, and he covered so much ground it constitutes some kind of record. He breakfasted with Donald Nelson, dined at the White House, and sandwiched in between a number of other lunches and dinners. He went down on the Hill with Floyd Hagie, of the National Reclamation Association, and sat in a great conference of Western, Southern and specially chosen Eastern Senators, all of whom were keenly interested in setting up the principle that when navigation and beneficial use of water (in streams) clash, the beneficial use should come before navigation.

Apparently the politicians in Washington like your Rex very much; they dogged his footsteps, from the portico of the White House to the Halls of Congress. We liked him, and his eager ways, and we feel he will be a very great asset to your program to build up the West.

Just about the time Rex flew back, another guest appeared, Fred D. Parr, of the Parr-Richmond Terminal Corp., who came to see what he could get in the way of encouragement for the establishment of a Golden Gate International Airport at Albany, in the Bay area. We got a glowing picture of airports, hotels, and other new facilities to be established after the war. The whole business is to cost $53,000,000, a sizable sum ordinarily but chicken-feed these days. The airport alone is estimated at $20,000,000, the balance to be spent on hotels, docks, theaters, and other conveniences. Parr made the rounds, and was cordially encouraged at Civil Aeronautics Authority, by Jesse Jones of Reconstruction Finance Corporation, and by other friendly agencies. The representatives of the Chambers of Commerce, from Seattle to San Diego, under the wing of Frank E. Marsh, representing the San Francisco Chamber, gave Parr lunch and sound counsel. Just as this is about to go into the mail we have word that Louis Lundberg, general manager of the San Francisco Chamber, has landed in town. He has come, in all likelihood, to see what may be done about untangling that muddle about labor shortage out there.

Labor and WPB

We hear that you have real labor problems now, problems which make those that went before seem like a picnic. They tell us the avalanche of public works millions dumped upon the Coast, especially from San Francisco to San Diego, caught you entirely unprepared, and that your regional Government officials were just as bewildered as the laymen.

The Navy appealed to the Chamber of Commerce people to find 35,000 workers for the jobs out there; and others tell us you have real need for somewhere between 75,000 and 125,000, also that you have no shelter in which to house them. Donald Nelson is coming in late June to look you all over; and he will undoubtedly make some interesting speeches. Don is an extremely interesting man, and he could probably sell a blind man spectacles.

They tell us you think Charles E. Wilson, executive deputy chairman of WPB, does not like the West. This reporter does not know Wilson's private mind; but it seems most likely he is a good business man and a good American, and it is many dollars to one lonely doughnut that he would do everything that could be done to make the West Coast economy function smoothly and effectively.

Department appointments

Judge Clifford H. Stone, the Colorado jurist and publicist, who has been under discussion for the job of Assistant Secretary of Interior—very much hush hush—also had been groomed as an assistant commissioner of the Bureau of Reclamation. But the Department still has a number of estimable gentlemen in influential places regarded here as members of the old Palace Guard, and it appears that Judge Stone, a realistic and eminently level-headed gentleman, also possesses the cool integrity of a Western individualist.

Kenneth Markwell of Oklahoma was appointed to the place of assistant commissioner with expressions of gratifica-

tion by Secretary Ickes. Mr. Markwell is an attractive youngish man of 45 who formerly was regional director of the Federal Works Agency, and identified with the Public Works Administration. He was head construction engineer of the Santee-Cooper project near Charleston, S. C., chief draftsman in the Engineering Department of Memphis, Tenn., and has held several jobs in and out of the emergency war government the past few years. When the appointment was announced it was emphasized that William E. Warne, of the Imperial Valley and San Diego, appointed as Assistant Commissioner of Reclamation last August, will continue in that job.

About the same time, the Secretary of the Interior announced the appointment of Albert C. Horton, Jr., of Michigan, as Supervisor of Surveys of the General Land Office with headquarters at Denver. Mr. Horton is in direct charge of the cadastral engineering service embracing supervision over 12 public survey offices in the Western States and in Alaska. He succeeds Frank M. Johnson, who died.

Flood control and water use

Several members of Congress from Illinois and Missouri introduced bills which provided a total of $19,500,000 for emergency repair and restoration of levees and flood-control works. The Chairman of the Flood Control Committee of the House finally introduced a substitute bill which was enacted and which provides $12,000,000. Congressman Gearhart of California introduced H. R. 4762 which provides $618,000 for flood-control for the Fresno County Stream Group in the Sacramento-San Joaquin River basin. The bill has not yet been reported out of committee.

There has also been considerable debate about the rider on the Rivers and Harbors bill, introduced by Congressmen Carter and Elliott of California, which would remove the restriction that prevents the service of water from Federal projects on farm holdings in excess of 160 ac. in the Central Valley. The bill passed the House but ran into Secretary Ickes and others before it passed the Senate. Late in May the Elliott amendment was thrown out by the Senate Committee. The Reclamation people, as represented by Ickes, steadfastly insist the water should be delivered only to smaller farms not exceeding 160 ac., except as exempted by the present law. The project will supply water to 550,000 ac. of new lands. Of this acreage 310,000 ac. are in tracts of over 160 ac. Ickes wishes to have them subdivided and made available for settlement in family-size farms. There are now 1,500,000 ac. of land in the Central Valley under irrigation which would be served with supplemental water. More than 340,000 ac. are tracts in excess of 160 ac. These also, under the Ickes plan, should be served with water if it is agreed that they will be subdivided by the time the water is available. In seeking a solution, reclamation interests are making various suggestions including the exclusion of lands served by pumped water, and the assessment of an interest charge based upon construction costs to be imposed especially on tracts in excess of 160 ac. We are told particularly not to attribute the funny socialization ideas that may come out of Interior to those who presumably guide the Reclamation Bureau. Most of the policy definitions have now soared out of the realms of the Palace Guard.

Missouri river

This correspondent has listened to hours upon hours of discussion of the Missouri River problem as encompassed by the Rivers and Harbors bill. The Congressional Record is filled with oratory, particularly with the rounded periods of Rep. Whittington of Mississippi, who has the unconscious arrogance of the almost-vanished Southern planter in relation to those who do not hail from the state of Jefferson Davis. Mr. Whittington, as chairman of the Rivers and Harbors Committee, is an institution, much as the dome of the Capitol is an institution. Mr. Whittington, suh, cannot understand how any one can question the wisdom of the Corps of Engineers as the ultimate authority in any discussion about rivers and harbor problems.

The Engineers, as you probably know, are opposed to any declaration of overall policy which will put irrigation and other beneficial uses ahead of navigation, when and if the two conflict. That is the primary difference inherent in the Missouri River fight. They would make a 9-ft. channel from Sioux City, Iowa, to St. Louis, no matter how much land might be deprived of irrigation in the upper States. No one here puts it as baldly as that but there is the fact. The people in Montana, North Dakota, Wyoming, Kansas, Nebraska, Colorado and South Dakota have been told by the Governors, by the Bureau of Reclamation, that any careless programming of the water of the Missouri may deprive them of the cultivation of 4,000,000 ac. of fine land. They are particularly vigilant because they were once quite convinced that navigation down below would not hurt them.

They derived this conviction from the exposition of the so-called Pick Plan, apparently a pleasing generalization which has not stood up under the acid test of careful analysis. Col. Lewis A. Pick is one of the most genial and engaging officers of the Chief's office in Washington. A year or so ago he toured the Missouri River basin and sold the Pick Plan to its people. Being closer to the pay-off, the people of the Missouri basin now are willing to pay the utmost respect to the prestige of the Engineers, but are not willing to accept general assurances in the face of colder facts. That is where they parted with both Col. Pick and Congressman Whittington.

On the other side of the argument there is the Bureau of Reclamation, with practically no support from the Secretary, but with a clearly incisive and utterly convincing analysis by W. G. Sloan who is Assistant Regional Director of the Bureau at Billings, Mont. Mr. Sloan rises so far above all the other irrigation champions in the clarity of his exposition that it is now the habit to call his presentation the Sloan Plan. One Saturday afternoon recently he appeared before a group of 40 or more Senators on the Hill, and held them so engrossed by the fairness and reasonableness of his presentation, that he kept them in a solidly packed small room for over 4 hours, subject to the most searching examination.

Sloan left a profound impression upon the minds of those men, many of whom were definitely opposed to the irrigation side when they went into the conference. As a result the Senators appear quite convinced that the Corps of Engineers have based their program more upon laudable ambition than upon solid reason, and those who have championed the Engineers' proposal offered a compromise. Sen. Overton, Louisiana, appeared on their behalf before another Saturday afternoon meeting and in effect offered to write into the Rivers and Harbors bill an undertaking that the people in the upper states of the Missouri River would be entitled to all water required for their irrigation program and offered to agree that the navigable channels be improved only so far as possible within the limits of the water that would be left. But the Engineers declined to commit themselves to an amendment establishing the principle of the prior right of beneficial use of water ahead of navigation.

At this writing it seems assured that on the floor of the Senate the irrigationists will have the vote. Under Sen. O'Mahony's astute leadership it seems probable the rights of the States will be placed ahead of Federalization; and that disputes between agencies, such as this Reclamation and Engineers dispute, must be reported to Congress with a joint report before any agency may attempt to force a program through. It seems likely the definition sought by the irrigationists will be voted by the Senate. This means the direct difference between the House and the Senate must be adjusted in conference; and with the attitude of Chairman Whittington in support of the Engineers, no one would venture to predict the outcome.

The road bill

Late in May the Federal-Aid road bill, H. R. 2426, still was unreported from the House Roads Committee. The most authentic word was that the committee might recommend the total potential appropriation be reduced from $3,000,000,000 to $1,500,000,000, to be allocated at the rate of $500,000,000 annually, and that the apportionment be arranged at 60 percent Federal Aid and 40 percent contribution by the States during the first year; thereafter 50 percent by each. If this plan is finally adopted it would be a modification of the suggestions made by Federal Works Administrator Maj.-Gen. Philip B. Fleming and Public Roads Commissioner Thomas H. MacDonald. The most generally acceptable apportionment seems to be one-third on the basis of population, one-third area, and one-third post-road mileage; secondary and feeder

roads would be distributed on the same basis, and the balance would be apportioned according to population in cities of 10,000 or more. Much emphasis is placed in all quarters on the fact that this is the largest program in public road planning ever launched, and that proper planning should be actively in progress right now.

The American Association of State Highway Officials, which has been active in counseling with the House Committee on Roads, has written this reporter that it wishes to be placed clearly on record as not having been the sponsor of H. R. 4170, the bill that was introduced by Congressman Miller of New Jersey. The Miller bill was given prolonged consideration by the committee, but was superseded by several other bills, all of which apparently were sidetracked when the committee went back to further consideration of H. R. 2426, which has been the springboard for the most prolonged discussion. Early in May, Congressman Kefauver introduced H.R. 4718 which would provide $1,125.000,000 to be available at the rate of $375,000,000 a year for three years. H. R. 4811, introduced by Congressman Mott, would provide $3,000,000,000, to be expended in three equal sums for three successive years. Late in May, Congressman Robinson of Utah introduced H. R. 4853 which would cut the total to $1,500,000,000 at the rate of $500,000,000 per year, $200,000,000 to be immediately available after the war or before whenever Congress may direct.

H. R. 4648 was introduced by Delegate Dimond of Alaska providing that Federal Aid and Highway Acts be extended to the Territory of Alaska. S. 1875, introduced by Sen. McKellar, would make funds of the Defense Highway Act of 1941 available for maintenance as well as for construction.

Miscellaneous

The Pan-American Highway Congress will meet in Lima, Peru, July 15 to 25. Canada has been invited for the first time. In this connection, Chief Edwin W. James, Inter-American Regional Office, Public Roads Administration, predicted continuous automobile passenger travel will be possible by December, 1947, over the Inter-American Highway between the United States and Panama.

It is reported from the Alaska Highway that the spring breakup was unusually light, that the highway came through the winter in excellent condition, and that traffic was better in winter than in summer.

Department of Commerce reports that Quebec Province expropriated the production and distributing facilities of the Montreal Light, Heat and Power Corp., largest electric power suppliers of the Province. The property has been taken over by the newly created Quebec Hydro-Electric Commission. The cost has not been fixed. Quebec aims to compete with the long-established Ontario public power system, and to be ready for benefits to be derived from the potential United States-Canadian power development on the St. Lawrence.

NEW BOOKS...

BASIC MATHEMATICS FOR ENGINEERS — By Paul G. Andres, Hugh J. Miser, Haim Reingold. Published by John Wiley and Sons, Inc., New York. 726 pages, 9 x 6. Price $4.00.

Designed for use by students who have had at least two years of high school mathematics, this text book presents the mathematics required for an intelligent pursuit of elementary engineering courses and as a preparation for the study of calculus. It contains those topics from algebra, trigonometry and analytic goemetry which are needed for these purposes. It is possible to use the book with students who have had little mathematical training beyond ordinary arithmetic because the fundamental rules of geometry are collected in an appendix. Many illustrative examples are worked out in full so that the student can follow the operations from one end to the other.

Use has been made throughout of engineering symbols and terminology because the volume is intended to relate mathematics to engineering applications. The importance of accuracy, the operation of the slide rule, graphical solutions and the Doolittle method of solving simultaneous equations are other features stressed in the book.

Tables of logarithms and trigonometric functions and common constants are included in the appendix.

* * *

PILE-DRIVING HANDBOOK—By Robert D. Chellis, B.S., C.E. Published by Pitman Publishing Corporation, 2 West 45th St., New York 19, N. Y. 276 pages, 8 x 5½. Price $4.50.

Written by a structural engineer of the well known firm of Stone & Webster, this handbook is intended to provide ready information for design and driving pile foundations. He feels that lack of technical discussions of this type of foundation has resulted in the past in many inadequate and uneconomical designs. The design of pile foundations should be based on a study of adequate soil borings, driving resistance, friction and end-boring values.

Chapters in the volume are devoted to tests and development of suggested pile-driving formulae, application of formulae, driving factors, selection of driving equipment, selection of type of pile, spacing and preservation of piles. In addition, many useful tables governing pile factors and an appendix of formulas, test summaries and standard specifications are included.

* * *

MODERN WOOD ADHESIVES—By T. D. Perry. Published by Pitman Publishing Corporation, 2 West 45th St., New York 19, N. Y. 208 pages, 9 x 6. Price $3.00.

Because of the rapidly expanding use of glued structural timber, the author has expanded one very brief chapter of his book "Modern Plywood" published in 1942 into this new volume. This has made it possible not only to give more attention to the various major adhesives, but also to discuss their various qualities. Chapters are also devoted to the fundamentals of heat and pressure as applied to gluing technique, and information on gluing equipment, impregnated products and testing methods complete the book.

A large share of the book is devoted to synthetic resin adhesives which are still being developed. A glossary of trade terms used in the wood adhesive industry is also included.

While the present resurgence in the wood working industries is attributable to the war, it is anticipated laminated timber will have an important place in postwar America and this book is devoted to a practical explanation of the factors involved in manufacturing such material.

* * *

OXY-ACETYLENE HANDBOOK —Published by The Linde Air Products Company, 30 East 42nd St., New York 17, N. Y. 587 pages, 9½ x 6. Price $1.50.

Designed both as a guide for self-instruction and as a classroom text book in the basic principles of oxy-acetylene welding and cutting procedures, this book covers the entire range in that process, giving clear instructions for handling all common commercial metals and simple explanations of the fundamental principles of the safe methods of depositing and controlling molten metal. Considerable space is also devoted to an explanation of the operating principles of oxy-acetylene equipment and instruction in its care and maintenance.

Among the subjects covered are the history of oxy-acetylene process, the identification of metals, welding techniques for various metals, cutting rules, testing welds, organization and layout of a welding shop and the general theory of expansion and contraction. The book will be found useful not only in vocational and trade schools, but as a reference book for engineers, designers, superintendents and plant management officials.

* * *

ENGLISH-CHINESE AUTOMOTIVE NOMENCLATURE — Compiled and edited by Calvin C. Chang. Published by Marmon-Herrington Company, Inc., Indianapolis, Ind. 236 pages, 8 x 5. Price $2.50.

To meet a need for a comprehensive book of English-Chinese automotive nomenclature, this volume contains thousands of words used in the automotive business, printed both in English and Chinese characters.

Because many dialects exist in China, the author has presented this book in the hope that it may assist in standardizing Chinese automotive names and terms. Automotive transport is expanding so rapidly in China during the war and will be so fundamental to that nation's rehabilitation after the war, that this pioneer volume is expected to be of great value.

State Officials Meet Los Angeles AGC to Consider Post-War Problems

A BANQUET of the Los Angeles chapter of Associated General Contractors of America was held on May 10 as the opening move of the chapter's postwar business program. Participating in the meeting were C. H. Purcell, director of public works in California; Col. Alexander R. Heron, state director of reconstruction and reemployment; Dr. Robert A. Millikan, president of California Institute of Technology; Don McCreery, president of the Los Angeles section of the American Society of Engineers; and various mayors and other officials of the Southern California area.

The meeting was presided over by E. S. McKittrick, president of the Los Angeles chapter of A.G.C. More than 500 were in attendance at the dinner, 200 being public officials.

A message was read from Governor Warren of California in which he briefly outlined the wartime growth of the state and the challenge presented for the postwar period. He indicated the contribution which must be made to postwar prosperity by the construction industry.

Col. Herron followed Governor Warren's message by pointing out the need for planning, and even greater responsibility for blueprinting, now. He urged both governmental agencies and private business to appropriate money immediately for complete design of postwar projects.

Purcell described the work of planning now under way in the offices of the California Division of Highways and emphasized that at the close of hostilities the state will have plans prepared and right-of-way for an $80,000,000 highway program. The Division of Architecture and the Department of Education are also making good progress on the preparation of blueprints for institutions and buildings to be built after the war.

The principal address of the evening was given by Frank J. Connolly, manager of the Los Angeles chapter. His talk was entitled "Let's Take the Highroad" and was condensed into a booklet which has subsequently been distributed throughout the state. His address was illustrated by numerous charts showing the growth in different fields for recent years. Among other things the charts graphically illustrated the relation of home building to population and income in recent years, the decline of public works construction in Southern California recently, and perhaps most telling, a comparison of the amount of time required for the three stages of a construction project. Whether in the case of public works, industrial building or residential building the period of initiation and development is the longest. The period of preparation and design is somewhat shorter and is approximately equalled by the period of construction. In other words the actual building time, during which many men are employed, is less than one-third of the total time involved in the completion of a given proposal. Unfortunately, it is the last third which emphasizes the need for planning now if the employment period is to be ready when the men are available.

Workers Sought for Big Washington War Project

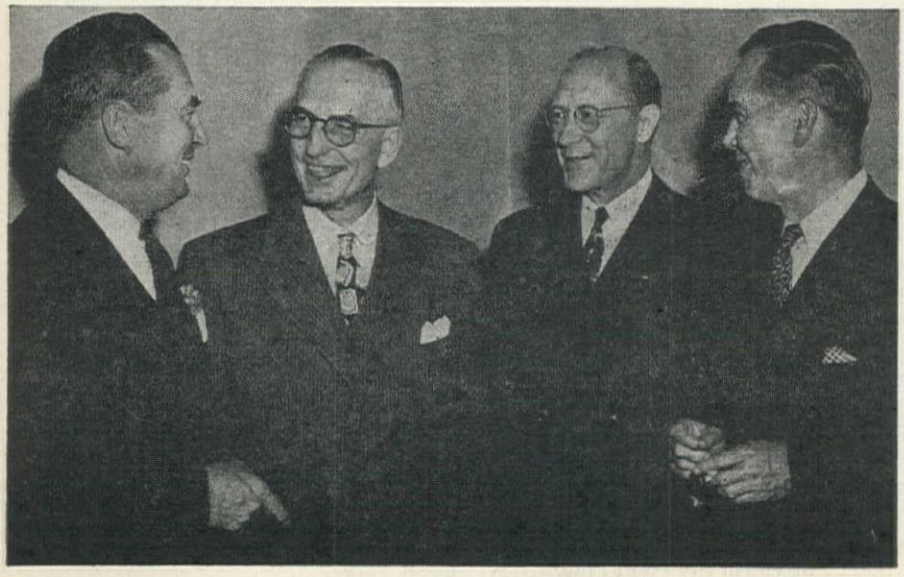
At the urgent request of the War Department, Joseph D. Keenan, Vice Chairman of the War Production Board, has appealed for several thousand construction workers to go to Pasco, Wash., to work on an important war project. He voiced the appeal before the Pennsylvania State Federation of Labor at Wilkes-Barre on Apr. 19.

"So urgent is the need of men," he said, "that on Monday of this week Robert Patterson, Under Secretary of War, called a conference in his office attended by William Green of the American Federation of Labor and representatives of several international unions, to request the help of the Building and Construction Trades Department in recruiting the needed mechanics and laborers."

The project needs 4,000 unskilled laborers at the rate of $1.00 per hr., 750 electrical workers at $1.55, 750 millwrights at $1.40, 320 welders at $1.20 to $1.62½, and 75 U-69 welders at $1.80 per hr.

Keenan referred workers to their local USES or WMC offices for detailed information, but stressed that the War Department has instructed the contractor in charge of the project to advance the cost of transportation and to supply incidental expenses to all workers who need it.

IN ATTENDANCE at the post-war planning banquet of Los Angeles AGC were l. to r.: GEORGE J. O'BRIEN, vice-president, Standard Oil Co. of Calif.; HAL THOMAS, regional director, Committee for Economic Development; E. S. McKITTRICK, president, Los Angeles chapter; and HERBERT ORMSBY, Research Director, State Chamber of Commerce.



Supreme Court Settles O'Shaughnessy Dam Suit

THE LEGAL BATTLE between the Transbay Construction Company and the city of San Francisco has been finally terminated. The case arose over excavation at O'Shaughnessy dam, on which the company was the contractor. The contract was awarded in 1935; unit bids were published in *Western Construction News* for February, 1935. The work involved raising the dam 85 ft. The structure is on the Tuolumne River and is the main storage reservoir for the city's water storage and power development.

The original estimate included 30,000 cu. yds. of excavation; the final figure was reported to be 84,000 cu. yds. The rate of payment for this additional excavation was the basis of the suit which has been in the courts for a number of years. The case was decided in favor of the city some time ago by the Supreme Court of the United States, but the company filed an amended complaint, seeking to reopen the matter in the lower courts. The Supreme Court declined to reconsider this complaint and the case was officially closed with the payment by the city of $20,000 which had been withheld pending settlement of another case involving use of a patented fixture by the company. Court costs were assessed to the company.

USED Selling Surplus Government Facilities

THE WAR DEPARTMENT has declared that 15 government owned projects located on leased land throughout the Northwest are surplus and the real estate division of the United States Engineer Office is studying them with a view to disposal. They include former C.C.C. camps at Woahink Lake, Foss,

Stanfield, Squaw Creek in the Pendleton reservation, Heppner, Baker (all in Oregon), and Meridian, Idaho; W.P.A. barracks at Longview, Washington; and former Army barracks at the Gold Beach fairgrounds, Bandon, Waldport, Newport, Manzanita and Woods (all in Oregon).

It is probable the installations will be submitted for purchase to the highest bidder. The announcement of the availability of these northwest installations follows closely the sale and dismantling of Camp Young and six sub-camps near Indio, California, and the discontinuance of activities at the Army Air Base at Blythe, Calif.

The Camp Young facilities were abandoned because they were designed for training Army units in desert warfare. With the cessation of hostilities in North Africa this type of training was no longer required. The Blythe airfield was discontinued because atmospheric conditions do not seem suitable for training of pilots there.

Idaho Private Utilities Merge Power Properties

THE PROPERTY of the West Coast Power Co., serving 15 communities in southern Idaho, will be transferred to the Idaho Power Co., Boise, according to C. J. Strike, manager of the latter concern.

Officials of the two companies have agreed on the basic principles of the transfer, and are working out the details. Communities affected are Hailey, Ketchum, Bellevue, Carey, Gannett, Picabo, Richfield, Fairfield, Cascade, McCall, New Meadows, Council, Mesa, Cambridge and Midvale.

Uniform rates of the Idaho Power Co. will be established through the territory and will result in substantial savings to customers, both domestic, commercial and industrial. Present West Coast employees will be offered an opportunity to join the Idaho Power organization.

West Coast at one time was a subsidiary of the vast Foshay utilities empire, but at the breakup of that organization became independent.

Idaho Power Co., formerly affiliated with Electric Bond and Share, recently became almost exclusively home owned when, pursuant to an SEC order, Electric Bond and Share sold its common stock holdings in Idaho, at public offering.

Construction Machinery Shipments on Increase

SHIPMENTS of all types of construction machinery have increased materially due to the impetus of the war effort, according to bulletins issued by the Construction Machinery Division of the War Production Board. While it is true that practically 100 percent of the production went to the armed forces, the increased output indicates that facilities will be available for meeting the pent-up demands of the construction industry when civilian production is resumed.

Shipments of road rollers during 1943 amounted to 2,850, nearly three times the number shipped in 1937, although only 50 percent more than in 1941. Recent planned expansions indicate that production will be even greater in 1944.

A total of 5,054 hauling type scrapers were shipped in 1943, which is an increase of only eleven over 1941 but is more than five times the production in 1937.

In 1943, shipments of angledozers and bulldozers totaled 16,110, and 5,320 graders were shipped. At least 95 percent of both types of equipment went to the military services. In both cases the output was more than double that for 1942.

Concrete and bituminous pavers are the only important construction equipment item to show a decreased production in 1943. In that year, shipments totaled 246, which was less than the yearly average during the 1937-1941 prewar period. In 1941, the peak year, 417 were produced.

OBITUARIES . . .

Frederick Q. Teichert, vice-president of the firm of A. Teichert & Son, Inc., of Sacramento, Calif., died May 12 in that city, at the age of 28. He was a director of the Northern California chapter of the Associated General Contractors, and a member of the American Society of Civil Engineers. He had been a member of the poineer construction firm since his graduation from college in 1936.

* * *

Jeremiah Ahern, life member of the American Society of Civil Engineers and honorary member of the Sacramento Section, died at Dixon, Calif., on April 19, at the age of 83. He became a member of the Society in 1904, and a life member in 1937. On receiving his degree in civil engineering at the University of California he entered the government service in the topographic branch of the U. S. Geological Survey, where he was engaged for several years before transferring to the U. S. Reclamation Service. He retired to private practice and life on his ranch near Dixon in 1908.

* * *

Palmer W. Blanchard, 51, president of the construction firm of Blanchard Brothers Construction Company of Denver, Colo., and a long time resident of that city, died April 28.

At the time of his death he was a member of the Executive Committee of the Colorado Contractors Association, an affiliated chapter of the Associated General Contractors of America, and at one time was president of the Wyoming A. G. C. Chapter, while a resident of Cheyenne.

* * *

Charles E. Randels, for the past 18 years civil engineer for the U. S. National Park Service, died April 11 in Tucson, Ariz., at the age of 56. He had served as chief civil engineer in Lassen National Park, Calif., and for a period of eight years was at Glacier National Park, later serving at Teton and Rocky Mountain National Parks.

* * *

Edwin P. Dewey, former city engineer of Pasadena and Long Beach, Calif., died at the age of 85 following a short illness. He was especially well known for his work on sewage disposal problems of the west. In addition to preparing plans and supervising construction of Pasadena's sewage disposal system, he drew the plans for the San Rafael bridge which spans the Arroyo Seco, acted as engineering consultant to the city of Pomona and other southern California sewage disposal districts.

* * *

Archie E. Palen, 61, former District Engineer for the U. S. Public Roads Administration for the Colorado, Wyoming and New Mexico District, with headquarters at Denver, died May 1, in St. Paul, Minn., where he had resided since 1933 when he accepted employment in the same capacity in another district.

* * *

R. E. Cowden, who for 25 years prior to his retirement a few years ago, was locating engineer for the Colorado State Highway Department, died May 14 in Denver. He had also directed construction on many of the railroad tunnels in Colorado. He was 81 years of age.

* * *

C. F. Sanborn, construction engineer for the J. B. Warrack Construction Co., and a national director of A.G.C., died April 28 in Seattle, Wash. He is a past-president of both the Northwest branch and the Seattle chapter of A.G.C., and has been in charge of construction for the Warrack company in Alaska and the northwest for 17 years.

* * *

H. A. Eddy, 52, assistant city engineer of Glendale, Calif., died recently in that city following a heart attack. He had been prominently identified with civic affairs for more than 30 years and at one time was president of the Glendale-Burbank Engineers' Club.

* * *

Cornelius J. Marvin, chemical and construction engineer for the du Pont Company for more than 25 years, died April 26, at his home in San Marino, Calif., following a brief illness.

* * *

Amos S. Benson died in Los Angeles recently at the age of 66. He was a former Oregon timberman and a pioneer in the construction of the Columbia river highway.

* * *

Nels H. Sjoberg, general contractor of Oakland, Calif., died in Elko, Nev., on

May 17 at the age of 65. He was a member of the San Francisco Builders Exchange.

* * *

George T. McGee, mining and construction engineer of Altadena, Calif., died on May 29. He had been active in building the Illinois and Mississippi canals and in western mining.

* * *

Vincent G. Shinkle, a retired electrical engineer, and for more than 20 years secretary-treasurer of the Washington Water Power Co., of Spokane, Wash., died in Pasadena, Calif., on May 23.

* * *

Robt. T. McClelland, an associate engineer in the engineering section of the U.S.E.D. in San Francisco, Calif., died recently in Berkeley, Calif. He was 60 years old.

* * *

Lyman Griswold, consulting engineer, and major of engineers in the first world war, died in Portland, Ore., on May 10, at the age of 64.

Charles Stockholm, 78, pioneer general and building contractor of San Francisco, Calif., died in that city recently.

* * *

Irving H. Burrell, 63, a member of the firm of Burrell Construction C. and its successor, California Bridge Co., died on May 22 in Oakland, Calif.

* * *

Ernest A. Baack, retired building contractor, died May 14 at Berkeley, Calif., at the age of 84.

PERSONALLY SPEAKING

COL. FISHER S. BLINN

Colonel Fisher S. Blinn of Marion, Ind., has been awarded the Legion of Merit for outstanding performance as resident engineer and commander of engineer troops on Amchitka. Colonel Blinn has been in Alaska since 1940 and has served as Resident Engineer on many important Army Engineer construction projects in that area.

* * *

Christopher D. McKeon has been elected president of the Associated Home Builders of San Francisco. He suceeds **Ellis Stoneson.** Other officers of the group are **Henry Doelger,** vice-president, **J. C. Johnson,** secretary, and **Earl Popovich,** treasurer. Directors are **Carl Gelert, Alfred T. Morris, Jr., H. C. Billings, Jr., Nils E. Johnson, Lloyd Sundeberg,** and **Albert Bernhardt.**

* * *

F. W. Slattery, U. S. Bureau of Reclamation engineer, is in charge of surveys and construction of all canal work for the Bureau on the Deschutes project at Bend, Ore. Slattery is a past president of the New Mexico section of the American Society of Civil Engineers. He was chief engineer on the Tule Lake project, W. R. A., and prior to this was assistant regional engineer with the Soil Conservation Service at Albuquerque, N. Mex.

* * *

Thomas G. Bard, consulting engineer, has been employed by the city of Santa Barbara to prepare a preliminary report on a city-wide post-war flood, erosion and drainage control project. Through construction of a breakwater some time ago, the ocean littoral currents were changed and as a result large sections of recreational beach have been washed away. Although replaced by dredge and fill, the erosion process has continued until now it is a critical problem.

* * *

Samuel F. Newkirk Jr., engineer and superintendent for the board of water commissioners, Elizabeth, N. J., in charge of operation, maintenance and additions to the physical plant, has been elected president of the American Water Works Association. He succeeds **Samuel B. Morris** of Stanford University. **Leonard N. Thompson,** general superintendent and engineer of the Saint Paul water department, Saint Paul, Minn., has been elected vice-president of the Association. **William W. Brush,** editor of *Water Works Engineering,* was re-elected treasurer, and **Harry E. Jordan,** editor of the *Journal of American Water Works Association* and executive secretary of the American Water Works Association since 1936, has been re-elected secretary. These men will take office at the close of the annual conference in Milwaukee, Wis., on June 16, 1944.

* * *

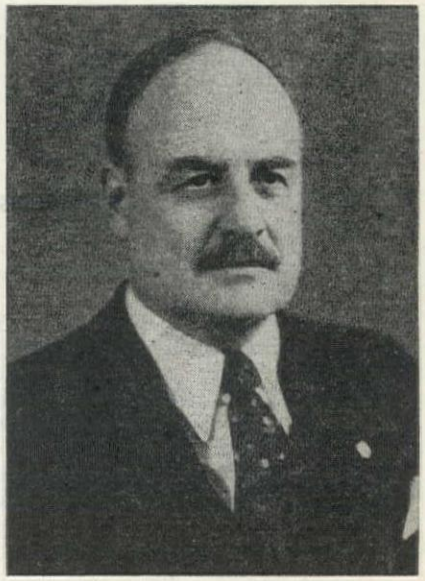
At the 25th Annual Meeting of the Wyoming Engineering Society held in Cheyenne, the following officers were elected: **George T. Cunningham,** President; **Chas. M. Smith,** Vice-President; **Kirby H. Olds,** Secretary-Treasurer.

Cunningham is State plant engineer, Mountain States Telephone & Telegraph Company located in Cheyenne. Smith is a bridge contractor located in Thermopolis and is State Senator from Hot Springs county. The secretary, Kirby Olds, is a designer in the Wyoming Highway Department.

* * *

Major Archer W. Bedell has reverted to inactive army status in accordance with Army practice of releasing personnel for whom specialized assignments no longer exist.

Major Bedell had been employed as an engineer with the Highway Department of his home state of Minnesota and had been Rice county and Faribault City Engineer prior to entering on active duty. For the past two years and up to the time of his release, he had been on duty with the Corps of Engineers at the Seattle, Wash., Port of Embarkation.



SAMUEL F. NEWKIRK, JR.

The following changes in the division engineer personnel of the Southern Pacific Co. are announced: **George L. Morrison,** former division engineer on the Salt Lake Division, is transferred to Shasta Division; **J. Stewart** has been assigned to the Ogden post from assistant division engineer on the Rio Grande Division, and **George M. Rowe,** assistant division engineer on the Los Angeles Division since 1942, has been transferred to the post vacated by Stewart on the Rio Grande.

* * *

Maj. Harold J. Richen, formerly of Oswego, Ore., is executive officer of an engineer aviation battalion in New Guinea, on construction of airfields, docks, bridges, and buildings. He reports, "This is construction in the raw, hindered by such things as 4 in. rain in 2 hours and occasional bombing."

* * *

D. B. Lund, refrigeration engineer, formerly of Billings, Mont., and for the past two years connected with The Kettering Company of Denver and Peter Kiewit & Sons of Omaha on cold storage plant construction, has been enlisted into the Navy ship repair units as a chief petty officer.

* * *

Allston R. Zryd and **John A. Gilmont,** assistant engineers for the Bureau of Rec-

lamation at Sacramento, Calif., and **Cecil L. Killgore** and **A. J. Larrabee**, employees of the Bureau at Redding, Calif., have been awarded special prizes for meritorious service to the agency. The award results from an improved process for coloring maps, in the case of Zryd and Gilmont, and a new method of generator frequency control in the case of Killgore.

* * *

D. Lester Lynch, a former field engineer with the Kaiser Co., Inc. at Portland, Ore., and until recently engaged in a special study of the use of wood waste in the war production of cellulose for Simpson Logging Co. at Shelton, Wash., has been commissioned a lieutenant in the U. S. Naval Reserve.

* * *

Roy Woodward, engineer of Pacific county, was elected president of the Washington State Association of County Engineers at the 38th annual meeting of the group. **Harold Blanton** of Franklin county was elected vice-president, and **Hjalmar Walberg** of Skagit county was named secretary-treasurer.

* * *

Arthur F. Royce has returned to his home in southern California and is employed as assistant naval architect in the design section at Roosevelt Base, Terminal Island, San Pedro. His specific duties involve stability calculations on naval vessels for U. S. Naval Drydocks.

* * *

Capt. Walter E. Brown, commander of the Pocatello naval ordnance plant, has been awarded the Brazilian Order of the Southern Cross, for his services to the southern republic in its ordnance program.

* * *

Austin W. Earl and **J. G. Wright**, San Francisco civil engineers, in recognition of their outstanding engineering services to the Government, have received the Meritorious Civilian Service award medals from the Bureau of Yards and Docks, Navy Department.

* * *

Kenneth J. Greene, who has been liaison engineer with the Goodyear Aircraft Corp. at their plant at Litchfield Park, Ariz., is now manager of the Modification Engineering Department which is actively engaged in modifying B-24 Liberators into Navy PB4Y-1s.

* * *

W. J. Homan is now chief of the Salt Lake City, Utah, branch of the Water Resources Division of the Sacramento District office of U. S. E. D., in charge of post-war planning for maximum flood control and water utilization in the area.

* * *

Gordon Long has been promoted from Captain to Major. He was formerly assistant bridge engineer with the State Division of Highways, and at the present time is in charge of the testing laboratory for the U. S. E. D. at Sacramento.

* * *

Dr. L. H. Fuller, formerly head of the electrical engineering school at University of California, has been appointed assistant chief engineer of the Joshua Hendy Iron Works at Sunnyvale, Calif. He has served the firm in a consulting capacity for the past 16 months.

ON A RECENT inspection tour of the Pan-American Highway through Central America were, l. to r.: RALPH A. MILLS, contractor on the Public Roads Administration work in Costa Rica; EDWIN W. JAMES, Chief Interamerican section, P.R.A.; MAJ.-GEN. PHILIP B. FLEMING, director of the Federal Works Agency; Commissioner THOS. R. MacDONALD, P.R.A.; M. L. HARSHBERGER, resident engineer for P.R.A. on the difficult work in Costa Rica.

The Northern Construction Co. of Portland, Ore., has moved from the Oregonian Building into more spacious quarters, with warehouse facilities at 2384 N. W. Savier St. **R. M. Robson** is general manager of this construction firm.

* * *

William Fairley and **Robert B. Rothschild, Jr.** have become members of the firm of Haas Construction Co., with offices located in the Merchants Exchange Building, San Francisco, Calif.

* * *

Clarence L. Forsling, who has held various positions with the U. S. Forest Service in Utah and New Mexico and has recently been assistant chief of the Service, in charge of research, has been named director of the Grazing Service.

Lloyd Y. White has been appointed by Morris and Van Wormer, consulting management engineers of New York City, as their Pacific Coast representative, and has established offices in San Francisco, Calif.

* * *

H. W. Lindsey has been appointed manager of Western States Utility Co. property at Winnemucca, Nev., replacing **A. J. Shaver**, who has become Nevada commissioner on the Colorado River Commission.

* * *

Cols. Ewart C. Plank, Theodore M. Osborne and **Frank O. Bowman**, Corps of Engineer officers from the Western states, have each been promoted to the rank of Brigadier General.

* * *

Arthur V. Walker of Sacramento, Calif., has accepted an appointment as Highway Engineer with the Bureau of Public Roads and expects to be stationed at Baton Rouge, Louisiana.

* * *

John M. Neff, formerly a government works project engineer, has been appointed planning engineer of Salt Lake county, Utah, to direct post-war planning activities in the county.

* * *

A. T. Hutchinson has been appointed application engineer at the Portland, Ore., office of Westinghouse Electric & Manufacturing Co.

* * *

Raymond Jack, architectural draftsman with Lockheed and Consolidated Vultee Aircraft companies, has been appointed deputy building inspector of Pasadena, Calif.

* * *

Roger Bates, San Francisco, Calif., has been re-appointed city engineer of Concord, Calif.

SUPERVISING THE JOBS

Carl Marquardt is general superintendent on construction of naval magazine facilities at Anaheim Bay, Calif. for Wm. Simpson Construction Co. and W. E. Kier Construction Co., southern California contractors. Other personnel are **M. (Mickey) Mikklesen,** carpenter superintendent; **Ray Gomes,** concrete superintendent; **E. J. Lessing,** labor foreman. **Charles Stains** is in charge of dirt moving, contract for which was awarded the W. E. Kier Construction Co. and T. M. Page Company of Glendale. **H. E. Martin** is superintendent for Consolidated Rock Products Co. of Los Angeles, handling the concrete work. **Dick Fowler** heads the engineering force.

* * *

Ross Phillips is superintendent for the Macco Construction Co. on this company's contract to construct rock seawall at the Naval Air Station at Alameda, Calif. Phillips is being assisted by **Neal Foulger, Andrew Cathey,** and **M. E. Smith,** seawall foremen, **Sam Castelli,** piledriver foreman, **Fred Jasken,** framing foreman, and **Sam Rodgers,** concrete foreman. **G. F. Kemp** is timekeeper on the job. The contract was awarded to Macco, contractor of Oakland and Clearwater, Calif., at $273,650, by the Bureau of Yards and Docks.

* * *

George E. Ruark, formerly welding superintendent on the Goodyear synthetic rubber plant in Los Angeles, and for a time a member of the firm of Continental Construction Co. located at 12020 S. Vermont Ave., Los Angeles, Calif., is now operating as a welding contractor under the name of George E. Ruark Welding Service, at the same address. Ruark is performing work for the U. S. Navy at the present time.

* * *

Mike Nealson is superintendent for Graham Brothers, Inc., Los Angeles, Calif., on the filling and grading up to finish grade for concrete, on the foundations for the Maywood Army Air Depot project. **Art Brogan** is general transportation manager for Graham Brothers, and **Charlie Devore** is assistant to the superintendent in the grading. Contract was awarded at approximately $180,000.

* * *

Francis W. Megarry of Megarry Bros., Minnesota contractors, is superintending the construction of approximately 22 mi. deep drain and 675,000 cu. yd. excavation at Shepherd, Montana, for his firm. **John Hillman** is superintendent of pipe and crossing installations. This is a $86,000 contract and work will be completed about June 15, 1944.

* * *

Glenn Fredrickson is acting as superintendent on the $330,180 contract which was awarded to his firm, Fredrickson Bros., Emeryville, Calif., for the construction of roads and railroad holding yard at the Benicia Arsenal in Benicia, Calif. **J. H. Wylie** is office manager and **Fred Butler** grading foreman.

ROSS W. PHILLIPS

* * *

E. J. Garbarini is superintendent of construction for Bechtel-McCone-Parsons Corp. on construction of a sulphuric acid plant at Richmond, Calif. Garbarini formerly occupied the same position for the contractor on construction of butadiene plant and sulphuric acid plant in the Los Angeles area.

* * *

Joseph A. Kinzley, formerly heavy construction superintendent for the U. S. District Engineers in Panama, is now serving in the field engineering department of John W. Stang Corporation on a contract for the installation of well point systems in San Diego, Calif.

* * *

John McLeod, superintendent, **E. T. Benson,** general foreman, **W. C. VanDivort,** project manager, and **James B. Lewis,** purchasing agent, are in charge of construction of an engine shop in Auburn, Wash., for the Atherton Construction Co., Seattle, who received the contract at $500,000.

* * *

Additional personnel for the contracting firm of William Crowell Company, Pasadena, Calif., on their Long Beach contract includes **Victor Gavel,** assistant superintendent on the utility buildings. **J. E. (Tommy) Thompson** is carpenter foreman and **J. E. Solem** is superintendent on construction of the portable units on the same project for Shumaker & Evans. Sully Miller Construction Co. has the grading contract. The sewer contract is held by Artukovich Bros., and Howe Bros. have the plumbing work on the project.

* * *

W. E. Byars is job superintendent on construction of highway paving in El Paso, Culberon, Jeff Davis and Hudspeth counties for Ned B. Hoffman, contractor of Fort Worth, Texas. Contract was awarded to Hoffman at $73,773. **M. J. Robertson** is general superintendent for the contractor.

* * *

George R. Nethery is general superintendent for Scherer & Prichard, Redlands, Calif., on erection of 4 storehouses and other buildings at Camp Elliott, San Diego, Calif. Job superintendent on the $76,188 project is **Marion Hauser.**

* * *

Charles L. Campbell is superintendent of grading for Bohannan & Chamberlain, on grading of streets and lots at a housing project in San Lorenzo, Calif., one of the largest in the country. **Bob Slater** and **Earl Brooks** are foremen on the job. The resident engineer is **Charles Rockwell.**

* * *

Jack E. Douglass, until recently maintenance superintendent for Utah Construction Co. on a coal stripping project at McDonald, Pa., has left the construction business for the present and is operating his own sawmill north of Ukiah, Calif., cutting 20,000 bf. of fir and redwood lumber daily.

* * *

J. H. Oliver is project manager for Barrett & Hilp, San Francisco, Calif., on their project at Port Chicago, Calif. **A. W. Baum** is the contractor's engineer on the project. **J. W. Warn** is field superintendent and **George Warn** is carpentry superintendent.

* * *

Howard C. Hill, job superintendent for Robert E. McKee, contractor of Los Angeles, Calif., on a $105,000 contract to build a car-icing dock at San Bernardino, Calif., is being assisted by **R. V. Robinson,** carpenter foreman.

* * *

Norman Smith is in charge of construction of concrete aprons and some asphaltic pavement at the Tooele Ordnance depot, Tooele, Utah, for R. J. Daum, contractor of Inglewood, Calif., who holds the $108,649 contract.

* * *

Francis Thomas is superintendent and **Robert Bayard** is his assistant on the $9,000,000 water works contract being constructed in Caracas, Venezuela, by S. J. Groves & Sons Co. and Johnson, Drake & Piper, Inc., acting as joint contractors on the project.

* * *

R. L. Smith is general superintendent and **Jimmie M. Rice** is job superintendent for United Concrete Forms, of Chicago, Ill., a sub-contractor on construction of the ammunition storage base at Anaheim Bay, Calif.

* * *

J. A. Golden has been made job superintendent for M. H. Golden Construction Co., San Diego, Calif., on construction of a quay wall at Spanish Bight, a portion of

Photo by US Army Signal Corps

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SEATTLE . . 3410 First Avenue South

the Naval air station at San Diego. The contract is for $1,810,825.

* * *

Robert B. Ogden is serving as superintendent on the $110,800 job awarded to Flotation Systems, Inc., Los Angeles, Calif., to construct a swimming pool at the Naval hospital at Long Beach, Calif.

* * *

Ernie Morgenthaler is supervising the job awarded to Clements & Co., Hayward, Calif., at $79,981, for road repairs and parking area construction in Richmond, Calif.

* * *

W. L. Denton is in charge of construction for M. H. Golden Construction Co., San Diego, Calif., on a $544,934 contract to erect a 240-bed addition to the Naval hospital at Corona, Calif.

L. H. Calkins is superintendent for Stolte, Inc., Oakland, Calif., on two important contracts at the Naval air station at Alameda, Calif. The first is for $1,423,000 to build barracks and sea plane hangar foundations, and the second is for $517,000 to relocate Atlantic Ave. at the base.

* * *

W. L. Osborne has been appointed superintendent by Flotation Systems, Inc., Los Angeles, Calif., to direct construction of a combat training tank at Camp Pendleton, near Oceanside, Calif., a $82,291 contract.

* * *

Ole Michelson is job superintendent for Quigg Bros. Construction Co., Hoquiam, Wash., in charge of clearing, grading, draining, surfacing and road-mix oiling on about 1.3 mi. of primary State Highway 9 in Grays Harbor county, Wash. Manager for the project is **Charles O. Quigg** and purchasing is in charge of **Otto B. Eklund.** This is a more than $729,000 contract.

* * *

William Vezey is in charge of construction of a community hospital and nurses' home at Pittsburg, Calif. The work is to cost $439,886, and is being constructed by Stolte, Inc., Oakland, Calif.

* * *

Carroll A. L'Ecluse of Arcadia, Calif., a concrete inspector for a construction firm, has been reported missing in action in the Mediterranean area. He was serving as the pilot of a bomber.

* * *

Cecil Welton has been named job superintendent for Clements & Co., Hayward, Calif., on their $98,840 contract to repair sections of highway between Rattlesnake Summit and Garberville, Calif.

* * *

A. W. Poulton superintendent of the Austin Co., is now in charge of the construction of the new cafeteria building being built by this company for North American Aviation at Los Angeles. Acting as unit superintendent is **J. C. Matchette.**

* * *

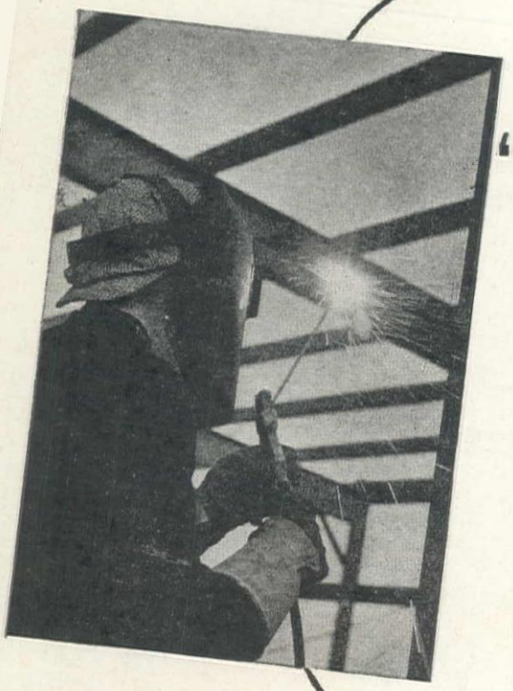
Robert M. Law, who has been a key man on southwestern construction jobs, and formerly labor foreman for J. L. Barnes Construction Co. at the marine base at El Toro, has been inducted into the Navy as machinist second class.

* * *

Superintending the erection of theater and barracks buildings for the contracting firm of Haddock-Engineers, Ltd. at the Amphibian Tractor Battalion Training Center at Oceanside, Calif., is **Joe H. Thomas,** assisted by **Guy M. Gault.**

* * *

Paul Speer of the Structon Construction Company in Los Angeles is supervising work on two nursery school projects being built at Compton and Lakewood schools in Los Angeles.



"Man, What Sweet Electrodes"

"I used to think an electrode was just a piece of wire with a coating on it.

"But the war has shown me I was mistaken. I've used enough of them in the last few years to know how important electrodes are when it comes to making time and turning out a good job.

"I've learned, too, that there can be a lot of difference in electrodes — even if the analysis is the same.

"That's why I prefer Wilson Electrodes. They work easier and produce a smoother, better looking job. And you can count on them always being the same.

"Give me a Wilson Electrode in the holder, and I'll go places."

The Man in the Helmet

3 WILSON ELECTRODES FOR FASTER AND BETTER WELDING

WILSON No. 98N

An all position, reverse polarity shielded arc electrode for general purpose DC welding where high ductility and tensile strength are essential.

Its high deposition efficiency permits increased welding speeds in vertical and overhead positions along with excellent contour of the weld deposit. Fillet welds in vertical and overhead positions have a relatively flat face.

WILSON No. 105

This shielded arc electrode can be used with high current — either AC or DC — permitting exceptionally high welding speeds. The weld deposit is unusually smooth and spatter loss is very low, due to smooth action of the arc. The penetration of this electrode is excellent and slag removal is exceptionally easy.

For horizontal and flat positioned fillets and groove welds on rolled steel plate structurals and castings.

WILSON No. 107

A general purpose, all position, straight polarity electrode for DC or AC welding. Especially recommended for single or multiple pass welding on plates or sections *where fit up is poor and where high welding speeds and good appearance are of first importance.*

The deposit is exceptionally smooth and the slag is readily removed after the weld has cooled.

Any nearby Airco Office will be glad to furnish further details on these and other Wilson Electrodes. If you prefer, write to Dept. WCN at the New York Office.

WILSON

ASK THE MAN IN THE HELMET

Electrodes

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UNIT BID SUMMARY

Airport . . .

California—Santa Barbara County—Navy—Runways

A. Teichert & Son, Inc., Sacramento, Calif., submitted the lowest bid on grading and paving runways and parking areas at the Marine Corps air station at Santa Barbara. The bid was submitted to the U. S. Navy Bureau of Yards & Docks, and amounted to $863,683. The work includes two asphaltic runways, each 250 ft. wide, taxiways and parking areas, the removal of existing revetments, installation of boundaries and erection of barracks and other buildings. Unit bids submitted were as follows:

(A)	A. Teichert & Son, Inc.	$863,683	
(B)	Warren Southwest, Inc.	926,945	
(C)	Casson & Ball	938,590	
(D)	Basich Bros.	947,656	
(E)	Griffith Company	953,704	
(F)	MacDonald & Kahn	$ 963,672	
(G)	Haddock-Engineers, Ltd.	967,407	
(H)	Owl Truck & Construction Co.	1,009,213	
(I)	Macco Construction Co.	1,050,714	

(1) 45,000 cu. yd. excavation.
(2) 147,000 cu. yd. imported borrow.
(3) 110,000 cu. yd. selected borrow.
(4) 8,500 tons emulsified asphalt for stabil. base.
(5) 200 tons emulsified asphalt for seal coat.
(6) 26,000 sq. yd. emulsified asphalt stabil. base.
(7) 376,400 sq. yd. 8-in. emulsified asph. stabil. base.
(8) 53,000 tons asphal. cement concrete.
(9) 10,200 cu. yd. Portland cem. conc. pavement.
(10) 95 cu. yd. Portland cem. conc. drain. structs.
(11) 1,320 lin. ft. 12-in. corr. metal pipe.
(12) 210 lin. ft. 15-in. corr. metal pipe.
(13) 910 lin. ft. 18-in. corr. metal pipe.
(14) 80 lin. ft. 21-in. corr. metal pipe.
(15) 2,760 lin. ft. 24-in. corr. metal pipe.
(16) 68 lin. ft. 21x13½-in. corr. metal arch.
(17) 850 lin. ft. 25¾x15½-in. corr. metal arch.
(18) 700 lin. ft. 30x17-in. corr. metal arch.
(19) 560 lin. ft. 37x21-in. corr. metal arch
(20) 296 lin. ft. 24-in. reinf. concrete pipe.
(21) Lump sum, install (3) 24-in. automatic drainage gates and salvage (1) 24-in. same.
(22) Lump sum, salvaging and relaying 310 lin. ft. corr. metal arch.
(23) Lump sum, removing 5 revetments.
(24) Lump sum, lighting system for runways.
(25) Lump sum, building construction.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
(1)	.40	.55	.44	.70	.60	.40	1.17	.40	.50
(2)	.65	.80	.77	.75	.63	.66	.70	.76	.87
(3)	.60	.70	.62	.75	.69	.75	.66	.71	.90
(4)	20.00	20.50	19.00	17.00	22.90	17.00	18.50	22.60	20.00
(5)	20.00	22.00	20.00	18.00	30.00	20.00	25.00	25.40	30.00
(6)	.17	.14	.20	.17	.17	.30	.28	.26	.30
(7)	.18	.18	.20	.22	.21	.30	.29	.30	.30
(8)	4.20	4.40	4.90	5.00	4.45	5.00	4.35	4.62	5.00
(9)	12.80	12.40	12.71	14.00	14.20	12.50	14.50	14.00	14.50
(10)	60.00	55.00	85.00	40.00	48.00	55.00	65.00	53.00	90.00
(11)	2.25	2.90	3.30	2.25	2.50	2.20	2.55	2.60	2.30
(12)	2.70	3.50	3.80	2.75	3.00	2.80	3.30	3.15	3.00
(13)	3.10	4.30	4.50	3.25	3.50	3.20	3.50	3.70	3.40
(14)	3.50	5.00	5.10	3.75	4.00	3.80	4.10	4.15	4.00
(15)	4.20	6.30	6.50	4.00	5.00	4.40	4.70	4.85	4.60
(16)	4.60	4.70	5.40	3.50	3.70	3.25	4.35	4.05	4.00
(17)	3.90	5.25	5.80	4.00	4.20	3.85	4.60	4.60	4.20
(18)	4.40	6.00	6.40	4.50	5.00	4.40	5.10	5.15	5.00
(19)	6.60	7.50	9.30	6.30	7.00	6.70	7.30	7.25	7.20
(20)	6.30	8.00	9.30	6.30	7.20	6.45	7.50	7.10	6.50
(21)	300.00	250.00	250.00	20.00	120.00	140.00	180.00	205 00	300.00
(22)	900.00	$2.000	$1,500	600.00	$1,000	800.00	870.00	$1,200	600.00
(23)	$8,600	$12,000	$7,000	$2,000	$8,700	$7,000	$6,000	$7,150	$6,100
(24)	$22,000	$21,000	$21,000	$22,000	$21,000	$40,000	$21,700	$2.000	$2,000
(25)	$15,000	$22,500	$21,000	$12,000	$23,380	$20,000	$12,400	$28,000	$18,000

Irrigation . . .

Washington—Yakima County—Bureau of Reclamation—Canals

Macri Company, Seattle, Wash., was low bidder with a proposal of $169,668 to the Bureau of Reclamation and was awarded the contract for construction of earthwork, pipelines and structures on laterals and sub-laterals and 6.7 mi. of diversion channel on portions of the Roza Division of the Yakima project in Washington. The principal items involved are excavation, compacting of embankments and laying about 42,000 lin. ft. of concrete irrigation and culvert pipe. Bids were submitted by the following contractors:

(A)	Macri Company	$169,668	
(B)	Chisholm & Eiford	170,208	
(C)	Thorburn & Logozo	171,991	
(D)	A. C. Goerig Construction Co.	172,687	
(E)	Poe Bros. & Morrison	173,627	
(F)	Watt & Neuman	174,854	
(G)	Oscar Butler & Son	176,477	
(H)	Northwest Engineering Co.	176,620	
(I)	Frazier & Olels	185,038	
(J)	L. Coluccio & Co.	$186,657	
(K)	H. H. Walker, Inc.	187,687	
(L)	Valley Construction Co.	188,246	
(M)	David A. Richardson	199,463	
(N)	Lease & Leigland	207,675	
(O)	Anderson, Nettleton & Baldwin	210,026	
(P)	Leonard & Slate	233,790	
(Q)	Superior Construction Co.	281,518	

		(A)	(B)	(C)	(D)	(E)
(1)	98,000 cu. yd. excavation, common, laterals and channels	.34	.35	.30	.35	.30
(2)	2,000 cu. yd. excavation, rock, laterals and channels	1.50	2.00	2.50	3.00	1.00
(3)	20,000 sta. cu. yd. overhaul	.04	.03	.02	.05	.03
(4)	9,600 cu. yd. compacting embankments	.40	.25	.35	.35	.30
(5)	13,000 cu. yd. excavation, common, pipe trenches	.45	.40	.25	.55	.60
(6)	400 cu. yd. excavation, rock, pipe trenches	2.00	3.00	2.50	3.00	3.00
(7)	3,900 cu. yd. excavation, common, structures	.65	.90	.70	.75	2.40
(8)	100 cu. yd. excavation, rock, structures	2.00	3.00	4.00	3.00	6.00
(9)	5,200 cu. yd. backfill, around structures	.25	.20	.20	.25	.60
(10)	4,400 cu. yd. puddling or tamping backfill	.45	.30	.45	.35	.45
(11)	13,400 cu. yd. backfill, pipe trenches	.25	.25	.20	.25	.21
(12)	1,800 cu. yd. concrete in structures	33.00	36.00	40.00	35.00	33.00
(13)	12,000 lb. placing reinforcement bars	.04	.04	.05	.05	.03
(14)	1,475 sq. yd. dry rock paving	3.00	3.00	2.50	2.50	2.50
(15)	19 M.F.B.M. timber in structures	45.00	40.00	60.00	45.00	45.00
(16)	21,000 lb. installing gates and metal work	.05	.07	.06	.05	.08
(17)	4,500 lin. ft. 6-in. standard conc. irrig. pipe	.40	.36	.35	.35	.48
(18)	8,400 lin. ft. 8-in. standard conc. irrig. pipe	.59	.45	.43	.45	.54
(19)	7,000 lin. ft. 10-in. standard conc. irrig. pipe	.65	.56	.58	.60	.69
(20)	5,300 lin. ft. 12-in. standard conc. irrig. pipe	.85	.83	.78	.75	.87
(21)	2,450 lin. ft. 15-in. standard conc. irrig. pipe	1.15	1.05	1.00	1.00	1.15

(Continued on next page)

4 MOTO-CRANES

TEAM-UP TO ERECT LONGEST WOOD ROOF TRUSSES EVER BUILT

USING 4 Moto-Cranes to raise thirty-one 200 ft. wood roof trusses on the new Ryan Aeronautical Final Assembly Building in San Diego, is a liftable idea submitted by R. E. Hazard & Sons, owners of 12 Lorains.

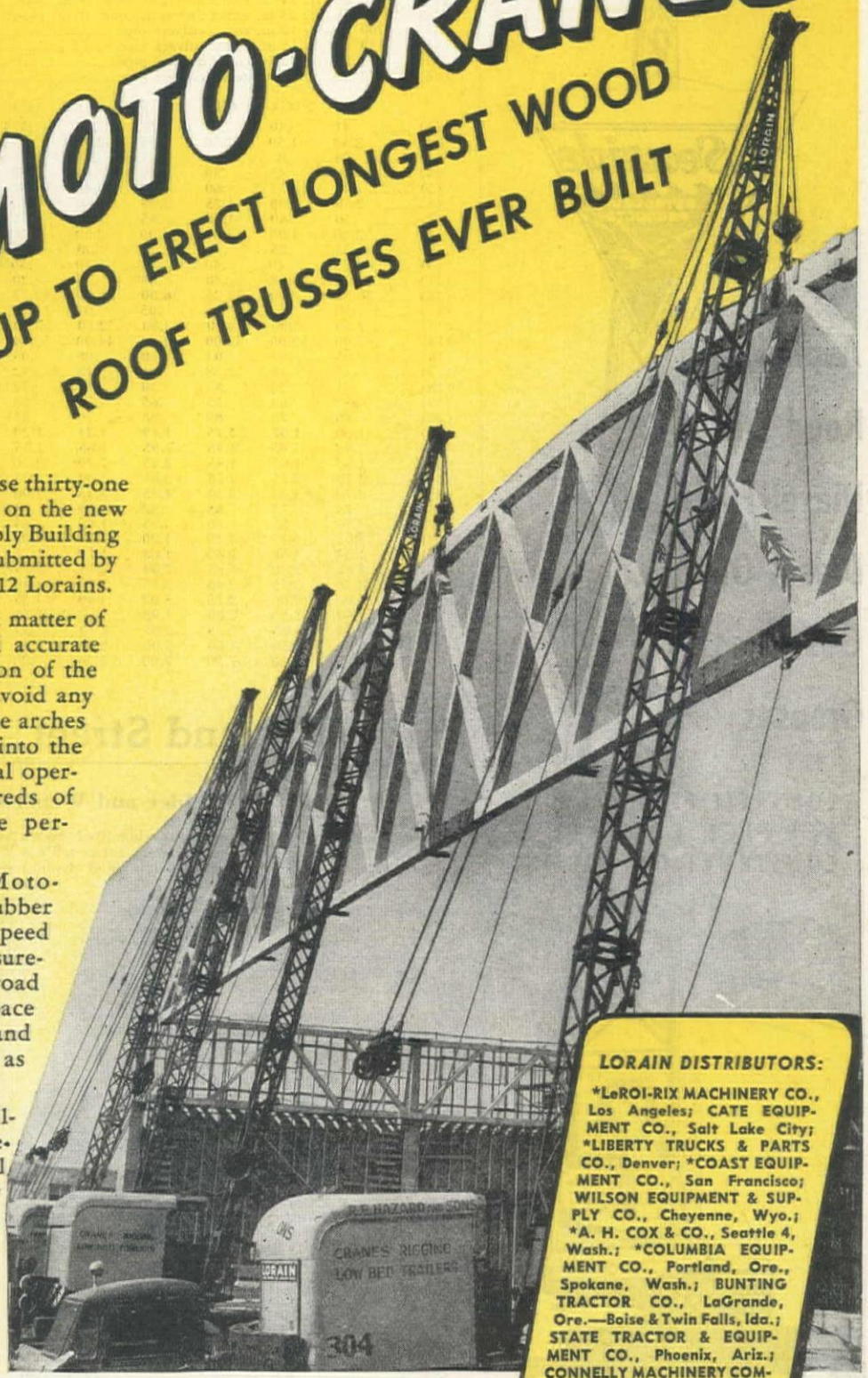
This job was not so much a matter of weight as one of mobility and accurate boom control. Equal distribution of the load had to be maintained to avoid any distortion or mistreatment of the arches while maneuvering each truss into the heel plate positions—an unusual operation, yet typical of the hundreds of varied jobs Moto-Cranes are performing daily.

Completely mechanized, Moto-Cranes are mounted on 10 rubber tires that cushion as well as speed their travel between jobs—are sure-footed and steady on off-the-road jobs, crawl along at a snail's pace or speed up to 35 M.P.H., and jockey into working position as easily as parking your car.

If mobility and maneuverability are essential on your material handling operations, you'll find it mighty profitable to apply Moto-Crane performance on your postwar jobs. See your Lorain distributor for details.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Ryan Aeronautical Company Photo



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Carries a representative stock of spare parts.

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CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

(22)	3,550 lin. ft. 18-in. standard conc. irrig. pipe	1.80	1.50	1.75	1.50	1.60						
(23)	1,460 lin. ft. 21-in. standard conc. irrig. pipe	2.20	1.25	2.10	1.90	2.10						
(24)	600 lin. ft. 24-in. standard conc. irrig. pipe	2.95	2.70	2.85	3.00	2.85						
(25)	190 lin. ft. 27-in. standard conc. irrig. pipe	3.50	3.00	3.30	3.25	3.30						
(26)	1,300 lin. ft. 8-in. extra strength conc. irrig. pipe	.82	.85	.70	.75	.84						
(27)	1,020 lin. ft. 10-in. extra strength conc. irrig. pipe	.90	.95	.80	1.00	.96						
(28)	2,000 lin. ft. 12-in. extra strength conc. irrig. pipe	1.10	1.16	1.18	1.10	1.16						
(29)	1,220 lin. ft. 15-in. extra strength conc. irrig. pipe	1.50	1.60	1.70	1.50	1.65						
(30)	820 lin. ft. 18-in. extra strength conc. irrig. pipe	1.90	1.90	2.10	1.75	2.05						
(31)	310 lin. ft. 21-in. extra strength conc. irrig. pipe	2.30	2.50	2.40	2.25	2.57						
(32)	380 lin. ft. 24-in. extra strength conc. irrig. pipe	2.95	3.00	3.25	3.00	3.07						
(33)	200 lin. ft. 12-in. conc. culvert pipe	2.00	1.65	1.40	2.00	1.75						
(34)	350 lin. ft. 15-in. conc. culvert pipe	2.50	2.00	1.80	3.00	2.25						
(35)	285 lin. ft. 30-in. conc. culvert pipe	7.60	5.60	5.60	5.00	6.90						
(36)	300 lin. ft. 36-in. conc. culvert pipe	9.90	7.00	7.50	8.00	9.00						

	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)
(1)	.41	.40	.34	.375	.39	.333	.29	.37	.40	.49	.70	.70
(2)	2.50	1.50	2.50	2.99	2.00	.333	1.65	.37	3.00	2.50	2.50	4.50
(3)	.04	.05	.03	.05	.05	.05	.04	.12	.06	.05	.05	.05
(4)	.30	.45	.30	.39	.60	.50	.65	.60	.50	.40	.25	.40
(5)	.40	.33	.60	.49	.48	.50	.35	.70	.50	.45	.70	.80
(6)	2.50	4.00	3.25	3.99	2.50	.50	2.00	.70	5.00	3.00	5.00	6.00
(7)	.50	.60	1.50	.95	1.25	.75	2.00	2.00	1.50	1.50	1.00	3.00
(8)	2.50	4.00	4.00	3.00	2.50	2.00	5.00	2.00	5.00	3.00	5.00	8.00
(9)	.25	.25	.35	.25	.30	.40	1.25	.20	.50	.50	.25	.50
(10)	.35	.40	.40	.49	.50	.50	.50	.65	.80	.75	.70	.30
(11)	.25	.18	.30	.20	.25	.20	.10	.45	.30	.20	.25	.40
(12)	36.00	37.00	34.25	36.00	36.00	43.75	41.00	41.00	40.00	43.45	45.00	45.00
(13)	.03	.03	.06	.05	.04	.06	.05	.10	.05	.05	.10	.05
(14)	2.50	3.00	4.50	3.00	2.50	3.00	3.50	1.50	4.00	3.50	4.00	3.50
(15)	45.00	50.00	39.00	45.00	44.00	50.00	55.00	35.00	50.00	65.00	50.00	45.00
(16)	.05	.03	.03	.10	.08	.05	.08	.09	.10	.10	.10	.12
(17)	.35	.38	.38	.41	.43	.42	.40	.50	.50	.38	.40	.65
(18)	.45	.50	.43	.50	.58	.52	.47	.58	.65	.46	.50	.75
(19)	.55	.63	.55	.65	.72	.63	.59	.83	.80	.55	.60	1.00
(20)	.80	.83	.80	.88	.90	.84	.85	1.00	1.00	.93	.75	1.70
(21)	1.10	1.07	1.15	1.19	1.24	1.20	1.15	1.30	1.30	1.27	1.00	2.50
(22)	1.40	1.65	1.45	1.95	1.65	1.75	1.75	1.62	1.70	1.65	1.50	3.25
(23)	1.90	1.95	1.95	2.45	2.20	2.30	2.15	2.00	2.25	1.95	2.00	4.50
(24)	2.70	2.75	2.75	3.85	3.00	3.25	3.00	2.91	3.00	2.65	2.75	4.95
(25)	3.70	3.80	3.50	4.35	3.45	3.90	3.80	3.70	3.75	3.07	3.75	6.50
(26)	.75	.75	.65	.82	.90	.84	.71	.82	1.00	.69	.75	.95
(27)	.90	.85	.80	.95	1.05	.95	.84	.96	1.20	.78	.90	1.15
(28)	1.05	1.15	1.10	1.20	1.24	1.20	1.11	1.20	1.40	1.19	1.20	1.95
(29)	1.55	1.50	1.60	1.68	1.75	1.75	1.58	1.70	1.80	1.70	1.70	2.75
(30)	1.85	2.00	1.85	2.00	2.15	2.35	2.12	2.00	2.00	2.02	2.10	3.45
(31)	2.30	2.35	2.40	2.45	2.80	2.90	2.56	2.43	2.75	2.36	2.60	4.85
(32)	3.00	2.90	2.75	3.00	3.40	3.35	3.05	2.90	3.50	2.90	3.25	5.50
(33)	1.60	1.50	2.00	1.95	1.60	1.75	2.10	1.75	1.80	1.64	1.50	1.50
(34)	2.15	1.85	2.35	2.65	2.10	2.35	2.50	2.25	2.25	2.23	2.25	2.00
(35)	5.50	4.50	4.60	5.00	5.25	5.35	5.25	5.04	5.50	5.32	6.00	5.80
(36)	8.50	6.00	7.50	7.00	7.36	7.20	6.75	7.00	7.50	8.25	7.50	6.50

Highway and Street...

Utah—Box Elder and Weber Counties—State—Surf.

Olof Nelson Construction Co., Logan, submitted the low bid of $120,557 to the Utah State Road Commission for 3.5 mi. of roadmix bituminous surfacing between Plain City and Hot Springs. The roadway width is 44 ft. and the width of surfacing is to be 26 ft. Five of the bids submitted were lower than the engineer's estimate. The following bids were received:

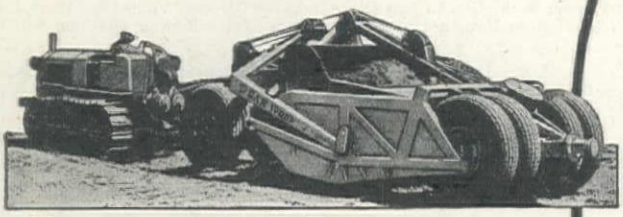
(A)	Olof Nelson Construction Co.	$120,557	
(B)	L. A. Young Construction Co.	133,586	
(C)	W. W. Clyde & Co.	145,586	
(D)	Wheelwright Construction Co.	147,459	
(E)	LeGrande Johnson	147,988	
(F)	J. M. Sumsion	159,214	
(G)	Deal Mendelholl Construction Co.	$169,215	
(H)	Reynolds Construction Co.	170,739	
(I)	A. O. Thorn & Sons Construction Co.	182,521	
(J)	Chytraus Construction Co.	185,536	
(K)	Engineer's estimate	155,764	

(1) 98,000 gal. bituminous material, Type MC-2
(2) 16,300 gal. bituminous material, Type RC-5
(3) 825 T. cover material
(4) 3.918 mi. scarifying and mixing
(5) 33,000 T. cr. rock or cr. gravel surface course
(6) 34,200 T. gravel or cr. rock base course
(7) 90,000 cu. yd. unclassified excavation
(8) 600,000 st. yd. overhaul, Class "A"
(9) 135,000 yd. mi. overhaul, Class "B"
(10) 2.800 cu. yd. channel excavation
(11) 1,800,000 1,000-gal. watering
(12) 1,270 hours rolling
(13) 2,000 cu .yd. gravel backfill
(14) 942 lin. ft. 10-in. underdrains
(15) 141 lin. ft. 12-in. underdrains
(16) 915 lin. ft. 15-in. underdrains
(17) 576 lin. ft. 18-in. underdrains
(18) 222 lin. ft. 12-in. concrete pipe
(19) 201 lin. ft. 15-in. concrete pipe
(20) 1,218 lin. ft. 18-in. concrete pipe
(21) 241 lin ft. 24-in. concrete pipe
(22) 84 lin. ft. 30-in. concrete pipe
(23) 204 lin. ft. 36-in. concrete pipe
(24) 3,000 cu. yd. excavation for structures
(25) 115 cu. yd. concrete, Class "A"
(26) 16,000 lb. reinforcing steel
(27) 1,500 lb. structural steel
(28) 400 sq. yd. removal of existing pavement
(29) 8,650 lin. ft. moving fence
(30) 21,000 lin. ft. right of way fence, Type "A"
(31) 18 ea. 14-ft. gates
(32) 2 ea. moving railroad signs
(33) 2 ea. moving advance warning signs

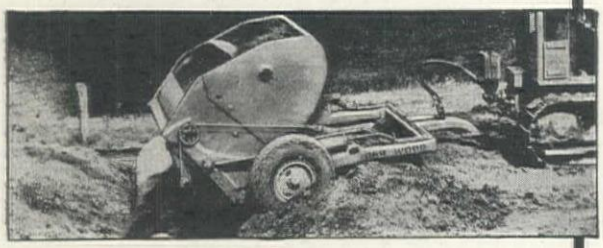
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
(1)	.09	.09	.09	.12	.11	.11	.11	.12	.11	.10	.11
(2)	.09	.09	.10	.12	.11	.12	.12	.12	.11	.11	.12
(3)	2.50	3.00	3.00	3.00	3.50	3.00	3.00	3.00	4.50	3.25	3.50
(4)	500.00	800.00	700.00	600.00	800.00	800.00	700.00	800.00	750.00	650.00	800.00
(5)	.62	.67	.80	.77	.80	.80	.90	.90	.90	.98	.90
(6)	.61	.62	.80	.72	.70	.75	.87	.85	.90	.96	.85
(7)	.17	.22	.25	.205	.25	.26	.30	.25	.30	.30	.22
(8)	.01	.0125	.01	.01	.01	.015	.015	.02	.015	.015	.015
(9)	.10	.09	.10	.10	.10	.15	.15	.15	.15	.12	.13
(10)	.30	.75	.60	.50	.75	.50	1.00	.50	1.00	1.00	.35
(11)	1.00	2.00	1.50	1.50	1.50	1.50	1.50	1.00	1.50	1.50	1.50
(12)	3.50	4.00	3.50	8.00	4.00	3.50	3.50	5.00	5.00	4.25	3.50
(13)	1.00	.87	1.00	1.50	1.50	1.00	1.00	1.50	2.00	3.50	1.50
(14)	.62	.60	.65	.50	.70	1.25	.50	.75	1.30	1.30	.50
(15)	.80	.80	.85	.70	1.00	1.40	.67	1.00	1.40	1.35	.70
(16)	1.10	1.05	1.16	1.10	1.25	1.60	.95	1.50	1.50	1.95	.75
(17)	1.65	1.45	1.70	1.60	2.00	2.00	1.45	2.00	2.10	2.25	1.00
(18)	1.67	1.52	1.75	1.70	2.50	2.00	1.95	1.75	2.00	1.65	1.25
(19)	1.95	1.75	2.00	2.20	3.00	2.30	2.15	2.25	2.25	2.05	1.50

(Continued on next page)

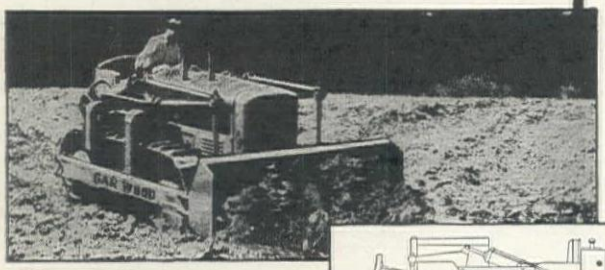
2A 4-wheel hydraulically operated Scrapers for earth moving, specifically constructed for fast digging, easy loading, accurate spreading.



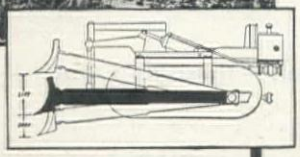
2B 4-wheel cable operated Scrapers for earth moving provide less power to load; greater clearance; flexibility for fast hauls; positive rolling ejection; precision spreading.

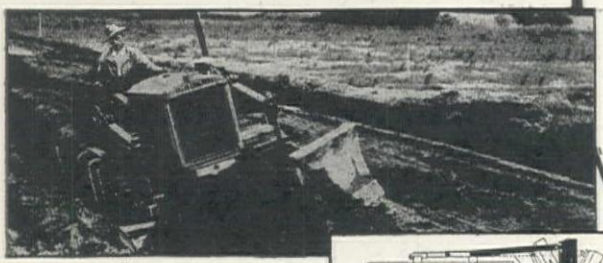


2C 2-wheel hydraulic Scrapers for low-cost, earth moving—dig, load, haul, back dump, make short turns.

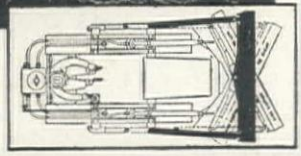


2D Bulldozer: Blade fixed for pushing loads ahead.





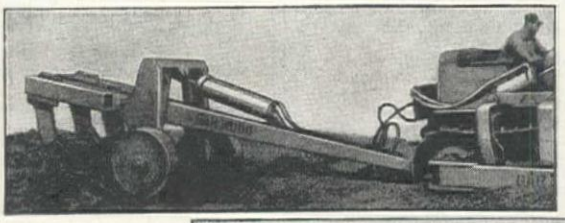
2E Roadbuilders: Blade set to push loads ahead, sidecast loads to left or right.



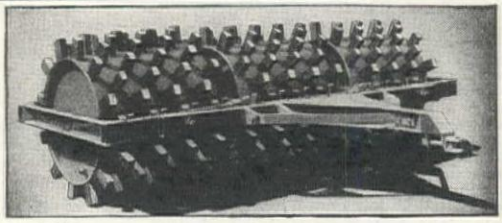
GAR WOOD Road Machinery

Gar Wood Industries, Inc., manufactures a complete line of heavy-duty, earth-moving machinery: two-wheel Hydraulic Scrapers in 3, 5, 6, and 8 cubic-yard capacities; four-wheel Hydraulic Scrapers in 8, 10, and 15 cubic-yard capacities; four-wheel Cable Scrapers in 11, 15, 20, and 25 cubic-yard capacities; Bulldozers; Roadbuilders; Tamping Rollers; Rippers. Accepted by leading contractors and governmental agencies throughout the world, as meeting all requirements for heavy earth-moving equipment.

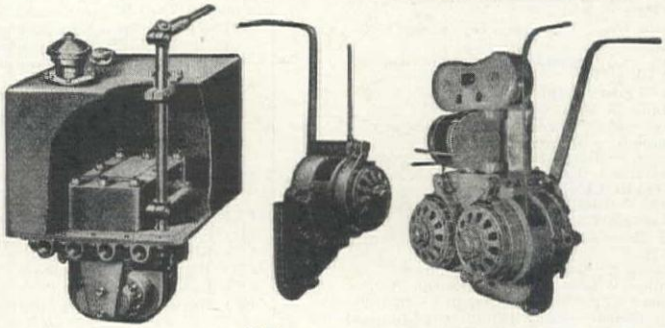
Refer to picture number when ordering literature



2F Rippers rip compacted earth, shale, rock, roots, old pavements, old roads.



2G Sheep-foot Tamping Rollers built with interchangeable drums (single, double, triple).



2H Hydraulic Control Unit

2J Cable Control Single Drum.

2K Cable Control Double Drum

Hydraulic and Cable Control Units for operation of Scrapers, Bulldozers, Roadbuilders, Rippers, for heavy-duty service with track-type tractors.

GW ROAD MACHINERY
is Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, Inc.
DETROIT 11, MICHIGAN

(20)	2.30	2.35	2.40	2.65	3.25	2.60	2.50	2.50	2.75	2.70	1.75
(21)	3.40	3.35	3.40	3.35	3.75	3.50	3.65	3.50	4.00	4.30	2.20
(22)	4.10	3.90	4.20	3.85	4.50	4.00	4.20	6.00	5.00	5.45	4.50
(23)	5.60	6.00	5.60	5.00	6.00	6.00	5.50	7.00	7.00	6.40	5.70
(24)	1.00	1.00	1.00	1.50	1.00	1.50	1.25	1.00	2.00	1.50	1.00
(25)	35.00	38.00	35.00	40.00	35.00	35.00	35.00	30.00	40.00	43.00	35.00
(26)	.08	.08	.08	.08	.10	.08	.09	.10	.10	.09	.09
(27)	.20	.20	.20	.12	.15	.20	.15	.20	.30	.22	.15
(28)	.10	.50	.60	.75	1.50	.75	1.00	.50	3.00	1.00	1.00
(29)	.08	.15	.15	.12	.10	.11	.12	.20	.10	.17	.12
(30)	.12	.15	.18	.12	.12	.15	.15	.20	.20	.40	.17
(31)	20.00	18.00	25.00	20.00	25.00	25.00	25.00	35.00	30.00	18.25	20.00
(32)	100.00	25.00	50.00	50.00	75.00	.50	200.00	50.00	50.00	125.00	30.00
(33)	50.00	25.00	30.00	50.00	10.00	50.00	100.00	50.00	50.00	10.00	15.00

California—San Diego County—State—Pavement

Griffith Co., Los Angeles, submitted the low bid of $75,316 to the California Division of Highways, Sacramento, and was awarded the contract for grading and surfacing with P.C. concrete pavement and plant-mixed material about 1.1 mi. of city street in the City of San Diego, between Mission Valley Road and Linda Vista Housing Project. All materials are to be furnished by the contractor. The following total and unit bids were received:

(1) Griffith Co. $75,316
(2) R. E. Hazard & Sons Contracting Co. 78,801
(3) V. R. Dennis Construction Co. $82,499
(4) Daley Corp. 85,756

		(1)	(2)	(3)	(4)
100	cu. yd. removing concrete	3.30	3.50	4.00	5.00
Lump sum,	clearing and grubbing	$2,000	$1,000	$2,400	$1,200
43,000	cu. yd. roadway excav.	.57	.50	.52	.65
800	cu. yd. structure excav.	3.00	3.20	2.00	3.45
900,000	sta. yd. overhaul	.006	.008	.007	.0075
1,100	T. imported base material	1.90	2.00	2.40	2.00
3,700	sq. yds. preparing subgrade	.18	.18	.14	.135
Lump sum,	develop water and furnish equip.	850.00	$2,200	$1,750	$1,000
1,500	M. gal. applying water	1.10	1.25	1.50	1.75
48	sta. finishing roadway	11.00	12.50	15.00	11.50
5	T. liquid asphalt MC-2 (Pr. Ct.)	50.00	50.00	70.00	75.00
1,225	T. plant-mixed surfacing (Type A)	4.20	5.00	5.20	4.75
1,875	T. plant-mixed surfacing (Type B)	5.60	6.00	4.90	5.90
755	cu. yd. Class "B" P.C.C. (pavement)	11.30	10.50	16.50	12.00
150	cu. yd. Class "A" P.C.C. (structures)	28.00	35.00	42.00	40.00
15	T. asph. emulsion (Sl. Ct. & Pt. Bdr.)	60.00	100.00	60.00	80.00
100	T. screenings (seal coat)	3.00	3.75	3.50	3.50
32	ea. monuments	5.00	5.00	5.00	5.00
190	lin. ft. laminated guard railing	2.20	2.50	2.50	3.00
19	ea. culvert markers	3.30	3.50	4.00	4.00
71	ea. guide posts	5.00	4.90	5.00	5.45
20	lin. ft. 18-in. unreinf. conc. pipe (2000 D)	3.70	4.00	4.50	4.20
428	lin. ft. 24-in. unreinf. conc. pipe (2000 D)	4.85	5.10	5.00	5.15
25	lin. ft. salvage pipe culverts	1.00	.75	1.00	2.00
25	lin. ft. relay salv. conc. pipe culv.	1.50	1.50	1.00	4.00
12,000	lb. bar. reinf. steel (pav't & str.)	.06	.09	.10	.08
250	ea. pavement dowels	.55	.60	.40	.65
500	cu. yd. rock slope protection	2.00	2.75	2.00	2.20

Oregon—Linn County—State—Paving

Warren Northwest, Inc., Portland, submitted low bid of $57,975 before the Oregon State Highway Dept. on the construction of an asphaltic concrete pavement between Crabtree Corner and Crabtree Creek on the Albany-Lyons secondary highway. The following unit bids were submitted:

(1) Warren Northwest, Inc. $57,975
(2) J. C. Compton Co. 66,225
(3) Newport Construction Co. 80,952
(4) Porter W. Yett $82,700
(5) United Contracting Co. 86,775

		(1)	(2)	(3)	(4)	(5)
2,000	T. Cl. "B" asph. conc. patching	5.50	5.85	8.07	8.00	9.00
8,000	T. Cl. "B" asph. conc. in pavement	5.00	5.85	7.07	7.25	7.50
750	cu. yd. furnishing and placing aggreg.	3.50	4.00	4.01	5.00	4.00
75	T. furnishing and placing 120-150 asph.	25.00	30.00	35.00	30.00	35.00
900	cu. yd. ¾ in - 0 material in shoulders	2.75	2.75	2.91	3.00	3.50

Montana—Missoula County—State—Surf.

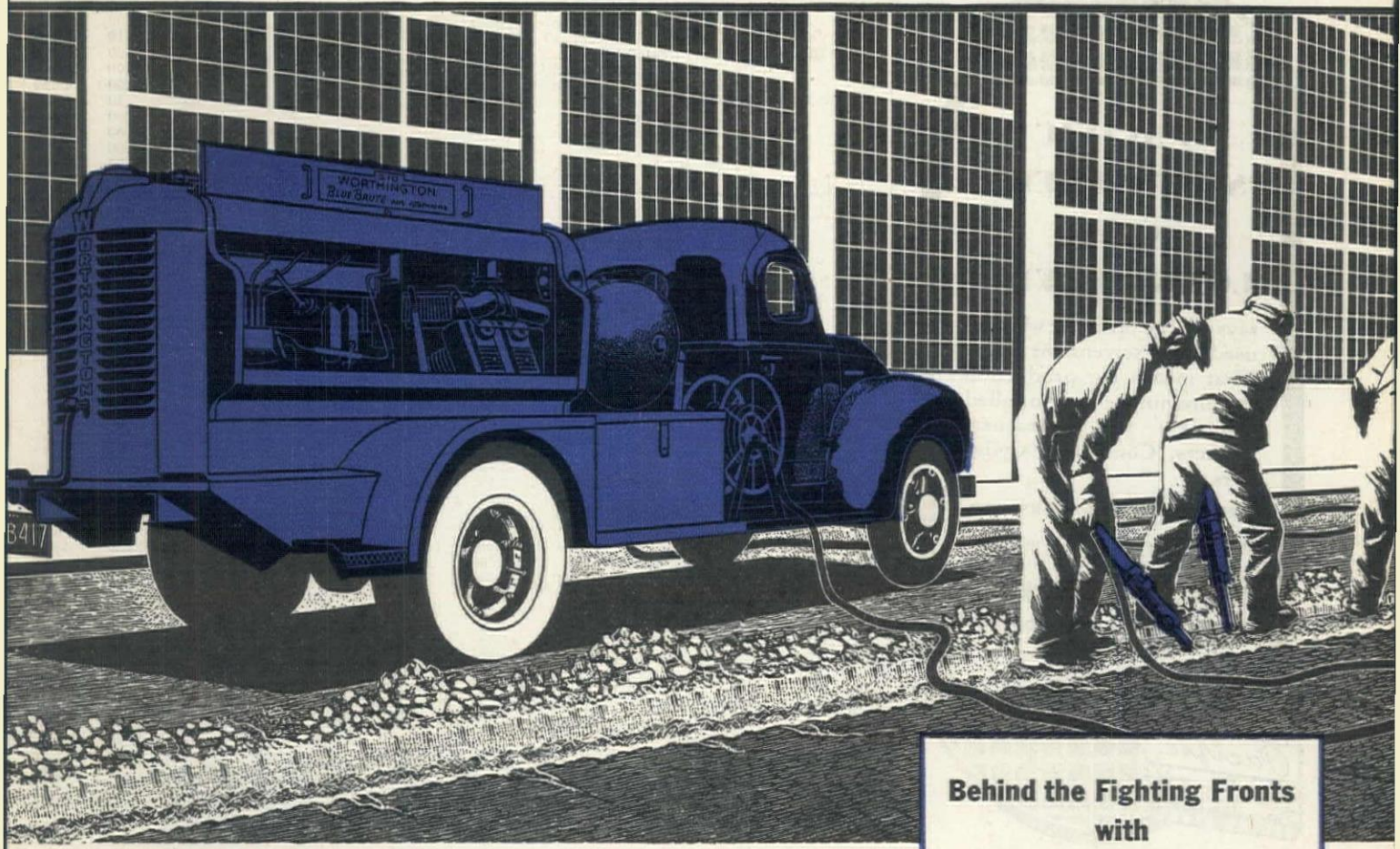
Nilson Smith Construction Co., Great Falls, bid low at $371,394 to the Montana State Highway Commission, and was awarded the contract for 12.2 mi. of grading and surfacing with plantmix material between Tarkio and Missoula. The contract price was well below the engineer's estimate. Unit bids were as follows:

(A) Nilson Smith Construction Co. $371,394
(B) Union Construction Co. 378,913
(C) Birch & Sons Construction Co. 380,009
(D) Big Horn Construction Co. 394,847
(E) Leach Bros. 406,351
(F) Northwestern Engineering Co. 416,676
(G) Clifton & Applegate $420,552
(H) Colonial Construction Co. 433,567
(I) Inland Construction Co. 438,469
(J) McLaughlin, Inc. 447,780
(K) Morrison-Knudsen Co., Inc. 448,784
(L) Engineer's estimate 424,483

			(A)	(B)	(C)
(1)	298,600	cu. yd. uncl. exc.	.18	.21	.186
(2)	1,355	cu. yd. culv. exc.	.50	1.00	.70
(3)	20,953	yd. mi. overhaul	.12	.30	.26
(4)	152,532	cu. yd. sel. material	.23	.23	.17
(5)	241,877	yd. mi. overhaul sel. material	.14	.11	.17
(6)	107,590	T. base course cr. gravel surf.	.76	.65	.83
(7)	27,831	T. Grade "A" top course cr. gravel, Cush. & S.	1.00	.80	.95
(8)	2,610	T. stone chips	3.50	4.00	3.35
(9)	5,700	cu. yd. binder	.10	.10	.05
(10)	11,400	yd. mi. overhaul on binder	.05	.05	.05
(11)	11,906	M. gal. watering	1.20	1.30	1.50
(12)	18,213	T. plant mix surf. grade B-1	2.85	3.60	2.75
(13)	216,618	gal. 150-200 pen. asp. cem. in mix	.09	.09	.085
(14)	54,290	gal. prime coat oiling with MC-1	.11	.12	.15
(15)	72,460	gal. seal coat oiling with 150-200	.11	.14	.12
(16)	382	lin. ft. 15-in. reinf. conc. pipe culv.	1.90	2.00	1.80
(17)	840	lin. ft. 18-in. reinf. conc. pipe culv.	2.30	3.00	2.40
(18)	846	lin. ft. 24-in. reinf. conc. pipe culv.	3.50	4.00	3.30
(19)	132	lin. ft. 30-in. reinf. conc. pipe culv.	6.00	6.00	4.80
(20)	208	lin. ft. 36-in. reinf. conc. pipe culv.	7.50	8.00	6.85
(21)	216	lin. ft. 48-in. reinf. conc. pipe culv. ex. st.	13.00	15.00	12.00
(22)	28	lin. ft. 15-in. corr. met. syph. pipe	4.00	4.00	2.40
(23)	170	lin. ft. 24-in. corr. met. syph. pipe	6.00	6.00	4.25

(Continued on next page)

BLUE BRUTES FOR POST-WAR WATER WORKS



If you "come from Missouri" — see Blue Brutes. This truck-mounted compressor will back your bid on post-war projects like this one:

A 6-year betterment program outlined by the Chief Engineer and Superintendent, Kansas City Water Department, including a $2,933,000 deferred expenditure for work interrupted by the war.

Hundreds of post-war plans are ready now, for highways, buildings, bridges, city improvement! In water works and sewerage alone, $400,000,000 to $600,000,000 is the estimated annual figure for the nation, immediately post-war. You'll find Blue Brutes your best bets to air-power the jobs.

Dependable — their Feather Valves* prevent the lost-time troubles other valves are apt to cause. Blue Brute compressors deliver more air, continuously, by easier breathing.

Trouble-free—three-point suspension on chassis protects engine and compressor from misalignment due to distortion of chassis on rough going.

Economical—less maintenance time, fewer delays on the job can save big money when time is your contract's essence. This too: Worthington Blue Brute air tools use less air; modern design and easy-handling strength make them top-raters on your "air power team."

Investigate Blue Brutes, right now, for that rush job today, and that still bigger job planned for the future! Your nearest distributor is listed on page 104.

*Reg. U. S. Pat. Off.

Behind the Fighting Fronts with

BLUE BRUTES

Broken cities, like Naples, need compressed air power for reconstructing public services. Blue Brutes, in "uniforms" of olive drab, are part of Engineers' battalions overseas, part of Sea Bees' equipment, too, in battleship gray. From Arctic Circle to the tropic sands — and here at home in camps, bases, ordnance plants — Blue Brutes are with the men who now are fighting for the right to build a free America.

PC4-8

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTH BEHIND THE NAME WORTHINGTON

Worthington Pump and Machinery Corporation Construction Equipment Division, Holyoke, Massachusetts

(24)	66 lin. ft. 30-in. corr. met. syph. pipe						8.00	9.00	4.75
(25)	118 lin. ft. 36-in. corr. met. syph. pipe						10.00	10.00	7.15
(26)	506 lin. ft. relaying pipe culverts						1.00	1.00	1.10
(27)	91.39 cu. yd. Class "A" concrete						40.00	40.00	35.50
(28)	0.85 cu. yd. Class "B" concrete						60.00	40.00	35.50
(29)	6,000 lb. reinf. steel						.15	.10	.12
(30)	14.74 M.F.B.M. treated lumber						200.00	140.00	180.00
(31)	0.59 M.F.B.M. untreated lumber						140.00	140.00	140.00
(32)	22 ea. tr. tbr. piles, 25-ft. long						55.00	40.00	44.50
(33)	3,000 lin. ft. wd. slat snow fence						.25	.30	.30
(34)	250 sq. yd. grouted riprap						3.00	4.00	3.00
(35)	2 ea. conc. proj. markers						10.00	10.00	10.00
(36)	106 ea. conc. r/w monuments						3.00	3.00	3.00
(37)	64 ea. conc. sta. markers						3.00	5.00	3.00
(38)	Lump sum, removing old bridge						$1,000	250.00	350.00
		(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
(1)		.24	.22	.22	.29	.22	.28	.23	.25	.21
(2)		1.15	1.26	1.00	2.00	1.50	1.80	1.50	4.50	1.00
(3)		.20	.20	.20	.30	.18	.24	.26	.20	.12
(4)		.48	.30	.30	.37	.40	.28	.35	.29	.25
(5)		.10	.12	.12	.13	.16	.24	.10	.11	.10
(6)		.60	.82	.90	.65	.80	.68	.65	1.00	.75
(7)		.87	1.10	.95	.70	.90	.92	1.20	1.25	.90
(8)		3.10	3.50	3.30	3.65	4.00	4.60	8.00	3.50	3.00
(9)		.01	.02	.45	.03	.10	.10	.25	.30	.30
(10)		.01	.02	.12	.01	.10	.10	.12	.11	.15
(11)		1.35	1.50	1.50	1.50	1.50	1.80	1.50	1.75	1.50
(12)		2.75	2.50	2.45	3.20	3.00	2.60	4.50	2.80	5.50
(13)		.09	.11	.12	.10	.11	0.87	.095	.10	.09
(14)		.11	.11	.13	.10	.11	.12	.13	.125	.11
(15)		.11	.11	.12	.10	.12	.12	.13	.11	.13
(16)		1.70	1.60	2.35	2.30	2.30	2.00	2.50	2.20	2.30
(17)		2.25	2.20	2.95	3.00	3.20	3.00	3.25	3.00	3.50
(18)		3.25	3.20	4.25	4.40	4.60	4.00	5.00	4.10	4.50
(19)		4.70	4.50	6.25	6.20	6.50	6.80	6.50	5.80	6.60
(20)		6.50	6.00	9.00	9.00	8.00	9.60	8.00	9.25	8.50
(21)		11.60	11.50	16.00	14.00	15.00	16.00	14.00	14.50	18.50
(22)		4.05	3.00	3.60	3.20	2.10	4.80	4.00	3.50	2.50
(23)		4.30	5.50	6.70	5.75	4.00	7.40	7.00	6.70	4.50
(24)		9.20	8.00	9.50	8.60	6.00	10.50	9.00	10.00	5.50
(25)		10.45	9.50	11.50	10.50	7.50	12.60	11.00	11.00	8.50
(26)		.90	1.00	1.25	1.50	1.50	2.80	2.00	2.00	1.00
(27)		40.00	45.00	45.00	36.00	40.00	46.50	40.00	50.00	25.00
(28)		40.00	45.00	35.00	36.00	40.00	53.00	40.00	50.00	30.00
(29)		.15	.15	.15	.12	.10	.15	.15	.10	.11
(30)		150.00	160.00	175.00	175.00	150.00	221.70	200.00	200.00	150.00
(31)		150.00	150.00	120.00	175.00	110.00	221.70	200.00	150.00	135.00
(32)		50.00	50.00	50.00	40.00	45.00	45.00	40.00	50.00	35.00
(33)		.40	.30	.35	.40	.75	.32	.35	.75	.30
(34)		2.50	6.00	9.50	4.00	5.00	4.50	5.00	5.00	3.00
(35)		12.00	10.00	15.00	10.00	15.00	18.00	15.00	9.00	25.00
(36)		3.00	3.00	3.15	5.00	3.00	5.00	3.00	3.25	4.00
(37)		3.00	3.00	6.25	4.00	3.00	5.00	5.00	3.25	4.00
(38)		150.00	800.00	435.44	300.00	500.00	750.00	$1,000	$1,500	300.00

Oregon—Coos County—P.R.A.—Surf.

Watt & Neuman, Portland, Ore., at $108,181 was low bidder to the Public Roads Administration in Portland for grading, surfacing and structures on a timber access road to be built to the south fork of the Coquille river in Coos County, Ore. The following unit bids were submitted:

(1) Watt & Neuman $108,181
(2) David A. Richardson 149,820
(3) Oscar Butler & Son $158,518
(4) Scheumann & Johnson 161,683

	(1)	(2)	(3)	(4)
2 ac. clearing	350.00	$1,500	$1,500	$1,000
19 ac. grubbing	150.00	300.00	600.00	500.00
200 sta. clearing	25.00	100.00	30.00	50.00
79,700 cu. yd. unclass. excav.	.60	.74	.85	.80
1,050 cu. yd. unclass. excav., struct.	1.25	2.00	1.00	5.00
2,000 cu. yd. unclass. excav., borrow	.50	.40	.50	1.00
25,000 sta. yd. overhaul	.05	.04	.03	.04
200 cu. yd. special borrow overhaul	.25	.30	.20	.30
210 units, watering base course	2.00	2.50	3.00	2.00
130 units, watering surf. course	2.00	2.50	3.00	2.00
Lump sum, provide and maintain water plants	500.00	300.00	$1,000	500.00
10,300 cu. yd. cr. grav. or stone base	1.70	2.50	3.00	3.00
4,300 cu. yd. cr. grav. or stone surf.	2.10	2.50	3.00	3.00
2,500 cu. yd. cr. grav. or stone surf. in stockpiles	2.10	2.50	2.75	2.00
1 ea. 60-ft. log trestle span	800.00	300.00	900.00	$1,500
1 ea. 43-ft. log trestle span	700.00	250.00	645.00	$1,000
1 ea. 41.5-ft. log trestle span	675.00	250.00	622.50	900.00
1 ea. 26.5-ft. log trestle span	375.00	200.00	265.00	700.00
1,070 lin. ft. logs in log bents	.50	.80	.75	2.00
98 lin. ft. log culverts 3x3-ft.	10.00	5.50	8.00	4.00
182 lin. ft. log culverts 4x4-ft.	10.00	9.00	10.00	6.00
76 lin. ft. log culverts 6x4-ft.	10.00	13.00	11.00	10.00
77 lin. ft. log culverts 6x6-ft.	10.00	15.00	13.00	15.00
50.5 M.F.B.M. untreated timber	85.00	75.00	80.00	100.00
1,618 lin. ft. 18-in. standard reinf. conc. culvert pipe	3.00	3.00	.....	3.00
298 lin. ft. 24-in. standard reinf. conc. culvert pipe	4.00	5.00	.....	5.00
1,618 lin. ft. 18-in. creosoted wood stave culv. pipe	.....	3.50	2.70	.....
298 lin. ft. 24-in. creosoted wood stave culv. pipe	.....	5.50	3.20	.....
300 lin. ft. 8-in. perf. conc. pipe underdrain	1.50	2.00	2.00	2.00

Colorado—Ouray & San Miguel Co's.—State—Gravel Surf.

J. H. & N. M. Monaghan, Denver, submitted the low bid of $175,098 to the State Highway Engineer, Denver, for 4,704 mi. of gravel surfacing on S. H. 62 between Ridgway and Placerville. The following total and unit bids were received:

(1) J. H. & N. M. Monaghan $175,098
(2) Lowdermilk Bros. 185,992
(3) Brown Construction Co. 189,075
(4) Domenic Leone 210,907
(5) Northwestern Engineering Co. $215,044
(6) C. A. Switzer & A. S. Horner Co. 223,113
(7) Platt Rogers, Inc. 228,335
(8) Engineer's estimate 197,875

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lump sum, clear and grub	$4,400	$3,000	$5,400	$1,750	$1,500	$2,500	$3,000	500.00
Lump sum, remove 25 structures	625.00	500.00	$1,000	500.00	$1,500	500.00	$1,250	300.00
Lump sum, remove and backfill cellar	10.00	25.00	10.00	200.00	75.00	50.00	20.00	10.00

(Continued on next page)

. . . That *War Birds* may fly sooner

"SOMEWHERE in England"—there are lights shining through the night! There is the rumble of drum gears mixed with the clatter of concrete as it pitches from the drum buckets, a discharge bucket rolls out on the boom and another yard of concrete slithers in a ribbon across the subgrade of a new runway—

Sometimes the alert comes and the lights are doused as the Hun wings overhead.

All over the world MultiFoote Pavers are rolling out wide ribbons of concrete. The dependability of their hour after hour operation and their tremendous output is amazing, even to those who have had experience with MultiFoote pavers before.

Wartime operation has lessons that will influence peacetime profits. MultiFoote postwar owners will secure the benefits of an advance experience, smoother operation, better design and greater output — an advantage that could only come with the study of a *great number of machines on "highball" work.*

Remember there are more MultiFoote pavers in service than any other make. If we can help you in your future plans, ask for details.

THE FOOTE CO., NUNDA, NEW YORK

For black top pavement ask about the Adnun Black Top Paver. It brings you advantages that no other black top paver can offer.

MULTIFOOTE
CONCRETE PAVERS

1,200	lin. ft. remove fence	.03	.05	.02	.05	.15	.05	.10	.04
16,500	lin. ft. remove and rebuild fence	.20	.12	.10	.10	.50	.15	.15	.10
820	ea. line posts	.75	1.00	.50	1.00	.85	1.50	2.00	.75
500	lin. ft. remove and rebuild snow fence	.35	.30	.40	.50	.75	.50	.75	.25
120,000	cu. yd. unclass. excav.	.40	.61	.50	.65	.59	.75	.74	.60
10,000	cu. yd. unclass. ditch excav.	.60	.50	.60	.90	.80	.75	.74	1.00
5,500	cu. yd. place top soil	.75	.40	1.60	.75	1.25	1.00	1.00	1.00
26,400	T. select material	.48	.50	.70	.50	.54	.60	.70	.50
710	cu. yd. dry rock excav.	2.50	2.50	3.00	3.00	3.50	3.50	2.00	2.50
710	cu. yd. dry common excav.	2.40	2.00	2.00	2.00	2.00	2.00	1.50	1.50
240	cu. yd. wet rock excav.	3.00	3.00	5.00	4.00	7.00	5.00	3.00	3.00
240	cu. yd. wet common excav.	2.65	3.00	4.00	3.00	2.50	4.00	2.50	2.50
550	hr. mechanical tamping	5.00	3.50	2.00	4.00	3.50	3.50	4.00	3.50
1,600	unit hr. rolling	3.00	2.50	2.00	3.00	3.50	4.00	5.00	3.00
4	units furn. roller	100.00	25.00	100.00	250.00	60.00	50.00	100.00	60.00
3,070	M. gal. watering	2.00	1.25	1.00	1.50	2.00	3.00	2.00	2.50
80	hr. rolling select matl.	4.00	7.00	3.00	5.00	3.50	8.00	5.00	5.00
Lump sum,	furn. flat wh. roller	250.00	100.00	300.00	300.00	500.00	200.00	300.00	300.00
441,000	sta. yd. overhaul	.02	.015	.02	.02	.015	.02	.015	.02
8,000	mi. yd. overhaul	.20	.20	.20	.20	.15	.20	.20	.20
20,000	T. gravel surfacing	.70	.75	.90	.90	.83	.75	1.00	.90
201,000	T. mi. overhaul	.10	.08	.06	.12	.09	.08	.10	.10
647	T. stone screenings	5.00	4.00	3.00	3.00	4.50	5.00	4.00	3.50
75	cu. yd. "A" concrete	30.00	40.00	40.00	35.00	45.00	36.00	30.00	32.00
209	cu. yd. "B" concrete	30.00	40.00	40.00	35.00	43.00	33.00	30.00	30.00
8,000	lb. reinf. steel	.09	.10	.10	.10	.10	.08	.10	.10
170	lin. ft. relay pipe	2.00	2.00	4.00	1.00	1.50	1.00	1.50	1.00
36	lin. ft. 18-in. reinf. conc. pipe, std. strength	3.50	4.00	4.00	3.25	4.05	4.00	3.50	3.00
1,845	lin. ft. 24-in. reinf. conc. pipe, same	5.80	5.00	5.00	5.25	5.45	5.25	5.00	4.00
36	lin. ft. 36-in. reinf. conc. pipe, same	10.00	9.00	10.00	10.00	9.75	11.00	10.00	7.00
65	lin. ft. 48-in. reinf. conc. pipe, same	18.00	15.00	15.00	18.00	15.70	17.00	15.00	10.90
218	lin. ft. 24-in. reinf. conc. pipe, extra str'gth	6.50	5.50	6.00	6.00	5.95	6.50	5.00	4.50
25	cu. yd. riprap	5.00	10.00	10.00	3.00	12.00	4.00	5.00	4.00
1,000	lin. ft. untr. wood posts	.15	.14	.10	.15	.46	.18	.20	.15
14,800	lin. ft. untr. wood posts	.22	.20	.20	.22	.53	.22	.28	.22
11	ea. barbed wire gates	7.50	10.00	10.00	10.00	15.00	10.00	10.00	7.00
42	ea. right-of-way markers	5.00	6.00	10.00	5.00	5.00	7.00	8.00	6.00
246	ea. timber guard posts	2.90	3.00	8.00	4.00	4.00	3.00	3.50	3.00

Miscellaneous . . .

Washington—Mason County—Navy—Railroad

General Construction Co., Seattle, bidding $1,889,043 to the Public Works Officer at the Puget Sound Navy Yard, Bremerton, Wash., was awarded the contract for construction of 27 mi. of railroad tracks, overpasses and necessary facilities between Shelton and the Kitsap county line. This is the first unit of a 40-mi. railroad link to the Navy Yard which will considerably shorten transportation facilities to that area. The following total and unit bids were submitted:

(1) General Construction Co. $1,889,043
(2) Sound-Kiewit 2,037,084
(3) J. A. Terteling & Sons 2,214,341
(4) Guy F. Atkinson Co. 2,335,654
(5) S. Birch & Sons $2,435,467
(6) Morrison-Knudsen Co. 2,468,206
(7) Puget Sound-Macco 2,481,366
(8) Clifton & Appleton 2,721,829

		(1)	(2)	(3)
Lump sum,	clearing and grubbing	$150,000	$150,000	$200,000
1,506,000	cu. yd. uncl. railroad excav.	.35	.34	.36
3,077,625	cu. yd. overhaul	.02	.02	.02
400	sq. yd. riprap	7.00	8.00	15.00
1,160	cu. yd. box culv. inlets	5.00	5.00	10.00
1,549	cu. yd. conc. D-2 culv. inlet headwalls	30.00	23.00	37.50
516	cu. yd. conc. D-1 culv. inlet headwalls	45.00	46.00	40.00
65	cu. yd. conc. C-1 MH footings	40.00	30.00	40.00
12,390	lb. reinf. steel	.07	.15	.10
5,000	bricks	150.00	500.00	110.00
2,130	cu. yd. gravel fill	4.00	2.50	3.00
460	lb. misc. iron	.20	.13	.18
Lump sum,	misc. items	$2,000	$2,500	100.00
200	lin. ft. 8-in. perf. CMP drain	2.00	1.50	2.00
5,200	lin. ft. 12-in. perf. CMP drain	2.25	2.20	3.00
200	lin. ft. 18-in. perf. CMP drain	2.50	3.00	4.75
200	lin. ft. 24-in. perf. CMP drain	3.00	4.00	8.25
810	lin. ft. 18-in. reinf. std. conc. pipe	3.00	3.00	5.60
1,906	lin. ft. 24-in. ex. str. conc. pipe	4.50	5.00	8.50
2,504	lin. ft. 36-in. ex. str. conc. pipe	8.00	8.00	13.00
585	lin. ft. 48-in. ex. str. conc. pipe	12.00	15.00	20.00
210	lin. ft. 60-in. ex. str. conc. pipe	18.00	25.00	30.00
710	lin. ft. 72-in. ex. str. conc. pipe	28.00	32.50	35.00
140,800	lin. ft. track incl. ballast	5.40	6.25	6.50
15	ea. turnouts	900.00	260.00	$1,000
5	ea. crossing frogs	500.00	600.00	250.00
600	lin. ft. relay track	2.50	3.00	3.00
4	ea. relay turnouts	300.00	400.00	10.00
300	lin. ft. shift track	1.00	1.25	.50
450	lin. ft. rem. track grade	2.00	2.00	.25
3,000	sq. ft. grade crossings	.45	1.00	.50
30	ea. R.R. signs, crossarms	70.00	75.00	65.00
30	ea. R.R. signs, adv. warning	25.00	27.50	55.00
10	ea. R.R. signs, stations	15.00	20.00	10.00
50	ea. R.R. signs, whistle	16.00	20 00	12.00
25	ea. R.R. signs, milepost	12.00	16.00	7.50
4	ea. R.R. signs, deadend	15.00	18.00	10.00
2,150	sq. yd. gravel pave., Co. roads	1.00	.70	1.20
3,330	cu. yd. bitum. pave.	3.00	2.00	1.30
660	cu. yd. pave., black top	3.00	1.00	1.50
23	cu. yd. backfill, bridge No. 1	3.00	2.40	5.00
1,405	lin. ft. drive tr. piles	1.60	1.85	3.40
10,240	B.F.M. timber trestles	.15	.19	.16
144	lin. ft. erect wood rail	.50	1.20	.40
2,250	lb. misc. iron	.14	.18	.18
Lump sum,	misc. items, cleanup	500.00	200.00	100.00
368	cu. yd. backfill, bridge No. 2	4.00	1.80	10.00
8,010	lin. ft. drive tr. piles	1.40	1.70	3.40
366	cu. yd. conc. footings and abutments	30.00	31.00	35.00
651	cu. yd. conc. footings and abutments	32.00	31.00	50.00
66,040	lb. furn. reinf. steel	.07	.08	.12
155	T. furn. struc. steel	200.00	275.00	300.00
20,156	lb. furn. steel castings	.35	.40	.40
Lump sum,	bearing plates	400.00	180.00	345.00

(Continued on next page)

AIR PLUS JAEGER COMPRESSOR

We are producing for Uncle Sam today the compressor you'll demand tomorrow . . . built to the micro-precision of fine aircraft motors

Courtesy AVIATION

"AIR PLUS" Jaeger Vertical Two-Stage, Air-Cooled Compressors, in sizes from 60 to 500 ft., will be available to help you win your battles tomorrow.

THE JAEGER MACHINE CO., COLUMBUS 16, OHIO

JAEGER *Engineered* **EQUIPMENT**

"AIR-PLUS" 2-STAGE AIR-COOLED COMPRESSORS, 60 TO 500 FT.—"FLEET-FOOT" CRANE-LOADERS—"SURE PRIME" CENTRIFUGAL PUMPS—"SPEEDLINE" BUILDING MIXERS—"DUAL-MIX" TRUCK MIXERS—"JAEGER" HOISTING ENGINES AND TOWERS—"JAEGER-LAKEWOOD" PAVING EQUIPMENT

456 lin. ft. erect wood rail	.50	1.20	.60
10,415 lb. misc. iron	.14	.18	.18
Lump sum, misc. items	$2,000	600.00	500.00
83 cu. yd. ex. backfill, bridge No. 1-3	4.00	3.00	10.00
1,508 lin. ft. furn. and dr. No. 8 pile	1.70	2.40	3.00
134 cu. yd. conc. footings, piers, slabs and forms	35.00	36.00	45.00
6,215 lb. furn. and place reinf. steel	.07	.08	.12
18,330 F.B.M. erect tr. timber bents in trestle	.16	.18	.16
18 T. furn. and erect str. steel	200.00	275.00	300.00
156 lbs. furn. and pl. grease	1.00	.60	.25
430 lin. ft. wood rail and posts	4.50	1.20	.60
1,816 lin. ft. misc. iron	.15	.18	.18
Lump sum, misc. items	700.00	300.00	250.00
507 cu. yd. backfill, Bridge 1-4	3.00	1.20	10.00
163 cu. yd. conc. slab	32.00	35.00	45.00
604 cu. yd. conc. footings	30.00	24.00	45.00
80,210 lb. furn. reinf. steel	.07	.08	.12
53 cu. yd. grav. backfill, drain	4.00	4.50	5.00
Lump sum, misc. items	$1,000	850.00	250.00
560 cu. yd. ex. backfill, bridge No. 1-5	3.00	1.20	10.00
169 cu. yd. conc. deck slab	32.00	34.00	45.00
790 cu. yd. conc. footings	30.00	21.00	45.00
35,410 lb. reinf. steel	.07	.08	.12
64 cu. yd. grav. fill, drain	3.00	4.50	5.00
Lump sum, misc. items	$1,000	900.00	250.00
Lump sum, sanitary sewer (Shelton)	$2,000	$10,000	$10,000
1,543 lin. ft. guard rails	2.00	2.40	1.65
Lump sum, timber	$1,600	$1,000	500.00

Colorado—Weld County—Bureau of Reclamation—Transmission Line

Collier Electric Co., Denver, Colo., with a bid of $13,946 was low to the Bureau of Reclamation at Denver, on construction of a 116 kilovolt transmission line from the Greeley-Ft. Morgan Transmission Line to Prospect Valley sub-station. This work is a part of the Colorado-Big Thompson project. The bidding was particularly interesting because the high bid was nearly six times the low proposal and the second low was twice as much as the winning bid. Bids submitted follow:

(1) Collier Electric Co. $13,946
(2) Larson Construction Co. 26,716
(3) Sanford Construction Co. 36,252
(4) Enterprise Electric Co. 51,562
(5) Clifford Electric Co. $53,630
(6) H. S. Tittle Co. 61,302
(7) Central Electric Co. 68,143

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump sum, clearing land and right-of-way	150.00	$1,000	110.00	912.00	$10,500	$12,000	$13,000
1 ea. type HS struct. with 45-ft. poles	54.25	100.00	66.00	207.55	180.00	269.36	260.00
16 ea. type HS struct. with 50-ft. poles	56.00	100.00	71.94	215.90	180.00	269.36	291.00
68 ea. type HS struc. with 55-ft. poles	65.00	100.00	77.00	215.90	180.00	269.36	300.00
26 ea. type HS struct. with 60-ft. poles	70.00	100.00	81.84	226.75	180.00	271.58	305.00
2 ea. type HS struct. with 65-ft. poles	80.00	100.00	92.40	237.50	180.00	271.58	310.00
1 ea. type HA struct. with 55-ft. poles	73.00	120.00	90.20	216.20	190.00	277.50	310.00
1 ea. type HA struct. with 60-ft. poles	79.00	120.00	96.80	224.50	190.00	277.50	325.00
1 ea. type HTR struct. with 60-ft. poles	84.40	120.00	105.60	272.65	200.00	285.00	325.00
3 ea. type HTR struc. with 65-ft. poles	85.00	130.00	116.60	271.85	200.00	293.78	334.00
1 ea. type 3A struct with 55-ft. poles	59.00	150.00	90.20	220.50	250.00	290.00	327.00
1 ea. type 3AB struct. with 55-ft. poles	66.70	150.00	96.80	231.15	275.00	290.00	330.00
1 ea. type 3AT struct. with 55-ft. poles	59.00	200.00	99.00	289.10	300.00	293.78	335.00
1 ea. type 3AT struct. with 60-ft. poles	69.00	200.00	112.20	289.10	300.00	293.78	335.00
1 ea. type 3T struct. with 55-ft. poles	100.00	200.00	158.40	299.40	295.00	285.00	335.00
1 ea. type 3SWT struct. with 50-ft. poles	151.00	300.00	440.00	531.10	300.00	277.50	330.00
Lump sum, one type 3BT struct. with 55-ft. poles and one type 3SWT struct. with 50-ft. poles, to replace exist. structs. and make tap con.	525.00	$2,000	$1,100	$1,525	700.00	355.00	475.00
10 ea. assembling and attaching X-braces	7.50	25.00	13.20	80.90	50.00	40.70	39.00
10 ea. single guys, compl. except plac'g anchors	7.50	10.00	6.93	22.30	10.00	18.50	26.00
29 ea. double guys, compl. except plac'g anchors	8.50	10.00	13.20	33.60	15.00	41.44	47.65
36 ea. plate anchors	7.50	10.00	7.70	23.45	20.00	20.00	23.75
3 ea. rock anchors	17.70	15.00	11.00	49.50	25.00	35.00	31.00
345 ea. suspension-insulator assemblies with 7 insulator units	2.00	3.00	2.20	9.10	20.00	6.29	6.90
12 ea. suspension-insulator assemblies with 8 insulator units	2.75	3.00	2.64	9.10	20.00	7.40	7.20
6 ea. suspension-insulator assemblies with 9 insulator units	3.00	5.00	2.86	12.30	20.00	8.80	10.95
6 ea. tension-insulator assemblies with 8 insulator units	2.35	5.00	2.86	12.30	25.00	11.00	10.95
18 ea. tension-insulator assemblies with 9 insulator units	2.75	5.00	2.86	11.95	25.00	13.32	14.70
16 mi. three-phase No. 3/0 aluminum steel-reinforced conductor	200.00	500.00	$1,394	821.00	500.00	536.00	605.00
100 fence ground posts and grounding fences	2.00	2.00	5.50	12.75	15.00	11.84	13.25

Building . . .

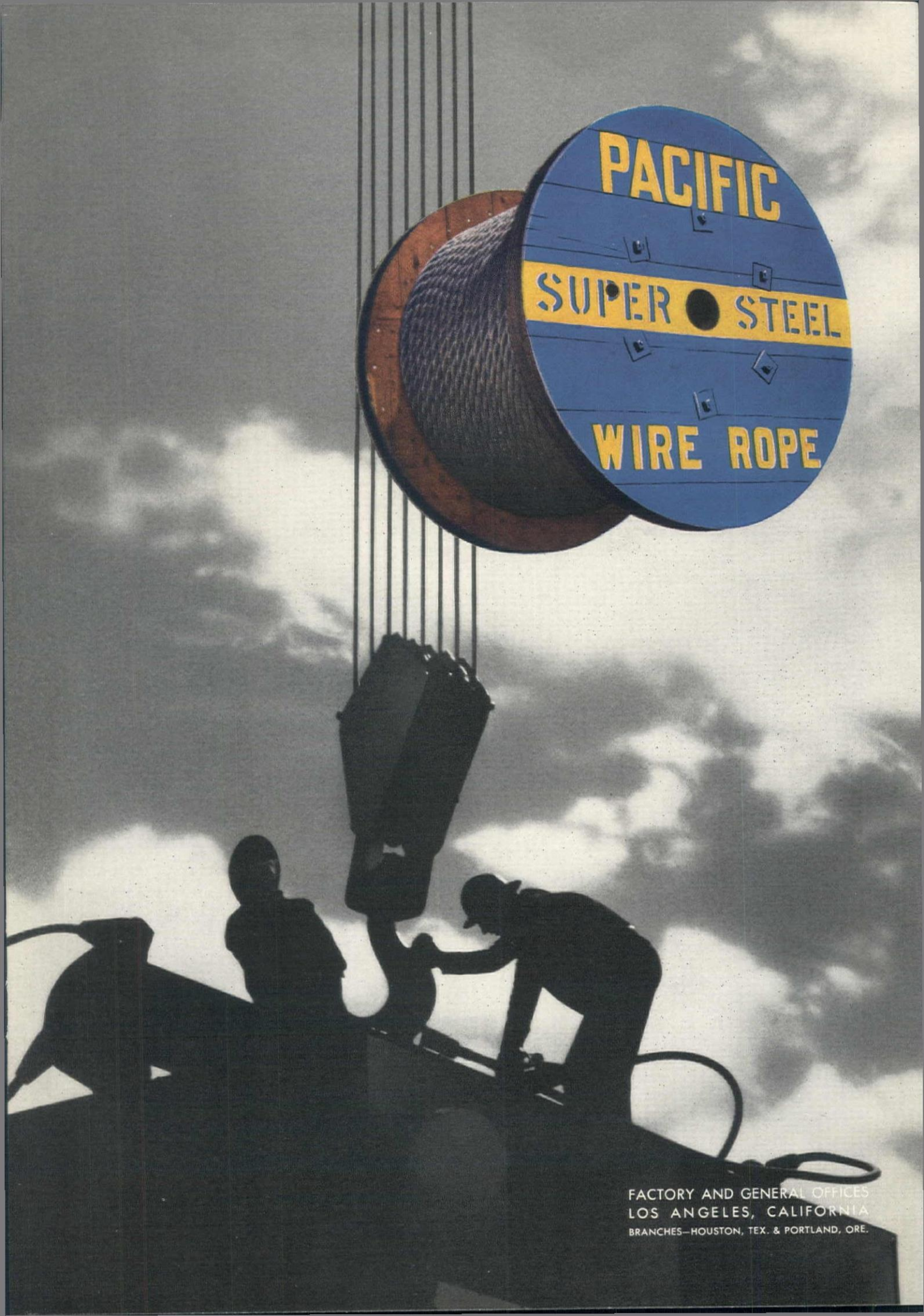
California—Riverside County—Bureau of Reclamation—Residences

John Bohannon, Maywood, Calif., bidding $114,445 to the Bureau of Reclamation at Yuma, Ariz., was low on construction of 13 6-rm. residences and 12 5-rm. residences near Coachella, Calif., as a portion of the All-American canal system of the Boulder Canyon project. The following unit bids were submitted:

(A) John Bohannon $114,445
(B) W. D. Haxton 133,387
(C) Secrest Construction Co. 134,811
(D) E. E. Wikholm 137,450
(E) Brunzell Construction Co. 145,970
(F) Baruch Corp. $148,267
(G) Myers Bros. 159,820
(H) W. C. Smith, Inc. 169,181
(I) John C. Blystone 182,995
(J) Ramey & Mathis 190,895

(1) 3,000 cu. yd. excavation, all classes
(2) 500 cu. yd. concrete
(3) Lump sum, const. (3) six-room resid., each with bay window; except excav. and conc.
(4) Lump sum, const. (10) six-room resid., each without bay window, except excav. and conc.
(5) Lump sum, const. (3) five-room resid., each with bay window; except excav. and conc.
(6) Lump sum, const. (9) five-room resid., each without bay window; except excav. & conc.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
(1)	1.80	.75	1.30	1.25	1.50	.80	1.00	2.06	1.00	2.00
(2)	12.00	10.00	12.50	9.00	16.00	29.00	30.00	17.00	20.00	25.00
(3)	12,900	15,615	15,525	16,050	16,914	16,950	17,760	20,480	20,961	21,765
(4)	42,645	51,650	51,050	53,000	55,380	55,130	58,600	65,767	69,870	71,550
(5)	12,000	14,691	14,670	15,150	15,519	15,115	16,500	17,401	19,791	19,995
(6)	35,500	44,181	43,416	45,000	45,657	44,172	48,960	50,853	59,373	59,085



FACTORY AND GENERAL OFFICES
LOS ANGELES, CALIFORNIA
BRANCHES—HOUSTON, TEX. & PORTLAND, ORE.

CONSTRUCTION SUMMARY

The following pages contain the most complete available tabulation of construction contracts awarded in the eleven western states during the past month. Except for certain instances, contracts amounting to less than $10,000 are not listed. Space is not available to list more than a small proportion of the proposed projects. For your convenience, all items are prepared in an identical manner to provide the following information: County of job location (capital letters); name and address of contractor (bold face); bid price; brief description of work; awarding agency; and approximate date of award. More detailed information on many of these projects is often available, and will gladly be furnished upon your request to the Editor, WESTERN CONSTRUCTION NEWS, 503 Market Street, San Francisco.

CONTRACTS AWARDED

Large Western Projects . . .

Stolte, Inc., Oakland, Calif., was awarded a contract at $517,500 to relocate Atlantic Ave. at the Naval air station in Alameda, Calif., by Bureau of Yards & Docks, Washington, D. C.

Austin Road Co., Dallas, $355,225 for concrete on incomplete portion of Highway 183, by Texas State Highway Department, Austin.

Del E. Webb Construction Co., Phoenix, Ariz., at $2,502,880, received a contract for added aviation facilities at the Marine air station at El Toro, Calif. by Bureau of Yards & Docks, Washington, D. C.

Crown Paving & Construction Co., Ltd., Edmonton, Alta., has been awarded a $1,500,000 contract replacing with concrete sections of asphalt paving at Edmonton airport.

Ben C. Gerwick, Inc., San Francisco, Calif., has a $1,834,000 contract for a carrier pier at the Alameda, Calif., Naval air station, awarded by Bureau of Yards & Docks, Washington, D. C.

Stolte, Inc., Oakland, and **Duncanson-Harrelson Co.,** San Francisco, Calif., have received a contract at $5,810,127 for piling, riprap and other improvements at the Alameda, Calif., Intransit depot, from Bureau of Yards & Docks, Washington, D. C.

M. H. Golden Construction Co., San Diego, Calif., was awarded a contract at $1,810,825 for a quay wall at the Naval air station at San Diego, by Bureau of Yards & Docks, Washington, D. C.

L. E. Dixon Co., Los Angeles, Calif., and **Arundel Corp.,** Baltimore, Md., received contract at $1,659,000 for Horseshoe dam, earth and rock fill, on Verde river, Ariz., by Phelps-Dodge Corp., Phoenix.

M. H. Hasler, Santa Ana, Calif., bidding $392,560, received contract for earth lining on 80 mi. of the Coachella canal, All-American Canal System, Calif., by Bureau of Reclamation, Washington, D. C.

A. Farnell Blair, San Francisco, Calif., was given a contract at $2,452,445 for additional buildings at Shoemaker, Calif., by Bureau of Yards & Docks, Washington, D. C.

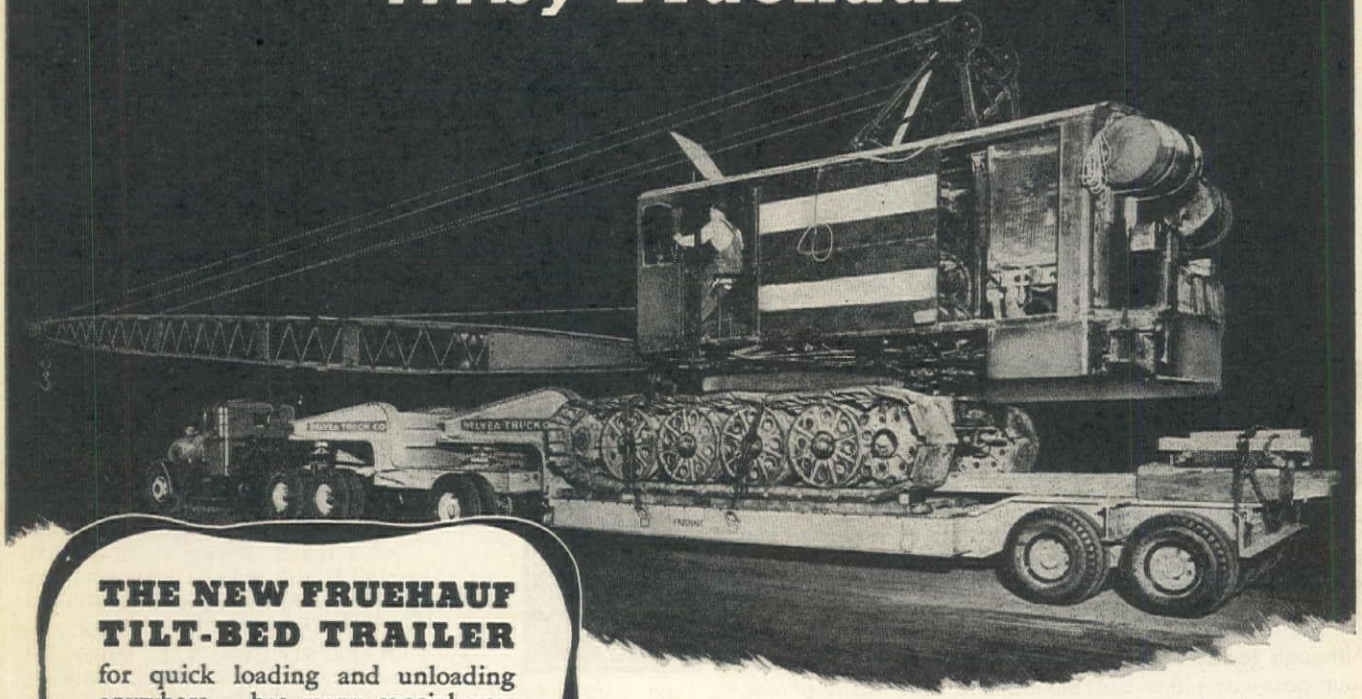
MacDonald & Kahn, Inc., San Francisco, also received a $2,613,000 contract for buildings at Shoemaker, by Bureau of Yards & Docks, Washington, D. C.

Stolte, Inc., Oakland, at $1,423,000, and **G. W. Williams Co.,** Burlingame, Calif., at $1,169,800, have contracts for buildings, etc., at Alameda, Calif., Naval air station, from Bureau of Yards & Docks, Washington, D. C.

Ford J. Twaits Co., Los Angeles, $1,451,175 for a seven-story concrete warehouse at San Diego, Calif., Naval supply depot, by Bureau of Yards & Docks, Washington, D. C.

Designed for your special hauling problem

...by Fruehauf



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TRUCK-TRAILER TRANSPORT IS DOING AN ESSENTIAL JOB FOR ALL AMERICA

Ford J. Twaits Co., and **Morrison-Knudsen Co. Inc.**, Los Angeles, Calif., approximately $2,500,000 for a second auxiliary air station at Klamath Falls, Ore., by Bureau of Yards & Docks, Washington, D. C.

Nettleton & Baldwin, Seattle, over $1,250,000 for 240 houses south of Seattle, Wash., by Ridge Homes, Inc., Seattle.

General Construction Co., Seattle, $1,889,043 for 27 mi. of railroad complete with facils. betw. Bremerton and Shelton, Wash., by Bureau of Yards & Docks, Washington, D. C.

Macco Construction Co., Oakland, and **Morrison-Knudsen Co.**, San Francisco, Calif., $2,013,000 for fill for extension of runway at San Francisco Municipal Airport, by U. S. Engineer Ofc., San Francisco.

Highway and Street . . .

Arizona

APACHE & NAVAJO COS.—**W. J. Henson**, 817 Crest Ave., Prescott—$111,909 for 11.7 mi. bitum. surfac. salvaged oil mix shoulders and sealcoat on the Holbrook-Lupton Hwy., starting about one-half mi. west of Houck and extending northeasterly to the Arizona-New Mexico state line—by State Hwy. Comm., Phoenix. 5-25

COCONINO CO.—**A. F. Miller**, 501 W. Foothill, Monrovia, Calif. — $16,516 to sample and test aggregates and asphalts for construction control at Navajo Ordnance Depot, Bellemont—by U. S. Engineer Office, Los Angeles, Calif. 5-4

NAVAJO CO.—**Wallace & Wallace**, Box 108, Tucson—$163,325 for 10 mi. grade, drain, base course and roadmix bitum. surf. on Winslow-Long Valley Hwy. and Winslow Airport access road—by State Hwy. Comm., Phoenix. 5-4

California

ALAMEDA CO. — **Stolte Inc.**, 8451 San Leandro Blvd., Oakland—$517,500 for grading, roads, services and relocation of Atlantic Ave. at Naval air station, Alameda —by Bureau of Yards & Docks, Washington, D. C. 5-23

ALAMEDA CO.—**A. A. Tieslau & Son**, 1220 East Shore Hwy., Berkeley—$19,544 for repairing 2 mi. with plantmix betw. San Joaquin Co. line and 1 mi. west of Mountain House—by Calif. Div. of Hwys., Sacramento, Calif. 5-15

CONTRA COSTA CO.—**Clements & Co.**, Box 277, Hayward—$79,981 to repair road and parking area in Richmond—by FPHA, San Francisco. 4-28

CONTRA COSTA CO.—**A. J. Raisch**, 900 W. San Carlos St., San Jose—$134,470 to repair 7.5 mi. with crusher run base and plantmix surf. on State Hwy. 75 betw. junction with Rt. 106 and 2.5 mi. east of Antioch—by Calif. Div. of Hwys., Sacramento. 5-15

FRESNO CO. — **Brown, Doko & Baun**, Dolliver St., Pismo Beach—$80,070, repairing portions 11.7 mi. with untr. rock base, plantmix surf. and sealcoat betw. Oil King School and Huron Road and betw. Hub and 4.6 mi. northerly—by Calif. Div. of Hwys., Sacramento. 5-23

HUMBOLDT CO. — **Mercer-Fraser Co.**,

DELIVERING...
When the Chips are Down

Emergency performance is an old, old story for Bucyrus-Erie excavators. Long a feature of Bucyrus-Erie machines, the ability to deliver record output when it's needed the most proves its value more than ever now. That's why Bucyrus-Eries are such important contributors to the speed-up of wartime operation — why you'll find them on the battlefronts and on the homefront working 24 hours a day to help bring victory nearer.

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Plan now to include field-proved Bucyrus-Erie quality and performance in your equipment. Whatever your excavating need, there's a Bucyrus-Erie excavator to fill it — shovels, draglines, cranes, dragshovels, etc. for low cost, high output service.

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WASHINGTON: Bucyrus-Erie Co., 3408 First Ave. So., Seattle 4; Clyde Equipment Co., 3410 First Ave. So., Seattle 4; Construction Equipment Co., 1118 Ide Ave., Spokane 1. OREGON: Clyde Equipment Co., 17th and Thurman Sts., Portland 9. CALIFORNIA: Bucyrus-Erie Co., 390 Bayshore Blvd., San Francisco 24; Crook Co., 2900 Santa Fe Ave., Los Angeles 11. UTAH: The Lang Co., 267 W. First So., Salt Lake City 9. COLORADO: Ray Corson Machy. Co., 1648 Wazee St., Denver 2. IDAHO: Intermountain Equipment Co., Broadway at Myrtle, Boise. NEW MEXICO: R. L. Harrison Co., 209 North Fourth St., Albuquerque. ARIZONA: O. S. Stapley Co., 723 Grand Ave., Phoenix. MONTANA: Westmont Tractor & Equipment Co., 150 E. Spruce St., Missoula. ALASKA: Northern Commercial Co., 419 Colman Bldg., Seattle 4, Wash.

Second and Commercial Sts., Eureka—$49,717 for repairing portions 3.7 mi. with gravel base, plantmix surf., sealcoat, etc., betw. North Scotia Bridge and Fortuna—by Calif. Div. of Hwys., Sacramento. 5-23

IMPERIAL CO.—**Arthur A. Johnson,** 421 Pearl St., Laguna Beach—$48,198, for portions of 10.9 mi. surf. with roadmix betw. Dixiland and 2 mi. east of Seeley and betw. El Centro and Meloland—by Calif. Div. of Hwys., Los Angeles. 5-5

INYO & MONO COS.—**Basich Bros. Construction Co.,** Box 151, Alhambra—$55,892 for repairing portions of 44.3 mi. with sealcoat, and stockpiling screenings betw. Bishop and Coleville — by Calif. Div. of Hwys., Sacramento. 5-22

KERN CO.—**Griffith Co.,** 1060 S. Broadway, Los Angeles—$96,627 for repairing 15.2 mi. with plantmix and applying asph. emuls. seal btwn. Maricopa and 3 mi. east; betw. 6.2 mi. west of Rt. 4 and Rt. 4; and betw. 0.5 mi. and 6.5 mi. east of Kern River —by Calif. Div. of Hwys., Sacramento. 5-15

KERN CO.—**R. R. Hensler,** 4254 Tujunga Ave., North Hollywood — $48,464 for 16.2 mi. roadmix surf. and seal repair betw. 1.0 mi. east of Blackwell's Corner and Semitropic School—by Calif. Div. of Hwys., Sacramento. 5-10

LASSEN & MODOC COS.—**E. B. Bishop,** Orland—$77,333 for repairing 12.2 mi. with plantmix betw. 4 mi. southwest of Adin and 2.7 mi. northeast of Rush Creek Bridge—by Calif. Div. of Hwys., Sacramento. 5-15

LOS ANGELES CO.—**Ansco Construction Co.,** 2725 Atlantic Ave., Long Beach —$34,321 for plantmix surf. on Seventh St., betw. Pine and Redondo Aves.—by City Council, Long Beach. 5-4

LOS ANGELES CO.—**Griffith Co.,** 1060 S. Broadway, Los Angeles — for street improv. at Manchester Ave. and Sepulveda Blvd., Los Angeles, to include 46,763 sq. ft. plantmix pave. and 24,000 sq. ft. walk, curbs and gutters — by Los Angeles Extension Co., Los Angeles. 5-16

LOS ANGELES CO.—**Vido Kovacevich,** 5400 Imperial Hwy., South Gate—$27,180 for 2.9 mi. repair with plantmix surf. on Lakewood Blvd., betw. Firestone Blvd. and Telegraph Road; and on Rosemead Blvd., betw. Santa Fe R. R. and Fawcett—by Calif. Div. of Hwys., Los Angeles. 5-5

LOS ANGELES CO.—**Schroeder & Co., Inc.** 8140 Tujunga Ave., Roscoe—$75,676 to repair portions of 16.2 mi. with plantmix surf. on Rt. 23, betw. Solamint and Acton Road and on Rt. 79 betw. Saugus and Newhall Junction—by Calif. Div. of Hwys., Los Angeles. 5-5

LOS ANGELES CO.—**Western Dredging & Construction Co.,** 315 Park Central Bldg., Los Angeles — $33,518 for pavement for open storage at Wilmington—by U. S. Engineer Office, Los Angeles. 5-4

MADERA CO.—**M. J. Ruddy & Son,** Box 1122, Modesto—$41,543 for repair 7.3 mi. with plantmix surf. and seal, betw. Madera and Merced Co. line — by Calif. Div. of Hwys., Sacramento. 5-5

MARIN CO.—**A. G. Raisch,** 2048 Market St., San Francisco—$70,822 for 3.1 mi., portions only, repair with asph. conc. pave. betw. Waldo and Golden Gate Bridge—by Calif. Div. of Hwys., Sacramento. 5-15

MARIN CO.—**A. G. Raisch,** 2048 Market St., San Francisco — $13,879 for cr. run base on imp. borrow, penetration treat. and armor coat on .4 mi. betw. Belvedere railroad crossing and Tiburon—by Calif. Div.


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of Hwys., Sacramento. 5-15

MENDOCINO & HUMBOLDT COS.—**Clements & Co.,** Box 277, Hayward—$98,840, repairing with plantmix surf. and sealcoat portions only of 9.7 mi. betw. Rattlesnake Summit & Garberville — by Calif. Div. of Hwys., Sacramento. 5-23

MODOC CO. — **McGillivray Construction Co.,** Box 873, Sacramento—$98,053 for repairing 21.8 mi. NE. of Brush Creek Bridge & Chambers Ranch with plantmix — by Calif. Div. of Hwys., Sacramento. 5-5

RIVERSIDE CO.—**Basich Bros. Construction Co.,** Box 151, Alhambra—$34,855 for portions of 9.6 mi. roadmix surf. repair on St. Hwys. Nos. 203-A & 187—by Calif. Div. of Hwys., Los Angeles. 5-5

SAN DIEGO CO.—**Griffith Co.,** 1060 S. Broadway, Los Angeles—$107,957 for 1.4 mi. grading & surf. with plantmix betw. Linda Vista Housing Project & San Diego River in San Diego — by Calif. Div. of Hwys., Sacramento. 5-23

SAN JOAQUIN CO. — **Geo. French Jr.,** 1883 Jewel Court, Stockton—$23,408 for repairing 2.3 mi. with borrow and plantmix surf. betw. Tracy & Stockton—by Calif. Div. of Hwys., Sacramento. 5-10

SAN LUIS OBISPO CO.—**Brown, Doko & Baun,** Dolliver St., Pismo Beach—$44,419 for repairing about 5.6 mi. with imp. base mater. & plantmix surf. W. of Pennington Creek & Morro Bay — by Calif. Div. of Hwys., Sacramento. 5-23

SAN LUIS OBISPO CO.—**Clinton Construction Co.,** of California, 923 Folsom St., San Francisco — $194,000 for bypass in causeway & misc. work at Morro Bay—by Bureau of Yards & Docks, Washington, D. C. 5-4

SAN LUIS OBISPO CO.—**Granite Construction Co.,** Box 900, Watsonville—$49,700 for 8.3 mi. plantmix surf. betw. San Luis Obispo & Santa Margarita & betw. 2 mi. E. of Estrella River and 0.5 mi. E. of Cottonwood Pass Rd.—by Calif. Div. of Hwys., Sacramento. 5-5

SAN MATEO CO.—**L. C. Smith,** First & Railroad Ave., San Mateo—$198,147 for road work at N. A. B. P. D., San Bruno—by Bureau of Yards & Docks, Washington, D. C. 5-19

SANTA BARBARA AND SAN LUIS OBISPO COS.—**Brown, Doko & Baun,** Dolliver St., Pismo Beach — $51,510 for plantmix surf. for portions 8.5 mi. hwy. betw. Gaviota Creek & Arroyo Grande—by Calif. Div. of Hwys., Sacramento, Calif.

SANTA CRUZ CO.—**A. J. Raisch,** 900 W. San Carlos St., San Jose—$55,981 for 6.2 mi., portions only, repair with plantmix surf. betw. Santa Cruz & Davenport—by Calif. Div. of Hwys., Sacramento. 5-15

SOLANO CO.—**Sheldon Oil Co.,** Main St., Suisun—$23,985 for repair with untr. rock base & plantmix surf. portions only of 1.2 mi. W. of Fairfield and E. of Suisun city limits — by Calif. Div. of Hwys., Sacramento. 5-23

STANISLAUS CO.—**A. A. Tieslau & Son,** 1220 E. Shore Hwy., Berkeley—$23,751 to grade & surf. 0.8 mi. with plantmix on crusher run base at Hammond General Hospital—by Calif. Div. of Hwys., Sacramento. 5-10

TULARE CO. — **Brown, Doko & Baun,** Dolliver St., Pismo Beach—$52,035 for portions 6.7 mi. plantmix surf. & sealcoat betw. 5.1 mi. N. of Kern county line & 0.5 mi. S. of Pixley—by Calif. Div. of Hwys., Sacramento. 5-5

MICHIGAN can do 5 JOBS for YOU

1 CRANE

2 CLAM

3 SHOVEL

From Clamshell or Crane use, the 3/8 yard and 1/2 yard MICHIGANS can be quickly converted to shovel use by changing booms. Much time is saved because in the MICHIGAN, no changes are necessary in the operating mechanism. Full circle loading.

4 DRAGLINE

On the regular crane boom, the Michigan Dragline equipment can be rigged in an hour or less. An unusually long reach is possible with this attachment, and the high speed, AIR-CONTROLLED operation of all MICHIGANS means added work capacity.

5 TRENCH HOE

This attachment, with its eleven-foot digging depth, finds scores of uses in public works and private construction.

Trench Hoe is available for both 3/8 yard and 1/2 yard models, as are all attachments pictured here.

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MICHIGAN
POWER SHOVEL CO.
BENTON HARBOR, MICHIGAN

Idaho

BONNER CO.—**R. L. Bair,** 1220 Ide Ave., Spokane, Wash.—$22,270 for stockpiling cr. gravel surf. & cover coat material, near U. S. No. 10—by Comm. of Public Works, Boise. 5-22

LEWIS CO.—**Max J. Kuney,** 120 N. Ralph St., Spokane, Wash.—$16,000 for crushed rock surf. in stockpiles near U. S. No. 95 betw. Winchester & Culdesac Grade—by Comm. of Public Works, Boise. 5-22

Kansas

FINNEY CO.—**Broce Construction Co.,** Dodge—$24,052 for 31.9 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-5

GOVE CO.—**M. W. Watson,** 1004 National Bank of Topeka Bldg., Topeka—$17,827 for 19.1 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-12

KEARNY CO.—**San-Ore Construction Co.,** McPherson—$15,177 for 22.3 mi. sing. asph. surf.—by State Highway Comm., Topeka. 5-5

KIOWA CO.—**J. H. Shears' Sons,** 410 E. Second St., Hutchinson—$16,312 for 23.4 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-7

LANE CO.—**Dan Scherrer Construction Co.,** 903 N. Third St., Kansas City—$11,342 for 16.3 mi. asph. surf. treatment—by State Highway Comm., Topeka. 5-5

NORTON CO.—**D. G. Hansen,** Logan—$12,583 for 13.99 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-12

PAWNEE CO.—**Yant Construction Co.,** Omaha, Neb.—$10,856 for 16.3 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-7

PHILLIPS CO.—**D. G. Hansen,** Logan—$29,090 for 32.3 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-12

PHILLIPS CO.—**Inland Construction Co.,** 3867 Leavenworth St., Omaha—$16,552 for 17.7 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-12

ROOKS CO.—**George Bennett Construction Co.,** 1520 Central Ave., Kansas City, Kan.—$15,017 for 17.3 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-12

RUSH CO.—**Yant Construction Co.,** Omaha, Neb.—$11,502 for 15.1 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-7

STANTON CO.—**J. H. Shears' Sons,** 410 E. Second St., Hutchinson—$10,615 for 12.7 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-5

WICHITA CO.—**D. G. Hansen,** Logan—$14,250 for 19.1 mi. sing. asph. surf. treatment—by State Highway Comm., Topeka. 5-5

Montana

FERGUS & PETROLEUM COS.—**J. L. McLaughlin,** 431 Ford Bldg., Great Falls—$38,642 for cr. & stockpiling 44,500 cu. yd. top course cr. gravel surf., from cr. set-ups—by State Highway Comm., Helena. 5-1

GRANITE, MISSOULA, POWELL & RAVALLI COS.—**Buck Helean,** 606 W. Pine St., Missoula—$57,240 for cr. & stockpiling 42,000 cu. yd. cr. gravel surf. from cr. set-ups—by State Hwy. Comm., Helena.

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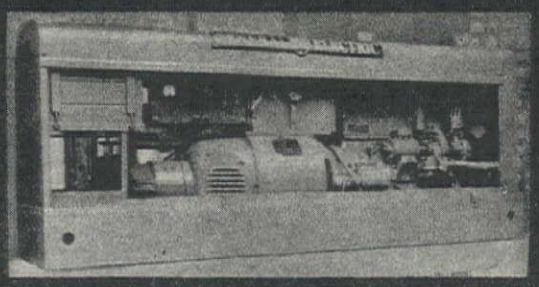

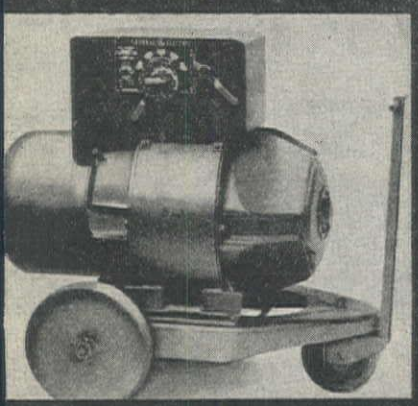

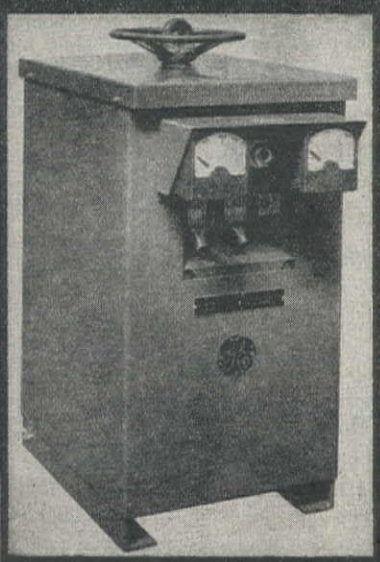

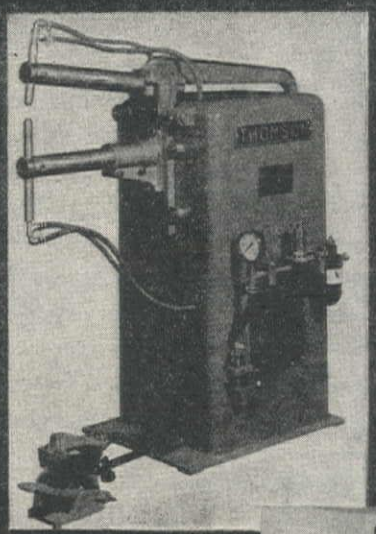

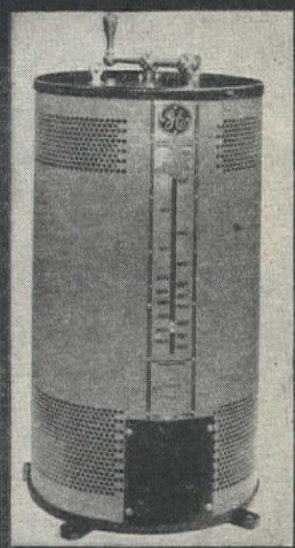

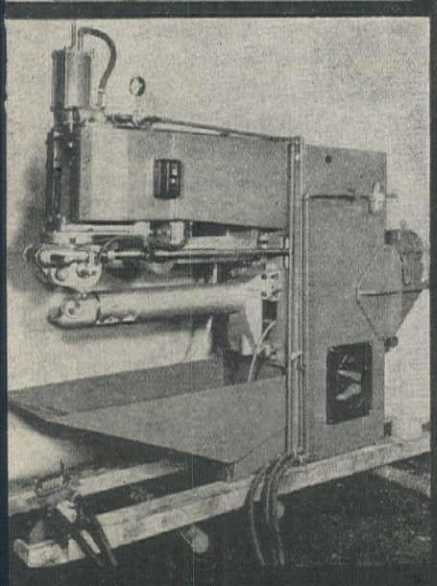

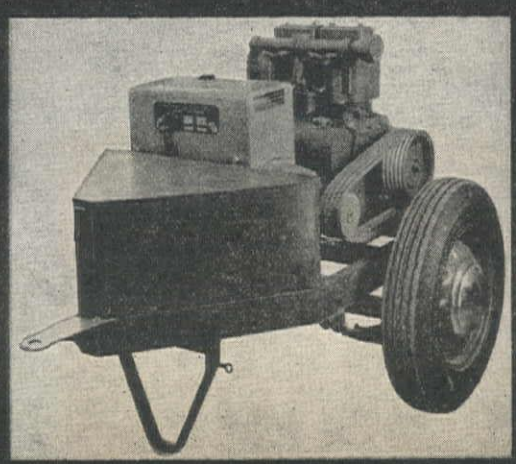

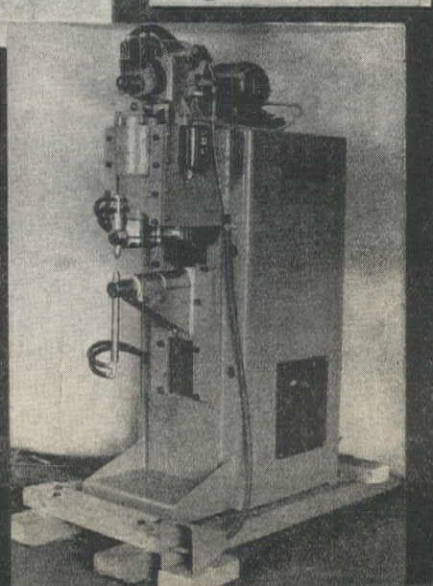

YELLOWSTONE, TREASURE, STILLWATER & BIG HORN COS.—**J. L. McLaughlin,** 431 Ford Bldg., Great Falls—$39,742 for 10.6 mi. asph. sealcoat & cr. gravel cover material on U. S. Hwy. No. 10, betw. Pompey's Pillar & Hysham; and cr. & stockpiling 30,000 cu. yd. cr. gravel surf. at various locations—by State Hwy. Comm., Helena. 5-1

New Mexico

SANTA FE & SANDOVAL COS.—**Brown Bros.,** Box 1479, Albuquerque—$40,985 for 6.3 mi. top course surf., oil process. & misc. constr. on St. Hwy. Rt. No. 4 betw. Otowi & Los Alamos—by State Hwy. Dept., Albuquerque. 5-11

Oregon

LAKE CO.—**Babler & Conley,** 4617 S. E. Milwaukee St., Portland—$37,816 for grading & surfacing 3.8 mi. & const. 3 pile trestle bridges on Lakeview Airfield access road—by State Hwy. Comm., Salem. 5-15

LAKE CO.—**M. C. Lininger & Sons,** Medford—$36,750 for 15,000 cu. yd. cr. rock in stockpiles, Lakeview Rock Production Project on Klamath Falls-Lakeview & Fremont Hwys.—by State Hwy. Comm., Portland.

UMATILLA & UNION COS.—**Western Rock Co.,** Portland—$21,983 to stockpile cr. rock & gravel, Meacham LaGrande Rock Project on Old Oregon Trail—by State Hwy. Comm., Portland. 5-12

Texas

CARSON, ARMSTRONG, DONLEY, OLDHAM, POTTER & RANDALL COS.—**Public Construction Co.,** Denton—$109,084 for 120 mi. sealcoat—by State Hwy. Dept., Austin. 5-2

CARTHAGE & PANOLA COS.—**Gaylord Construction Co.,** Box 6157, Houston—$37,603 for 14.5 mi. leveling-up course on U. S. Hwy. 79, Carthage to Rusk county line—by State Hwy. Dept., Austin. 5-17

COLLIN, ELLIS, DENTON, KAUFMAN & DALLAS COS.—**O'Neal Construction Co.,** 767 S. Lamar St., Dallas—$58,465 for 8.8 mi. leveling-up course on various U. S. & State Hwys.—by State Hwy. Dept., Austin. 5-17

DALLAM, HARTLEY, SHERMAN & MOORE COS.—**Public Construction Co.,** Denton—$154,270 for 166.6 mi. sealcoat—by State Hwy. Dept., Austin. 5-2

DALLAS, ROCKWALL, COLLIN, DENTON & KAUFMAN COS.—**Texas Bitulithic Co.,** Box 5297, Dallas—$116,797 for 31.1 mi. leveling-up course—by State Hwy. Dept., Austin. 5-2

DEL RIO & VAL VERDE COS.—**Day P. McNeel Co.,** 922 Austin St., San Antonio—$31,400 for 3.3 mi. leveling-up and sealcoat on U. S. Hwy. 90, S. of Devils River to N. of Evans Creek—by State Hwy. Dept., Austin. 5-17

DONLEY CO.—**Jack C. Vowell,** Box 253, El Paso—$38,915 for 6 mi. leveling-up course—by State Hwy. Dept., Austin. 5-2

ECTOR CO.—**Brazos Valley Construction Co.,** Mineral Wells—$107,027 for road work at Odessa—by State Hwy. Dept., Austin. 4-28

ECTOR CO.—**Panhandle Construction Co.,** Box 1500, Lubbock—$104,795 for grading, drainage, flexible base & asph. topping—by State Hwy. Dept., Austin. 4-28

ELLIS CO.—**E. B. Snead,** Littlefield Bldg.,

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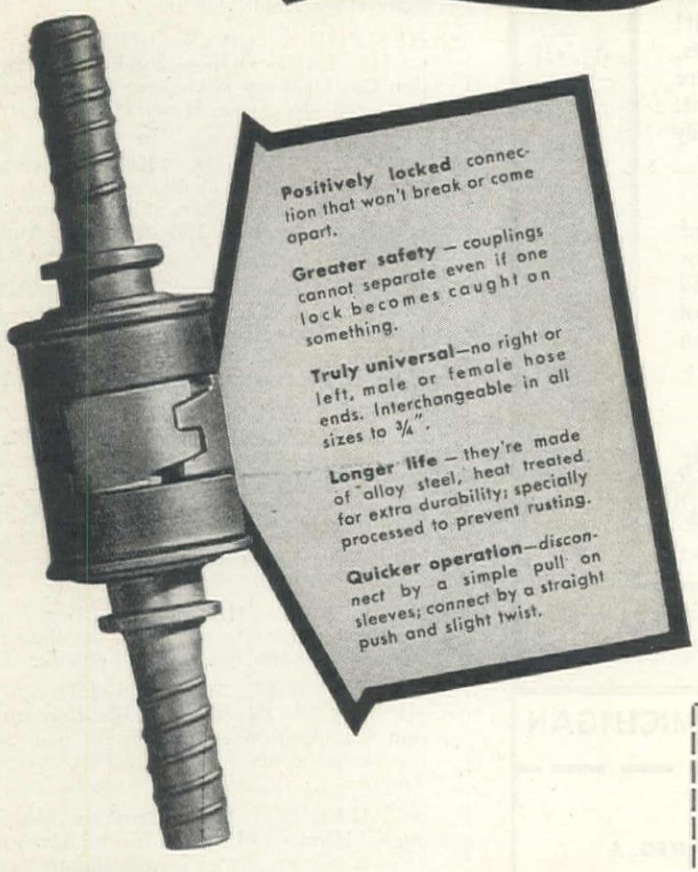

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315 S. Van Ness Ave., San Francisco, Calif.
1741 First Ave., S., Seattle, Wash.
54 E. Fourth, Salt Lake City, Utah

Austin — $114,973 for 12.9 mi. widening conc. pavement on U. S. 77, 2.3 mi. S. of Waxahachie to Hill county line—by State Hwy. Dept., Austin. 5-3

EL PASO CO.—**Jack C. Vowell,** Box 253, El Paso — $10,165 for 1.5 mi. leveling-up from Montoya to Canutille on U. S. Hwy. 30—by State Hwy. Dept., Austin. 5-17

ERATH CO.—**Southern Construction Co.,** Austin—$44,859 for 17.9 mi. leveling-up on U. S. Hwy. 281, Stephenville, S. to Hamilton county line — by State Hwy. Dept., Austin. 5-17

GONZALES & DEWITT COS.—**Collins & Bland,** Austin—$43,773 for 14.2 mi. leveling-up course — by State Hwy. Dept., Austin. 5-2

GRAYSON CO. — **Spencer Construction Co.,** Box 487, Carrollton—$194,500 for various paving jobs, including 30-ft. roadway 3 mi. across top of dam near Denison—by State Hwy. Dept., Austin. 5-17

HALE CO.—**Austin Road Co.,** 1813 Clarence St., Dallas—$83,959 for 16.3 mi. leveling-up course on U. S. Hwy. 87, Lubbock county line to Hale Center—by State Hwy. Dept., Austin. 5-17

HARDEMAN, FOARD, KNOX, COLLINGSWORTH, CHILDRESS, HALL & WHEELER COS. — **Ned B. Hoffman,** Mid-Continent Bldg., Fort Worth—$102,737 for 119.9 mi. sealcoat on various hwys. —by State Hwy. Dept., Austin. 5-17

HARTLEY, DALLAM & LIPSCOMB COS.—**Jack C. Vowell,** Box 253, El Paso—$75,232 for 10.5 mi. leveling-up course—by State Hwy. Dept., Austin. 5-3

HEMPHILL, GRAY, LIPSCOMB & OCHILTREE COS. — **Public Construction Co.,** Denton—$70,553 for 88.4 mi. sealcoat, etc.—by State Hwy. Dept., Austin. 5-3

HUTCHINSON CO. — **Kelly Construction Co.,** 2215 Belknap Place, San Antonio —$58,950 for road repairs at housing project at Borger—by Fed. Pub. Housing Auth., Fort Worth. 5-18

JIM WELLS, BEE, NUECES, KLEBERG, ARANSAS & GOLIAD COS.—**C. Hunter Strain,** Box 1057, San Angelo—$50,195 for 64.2 mi. sealcoat — by State Hwy. Dept., Austin. 5-2

KENT, FISHER, SCURRY, CALLAHAN & TAYLOR COS.—**Thomas & Ratliff,** Rogers—$48,160 for 70.4 mi. sealcoat —by State Hwy. Dept., Austin. 5-3

MOORE, CARSON & HUTCHINSON COS.—**Public Construction Co.,** Denton—$70,768 for 14 mi. leveling-up course—by State Hwy. Dept., Austin. 5-2

NUECES CO.—**Holland Page,** Box 1181, Austin — $34,366 for 11 mi. leveling-up course—by State Hwy. Dept., Austin. 5-2

OCHILTREE, HANSFORD AND HUTCHINSON COS.—**Public Construction Co.,** Denton — $262,985 for 53.6 mi. leveling-up course—by State Hwy. Dept., Austin. 5-2

OLDHAM CO.—**Nolan Brothers,** Minneapolis, Minn.—$74,194 for 15.4 mi. leveling-up course from Potter county line to Vega on Hwy. 66—by State Hwy. Dept., Austin. 5-3

PALO PINTO, ERATH, HOOD AND JOHNSON COS.—**Ned B. Hoffman,** Mid-Continent Bldg., Fort Worth—$43,922 for 57.9 mi. sealcoat, etc. — by State Hwy. Dept., Austin. 5-17

PALO PINTO CO. — **Uvalde Construc-**

tion Co., Box 3027, Dallas—$73,347 for 36.3 mi. leveling-up course from Stephens county line to Mineral Wells & from Mineral Wells N. 5 mi. on U. S. Hwys. 180 & 281—by State Hwy. Dept., Austin. 5-17

PARKER, PALO PINTO & ERATH COS.—**Texas Bitulithic Co.,** Box 5297, Dallas—$155,441 for 43 mi. leveling-up course from SW. of Weatherford to the Eastland county line on U. S. Hwy. 80—by State Hwy. Dept., Austin. 5-17

REEVES, WARD, PECOS & MARTIN COS.—**Uvalde Construction Co.,** Box 3027, Dallas—$138,221 for 44.9 mi. leveling-up & sealcoat on U. S. Hwy. 82 & S. H. 82 & 137—by State Hwy. Dept., Austin. 5-17

TARRANT CO.—**Austin Road Co.,** 1813 Clarence St., Dallas—$355,225 for pouring of concrete on incompleted part of Hwy. 183—by State Hwy. Dept., Austin. 4-28

THROCKMORTON, BAYLOR AND YOUNG COS.—**Public Construction Co.,** Denton—$38,041 for 49.2 mi. sealcoat on U. S. Hwy. 183 & St. Hwys. 199, 24 & 251—by State Hwy. Dept., Austin. 5-2

THROCKMORTON CO.—**Uvalde Construction Co.,** Box 3027, Dallas—$53,434 for 26.7 mi. level-up course—by State Hwy. Dept., Austin. 5-3

TOM GREEN CO.—**Gaylord Construction Co.,** Box 6157, Houston—$67,272 for 15.7 mi. leveling-up course from SE. of San Angelo to Concho county line on U. S. 87—by State Hwy. Dept., Austin. 5-17

WEBB, ZAPATA, HILDAGO, CAMERON & KENNEDY COS.—**E. B. Darby & Co.,** Pharr—$202,177 for 128.7 mi. leveling-up & sealcoat on U. S. Hwys. 83 & 281 & St. Hwys. 107 & 336—by State Hwy. Dept., Austin. 5-17

WHEELER CO.—**Uvalde Construction Co.,** Box 3027, Dallas—$151,963 for 21.9 mi. leveling-up & sealcoat on St. Hwy. 152, Gray county line to 5 mi. E. of Wheeler—by State Hwy. Dept., Austin. 5-17

WISE, TARRANT, JOHNSON AND PARKER COS.—**Southern Construction Co.,** Austin—$46,619 for 21.9 mi. leveling-up course from 1.3 mi. S. of Rhome to Hicks Overpass & from Cresson to Ben Brook on U. S. Hwys. 81 & 377—by State Hwy. Dept., Austin. 5-17

Utah

DUCHESNE & UINTAH COS.—**Deal Mendenhall Construction Co.,** Springville—$50,875 for gravel & cover material stockpiles—by Utah State Road Comm., Salt Lake City. 5-22

WEBER & BOX ELDER COS.—**Olof Nelson Construction Co.,** Box 413, Logan—$120,556 for bitum. roadmix surf. betw. Plain City & Hot Springs, F. A. Rt. No. 1—by State Road Comm., Salt Lake City. 4-28

Washington

BENTON CO.—**M. E. Nelson Construction Co., Inc.,** Ephrata—$163,877 for 8.3 mi. grade, surface, drain; & light bitum. surf. & single seal treatments on county road & city streets, Prim. St. Hwy. No. 3 Access Road Project—by Director of Hwys., Olympia. 5-24

KING CO.—**Valley Construction Co.,** Northern Life Tower, Seattle—$52,767 for repairing & resurfacing various streets & avenues in Seattle—by Seattle Board of Public Works, Seattle. 5-22

KITSAP CO.—**Western Asphalt Co.,** Se-

attle—$26,440 for 4 mi. asph. conc. wearing course on Prim. St. Hwys. Nos. 14 & 21, Tidewater Creek to Port Orchard—by Director of Hwys., Olympia. 5-17

KITTITAS CO.—**E. J. Templeton & Co.,** 2924 Lombard Ave., Everett—$72,788 for resurfacing 20.6 mi. with asph. conc. & nonskid single seal on Prim. St. Hwy. No. 2, Snoqualmie Pass to Easton—by Director of Hwys., Olympia. 5-17

PIERCE, JEFFERSON, GRAYS HARBOR, THURSTON & CLALLAM COS. —**Western Asphalt Co.,** Seattle—$109,980 for 57.8 mi. bitum. surf. on sections of several primary state hwys.—by Director of Hwys., Olympia. 5-17

SNOHOMISH CO. — **Hugo Seismund,** Everett — $26,000 for clearing, grubbing, excav., etc., for Rock Creek revision of Snohomish County Road — by City of Everett. 5-5

WHITMAN, PEND OREILLE, LINCOLN & STEVENS COS. — **McAtee & Heathe,** 3527 E. Trent Ave., Spokane — $42,386 for 53.3 mi. bitum. retread surf. on sections of several primary state hwys.—by Director of Hwys., Olympia. 5-17

Wyoming

CAMPBELL CO.—**Summit Construction Co.,** Rapid City, S. Dak.—$48,242 to grade, drain, surf. & repair 24.7 mi. and 8 timber bridges, etc., Gillette-Exheta Coal Mine Access Road — by State Hwy. Comm., Cheyenne. 5-11

CARBON CO.—**C. C. Warrington,** Cheyenne—$15,386 for grading, draining, surf., stone chip sealcoat, etc., 2.5 mi. on Hanna-Union Pacific Coal Co. Mine Access Road —by State Hwy. Comm., Cheyenne. 5-11

FREMONT CO. — **Big Horn Construction Co.,** Sheridan — $41,320 for 41.4 mi. stone chip sealcoat on Bubois-Diversion Dam Road—by State Hwy. Comm., Cheyenne. 5-11

UINTA CO. — **Big Horn Construction Co.,** Sheridan—$64,878 for 45.3 mi. stone chip sealcoat on Evanston-Granger Road & 3.9 mi. on Urie-Carter Road—by State Hwy. Comm., Cheyenne. 5-11

WESTON CO.—**Teton Construction Co.,** Cheyenne—$65,692 for 10.7 mi. base course surf., base treatment & sand sealcoat on Upton-Osage Rd.—by State Hwy. Comm., Cheyenne. 5-11

Bridge . . .

Arizona

MOHAVE CO.—**Morrison-Knudsen Co., Inc.,** 810 Title Guarantee Bldg., Los Angeles—for two concrete bridge abutments for hyw. grade separation on the Santa Fe Railroad, Topock—by A. T. & S. F. Railway Co., Los Angeles, Calif. 5-17

California

SAN DIEGO CO.—**E. G. Perham,** 1128 Stearns Dr., Los Angeles—$24,768 to repair three bridges across Otay River & across S. & N. channels of Sweetwater River, betw. 1 & 6 mi. S. of National City—by Calif. Div. of Hwys., Sacramento. 5-2

SOLANO CO.—**J. D. Proctor, Inc.,** Box 247, Pt. Richmond Station, Richmond — $20,587 for repairing fenders & piers of bridge across Napa River at W. city limits of Vallejo—by Calif. Div. of Hwys., Sacramento. 5-23

Airport . . .

California

ALAMEDA CO.—**Fredrickson & Watson Construction Co.,** 873 81st Ave., Oakland —$169,000 for additional conc. apron, Naval Air Station, Alameda—by Bureau of Yards & Docks, Washington, D. C. 5-19

ALAMEDA CO.—**Johnson, Drake & Piper,** Latham Square Bldg., Oakland—$783,000 for six hangars, warehouse, storehouse & relocation of existing structures at Naval air station, Oakland—by Bureau of Yards & Docks, Washington, D. C. 5-4

CONTRA COSTA CO.—**Johnson, Drake & Piper,** Latham Square Bldg., Oakland—$116,500 for runway shoulders & operations bldg., Concord—by Bureau of Yards & Docks, Washington, D. C. 5-12

KERN CO.—**J. E. Haddock, Ltd.,** 3538 E. Foothill Blvd., Pasadena—$21,746 for taxiways & landing mat at Minter Field, near Bakersfield—by U. S. Engineer Office, Sacramento. 4-24

LOS ANGELES CO.—**Bonadiman-McCain,** 1709 W. Eighth St., Los Angeles—$12,387 to remove certain revetments at Army Air Field, Long Beach—by U. S. Engineer Office, Los Angeles. 5-9

LOS ANGELES CO.—**Bonadiman-McCain,** 1709 W. Eighth St., Los Angeles—$58,035 for apron expansion at Hawthorne Municipal Airport, Hawthorne—by U. S. Engineer Office, Los Angeles. 5-11

ORANGE CO.—**Del E. Webb Construction Co.,** 302 S. 23rd Ave., Phoenix, Ariz.—$2,502,880 for added aviation facilities at Marine Corps Air Station, El Toro—by Bureau of Yards & Docks, Washington, D. C. 4-28

RIVERSIDE CO.—**Matich Bros. & Yeager,** Box 87, Riverside—$134,448 for hangar aprons & taxiways at March Field—by U. S. Engineer Office, Los Angeles. 5-22

RIVERSIDE CO.—**Stratton Construction Co.,** 1438 E. Broadway, San Gabriel—$60,448 for maintenance hangar, utils., & paving at Army Airfield, Palm Springs—by U. S. Engineer Office, Los Angeles. 4-27

SACRAMENTO CO.—**Campbell Construction Co.,** 800 R St., Sacramento—$21,393 for enclosing area betw. bldgs., Sacramento Air Depot—by U. S. Engineer Office, Sacramento. 5-15

SAN FRANCISCO CO.—**Macco Construction Co.,** Freight & Ferry Sts., Oakland and **Morrison-Knudsen Co.,** Russ Bldg., San Francisco—$2,013,000 for fill for extension of runway at San Francisco Municipal Airport—by U. S. Engineer Ofc., San Francisco. 5-29

SAN MATEO CO.—**Chas. L. Harney Co.,** 625 Market St., San Francisco—$197,062 for taxiways & parking areas at N. A. A. F., South San Francisco—by Bureau of Yards & Docks, Washington, D. C. 5-18

SANTA BARBARA CO.—**A. Teichert & Son, Inc.,** P. O. Box 1113, & **John C. Gist,** 1020 46th St., Sacramento—$863,682 to grade & pave runways & parking areas at Marine Corps Air Station, Santa Barbara —by Bureau of Yards & Docks, Washington, D. C. 4-28

Idaho

ADA CO.—**J. A. Terteling & Sons.** Box 1406, Boise—$122,920 for aprons at Gowen Field, near Boise—by U. S. Engineer Office, Portland, Ore. 5-23

Nevada

CHURCHILL CO.—**Dodge Construction Co.,** Fallon—$80,000 for improvement of runway & shoulders at A. A. S., Fallon—by Bureau of Yards & Docks, Washington, D. C. 5-23

New Mexico

BERNALILLO CO.—**J. A. Bridges,** 1422 E. Central, Albuquerque—$12,758 for airfield markings at Clovis—by U. S. Engineer Office, Albuquerque. 5-15

Oklahoma

OKLAHOMA CO.—**E. B. Bush Construction Co.,** Oklahoma City—$14,343, for crash truck station, wash & grease racks at Will Rogers Field, Oklahoma City—by U. S. Engineer Office, Tulsa. 5-3

Oregon

CURRY CO.—**E. B. Bishop,** Orland, Calif. —$184,635 for air field at Port Orford—by Civil Aeronautics Admin., Seattle. 5-10

CURRY CO.—**Leonard & Slate,** 7805 S. W. 40th Ave., Portland—$225,237 for air field at Port Orford—by Civil Aeronautics Admin., Seattle. 5-10

KLAMATH CO.—**R. A. Heintz,** 8101 N. E. Union St., Portland—$26,314 for clearing, grubbing & grading for air field at Beaver Marsh, north of Klamath Falls—by Civil Aeronautics Admin., Seattle. 5-22

Texas

DALLAM CO.—**Towns Contracting Co.,** 1704 N. W. 6th St., Oklahoma City, Okla. —$10,340 for marking runway & taxiways

at Dalhart Army Airfield—by U. S. Engineer Office, Tulsa, Okla. 5-15

EL PASO CO.—**A. O. Peabody,** Box 1724, Santa Fe, N. M.—$11,085 for dust palliative treatment at Biggs Field—by U. S. Engineer Office, Albuquerque, N. M. 5-9

TARRANT CO.—**Austin Road Co.,** 1813 Clarence St., Dallas—$18,353 for parking area extension at Municipal Airport, Fort Worth—by City of Fort Worth. 5-2

Washington

KING CO.—**Northwest Construction Co.,** 3950 6th Ave., N. W., Seattle—$238,614 for paving warm-up aprons & additions to taxiway at Boeing plant, Renton—by Boeing Aircraft Co., Seattle. 5-13

SPOKANE CO.—**Roy L. Bair & Co.,** 1220 Ide Ave., Spokane—$26,818 for grading & clean-up work at Spokane Army Air Depot, Spokane—by U. S. Engineer Office, Seattle. 5-9

Wyoming

LARAMIE CO.—**Peter Kiewit Sons Co.,** 1900 S. Logan St., Denver, Colo. & **Big Horn Construction Co.,** Sheridan—$174,925 for extensions to conc. runways & taxiway, grading, drainage, etc., at Cheyenne—by U. S. Engineer Office, Denver, Colo. 5-11

Foreign

ALBERTA, CANADA—**Crown Paving & Construction Co., Ltd.,** Edmonton—$1,500,000 for replacing asphalt sections of airport at Edmonton with concrete.

ALBERTA, CANADA—**Western Construction & Lumber Co.,** Edmonton—approximately $1,000,000 for construction work on the Grande Prairie Airport.

Water Supply . . .

California

ALAMEDA CO.—**McGuire & Hester,** 796 66th Ave., Oakland—$69,636 for inst. 6-in. to 24-in. cast iron water pipe in various streets in Oakland and Alameda—by East Bay Munic. Utility Dist., Oakland. 4-27

ORANGE CO.—**P. & J. Artukovich,** 3834½ W. Slauson Ave., Los Angeles—about $125,000 for instal. water lines in magazine area at Naval Magazine & Net Depot, Seal Beach—sub-contract by Wm. Simpson Construction Co. and W. E. Kier Construction Co., Los Angeles. 5-2

SAN DIEGO CO.—**Kenneth Fraser,** 1452 N. Lake Ave., Pasadena—$9,726 to improve water supply system at Camp Matthews, San Diego—by Bureau of Yards & Docks, Washington, D. C. 5-3

SAN DIEGO CO.—**Travers & Burgund,** 1256 W. Seventh St., Los Angeles—$24,220 for additional water connections & service for Marine Corps Base, San Diego—by Bureau of Yards & Docks, Washington, D. C. 5-4

SAN FRANCISCO CO.—**San Francisco Water Dept.,** 425 Mason St., San Francisco—$6,135 for laying 6-in. & 8-in. water mains in 41st, 42nd, 43rd, 47th Aves. and Ortega St., San Francisco—by Public Utilities Comm., San Francisco. 5-18

SAN FRANCISCO CO.—**E. J. Treacy,** 425 Dewey Blvd., San Francisco—$16,569 for laying 12-in. main for Lane St. pumps, San Francisco—by Public Utilities Comm., San Francisco. 5-4

Nevada

WASHOE CO.—**Van Valkenburgh & Kruly,** 8609 San Vincente Ave., South Gate, Calif.—$52,116 for water line from Reno to Reno Air Base—by U. S. Engineer Ofc., Sacramento. 5-8

Texas

DALLAS CO.—**Fred Dellone,** 4201 Versailles St., Dallas—$333,783 for cast iron water mains, pump house modification, etc., in Dallas—by City of Dallas. 5-3

TAYLOR CO.—**O. J. Boughton,** 3548 Rosedale St., Dallas—$21,876 for improvements at booster station and at Fort Phantom Hill Reservoir Station, Abilene—by City of Abilene. 5-10

Washington

KING CO.—**Steel Tank & Pipe Co. of Oregon,** 518 N. E. Columbia Blvd., Portland, Ore.—$122,240 for replacing Cedar River pipeline No. 2, Seattle—by Board of Pub. Works, Seattle. 5-9

Sewerage . . .

California

ALAMEDA CO.—**Manuel Smith,** 21761 Meekland Ave., Hayward—$33,795 for approx. 2.5 mi. vitrified sewers in the King & Lewelling Tracts near Ashland—by Oro Lomo Sanitary Dist., Hayward. 5-24

LOS ANGELES CO.—**P. & J. Artukovich,** 3834½ W. Slauson Ave., Los Angeles—for vitrified clay pipe sewers & house connections for 401 family units in Maribel Ave. & other streets, Wilmington—by Third Western Defense Housing Corp., Wilmington. 5-9

SAN DIEGO CO.—**P. & J. Artukovich,** 3834½ W. Slauson Ave., Los Angeles—$25,914 for sewer system for trailer camp at San Diego—by Fed. Pub. Housing Auth., San Francisco. 5-22

SAN DIEGO CO.—**V. R. Dennis Construction Co.,** P.O. Box "F," Hillcrest Sta., San Diego—$10,837 for drainage ditch, pipeline, manhole, etc., at San Diego—by Fed. Pub. Housing Auth., San Francisco. 5-17

SOLANO CO.—**C. M. Syar,** Box 1431, Vallejo—$29,108 for off-site sewer, Vallejo—by FPHA, San Francisco. 4-27

VENTURA CO.—**Bebek & Brkich,** 238 W. Florence Ave., Los Angeles—$44,380 for sewer near Port Hueneme, Oxnard—by City Council, Oxnard. 5-25

Oregon

CLATSOP CO.—**L. H. Hoffman,** 715 S.W. Columbia St., Portland—$45,400 for sewage treatment plant at Naval Hospital, Astoria—by Bur. of Yards & Docks, Washington, D. C. 4-28

Waterway . . .

California

ALAMEDA CO.—**Case Construction Co.,** P.O. Box 6, San Pedro—$252,000 to make dredge repairs, Oakland—by Bur. of Yards & Docks, Washington, D. C. 5-1

ALAMEDA CO.—**Ben C. Gerwick, Inc.,** 112 Market St., San Francisco—$1,834,000 for carrier pier at Naval Air Station, Alameda—by Bur. of Yards & Docks, Washington, D. C. 5-1

ALAMEDA CO.—**J. D. Proctor, Inc.,** P.O. Box 247, Richmond—$62,635 for pier & install. dolphins at Berkeley Yacht Harbor, Albany—by Bur. of Yards & Docks, Washington, D. C. 5-1

ALAMEDA CO.—**Raymond Concrete Pile Co.,** 140 Cedar St., New York, N. Y.—$10,985 for concrete test piles at AAF Intransit Depot, Alameda—by U. S. Engineer Ofce., San Francisco. 4-24

ALAMEDA CO.—**Stolte, Inc.,** 8451 San Leandro Blvd., Oakland, & **Duncanson-Harrelson Co.,** DeYoung Bldg., San Francisco—$5,810,127 for piling, deck & riprap at AAF Intransit Depot, Alameda—by U. S. Engineer Ofce., San Francisco. 5-22

LOS ANGELES CO.—**Charles W. Pettifer Co.,** 703 W. 14th St., Long Beach—$26,960 for reinf. conc. retaining wall, underground utilities & storm drain system at Pier "D," Long Beach Harbor—by Port Mgr., Long Beach. 4-28

SAN DIEGO CO.—**M. H. Golden Construction Co.,** 3485 Noell St., San Diego—$1,810,825 for quay wall at Spanish Bight, Naval Air Station, San Diego—by Bur. of Yards & Docks, Washington, D. C. 5-1

Oregon

BENTON & LANE COS.—**McNutt Brothers,** 351½ E. Broadway, Eugene—$307,600 for constr. on Section "C" of the Long Tom River channel—by U. S. Engineer Ofc., Portland. 5-20

BENTON & LANE COS.—**McNutt Brothers,** 351½ E. Broadway, Eugene—$259,835 for straightening & deepening Long Tom River channel to afford greater drainage of the Fern Ridge Dam reservoir—by U. S. Engineer Ofc., Portland. 5-1

BENTON & LANE COS.—**Strong & McDonald,** 4045 Ruston Way, Tacoma, Wash.—$221,306 for straightening & deepening Long Tom River channel to afford greater drainage of the Fern Ridge Dam reservoir—by U. S. Engineer Ofc., Portland. 5-1

CLATSOP CO.—**Gilpin Construction Co.,** Box 3860, Portland, Ore.—$206,571 for repairs & reconstruction to increase berthing facilities at U. S. Naval Station, Astoria—by Bur. of Yards & Docks, Washington, D. C. 5-25

MULTNOMAH CO.—**Portland Tug & Barge Co.,** 8444 N. W. St. Helens Rd., Portland—$13,060 for round piling bulkhead & piling dolphins at the Portland District Moorings, Portland—by U. S. Engineer Ofc., Portland. 5-23

Washington

KING CO.—**General Construction Co.,** 3840 Iowa Ave., Seattle—about $100,000 for a graving dock at 5550 Marginal Way, Seattle—by Todd Shipyards Corp., Seattle. 5-17

Dam . . .

Arizona

MARICOPA CO.—**L. E. Dixon Co.,** 609 So. Grand Ave., Los Angeles, Calif., and

Arundel Corp., Baltimore, Md.—$1,659,000 for constr. of Horseshoe Dam on the Verde River—by Phelps-Dodge Corp., Phoenix. 5-24

Oregon

MARION & LANE COS.—**Diamond Drill Contracting Co.,** Box 4056, Sta. "B," Spokane, Wash.—$10,965 for core drilling at Detroit on the Santiam River & at Dorena on the Bow River—by U. S. Engineer Ofc., Portland. 5-1

Washington

KING CO.—**Diamond Drill Contracting Co.,** Box 4056, Sta. "B," Spokane—$13,860 to do exploratory drilling at Green River dam site, 6 mi. from Auburn—by U. S. Engineer Ofc., Seattle. 5-8

KING CO.—**S. R. Gray,** Puyallup—$30,080 to clear 110 acres of reservoir site upstream from Mud Mountain dam near Enumclaw—by U. S. Engineer Ofc., Seattle. 5-10

Foreign

MANITOBA PROVINCE, CANADA—**Creaghan & Archibald,** 1440 St. Catherine St., W., Montreal—$200,000 for repairs to Seven Sisters Dam, Winnipeg—by Winnipeg Electrical Co., Winnipeg.

Irrigation . . .

California

IMPERIAL & RIVERSIDE COS.—**M. H. Hasler,** P. O. Box 387, Santa Ana—$392,560 for constr. sections of 80 mi. of earth lining & sections of 40 mi. road surf. on Coachella Canal, All-American Canal Sys., approx. 18 mi. W. to 90 mi. N. W. of Yuma, Ariz.—by Bur. of Reclamation, Washington, D. C. 5-9

Washington

YAKIMA CO.—**Macri & Co.,** 905 - 10th St., Seattle—$169,667 for earthwork, pipe lines & structures, Roza Div. of Yakima Proj., betw. 6 to 12 mi. east of Sunnyside—by Bur. of Reclamation, Yakima. 5-26

Building . . .

Arizona

YUMA CO.—**M. W. Bobe,** 1462 E. McKinley St., Phoenix—$64,560 for addition to hospital & nurses' home bldg. at Yuma—by Board of Supervisors, Yuma. 5-9

YUMA CO.—**E. W. Duhame,** 3719 N. Central Ave., Phoenix—$164,704 for hospital addition at Yuma—by Federal Works Agency, Washington, D. C. 5-4

California

ALAMEDA CO.—**A. Farnell Blair,** 9 Main St., San Francisco—$2,452,445 for detention units & misc. bldgs. at Shoemaker—by Bur. of Yards & Docks, Washington, D. C. 5-15

ALAMEDA CO.—**Alfred J. Hopper,** 243 Langton St., San Francisco—$184,909 for barracks & laundry bldgs. at Naval Air Station, Oakland—by Bur. of Yards & Docks, Washington, D. C. 5-10

ALAMEDA CO.—**MacDonald & Kahn, Inc.,** 200 Financial Center Bldg., San Francisco—$2,613,000 for extension to barracks,

Camp Parks, Shoemaker—by Bur. of Yards & Docks, Washington, D. C. 5-1

ALAMEDA CO.—**Moore & Roberts,** 693 Mission St., San Francisco—$307,199 for Bach. Officers Quarters, subsistence bldg., gasoline storage tanks, etc., at AAS, Oakland—by Bur. of Yards & Docks, Washington, D. C. 5-22

ALAMEDA CO.—**Stolte, Inc.,** 8451 San Leandro Blvd., Oakland—$1,423,000 for barracks & sea plane hangar foundations at Naval Air Station, Alameda—by Bur. of Yards & Docks, Washington, D. C. 5-1

ALAMEDA CO.—**G. W. Williams Co.,** 10 California Dr., Burlingame—$1,169,800 to complete interim overhaul bldg., at Naval Air Station, Alameda—by Bur. of Yards & Docks, Washington, D. C. 5-4

CONTRA COSTA CO.—**S. J. Amoroso Construction Co.,** 2136 Alemany Blvd., San Francisco—$193,100 to reinforce conc. jail addition, Martinez—by County Clerk, Martinez. 5-15

CONTRA COSTA CO.—**Stolte, Inc.,** 8451 San Leandro Blvd., Oakland—$439,886 for Community Hospital & Nurses Home, Pittsburg—by Bur. of Yards & Docks, Washington, D. C. 5-1

LOS ANGELES CO.—**Austin Co.,** 777 E. Washington Blvd., Los Angeles—$1,000,000 for 236 dwellings in Lakewood Village. Work has started—by Griffith Walker & Lee, Lakewood Village. 5-25

LOS ANGELES CO.—**Baruch Corp.,** 625 S. Olive St., Los Angeles—$427,131 for const. & alterations to bldgs. at W. Los Angeles Station, Sawtelle—by U. S. Engineer Ofc., Los Angeles. 4-24

LOS ANGELES CO.—**Halper Construction Corp.,** 739 N. Highland Ave., Los Angeles—$2,000,000 for 370 frame & stucco, single family dwellings near 120th St. & El Segundo at Hawthorne. Work has started—by Lee Hal, Inc., Los Angeles. 5-26

LOS ANGELES CO.—**H. M. Keller Co.,** 4604 Hollywood Blvd., Los Angeles—$141,106 for cafeteria bldg. & two barracks bldgs. at Lockheed Navy Plane Center, Van Nuys—by Lockheed Aircraft Corp., Burbank. 5-3

LOS ANGELES CO.—**Kenneth P. Schmidt, Inc.,** 140 No. Glendale Ave., Glendale—$400.000 for 32 frame & stucco apt. bldgs. to be constr. betw. Glenoaks Blvd. & Mountain St., Glendale—by self. 5-26

LOS ANGELES CO.—**Stronach Construction Co.,** 360 No. Camden Drive, Beverley Hills—$194,828 for 17 nursery school bldgs. located at various sites in San Fernando and Los Angeles—by Fed. Works Agency, Los Angeles. 5-22

LOS ANGELES CO.—**Structon, Inc.,** 8442 Santa Monica Blvd., Los Angeles—$48,300 for nursery units at 4 schools in Compton—by Federal Works Agency, Los Angeles. 5-4

LOS ANGELES CO.—**Swinerton & Walberg Co.,** 605 W. Olympic Blvd., Los Angeles—$36.509, for expansion of bldgs. & facil. at Azusa Polymer. Plant, Azusa—by U. S. Engineer Ofc., Los Angeles. 5-3

LOS ANGELES CO.—**Third Western Defense Housing Corp.,** 23301 Avalon Blvd., Wilmington—$1,300,000 for 102 family-unit bldgs. at Avalon Blvd. & Sepulveda Blvd., Wilmington—for self. 5-5

LOS ANGELES CO.—**Weymouth-Crowell Co.,** 2104 E. 15th St., Los Angeles—$77,904 for prefab. hangar bldg. & service apron at Palmdale AAF—by U. S. Engineer Ofc., Los Angeles. 4-24

ORANGE CO.—**Jules W. Markel,** 2128 Greenleaf Ave., Santa Ana—$102,000 for addition to telephone bldg., Santa Ana—by Southern California Telephone Co., Los Angeles. 5-11

ORANGE CO.—**Wm. P. Neil Company,** 4814 Loma Vista Ave., Los Angeles—$1,468,703 for adm. & personnel facil. at Naval Mag. & Net Depot, Seal Beach—by Bur. of Yards & Docks, Washington, D. C. 5-19

ORANGE CO.—**Travers & Burgund,** 1256 W. 7th St., Los Angeles—$54,398 for magazines at Naval Auxiliary Air Station, Los Alamitos—by Bur. of Yards & Docks, Washington, D. C. 5-3

RIVERSIDE CO.—**W. C. Beggs,** 610 S. Broadway, Los Angeles—$61,749, for receiving clinic & patients' effects bldg. at Torney General Hospital, Palm Springs—by U. S. Engineer Ofc., Los Angeles. 4-27

RIVERSIDE CO.—**John Bohannan,** 5411 Corona Ave., Maywood—$114,445 for 13 six-room dwellings & 12 five-room dwellings near Coachella, Boulder Canyon Project—by Bur. of Reclamation, Denver, Colo. 5-23

RIVERSIDE CO.—**M. H. Golden Construction Co.,** 3485 Noell, San Diego—$544,934, for addition to Naval Hospital, Corona—by Bur. of Yards & Docks, Washington, D. C. 5-3

SAN BERNARDINO CO.—**William Simpson Construction Co.,** 816 W. 5th St., Los Angeles—$223,909 to construct housing units, dormitories & community bldg. at Barstow—by Bur. of Yards & Docks, Washington, D. C. 5-12

SAN DIEGO CO.—**Baruch Corp.,** 625 S. Olive St., Los Angeles—$296,740 for engine test cells at Naval Air Station, San Diego

—by Bur. of Yards & Docks, Washington, D. C. 5-1

SAN DIEGO CO.—**O. L. Carpenter,** 353 Spreckels Bldg., San Diego—$147,180 for barracks at Naval Repair Base, San Diego —by Bur. of Yards & Docks, Washington, D. C. 5-11

SAN DIEGO CO.—**Donald & McKee,** 50 E. Vine St., Redlands—$133,157 for site work & utils. bldgs. for 200 family stop-gap units at Oceanside—by Fed. Pub. Housing Auth., San Diego. 5-17

SAN DIEGO CO.—**Haddock-Engineers, Ltd.,** Box 569, Oceanside—$80,000 for a mark & depth charge testing bldg. at the Naval Ammunition Depot, Fallbrook—by Bur. of Yards & Docks, Washington, D. C. 5-16

SAN DIEGO CO.—**Haddock-Engineers, Ltd.,** Box 569, Oceanside—$272,913 for 50 temporary instruction bldgs. at Camp Pendleton, Oceanside—by Bur. of Yards & Docks, Washington, D. C. 5-18

SAN DIEGO CO.—**Allison Honer Co.,** Box 84, Santa Ana—$406,500 for completion of a radio-radar bldg. at the Naval Air Station, San Diego—by Bur. of Yards & Docks, Washington, D. C. 5-25

SAN DIEGO CO.—**J. H. Pomeroy & Co. Inc.,** 333 Montgomery St., San Francisco—for 7,000-man expansion to amphibious training base at Fort Emery near San Diego —by Bur. of Yards & Docks, Washington, D. C. 5-18

SAN DIEGO CO.—**Ford J. Twaits Co.,** 451 So. Boylston Ave., Los Angeles—$1,-451,175 for 7-story reinf. concrete warehouse at Naval Supply Depot, San Diego—by Bur. of Yards & Docks, Washington, D. C. 5-23

SAN FRANCISCO CO.—**Dinwiddie Construction Co.,** 210 Crocker Bldg., San Francisco — $214,792 for refrig. storehouse, Treasure Island — by Bur. of Yards & Docks, Washington, D. C. 5-1

SAN FRANCISCO CO.—**Ben Liebman,** 3319 Fillmore St., San Francisco—$104,696 for conversion of warehouse into 50 living units for war workers, McAllister St., San Francisco—by Home Owners Loan Corp., San Francisco. 5-16

SAN FRANCISCO CO.—**MacDonald & Kahn, Inc.,** Financial Center Bldg., San Francisco—$446,337 for 696 dorm. units & maintenance bldg. at Hunters Point, San Francisco—by Housing Authority, San Francisco. 5-19

SAN FRANCISCO CO.—**Moore & Roberts,** 693 Mission St., San Francisco—$182,-374 for storehouses at Treasure Island—by Bur. of Yards & Docks, Washington, D. C. 5-1

SAN FRANCISCO CO.—**Standard Building Co.,** 1500 Judah St., San Francisco—$741,877 for library, theater & other recreation facils. at Treasure Island—by Bur. of Yards & Docks, Washington, D. C. 5-4

SANTA BARBARA CO.—**P. J. Walker Co.,** 3900 Whiteside Ave., Los Angeles—$886,666 for additional aviation facil. at Marine Corps Air Station, Santa Barbara—by Bur. of Yards & Docks, Washington, D. C. 5-11

SANTA CLARA CO.—**Carl N. Swenson,** 355 Stockton St., San Jose—$695,661 for shop structures & hangar at Moffett Field —by National Advisory Comm. for Aeronautics, Moffett Field. 5-19

SANTA CRUZ, MONTEREY & SAN BENITO COS. — **L. M. Tynan,** 7 E. Gabilan St., Salinas—$346,510 for barracks, storehouses, lean-to's and trainer bldg. at the AAS, Watsonville, Monterey and Hollister—by Bur. of Yards & Docks, Washington, D. C. 5-24

SONOMA CO.—**A. Farnell Blair,** No. 9 Main St., San Francisco—$297,338 for barracks, training bldgs. & other constr. at Santa Rosa—by Bur. of Yards & Docks, Washington, D. C. 5-8

STANISLAUS & SAN JOAQUIN COS. —**Nielsen, Erbentraut & Summers,** 446 6th St., San Francisco—$528,700 for barracks, trainer bldgs., etc., at Crows Landing & Vernalis—by Bur. of Yards & Docks, Washington, D. C. 5-8

Idaho

BANNOCK CO.—**Frank P. Kloepfer Co.,** 1214 N. 15th St., Boise—$131,000 for bldgs. at the Simplot fertilizer plant, Pocatello—by J. R. Simplot, Pocatello.

Oregon

HOOD RIVER CO.—**Drake, Wyman & Voss, Inc.,** 904 Lewis Bldg., Portland—approx. $178,381 for 260x193 ft. single story warehouse at Parkdale—by Hood River Apple Growers Assoc., Hood River. 5-18

KLAMATH CO.—**Ford J. Twaits Co.,** 451 So. Boylston Ave., and **Morrison-Knudsen Co., Inc.,** 810 Title Guarantee Bldg., Los Angeles, Calif.—approx. $2,500,000 for a second auxiliary air station at Klamath Falls—by Bur. of Yards & Docks, Washington, D. C. 5-8

Texas

BELL CO.—**Dean Word,** 446 E. Rosewood, San Antonio—$103,378 for constr. of ranges at Camp Hood—by U. S. Engineer Ofc., Fort Sam Houston. 5-3

BEXAR CO.—**Victor Prassel,** 809 American Hospital & Life Bldg., San Antonio—$143,262 for general repairs to several bldgs. at the San Antonio State Hospital, San Antonio—by Board of Control, San Antonio. 5-3

DALLAS CO.—**J. W. Bateson Co.,** Irwin-Keasler Bldg., Dallas—$228,800 for additional plant facilities by and for Continental Motors Corp., Dallas. 5-16

Washington

KING CO.—**Goering, Phelps & Strand,** Lloyd Bldg., Seattle—$957,560 for cafeteria bldg., equipment bldg., addition to personnel bldg. and misc. work at Boeing's Renton plant—by Boeing Aircraft Co., Seattle. 5-18

KING CO.—**Nettleton & Baldwin,** Lloyd Bldg., Seattle — over $1,250,000 for 240 houses adjoining south city limits of Seattle —by Ridge Homes, Inc., Seattle. 5-4

Wyoming

LARAMIE CO.—**Martin & Musick,** 1171 Krameria St., Denver., Colo., has started constr. of 44 one-story 5-room brick dwellings on Hynds Blvd., Cheyenne—by Fisher & Fisher, Architects, Denver, Colo. 5-11

Miscellaneous . . .

California

ORANGE CO. — **Guy F. Atkinson,** 662 Russ Bldg., San Francisco—$854,000 for various waterfront constr. (wharf, railroad track, paving, net slab & misc. bldg.) at Seal Beach—by Bur. of Yards & Docks, Washington, D. C. 5-9

SAN DIEGO CO.—**Haddock-Engineers, Ltd.,** Box 569, Oceanside—approx. $1,500,000 for addtl. expansion of amphibious training facils. at Camp Pendleton, Oceanside—by U. S. Bur. of Yards & Docks, Washington, D. C.

SAN DIEGO CO.—**F. E. Young,** Bank of America Bldg., & **I. C. Curry,** Box 150, San Diego—$1,934,000 for expanding facilities at Coronado—by Bur. of Yards & Docks, Washington, D. C. 5-11

SAN MATEO CO.—**A. Soda & Son,** 5231 Grove St., Oakland—$184,148 for sea plane ramp, N.A.A.F., South San Francisco—by Bur. of Yards & Docks, Washington, D. C. 5-19

SANTA CLARA CO.—**Haas Construction Co.,** 1104 Merchants Exchange Bldg., San Francisco—$89,961 for hospital car facilities i.e., paving & utilities at Dibble General Hospital, Menlo Park—by U. S. Engineer Ofc., San Francisco. 5-23

VENTURA CO.—**Jensen & Jepsen,** 1540 S. Robertson Blvd., Los Angeles—$136,677 for site development work for 200 portable dwelling units near Port Hueneme—by Fed. Pub. Housing Auth., San Francisco. 5-18

Colorado

DENVER CO.—**"Automatic" Sprinkler Corp. of America,** Youngstown, Ohio—$55,200 for automatic sprinkler system at Denver Medical Depot—by U. S. Engineer Ofc., Denver. 4-24

Nevada

MINERAL CO.—**Wm. P. Neil Co., Ltd.,** 4814 Loma Vista Ave., Los Angeles, Calif.—$249,284 for ammunition overhaul facils. at Naval Ammunition Depot, Hawthorne—by Bur. of Yards & Docks, Washington, D. C. 5-2

Oregon

MARION CO.—**Ross B. Hammond,** 1241 Williams Ave., Portland—$124,255 for auxiliary bldgs., roads, spur rail tracks & fencing on site of Columbia Metals Corp.'s plant at Salem—by Chemical Construction Co., Salem. 5-25

UMATILLA CO.—**J. H. Collins & Co.,** & **Charles A. Power,** Box 678, Walla Walla, Wash.—$79,000 for 200 apron slabs for igloo magazines at Umatilla Ordnance Depot, Hermiston. 5-10

Texas

GRAYSON CO.—**Warren Petroleum Corp.**, National Bank Bldg., Tulsa, Okla.—$40,000 for relocation of oil pipeline, Denison Dam and Reservoir—by U. S. Engineer Ofc., Denison, 5-3

HEMPHILL CO.—**Winston Brothers Co.**, 411 W. Fifth St., Los Angeles, Calif.—$67,802 for railroad alignment change, involving 200,000 cu. yds. of excavation & embankment work, at Canadian—by Santa Fe Railway Co., Amarillo. 5-18

Utah

TOOELE CO.—**R. J. Daum**, 6803 West Blvd., Inglewood, Calif.—$108,649 for concrete aprons & asphaltic pavement for igloo entrance roads at Tooele Ordnance Depot, Tooele—by U. S. Engineer Ofc., Salt Lake City. 5-24

WEBER CO.—**Grinnell Company of the Pacific**, 601 Brannan St., San Francisco, Calif.—$66,699 for sprinkler system at the Ogden Arsenal, Ogden—by U. S. Engineer Ofc., Sacramento, Calif. 5-25

WEBER CO.—**Olson Construction Co.**, 410 So. 7th St., Lincoln, Neb.—about $70,000 for heating warehouses at Ogden Air Depot, Ogden—by U. S. Engineer Ofc., Sacramento, Calif. 5-25

Washington

BENTON CO.—**Strand & Son**, 3935 University Way, Seattle—$129,600, prep. of sites for 300 privately owned trailers at Kennewick—by FPHA, Seattle. 5-1

BENTON CO.—**Strand & Son**, 3935 University Way, Seattle—$80,175 for community bldg. & facils. for 200 public trailers at Kennewick—by Fed. Pub. Housing Auth., Seattle. 5-23

KING CO.—**Kuney-Johnson Co.**, 235 - 9th Ave., N., Seattle—$70,632 for extension of utils. at U. S. naval station, Seattle—by Bur. of Yards & Docks, Washington, D. C. 5-13

MASON CO.—**General Construction Co.**, 3840 Iowa Ave., Seattle—$1,889,043 for 27 mi. tracks, facils. & overpasses, Bremerton-Shelton link railroad—by Bur. of Yards & Docks, Washington, D. C. 5-10

PROPOSED PROJECTS

Highway and Street...

California

LOS ANGELES CO.—Plans are in preparation for improvement of Torrance Blvd., Torrance, at cost of $42,000. 5-4

Oregon

LINN CO.—Approval has been given by the WPB for widening of the Halsey-Harrisburg section of the east side Pacific hwy. (U. S. 99) at a cost of $481,000. 5-18

Bridge & Grade Separation...

Utah

WEBER CO.—Plans are completed for the overpass unit of the Ogden by-pass project to be constr. north of Utah Hot Springs. Estimated cost, $150,000—by State Hwy. Comm., Salt Lake City. 5-11

Foreign

ALBERTA, CANADA—The Alberta government plans construction of two steel highway bridges, one across the North Saskatchewan River at Rocky Mountain House, Hwy. No. 11; the other across Athabasca River at Smith, Hwy. No. 2. Approx. total cost, $500,000.

Airport . . .

California

KERN CO.—The War Department has authorized constr. of additional hangars, parking aprons and utils. to cost $720,000;

and a new taxiway & addtl. parking apron & paving work to cost about $500,000 at Army Air Base, Muroc. 5-25

MARIN CO.—War Dept., Washington, D. C., has authorized const. of parking apron and reconst. of extension to night lighting system on runway at Hamilton Field. About $919,000. 5-22

Washington

GRAYS HARBOR CO.—Plans and specifications are being completed for a large airfield at Moon Island, near Hoquiam—by Civil Aeronautics Admin., Seattle. 5-2

Water Supply . . .

California

ALAMEDA CO.—Plans & specifications have been prepared for approx. 13,900 ft. of various sized mains in Oakland & Alameda, to cost $152,776—by Federal Works Agency, Berkeley. 5-3

LOS ANGELES CO.—Plans are being prepared for a number of large cast iron water trunk & distribution mains in vicinity of aircraft plants and war housing projects in Burbank. Cost about $300,000. 5-19

NAPA CO.—August Kempkey, San Francisco, is preparing plans for the acquisition, construction & completion of improvements in the waterworks system of the City of Napa, including a dam at Conn Valley. Approx. cost is $800,000. 5-4

Texas

HOWARD CO.—Plans are under way at Big Spring for constr. of water facilities estimated to cost $820,000. 5-8

TAYLOR CO.—Plans are in progress for water filtration plant improvements to cost $130,000, at Abilene—by City of Abilene.

Washington

SNOHOMISH CO.—Approval has been given for the laying of several miles of water pipe in an area south of Everett. Cost is estimated between $40,000 and $50,000—by Federal Works Agency, Seattle. 5-17

Sewerage . . .

California

LOS ANGELES CO.—Plans & specifications have been prepared for constr. approx. 13,368 ft. of sanitary interception sewer at Santa Monica, to cost $88,000—by Federal Works Agency, Los Angeles. 5-3

LOS ANGELES CO.—Working drawings are completed for constr. of a new 18-in. outfall sewer line in Hermosa Ave. extending from 13th Court to 3rd St. at Hermosa Beach; estimated cost, $51,000—by City Council, Hermosa Beach. 5-5

LOS ANGELES CO.—Plans have been finished for a vitrified clay pipe sewer to be laid near the Douglas Aircraft plant in Santa Monica, to cost $105,000—by Federal Works Agency. 5-5

SAN DIEGO CO.—Plans are under way for a trunk sewer in La Mesa to connect with the San Diego outfall trunk sewer in Solas Valley, to cost $124,000—by Federal Works Agency. 5-5

SAN DIEGO CO.—Plans have been completed for a sewage collection system & disposal plant, & a water supply system to be built at Fallbrook for the U. S. Navy. Appropriation is $144,000.

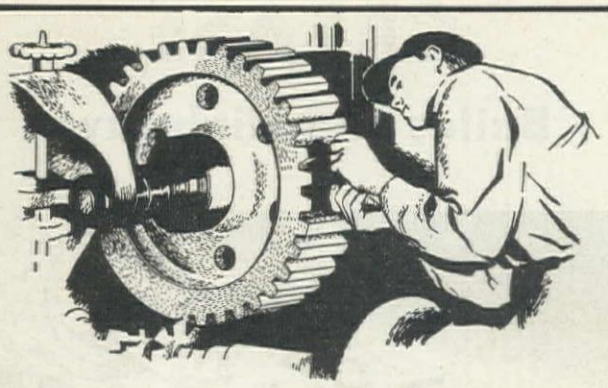
SOLANO CO.—Plans have been completed and submitted to the Fed. Works Agency, Berkeley, for a sewer system in South Vallejo. Estimated cost, $347,839. 5-19

Building . . .

California

LOS ANGELES CO.—Work of remodeling bldg. for health center at Long Beach is contemplated, to cost $250,568—by Federal Works Agency, Los Angeles. 5-3

LOS ANGELES CO.—Plans & specifications have been made for a 100-bed hospital at Huntington Park; estimated cost is $600,000—by Federal Works Agency, Los Angeles. 5-3



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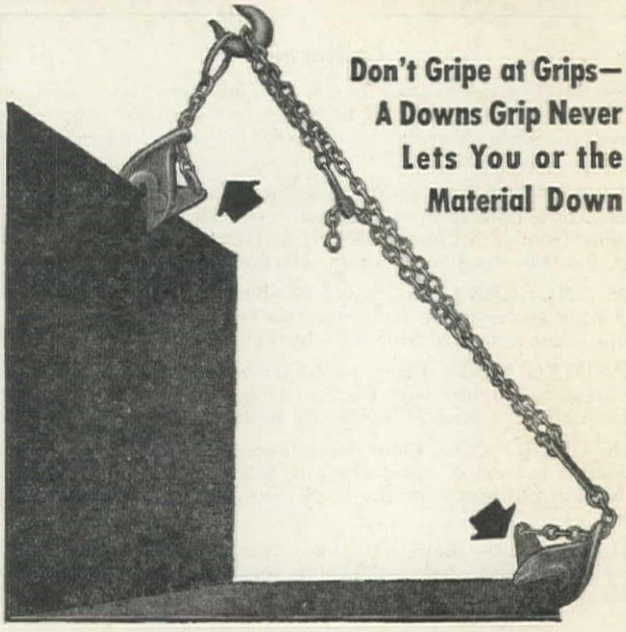

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TRADE WINDS

News of Men Who Sell to the Construction West

CALIFORNIA

William B. (Bill) Worden, widely traveled and experienced member of the Southwest heavy equipment field, has been appointed as R. G. LeTOURNEAU, INC., district representative in the area bounded by and including Los Angeles, Salt Lake City and Phoenix. His headquarters are in Hollywood, Calif., and he will work in conjunction with **Harry L. Vines,** company western manager, with offices at the LeTourneau plant in Stockton, Calif.

☆ ☆ ☆

Vernon Edler, vice-president and general manager of the PEERLESS PUMP DIVISION of the FOOD MACHINERY CORPORATION, died recently at his home in Los Angeles, Calif. He was 47 years of age. On completing his education, he started his commercial career as a sales engineer specializing in hydraulics. After World War I he founded the VERNON EDLER CORPORATION which merged with the FOOD MACHINERY CORPORATION in 1929. He was appointed resident manager of the corporation at Los Angeles and in 1935 was elevated to the vice-presidency when he became general manager of the Peerless Pump Division, Los Angeles, Fresno and Canton, O.

☆ ☆ ☆

The San Francisco office of the AMERICAN LUMBER & TREATING CO., under the managership of **G. M. Dewart,** has moved to new quarters at 604 Mission St., San Francisco 5. The West Coast plants, for whose production Dewart is responsible, are located at Weed, Calif., and Wauna, Ore.

☆ ☆ ☆

Ray Morse, for eleven years manager of the Los Angeles wire rope department of WICKWIRE SPENCER STEEL COMPANY, has been appointed sales manager of the WOOD MANUFACTURING COMPANY, Los Angeles, Calif., manufacturers of the Wood roadmixer, well known travel plant method of pavement construction. Widely known by equipment distributors and dealers throughout the southwest, Morse will concentrate his activities on the establishing of dealerships for the Wood roadmixer.

☆ ☆ ☆

Announcement of the appointment of **Wallace Johnson** as general sales manager of the JOSHUA HENDY IRON WORKS at Sunnyvale, Calif., and of **Jean M. Allen** as hydraulic-dredge consulting engineer, has recently been made by **Charles E. Moore,** president of Hendy.

☆ ☆ ☆

B. L. (Ben) Hagglund

Victor Wallace, for the past five years western sales manager of CATERPILLAR TRACTOR CO., has formed his own business in association with his son Don, and has been appointed Caterpillar distributor for Ventura County, with headquarters at Oxnard. Filling Wallace's berth as Sales Manager is **B. L. "Ben" Hagglund,** who, for the past three years, has been assistant Western Sales Manager with headquarters at San Leandro.

☆ ☆ ☆

THE CROOK COMPANY, with headquarters at 2900 Santa Fe Ave., Los Angeles, Calif., has been appointed by R. G. LeTOURNEAU, INC., to represent their line of Tournapulls, Carryall Scrapers, 'Dozers, Cranes, Power Control Units, and other products in the Southwest. They will give LeTourneau exclusive representation in Southern California, Clark county, Nevada, and all of Lower California in Mexico.

☆ ☆ ☆

In the announcement concerning the affiliation of **Jack H. How** and others with the EDWARD R. BACON CO., construction equipment distributors in San Francisco and other California cities, which appeared in Western Construction News for May, the photograph of Mr. How was inadvertently omitted. He is now one of the general partners in the firm, as are **H. N. How, Edward R. Bacon,** and **W. F. McGouirk.**

☆ ☆ ☆

INTERMOUNTAIN

The LOFLAND COMPANY, Dallas, Tex., has been appointed distributor for the KOTAL COMPANY in the state of Texas. The Lofland Company was organized in 1934 as a successor of May & Lofland Corporation, and is headed by **Ralph F. Lofland.** Besides the Kotal Company, the company represents several well known manufacturers of construction materials.

☆ ☆ ☆

A. P. JOHNSTON STAINLESS STEEL WELDING RODS, Los Angeles, Calif., announces the appointment of ARIZONA WELDING EQUIPMENT COMPANY, 230 S. Central Ave., Phoenix, Ariz., as a distributor for that area.

☆ ☆ ☆

FAIRBANKS, MORSE & COMPANY has opened a new office at 1335 Hunt Bldg., Tulsa, Okla. The office is under the management of **Frank D. Ratcliffe,** District Manager, Oil Industry Sales.

☆ ☆ ☆

PACIFIC NORTHWEST

PACIFIC HOIST & DERRICK CO., 3200 Fourth Ave. South, Seattle 4, Wash., with 30 years construction equipment experience in its background, is the latest West Coast distributor to be appointed by R. G. LeTOURNEAU, INC. The territory in which they will represent this manufacturer includes the following counties in the state of Washington: King, Pierce, Thurston, Lewis, Mason, Pacific, Grays Harbor, Clallam, Jefferson, Kitsap, San Juan, Island, Snohomish, Skagit and Whatcom. PACIFIC HOIST & DERRICK is headed up by **Elmer R. Schoen,** president and general manager, above photo; **A. T. Rautenberg,** executive vice-president; **George J. Schoen,** secretary and vice-president, and **Fred (Bob) Schoen,** presently serving in the armed forces of his country.

☆ ☆ ☆

Albert E. Horn, Jr., resident manager of the Oregon division of GENERAL PETROLEUM CORPORATION, has been transferred to Seattle as manager of the Washington division, according to a recent announcement by **A. H. DeFriest,** vice-president and sales director of the company.

☆ ☆ ☆

In keeping with the postwar plans of the MADSEN IRON WORKS, Huntington Park, Calif., to distribute nationally through established equipment dealers, they have appointed the LOMEN COMMERCIAL COMPANY, Seattle, Wash., to distribute their complete line of road construction equipment in Alaska and the Yukon Territory.

☆ ☆ ☆

CANADIAN CONSTRUCTION PRODUCTS LIMITED, 77th Ave. and Oak St., Vancouver, B. C., are now acting as western Canadian manufacturers and distributors for all the specialty construction products of G. F. STERNE & SONS LIMITED, Brantford, Ontario.

The Tractor Division of ALLIS-CHALMERS MFG. CO. has opened a district sales office at the White-Henry-Stuart Building (Room 5526), Seattle, Wash., to serve Alaska, Yukon Territory and British Columbia.

Managing this office is **Stanley B. Tatom,** a native of the Pacific Northwest, who has many years' experience with the Tractor Division and many friends among the various industries of the Northwest.

☆ ☆ ☆

The STAR MACHINERY CO., for over 40 years northwest distributor of construction and industrial equipment, machine tools and mill and woodworking machinery, has announced the addition of two more nationally known lines. One is that of the MARION STEAM SHOVEL COMPANY of Marion, Ohio, whose Northwest District Representative, **Joe Reed** of Portland, Ore., will work in close cooperation with the Star sales and service organization under the direction of **Jack T. Hatten.** The second new account is that of BLAW-KNOX COMPANY, heavy construction equipment manufacturers of Pittsburgh, Pa. **Otto H. Rabel** is president of the STAR MACHINERY CO., **Victor E. Rabel,** vice-president; **Irvine B. Rabel, treasurer,** and **Lloyd Y. Evans,** secretary.

☆ ☆ ☆

Reorganization of the OLSON MANUFACTURING CO., manufacturers of contractors' and miners' machinery and supplies in Boise, Idaho, has been announced with the sale of the stock holdings of this company by MORRISON-KNUDSEN CO. to a group of Boise businessmen.

Under the new organization **M. A. Compton** becomes president; **Harold Agee,** identified with the company almost from its inception, is vice-president and general manager, and **C. F. Adams,** director. **Larp Paine** is secretary and attorney.

The company was founded about 25 years ago by **Lawrence Olson.** After his death in 1941 the controlling interest was sold to J. A. TERTELING & SONS, Boise contractors, who last year sold their interests to Morrison-Knudsen.

☆ ☆ ☆

AMONG THE MANUFACTURERS

THE HERCULES CO. of Marion, Ohio, manufacturers of hydraulic control motor graders, hydraulic scoops, maintainers, terracers, rotary scrapers, etc., has been acquired by the W. A. RIDDELL CORP. of Bucyrus, Ohio, and the firm will operate under the name of THE HERCULES ROLLER CO. **Carl G. A. Schmidt, Jr.,** sales manager for Hercules Co., will be retained in that same capacity. The Hercules Roller Co. will supply replacement parts for all Hercules rollers now in the field and expects to continue the distribution of Hercules rollers at home and abroad.

☆ ☆ ☆

At a meeting of the Board of Directors of the UNION CARBIDE AND CARBON CORP., **Fred H. Haggerson** was elected president, succeeding **Benjamin O'Shea,** who becomes Chairman of the Board. Haggerson has been with the company for 25 years. The following directors were elected at the annual meeting of the stockholders of this corporation: **Ralph R. Browning, Paul P. Huffard** and **Homer A. Holt.** Browning, a vice-president, has been with the company for over 30 years; and Hufford, also vice-president, 35 years. Holt is a Charleston, W. Va., attorney and is the former governor of the state.

☆ ☆ ☆

LaPLANT-CHOATE MANUFACTURING COMPANY of Cedar Rapids, Iowa, **makers of construction equipment,** has been, for the third time, awarded the Army-Navy Production Award for high achievement in the production of war material. This company is one of the few in the construction equipment industry that can boast of a second white star in their "E" Award Flag.

☆ ☆ ☆

Looking forward to expanded Latin American trade after the war, the PLOMB TOOL CO. has announced the establishment of agencies in all South and Central American countries. Sales of the firm last year climbed 61 per cent above the previous year's gross for a 1943 total of $10,277,680. Their plants are located in Los Angeles, Portland, and Chicago.

☆ ☆ ☆

Charles L. Tolles has been elected president of the board of directors of the JEWELL BELT HOOK CO. At the same meeting **George E. Bean** was elected secretary and treasurer; **W. D. Calvert,** cashier; and **D. G. MacVicar,** sales manager.

☆ ☆ ☆

The purchase of the KRON COMPANY of Bridgeport, Conn., by YALE & TOWNE MANUFACTURING COMPANY of New York has now been consummated. The Kron Company has designed, manufactured and sold high-quality industrial scale

equipment for more than a quarter of a century. The acquisition of the Kron scale business gives Yale & Towne a line of products which tie in naturally with the markets and distribution channels through which Yale & Towne's materials handling machinery is sold.

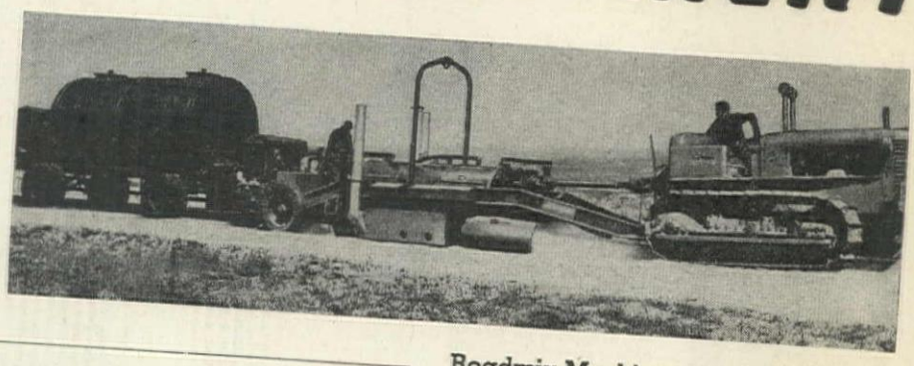
☆ ☆ ☆

Nearly 1,000 employees of the Wilkes-Barre, Pa., plant of HAZARD WIRE ROPE and AMERICAN CABLE DIVISIONS of AMERICAN CHAIN & CABLE CO., INC., were awarded the Army-Navy "E" for efficiency and excellence of production. Rear Admiral Wat T. Cluverius made the presentation and the award was accepted by George C. Gregson, manager of plants.

☆ ☆ ☆

SKILSAW, INC., Chicago, announces the appointment of Delmar M. DeWolf as advertising manager. DeWolf is well qualified for this new position, having been assistant advertising manager and editor of the "Skilsaw Blade" for three years, and brings with him a wide background of experience in the mill and hardware distribution field.

NEW EQUIPMENT



Roadmix Machinery

Manufacturer: Wood Manufacturing Co., Los Angeles, Calif.

Equipment: Roadmix paving machine.

Features claimed: A new model, increased in size from earlier Wood roadmixers, this machine can take windrows up to 8 cu. ft., cutting down the number required for a particular job. The machine can build a 20 ft. highway, 3 in. thick with one windrow in one pass. The mixing drum is increased in size from 48 in. to 54 in. Also featured is a power lift providing almost instant lifting of the drum and cutting blades through 4 hydraulically operated jacks. Faster and easier application of the cutting blade to grade is obtained by increasing the size of the jack plungers.

Pavement Breaker

Manufacturer: Syntron Company, Homer City, Pa.

Equipment: Self-contained gasoline hammer.

Features claimed: A new style completely self-contained gasoline hammer type of demolition tool, it weighs 96 lbs., is operated by one hand and can use narrow or wide chisels, gads, clay spades, tamping tools, asphalt cutters, driving tools or other implements, all with 1⅛" x 6" shanks. A maximum drill

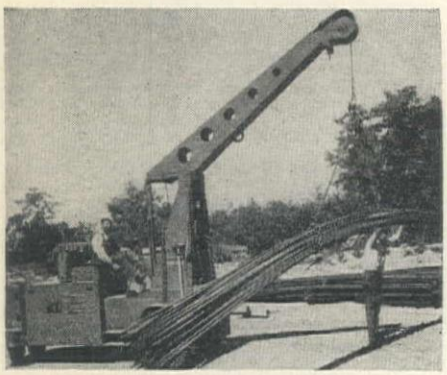
depth of 30" is obtainable. The machine consists of a 2-cycle gasoline engine with two pistons, one an engine piston and one a hammer piston. The engine piston drives the flywheel ignition magneto and a fan. The hammer piston strikes directly on the shank of the tool and is returned to the firing position by low pressure exhaust gases. Fuel consumption is relatively low, the fuel tank having a capacity for several hours' operation.

Mobile Crane

Manufacturer: Willamette Hyster Company, Portland, Ore.

Equipment: Fast mobile crane unit.

Features claimed: A high speed self-propelling general utility crane with capacity up to 10,000 lbs., the Karry Krane has pneumatic tires, a large power plant and high maneuverability. The lift speed of the machine is 35 ft. per min. and loads can be hoisted or lowered while traveling. Four speeds and reverse are provided and the operator has full vision while



handling bulky loads. Its ability to turn in its own length eliminates the need for a revolving boom. It may be used over any kind of rough and unimproved floor or road surface.

Water Flow Meter

Manufacturer: Builders-Providence, Inc., Providence, R. I.

Equipment: Propeller type flow meter.

Features claimed: An 8-blade bakelite propeller molded in one piece, is mounted in a Venturi throat which distributes the force of the flow against the full area of the propeller and results in improved accuracy throughout a wide range of flow. Straightening vanes just upstream of the propeller eliminate spiral flow. It is serviced easily by a "one-shot" lubrication system, a readily accessible stuffing box and an easily removable propeller mechanism. Liquid flow in lines 6" or larger may be measured accurately with very low pressure loss, since the shafts of the propeller rotate in ball bearings.

Welding Calculator

Manufacturer: Lincoln Electric Co., Cleveland, Ohio.

Equipment: Automatic welding temperature calculator.

Features claimed: Designed for readily determining the preheating and temperatures of steel where experience indicates the need for preheat to obtain

best welding rests, a circular cardboard calculator has been prepared. It is 6¼" in diameter and consists of four movable sections and is designed particularly for use in those instances where steels have a high content of carbon or other alloys and require preheating to minimize the tendency towards excessive hardening and possible cracking of the base metal.

Reinforcing Bars

Manufacturer: Joseph T. Ryerson & Son, Inc., Los Angeles, Calif.

Equipment: Hi-Bond deformed reinforcing bars.

Features claimed: Designed to increase the effectiveness of reinforcing steel into concrete by greatly improving the low pressure between the materials by means of reinforced double helical ribs extending between diametrically opposed longitudinal ribs, these bars furnish more than double the bearing area of usual commercial bars. They are available in ⅜, ½, ⅝, ¾, ⅞ and 1 inch round, and 1, 1⅛, 1¼ inch square. They are produced by Inland Steel Co. These bars will provide a substantial increase in bond stress, a more effective mechanical grip and reduction in crack width, reduced deflection and deformation in the finished structure and conservation of materials and labor.

Portable Heater

Manufacturer: Surface Combustion, Toledo, Ohio.

Equipment: Portable heating unit.

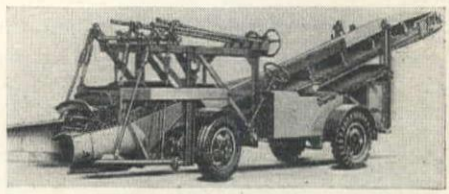
Features claimed: Equipped with gasoline-engine or electric-motor drive and mounted on a two-wheeled carriage, the unit can be moved in wheelbarrow fashion to any point of use. Serviceable for heating tents, for removing ice, preventing the freezing of perishable goods, supplying heat for concrete mixing or during curing, thawing frozen radiators, brake drums, and warming personnel. No draft is required for exhausting combustion products. Built-in safety features prevent any failure. Other features are, circulating air delivered by positive pressure blower, easy to start, burns liquid fuel, simple to maintain, high efficiency and positive combustion. The output rating of the heater is 250,000 Btu per hr.

Highway Loader

Manufacturer: Athey Truss Wheel Company, Chicago, Ill.

Equipment: Force-feed material loader.

Features claimed: To be used as a companoin tool to the motor grader on highway projects, this loader loads surplus earth, sod, sand, oilmix and other materials into trucks for removal. It is also useful in salvaging valuable road surfacing materials. It is one-man operated and travels under its own power at highway speed. It is also useful in removing ditch excavation debris.



Invisible Glove

Manufacturer: Turco Products, Inc., Los Angeles, Calif.

Equipment: Protective glove.

Features claimed: A smooth, white cream which disappears into the skin, forming an invisible glove

which prevents penetration of grease, paint or dirt into the pores. The undesirable material rinses off easily in ordinary water, with none adhering to the skin. The glove does not interfere with the sense of touch, nor hinder delicate mechanical operations. Because industrial solvents are not necessary, the stinging, smarting and drying effects of their use are eliminated.

Tilt-Bed Trailer

Manufacturer: Fruehauf Trailer Company, Los Angeles, Calif.

Equipment: Construction equipment trailer.

Features claimed: With a capacity of 10 tons, this tilting-bed trailer simplifies loading and unloading of farm or construction equipment anywhere in the field

without use of a loading platform. It can be operated by one man, and a tractor can be loaded in less than a minute. A goose-neck type frame and hitch is available so that it can be attached to any type of motive power.

Safety Hat

Manufacturer: B. F. McDonald Co., Los Angeles, Calif.

Equipment: Aluminum alloy safety hat.

Features claimed: Light weight, full protection, safety hat "T" style manufacture has been resumed by the McDonald Company. This hat, complete with full-floating head-band weighs only 11¾ ozs. A new feature is an adjustable head band interchangeable with the two shell sizes currently being manufactured. The smaller shell is for head sizes from 6⅜ to 7⅛, the larger of the sizes from 7¼ to 7⅝.

LITERATURE FROM MANUFACTURERS . . .

Templeton, Kenly & Co., Chicago, Ill.—General Catalog No. 44, just released, illustrates and describes in detail hundreds of Simplex jacks from 3 to 100 tons, and offers suggestions for their operation and maintenance. For quick reference the jacks are indexed by type and number. Complete measurements are given for each jack, many of which are pictured both by photograph and diagram. Four pages of photographs feature Simplex jacks "In The War" in a variety of fields such as aviation, shipfitting, barge building and mining.

The Producers' Council, Inc., Washington, D. C.—The Council has published a valuable report, "How to Plan Now for Tomorrow," which is directed primarily toward the manufacturers of building materials but which should be of interest to the construction industry as a whole. Factual graphs and statistics prepared by its Market Analysis Committee furnish added support for the Council's postwar program. The body of the report falls under three headings: "'Musts' for the Building Product Manufacturer," "The Building Product Market," and "How to Gauge Postwar Markets and Production."

Chain Belt Company, Milwaukee, Wis.—Bulletin 437 describes and pictures Rex Z-Metal chain belts and tells why they're better and more economical in many industries. Rex Z-Metal, the bulletin states, is a ductile ferrous cast metal with a high tensile strength, exceptionally tough; and although not stainless, it resists the corrosive action of many acids and alkalis which actively attack malleable iron or steel. Some of the industries mentioned in which Z-Metal belts are particularly serviceable are lumber mills, fertilizer plants, cement mills, and salt works.

Marlow Pumps, Ridgewood, N. J.—The new Marlow pump book (P43) is intended not only as a catalogue of Marlow pumps but also as a handbook of valuable engineering data bearing on the use of self-priming centrifugal pumps. Comprising 1002 pages and amply illustrated, the publication is designed to be the largest and most comprehensive of its kind. Full information is given on Marlow pumps under the following headings: (1) Portable, gasoline engine powered, self-priming centrifugal pumps; (2) Gasoline engine powered, high-pressure, self-priming centrifugals; (3) Self-priming centrifugals, electrically or belt driven; and (4) Diaphragm and plunger pumps. Pump and engine specifications are given for the 1st, 2nd, and 4th types of pumps mentioned above. For the 3rd type, pump specifications as well as dimensional and performance charts are given. The last 22 pages of the book are devoted to engineering data, pointers on how to select the proper type of pump, an index, and general information.

Broderick & Bascom Rope Co., St. Louis, Mo.—The company has just issued a pocket-sized edition of their "Riggers' Hand Book". Composed mostly of pictures and practical tables, the book gives helpful information on how to prolong rope life and increase output—tells when to choose the different types of slings, what the working loads are, where to look for wear, how to measure. A section of the book is devoted to Yellow Strand Braided Safety Slings, showing how their flexibility simplifies handling awkward, slippery or odd-shaped loads and how their patented braiding permits a soft, sure-gripping sling without surplus weight or bulk.

Power Take-Off Division, Davey Compressor Co., Kent, Ohio—The "Davey Power Take-Off", a new illustrated folder, concisely outlines the development of the power take-off, the construction of the unit, its advantages in modern industrial use. The folder shows how the power take-off enables the truck engines to power such auxiliary equipment as pumps, generators, air compressors, concrete mixers, welders, etc.

Jewell Belt Hook Company, Naugatuck, Conn.—Due to the shortage which has existed on belt fastenings for conveyor and drive belts, a new folder describing the malleable iron belt hooks stocked by Jewell will be of interest to readers. These hooks may be used for rubber, fabric, and leather belts—are clinch type, requiring no bolts or rivets—and, as the folder demonstrates, can be quickly and easily put in place. Contained in the folder is a price schedule for Jewell Potter Belt Hooks.

Reading-Pratt & Cady Division, American Chain & Cable Company, Inc.—Ideal for shop training or for a refresher on valves is the new Valve Selection Chart now available on heavy cardboard for handy reference. Size is 11½ x 17 in. Easy to follow—easy to understand, this chart explains the conditions to consider when selecting a valve, and breaks down these conditions to determine how they affect the operation of the valve. A typical "example" uses the points brought out in the chart and takes the reader through the selection of a valve under specified conditions.

Joshua Hendy Iron Works, Sunnyvale, Calif.—To further acquaint those interested in dredges and dredging equipment with the designing and building facilities of Hendy is the purpose of a new booklet just released by the Company. Two drawings of a Hendy-designed steam turbine dredge are printed in detail and facts and figures about modern pipe-line hydraulic dredges are given. Also pictured and described are the Company's line of cutters, dredging pumps, auxiliary pumps, generators, hoists and winches.

The Ric-wil Company, Cleveland, Ohio — Latest design changes in the Company's prefabricated conduits are outlined in a brochure. These changes are a new drive coupler for mechanical or welded conduit connection; a new pre-seal; and a welded spiral lock seam. Cut-away diagrams and structural details of the pipe units are given, and the process of prefabrication is pictured and explained.

Underwriters' Laboratories, Inc., Chicago, Ill.—On the occasion of its 50th anniversary, this non-profit, scientific and technical organization has published a booklet which gives a brief summary of its history, its accomplishments, and thumb-nail sketches of the men in the organization. Each department, such as the electrical and chemical department, is dealt with in an individual report. Throughout there are interesting pictures of tests being conducted in some one of the 17 departmental laboratories in Chicago. The western testing station of the U. L. is located at 500 Sansome Street, San Francisco, Calif.

B. F. Goodrich Co., Akron, Ohio—The Company announces a catalog section now available on its recently introduced clothing coated with rubber or rubber-like materials. The catalog section describes and illustrates the clothing including the fire coat, general purpose work coat, double back industrial coat, and standard police coat.

Broderick & Bascom Rope Co., St. Louis, Mo.—"Industrial Wire Ropes" is the title of a new booklet intended for the general contractor or rope user who needs general information on a wide variety of subjects. The booklet shows a complete set of data sheets on wire rope, mathematical tables of general value; and gives general recommendations on many types of equipment and fundamental data on slings, methods of calculating sling loads, installing wire rope clips, splicing and attaching sockets. A complete index is included.

Reimuller Brothers Company, Franklin Park, Ill.—Just released is a loose-leaf catalog sheet, which describes and pictures the company's new "V" way hydraulic vise and gap style hydraulic press. Features are listed and specifications are given on each machine. Also illustrated and described is the hydraulically operated foot-power unit which may be purchased separately.

Victaulic Company of America, New York, N. Y.—The company announces the release of a new pictorial catalog-manual (No. 44). Much of the catalog is devoted to Victaulic couplings, their design, operating and gasket features, installation and full-flow fittings. Eight pages of interesting pictures show Victaulic's uses in industry. The remainder of the catalog is given to steel and cast iron pipe, wrenches, valves and other Victaulic products. In this section many helpful dimension charts and specification tables are shown.

Cummins Engine Company, Columbus, Ind.—In a pocketbook publication entitled "Threshold To The Future," the Cummins Company—manufacturers of diesel engines—issues an invitation to learn more about their methods of scientific research. The major portion of the booklet is devoted to picturing and describing the laboratory where the company inspects materials and conducts tests of new developments in design and material. Also available is "Policy or Habit?," a companion booklet to the one described, which deals with the management, labor, sales and service of the Cummins Company.

Tivit Products Company, Los Angeles, Calif.—A series of three leaflets deal respectively with Tivit tanks, steam pressure cleaners and automotive maintenance equipment. Photographs and skeleton drawings of equipment are shown; and necessary structural details are given, as well as instructions for installation.

The Diamond Rubber Company, Los Angeles, Calif.—Three-color booklet entitled "Truck Tire Tips," intended to assist truck owners and operators in increasing tire mileage, reducing costs, and conserving rubber. Practices of the U. S. Army on mounting truck tires; definitions and drawings of proper loadings; discussion of the effect of speed on tires; and tables of load and inflation standards are included.

Victor Equipment Company, San Francisco, Calif.—A 72-page booklet with two photographs on each page, giving the effect of a moving picture illustrating the breakdown and repair by welding of a defense plant. The pictures show every step in the process, the effect on the metals, and the proper selection and application of electrodes. These pictures are taken from two films produced by the Jam Handy organization. The two films with accompanying recordings are available for instructional and training use in schools and industrial plants at $6.50.

Fruehauf Trailer Company, Detroit, Mich.—The third edition of a booklet entitled, "Are The United States United?" brings up to date available information on the movement to eliminate trade barriers between states and the adoption of uniform minimum standards for trucks and trailers. As a conclusion, the booklet proposes three important steps looking to equality in taxation for truck operators. They are: (1) Uniform state laws on trucks and highway use, (2) Elimination of laws applied to intrastate operators which are purely for tax collection purposes, and (3) Reciprocity between states covering fees and taxes against interstate operators.

American Institute of Bolt, Nut, and Rivet Manufacturers, Cleveland, Ohio—Vol. I, No. 1, of a publication entitled "Fasteners." It is printed in several colors and explains how the Institute can serve the users of metal fasteners. Discussed in the first edition are the rolled screw thread process; cold driving of large rivets; specifications for cold riveted construction; and an engineering discussion of the proper stress to be applied to bolts. These discussions are supplemented with photographs, graphs, and charts.

George S. May Business Foundation, Chicago, Ill.—"How Waste Reduction Boosts Production," a 12-page report, tells how production can be stepped up 25% or more by eliminating common waste factors. It presents 225 searching questions to aid management in tracking down unsuspected waste.

Charles Bruning Company, Inc., Chicago, Ill.—A leaflet describing three new professional quality sets of Bruning instruments. They are all made of brass, nickel plated and polished. In each case individual instruments may be bought separately.

Syntron Company, Homer City, Pa.—Bulletin 3-44 describes Syntron vibratory feeders for conveying bulk material, providing simple and easy means of controlling rate of flow. Materials of any size and density can be handled. Seven sizes of vibratory feeders are available, and general specifications for each are given.

Cannon Electric Development Company, Los Angeles, Calif.—Bulletin containing information, photographs, drawings and data on switchboard connectors for use in laboratories, testing equipment and experimental operations. Catalogued are surface and submounting plugs and receptacles, straight cord plugs and switching plugs. Installation photos show experimental switchboards in operation in various instances.

Byrne Doors, Inc., Detroit, Mich.—A profusely illustrated leaflet describing hangar doors, industrial doors, crane entrance doors and movable steel partitions. These are made in many styles, including upward-acting canopy doors, motorized slide doors, orange-peel circular doors and other more standard types. A lightweight expeditionary hangar is also illustrated.

American Institute of Steel Construction, New York, N. Y.—"Steel Construction Digest," Vol. I, No. 1, discusses the postwar bridge program of the nation and describes two important wartime bridge erection projects, one in Los Angeles, the other on the Alaska Highway. The use of steel in war is also briefly considered, and information is given on bookings and shipments for the past several years.

Butler Bin Co., Waukesha, Wis.—Bulletin No. 260 is almost entirely pictorial, illustrating the use of Butler bins under a multitude of conditions. Typical applications are shown in the following classifications: Ready mixed concrete plants; Central mixing plants; Batching plants; Portable bulk cement plants; Sand and gravel plants; Coal bins, industrial installations and other applications.

Powermatic Ventilator Company, Cleveland, Ohio—A cleverly prepared three-color leaflet describing the Iron Lung for industrial buildings, being a modern ventilating system for industrial plants and other buildings. One of the units is shown in a cutaway drawing so that all the valuable features may be seen. The Iron Lung is square in design to permit incorporation in modern factory roofs.

Kotal Company, New York, N. Y.—An eight-page leaflet describing Kotal bituminous paving mixes. Applications of this material in original paving; in the repair of pot holes; smoothing of pavement near car tracks; and resurfacing of busy streets are illustrated. The advantages of Kotal mixes are listed, and testimonials from numerous users are photostated.

OPPORTUNITY SECTION

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