WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XIX, No. 7

JULY • 1944

35 CENTS A COPY
$3.00 PER YEAR

IN THIS ISSUE

TEMPORARY TRASHRACK of timber and concrete being installed at a penstock intake at the right powerhouse of Grand Coulee dam. These temporary racks will be replaced by permanent ones of steel when that material becomes more abundant. Needle valves will be installed in eight turbine pits of the powerhouse to permit diversion of stream water, permitting maintenance work on the spillway.

NEW LOW-COST PROTECTION AGAINST RUST

HERE'S life extension for all equipment used by contractors, waterworks and sewage disposal plants . . . shovels, graders, concrete mixers and forms, screening plants, steel pipes, tanks, etc. . . . all metal exposed to corrosion, in use or in storage.

Texaco Rustproof Compound provides a penetrating, self-sealing film that is not only waterproof but highly resistant to chemicals and fumes. In many cases, costly chipping of existing rust and scale is eliminated. *Texaco Rustproof Compound* does not dry out, but remains soft, healing over any scratches and abrasions. It is much more economical —coat for coat—than paint.

Texaco Rustproof Compound has proven highly successful on leading railroads which have used millions of pounds for protection against the weather, salt brine drippings, flue gases, etc.

Write for free booklet entitled "Rust Prevention." It tells *how Texaco Rustproof* prevents rust, *where* and *how* to apply it and why it is so successful. Every industrial executive and engineer should have a copy. A single suggestion in this booklet may save thousands of dollars. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Rustproof Compound

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

FIFTEEN NORTHWESTS

for

PETER KIEWIT

Sons' Company

Omaha, Nebraska

Here's one of those dirt jobs we've been talking about—and here's one of the many well known contractors that gets things done and buys Northwests again and again for results, because he knows that if you have a real Rock Shovel, you are equipped for output in any kind of digging.

Fifteen Northwests—fourteen repeat orders is a lot of testimonial to service, particularly when the service includes practically every type of work from the ordinary road job to the Iron Range.

Concerns like Peter Kiewit Sons don't make mistakes in buying machinery, and a shovel that will make money for them will make money for you.

NORTHWEST ENGINEERING CO., 1727 Steger Bldg., 28 E. Jackson Blvd., Chicago 4, Ill.

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NO Compromise HERE!

Rear-Dump and Bottom-Dump EUCLIDS are designed and built for a single purpose — to move earth, rock, coal, ore and other materials on off-the-highway hauls with speed and economy. Planetary type full-floating drive axle, greater flotation and tractive power, and heavy construction throughout . . . all of these features make Euclid equipment outstanding for dependable performance and lower hauling costs.

Because they are built exclusively for hauling large loads on difficult hauls, there is no compromise in the design or the construction of Euclids. Weight is kept to a minimum consistent with large capacity and long life on tough jobs. Hundreds of earth moving contractors, and industrial owners too, have proved conclusively that Euclids cost less to own and operate on both long and short hauls.

The EUCLID ROAD MACHINERY Co. · · · Cleveland 17, Ohio

THE EUCLID ROAD MACHINERY CO.

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WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

Covering the Western Half of the National Construction Field

Contents for July, 1944

J. M. SERVER, JR.
Editor

SUBSCRIPTION RATES

The annual subscription rate is $3 in the United States and foreign countries where extra postage is not required. To Canada and to foreign countries where extra postage is necessary the annual rate is $4. Single copies, 35 cents.

Published by King Publications

OFFICE OF PUBLICATION
503 Market St., San Francisco 5, Calif. . . . . Telephone YUkon 1537

SOUTHWEST OFFICE
479 S. Holt Ave., Los Angeles 36, Calif. . . . . Telephone BRadshaw 2-3935
J. O. HODGES, District Manager

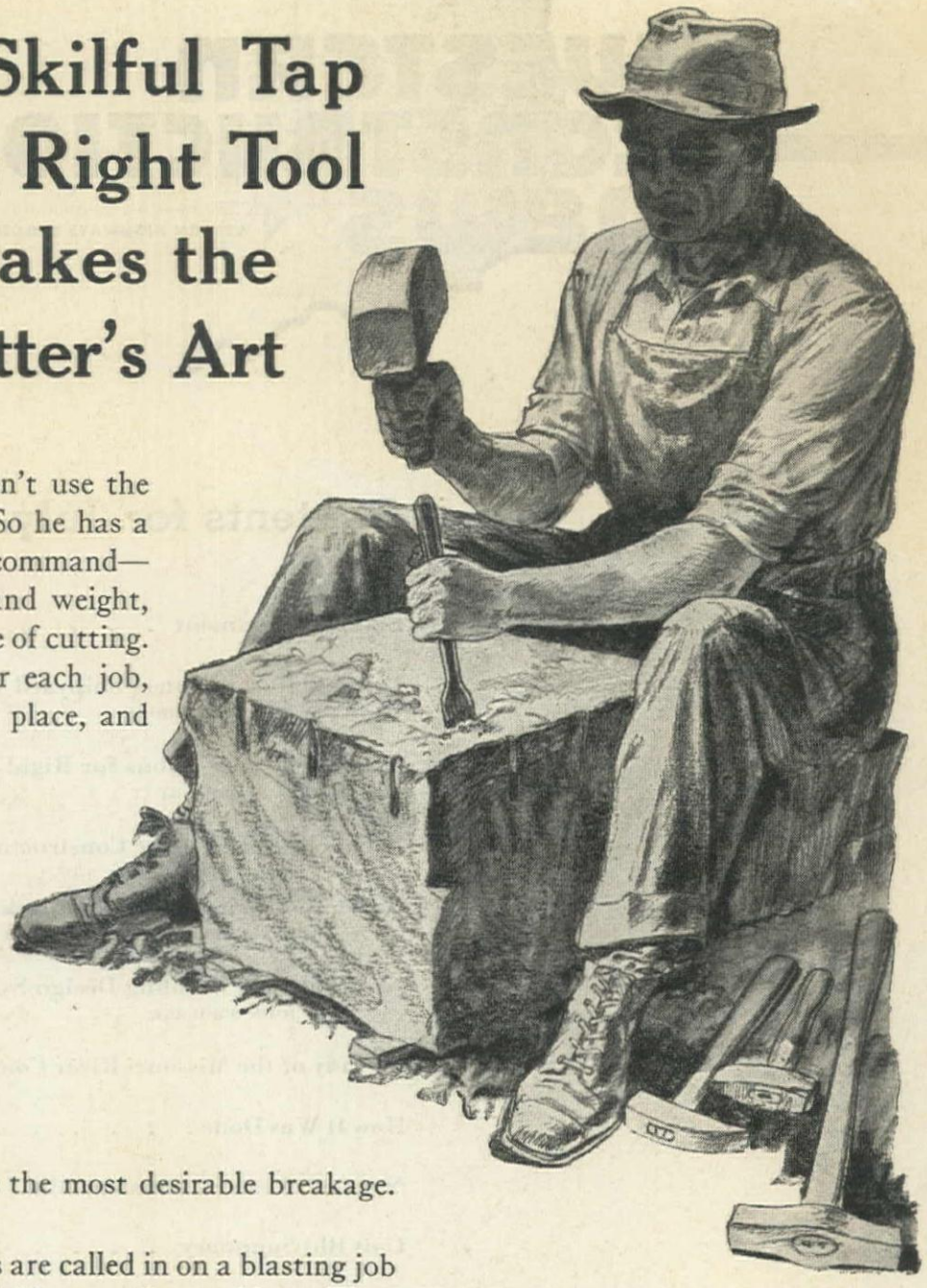
EASTERN OFFICE
5833 So. Spaulding Ave., Chicago 29, Ill. . . . . Telephone PRospect 1685
A. C. PETERSEN, District Manager

WASHINGTON OFFICE
1120 Vermont Ave., NW., Washington, D. C. . . . . Telephone District 8822
ARNOLD KRUCKMAN, Associate Editor

Please address correspondence to the executive offices, 503 Market St., San Francisco 5, California

Entered as Second Class Matter at the Post Office at San Francisco, California, under the Act of March 3, 1879.

It's the Skilful Tap With the Right Tool That Makes the Stonecutter's Art



THE stonecutter doesn't use the same hammer on all jobs. So he has a number of hammers at his command—each of a different shape and weight, each made for a specific type of cutting. Using the *right* hammer for each job, hitting in exactly the right place, and with just the right force, the stone is cut precisely as the stonecutter wants it.

In blasting likewise you cannot use the same tool for every job and get good results each time. It takes the *right* explosive, used by the right method—with the right force, at the right place—to produce the most desirable breakage.

When Atlas Representatives are called in on a blasting job they apply synergistic* thinking to the problem. They study every detail, swap ideas with the blasting men. From this comes a specific recommendation: The *one explosive*, the *one blasting method*, that will produce the utmost in fragmentation.

***Synergism:** *The force that produces "2 + 2 = 5" results when you and we get together and really "click."*

For "2 plus 2 equals 5" blasting results, consult Atlas.

Offices in Principal Cities

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

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

Tournapulls are designed and built for earthmovers by earthmovers with years of experience on actual earthmoving jobs. They know that speed and stoutness pay. You get both in Tournapulls.

PLAN NOW TO REPLACE

Obsolete Equipment

WITH THE FASTER POWER OF TOURNAPULLS

YOU'LL GET MORE POWER FOR DIRTMOVING . . . . LUG LESS DEADWEIGHT . . . WORK FASTER

Tournapulls move more dirt . . . move it faster and cheaper . . . because their working weight compared to power and capacity is much less than slower, track-type outfits—

Prime Mover and Equipment	Super C Tournapull & 15-Yd. Carryall	Tractor & 15-Yd. Scraper Approx.
Weight of Combined Units	31,000 #	53,500 #
Lbs. of Weight per Horsepower	207	411

Note that this difference in weight is the equivalent of 7.5 pay yards. Can you afford to lug that much deadweight back and forth on a 10,000-hour working life when you could be moving pay dirt with a Tournapull?

BIG TIRES REDUCE MAINTENANCE

Note, too, that the Tournapull has 150 brake horsepower for its working weight of 31,000—plus the flotation of big drive tires (21 x 24). These large tires give you plenty of traction with a minimum of wearing parts . . . also cushion the equipment against shock and reduce operator fatigue.

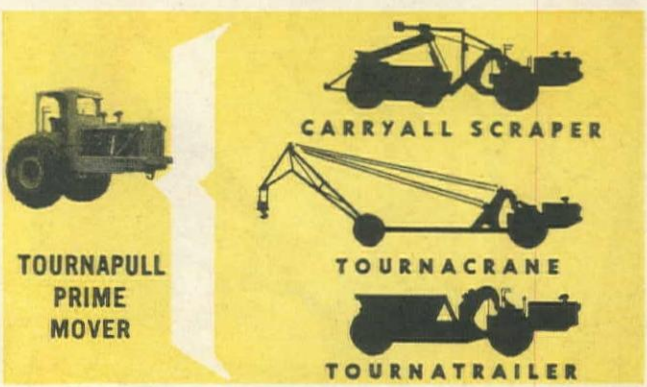
NO CHANGE IN OPERATING METHODS

With Tournapulls you use the same time-tested LeTourneau operating methods that have proved so successful with tractor-scraper outfits—downhill loading, pushers for big-capacity scrapers, working cuts and fills in series, etc. But Tournapull speed enables you to complete round trips in ⅓ to ½ the time.

Why use slow-moving, overweight equipment, when you can have faster-moving, job-proved Tournapulls? You'll pay less, move more yardage . . . more profitably. Plan NOW to replace obsolete equipment with faster powered Tournapulls.

Only *TOURNAPULLS* Give You This Interchangeability

Cable control, with the job-proved LeTourneau Power Control Unit, makes possible these cost-cutting combinations—all with the same Tournapull prime mover.



Write today for this "Postwar Equipment Folder". Tells what to look for and why in selecting future construction units. Address your request to Dept. WCN 744, R. G. LeTourneau, Inc., Peoria, Ill.

LETOURNEAU TOURNAPULLS

PEORIA, ILLINOIS . STOCKTON, CALIFORNIA

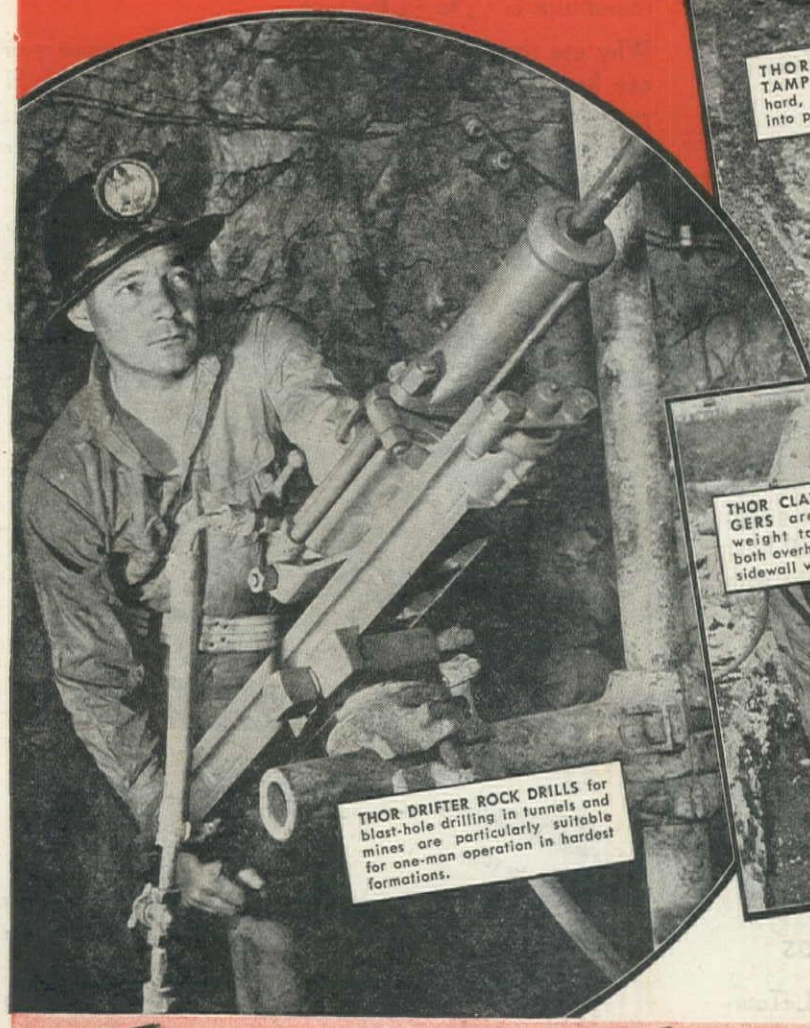
JOB-PROVED 1800 Built and Shipped

Manufacturers of TOURNAPULLS*, DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TOURNACRANES*.
*Trade Mark Reg. U. S. Pat. Off.

RUBBER-TIRED POWER FOR FASTER EARTHMOVING

From the DEEPEST PIT to the HIGHEST

THOR BACKFILL TAMPERS ram dirt hard, put fill firmly into place.



THOR DRIFTER ROCK DRILLS for blast-hole drilling in tunnels and mines are particularly suitable for one-man operation in hardest formations.

THOR CLAY DIGGERS are light weight tools for both overhead and sidewall work.

THOR SUMP PUMPS operate dependably either partially or fully submerged.

Six models of Thor Sinker Rock Drills for light, medium and heavy duty drilling.

Two models of Thor Drifter Rock Drills for light and medium duty blast-hole drilling.

Thor's Stoper Rock Drill, medium weight, for general stoping, raising and ring drilling work.

Four models of Thor Paving Breakers for light, medium and heavy duty demolition work.

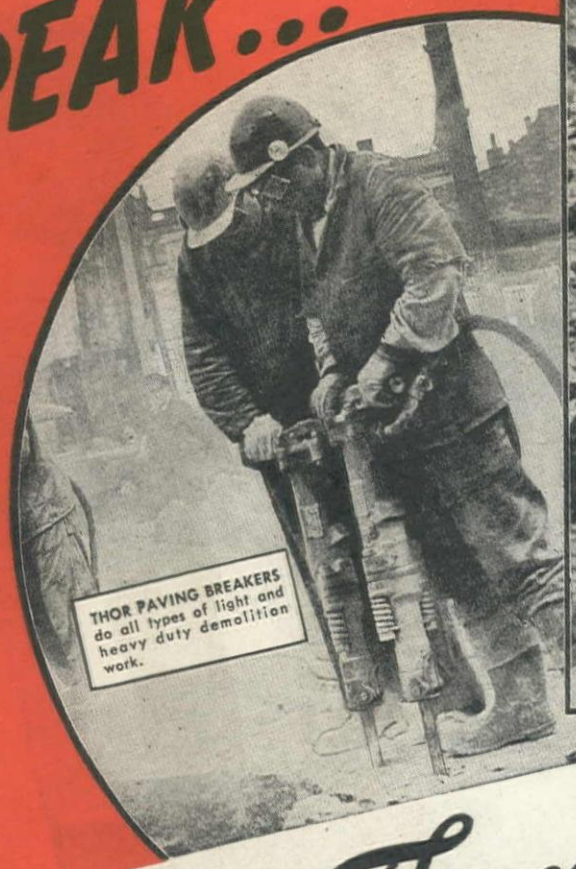
Six models of Thor Clay and Trench Diggers for all types of digging in all formations.

The Thor Sump Pump, designed for efficient work under most unfavorable conditions.

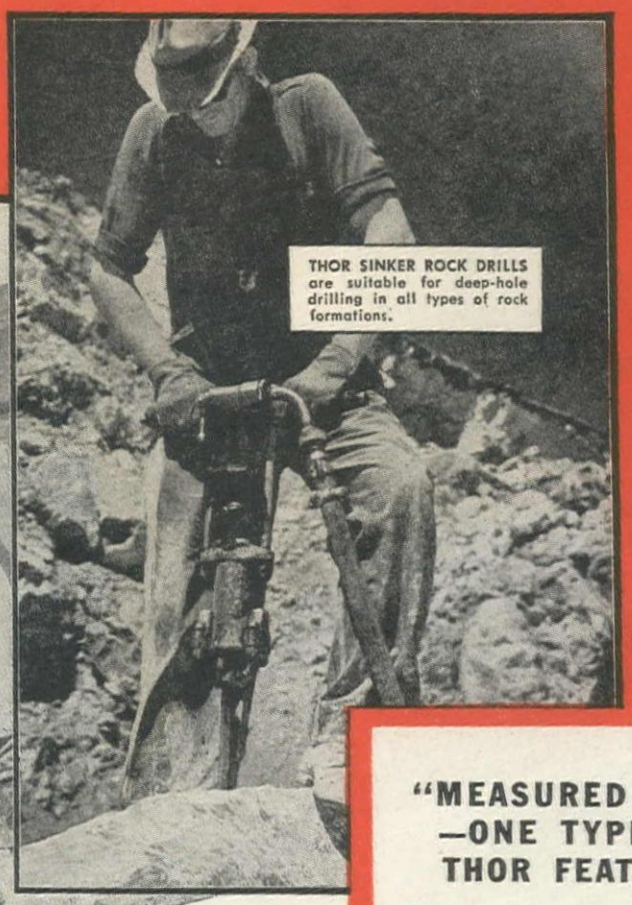
Thor Backfill Tampers for light and heavy duty dirt ramming and filling.

A THOR AIR TOOL FOR EVERY CONSTRUCTION JOB

PEAK...



THOR PAVING BREAKERS do all types of light and heavy duty demolition work.



THOR SINKER ROCK DRILLS are suitable for deep-hole drilling in all types of rock formations.

"MEASURED AIR" —ONE TYPICAL THOR FEATURE

Typical of the many advantages of design and construction of Thor Air Tools is the "Measured Air" feature of the Thor Positive Short-Travel Tubular Valve which controls air input to tolerances of *.00025 of an inch!*

Thor "Measured Air" provides:

- ***Balanced Power*** . . . because only a precisely governed quantity of air is allowed behind the piston.
- ***Smooth Performance*** . . . because every stroke is powered by the same measured quantity of air.
- ***Air Economy*** . . . because every ounce of air entering the machine provides its full measure of power for efficient performance.
- ***Low Maintenance Cost*** . . . because there are no separate parts of this patented Thor valve to lose or wear.

Thor AIR TOOLS

DO EVERY TYPE OF CONSTRUCTION WORK FASTER

From the deepest pit to the highest peak . . . from bed rock to top soil—*wherever* rock is drilled or earth is dug, there's a Thor Air Tool that will do the job faster! Thor Air Tools *cover the field* with a wide range of models of rock drills, paving breakers, clay diggers, sump pumps, and related tools. Write today for complete details in Catalog 42-A.

Leading Construction Equipment Distributors Everywhere Sell and Service Thor Contractor's Tools. Write Today for Name of the Thor Distributor Nearest You.

Thor Portable Pneumatic and Electric Tools

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

HOW AIRFIELDS GROW ON MUCK, ON SAND, ON TUNDRA

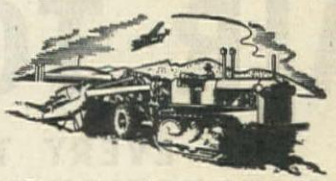
ON world-wide battle fronts America's planes are taking off on missions against the enemy —taking off from desert sand, jungle muck, or Aleutian tundra.

In a matter of days, bulldozers shove aside the muck or level the sand. And giant cranes lay steel landing mats that are bolted into a landing strip.

Look at the engines in these bulldozers and cranes. You'll find familiar friends—the same friends that power tanks and trucks, landing barges and patrol vessels, tractors and auxiliaries—General Motors Diesels.

And in these rigorous jobs of war, a promise is being written—a promise of plentiful, dependable, easily maintained, low-cost power for America's needs in the peacetime days ahead.

Tomorrow



Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.

GM
GENERAL MOTORS
DIESEL POWER

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

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

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

LOOK AT THE RECORD ON *UNDERGROUND* BELTS

MORE MINES

are equipped underground with Goodyear conveyor belts than with any other kind

MORE MILES

of Goodyear conveyor belts are used in underground mine haulage than any other kind

MORE TONS

are hauled, both underground and topside, on Goodyear conveyor belts than on any other kind

THESE three facts tell you what veteran mine operators think about Goodyear conveyor belts for underground service. Goodyears are first choice because experience has proved them *first* in performance, economy and long life. Yes, there are reasons — *more than a dozen of them!* Get the full story, fact by fact, from the G.T.M. — Goodyear Technical Man — before conveyorizing underground. To bring him to your office, write Goodyear, Akron 16, Ohio or Los Angeles 54, California — or phone the nearest Goodyear Industrial Rubber Products Distributor.

BUY WAR BONDS • BUY FOR KEEPS

"What do you mean, IT PEELS AIR?"

"THAT'S exactly what I mean," the Rex Distributor told me, looking over at that Rex pump. "It peels air about like you peel an apple. You see, every Rex Speed Prime Pump has an exclusive feature that automatically peels the air from the impeller and rushes it out the discharge. We call it our 'air peeler.'

"You've probably noticed," said the Rex man, "that Rex Pumps prime much faster than any others. Well, you've got the Rex air peeler to thank for that. It keeps the pump delivering as long as there's any water in the hole. Even if the suction line is leaking air, a Rex Pump will continue to operate."

"You bet your life, I've noticed it," I said. "So that's the reason Rex Pumps are so good. I'll have to tell my foreman about that. Imagine a pump that peels air. No wonder you Rex Distributors are so proud of your pump line!"

• • •

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 Mixers, Pavers, Moto-Mixers, Pumpcretes and Pumps. 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

Basic Tools for *INDUSTRY*

The above "inkling" of the scope of Blaw-Knox products and services must impress any industrialist with the fact that Blaw-Knox possesses skills, facilities, engineering experience of an order to make it truly a partner of industry.

For ferrous and non-ferrous industries Blaw-Knox has long produced rolling mill machinery, rolls and other basic equipment. Its leadership is equally emphatic in fabricated products for railroads, public utilities, the electronic industry and general industry. Among contractors, Blaw-Knox is synonymous with speed, efficiency and economy. In the process and chemical fields, Blaw-Knox products include all types of equipment as well as engineering and research based upon long experience.

With Blaw-Knox services and products go the *plus* value of an industry-wide background . . . of ability to think beyond the product into its ultimate uses. A discussion of your special problems is invited.

THE ILLUSTRATION presents a partial idea of Blaw-Knox Products and Services.

1 Transmission Towers
2 Radio Towers
3 Standard Buildings
4 Construction Equipment
5 Steel Forms for Concrete Construction
6 Chemical Plant Equipment
7 Rolling Mill Machinery
8 Electronic Equipment (censored)
9 Open Steel Flooring
10 Another censored line o. products
11 Complete Process Plant Units
12 Rolls for Rolling Mills
13 Prefabricated Power Piping
14 Special Castings
15 Castings for Locomotive Frames, Crossheads and Wheel Centers
16 Clamshell Buckets

Buy U. S. War Bonds and Stamps

A PACEMAKER FOR AMERICAN INITIATIVE AND INGENUITY

BLAW-KNOX COMPANY

2062 FARMERS BANK BLDG., PITTSBURGH, PA.

LEWIS FOUNDRY & MACHINE DIVISION, Rolls and Rolling Mill Machinery

POWER PIPING DIVISION, Prefabricated Piping Systems

NATIONAL ALLOY STEEL DIVISION, Heat and Corrosion-Resistant Alloy Castings

PITTSBURGH ROLLS DIVISION, Rolls for Steel and Non-Ferrous Rolling Mills

BLAW-KNOX DIVISION, Chemical & Process Plants & Equipment, Construction Equipment, Steel Plant Equipment, Radio & Transmission Towers . . . General Industrial Products

COLUMBUS DIVISION, Ordnance Matériel

UNION STEEL CASTINGS DIVISION, Steel and Alloy Castings

MARTINS FERRY DIVISION, Bofors Anti-Aircraft Gun Mounts

BLAW-KNOX SPRINKLER DIVISION, Automatic Sprinklers and Deluge Systems

Four Blaw-Knox Plants have been awarded the Army-Navy "E" for war-production excellence

A FEW VICTORY PRODUCTS

ANTI-AIRCRAFT GUN MOUNTS · GUN SLIDES · LANDING BARGES · POWDER PLANTS · PIPING FOR NAVAL VESSELS · SYNTHETIC RUBBER PLANTS
CAST ARMOR FOR TANKS & NAVAL CONSTRUCTION · CHEMICAL PLANTS

"EVERY PERSON SHOULD

United States Senate

COMMITTEE ON
POST OFFICES AND POST ROADS

March 22, 1944

Mr. C. W. Brown, President
American Road Builders' Association
1319 F. Street, N. W.
Washington, D. C.

My dear Mr. Brown:

The report, "A Sound Plan for Postwar Roads and Jobs," prepared and submitted by the American Road Builders' Association, has been of great value to my Highways Sub-Committee of the Special Senate Committee on Postwar Economic Policy and Planning, and has now been printed for the use of the entire Committee.

As you know, this Committee, commonly known as the George Committee, must consider all phases of the postwar problem. Therefore, a careful study must be made of everything that has to do with production, employment, government activities and the national economy. Your report has been and will be one of our important references, not only because of its summation of highway needs, but also by reason of its consideration of the major economic factors affecting our national prosperity. Containing, as it does, answers to many vital postwar planning questions, every person concerned with the postwar problem should read and study it.

The American Road Builders' Association and the author of the report, Engineer-Director Charles M. Upham, merit the highest praise for this worthwhile contribution.

Yours very sincerely,

Carl Hayden

United States Senator
From Arizona

THIS ADVERTISEMENT CONTRIBUTED TO STIMULATE POSTWAR PREPAREDNESS

READ AND STUDY IT!"

Says U. S. Senator Carl Hayden, Chairman, Highway's Sub-Committee

When a Senator writes to urge everyone to get interested—that's news.

Senator Carl Hayden's letter reproduced on the facing page shows two healthy signs. It indicates that legislators appreciate the thoughts of the public on important matters. It also indicates that Senator Hayden and his Highway's Sub-Committee are on the job and looking ahead. This is indeed fortunate.

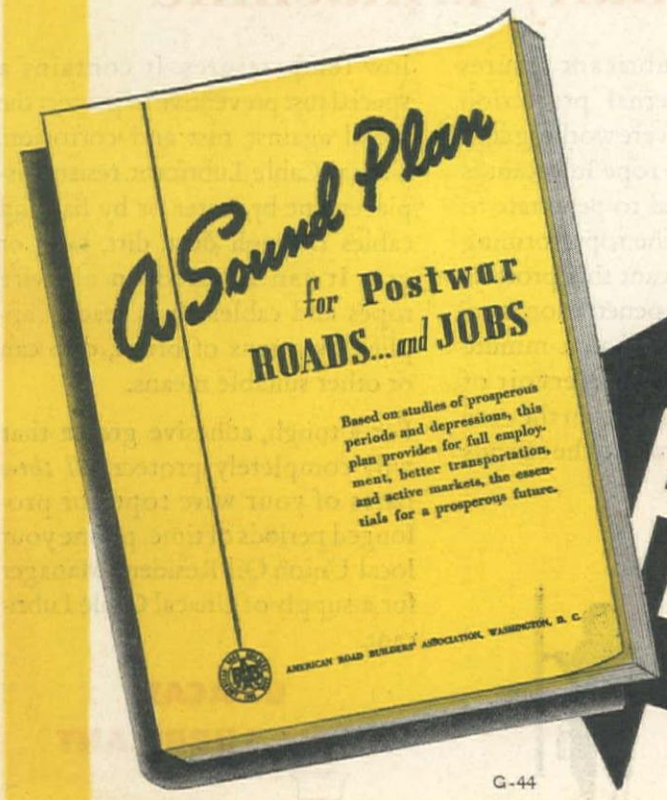
Every man, woman and child has an interest in the postwar highway building program. Good roads are a necessity, bringing countless benefits and savings to all. As a matter of fact, the economic structure of our country is built around the motor vehicle.

Many postwar plans will come before Congress. But that of the American Road Builders' Association is the first sound plan up for consideration which so greatly affects the prosperity of all without imposing a drain on the national economy.

The proposed highway program calls for an inter-regional system worked out by the American Association of State Highway Officials. Covering 34,000 miles, it will afford jobs for three million persons quickly. According to the U. S. Public Roads Administration, the three billion dollar annual budget proposed for it will eventually result in nine and one-half billion dollars in business transactions. Taxes and fees now levied for highways and streets, if used for the purpose, would eventually build and maintain the system.

What happens to the postwar highway building program will set a pattern, good or bad, under which private enterprise will function freely or otherwise.

Besides detailing a planned, plausible, postwar program, the book, "A Sound Plan", gives deep but comprehensive consideration to the major economic factors affecting our postwar prosperity. Read this book and we feel sure it will win your active support.



G-44

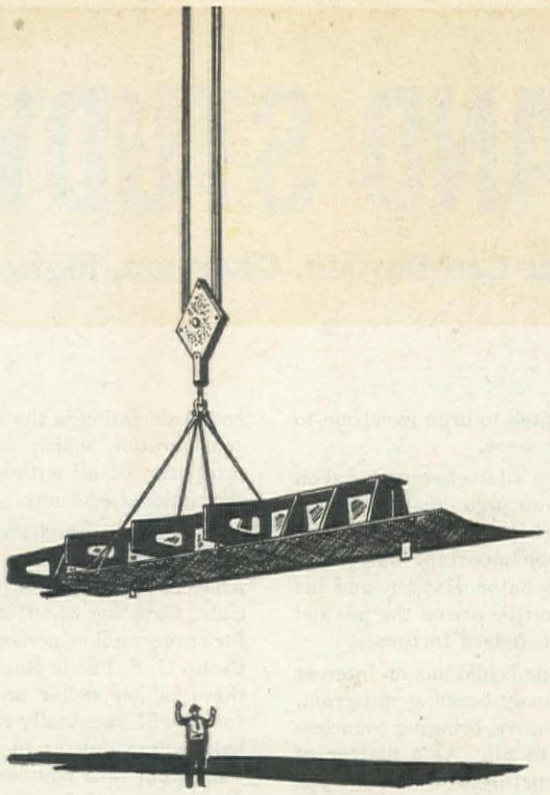
FREE

Charles M. Upham, Engineer-Director
American Road Builders' Association
1319 F St., N. W., Washington 4, D. C.
Please send "Sound Plan" book Free.

NAME .....
FIRM .....
ADDRESS .....
CITY ..... STATE .....

UNION WIRE ROPE CORPORATION

2146 MANCHESTER AVE., KANSAS CITY 3, MO.



Wire rope is actually a machine

Wire rope is actually a machine. It has three working parts—core, strands and wire. And like any machine, these moving parts must be adequately lubricated at all times for maximum service.

Internal lubrication of wire rope is highly important... *Smearing just any kind of grease on the outside of wire rope is not lubricating it!* You need a special lubricant that will penetrate to the inside. For if the core becomes dry it will no longer flex under the strain but will compress and break. Fine particles of corroded wire can work into rope centers and cause abrasion. Friction temperatures on dry rope may be high enough to char and weaken core fibers.

Unacal Cable Lubricant assures internal and external protection under the most severe working conditions. This wire rope lubricant is especially designed to penetrate to the very heart of the rope, forming a cushion of lubricant that protects the steel. Its rapid penetration is accomplished in less than a minute after application. A reservoir of lubricant is then formed in the core which feeds lubricant to the strands as the cable works.

Unacal Cable Lubricant is adhesive enough to prevent throw-off at high speeds and sufficiently tough to prevent cracking and flaking at low temperatures. It contains a special rust preventive to protect the metal against rust and corrosion. Unacal Cable Lubricant resists displacement by water or by hauling cables through dust, dirt, sand or grit. It can be used on all wire ropes and cables. It is readily applied by means of brush, drip can or other suitable means.

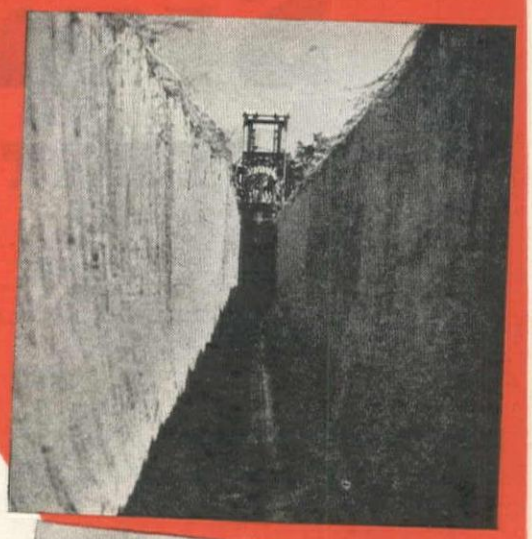
For a tough, adhesive grease that will completely protect *all three* parts of your wire rope for prolonged periods of time, phone your local Union Oil Resident Manager for a supply of Unacal Cable Lubricant.

UNACAL
CABLE LUBRICANT

Another
UNION OIL
Success-Tested Product

STOP

These "Thieves" with Buckeye Trenchers!

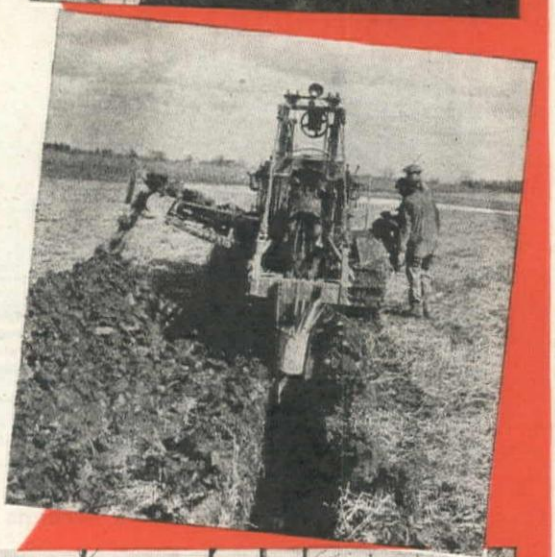


Every year erosion and oxidation needlessly take a tremendous toll of public and private property. Power, light and telephone lines placed underground escape the attacks of rain, ice and sun and are free from expansion and contraction stresses resulting from temperature changes.

In addition, buried cables enhance the appearance of any community and eliminate a hazard to aviation.

Every spring hundreds of thousands of basements are flooded, destroying merchandise and visiting havoc on home owners; all of which could be eliminated by proper drainage. Many highways and streets are damaged in the same places year after year because of improper drainage.

There are limitless essential post-war trenching jobs awaiting the Buckeye trenchers to do them—jobs that will stop the costly deterioration of transmission lines and arrest the destruction of property. Jobs that will increase America's assets. Rugged, soundly engineered Buckeye trenchers can do the trenching faster, and at minimum cost. *Plan ahead*—ask for Trencher Catalog.



BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

Top: "Digging Wheel" Buckeye trenching for steam mains at a Naval Base. Center: Model 12 Buckeye trenching for telephone cable near airport. Above: Fast, compact "boom type" Model 410 digs trench for water main in Michigan. Left: Model 120 "boom type" Buckeye trenching for drainage, sewage, water, gas, steam and electric cable at new Veterans' Hospital, Hines, Illinois.

Built by Buckeye

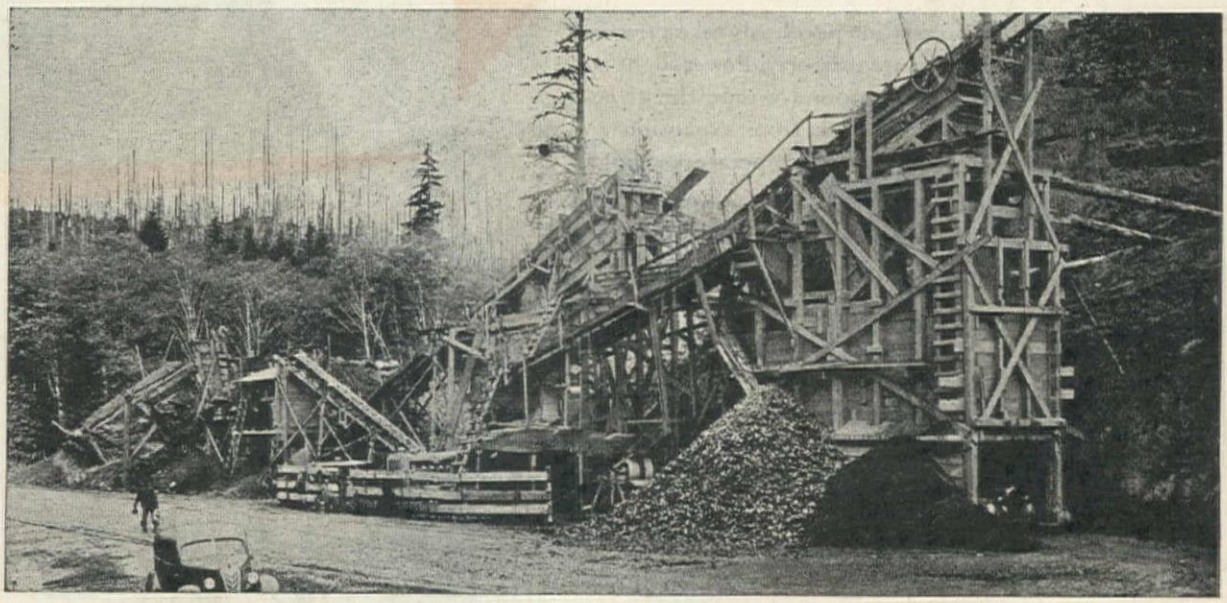
Convertible Shovels Road Wideners Trenchers
Spreaders R-B Power Finegraders Tractor Equipment

Simplicity

GYRATING SCREENS

are

EFFICIENT and ECONOMICAL



View of temporary West Coast plant using three 4' x 10' Triple Deck Screens to produce 3130 tons per hour of rock.

Simplicity Gyrating Screens are at work in every state in this country, in Alaska, Canada, Mexico and other foreign lands. The reputation earned by these universally used screens is best expressed by this statement made by one of the army of satisfied Simplicity users, "It is hard to believe, but we are now getting 50% more capacity from our plant, with the only change in our equipment being the replacement of our screening unit with the same size Simplicity Gyrating Screen. The cost of operation has also been greatly reduced."

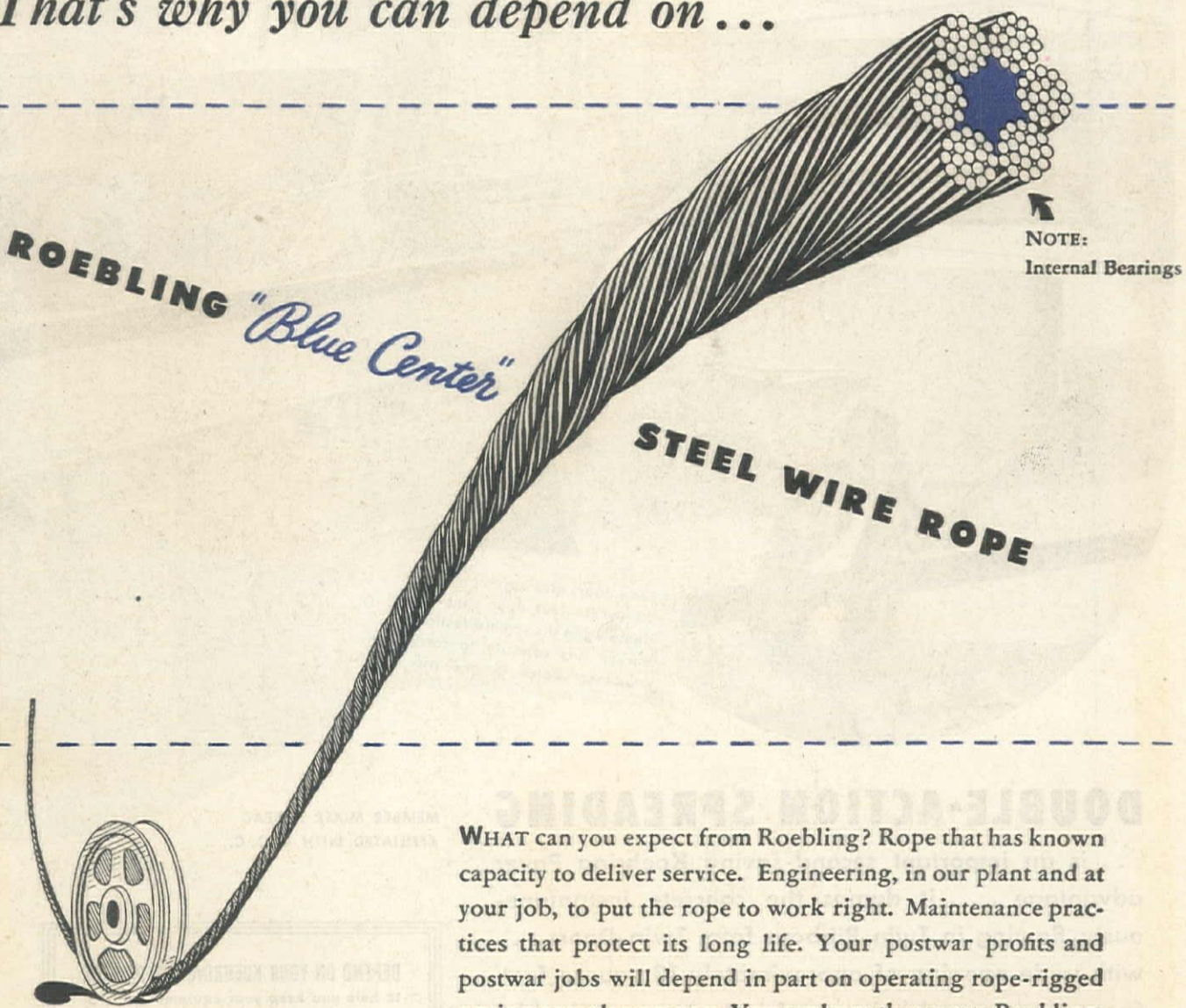
To secure a recommendation and quotation covering Simplicity Gyrating Screens for your job, contact the factory or one of our listed dealers.

The Donald Kenneth Co., Rialto Bldg., San Francisco, Calif.; Snyder Foundry Supply Co., 2444 E. 57th St., Los Angeles, Calif.; Contractors Equipment Corp., 1215 S. E. Grand Ave., Portland, Oregon; Pacific Hoist & Derrick Co., 3200 Fourth Ave. So., Seattle, Wash.; Empire Equipment Co., E. 3627 Alki Avenue, Spokane, Washington; Arizona Mining Supply Corp., Prescott, Arizona.

Simplicity

ENGINEERING COMPANY · DURAND MICH.

From steel making to rope laying...we never forget this fact...that pound for pound, wire rope has more bearing surface than any other piece of equipment. That's why you can depend on...



WHAT can you expect from Roebling? Rope that has known capacity to deliver service. Engineering, in our plant and at your job, to put the rope to work right. Maintenance practices that protect its long life. Your postwar profits and postwar jobs will depend in part on operating rope-rigged equipment at lowest cost. You can leave that part to Roebling.

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA
San Francisco • Los Angeles • Seattle • Portland

Wire Rope and Strand • Fittings • Cold Rolled Strip • Aircord, Swaged Terminals and Assemblies • Round and Shaped Wire Wire Cloth and Netting • High and Low Carbon Acid, and Basic Open Hearth Steels Suspension Bridges and Cables • Electrical Wires and Cables • Aerial Wire Rope Systems

ROEBLING

PACEMAKER IN WIRE PRODUCTS

FAST DUMPING CUTS BATCH CYCLE TIME..

DOUBLE-ACTION SPREADING

. . . is an important second-saving Koehring Paver advantage . . . it dumps the concrete instantaneously, flowing in Twin-Ribbons from Twin-Doors . . . with wide opening of approximately 13 square feet. Seconds are saved because of instantaneous double-action dumping and spreading . . . no choking at bucket doors with dry or harsh concrete. Time consuming bucket shaking is not necessary. Seconds saved when dumping or spreading cuts batch cycle time.

KOEHRING COMPANY, *Milwaukee 10, Wis.*

MEMBER MIXER BUREAU
AFFILIATED WITH A. G. C.

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.

ARMY E NAVY

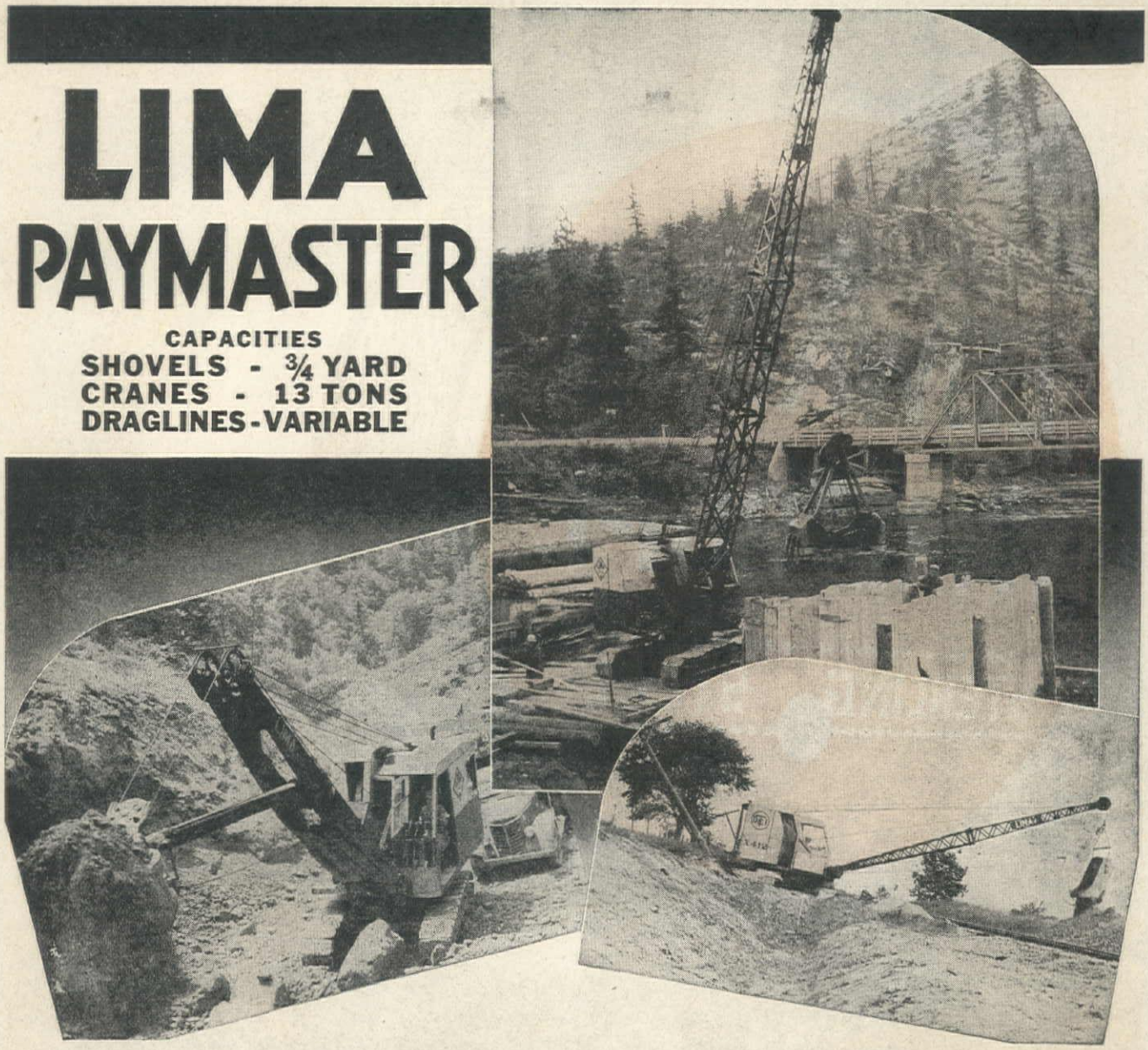
KOEHRING HEAVY DUTY

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.

LIMA PAYMASTER

CAPACITIES
SHOVELS - ¾ YARD
CRANES - 13 TONS
DRAGLINES - VARIABLE



The LIMA *Paymaster* has established records of big production and low operating and maintenance cost on every conceivable kind of work suited to a shovel, crane or dragline of ¾ yard capacity. Its modern design, and many practical features, assures big output with maximum economy and efficiency. See a LIMA *Paymaster* in action and make your own comparison. You will be convinced that it is the biggest little machine on the market.

Bulletins are available, write today for a copy.

LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division
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NEW YORK, N. Y. PHILADELPHIA, PA. MEMPHIS, TENN. ST. LOUIS, MO. NEWARK, N. J. PORTLAND, ORE. DALLAS, TEXAS SEATTLE, WASH.
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LIMA

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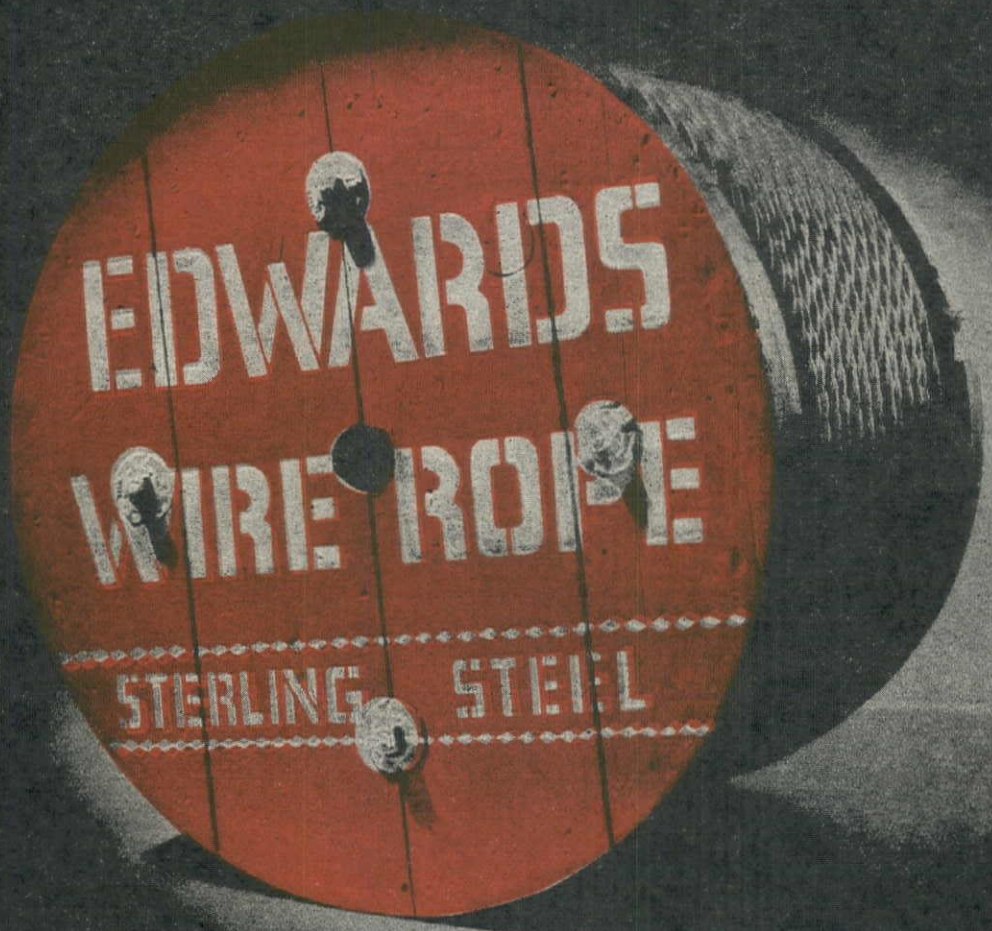
SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE

Seattle office, 1932 First Avenue South; General Machinery Company, E. 3500 Block, Riverside; Feenaughty Machinery Company, 112 S.E. Belmont St., Portland, Oregon and 600 Front St., Boise, Idaho; Garfield and Company, 1232 Hearst Bldg., San Francisco, Calif.; Smith Booth Usher Company, P. O. Box 3578 Terminal Annex, Los Angeles, Calif.; F. W. McCoy Co., 956 Cherokee St., Denver, Colorado; Smith Booth Usher Co., 1756 Grand Avenue, Phoenix, Arizona; Steffeck Equipment Co., Main & Cutter Streets, Helena, Montana; Willard Equipment Company, 860 Beach Avenue, Vancouver, B. C., Canada; Western Machinery Company, P. O. Box 2196 (748 W. 8th St.), Salt Lake City, Utah.



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THESE SLINGS PASS WARTIME INSPECTION

FOR SAFETY...SPEED...ECONOMY OF MANPOWER AND MATERIALS

When virtually every load is tagged for war production, efficient handling becomes an obligation—one you'll discharge on all counts with Yellow Strand Braided Wire Rope Slings.* *Safety?* The strength of this patented sling lies in tough Yellow Strand Wire Rope, so braided that it gains marked flexibility . . . conforms readily to any product . . . grips it gently but securely. *Speed?* Light weight and high kink-resistance make the sling easy to carry, attach and remove. *Economy?* A compact braided sling conserves manpower and materials, compared with bulky types. Even when lifting heavy locomotives, turbines, pressure towers or weapons, a Yellow Strand Braided Sling will require fewer men —and less steel. And for such lighter lifts as jigs, tools, drums or crates, a Yellow Strand Sling offers relief from the fiber shortage. Fitting material-handling equipment to your specific job is the function of Broderick & Bascom's specialized Sling Engineers. Investigate today!

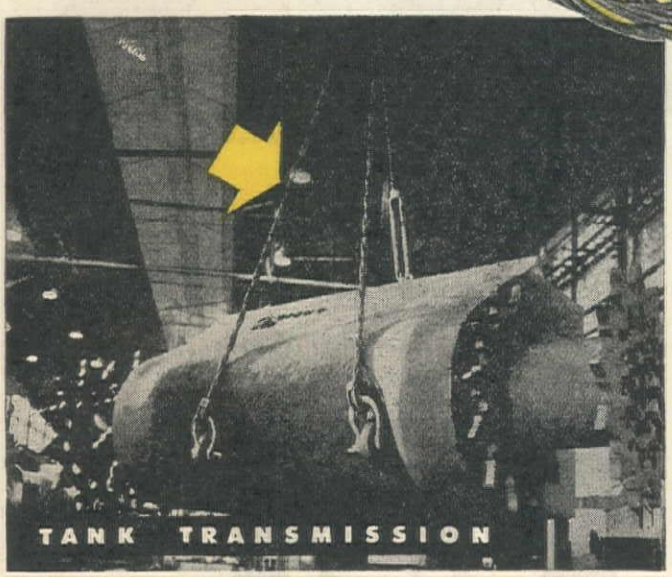
Broderick & Bascom Rope Co., St. Louis

Branches: SEATTLE, New York, Chicago, Houston, Portland
Factories: SEATTLE, St. Louis, Peoria

FREE

Riggers' Hand Book

96-pages of practical wire rope sling information. Send for free copy.



TANK TRANSMISSION

DIESEL LOCOMOTIVE

*Patents: U. S., 1475859, 1524671, 2142641, 2142642, 2299568 • Canadian, 252874, 258068

BRODERICK & BASCOM

YELLOW STRAND

Braided Wire Rope SAFETY SLINGS

Installing "Usiflex" flexible joint cast iron pipe for submarine crossing. Drawn by Rico Lebrun for U. S. Pipe & Foundry Co.

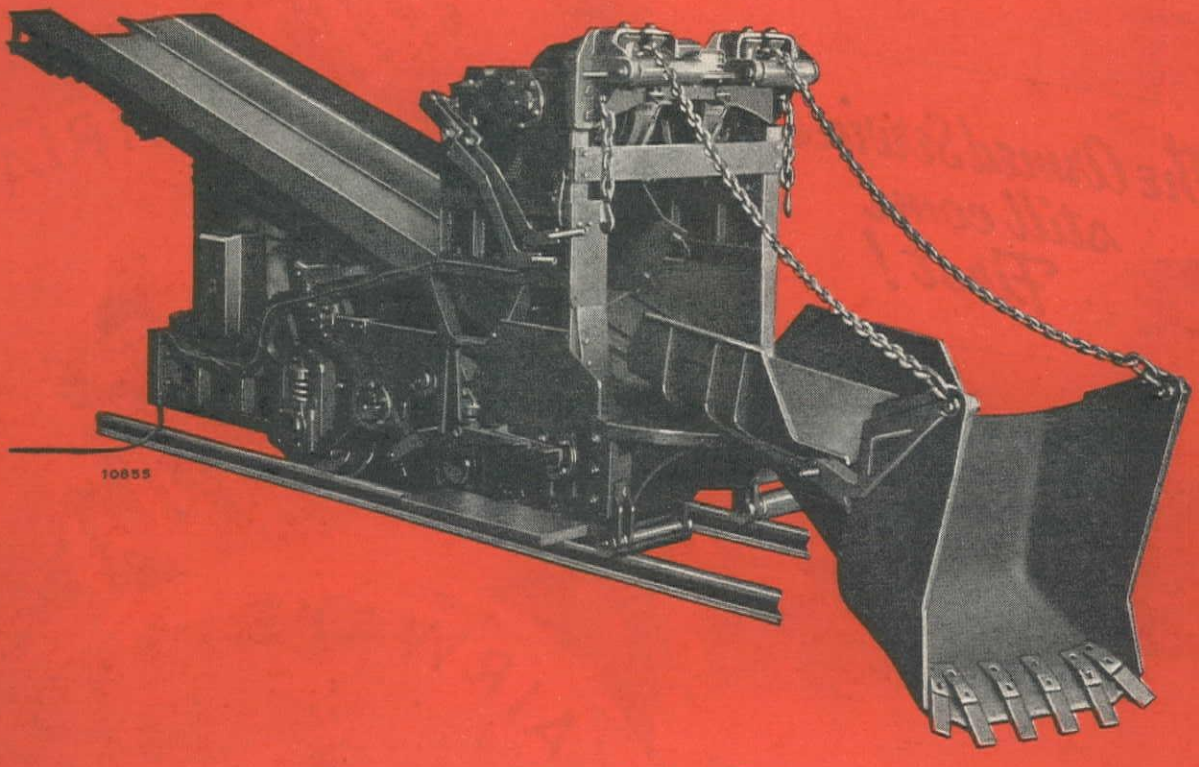
"Usiflex" flexible joint cast iron pipe has an outstanding performance record under difficult installation conditions such as submarine crossings and lines in swampy or unstable soils where settlement is to be expected. Other types of flexible joint pipe are also manufactured to meet these special requirements. We also produce bell-and-spigot, mechanical joint, flanged and plain end pipe in accordance with all standard or special engineers' specifications.

U.S. cast iron PIPE

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

THE TYPE 75 *Conway Shovel*

- large dipper capacity
- powerful digging action
- wide cleanup range
- fast loading cycle
- loads everything, blocky or fine, wet or dry
- heavy, rugged construction throughout
- low operating cost



Details of any one of the complete line of Goodman built Conway Shovels are available upon request.

ARMY E NAVY

GOODMAN MANUFACTURING COMPANY

HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

You can always get CEDARAPIDS EQUIPMENT for essential civilian needs

The Armed Services still come First!

THE IOWA MFG. DISTRIBUTORS:

HOWARD-COOPER CORP.
Seattle, Spokane, Wash., and Portland, Ore.

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EVEN THOUGH we're still making aggregate plants for the Army, Navy and for Lend-lease we can accept your orders for more Cedarapids crushing and asphalt equipment. Only the usual releases and priorities are necessary. Just tell us your needs and we'll help you with the priority forms and engineer the equipment to fit your requirements.

Manufacturing facilities and engineering skill which produced and are producing aggregate plants for war use, at such an unprecedented rate, can also be used for essential civilian production. The performance of Iowa plants in producing the aggregates which made America strong means lower cost and better performance on your contracts for highways, airports, dams, and other construction.

The Cedarapids line is complete and will meet any aggregate production problem either from the standpoint of output or character of materials for either an entire plant or a single piece of equipment.

Be sure you come to headquarters for aggregate producing equipment first. See your Iowa dealer or write direct.

Cedarapids

ARMY E NAVY

Built by IOWA

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa

TYPICAL DIESEL LUBRICATION PROBLEMS:

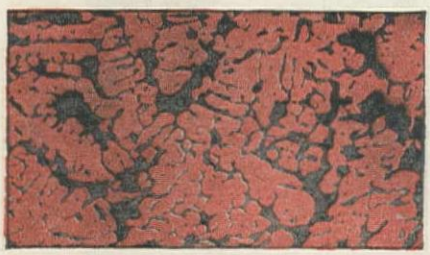
2. Bearing Corrosion

The high speeds of automotive Diesel engines have increased the loads on bearings to such an extent that copper-lead and other alloy bearings are widely used. These bearings, although able to withstand far greater pressures and higher temperatures than the conventional babbitt type, are subject to corrosion.

These same conditions of pressure and temperature promote a reaction between the lubricating oil and the air in the crankcase. When a hydrocarbon lubricating oil is exposed to oxygen at elevated temperatures, the oxygen atoms combine with the oil molecules. With some lubricating oils, this reaction causes them to become corrosive.

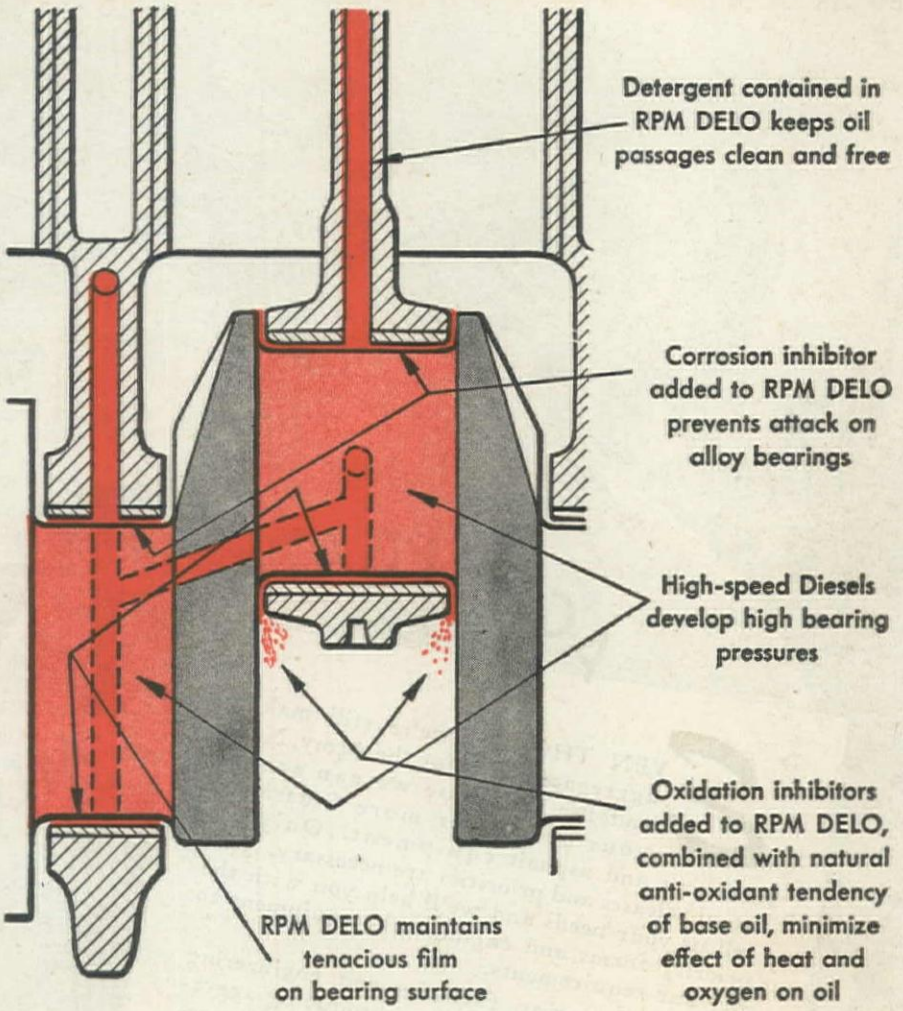
The products formed in this reaction tend to dissolve the lead in the copper-lead structure of the bearing, leaving a porous copper shell which breaks down under pressure.

This tendency, which presents a serious problem to operators of high-speed Diesels, can be entirely overcome through use of RPM DELO in accordance with the recommended procedure.



Top Photo: A photomicrographic cross-section shows the lead component of a new copper-lead bearing in light grey. The copper is shown as red. Note the even distribution throughout.

Bottom Photo: A similar cross-section corroded by use of straight, uncompounded mineral oil. Note how lead has been eaten from surface, leaving copper honeycomb.



Diagrammatic sketch of connecting rod and crankshaft bearing assembly illustrates one section of engine where RPM DELO reduces overhaul and repair expense.

RPM DELO, in addition to its other properties, prevents bearing corrosion in three separate ways:

1. The base stock of RPM DELO contains natural inhibitors which are highly resistant to oxygen, and minimize the original tendency of all mineral oils to oxidize under heavy-duty conditions.

2. A powerful oxidation inhibitor is added to RPM DELO, which further reduces the rate at which the oil absorbs oxygen.

3. Direct protection is given to the bearing by the corrosion inhibitor added to RPM DELO.

Even more important than its non-corrosive property, is the ability of RPM DELO to eliminate ring-sticking, prevent excessive deposits on rings and ports, and minimize ring and cylinder wear.

★ ★ ★

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help—make your maintenance job easier. Call your Standard Representative or write to Standard of California, 225 Bush Street, San Francisco 20, California.

RPM DELO

STANDARD OF CALIFORNIA

Gnawing on a hillside

...means continual load variation on the Diesel power-unit

● Whether the shovel chips and bucks its way along in loosening tough, rocky earth—or swings rhythmically through load and drift in "easy going"—the Pierce Governor keeps the speed constant, the power efficiently controlled to the need.

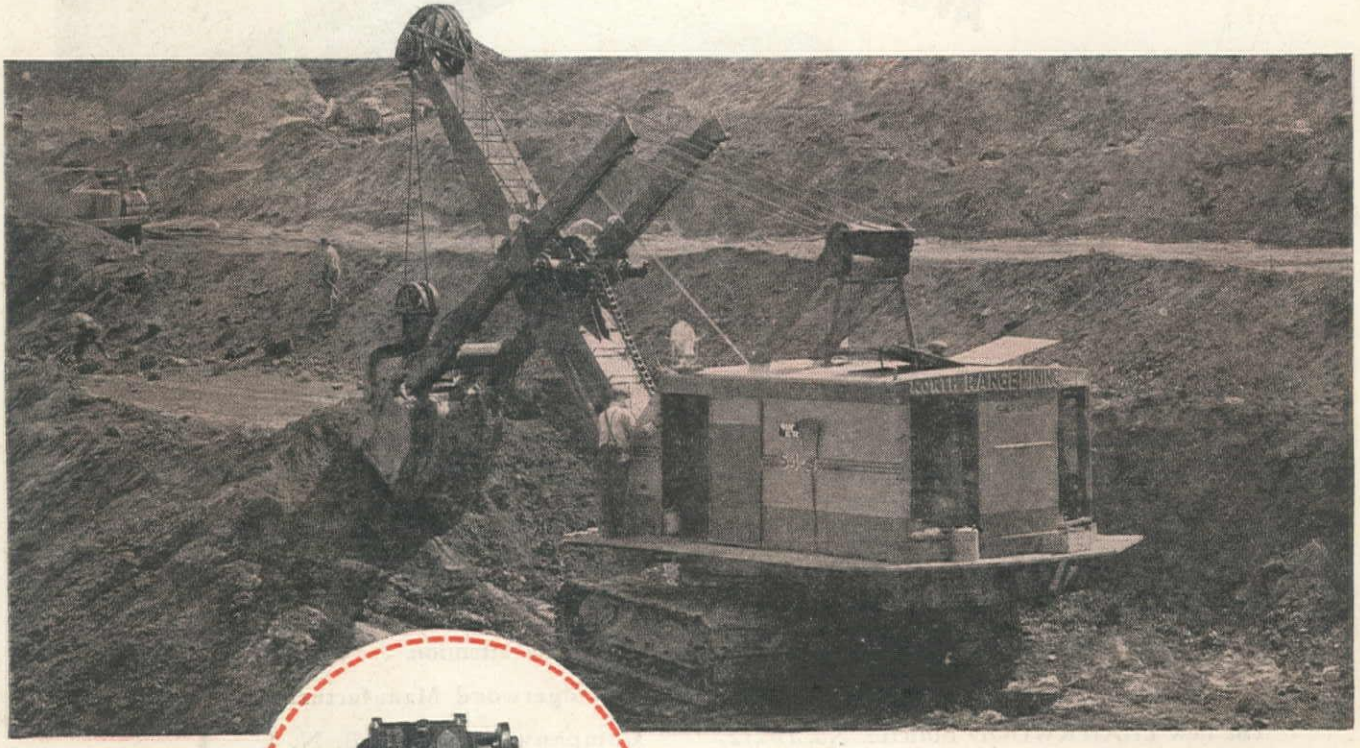
For the operator, it is better than a human hand at the throttle control. Pierce Flyball Governors compensate instantly for every change in load. Action is mechanically positive—dependable through maximum trouble-free service life. There is no gumming or sticking.

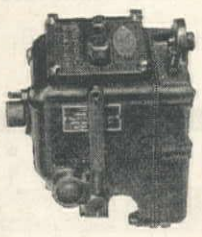
This is but one example of Pierce Governor's many applications. Grading, rolling, excavating, hoisting, compressing, transporting—everywhere that internal combustion engines provide power—and need governing—Pierce Governors are on the job. Specify Pierce on the new equipment you buy—and if your present equipment is not Pierce governed, write for the new Pierce Catalog just off the press.

THE PIERCE GOVERNOR COMPANY, INC. • 1645 OHIO AVENUE • ANDERSON, INDIANA

Manufacturers of Pierce Precision Governors and Sisson Automatic Chokes

Canadian Manufacturer and Distributor: BURLEC LIMITED, Toronto 13, Canada





PIERCE GOVERNORS

NEW LIDGERWOOD BULLETIN GIVES COMPLETE DETAILS ON CONTRACTORS HOISTS

Available on Request

NOW... KNOW THE EXACT SPECIFICATIONS ON MODERN LIDGERWOOD HOISTS

Yes, right *now* LIDGERWOOD hoists are available for war-supporting use! Since 1873, these hoists for contracting, mining and industrial service have established a standard of efficiency and reliability. *Modern* LIDGERWOOD hoists, powered by Gasoline, Electric, Steam or Diesel engine, live up to their tradition in quality and long life while including the most modern improvements.

The new LIDGERWOOD Bulletin, No. H-212, contains full details, including size, weight, speed and power, on the general purpose and Contractor's types of hoists. Here are the facts and figures on hoists you may be using now or in the future, including derrick hoists for hook and grab bucket work, with and without swinging gear and separate swing hoists, and barge derrick hoists.

Have the statistics at your fingertips! The illustrated 12-page LIDGERWOOD Bulletin H-212 is now ready for mailing — a request on your letterhead for your copy will receive immediate attention. . . . Write to Lidgerwood Manufacturing Company, Elizabeth B, N. J.

ARMY (E) NAVY

LIDGERWOOD
ESTABLISHED 1873
Manufacturing Company
MAIN OFFICE AND WORKS • ELIZABETH B, NEW JERSEY

ON THE FIGHTING FRONT AND IN THE FOREST

TIMBERMEN can readily see the elements of tractor arch operation in this picture of the Army's Tank Recovery Unit, designed to remove tanks from the battle zone for quick repair. To drag a disabled tank, bogged down in mud or sand, on to the trailer, *tough wire rope* is essential. In many of the units now in operation, American TIGER BRAND Excellay Preformed is providing the strength, ruggedness and ease of handling necessary for unfailing performance.

For your hauling operations insist on the wire rope that insures top efficiency with a minimum of trouble. Excellay Preformed guarantees steady, continuous production. Its flexibility, resistance to kinking and snarling and the fact that crown wires lie flat when broken make it always safe and easy to handle and greatly reduce accident hazards.

American TIGER BRAND has a wire rope for every need. Our wire rope engineers are ready to examine your problems and help you specify the types best suited for your job. They can give you valuable, money-saving tips on operation and help you get more work out of the rope now on the job. Call on the American TIGER BRAND Wire Rope Engineer for dependable, efficient wire rope service.

COLUMBIA STEEL COMPANY

San Francisco, Los Angeles, Portland, Seattle, Salt Lake City

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

United States Steel Export Company, New York

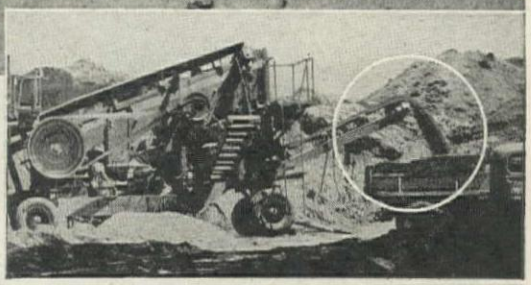
USS

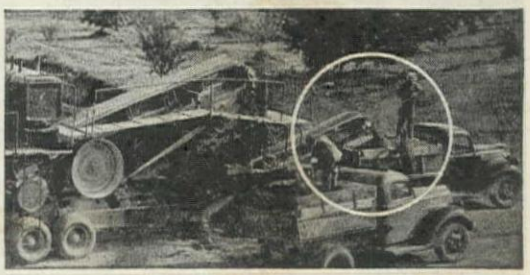
UNITED STATES STEEL

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.





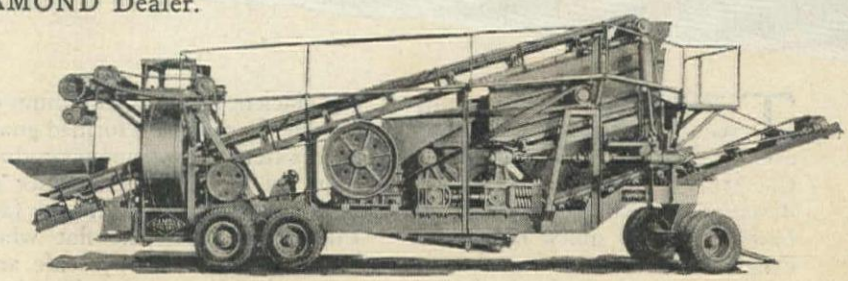
High Output at Lower Cost per Ton because-- NO BOTTLENECKS in a DIAMOND Plant

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.

BACK OF EVERY ATTACK . . .

Preformed wire rope

Out where fighting Yanks attack, big howitzers pummel the enemy. But shells that pack a deadly wallop are too heavy for men to lift.

So a crane—rigged with Preformed wire rope—hoists the shell, then shoves it home. Every second counts. That's why the rope is Preformed. It lasts longer than ordinary wire rope. It handles faster and easier, speeding every operation. And it prevents accidents, too, because it's safer.

On the firing line—as on the production line—Preformed is proving that it's the tough wire rope for the tough war jobs.

On practically all kinds of mobile equipment, Preformed is back of every attack.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR SUPPLIER FOR PREFORMED WIRE ROPE

Adzing machine . . . dependably powered with LEROI valve-in-head engine

TURN THE PAGE

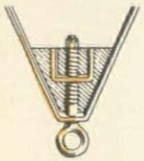
Le Roi Compressor Features

BALANCED CRANKSHAFTS

Le Roi Compressors have dynamically balanced crankshafts with integral counterweights. Weight of pistons and connecting rods held to extremely close limits.

HEAVY-DUTY ENGINE

Overhead valve construction, hardened valve seat inserts, removable wet sleeve cylinders are features of Le Roi power that save time and money on maintenance.



EXTRA MOBILITY

Spring-cushioned towing eye—truck-type springs — retractable caster wheel — enable you to get air for a job in a hurry, with minimum time lost on and between jobs.

SOUND DESIGN

Circumferential cooling fins for maximum cooling effect — compressor valves of time-tested circular plate type — intercoolers equipped with relief valve.

FORCE FEED LUBRICATION

Compressor oil pump shown at left is part of a complete force feed system, assuring you of adequate lubrication whether machine is standing on level or uneven ground.

ON THE REVERSE SIDE — A heavy-duty, 4-cylinder, 16 H.P. Le Roi Engine powers an adzing machine for resurfacing railroad ties. In remote places where service and maintenance is not readily accessible, Le Roi *dependability* is a dominant factor on all types of equipment.

LE ROI

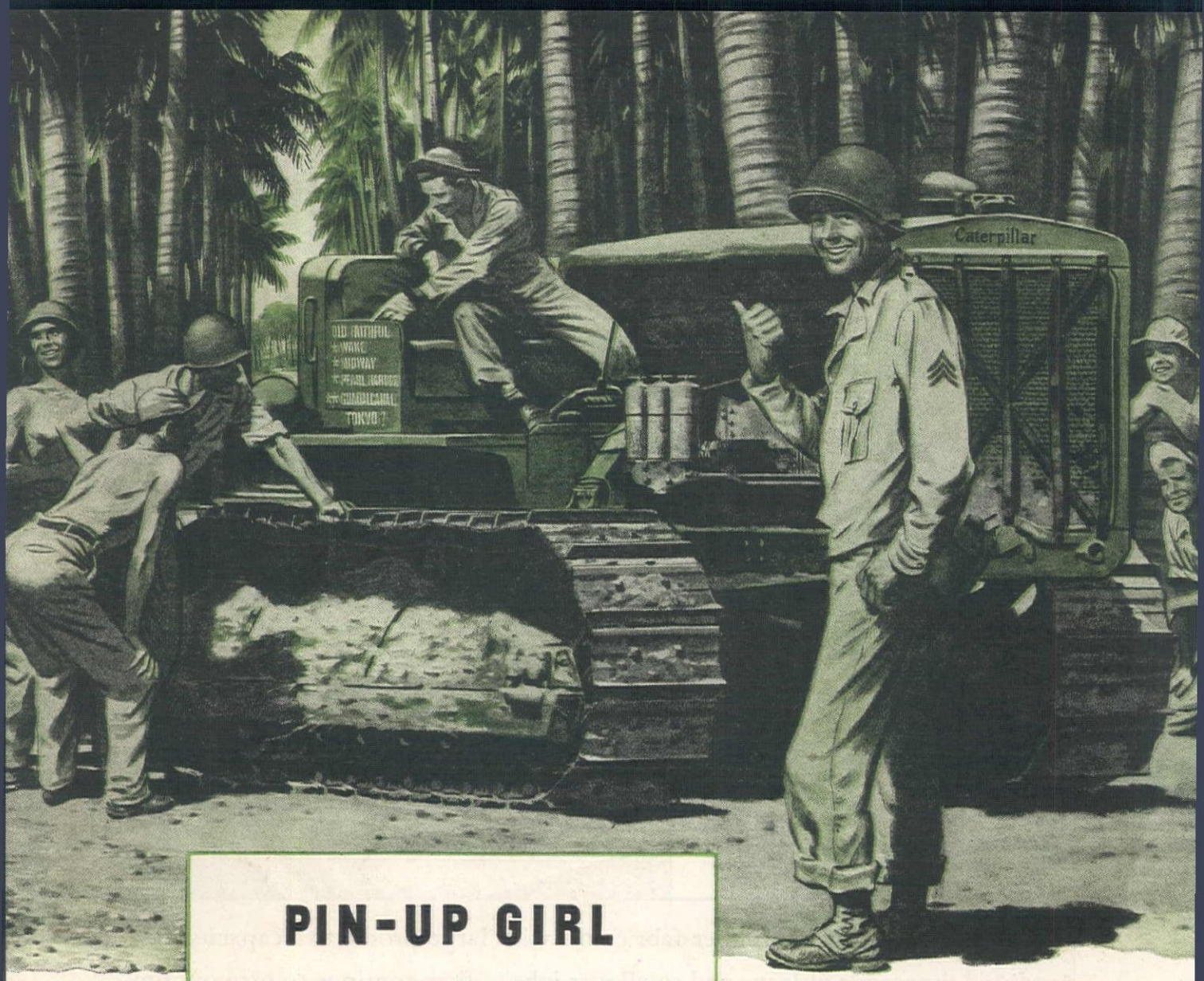
Portable Air Compressors Meet Today's Performance Demands!

Speed — and more speed — is the demand in today's construction schedules. And that's just what you get when Le Roi Compressors are on the job. Their high mobility gets them to the job faster — into working position faster — and gives you air faster.

Because Le Roi is the only manufacturer who builds both engine and compressor, you get the benefit of integral design — smooth-running teamwork — and coordinated action. Le Roi compressors are built to the precision standards of an engine-builder — a perfect team that wins you a reputation for "on-time" performance. Standard sizes are available for approved projects. Consult your nearest Le Roi dealer or write for bulletins.

LE ROI COMPANY
1726 S. 68th St., Milwaukee 14, Wisconsin

LE ROI



PIN-UP GIRL OF GUADALCANAL

Painted from an actual photograph taken on Guadalcanal

THEY call her "Old Faithful"— as true a sweetheart as ever endeared herself to fighting men in all history. No slim and shapely beauty, she holds a treasured spot in the hearts of thousands of U. S. Marines and Navy Seabees.

She was on duty at Wake Island when the war began. She's seen wartime service on Midway and done her share in the repairs to Pearl Harbor. Then off to Guadalcanal she went, to toil and labor in the steaming heat of the jungles. And beneath the campaign stars which she so proudly wears is emblazoned the word "Tokyo," so there's no telling how far her adventures may carry her.

Silly, you say, to speak that way of a "Caterpillar" Diesel Tractor? Just ask any service man who has fought on the battlefields around the world! You'll discover a genuine, deep-rooted affection for these rugged machines . . . an affection inspired by the brawny power and tireless dependability that fighting men admire.

They've gone side by side with our troops in the face of death . . . landed on beachheads and helped to hold them . . . hauled precious supplies to places of safety . . . hewed out airfields . . . helped build roads and bridges . . . demolished enemy pillboxes. With bulldozer blades raised, they've even spearheaded infantry attacks on machine-gun nests. And when landing barges laden with wounded have refused to budge, they've waded deep into the surf to nudge them off into the sea and on their way.

Already the history of this war is filled with tales of heroic men and the faithful "bulldozers" that have given them the priceless advantage of "work-power." When you read one of these "'dozer" stories, you can be pretty sure it refers to a "Caterpillar" Diesel Tractor, whether it was equipped with a bulldozer blade or not.

And it's not only "Caterpillar" Diesel Tractors that are winning their laurels. Doing a thousand and more jobs on the fighting fronts, "Caterpillar" Diesel Motor Graders, Engines and Electric Sets are earning their service stripes in every branch of the armed forces.

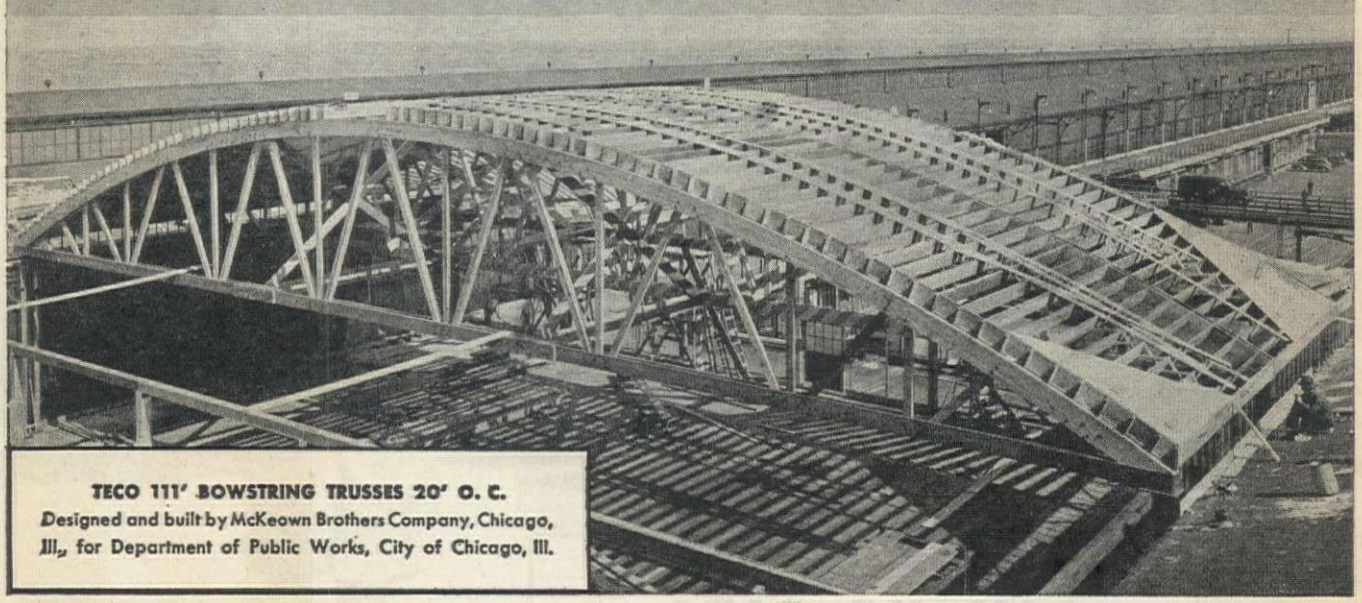
Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

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

67 TECO TIMBER FABRICATORS *At Your Service* FROM COAST TO COAST



TECO 111′ BOWSTRING TRUSSES 20′ O. C.
Designed and built by McKeown Brothers Company, Chicago, Ill., for Department of Public Works, City of Chicago, Ill.

Experienced nation-wide timber fabricators with large productive capacity have produced thousands of large and small war jobs... they continue to turn out timber structures on time... and these plants are serving private industry in postwar planning of Clear Span Roof Trusses, Bridges, Heavy Structural Framing, Barges, Towers, Power Lines, Glued Laminated Construction, Prefabricated Housing.

HEAVY STRUCTURAL DIMENSION AND TIMBERS ARE AVAILABLE

The War Production Board states 3″ and 4″ Dimension and Timbers are readily available for essential uses...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.

Write us for list of timber fabricators who use the Teco connector system of construction.

TIMBER ENGINEERING COMPANY
WASHINGTON · CHICAGO · MINNEAPOLIS · NEW ORLEANS · PORTLAND

Specify **TECO CONNECTORS AND TOOLS**
Endorsed by Leading Lumber Manufacturers and Fabricators

Ready for the Nation's Highways

THE NEW STANDARD-LEWIS ROLLER HAS BALANCE, MANEUVERABILITY, AND FEWER WORKING PARTS

The new Standard-Lewis roller is a good example of the design and engineering behind all Standard equipment. This 2-ton roller embodies a number of exclusive features. It is ready for production when the word is given. Behind it will be a distributor organization second to none. Contractors are assured "tops" in service.

Other Standard road construction equipment: subgraders, paving plants, batching plants, dryers, finishers, brooms.

A FEW OF THE FEATURES

The chain drive is adjusted quickly and simply by moving the one piece drive mechanism. This feature eliminates need for idlers and extra moving parts. Steer wheel is split. The yoke carries adjustable sleeve to eliminate play between sections of wheel. All welded, one piece construction.

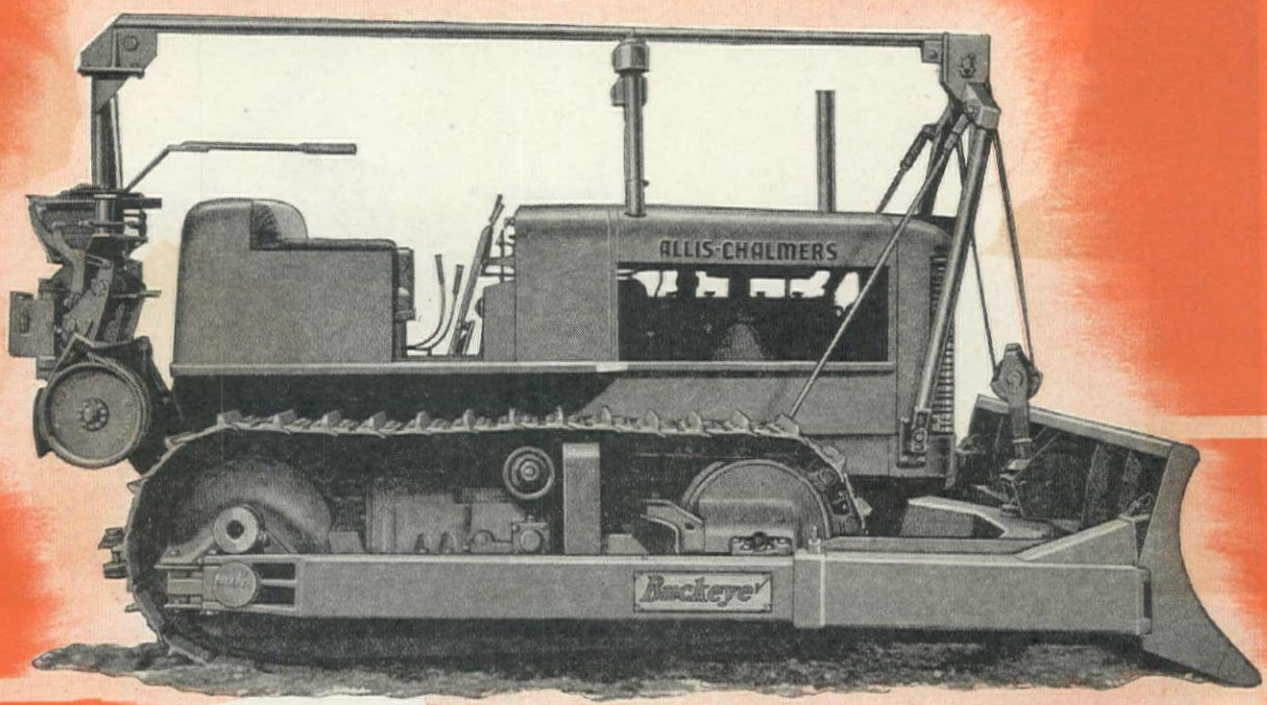
STANDARD

STEEL CORPORATION

General Offices and Plant: 5001 South Boyle Avenue
Los Angeles 11, California

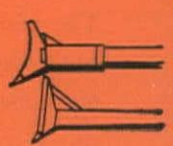
look it over...

The NEW Buckeye Dozer!



This is the NEW Buckeye cable-controlled dozer that is setting higher standards of bulldozer and trailbuilder performance under the toughest possible operating conditions. Hour after hour, testing engineers put it through the most punishing operations with just one thought in mind—"Break the bulldozer." But it couldn't be done! They roll larger yardage loads, punch out boulders, uproot huge trees and stumps, and do a hundred and one odd jobs better than you ever imagined possible.

The single point, center lift suspension of the moldboard permits natural, direct, straight lift of the blade. Full power of the tractor engine is utilized and maximum lifting power provided for the blade.

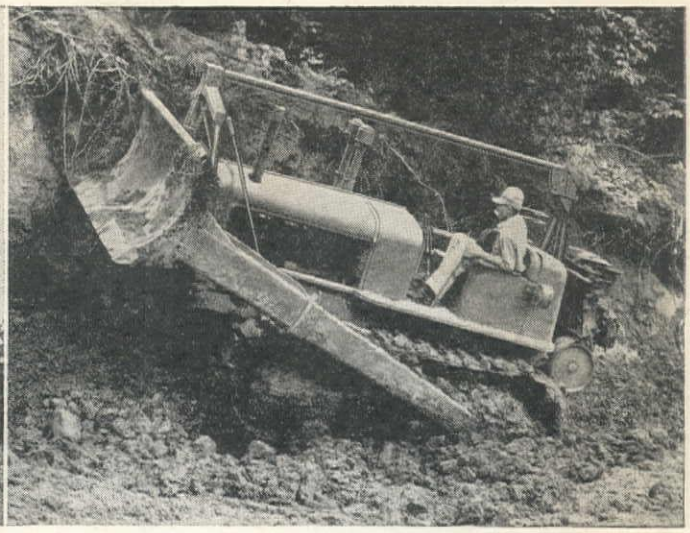


The new moldboard design packs more strength into less weight. There's no useless excess weight to absorb tractor power. Rigid and fully braced, the moldboard can withstand all types of dozing work. Blade is reversible with replaceable corner bits.

Now available for Allis-Chalmers and Cletrac Tractors. Write for details,

CENTRO-LIF

Built by Buckeye

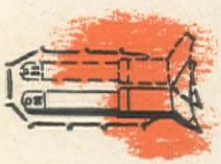


these features mean EXTRA PROFITS

...even on your toughest jobs!

Center Lift, single point suspension — Blade is raised in natural, direct way assuring maximum lifting power. Wear and friction losses are minimized. Design and construction of the new model are simplified. Full power of tractor engine is utilized.

Blade easily angled — With new push arm and horn construction, trailbuilder blade can easily be adjusted to right or left on a single king pin to standard desired angles by removing the two landside pins which hold the blade rigidly in place when angled or straight.

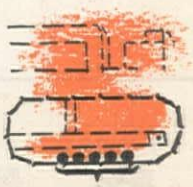


Double Trunnion Tilting — Double trunnion mounting permits either end of trailbuilder or bulldozer blade to be tilted 12" by attaching one push arm to the top trunnion on one side while the opposite arm is attached to the lower trunnion on the other side.

Bigger yardage loads — Scientific blade curvature rolls the load ahead enabling the operator to take deeper cuts — no dead weight — less power required — bigger payloads — moves faster — less strain on tractor — blade digs its own way in like a plow.

Finger-Tip, Split-Second, Fraction-of-an-inch Control — Buckeye Power Control Unit takes hold of the line with a smooth, powerful pull, without any jerking action. Large clutches and brakes, plus external location, mean cool operation and long life.

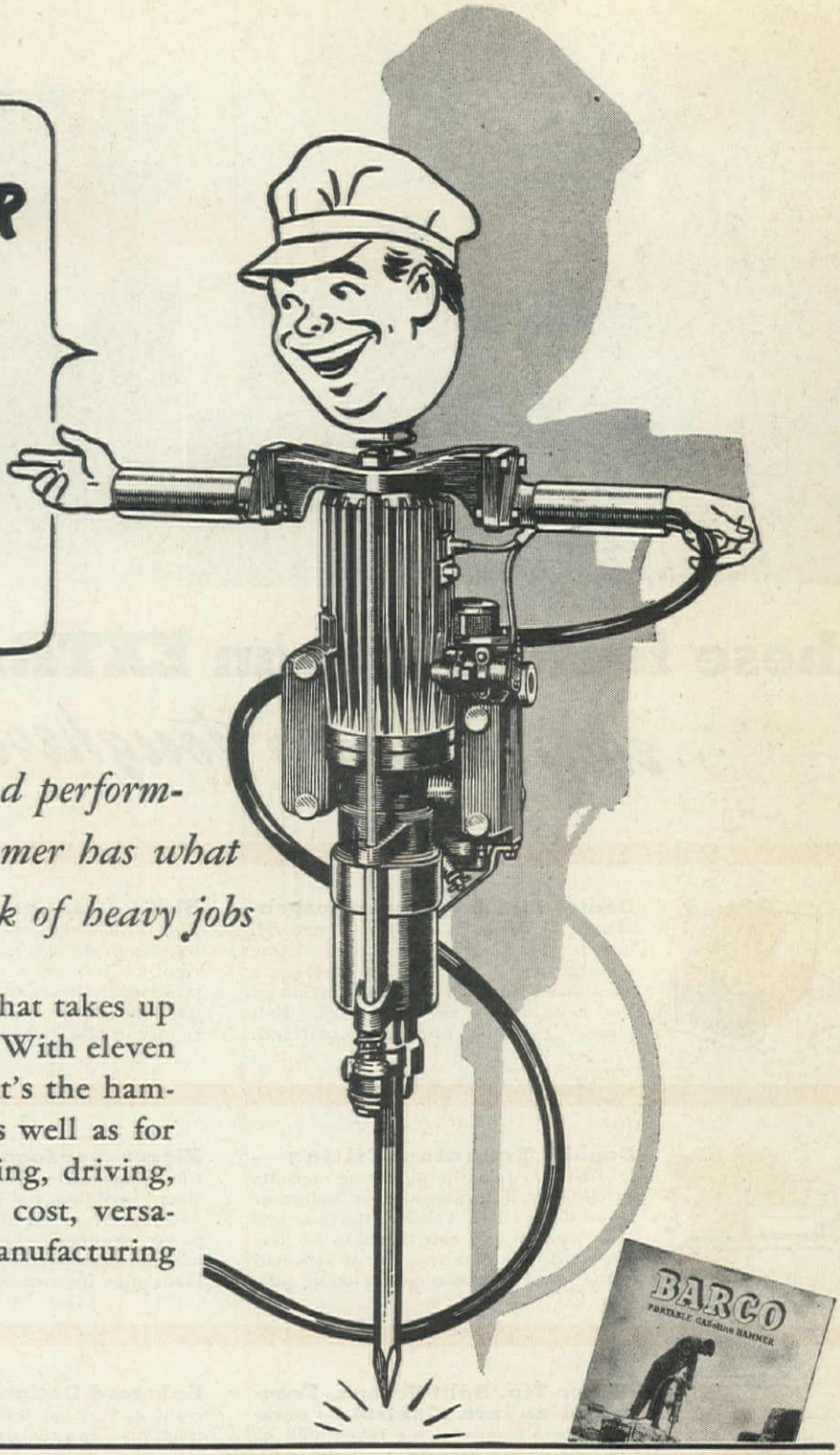
Balanced Design — Full length of crawlers stay on the ground — no lost traction — maximum pushing power assured — mechanical downward pressure not required. Weight is distributed uniformly over each of the crawler shoes on the ground. Blade hugs radiator.



BUCKEYE TRACTION DITCHER CO.

Findlay, Ohio

"THE TOUGHER THE JOB, THE BETTER I LIKE IT!"



Rugged in construction and performance, the Barco Gas Hammer has what it takes to make light work of heavy jobs

It's a self-contained unit that takes up little room in your truck. With eleven special tool attachments, it's the hammer for that special job as well as for regulation breaking, drilling, driving, tamping or digging. Low cost, versatile, and efficient. Barco Manufacturing Company, Not Inc.

BARCO
PORTABLE GASOLINE HAMMERS

BARCO MANUFACTURING CO., NOT INC.
1819 Winnemac Ave., Chicago 40, Ill.

Gentlemen:

Without obligation on my part please send me a copy of the BARCO HAMMER BOOKLET.

Name_____

Street_____

City_____ State_____

CARCO HOISTS are *Simple* to Operate, too!

CARCO single drum hoists have pull and power to spare for the toughest jobs.

Into the creation of these better hoists has gone all of Pacific Car's 40 years of technical experience. Carco Hoists are equally adapted to hoisting and towing. They play line out more smoothly without jams or snarls. The free-wheeling brake takes effect instantly, reduces shock on main lines, cuts wire costs, simplifies operation.

Carco Hoists get extra strength from Carcometal—patented alloy steel product of Pacific Car, with almost twice the elastic strength of ordinary steel. Carco Hoists are compact, streamlined, light in weight. They're built with a sealed one-piece case which protects gears, shafts and bearings against grit, dust, water. All gears run in a continuous oil bath.

Although thousands of Carco Hoists are in battle-dress today, they are still available for war-essential lumber and construction jobs at home.

PACIFIC CAR AND FOUNDRY COMPANY

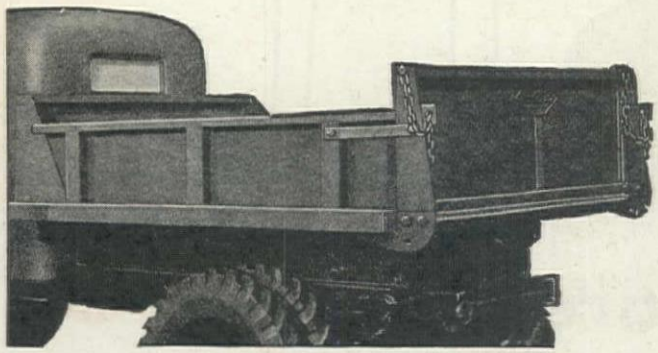
SEATTLE 4, WASHINGTON

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.

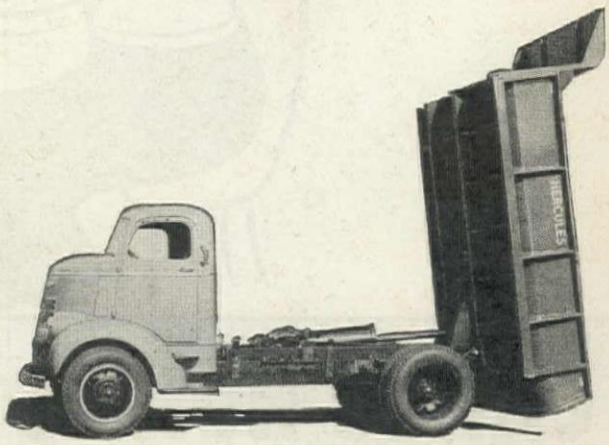
HERCULES

HYDRAULIC HOISTS and DUMP BODIES

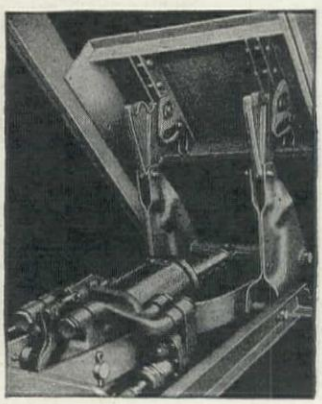
GIVE DEPENDABLE SERVICE ON ALL KINDS OF JOBS



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

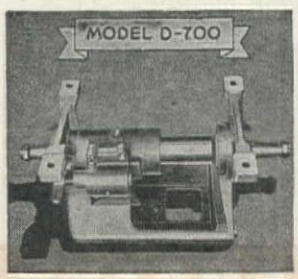
Makes any truck a Dump Truck

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.

HERCULES STEEL PRODUCTS CO.

GALION, OHIO

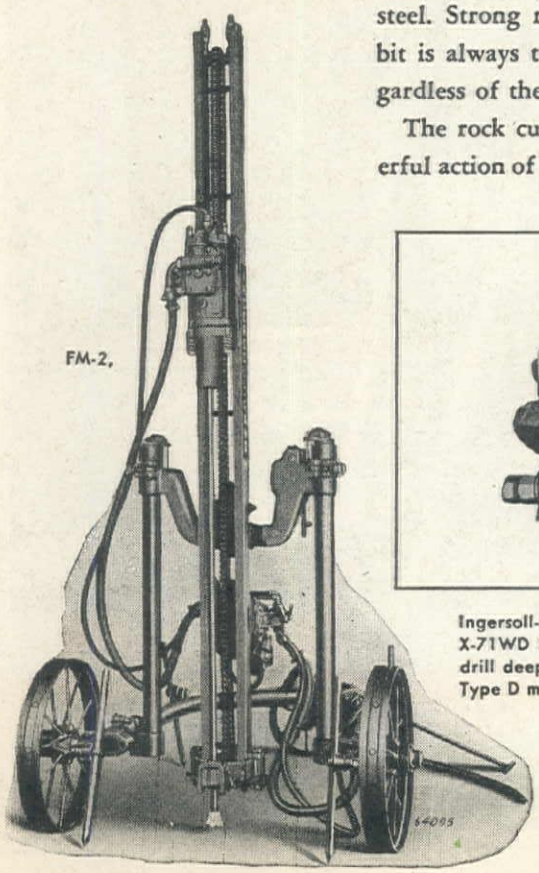
UTILITY TRAILER SALES, Seattle, Wash.; NEWELL TRUCK EQUIPMENT CO., Portland, Ore.; A. PASTERIS CO., Oakland, Calif.; STANDARD CARRIAGE WKS., INC., Los Angeles, Calif.; STANDARD IRON WORKS, San Diego, Calif.; SAWTOOTH CO., Boise, Idaho; WESTERN CONSTRUCTION CO., Billings, Mont.; WYOMING AUTOMOTIVE SUPPLY CO., Casper, Cheyenne, Rock Springs, Sheridan, Wyoming; McKELVY MACHINERY CO., Denver, Colo.; MORROW & CO., Albuquerque, New Mexico.

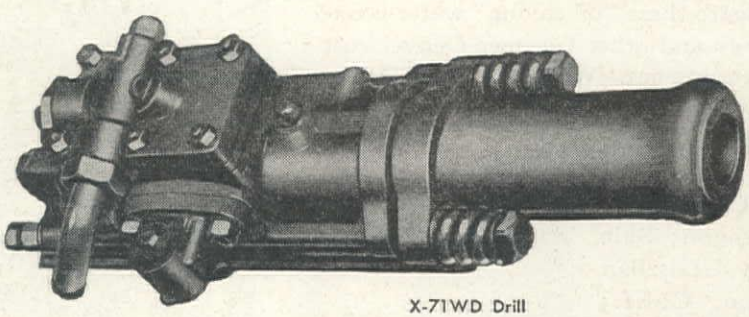
The X-71WD drill is designed especially for deep-hole drilling. Its heavy piston, the heaviest used in any hammer drill, has an extremely long stroke and hits the drill steel a solid, powerful blow.

Added to this slugging power is a unique follow-through characteristic which overcomes the inertia of heavy drill steel. Strong rotation results; hence the bit is always taking deep, fresh bites regardless of the hardness of the rock.

The rock cuttings created by the powerful action of the drill are easily removed by a new method of blowing which greatly reduces the loss of air around the drill steel shank. As a result, the high pressure so necessary for cleaning deep holes is maintained.

These operating features, plus the ruggedness and stamina which are essential qualities of a champion, will help you drill more feet of hole day in and day out. The use of Jackbits in conjunction with the drilling power of the X-71WD will give you even better results. Jackbits are available in sizes ranging from 1⅜ to 4½ inches.




X-71WD Drill

Ingersoll-Rand has developed two wagon mountings to provide portability for the powerful X-71WD Drill. The FM-2, shown at the left, is an extremely flexible 3-wheeled mounting. It will drill deep holes at any angle and will handle six-foot steel changes. Then there is the improved Type D mounting which is used for 10 or 15-foot steel changes, and for holes to a depth of 40 feet.

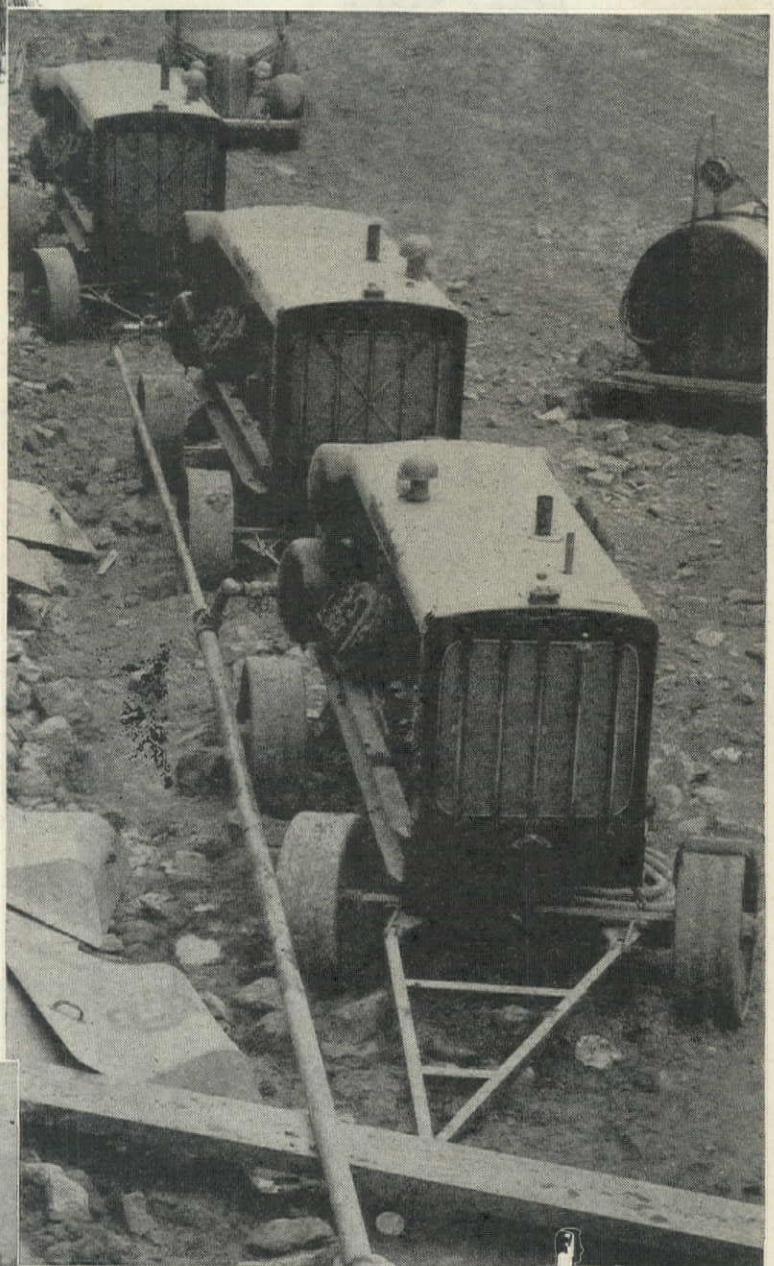
Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

5-380

COMPRESSORS • TURBO-BLOWERS • ROCK DRILLS • AIR TOOLS • CENTRIFUGAL PUMPS • CONDENSERS • OIL AND GAS ENGINES

YOU'LL FIND NO "OIL HOGS" HERE



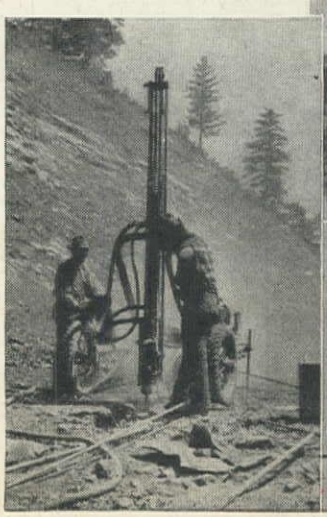
NOT with Gardner-Denver Water Cooled Portable Compressors on the job!

Because they are fully water cooled, they run cooler—use less lubricating oil. Rarely is it necessary to add any oil between regular oil changes.

And because they run cooler, they deliver cooler air—cause less wear on hose.

You'll find Gardner-Denver "Portables" equally efficient in winter or summer—at high altitudes or low. In winter, warm water from the engine circulates through the cylinder jackets, thoroughly warming the compressor before it is started. In summer, the circulating water keeps the compressor cool.

Investigate these "oil saving" water-cooled compressors and other Gardner-Denver cost-cutting equipment. Write Gardner-Denver Company, Quincy, Illinois. Western Branch Offices: Butte, Mont.; Denver, Colo.; Los Angeles, Calif.; Portland, Oregon; Salt Lake City, Utah; San Francisco, Calif.; Seattle, Washington; Wallace, Idaho.



For faster drilling and extra maneuverability, even over the roughest ground, check the Gardner-Denver UM-99 Wagon Drill. Ability to handle full six-foot steel changes quickly, means faster drilling on deep holes.

GARDNER-DENVER

Since 1859

EMPTY SHOW ROOMS *mean your Cletrac Dealer is on the job*

THE show room of your Cletrac distributor is probably empty of new machines. This merely means he is right on the job today in his service department — busier and doing more work than he once thought possible.

Plagued with shortages of men and material, loaded with more demands for service than ever before, he is still doing the impossible, day after day, in helping to keep present tractor equipment in working condition.

In these efforts he is not only making a full contribution to the war by saving time and money for Cletrac owners, but also helping to conserve equipment needed to carry on the jobs of the home front. The big task today is to keep your present equipment running.

There is a limited number of new Cletracs available. These tractors are not in your dealer's showroom but subject to government release. 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.

THEY TOOK IT.

No let-up! The same 2-cycle Diesel tractors that hurried the giant defense projects here are under still more pressure constructing new, outlying bases and airfields. Hauling supplies from landing boats (right) is another one of the numerous jobs.

Their names may never be mentioned in history ... but their deeds are carved out for all time.

Joe, Hank, Jack or Blackie—men you didn't want to lose, but whose work now makes you more proud of them than ever! You'd never guess when you "broke 'em in" on the bulldozer and tractor-scraper outfits that they would use that training to help win this war.

Now they are "over there" somewhere . . . either with the combat forces or close behind. One of their biggest jobs is to convert bombed territories and dense, disease-ridden jungles into mammoth air and supply bases. One Seabee said, "Boy, I wouldn't take $5.00 a yard to move this dirt back in the states." But he and others are moving it . . . with remarkable speed and efficiency. They know the fate of our nation is riding on those 'dozer blades as much as on any other tool of war.

• • •

Many of the 2-cycle Diesel tractors our armed forces enlisted to carve out new bases, roads and airfields are the same units used to rush through the big ordnance jobs here. After long hours of tough service they were reconditioned and shipped to foreign shores to continue this fight for our free way of life.

When the time comes to put the big, proposed postwar construction program into action . . . you will find 2-cycle Diesel tractors "in there pitching", taking everything and asking for more. Figure on them, too, for your postwar work!

ALLIS-CHALMERS

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

and Asked for More!

U. S. Marine Corps Photo

2-CYCLE DIESEL OWNERS! Get your copy of our Service Manual on the HD series of Tractors

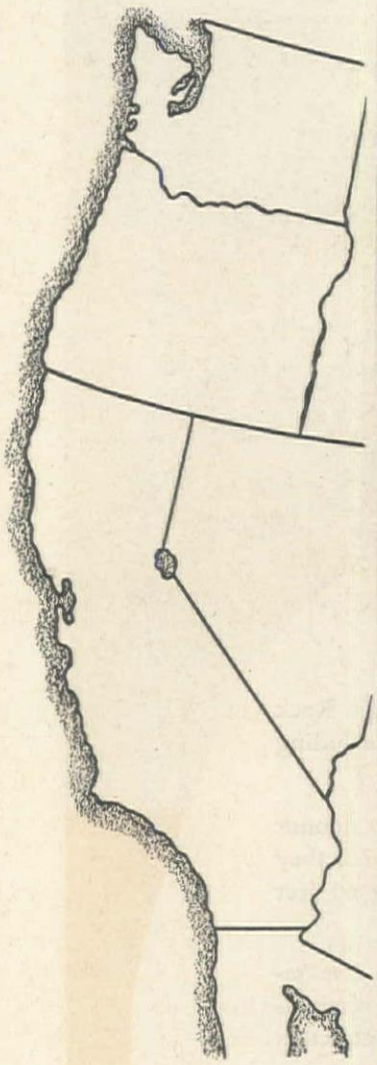
Gives complete, detailed information on adjustments, service, maintenance and overhaul of 2-cycle Diesel tractors . . . profusely illustrated! Tells you what, when, how! Invaluable to every HD user to maintain the efficiency and lengthen the life of these tractors. Complete in every detail—344 pages, 576 illustrations! Price $1.50 Postpaid.

THIS MANUAL WILL SAVE YOU TIME AND MONEY, EXTEND TRACTOR LIFE, CONSERVE CRITICAL MATERIALS.

2-CYCLE DIESEL TRACTORS

★ BUY WAR BONDS ★ SAVE WASTE PAPER ★ PLANT FOR VICTORY ★ TURN IN SCRAP METAL ★ BE A BLOOD DONOR ★ PAY ONLY CEILING PRICES

All Over the West it's GALION

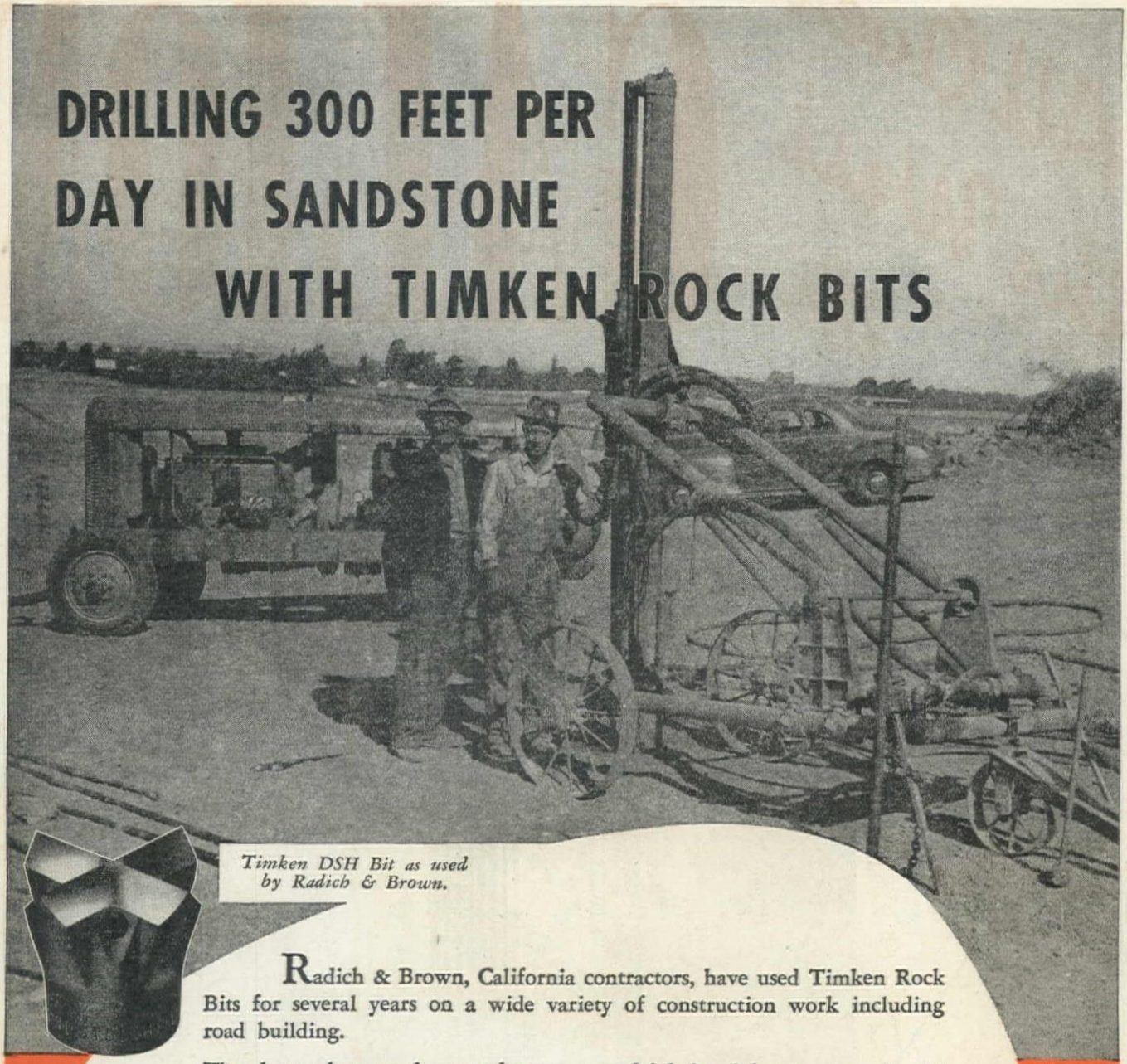


GALION MOTOR GRADERS and ROLLERS
AS RUGGED AS THE WEST
PLAN TO USE THEM ON YOUR POST-WAR JOBS

Distributors in Principal Cities

The **GALION** IRON WORKS & MFG. CO.
GALION . . . . . OHIO

DRILLING 300 FEET PER DAY IN SANDSTONE WITH TIMKEN ROCK BITS



Timken DSH Bit as used by Radich & Brown.

Radich & Brown, California contractors, have used Timken Rock Bits for several years on a wide variety of construction work including road building.

The above photograph was taken on a road job involving a great amount of drilling in sandstone. Despite the abrasive nature of this material, they have been getting 300 feet per day with a wagon drill, averaging 60 feet per bit use.

They resharpen their bits by grinding and report an average of five regrinds per bit. Altogether, Timken Bits have proved to be a very economical investment for this user — as they have for many other contractors and mine operators. It will pay you to adopt them no matter what kind of rock you may have to drill. Write for address of nearest Authorized Distributor. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

ROCK BITS

5TH WAR LOAN

WHAT YOU WANT *for Piping* WHERE YOU WANT IT

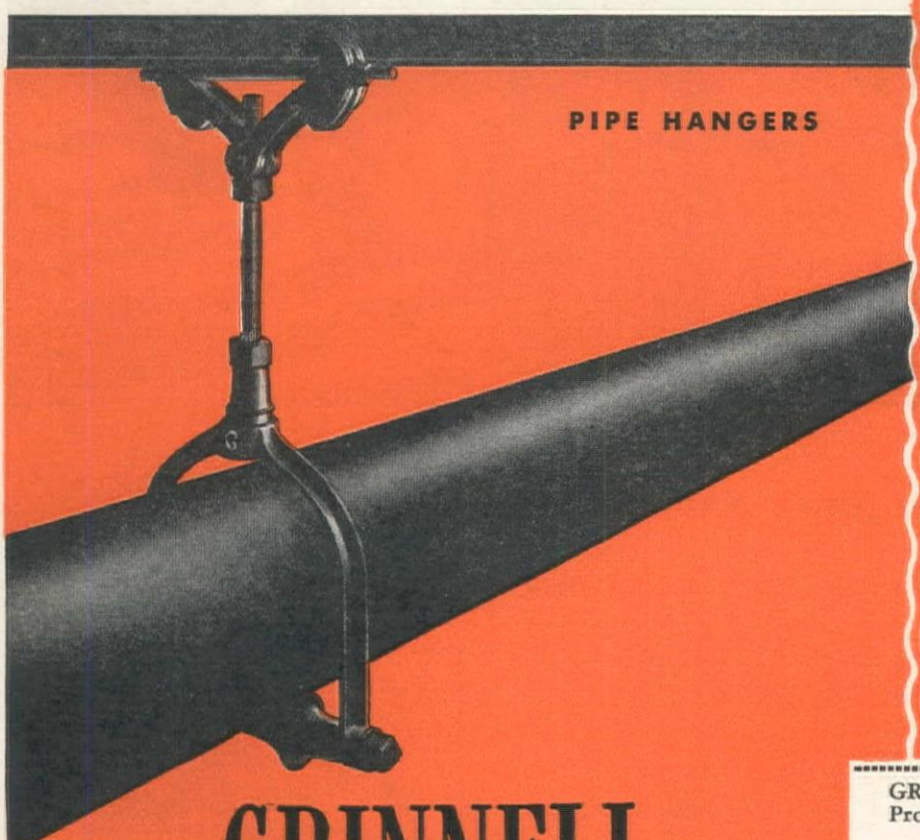
You can get materials for any piping requirement from Grinnell warehouses in the cities listed here. Included are practically every type of materials for simple or complex piping installations. At these Grinnell branches, experienced engineers will assist you to solve any unusual piping problem.

Grinnell piping products are available from your local Grinnell jobber. Send for catalogs and remember Grinnell "whenever Piping is involved".

GRINNELL COMPANY, INC.
Executive Offices: Providence 1, R. I.

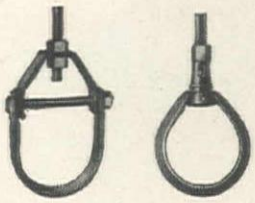
Branches and Warehouses

Atlanta 2, Ga.
Charlotte 1, N.C.
Chicago 9, Ill.
Cleveland 14, O.
Houston 1, Tex.
Los Angeles 13, Cal.
Minneapolis 15, Minn.
New York 17, N. Y.
Oakland 7, Cal.
Philadelphia 34, Pa.
Providence 1, R. I.
St. Louis 10, Mo.
St. Paul, Minn.
San Francisco 7, Cal.
Seattle 1, Wash.



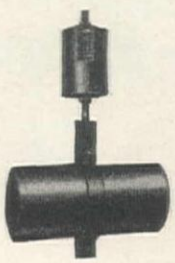
GRINNELL
WHENEVER *Piping* IS INVOLVED

Cast Iron, Malleable, Bronze and Steel Pipe Fittings



Pipe Hangers

Welding Fittings



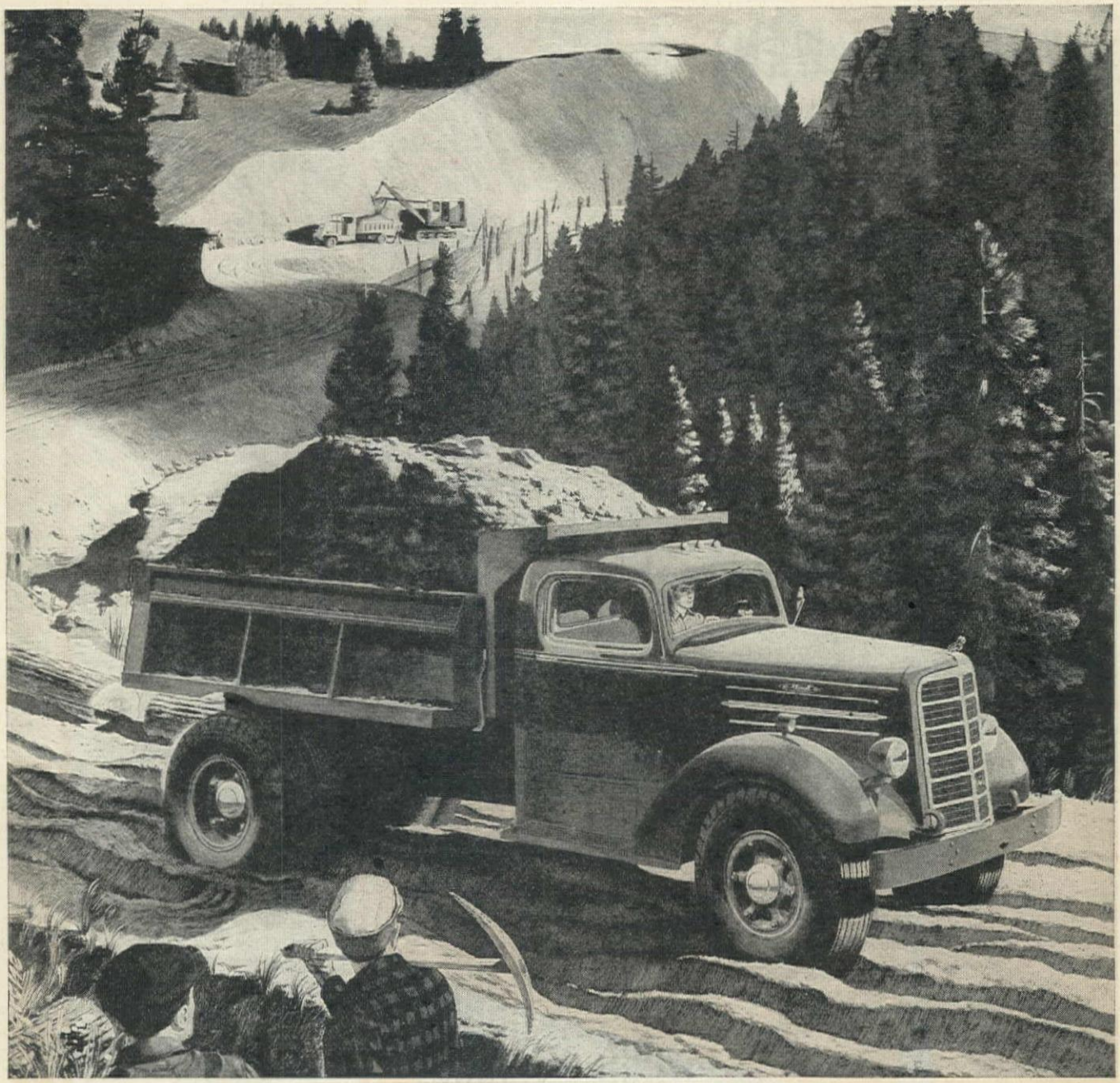
Pre-Engineered Spring Hanger

Grinnell-Saunders Diaphragm Valve

Also Pipe – Valves – Specialties for Heating, Water Works, Fire Protection and Pulp and Paper Mills.

GRINNELL COMPANY, INC.
Providence 1, R. I.
Please send copy of Catalog describing
Pipe Fittings....., Welding Fittings.....
Pipe Hangers....., Spring Hangers.....
Grinnell-Saunders Valves .....

Name..... Title.....
Company.....
Address.....



GOOD IDEA . . . FROM AWAY BACK . . .

It isn't hard to build a truck. But it's mighty hard to build a truck to match a Mack! And there's a reason. Back in 1900, John Mack set out to build the best truck in the world. His very first Mack stayed in service 17 years. Today we go forward with his same idea—backed by all we learned along the way. Big or little—heavy or light—no matter what type of Mack you own, you can be sure you'll get your money's worth in *work.* That's what "Built like a Mack truck" means. And the record says it means it *more* with every passing year.

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

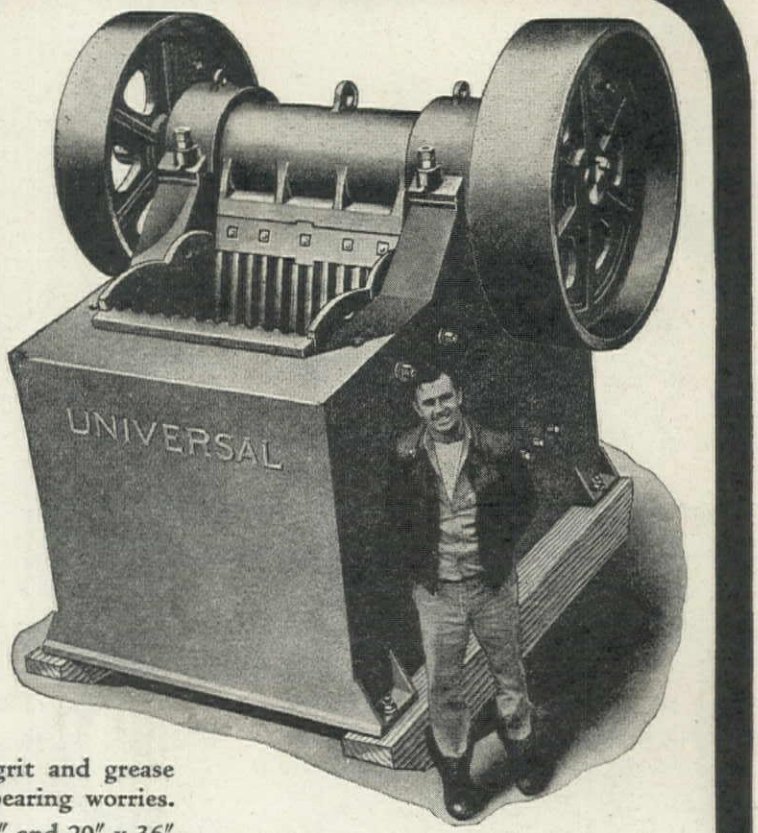
BUY U. S. WAR BONDS

Mack International Motor Truck Corporation
Los Angeles, Sacramento, San Francisco, Seattle, Portland
Factory branches and dealers in all principal cities for service and parts.

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

IF you've ever had an engine "conk out". . . . if you've ever had to delay work to wait for engine repairs... if you're spending more for fuel than you like... then you're a man who'd want to know more about this modern Hendy Diesel. Built for the toughest kind of service—war duty—it has features never before combined in *any* Diesel. Some of its features—overhead camshaft, unit-type injectors, oil-cooled pistons—you probably know and like. Others, such as its simplified control and its cross-head-actuated dual valves which prolong engine life and reduce maintenance, are advancements in design that we'd like to show you in detail. Write or wire us for pictures and complete information. No obligation, of course.

This big bruiser is not as heavy as it looks (but it's tougher than it looks!)



Universal has led the field in eliminating dead-weight—we've done it again with the NEW "WRB" series *welded steel plate* crushers with cast steel pitmans. Not an ounce of excess metal, yet all the structural strength necessary to prevent distortion of frame or misalignment of bearings. Lateral and transverse ribbing and heavy plate side walls assure absolute stability.

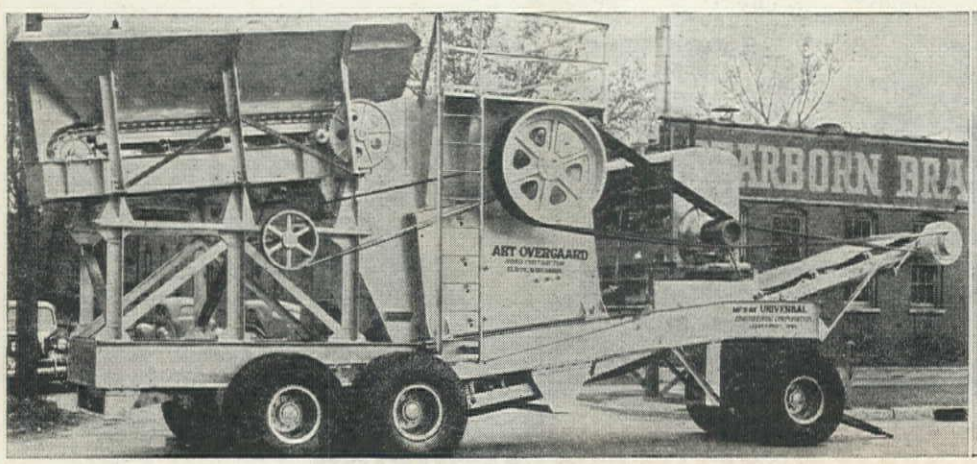
Four big SKF roller bearings—two on the pitman and one on each side—labyrinth sealed against grit and grease and Alemite lubricated, assuring freedom from bearing worries.

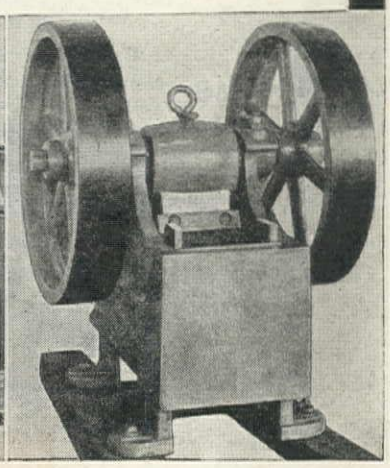
Two sizes available in the "WRB" series—30″ x 42″ and 20″ x 36″ feed openings; other sizes later.

A number of Universal "WRB" Crushers are in use. Users of the 30″ x 42″ report from 150 to 200 tons per hour of 4″ material. A 30″ x 42″ crusher on a primary crushing unit built for Art Overgaard, Elroy, Wisc. is shown below. Send for bulletin on the "WRB" line.

The overhead eccentric type jaw crusher, first built by Universal in 1906, has become the most widely accepted method for primary reduction of rock and gravel. While there have been improvements in materials, bearings and construction, there has been no major improvement in this basically sound method of crushing which provides two crushing blows with each revolution of the eccentric—a preliminary blow in the mouth of the crusher and a further reduction in the throat, at the bottom of the crusher. Some of these early crushers are still in use. The Universal "WRB" series employs this original highly efficient crushing principle.

UNIVERSAL ENGINEERING CORPORATION
323 8th St. West **Cedar Rapids, Ia.**



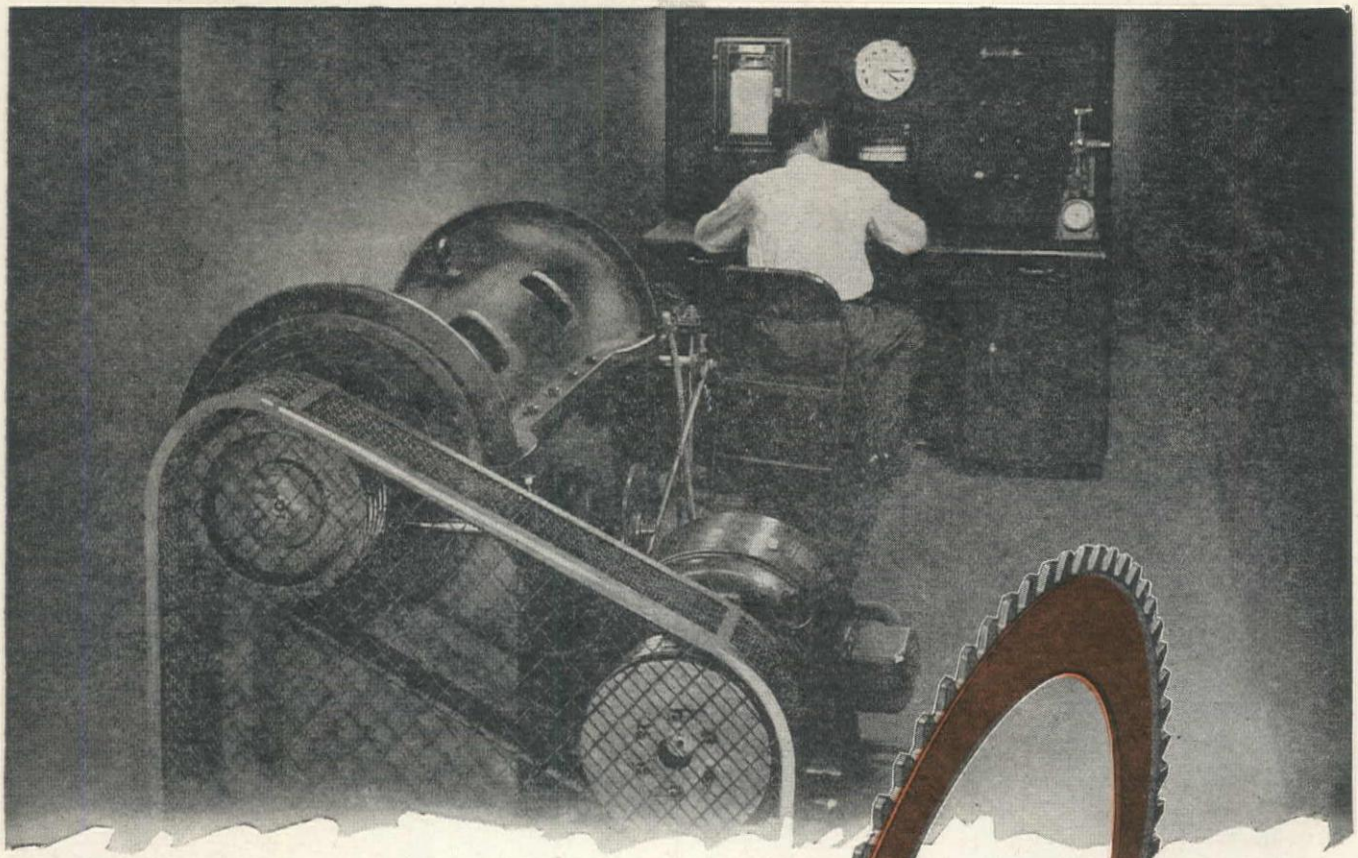


ARMY E NAVY

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADERROLLERS, PORTABLE ASPHALT PLANTS

Start Post-War Planning Now!



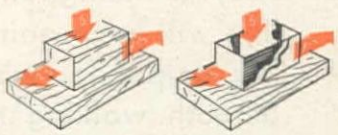
...to give you BETTER friction materials

The large and well equipped Wellman laboratories are devoted exclusively to testing *rubbing surfaces.* With many different types of dynamometers and much other specialized equipment, our skilled engineers are engaged in continuous study of powdered metal friction materials. The result: Velvetouch clutch facings and brake linings give you the utmost in dependable performance and long wear. Specify Velvetouch for replacements in your tractors, scrapers, shovels and other earth-moving equipment.

THE S. K. WELLMAN COMPANY
1374 East 51st Street • Cleveland 3, Ohio

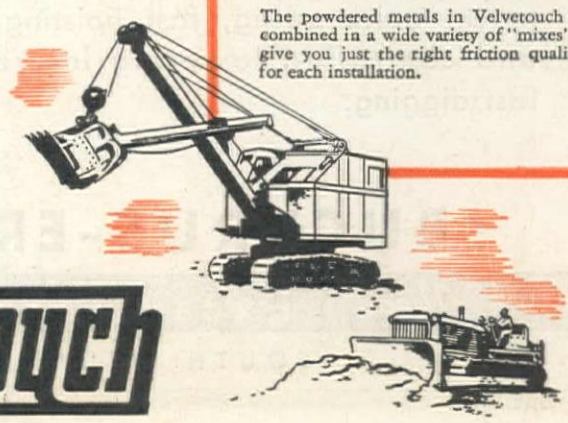
Interesting facts about Friction

Whenever a pair of surfaces rub together, friction is developed which tends to retard the motion. Friction between like bodies is greater than between unlike bodies, hence the reason for steel shafts housed in bronze journals.



Hard wood rubbing against hard wood under certain conditions would have a coefficient of slightly less than .5. On the other hand, lubricated wrought iron on hard wood under the same conditions would have a coefficient of less than .1.

The powdered metals in Velvetouch are combined in a wide variety of "mixes" to give you just the right friction qualities for each installation.



FOR BRAKE AND CLUTCH USE Velvetouch

WITH BUCYRUS-MONIGHANS IT'S *All Weather* PERFORMANCE

When bad weather makes footing too soft for other excavators, your Bucyrus-Monighan walking dragline will keep going, delivering the big output for which it is famous. Smooth walking traction carries it safely, surely around trouble — the large bearing area provides solid footing even in soft muck. Long reach, quick swing, fast hoisting, and controlled lowering insure fast digging.

That's the essence of the Bucyrus-Monighan performance story—the result of "years-ahead" design and construction, the reason you get your excavating work done **fast** with a Bucyrus-Monighan on the job.

Plan now to include field-proved Bucyrus-Monighans in your excavating equipment. Take advantage of their all-weather performance for quick solutions to your digging problems.

P-51

Sold by

BUCYRUS-ERIE COMPANY

"Years Ahead" Excavators for the Years Ahead

SOUTH MILWAUKEE, WISCONSIN

QUICK QUIZ FOR CONSTRUCTION MEN

One of these Answers May Make You a Fortune!

Q Can you put "M.P.T."* into your machines?

A Chances are you can, just as this contractor did. He suspected his lubrication methods were too slow and were costing him production. He consulted with an Alemite Lubrication Specialist who recommended a faster, more accurate and efficient "on the job" method. Now, the contractor lubricates track roller bearings in 2½ seconds. Fills transmission and final drive at the rate of 14 pounds per minute. How do these lubrication times compare with yours?

**More Productive Time*

Q Having an epidemic of track roller failures?

A If the answer is "Yes," here's how one outfit cured their trouble. Alemite Lubrication Specialists recommended an "on the job" method of pressure lubrication. In the first 18 months, a check-up revealed that track roller wear had been reduced almost 1/3 over old hand-type greasing. The method also produced a 19% reduction in the consumption of grease and oil. Would performance like that be interesting to you?

Q Summer heat knocked the "fight" out of your lubricants?

A Not if they're Alemite greases and oils. Here's why: Alemite builds an extra-wide operating range into every grease and oil. They have the toughness, the resistance to heat and pressures that keep them in there fighting friction no matter the summer temperatures. Alemite #33, in addition to heat-resisting qualities, is extremely water-repellent, endures tremendous loads, can't clog grease guns or bearing lubricant grooves.

Can "LUBRI-*chaos*" Rob You of Money, Machines and Production?

It surely can. And "Lubri-*chaos*" is found in the most modern construction set-ups. Today, with wartime schedules of production, "Lubri-*chaos*" has shown how it really can cut into plant efficiency.

Alemite, as pioneer in the handling, distribution and application of lubricants has long crusaded against "Lubri-*chaos*." As a result, the modern Alemite methods are now recognized as the answer to "Lubri-*chaos*" by scores of construction and engineering companies all over America.

The Alemite method of lubrication will play an important role in boosting peacetime operations to meet competition. Why not consult with Alemite Lubrication Specialists about readying your machines now to gain the competitive advantages of the world's most modern lubricating methods? There's no obligation. Alemite, 1819 Diversey Parkway, Chicago 14, Illinois, or Belleville, Ontario.

WANTED
Tough Job by Man with "MML" Degree!

This man, an Alemite Lubrication Specialist, is a "Master of Modern Lubrication." His technical training, skill and experience equip him to come on your job and consult with you about applying the most modern lubricating methods. He has added more productive time to machines, saved lubricants and man power. He has installed safer, surer, more accurate lubricating methods.

He's ready to go to work for you now, backed by the world's most experienced organization in the handling and application of lubricants. Call him. Or, if you prefer, write, wire or phone Alemite for his address.

Another Product of STEWART WARNER

ALEMITE

First in Modern Lubrication

CONSULTATION • ENGINEERING • EQUIPMENT • LUBRICANTS • MAINTENANCE

MIRACLE MAN: on the Truck Front

He's the man in the service shop.

The man whose skill and training and equipment are keeping America's trucks rolling with the stuff of Victory.

He works miracles on old trucks long overdue at the scrap heap . . . adds thousands of miles to their long life, thousands upon thousands of ton-miles of *essential* war transportation.

He's the man behind the trucks—the man in the shop. He works long hours—over, under, inside, and outside the trucks he knows *must* be kept on the road.

For since America entered the war there have been very few new trucks. It's been up to the man in the shop to keep the available supply of trucks on the job. Because of him, vital transportation schedules have been maintained. Food and fighting gear get there by truck, *on time!* A mighty important job. And he's doing it!

The men of International Truck Service *—the nation's largest company-owned truck service organization—*are busier and more alert than ever, now that they're in wartime service. No matter what your make or model of truck, let the truck-trained men of International Service add that vital *extra* mileage to your trucks and keep them rolling on the road to Victory!

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

NEW TRUCKS—*Limited!* The government has authorized the manufacture of a limited quantity of trucks for civilian hauling in essential occupations. But don't count too much on getting these trucks. Meanwhile, make sure every ounce of maintenance protection is given the nation's trucks.

International Truck Branches located at San Diego, Los Angeles, West Los Angeles, Glendale, Fresno, Sacramento, Oakland, San Francisco, Portland, Tacoma, Seattle, Spokane and Salt Lake City.

INTERNATIONAL TRUCKS

LET YOUR EARTH MOVING OPERATIONS REVOLVE AROUND WOOLDRIDGE TERRA CLIPPER SCRAPERS

To keep worlds of earth constantly on-the-move, around the clock, month after month, requires earthmoving equipment that's engineered and ruggedly built for heavy duty year 'round performance. By consistently moving larger heaping yardage loads, trip after trip—shift after shift, with less time out for repair Wooldridge Terra-Clipper Scrapers not only keep jobs on schedule but keep costs and upkeep down. In these times especially, when maintenance is such a problem you can count on Wooldridge dependability. Always specify and rely on Wooldridge Scrapers. Make them the hub of all your earthmoving operations.

WOOLDRIDGE heavy duty Earthmoving Scrapers are built in sizes ranging from 4 to 30 cu. yard capacities. When you buy scrapers, power units, bulldozers, rippers or trailbuilders specify and rely on WOOLDRIDGE Equipment.

WOOLDRIDGE

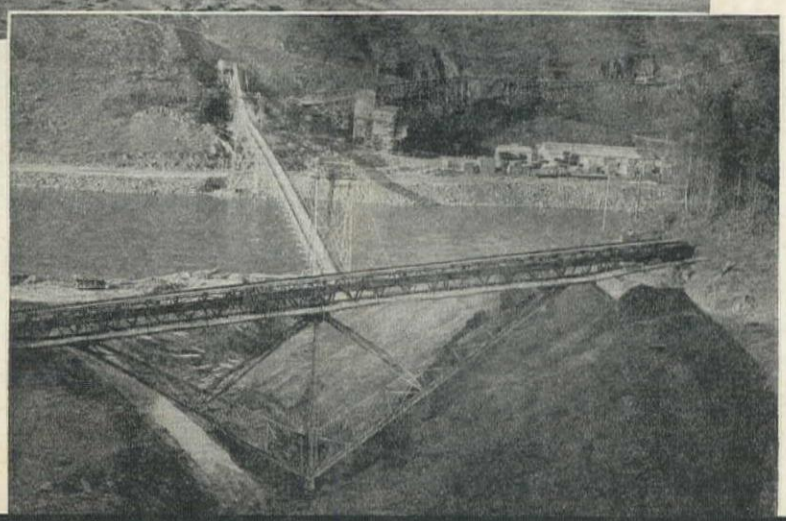
MANUFACTURING COMPANY • SUNNYVALE, CALIFORNIA

SCRAPERS • POWER UNITS • BULLDOZERS • RIPPERS • TRAIL BUILDERS

BOILING BOWL TERRA CLIPPER PRINCIPLE

SCRAPERS

Stockpiling



Labor saving equipment is of the utmost necessity now and in the immediate months to come. To meet this need, WPB has released a limited schedule of Barber-Greene Model 82-A Bucket Loaders and Wheel Mounted and Permanent Belt Conveyors.

Preparation of aggregate and stock piling sized material is greatly facilitated with Barber-Greene Permanent and Portable Belt Conveyors. Reclaiming from stock piles is speeded up using the high capacity Model 82-A Bucket Loader, requiring less idle truck time. Often truck drivers easily fill in as loader operators loading their own trucks.

Barber-Greene engineers can assist you in utilizing your present equipment to its fullest advantage, as well as suggesting new equipment if it is necessary. Write to Sales Engineering Department, Barber-Greene Company, Aurora, Illinois, U.S.A.

44-24

BARBER-GREENE

AURORA, ILL.

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.

PRODUCING BALLAST AT RAILSIDE PITS

Saves Ton-miles in hauling

Because of the record volume of war-time traffic, the shortage of cars and labor, railroads are faced with new ballast problems. They must secure more and better ballast, at lower costs, with shorter hauls and speed up ballasting operations.

The answer to these new demands was found by one railroad by producing ballast at railside pits with a portable plant.

A Pioneer Portable plant was selected by the contractor E. W. Wylie Co., Inc., of St. Paul. It meets all the requirements of the job. It is easily moved to railside pits. It is producing approximately 125 yards of ballast per hour from pits containing 40% oversize. The railroad is receiving a better quality of ballast, at a saving over the cost of commercial gravel, plus savings in rail haul and use of cars.

This Pioneer Portable ballast plant consists of a loading hopper equipped with mechanical feeder, a 1536 primary jaw crusher and power unit mounted on truck and a 38 V Pioneer crushing, screening, loading plant mounted on a railroad flat car. A belt conveyor loads a gondola on parallel track every 17 minutes. In moving from one pit to another, the primary crusher and the conveyors are loaded on another flat car.

The E. W. Wylie Company is equipped for modern methods of producing ballast through wide flexibility of operation. Because their Pioneer plant is readily portable it is moved easily to various pits each accessible to ballasting operations—and because the plant is a Pioneer they can produce any size or variation of crushed product at the lowest dollar cost.

● Pioneer equipment is profit-making equipment because it is engineered to meet your requirements for either a specific application or a wide range of work. It is durable equipment built to function with a minimum of maintenance. Planning with Pioneer involves no obligation. Regard its complete service as an ally of your business which is always available. Detailed literature on any Pioneer products furnished promptly.

Pioneer
ENGINEERING WORKS
Crushers · Screens · Conveyors · Feeders and Portable Plants
MINNEAPOLIS 13, MINNESOTA

ENGINEERS and MANUFACTURERS of QUARRY · GRAVEL AND MINING MACHINERY

Giant 33-ft. diam. Vacuum Fractionating Tower . . .

. . . . fabricated at one of our plants and field erected at well known oil refinery.

REPUTED to be one of the largest vacuum fractionating towers in existence, this field-erected vessel incorporates many impressive engineering features. It is designed to operate at from 15 lbs. per sq. in. vacuum to 30 lbs. per sq. in. pressure and was installed to provide a vacuum stage for a crude still with an operating capacity of 37,000 bbls. per day. The throughput of 37,000 bbls., plus the fact that the tower operates at a vacuum, makes the diameter of 33 ft. necessary. The 81 ft. 6 in. height is based upon the need for twelve 33-ft. diam. trays and seven of smaller diam. in the top and bottom of the tower to produce the different products desired, principally various grades of lubricating oils.

The designing and fabricating of pressure vessels to meet the most exacting requirements is "everyday" production at our plants. Let us know your specific requirements.

CHICAGO BRIDGE & IRON COMPANY

CHICAGO • HOUSTON • TULSA
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Plants at BIRMINGHAM, CHICAGO, and GREENVILLE, PENNSYLVANIA

July, 1944

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

Vol. 19, No. 7

Reclamation Supported on Missouri

SOME ATTEMPT is made in the pages of this magazine to examine the differing programs proposed by the Corps of Engineers and the Bureau of Reclamation for development and use of the waters of the Missouri River.

Surely no one will say that the planning or engineering which has been performed has in the case of either agency been inept or incapable. The differences in the two plans arise from the objectives sought to be achieved. The Army engineers regard flood control and navigation as paramount, while the Bureau seeks use of the major portion of the water for irrigation and power. In the end, the conflict is between navigation and irrigation, since flood control and power generation will eventuate to a considerable degree from the adoption of either plan.

It is the studied opinion of this magazine, devoted as it is to a non-political and unbiased program of development of all the West, that the proposals of the Bureau of Reclamation should be adopted and placed under construction, and that a permanent policy recognizing agricultural and domestic uses of water as its highest purpose in the West be pursued.

In making this declaration, there is no insinuation that the proposals of the Pick report issued by the Corps of Engineers is technically unsound or that Col. Pick or any of his staff had any base motives in planning it. The feeling does exist that some Army engineers are not as keenly aware of the need for careful husbanding of every available drop of water in the arid or semi-arid states of the West, as they should be.

It is the traditional role of the Army engineers to protect and expand the inland waterways of the nation, and as a corollary, in recent years, to attend to flood control works as a protection to the navigable streams. In these fields, they have done splendid work, as exemplified on the Mississippi River, the Los Angeles, Calif., coastal basin, the Willamette valley in Oregon, and in many other places.

While river traffic has been of tremendous importance on the Mississippi and Ohio rivers, it has been much smaller in volume on the Missouri. To be sure, it has existed, but due to sparser population and lesser industry, has never achieved the volume or the value of that on the other streams. Its loss, therefore, assuming that it would be lost, would not be a major calamity; in fact, there is some doubt whether it would be entirely eliminated under the Reclamation program. At any rate, steadily lowering truck and rail tariffs are removing the single factor which made water transportation desirable, namely, lower cost.

The opportunity for expansion of vigorously productive farm lands, however, is of great and constantly growing importance. Over 4,760,000 ac. of land which has never before produced anything could be added to the farm resources of the nation, and another 538,000 ac. now restricted in their yield because of inadequate water supply could be made completely productive. This magazine feels that an opportunity to add such quantities of food to a supply which never in our history has been completely adequate, even without considering the demands of impoverished foreign nations, must not be overlooked or lightly discarded.

Hazards to Private Contracting

MUCH ACTIVITY is currently under way looking to the preservation of the private contract system of construction in the years to come. And well it might be! In talking to a Naval construction officer recently, this editor was shocked to hear him say that construction of naval facilities (now and presumably in the post-war) should be taken over by the Seabees. Pointing to men at work on a great project now under construction, he said, "These men don't care to work more than 8 or 10 hours per day. If they were in uniform they could be made to work as long as seemed necessary, 24 hours if that was required." So far as is known, no official Navy action of this kind has been taken, or even considered, but that it is in the minds of individual officers is alarming. It could also conceivably be considered by Army Engineer officers.

There is still another fact of military construction which has been operating toward a denial of the private contract system. This is the process of extending contracts already in force, frequently to many times the original work planned. Sometimes contracts let for $1,000,000 have been ballooned to 10 or 20 or more times that figure without any additional competitive bidding.

The reasons given of course are that the first contractor has his equipment and organization already on the site, that his work has been satisfactory, and that he works well with the officers in charge.

These reasons are not without merit, but are subject to inspection. In the first place, another contractor might do even better work, and be even more cooperative. His equipment and men might be better. And, of importance, though frequently not considered so, open competitive bidding might cut costs and time of completion to a very considerable extent.

The practice was further excusable during the construction rush days of 1942 and early 1943 on the ground that probably no other contractor was immediately available for later stages of the project. This, however, does not now hold. Capable construction firms are available, and all the benefits commonly believed to accrue from free competitive bidding could operate in favor of the contracting agency.

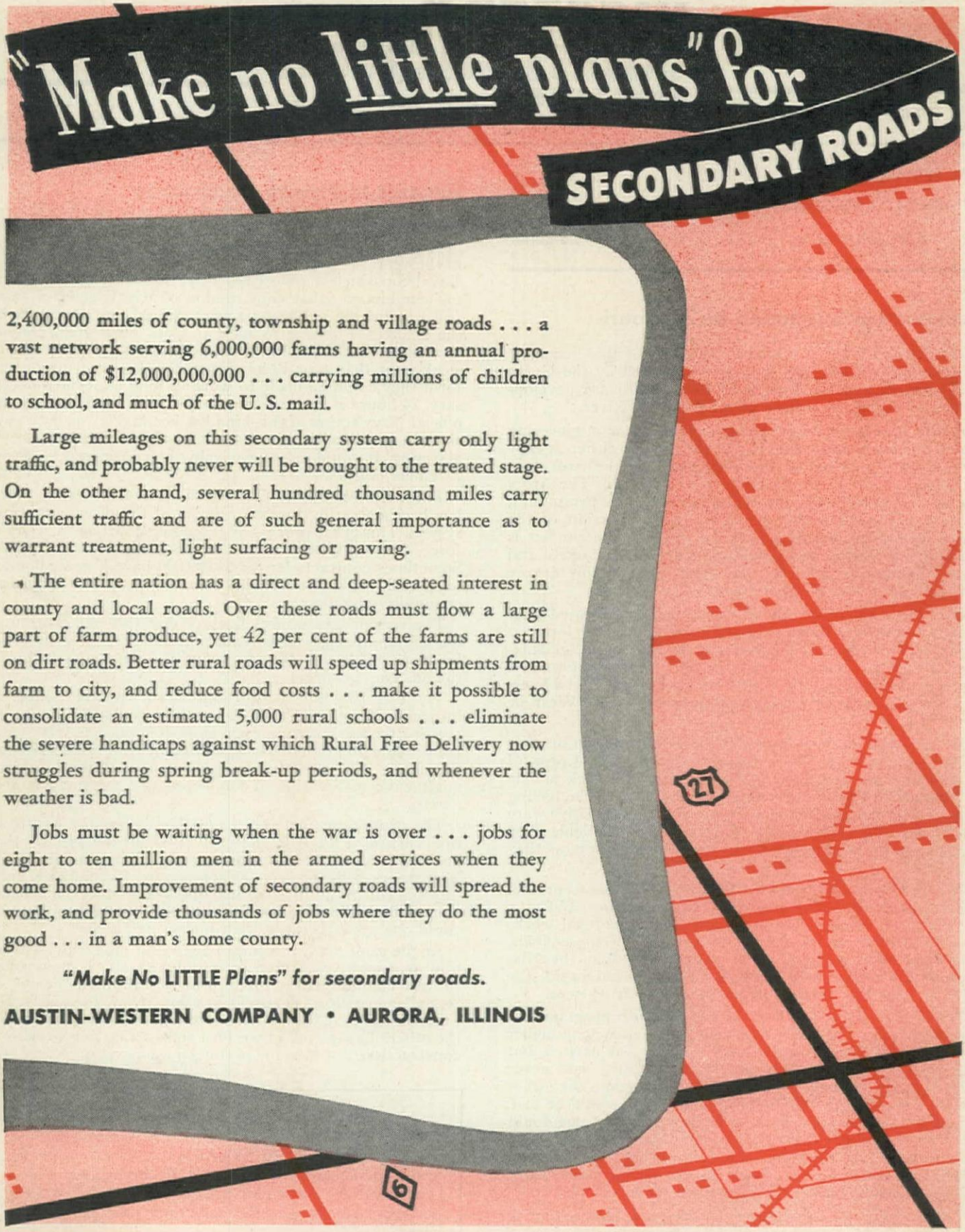
At the same time this improvement in military construction practice is instituted, it would be well to discontinue the consideration of a given firm as either an "army" or "navy" contractor, because it has done work for one or the other in the past, and is therefore ineligible to perform for the other. The talents of western contracting firms relate to **construction**, not to some particular agency.

TO SUBSCRIBERS

DUE TO PAPER SHORTAGES and the continually growing demand for copies of *Western Construction News*, we are forced to discontinue service to subscribers promptly on the date their subscription expires.

In order to assure not missing a single issue of the magazine, it is imperative that renewals be forwarded, if possible, before the date of expiration. **A postpaid order blank will be found in your copy. Sign it and mail it as an indication of your desire to continue receiving this publication. You will be billed later.**

DO IT NOW—THANK YOU.



2,400,000 miles of county, township and village roads . . . a vast network serving 6,000,000 farms having an annual production of $12,000,000,000 . . . carrying millions of children to school, and much of the U. S. mail.

Large mileages on this secondary system carry only light traffic, and probably never will be brought to the treated stage. On the other hand, several hundred thousand miles carry sufficient traffic and are of such general importance as to warrant treatment, light surfacing or paving.

The entire nation has a direct and deep-seated interest in county and local roads. Over these roads must flow a large part of farm produce, yet 42 per cent of the farms are still on dirt roads. Better rural roads will speed up shipments from farm to city, and reduce food costs . . . make it possible to consolidate an estimated 5,000 rural schools . . . eliminate the severe handicaps against which Rural Free Delivery now struggles during spring break-up periods, and whenever the weather is bad.

Jobs must be waiting when the war is over . . . jobs for eight to ten million men in the armed services when they come home. Improvement of secondary roads will spread the work, and provide thousands of jobs where they do the most good . . . in a man's home county.

"Make No LITTLE Plans" for secondary roads.

AUSTIN-WESTERN COMPANY • AURORA, ILLINOIS

SMITH BOOTH USHER COMPANY	Phoenix, Arizona
EDWARD R. BACON COMPANY	San Francisco 10, California
SMITH BOOTH USHER COMPANY	Los Angeles 54, California
LIBERTY TRUCKS & PARTS CO.	Denver 1, Colorado
WESTERN CONSTRUCTION EQUIPMENT COMPANY	Billings, Montana
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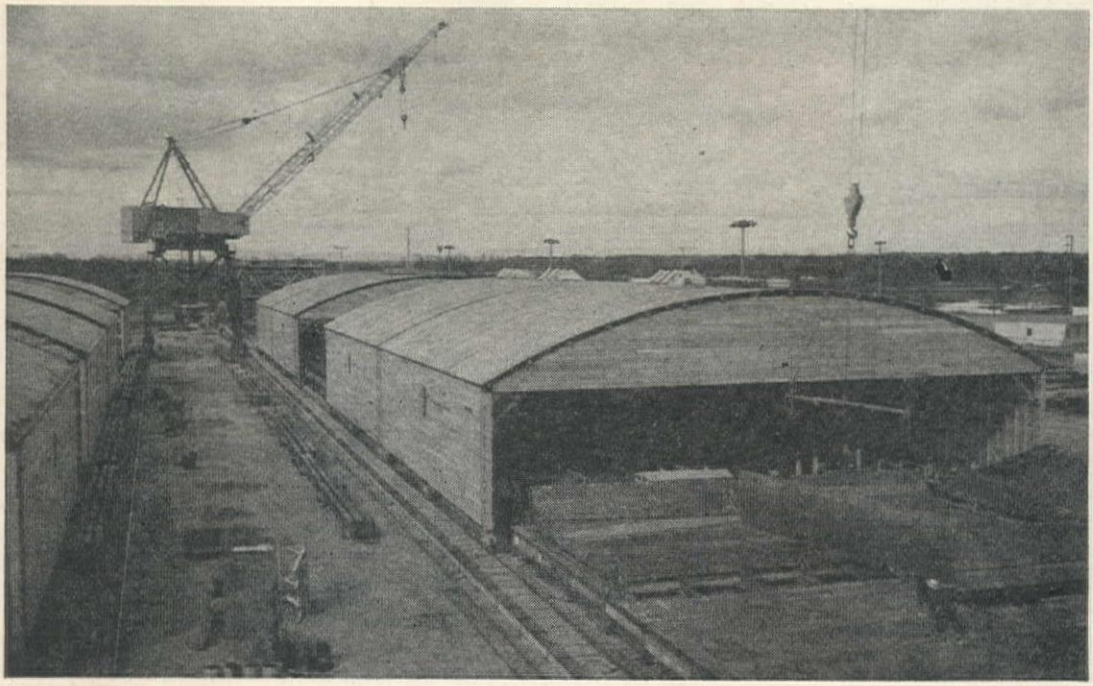
WESTERN CONSTRUCTION NEWS
JULY • 1944



EIGHT OF THE motorized movable roofs to shelter welders on pre-fabricated ship section at Oregon Shipyards of Kaiser Co. Whirley crane tracks between the two covered areas permit placing and moving of material. Roof spans are 76 ft.

Movable Roofs— Protect Shipyard Welders From Rain

Self-propelled protective sheds permit round-the-clock operation in shipyard fabricating area in all weather conditions with complete safety to workers—Light steel frame supports sheathing of shiplap—Electric motors supply power for easy movement of shelters into desired positions

By A. E. NIEDERHOFF
Design Engineer
Oregon Shipbuilding Corporation
Portland, Ore.

MAKE IT BIG, make it movable, reduce friction, compensate for unavoidable irregularities in appurtenant works! Those are the inspiring precepts of facilities designers in Kaiser's shipyards. The result is a remarkable achievement in new tool, jig and fixture design for producing ships.

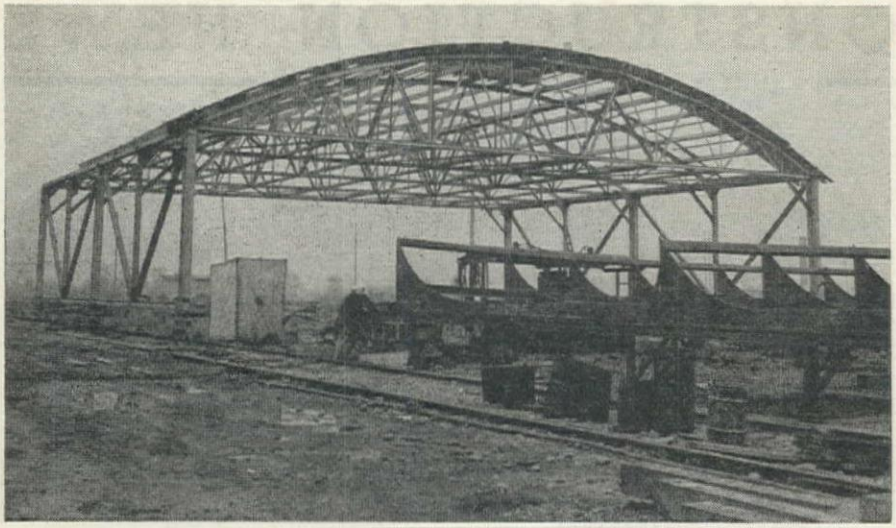
At Oregon Shipbuilding Corporation, near Portland, Ore., there is a good example of the above instructions. Ten new, motorized, movable roofs protect welders and shipfitters from the vicissitudes of Oregon's climate. The design and construction of these movable roofs is in line with the policy of the corporation to protect workers building large sub-assemblies of ships at remote points from the building ways. It is a policy dictated by security and efficiency. Keeping workers off the shipbuilding ways eliminates a bottleneck in production caused by crowding, confusion and unnecessary risk. Working at remote points not only allows plenty of room, better control and safety but gives an added measure of flexibility of operation. Catastrophes that might strike at one portion of the plant cannot seriously interrupt production if workers can immediately be switched to undamaged areas.

The movable roofs run on rails laid 76 ft. apart, forming a track nearly 800 ft. long. There are two such tracks, separated by a 32-ft. runway for a whirley crane on a gantry mounting. Under the roofs are steel jigs on concrete foundations, used to fabricate parts of the sides of ships. Some of these parts are 50 ft. wide and 50 ft. long and weigh close to 50 tons. The whirley lowers the shell plates and ship ribs into the jigs and hoists the completed sub-assembly out again when it is finished. Transporting these ship sections nearly a mile to the shipbuilding ways is accomplished by a diesel truck pulling a 16-wheel trailer.

The use of tents and small movable shelters as a temporary expedient to protect workers or material from the ravages of weather is not new. The Kaiser shipyards have systematized the practice, motorized the roofs and planned the units large enough to make a really effective installation. In the shell erection section of Oregon Shipyard there are eight roofs 68 ft. long and two 102 ft. long. The span of each is 76 ft.

Structural framing

Steel bow string trusses spaced 17 ft. on centers support 4x8-in. wood purlins. On



STRUCTURAL DESIGN of the steel framework of the movable roofs. Over the steel will be nailed studs and sheathing. The framing of the sidewall truss is shown, and in the foreground is a welding jig for fabricating sides of ships up to 50 tons in weight.

top of the purlins is laid 1 x 8-in. shiplap sheathing covered with 3-ply roofing paper. Design assumptions contemplated a vertical load of 25 lbs. per sq. ft. and a horizontal wind load on one side of the structure equal to 10 lbs. per sq. ft. of horizontally projected area. The straight bottom chord member of the truss is a 6-in. channel, while the top chord member, bent to a radius of 76 ft., is an 8-in. channel. Web members are angles welded directly to the chords thus eliminating gusset plates and reducing weight. The dead weight of steel in one truss is 4,800 lbs.

Diagonal bracing of the trusses is provided in the plane of the lower chord only. It consists of crossed angles in the two end bays, fastened to the panel points of the trusses.

Longitudinal bracing between bow string trusses consists of vertical trusses at third points of the 76-ft. span, yielding an element of rigidity in the direction of travel of the roofs. Extensive use was made of tee sections for longitudinal spacers between trusses. Wide flange sections were burned along the web centerline, thus providing two tee sections from each wide flange beam.

The roof trusses rest on stanchions, forming a wall truss. All members of this wall truss, with the exception of the stanchions to which trucks are attached, are 6 x 6-in. steel beams, butt welded or fillet welded to seats. In the bosoms of these steel sections are bolted nailing strips to take the 2 x 4-in studs and 1 x 8-in. shiplap sheathing. The steel frame work is thus inclosed by wood siding on the roof, sides and gable ends. Overall height of the roof from top of rail to crown of roof is approximately 30 ft.

Stanchions to which trucks are attached are made of two 9-in. channels laced together with steel bar lacing and tied at both ends by solid steel plates. The column thus formed has outside cross sectional dimensions of 9 x 15-in. Tie plates on the bottom extend beyond the lower end of the channels and are rounded to form a semi-circle. A 2-in. horizontal pin connects the trucks with these extended stanchion tie plates. The pin equalizes the load on the wheels when running over uneven rails. Actually, the trucks have a vertical swing about this horizontal pin of nearly 270 deg. The anticipated settlement of the rails, originally laid on newly filled ground, has occurred, making a compensating movement of the trucks highly important.

Carrier trucks

To take care of track misalignment a 3-in. diameter vertical pin is introduced which allows the truck to swivel horizontally through 360 deg. The contact surface of the stationary steel plate and the rotating steel plate welded to the truck is pressure lubricated through an alemite fitting.

Double flanged, cast steel wheels with a tapered tread to fit a 60-lb. ASCE rail are mounted in roller bearing pillow blocks bolted to a channel frame. Two wheels, 16 in. in diameter, make up one truck. The axle that is pressed into the hubs of the cast steel wheels is $1\frac{15}{16}$ in. in diameter. On top of, and welded to the two 8-in. channels comprising the frame, is a 1-in. cover plate with an annular grease groove cut into it. The vertical swiveling pin is welded to the cover plate and extends up and through a welded steel bracket that is pinned to the stanchion with the 2-in. round horizontal pin previously mentioned.

Roofs that are 68 ft. long have a total of six trucks per unit, while the longer 102-ft. roofs each have eight trucks. Of this total, two trucks located at diagonally opposite corners of the unit, are motorized.

All parts of the roofs were to be made interchangeable, so that the governing weight, as far as propulsion was concerned, was that of the largest roof. This weight aggregated 75 tons, including lighting fixtures, transformer and other miscellaneous equipment hung on it after it was placed in operation. With roller bearing trucks and consequently low rolling friction it was assumed that the force to pull the roof was 40 lbs. per ton of weight. Acceleration added 10 per cent to this force and to take care of starting inertia an additional 5 per cent was added to the total pull. The design force was thus computed at 3,465 lb.

Traveling speed was a moderate 60 ft. per min. When substituted in the formula:

$$\text{Horsepower} = \frac{F \times S}{33{,}000} \qquad \text{.....(1)}$$

where F = pull in lbs. and S = velocity in ft. per min., the indicated horsepower of the prime mover is 6.3. After several trial combinations and cost estimates it was determined that two 3-hp., 1,750-r.p.m., 440-volt, 60-cycle, 3-phase motorized reducers would not only be most economical but were also obtainable within 60 days. The triple reduction helical gears gave an output shaft speed of 20 r.p.m.

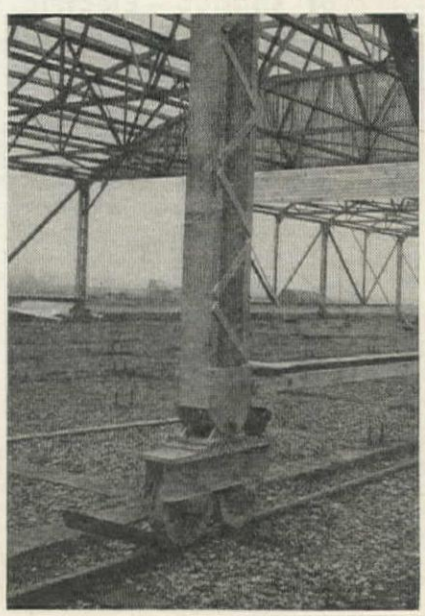
On this output shaft was mounted a single width, 19-tooth sprocket with a 1¼-in. pitch chain drive. A driven sprocket of 26 teeth was keyed to the extended axle of one of the two wheels in the truck. The computed pull of 1,750 lbs. from this overhung drive was determined from the expression:

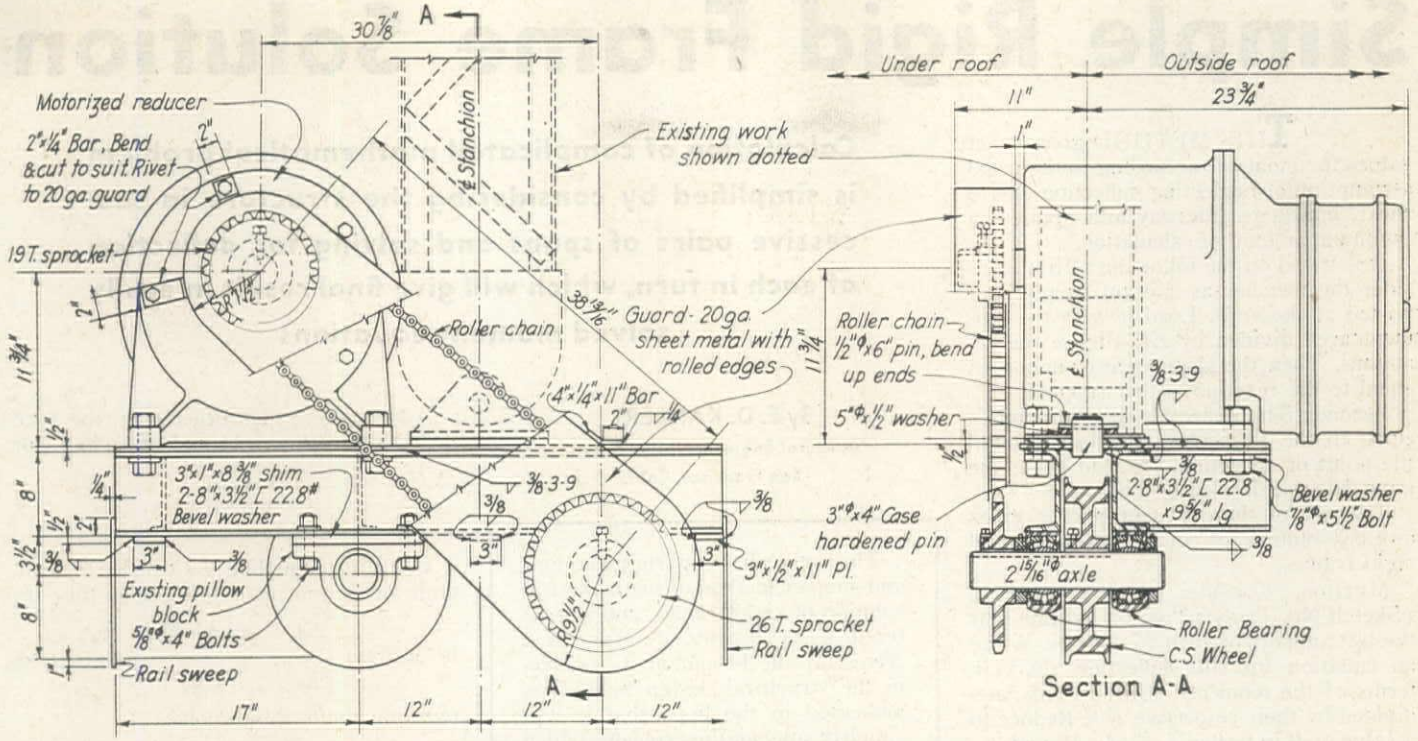
$$P = \frac{126{,}000 \times HP}{D \times N} \qquad \text{.....(2)}$$

Where P = pull in lbs.
HP = horsepower of motor.
D = pitch diameter of sprocket in inches.
N = r.p.m. of driving sprocket.

To take care of this outboard force

TWO-WHEEL compensating trucks are fastened to the end of the stanchions. The load on the wheels is equalized by a vertical and a horizontal pin connection. Motorized propelling units are placed on two diagonally opposite corner stanchions.





MOTORIZED TRUCK used in automatic operation of the movable roofs at Oregon Shipyard, Portland, Ore. Two are required for each structure, and calculations showed that 3-hp. motors would be adequate to move the sheds. Truck wheels are 16 in. in diameter, and are double-flanged, with a tread tapered to fit a 60-lb. rail. The method of pin connection to compensate for irregularities in the track is clearly shown.

and to facilitate procurement of stock roller bearing pillow blocks, an axle 2 15/16-in. in diameter was selected. This axle was keyed to the cast steel wheel, supported in roller bearings, and on one side extended outward to mount the large driven sprocket.

The entire motorized truck assembly weighed 1,500 lb. and cost $650 in place.

Power is supplied to the motorized reducers through a cable that is plugged into stationary electrical outlets conveniently located along the track. When it is desired to move the roof from the welding jig a shipfitter merely presses a button and the shelter begins to travel along the rails. These individual drives on each structure save manpower, time and money, as well as preserving the steel frame that was formerly distorted by unsymmetrical application of force to move the roof.

Acknowledgment

The writer was responsible for the structural and mechanical design of these motorized roofs. Working under the direction of Roy E. Cook, Chief Engineer for the Corporation, the writer benefited tremendously from the broad experience and sound judgment of his immediate superior. Thankful acknowledgment of the opportunity for preparing this article is given to Albert Bauer, Assistant General Manager of Oregon Shipbuilding Corporation. Oregon is one of the three Portland shipyards working under the supervision of Edgar Kaiser.

Production Record at Kaiser Steel Mill Honored by Award

THE PRODUCTION RECORD made by the steel plant of Kaiser Company, Inc., Iron and Steel Division, near Fontana, Calif., has been recognized by the Maritime Commission with the award of its "M" burgee. The ceremonies were held May 27 at the plant and Henry J. Kaiser accepted the burgee from Carl W. Flesher, Director, Regional Construction Office, U. S. Maritime Commission. All employees were given the "M" Merit Badge.

It is reported that the rolling mills are operating at the rate of more than 360,000 tons of plate per year, considerably in excess of the rated capacity of 300,000 tons per year. The rapid completion of this first integrated steel plant on the Pacific Coast has made available large tonnages of plate for the gigantic shipbuilding program of the country.

The record-breaking construction of this plant is indicated by the following dates: ground broken April, 1942; 1,200-ton blast furnace in operation December, 1942; the first of six 185-ton open-hearth furnaces tapped May, 1943; and the first sheared plate was shipped August, 1943.

The structural mills began operation in June, producing billets for shells on contract with the Ordnance Department of the U. S. Army.

It is anticipated that the largest part of the steel produced at this plant will be devoted to ship plate and shell production for an indefinite period. However, coke oven by-products and miscellaneous other products are being sold.

Elevated Railroad Proposed To Eliminate Delays in Reno

AN ELEVATED RAILROAD through the city of Reno has been proposed by the Nevada state highway engineer. At the present time the Southern Pacific Railroad passes through the center of the city so that traffic is delayed many minutes whenever trains are passing through or stopping at the depot. Under the plans proposed by the highway department, tracks would be raised above street level throughout the entire city. There would be no depression of city streets. The estimated cost of the project is $2,000,000, and it is hoped that work can begin early in the postwar period.

THE PRODUCTION of cement in California totaled 18,515,085 bbls. during 1943, according to the report of the state mineralogist. This cement had a total value of $27,865,466 f.o.b. plant. The 1943 output was a decrease both in amount and value from that of 1942, when the largest annual yield in history, 23,306,578 bbls., was produced. Slightly more than half of the production was from mills in northern California.

An average of 2,725 men was employed in the 12 plants in the state during the year. The potential annual capacity of California plants as of January 1, 1944, was 27,690,000 bbls. according to the U. S. Bureau of Mines.

Simple Rigid Frame Solution

Calculation of complicated mathematical problem is simplified by considering the structure in successive pairs of spans and solving for deflection of each in turn, which will give final result in easily solved moment equations

By E. D. KAHLERT
Structural Engineer, Joslyn & Ryan
San Francisco, Calif.

THIS METHOD gives exact values for moments according to the usual assumption of neglecting deflection due to shear, considers sidesway and involves a minimum amount of calculation.

It is based on the following: First, consider the member as a beam simply supported at the ends. Load it with the moment area divided by EI. Figure the reactions. Then the slope at any support is equal to the reaction at that support.

Second: The deflection at any point is equal to the moment of the load around the point of deflection, the load being the moment area divided by EI.

The use of these two properties gives an easy solution for continuous beams and rigid frames.

METHOD. Consider spans L_1 and L_2 (Sketch No. 1) as a "pair." Assume that the left support of span L_1 deflects. Write an equation for this deflection (Δ_1) in terms of the moments A, B, M_1, M_2, etc. divided by their respective K's. Reduce to a value of B in terms of A, M_1, M_2 and Δ_1.

Consider the next "pair" of spans, L_2 and L_3. Assume that the left support of span L_2 deflects. Write an equation for this deflection (Δ_2) in terms of A, B, C, M_2 and M_3 divided by their respective K's. Substitute the value of B from the first pair and reduce to a value of C in terms of A, M_1, M_2, M_3 and Δ_1 and Δ_2. Do the same for the third "pair" of spans and get a value of D in terms of A, M_1, M_2, M_3, M_4, divided by their respective K's and Δ_1, Δ_2 Δ_3.

Repeat the operation until all moments are similarly evaluated.

For a continuous beam, the deltas being zero, the last pair will give a value of A in terms of the several moments. Substitute this value in the equations for B, C, D etc. and find these latter in terms of the moments M_1, M_2, M_3, etc.

For a rigid frame, get the values of all moments in terms of A, M_1, M_2, etc. and the deltas. Evaluate the deltas and finally get the values of the unknown moments.

For a member with a fixed end, consider that one span of the pair is infinity. For example, assume that span L_2 (Sketch No. 1) has the left end fixed. Then the span L_1 would be infinity and its value in the equations would be zero.

In Sketch No. 2 the deflection at the right end of span L_1 (Δ_1) is made up of two parts: one part being the deflection of the span as a cantilever and the other part being the product of the slope at the left end of span L_1 (which equals the slope at the right end of span L_2) multiplied by the span length L_1.

As a cantilever, the deflection (part of Δ_1) equals $\frac{2AL_1^2}{6EI_1}$. The slope at the right end of span L_2 equals $\frac{(2A-B)L_2}{6EI_2}$ and the deflection (part of Δ_1) at the right end of span L_1 equals this slope times L_1 or $\frac{(2A-B)L_2L_1}{6EI_2}$.

Adding these quantities gives the total deflection at the right end of span L_1 or

$$\frac{2AL_1^2}{6EI_1}+\frac{(2A-B)L_2L_1}{6EI_2}=\Delta_1.$$

Using K's equaling I's divided by L's, omitting E and multiplying by 6 this can be written $\frac{2A}{K_1}+\frac{(2A-B)}{K_2}=\frac{6\Delta}{L_1}$ and, omitting the 6, this becomes

$$\frac{2A}{K_1}+\frac{2A}{K_2}-\frac{B}{K_2}=\frac{\Delta_1}{L_1}$$

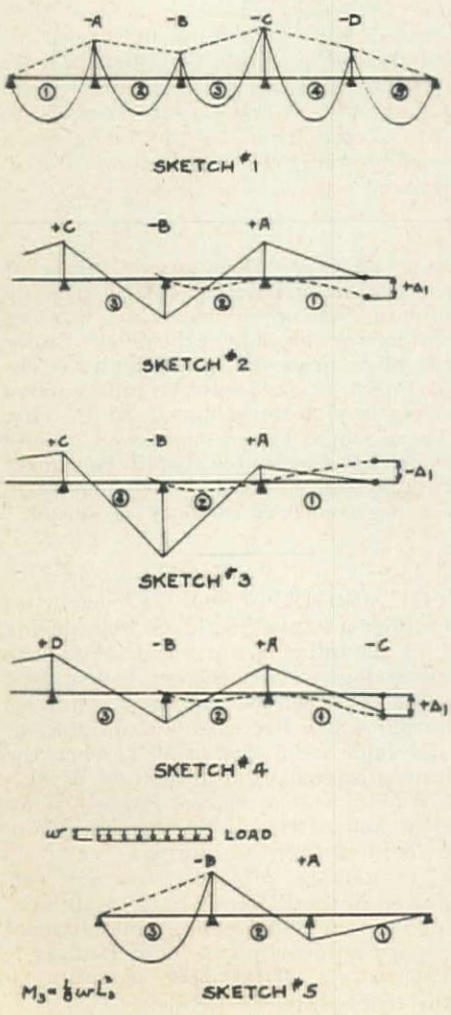
Note that the expressions $\frac{2A}{K_1}$ and $\frac{2A-B}{K_2}$ represent quantities equal to six times the slope at the support. In the problem connected with Sketch No. 6 there are terms which represent quantities equal to six times the slope at the support for the various moments. These quantities (six times the slope at the support) for various loadings are given in the table on page 72.

It is important to note here that for certain values of the K's and the moments A and B, the deflection (Δ_1) may be upward, or minus, in which case the term to the right of the equality sign should be written negatively.

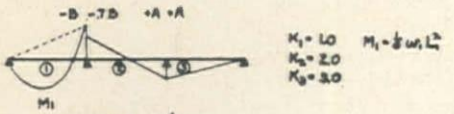
Thus, if the K's are both equal to one (unity) and the value of B is more than four times the value of A, the deflection Δ_1 would be upward, or minus. See Sketch No. 3.

Before beginning calculations, assume that the deflection is either upward or downward or to the left or right as may be convenient, and make the sign of the right side of the equation plus or minus by comparing it with the sign, plus or minus, of the moment A at the opposite end of the member for which the deflection is figured. Thus, in Sketch No. 2, the term Δ_1 would have the same sign as the moment A inasmuch as the moment (shown on the tension side of the member) would produce a deflection in the same direction as shown for Δ_1. Conversely, if the moment is assumed to be minus, the sign of the deflection would be minus.

In Sketch No. 3 the negative sign for the delta would be opposite the plus sign of the moment A since the deflection as shown is in the opposite direction to that



SKETCH #6



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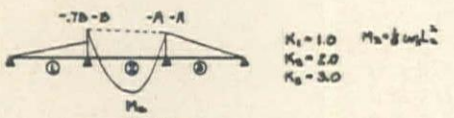
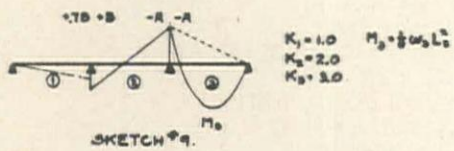
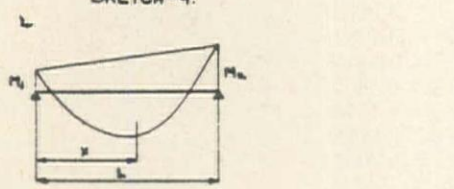


SKETCH #8



SKETCH #9.



SKETCH #10

which would be produced by the moment.

Suppose there is a moment at the right end of span L_1, as shown in Sketch No. 4 and it is assumed that the deflection at the right end of the span is plus; that is, of the same sign as the moment. The deflection of the span would then equal $\frac{(2A-C)L_1^2}{6EI_1}$. The slope of the left end of span L_1 (or the right end of span I_2) equals $\frac{(2A-B)L_2}{6EI_2}$ and the deflection at the right end of span L_1 due to this slope equals this quantity multiplied by the span length or $\frac{(2A-B)L_2L_1}{6EI_2}$.

Adding, substituting as in the case of Sketch No. 2, omitting the E and the 6, this becomes

$$\frac{C}{K_1}+\frac{2A}{K_1}+\frac{2A}{K_2}-\frac{B}{K_2}=\frac{\Delta_1}{L_1}$$

Note that in figuring in this manner for any two spans there is a "set form": For any two spans considered, once times the end moments (minus) and two times the center moments (plus) divided by their respective K's.

So far only the moments brought about by continuity have been included in setting up the equations for the deflection and the moments at the ends of the pairs are included. For the load moments, only the terms for the slopes at the center of the pair are to be included.

Sketch No. 5 illustrates the application to a continuous beam with a load of w per unit length in span L_3.

For spans L_1 and L_2, the deflection at the right end of span L_1 equals

$$\frac{2A}{K_1}+\frac{2A}{K_2}-\frac{B}{K_2}=\frac{\Delta_1}{L_1}=0,$$

which reduces to

$$B=\frac{2(K_1+K_2)}{K_1}A=XA$$

For spans L_2 and L_3, the deflection at the right end of span L_2 equals

$$\frac{A}{K_2}-\frac{2B}{K_2}-\frac{2B}{K_1}+\frac{2M}{K_1}=0.$$

Substituting the value of

$$B=\frac{2(K_1+K_2)}{K_2}A$$

and reducing, this gives

$$A=M\frac{2K_2}{2(K_1+K_2)X-K_1}$$

and $B=XA$.

It is simpler to insert directly the values of the K's in the equations and get the value of B in terms of A. Then to find the value of A in terms of the load moment.

Sketch No. 6 shows the application to a continuous beam with all spans loaded.

For spans L_2 and L_3:

$$\frac{2A}{3}-\frac{2A}{2}-\frac{B}{2}+\frac{2M_3}{3}+\frac{2M_2}{2}=0.$$

Reduce to

$$B=-3.33A+1.33M_3+2.0M_2.$$

For spans L_1 and L_2:

$$\frac{A}{2}-\frac{2B}{2}-\frac{2B}{1}+\frac{2M_2}{2}+\frac{2M_1}{1}=0.$$

Substitute the value of B and reduce to $A=-.211M_1+.526M_2+.421M_3$ and $B=.702M_1+.211M_2-.071M_3$.

In the foregoing example the positive moments are generally figured approximately. At the center of span L_1 the negative moment equals one-half of the minimum negative moment at the right end of the same span. This, added algebraically to the positive moment at the center of the span gives the final positive moment.

A method is given below for figuring this accurately. (See Sketch No. 10.) Figure the net reaction at the left end of the span, which equals $\frac{1}{2}wL-\frac{M_2-M_1}{L}$.

Divide the net reaction by the load per unit length (w) and get x, the distance to the point of maximum positive moment.

Multiply x by one-half the net reaction, subtract M_1 and this result equals the maximum positive moment in the span. The quantity may be figured in the same way from the right end using M_2 subtractive.

For restraint at any support due, say, to the torsional resisting moment of a heavy girder, see sketches 7, 8 and 9.

For the moment in span L_1, see Sketch No. 7. In spans L_2 and L_3:

$$\frac{2A}{3}+\frac{2A}{2}-\frac{.7B}{2}=0,$$

which reduces to $B=4.76A$. In spans L_1 and L_2:

$$\frac{A}{2}-\frac{2(.7B)}{2}-\frac{2B}{1}+\frac{2M_1}{1}=0.$$

Substituting the value for B and this reduces to $A=.162M_1$ and $B=.771\ M_1$.

For the moment in span L_2, see Sketch 8. In spans L_2 and L_3:

$$\frac{2A}{3}-\frac{2A}{2}-\frac{B}{2}+\frac{2M_2}{2}=0,$$

which reduces to $B=-3.33A+2.00M_2$. In spans L_1 and L_2:

$$\frac{A}{2}-\frac{2B}{2}-\frac{2(.7B)}{1}+\frac{2M_2}{2}=0.$$

Substituting the value for B and this reduces to $A=.507M_2$ and $B=.310\ M_2$.

For the moment in spans L_3, see Sketch 9. In spans L_2 and L_3:

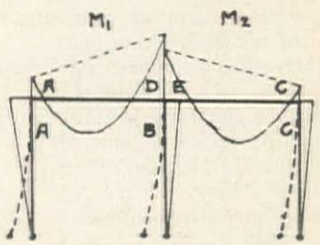
$$\frac{2M_3}{3}-\frac{2A}{3}-\frac{2A}{2}+\frac{B}{2}=0.$$

This reduces to $B=3.33A-1.33M_3$. In spans L_1 and L_2:

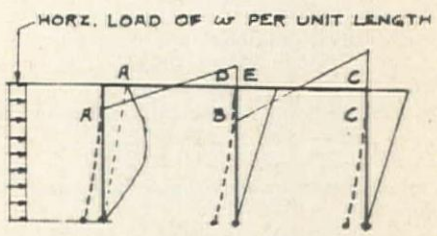
$$\frac{A}{2}+\frac{2B}{2}+\frac{2(.7B)}{1}=0.$$

By substituting the value for B, this reduces to $A=.426M_3$ and $B=.089M_3$.

Then the maximum moment for the right end of span L_1 equals $-.771M_1-.217M_2+.062\ M_3$. The maximum moment at the left end of span L_2 equals $-.540M_1-.310M_2+.089M_3$.

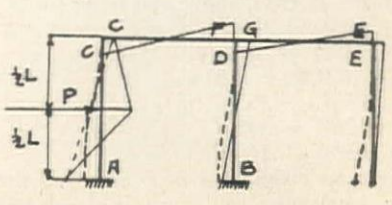


SKETCH #11



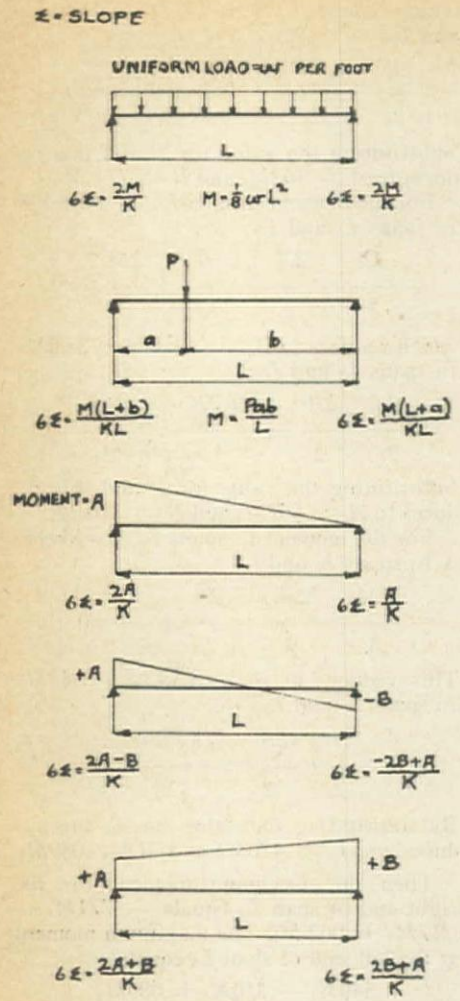
$M=\frac{1}{8}wL^2$

SKETCH #12



M = ¼ PL

SKETCH #13



The other maximum moments may be summed up in the same way.

Illustration for two-bay bent. (See Sketch No. 11.) Assume that the bent deflects to the right as shown. For simplicity in presenting same, all K's and L's are assumed to be one (unity).

$-2A-2A-D+2M_1=+\Delta$

(Note minus A and plus Δ)

$D=-4A+2M_1-1.0\Delta$

$-2B-2D-A+2M_1=-\Delta$

(Note minus B and minus Δ)

Substitute D from above and reduce to

$B=3.5A-M_1+1.5\Delta$

$D-E-B=0$

Substitute from above and reduce to

$E=-7.5A+3M_1-2.5\Delta$

$2B-2E-C+2M_2=\Delta$

Substitute from above again and reduce to

$C=22A-8M_1+2M_2+7\Delta$

$-2C-2C-E+2M_2=-\Delta$

Substitute from above once more and reduce to

$\Delta=-3.286A+1.184M_1-0.245M_2$

$A=B+C$ or $A-B-C=0$

Substitute from above and reduce to

$-2.45A+9.0M_1-2.0M_2-8.5\Delta$

Substitute Δ from above and reduce to

$A=.310M_1-.024M_2$

$B=.333M_1-.333M_2$

$C=-.024M_1+.310M_2$

$D=.595M_1+.262M_2$

$E=.262M_1+.595M_2$

$\Delta=.165M_1-.165M_2$

The proper signs for B, D and E in the above equations are determined as follows: looking from point DBE toward A it is seen that D is on the right, therefore it is given the plus sign. Looking from point DBE toward C it is seen that E is on the left, therefore it is given the minus sign. Looking from point DBE along the column it is seen that B is on the left, therefore it is given the minus sign.

For the application to a bent where the load is applied to one of the vertical members, see Sketch No. 12. For simplicity all K's and L's are taken as one (unity). Column ends are hinged at base.

$2A+2A+2M-D=\Delta$

$D=4A+2M-\Delta$

$2B+2D-A=\Delta$

Substitute from above and reduce to

$B=-3.5A-2M+1.5\Delta$

$B-D-E=0$

Substitute from above and reduce to

$E=-7.5A-4M+2.6\Delta$

$2B+2E-C=\Delta$

Substitute from above and reduce to

$C=-22A-12M+.7\Delta$

$2C+2C-E=\Delta$

Substitute from above and reduce to

$\Delta=3.286A+1.796M$

$A+B+C=\frac{1}{2}wL^2=4M$

Substitute from above and reduce to

$A=.7969M$

$B=1.833M$

$C=1.371M$

$D=0.773M$

$E=1.060M$

$\Delta=4.415M$

Figure reactions and check statically.

Illustration for two-bay bent with a horizontal load on a vertical member; two columns with fixed ends and one column with hinged end. All K's and L's are assumed to be one (unity) for simplicity. (See Sketch No. 13.)

$2A-C-1.5M=\Delta$

$C=2A-1.5M-\Delta$

$-A+2C+2C-F+1.5M=\Delta$

Substituting, $F=7A-4.5M-5\Delta$

$2B-D=\Delta$

$D=2B-\Delta$

$-B+2D+2F-C=\Delta$

Then, $B=-4A+2.5M+4\Delta$

$D=2B-\Delta$

Substituting, $D=-8A+5M+7\Delta$

$F+G-D=0$

G becomes $-15A+9.5M+12\Delta$

$-B+2D+2G-E=\Delta$

$E=-42A+26.5M+33\Delta$

$2E+2E-G=\Delta$

$\Delta=1.285A-0.811M$

$A+B+C+D+E=\frac{1}{2}PL=2M$

$A=1.028M$

$B=0.428M$

$C=0.046M$

$D=0.346M$

$E=0.154M$

$F=0.146M$

$G=0.200M$

$\Delta=.510M$

Figure reactions and check statically.

Production of Tractor Repair Parts Now Rigidly Regulated

THE WAR Production Board has tightened control over the sale of repair parts for track-laying tractors and allocated 65 percent of tractor manufacturers' shipments of repair parts to the military agencies. The action was taken by amendment of Order L-53-b.

All producers of track-laying tractor repair parts are now covered by the order. Formerly only producers of tractors who also manufactured repair parts were covered by the order.

Shipments of any critical repair part —that is, any part for which unfilled orders exceed inventory—must be divided by the tractor manufacturers on the basis of 65 percent for the military and 35 percent for other orders. No shipments of critical parts may be made to dealers in the United States or Canada for stock. Purchase orders from dealers are to be treated as orders for stock unless accompanied by a statement that the parts are needed to fill customers' orders actually on hand that cannot be filled from stock.

The unrestricted use of the 35 percent is designed to enable manufacturers and dealers to take better care of emergency breakdowns on essential work and to simplify the manufacturers' shipping procedure, WPB said.

Repair parts may be purchased from producers and dealers only through emergency certification of the purchase order, with certain specified exemptions. The form of the certification is given in the order. It states that the parts are immediately needed to put the tractor (or tractors) owned by the purchaser into serviceable condition and are not for stock; that similar parts are not on hand; that another purchase order for these parts has not been placed elsewhere; and that the parts will be used only on the tractor (or tractors) designated by serial number.

Emergency certification is not required on direct sales to the military by producers; on sales authorized by WPB through approval of WPB Form 1319; sales to producers or dealers in the United States or Canada; and where the order is for fuel filters or oil filters in a quantity to permit not more than 500 hours' operation.

RESENTMENT has been expressed by Governor Vivian of Colorado over the failure of the Inter-Regional Highway System proposed by the Public Roads Administration to pass through Colorado. He has instructed the Colorado Congressional delegation to urge that one or more of the main routes of the system be changed to pass through his state. The city of Denver is on one of the north-south routes of the system and is the western terminus of one of the east-west links. However, no section of the highway plan links Denver directly with cities to the west.

Is Caliche A Durable Base?

Opinions received to date have indicated that caliche has proven satisfactory as an asphalt paving base for parking areas and runways at airports, unsatisfactory as a base for permanent roads carrying fast traffic and heavy equipment

A. H. GRAHAM, field editor of *Western Construction News*, on recent trips through the Southwest, has observed numerous applications of a particular type of material known as caliche in the construction of airports and highways. Upon inquiring, it has developed that the use of caliche for such projects is highly controversial, and it is the purpose of the editors to present herewith a few facts and some opinions, and to invite further comment, so that all the potential values of the substance may be utilized in future construction.

What is caliche?

The following geological and physicochemical discussion is condensed from a treatise on the subject by J. F. Breaseale and H. V. Smith of the University of Arizona.

The meaning of the term "caliche" is not very definite. The word is of Latin origin; calix, meaning lime, was used originally in Spain to designate crusts of lime which flake from plastered walls, or pebbles burned into clay brick. It is sometimes applied as a name for cracks which form in pottery.

The term was carried to Chile, Peru and Argentina by the Spaniards, and there applied to the deposits of sodium nitrate, or saltpeter, either on account of the presence of lime in these beds, or of their resemblance to beds of lime hardpan or true caliche. The early Spanish settlers in the Southwest applied this term to calcareous hardpan, and the term "caliche" is now used almost exclusively to designate such formations. Caliche and hardpan will be used as synonymous terms in the following discussion.

Caliche and hardpan

Caliche may be defined as a true hardpan. However, the term "hardpan" is very indefinite also. To the ordinary individual this term applies equally as well to a puddled condition of the clay subsoil, or plowsole, as it does to the worst types of bog iron formations that are common in the lowlands of the Northwest. It must be remembered that the formation of caliche and other hardpans is brought about by the solution, transportation, and precipitation of some cementing material. In the bog formation above referred to, this cementing material is iron, in certain other sections it is silica, and occasionally it may be organic matter. Iron, silica, and organic hardpans occur in humid regions, but calilche, or calcareous hardpans, seldom occur outside of arid or semi-arid regions. The caliche in the Southwest is always calcareous.

Occurrence of caliche

Caliche usually occurs either as strata of thin sheets of fairly pure calcium carbonate, or as a conglomerate, that is as sand, gravel, etc., embedded in calcium carbonate, or as a mixture of uncemented material. Caliche is a natural cement, and its structure depends upon the conditions under which it was formed. The purity of the caliche, or its percentage of carbonate lime, varies widely, depending upon the amount of foreign material which it contains. It seldom occurs as a regular, horizontal stratum, but in irregular layers, varying from a fraction of an inch to many feet in thickness. Caliche may appear upon the surface, but is more often covered by a layer of soil. It is often continuous over many acres, and conforms roughly to the contour of the land.

Caliche may occur upon the hills also as a coating of fairly pure calcium carbonate over volcanic rocks; it may occur as a vein in crevasses, or it may occur in sheets over a valley fill. It occurs only where there has been a supply of calcium carbonate in a solution of carbon dioxide, and where the drainage is not sufficient or rapid enough to remove the water. In all cases there must be an adequate supply of calcium carbonate, or limestone. This usually comes from the Paleozoic limestones that are widely distributed in the Southwest, from igneous rocks, or from the soil. The gravelly mesa soils where caliche often occurs usually contain 5 per cent or more or calcium carbonate.

Formation of caliche

Since all forms of caliche involve the solution, transportation, and precipitation of calcium carbonate, the formation of caliche is largely a chemical phenomenon. The calcium carbonate may be dissolved and precipitated in the same stratum, as when a bed of caliche is broken up and recemented, or it may be transported in solution over long distances, and precipitated.

In pure distilled water, calcium carbonate is soluble only about 8 parts per million, but in cold water that has been saturated with carbon dioxide, its solubility is increased a hundredfold, or over 800 ppm. This increase in solubility is due to the presence of carbon dioxide, which, when combined with water, forms carbonic acid. The carbonic acid, in turn, dissolves the calcium carbonate and forms calcium bicarbonate. Solutions of calcium bicarbonate are fairly stable and, as long as the carbon dioxide remains in solution, the calcium carbonate may be transported great distances as the bicarbonate.

The precipitation of calcium carbonate from such solutions is brought about in two ways, either by the evaporation of the water in which it is dissolved, or by the loss of carbon dioxide by which it is held in solution.

The formation of caliche may be either a slow or a fairly rapid process; the density depends largely upon the rate of precipitation and the amount of foreign material in the mass. The dense, impermeable types which lie deep in the alluvial material filling valleys and basins are probably very old, while the softer types which lie near the surface in the flood plains may be of recent origin. Many cases are reported in Tucson where pieces of brick and gravel have become cemented together in a few years, or where a well defined stratum of caliche has formed a few inches below the surface, in a lawn that has been watered regularly. No evidence in the form of fossils has been found in caliche that would indicate a great age, geologically. It has all been formed in the present era.

U. S. Engineers Consider Caliche Inferior Base

By F. THORNE
U. S. District Engineer Office
Los Angeles, Calif.

IT APPEARS, from the consensus of opinion among the personnel of the Soil Engineering Laboratory of the Los Angeles District Engineer Office, that caliche is being treated as a soil or rock and not as a bonding agent. Immersion tests have revealed that caliche —in its native form—has an apparent specific gravity of from 2.2 to 2.5, whereas in a theoretically pure form its specific gravity is the same as that of other rock and soil (i.e., from 2.65 to 2.70). The relative lightness of native caliche is a quality which results from the existence of air voids and voids of non-integrated clay almost consistently throughout its structure. As a result of these voids caliche has a somewhat soft, porous quality. For this reason it is almost too soft to provide a high grade of desirable direct base for paving designed to carry heavy loads. It is gen-

erally necessary, therefore, to place from 6 to 18 in. of sand and/or gravel (usually 12 in. of sand and then 6 in. of mixed sand and gravel) over the caliche before paving.

In some sections of New Mexico and Texas caliche has been used for many years as a direct base for road pavement. The fact that this type of construction proved comparatively satisfactory for a certain period of time has led some people to believe that native caliche in those two states was of a much harder and more durable texture than caliche deposits encountered in Arizona and parts of the California desert. It is quite possible that this may be true to a very small degree. The paving of parking areas and even small runways is also done directly on a caliche base in some cases in New Mexico and Texas. Consideration should be given, however, to the intended life span of such projects. It cannot be denied that the introduction of heavier and higher-speed traffic through these two states has made the hitherto "satisfactory" caliche-based roads obsolete, washboard affairs. Caliche as an actual road surface would be similar to and hardly more satisfactory than common clay.

Caliche is extremely hydrophyllic—that is, it has a strong affinity for water. For that reason it cannot, generally speaking, be used in direct contact with asphalt or other types of petroleum derivatives used in paving. In a few rare cases caliche which has been in contact with oil for a considerable length of time has given evidence of a gradual reduction of its ordinarily extremely hydrophyllic quality to a point of approximate balance, where it is practically neutral in its affinities for water and oil. It is then said to be neither hydrophyllic nor hydrophobic. It is conceivable that caliche in such a state of balance could be used in direct conjunction with oily paving materials, but the extremely rare occurrence of this condition makes the idea impracticable.

The findings of the laboratory, based upon investigations throughout Arizona and Southern California, seem consistently to indicate that caliche should be classified as a problem to the soil engineer and to the agriculturalist. There certainly seem to be very few, if any, practical features in its favor.

CAA Improves Quality By Production Control

By C. G. O'FIEL
Chief, Airways Engineering Branch
Civil Aeronautics Administration
Fort Worth, Texas

CALICHE DEPOSITS are rather common in the southwestern parts of the United States, more frequently found in western parts of Texas, Oklahoma and a large portion of New Mexico and Arizona. The caliche found in Chile is entirely different from that found in the United States.

The following applies to caliche deposits in the United States. Caliche deposits belong to the limestone family. There are also caliche gravel or conglomerated deposits of low grade limestone, gravel, sand and clay. The deposits will vary considerably as to the amount of gravel, sand and clay contents. The deposits are generally covered with a shallow layer of soil, and often there is a very hard layer of caliche just beneath the soil which forms a cap rock covering the caliche deposits. This caliche cap rock is patterned with seams and cracks, and is much harder than the material beneath it. The deposits are invariably spotted; that is, the caliche does not run uniformly throughout the pit insofar as hardness and soil constants are concerned. The deposits are generally soft, medium or hard caliche, but seldom are the three types found in the same pit. The material in pits may be light grey or light pink-grey, and at times almost white in color. Caliche has been used for base material by the Texas and New Mexico Highway Departments for a number of years where covered with asphalt paving.

The Fourth Region of the Civil Aeronautics Administration has constructed a number of airports where caliche was used for base materials and covered with asphalt paving of different types. These airports have proven highly satisfactory.

Strict control is required in construction of caliche bases both in production at the pit and in installing the base materials. First, the pits are spotted as mentioned before, as to quality of materials. Second, the material must be properly watered and rolled to get proper compaction at optimum moisture content. Sheepfoot rollers are generally used in conjunction with pneumatic tire rollers and flat wheel rollers for finishing surface, and some caliche base materials finish better by slush rolling the surface; this depends on fine binder material being plastic or sand. Caliche will set up very hard and dense when properly compacted at optimum moisture content. We have found that caliche base material should be slaked for 72 hours and then the fines shall meet the following soil constants. Liquid limits shall not exceed 35 and plastic index shall not exceed 10, and the material shall not exceed 80 per cent wear by the Los Angeles Rattler Test for hardness. Material shall be crushed to meet the following gradations:

Passing 2 in. square mesh	100%
Passing 40 mesh sieve	15-35%
Passing 200 mesh sieve	0-20%

WPB Appeals for Idle Equipment To Meet Essential Industry Needs

ONLY 2 PER CENT of used cranes, shovels, track-laying tractors, and motor graders now registered by contractors and distributors under Order L-196, are available for sale and only 4 per cent are available for rental, the War Production Board's Construction Machinery Division reported today. As of March 1, 1944, the inventory of used construction machinery owned by contractors and distributors listed 22,615 track-laying tractors, 4,788 motor graders, and 16,444 cranes and shovels.

Because of this shortage of available machinery, the division has written the following letter to manufacturers of construction machinery:

"A serious shortage exists in certain types of heavy construction machinery because military programs are taking most of the new equipment produced.

"This industry is producing at a rate nearly four times greater than in prewar years and still the demand for new machines far exceeds production. Our only solution is the substitution of used equipment for vital war work because new machines are not available. We are desperately short of used track-type tractors, cranes and shovels, and motor graders.

"It is therefore necessary that owners of such idle machines make them available for use on the home front by registering them with our regional WPB offices. This equipment is needed in mining—coal in particular, logging, oil field and pipeline work, and in all phases of agricultural production.

"Your equipment was not built and sold to become a monument to idleness. It was built to do a job. It's use is constructive and every effort should be made to see that the maximum amount of good comes from its existence on the home front at this time. We are confident that your advertising and publicity personnel can grasp this thought and put out a real appeal to owners of your equipment—an appeal that will produce results."

Navy Geologists Investigate Alaskan Oil Potentialities

GEOLOGISTS of the Navy Department are examining American oil reserves north of the Arctic Circle, and if found to be extensive, will recommend drilling of wells in the area and construction of pipelines to convey the oil to the States' shipping points. The engineers and geologists comprising the expedition party are located at Pt. Barrow, Alaska. The known reservoir is designated as Navy Petroleum Reserve No. 4, and was set aside for Navy use in 1923. It is the purpose of the present investigations to determine the extent of the field and recommend possible operations.

Relation of Surge Chambers To Water Hammer Pressures

By OSCAR G. GOLDMAN
Assistant Superintendent
San Francisco Water Department
San Francisco, Calif.

IN THE WRITER'S article* entitled "Hydraulics of Water Hammer, Its Cause, Magnitude and Prevention," the design of closed surge chambers for any condition of water hammer was fully disclosed. However, the function of the closed surge chamber in preventing the rise or fall in pressure due to a rapid changing of the velocity in a pipe line seems to have been misunderstood.

The common conception of the function of a closed surge chamber is expressed by the following: "Adequately proportioned air chambers on pumping mains and surge tanks on water power supply pipes serve to absorb almost entirely the shock of water hammer."**

As explained in the writer's article "Hydraulics of Water Hammer," the cause of the rise or fall of the pressure in a pipe line is due to the compression or expansion of the water column in the pipe line caused by a rapid increasing or decreasing of the velocity of the water column.

If it were possible to entirely prevent this compression or expansion of the water column no rise or fall in the pressure would take place. If the water column is permitted to compress or expand without interference the maximum rise or fall in the pressure will take place, the magnitude of which will depend only upon the amount of the rapid change in velocity occurring.

It is, therefore, evident that the smaller the degree of compression or expansion occurring in the water column the smaller will be the rise or fall of the pressure.

When the change in the velocity of the water column in a pipe line is such as to produce compression in the water column the pressure will increase. When the change in velocity is such as to produce expansion in the water column the pressure in the pipe line will decrease.

The only way of preventing the compression of the water column would be to *remove* some of the water from the pipe line at the point where the compression would occur. Likewise, to prevent the expansion of the water column from taking place it would be necessary to *add* some water to the pipe line at the place where the expansion of the water would occur. The volume of water subtracted from or added to that in the pipe line will determine the magnitude of the rise or fall of the pressure for the particular condition of velocity change. The proper location on the pipe line for subtracting from or adding to the water is at the point where the maximum compression or expansion in the water column will occur.

This subtracting from or adding to the water in the pipe line is the function of the closed surge chamber in preventing excessive water hammer. From a practical point of view it is impossible to entirely eliminate the effect of water hammer. A properly designed, closed surge chamber simply reduces the effect to some predetermined value, thereby overcoming its destructiveness.

In the article "Hydraulics of Water Hammer" it was shown that the diameter of the closed surge chamber was determined from the following equation:

$$d_2 = \sqrt{\frac{p_1}{p_2}}$$

Where

d_1 = diameter of pipe line

d_2 = diameter of surge chamber

p_1 = maximum rise or fall of the pressure, due to a rapid change in velocity from the static pressure.

p_2 = allowable rise or fall of the pressure for the safe operation of the equipment or pipe line from the static pressure.

Since the amount of compression or expansion is directly proportional to the applied pressure, therefore by using the static pressure for the zero datum, p_1, when above static, is an indication of the amount of compression in the water column at the point where the reading was taken. Also when p_1 is below static it is an indication of the amount of expansion in the water column at the point of the pressure reading. The pressure p_2 likewise indicates the amount of permissible compression or expansion which can remain in the water column without destructive effect.

In order to entirely eliminate the effect of water hammer in a pipe line the value of p_2 would have to equal zero, which means that the diameter of the surge chamber would be infinite.

It was also shown in the said article that the distance the water column in the surge chamber will travel in order to establish the assumed pressure of p_2 above or below static was determined by means of the following equation:

$$y = \left(\frac{d_1}{d_2}\right)^2 v_1 t$$

Where

y = distance traveled by water column in surge chamber for change in pressure

v_1 = velocity of water column in pipe line

t = time required for surge pressure to travel from its maximum or minimum value to zero.

The volume of water which is subtracted from or added to that in the pipe line by the surge chamber in order to reduce the effect of the water hammer to some predetermined value p_2 is, therefore

$$V = \pi \frac{d_2^2}{4} y$$

It is extremely important that the movement of the water in the surge chamber and in the pipe line be synchronized, otherwise a compounding of the surge pressure may occur, the result of which cannot be predicted.

In conclusion, it can be stated that:

(1) A properly designed surge chamber simply subtracts from or adds to the water in a pipe line.

(2) A properly designed surge chamber simply decreases the amount of compression or expansion of the water column.

(3) For practical reasons a closed surge chamber cannot entirely eliminate all the effects of water hammer.

(4) A properly designed closed surge chamber can control the effect of water hammer to a predetermined amount.

* Published in *Western Construction News*, March and April issues, 1944.

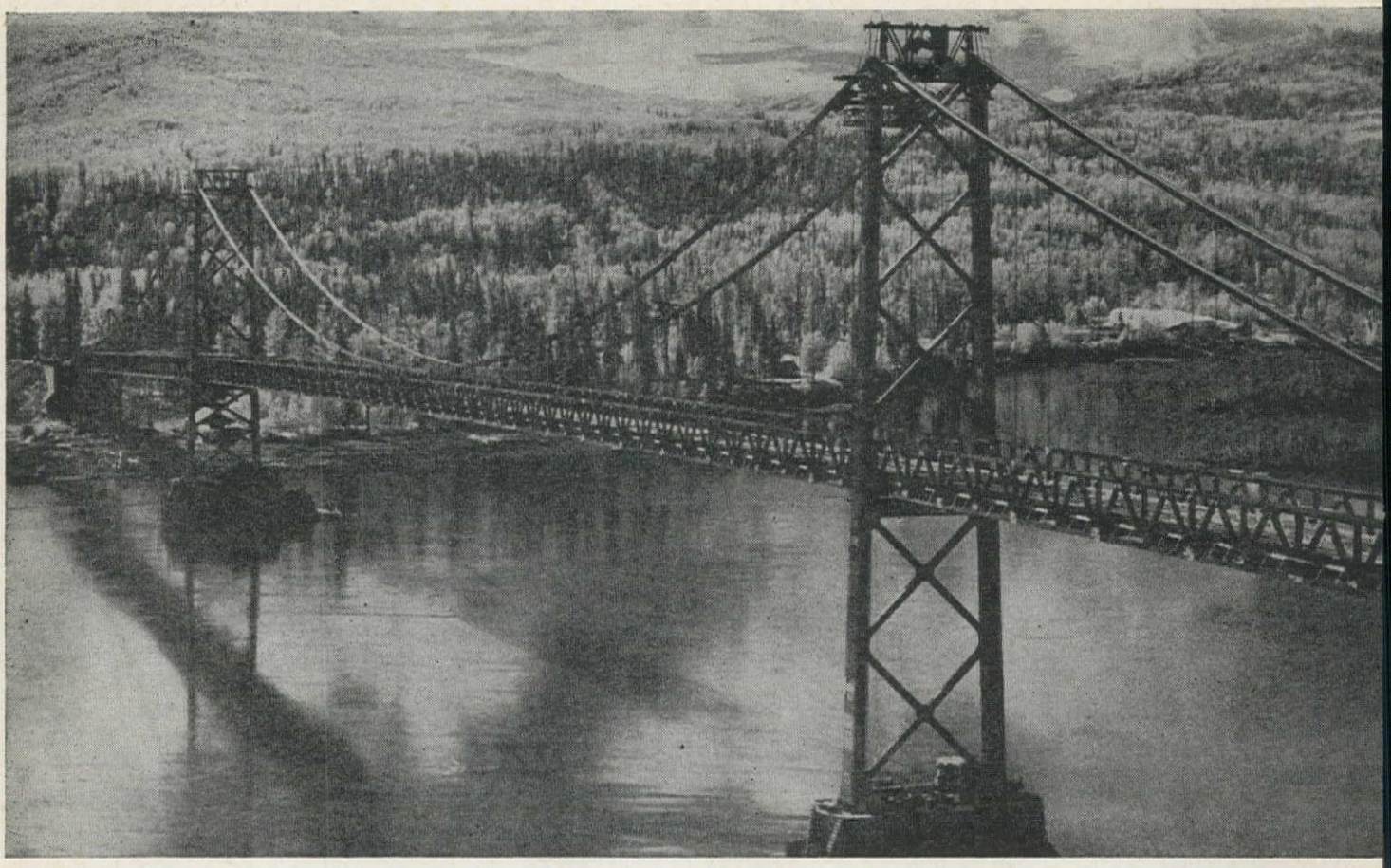
** *"Hydraulics,"* by Schoder and Dawson, published by McGraw-Hill Book Company, New York.

Use of Timber in Structural Design Being Taught in Many Universities

A GROWING RECOGNITION of timber as a structural material is revealed in a survey conducted by the Timber Engineering Co., which disclosed that 188 engineering and architectural professors in 135 universities are teaching timber engineering. These figures compare to 31 professors in 23 universities shown in a survey in 1936.

Last year 333 professors in 187 technical schools, representing all states, were supplied upon request with 40,000 pieces of technical timber literature by the company. These teachers were asked whether they were teaching timber engineering and whether they planned to continue such courses after the war. Of the 224 who replied, 188 answered as above and 144 stated that they plan to continue.

Much of this renaissance in the teaching of timber engineering is laid to the Army and Navy training program, but the upward swing began years ago. A trend noted in the survey is the ground gained by timber engineering in eastern universities, a section in which it was formerly weak.



PEACE RIVER suspension bridge on the Alaska Highway. This is the longest structure on the highway, center span being 930 ft. long and each approach span 465 ft. Cables are open.

Alaska Highway—
Design and Erection of Structures

Many important bridges required on the 1,400-mi. defense highway to Alaska—Because of the urgency of the work, standardized and interchangeable sections were used so far as possible—Two suspension spans required for longest crossings—Much of construction performed during winter

By RAYMOND ARCHIBALD
WILLIAM K. GREENE and
JOHN W. GUPPY
Structural Engineers
Public Roads Administration

CONSTRUCTION OF THE Alaska Highway required the building of many bridges over streams of all descriptions. In the initial penetration of the area in 1942 only temporary bridges were constructed. During the winter of 1942-43 an extensive program of permanent bridge construction was laid out.

Many culverts and some bridges were built of wood or salvaged steel. The new steel structures with span lengths of 40 ft. and over, which required approximately 16,000 tons of steel, are discussed in this article. For speed and economy it was essential to adopt construction standards suitable for the major portion of the bridges. A number of river crossings required individual attention and design of special structures, but these were considered during the course of the work as the need arose.

Design specifications

American Association of State Highway Officials specifications were used as general specifications for all spans. A basic unit stress of 20,000 p.s.i., increased 20% when wind stresses were included, was adopted. This unit stress was adopted to conform to the wishes of the War Production Board for design of steel bridges during the emergency. Provisions were made for a 24-ft. roadway and two 18-in. safety curbs. A clear height of 16 ft. was maintained over the full width of roadway. The loading was H20, except for a few special structures where H15-S12 loading was used.

Allowance was made for a total temperature range of 160 deg. F., with a normal of 30 deg. F. Although the highway is in northern latitudes, with extremely low winter temperatures, its location east of the coastal range places it in territory where the annual precipitation ranges from 10 to 20 in. For this reason no allowance was made for snow load. Designs and plans were adapted for either timber or concrete floors, since it might be necessary to use timber floors on bridges finished during winter months. Provisions were made for steel guard rail, but wood was used in the original construction.

The material was to be transported to the bridge sites by railroad, steamship, narrow gage railroad and truck. Many handlings were necessary, with storage at docks, railroad yards and bridge sites. An effort was made to

keep shipping pieces under 40 ft. in length, but it was necessary to allow a maximum length of 55 ft. on some of the special bridges. Study of the transportation problem indicated the desirability of following the usual export practice of shipping with all large gusset plates loose. Identification of pieces was important. A different color shop paint was used for each of the three geographical divisions of the highway, and a colored symbol was adopted for each bridge. The symbols were painted on four sides of each piece and box.

Bridges needed

Various types of river crossing had to be considered. There were streams with well-defined channels up to 1,000 ft. or more in width, carrying a large volume of water throughout the year. In order to minimize construction difficulties and troubles from icing, and to cut the cost, special construction would be needed. Some of the small streams, confined to narrow channels in ravines or gorges, could be spanned by simple construction. There were other small streams in broad valleys. For a good part of the year these watercourses carry only a trickle of water and are of a meandering, shifty nature. During flood season the whole valley becomes a raging torrent of water, ice and drift. A series of simple standard spans arranged so as to provide proper drainage channel and underclearance could be used for these crossings.

It was possible to classify nearly all the bridges on the Alaska Highway early in 1942 before detailed information was available. While the exact overall length of any crossing could not be determined with any certainty at that time, a fairly accurate estimate of requirements was obtained. On the basis of this information it was decided to make standard designs for 40, 50 and 60-ft. beam spans, 100-ft. pony spans, 160, 200, 225 and 250-ft. through truss spans and 200-ft. deck truss spans. Aside from the six special bridges there were a total of 122 spans for structures that ranged in size from a single 50-ft. beam span to as many as nine 200-ft. through spans.

Standardization of trusses

In the design of the standard spans several conditions were imposed in addition to those of the standard specifications. Simplification of shop and field requirements was essential. It was required that the standard spans be so designed that any arrangement of spans could be assembled for a single crossing without complications. Accordingly, the end details were standardized. Constant dimensions were established for all through truss spans from the crown of the roadway to the top of the pier or abutment, center to center of bearings at piers, and center of bearing to face of backwall at abutments. Expansion joints were made alike insofar as the supporting steel was concerned. Both ends of all spans were made identical. This procedure made it possible to use the same abutment seat and backwall construction for all truss bridges and all pier tops could be made alike.

Tapes used in the different shops had been standardized at different temperatures. Each shop was permitted to fabricate all parts of a span without temperature correction. However, actual span lengths at 30 deg. F. were calculated and used in making pier and abutment layouts for specific bridges.

All standard spans were designed and detailed as level structures with normal outline under full dead load. Where it was necessary to place a structure on a grade, appropriate correction was made in the spacing of piers and abutments.

The same floor arrangement was used for all truss spans. Six lines of framed stringers conforming with a 1½-in. crown supported a 6-in. roadway slab, the bottom of the slab being flush with the under side of the stringer flange. Curbs were cantilevered outside of the stringers. If it became necessary to lay a temporary wood floor because of freezing weather, it was of 2 x 8-in. laminated construction without crown. Different thicknesses of nailing strips were used on the stringers and wood floors were surfaced with 2-in. running plank. With timber flooring, expansion joint openings were spanned with flat plates, but permanent standard expansion dams will be placed whenever a concrete deck is installed.

Beam span design

Beam spans consisted of five lines of beams placed level, and a roadway slab varying in thickness from 6¾ to 8¼ in. to obtain the crown. When wood flooring was used, it was similar to that on the truss spans, with all the nailing strips of the same thickness.

The main beams of the 40 and 50-ft. spans were not spliced. Those for the 60-ft. spans were shipped in two pieces with a field splice near a quarter point. Rocker shoes were used on the 50 and 60-ft. spans and sliding bearings were used on the 40-ft. spans. Adequate diaphragms connected the main beams.

All the standard spans were designed as Warren trusses with curved top chord, since this type presents a good appearance and is economical of material. The panel arrangement was 6 for the 100-ft., 8 for the 160-ft. and 10 for the 200, 225 and 250-ft. spans. With this arrangement most of the members were 40 ft. or less in length, although a few were as long as 50 ft. Verticals were used at all panel points to obtain rigidity and provide intermediate supports for the compression chords.

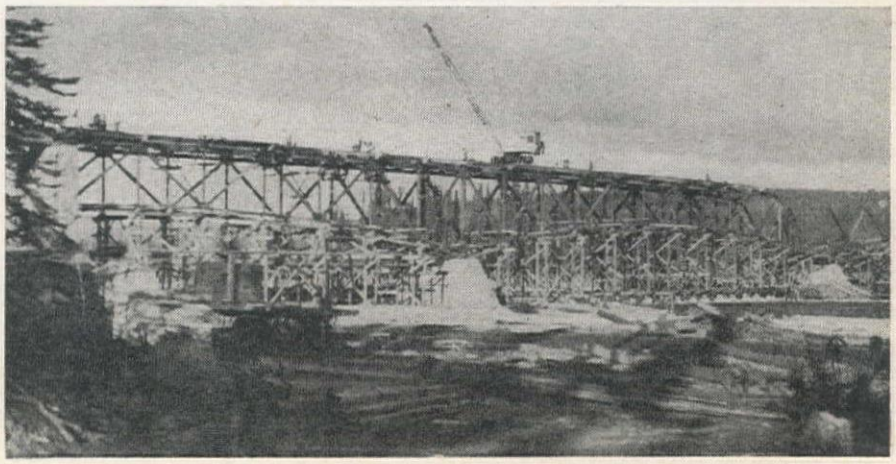
Horizontal ties midway between the top and bottom chords shortened the unsupported length of the web members and made a rigid as well as an economical structure. Wide flange sections were used for all truss members except the end posts and top chords, which were box sections built up of two channels and two plates. The bottom plates had openings of 8 x 14 in. to give access for riveting and painting. Top lateral struts of chord depth were provided at each panel point. Sway frames, extending to the clearance line, were located at alternate panel points. The lateral bracing was composed of single angles and the shoes were made by welding structural steel.

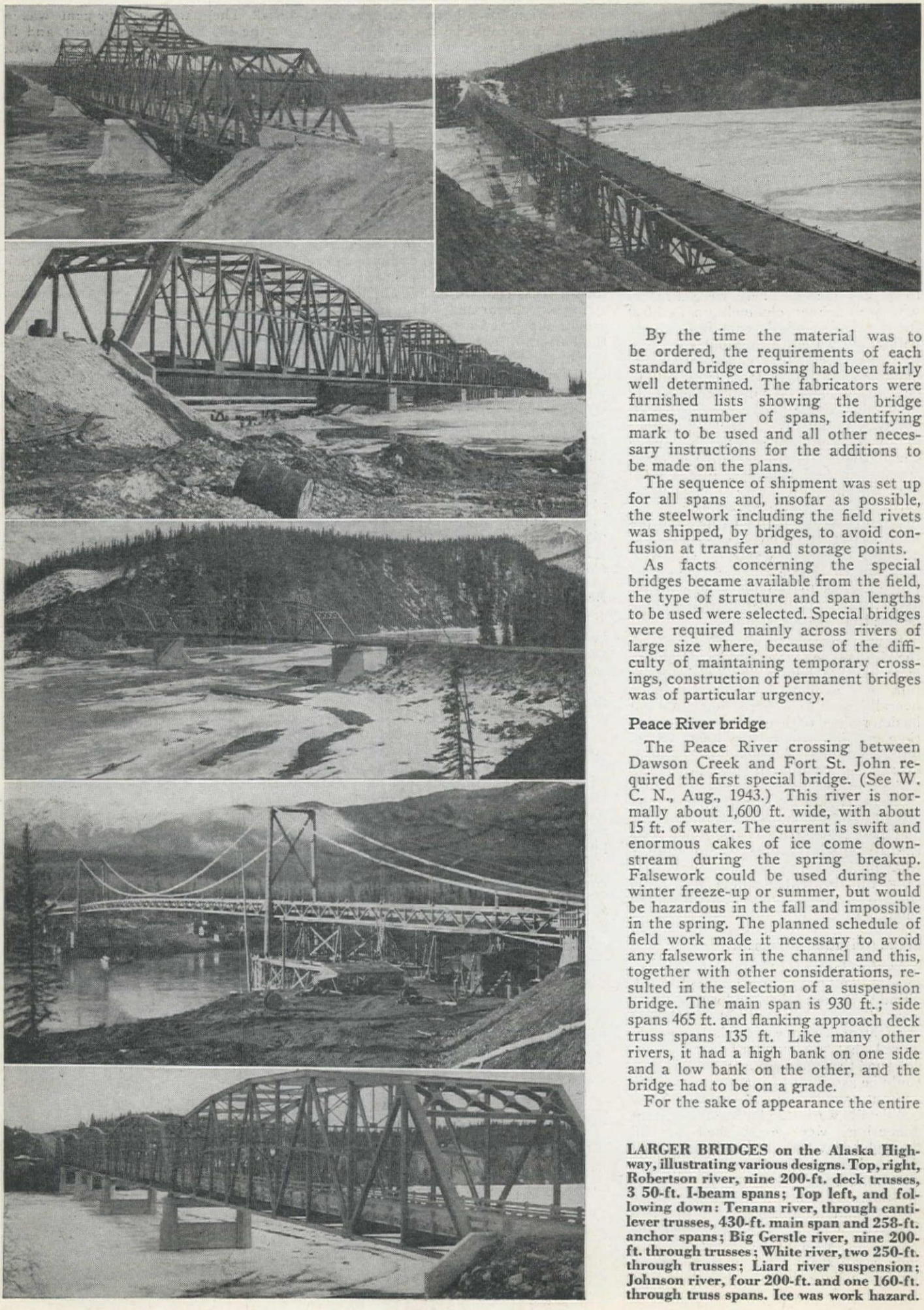
Fabrication

To avoid confusion and delay, steps were taken to prepare material lists and drawings of shop details for distribution to the various fabricators. A single fabricator was awarded a contract for preparation of material lists and shop details for all standard spans. Working in close cooperation with the designing engineers, this fabricator prepared detailed layouts of the various joints sufficient for making complete material lists. Meanwhile the work had been advertised on the basis of the design drawings and a few typical detailed drawings prepared by the design office to indicate the class of workmanship. Contracts were let to eight fabricating companies in the United States and Canada.

During the time material was being rolled, work went ahead on the shop drawings. A separate and complete set was made for each span length, including an anchor bolt setting plan, erection plans, and field rivet and bolt lists. These drawings were arranged so that each fabricator could add information about his part of the work.

HYLAND RIVER bridge on the Alaska Highway during construction. In this case it was possible to use falsework to erect the steel deck truss structure. It is a 3-span, continuous deck bridge with curved bottom chord. Center span is 222 ft. long.





By the time the material was to be ordered, the requirements of each standard bridge crossing had been fairly well determined. The fabricators were furnished lists showing the bridge names, number of spans, identifying mark to be used and all other necessary instructions for the additions to be made on the plans.

The sequence of shipment was set up for all spans and, insofar as possible, the steelwork including the field rivets was shipped, by bridges, to avoid confusion at transfer and storage points.

As facts concerning the special bridges became available from the field, the type of structure and span lengths to be used were selected. Special bridges were required mainly across rivers of large size where, because of the difficulty of maintaining temporary crossings, construction of permanent bridges was of particular urgency.

Peace River bridge

The Peace River crossing between Dawson Creek and Fort St. John required the first special bridge. (See W. C. N., Aug., 1943.) This river is normally about 1,600 ft. wide, with about 15 ft. of water. The current is swift and enormous cakes of ice come downstream during the spring breakup. Falsework could be used during the winter freeze-up or summer, but would be hazardous in the fall and impossible in the spring. The planned schedule of field work made it necessary to avoid any falsework in the channel and this, together with other considerations, resulted in the selection of a suspension bridge. The main span is 930 ft.; side spans 465 ft. and flanking approach deck truss spans 135 ft. Like many other rivers, it had a high bank on one side and a low bank on the other, and the bridge had to be on a grade.

For the sake of appearance the entire

LARGER BRIDGES on the Alaska Highway, illustrating various designs. Top, right, Robertson river, nine 200-ft. deck trusses, 3 50-ft. I-beam spans; Top left, and following down: Tenana river, through cantilever trusses, 430-ft. main span and 258-ft. anchor spans; Big Gerstle river, nine 200-ft. through trusses; White river, two 250-ft. through trusses; Liard river suspension; Johnson river, four 200-ft. and one 160-ft. through truss spans. Ice was work hazard.

structure was made to conform to vertical curve with a middle ordinate such that at maximum live load and temperature the spans would not develop a sag. Cable bents were used at the ends of the side spans, and these also support the river ends of the approach deck spans. The bents are of steel, 60 and 77 ft. high, hinged at the bottom and set vertical, requiring that the cables be clamped to the cable bent saddles. The anchorages are located at the outer ends of the approach spans and serve also as the abutments supporting them.

The main towers are 168 and 191 ft. high, the columns being made essentially of two wide flange beams 36 in. deep and two plates varying in width from 6 ft. at the bottom to 3 ft. at the top. A diaphragm dividing the column into two cells extends from the bottom for about two-thirds of the height. Ladders were placed in the cells. Cross bracing of cover-plated channels (turned in) with horizontal struts at the top and bottom of the tower and below roadway level, was used for tower bracing.

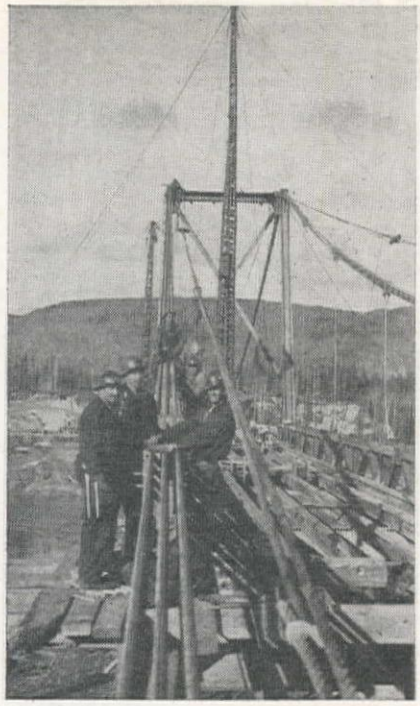
Open strand construction was adopted for the cables. There are 24 strands, 4 wide by 6 high, in each cable. The center span sag ratio is one-tenth, with the cables clearing the stiffening trusses at midspan by about 3 ft. The stiffening trusses are made entirely of wide flange sections 13 ft. center-to-center of chords with the floorbeams framed to the trusses at the bottom chord. Stringer panels are 19 ft. 8 in. in length, with hangers located at alternate panel points. Temperature corrections were made in all members so that the structure would have a normal outline at 30 deg. F.

The trusses were designed using the deflection and sine series methods, taking into account grade change under live load and wind action. Equivalent loadings were used. The floor was designed for H15-S12 loading, cables for 600 lb. per lin. ft. of cable, trusses for 650 lb. per lin. ft. of truss. Wind load was assumed to be 270 lb. per lin. ft. of bridge.

Liard River bridge

The Liard River bridge was the second special steel bridge on the program. Many of the problems here were similar to those at the Peace River, and a suspension bridge was adopted. The Liard River is about 600 ft. wide, with 5 to 25 ft. of water. The main span was made 543 ft. long and side spans 233 ft. This structure is symmetrical, but in general the construction was made the same as for the Peace River bridge. The floor was designed for H15-S12 loading, cables for a load of 650 lb. per lin. ft. of cable, trussses for 700 lb. per lin. ft. of truss and wind load was assumed to be 310 lb. per lin. ft. of bridge. Unit stresses were increased 20 per cent for the combined loads as on Peace River bridge.

Small rocker cable bents 7 ft. 6 in. high, sloped to give equal tensions in the cable, support the cables at the anchorages. The towers are 94 ft. high, with columns made of three wide flange



CABLE ERECTION on the Liard River suspension span. The main span is 543 ft. long, towers 94 ft. high. Open style, 12-strand, 2☆-in. cables were used.

beams 21 in. deep, one beam being used as a diaphragm between the other two. Cables are composed of twelve strands arranged three wide by four high. The stiffening trusses are 8 ft. deep and the floor and hanger arrangement is the same as for Peace River bridge. Adjustment joints for use should a wood floor be used were placed near the third points, and provisions made for changing the hanger lengths. This bridge was built with wood floor and altered outline.

Conditions at the Hyland River crossing were such that partial or complete falsework could be used. A deck structure about 600 ft. long was needed. Such a structure had been designed and fabricated for the Rio Goascoran, between Salvador and Honduras, on the Inter-American Highway, and it was decided that a duplicate structure could be used with a considerable saving in time. The bridge is a three-span, continuous deck truss with curved bottom chord. The center span is 222 ft. and the side spans 130 ft. The truss depth at the main pier is 25 ft., curving up to 15 ft. depth at the ends and center of the main span. Wide flange sections are used for all members except the top chords, which are built up of two channels and two plates with the bottom plate perforated. Flanking beam spans 60 ft. long were added to fit conditions at the site. Temperature corrections were applied in making the pier layout to get proper outline at 30 deg. F. The panels were 18 ft. 6 in. long and the floor differed from other truss spans in that five lines of stringers were used. The floor slab was made 6.25 in. thick.

The next bridges to be planned were some 50 and 60-ft. beam spans, 100-ft. pony spans and 250-ft. through spans, all on a skew. The plans for these, in general, followed those for the standard spans. The 100 and 250-ft. spans were skewed one panel, and for simplicity the trussses of the 250-ft. skewed spans were made with parallel chords.

The Upper Liard River bridge crosses a channel about 500 ft. wide with 5 to 10 ft. of water. A two-span, continuous through truss was selected. This could be erected either with partial falsework and as a cantilever, or completely on falsework. The main truss panels were made 40 ft. and subdivided to give 20-ft. floor panels. Rolled sections were used except for end posts, top chords and main diagonals adjacent to the pier which were built up of two channels and two plates, and the vertical at the pier, which was a built up H-member. The bridge is 640 ft. long, 50 ft. deep over the center pier, sloping down to a depth of 35 ft. at 120 ft. from the pier.

Tanana and Teslin rivers

The Tanana River bridge in Alaska crosses a channel about 900 ft. wide, with water up to 10 ft. deep. A cantilever through truss was selected with a 430-ft. main span and 258-ft. anchor arms. Here again, as at the Upper Liard, subdivided panels were used with lengths of 43 ft. for the main panels. The trusses are 60 ft. deep over the piers, sloping to 30 ft. in both the main span and anchor arms. Wide flange sections were used throughout, except for top chords and end posts which were built up of two channels and two plates and the pier verticals which are built up H-members. This structure was placed on a 1 per cent grade.

Last of the special structures was the Teslin River bridge. Either a high-level bridge or a movable span was required because of navigation requirements. A high-level structure was selected, since less maintenance would be required and for other reasons. A clear channel 75 ft. wide with 62-ft. underclearance for a width of 45 ft. was needed. The channel is about 550 ft. wide, with water up to 40 ft. deep. To reduce pier heights, a deck structure was used with the center span a cantilever rising to provide the necessary clearance. The main span is 260 ft. and the anchor arms are 220 ft., with truss depth at the main piers 40 ft. 6 in., sloping up to 30 ft. in the anchor arms.

The cantilever arms and the 60-ft. suspended girder span over the main channel are so designed that the bottom chords have an arched outline with a rise of 37 ft. at the center. A standard 200-ft. deck span flanked the cantilever on each end, and beyond these were 100-ft. deck spans, making an overall length of 1,300 ft. The entire bridge is on a 2 per cent grade. Twenty-ft. panels and standard floor construction were used throughout, except in the channel spans where the trusses were spaced so that the top chords served as the outside lines of stringers.

Organization

The designs and details of all standard and special structures were worked out

TYPICAL DETAILS of the standardized 200-ft. through truss span utilized on numerous Alaska Highway bridges. This shows the structure over the Big Gerstle river during construction. Wood flooring was only temporary, installed because of weather, which made placing of the permanent 6-in. concrete slab infeasible until Spring.

in close cooperation with the fabricators. In all, there were 16 shops involved in the work. Questions involving the details, material and fabrication were settled promptly and the work of the various fabricators coordinated as necessary within the limits of their own procedures and shop requirements. In making the designs for all the steel spans and in fabricating and erecting them, the foremost thought was to obtain bridges at the various sites as soon as possible. Careful consideration was given to design, details, fabrication, shipment, handling and construction affecting this aim.

Raymond Archibald was in general charge of design and erection of permanent bridges. A design office was established in New York City with William K. Greene in charge and John W. Guppy as his chief assistant. All of the standard spans and the special superstructures referred to in this article were designed in this office and the close contact with the fabricators and their knowledge of the shop methods were the chief contributing factors in the successful construction of the bridges. Substructures and timber bridges were designed in offices at Edmonton, Fort St. John and Whitehorse.

Power Generation Starts at Shasta, Two Units in Service

CALIFORNIA'S supply of electric energy for war industries, and for the peacetime agricultural and industrial development of the State was substantially increased on July 14 when two generators of 150,000 kw. capacity were officially placed in operation in the huge 375,000 kw. power plant at Shasta dam.

Under high priority orders of the War Production Board, Shasta dam and power plant, and the Shasta-Oroville transmission line are being rushed to completion on an emergency construction program.

To insure maximum usefulness of the dam and power plant for war, the War Production Board is keeping a careful check on the amount of water released from Shasta Lake for irrigation, in relation to the requirements of storage for the production of power. The expansion of the war fronts is increasing the requirements for oil, and every kilowatt of hydroelectric power produced releases for direct war use critical fuel otherwise required for the steam generation of electric power.

The Shasta power plant is equipped with two 75,000-kw. generators with space for the ultimate installation of 3 more units of the same size, two of which were manufactured in 1943 and loaned to Grand Coulee power plant, where they are now in service. The final unit was partially built when the War Production Board halted its construction. Complete power plant installation will be made at the close of the war. Two 2,500-kw. station-service generators are in service to provide electricity for dam and power plant operations.

Water storage began in Shasta Lake on Dec. 30, 1943, when the diversion-tunnel gates were partially closed. The tunnel under the west abutment of the dam was used first by the Southern Pacific Railroad, prior to its relocation outside of the reservoir area, and later was used to divert the flow of the river while concrete was poured in the center or spillway section of the dam. The tunnel is plugged now with nearly a thousand feet of concrete, and releases from Shasta Lake are made through power penstocks or through outlet tubes installed in the spillway section of the dam. In normal operation, these outlets will release water from the lake for downstream use when the lake level is below the height at which it spills or when the power plant is not in operation.

Since January 1 of this year, Shasta Lake has attained a length of nearly 30 mi., with water at the upstream face of the dam about 325 ft. deep. The reservoir will cover 29,600 ac., and will store 4½ million ac. ft. of water.

To relocate the Southern Pacific Railroad, which otherwise would have been submerged by the rising lake, 30 mi. of new railroad, including 12 tunnels and 8 bridges, were built. About 12 mi. of U. S. Highway 99 were reconstructed, also, to avoid the lake. The Pit River bridge, the highest double-deck bridge in the world, carries both the railroad and the highway across the Pit River arm of the reservoir.

A 465-ft. steel headtower at the dam, was the hub of the 7 cableways which radiated from the headtower and were anchored to movable tailtowers located on sections of curved track. The cableways were arranged to cover the entire construction area. Over these cableways, the 8-cu. yd., 20-ton buckets of concrete and other construction materials were swung and lowered.

A 10½-mi. conveyor belt, longest ever built, carried sand and gravel at a maximum rate of 1100 tons per hour from a pit near Redding, to stock piles at Coram, nearly a mile downstream from the dam. Another conveyor belt moved the aggregate to the concrete mixing plant at the dam. Aggregate totaling 10,400,000 tons were delivered by this conveyor, and its job is now done. The ingredients of the concrete which remains to be placed in the dam are now in stock piles, and the contractor is free to dismantle the conveyor.

Shasta Dam has been built at an estimated cost of $87,167,200. An allocation of cost to the various benefits is under study. The amounts allocated to flood control and navigation benefits will be non-reimbursable, while the sums expended for irrigation benefits will be repayable without interest. Expenditures for power are repayable to the U. S. Treasury at 3½ per cent interest.

Shasta Dam, the keystone structure of the multiple-purpose Central Valley Project of California, is being built by the United States Bureau of Reclamation. Charles E. Carey is Regional Director for the Bureau located at Sacramento, Calif., and Ralph Lowry is construction engineer of the dam.

First Flood Control Engineer In Los Angeles Is Honored

THE BOARD of Supervisors of Los Angeles county has changed the name of Pacoima Flood Control dam to the James W. Reagan dam. Reagan was the first chief engineer of the Los Angeles County Flood Control District and supervised design and construction of the Pacoima structure, which at the time of its completion was the highest arch dam in the United States. Reagan died in 1942.

Modular Design in Home Construction

The possibility of postwar prefabricated houses has challenged the building industry to devise simple construction procedures that are applicable to mass production and yet retain individuality in design. Economy, as a major industrial problem, is the prime objective of Modular Planning

By JOHN O'ROURKE
Industrial Consultant, The McCarty Company
San Francisco, Calif.

FEW OTHER western industries have felt the tremendous expansion, coupled with immense future possibilities, experienced by the construction field. So vast is the postwar horizon of this industry that important competitors are challenging one another for superiority in a single element of the potential market—prefabricated houses.

Builders of other types of construction — industrial, civic, institutional — also have an eye on postwar markets, as have architects and suppliers.

A simple planning system is the key to the chances of success of every one of them. Called by its proponents "Modular Planning," the system uses a standard layout unit, or module, of four inches as its basis, and goes on from there. This idea promises to simplify nearly everything connected with the construction industry, including its costs. Suppliers using the new system and purchasers who discover that their building dollars are more flexible than they expected, will be able to put western construction on an automobile assembly-line basis!

Advantages of the system

Ernest Flagg, a dean of American architecture and the first proponent of modular planning on the basis of Greek structures like the famous Parthenon, points to the advantages of simplicity in design and construction, ease of mass producing standardized parts (he believes standardized buildings are undesirable), symmetrical plans for ordinary houses through proper proportions, decrease of labor in making plans and elimination of errors and figuring. These are the principal arguments in favor of modular planning and its growing army of proponents say the system can be extended even to small, commonly-used household articles. That, however, they admit, represents the "mopping up" phase of the battle for universal adoption of their system.

In itself, modular planning is simply "a basis for the coordination of dimensions of building materials and equipment, and the correlation of building plans and details with such dimensions." The four-inch standard might have been any other dimension the proportions of which the human eye can grasp. The four-inch layout unit was chosen after studies by Albert Farwell Bemis and others, as being "most consistent with present building practice and affording maximum simplification compatible with practicable flexibility and utility." It has been tested in a number of fields and found generally applicable. The basis of the whole system of proportion is the same as that used by the Greeks: the square, "the very simplest that can be devised." From this, modular planning is susceptible of being projected invariably on a grid. This example of simplification is an indication of what the system accomplishes. In another direction it has been called "a higher form of art characteristic of and compatible with our efficient machine age." The western builder's demand for beauty with economy answered!

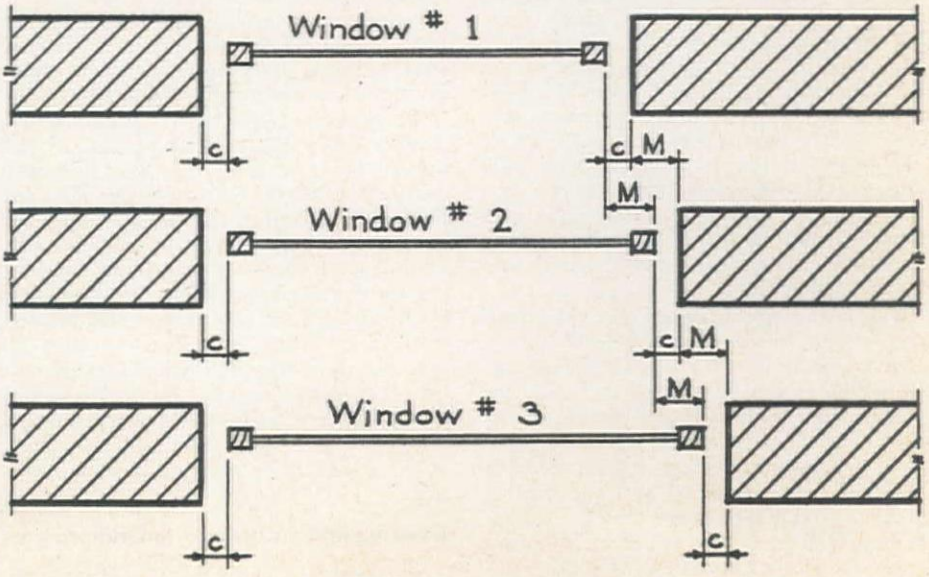
It is no secret to construction people that standardization of the infinite sizes and shapes, and the elimination of the miscellany of "trick" designs in all types of building, have long been definite requirements if the industry is to go on a mass production basis. War urgency has pushed this standardization part of the way, but some of the gain has been nullified by war shortages. In lumber, for instance, it is frequently impossible to get even stock sizes in needed quantities. Excellent designs have sometimes resulted in appalling and, under the circumstances, unavoidable wastes. These may be reduced, modular planners say, as standardization becomes more widespread.

One major obstacle to postwar development of a western building industry has been the obvious necessity of merchandising to such an extent that potential profits would be threatened. Modular planning may be the answer to this problem, too, because it offers the attractive possibility of reducing costs through "efficient house production." Proponents of the system point for proof of their contentions to the prewar advantages resulting from the adoption of standard gauges for railroads, and the pioneer work done by Herbert Hoover's Division of Simplified Practice in the building field itself. They cite also the impetus given to war production by standardization under the National Screw Thread Commission. What these and other standards have done, modular planners say their system can accomplish for the construction industry, particularly in the West, which is obviously fertile ground for a postwar building boom.

Industry acceptance

Already, concrete evidence that they are on solid ground is appearing in a number of places. Led by Frederick Heath, Jr., a former Tacoma architect, a project for the coordination of Dimensions of Building Materials and Equipment has been set up by the American Standards Association and sponsored by the American Institute of Architects and The Producers' Council, Inc. Impressive regional support, in the West as well as elsewhere, has followed this national organization. Charles W. Kraft,

THE APPLICATION of a standard 4-in. module to window dimensions permits the flexibility in dimensions needed to meet different building conditions and at the same time retains the simplicity resulting from the use of identical jamb and frame details.



president of the Kraftile Company, for one, has given vigorous support to one of the most active study committees on modular planning—the Structural Clay Products group, and brick and tile manufacturers as a whole have given a ten to one approval of the adoption of modular masonry standards.

Wood doors and windows will come in for a huge share of modularization if a committee appointed by the National Door Manufacturers, Inc., seconds the findings of manufacturers who have already gone into considerable production on a modular basis. Modular solutions for lightweight steel casement windows have been developed by the metal window industry. Natural stone, structural steel, miscellaneous metal products, masonry partitions—are all being studied from a modular point of view. So are convectors and air conditioning units.

Actual progress is already beyond the study and design stage, however. The National Concrete Masonry Association has resolved to adopt the American Standard basis for the coordination of masonry, ranking as the first body to take national action on modularization. Prefabricated housing has developed, at least in one company, a very comprehensive system of modular design which is actually in production on a large basis. An important steel company has employed architects for modular design of a suburban group of 600 houses.

Anticipating the trend, glass brick manufacturers organized their production on a modular basis in the early '30s. Libbey-Owens-Ford has announced a plan to cooperate with window manufacturers in attaining standardization of Thermopane, a factory-assembled double window glass sealed at the edges, which cannot be cut to size. Owens-Corning Fiberglas Corporation's Dust-Stop Air Filters and assembly frames are also designed to a four-inch module.

Modular planning has, obviously, moved right into the postwar picture of the construction industry. Its evident advantages make it an agreeable and welcome neighbor, because it will assure genuine values from every point of view. In addition to its economy, architects agree that it will improve both the stability and the appearance of our buildings. Some go so far as to predict that if western builders and suppliers achieve sufficient unanimity in the adoption of the modular idea, they can easily pioneer a genuine American architecture.

In any event, "Modularia," Frederick Heath's jocose name for the "disease" of modular planning, is fairly endemic by now in western architecture and building industries. Given halfway favorable conditions, it may well become one of the major wholesome epidemics in the postwar West.

The Missouri River Dispute

The Army's Pick Plan

Future development of the water resources of the Missouri River has caused the publication of two controversial reports, the Pick Plan of the Army Engineers, emphasizing flood control and navigation, and the Bureau of Reclamation plan, emphasizing irrigation—Both are summarized here

THE MISSOURI RIVER is formed by the confluence of the Gallatin, Madison and Jefferson rivers at Three Forks, Mont., and flows generally east and south about 2,460 mi. to its confluence with the Mississippi river about 17 mi. above St. Louis. The drainage area of the basin is 529,350 sq. mi., including 9,715 sq. mi. in the Dominion of Canada. That portion of the drainage area located within the United States includes all of the State of Nebraska and portions of the States of Montana, Wyoming, North Dakota, South Dakota, Minnesota, Colorado, Iowa, Kansas, and Missouri.

Most of the area within the Missouri river basin is gently rolling or plains country. The Ozark Mountains in Missouri, the Black Hills in South Dakota, and the Rocky Mountains which form the western boundary of the basin, are the principal mountainous areas in the basin. In the reaches of the Missouri river above Fort Benton, the river generally flows through narrow valleys and canyons with banks composed of rock and gravel. Between Fort Benton and Sioux City, Iowa, the Missouri river flows through a valley from 1 to 10 mi. in width, with easily eroded banks and an unstable channel.

The drainage area of the Missouri river above Sioux City is 314,617 sq. mi., and below Sioux City it is 214,733 sq. mi. Between Sioux City, Iowa, and the mouth, the principal tributaries are the Platte and Kansas rivers, whose principal drainage areas are, respectively, in Nebraska and Kansas, and the Grand, Osage, and Gasconade rivers, whose principal drainage areas are in Missouri.

Below Sioux City the bluffs along the valley are steeply rolling and rise from 150 to 300 ft. above the valley floor. The valley width varies from 1½ to 17 mi. The valley-floor elevations vary from approximately 420 ft. mean sea level at the mouth to approximately 1,100 ft. mean sea level at Sioux City.

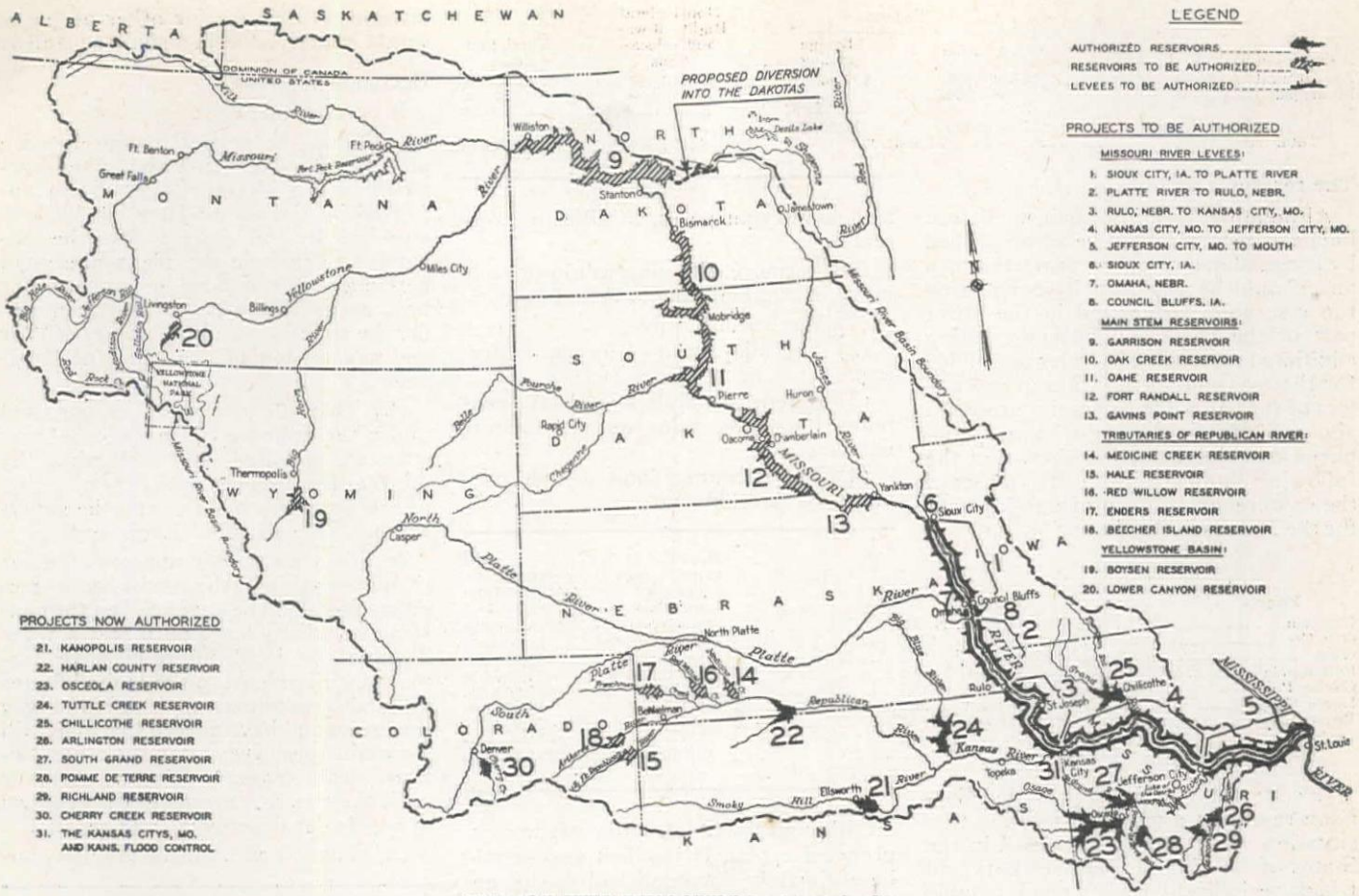
The average rainfall for the area between Sioux City, Iowa, and the mouth varies from about 26 in. at Sioux City to about 40 in. near the mouth. The regimen of the Missouri river is characterized by wide variations between maximum and minimum discharges.

There is an existing 6-ft. navigation project from Sioux City, Iowa, to the mouth. Commercial navigation has been carried on below Kansas City, Mo., for many years and to Omaha, Nebr., for several years prior to the war. Several commercial towboats formerly operating on the Missouri river have recently been withdrawn for use on the Mississippi and other inland waterways to assist in relieving the critical transportation problems in the East. However, when towing equipment is available water-borne transportation will be available to the entire area under investigation.

Existing and authorized federal projects

The existing navigation project between Sioux City, Iowa, and the mouth provides for securing a navigable channel with a minimum low-water depth of 6 ft., by means of bank revetment, permeable dikes to contract and stabilize the waterway, removal of snags, and occasional dredging. The project is about 97 percent complete between Kansas City, Mo., and the mouth, and about 90 percent complete between Sioux City, Iowa, and Kansas City, Mo. Further new construction has been deferred in order to conserve critical materials and manpower for the war effort. The navigation works, although not completed, have already stabilized the banks of the river, eliminated the constant shifting of the channel, and greatly reduced bank erosion.

Fort Peck dam in Montana, with a gross reservoir capacity of about 19,500,000 ac.-ft., was constructed primarily for assuring adequate navigation depths downstream, and was essentially completed in 1939. The reservoir is operated to store excess water during the high-water season for later release to augment the flow during low-water periods. A hydroelectric power plant at the Fort Peck dam was authorized. On June 30, 1943, one 35,000 kw. unit was placed in operation. Operation of the project not only provides water for navigation and



MAP OF THE MISSOURI basin with the developments proposed by the Army Engineers. Garrison reservoir, largest project in the Pick Plan is eliminated in Reclamation suggestions, but Oahe project is enlarged.

the generation of power for irrigation and other purposes, but produces large flood-control benefits by storing excess flows during high-water periods.

Flood characteristics

The Missouri river between Sioux City, Iowa, and the mouth is subject to two general periods of high water each year. The first is often referred to as the March rise. It is caused by the rapid melting of snow in the Plains areas in Montana, Wyoming, and the Dakotas and the break-up and melting of the ice in the main stem and its tributaries. This melting of snow and ice occurs in a relatively short period of time and turns into flowing water the moisture that has been held back throughout the winter months in the form of snow and ice. This high-water period is usually accompanied by a relatively small amount of precipitation. It is characterized by relatively sharp peaks, although the volume of water during this high-water period is considerable. Due to the fact that this rise is ordinarily accompanied by very little precipitation, the crest flattens as it continues downstream, and floods from this rise are usually most severe in the upper part of the river. An example of a March rise flood is the one that occurred during the spring of 1943. This rise produced stages higher than any since 1881 from Pierre, S. Dak., to Rulo, Nebr.

The second general period of high water is often referred to as the June rise. This high-water period is produced by the combined run-off from two sources: (1) the melting of snow from the mountains in the headwaters regions, which persists for a comparatively long period of time (2 or 3 months), and (2) run-off from rainfall occurring in the basin. Floods from this rise are ordinarily most severe in the lower part of the basin where the rainfall is normally the greatest. The run-off from excessive snow melt from the headwaters regions, combined with run-off from heavy rainfall in the basin, produces floods of major proportions. Examples of this type of flood are those which occurred in 1844 and 1903.

Proposed flood control plan

The plan of flood control proposed consists of a series of levees and appurtenant works along both sides of the river from Sioux City, Iowa, to the mouth of the Missouri river, supplemented by the presently authorized reservoirs in Nebraska, Kansas, and Missouri, and additional multiple-purpose reservoirs, including reservoirs above Sioux City. This plan would provide flood protection for agricultural lands along both sides of the river and protection for the cities of Sioux City, Iowa; Council Bluffs, Iowa; Omaha, Nebr.; and the Kansas Citys, Kans. and Mo.

Flood discharges are usually greatest in the lower part of the river, which area normally receives the greatest amount of rainfall. Also the valley in the lower end is considerably narrower than in the upper part. Consequently, the relative degree of protection which can be economically provided by levees alone is considerably less in the lower part of the river than in the upper river.

Complete protection against all floods of record by levees alone is impracticable. However, the levees proposed herein, supplemented by the presently authorized reservoirs in the lower part of the basin and the additional multiple-purpose reservoirs would provide protection between Sioux City, Iowa, and the mouth against all floods of record.

The proposed levees for protecting agricultural areas would be of earth fill, with a 10-ft. crown, and side slopes of 1 on 3 on the river side and 1 on 5 on the land side, with a 2-ft. freeboard above the design flood after settlement. Structures would be placed through the levees as required to drain interior run-off. Where required, by foundation conditions or other special reasons, rolled fill levees would be constructed. Proposed floodway widths between levees would vary from a minimum of 3,000 ft. from Sioux City, Iowa, to Kansas City, Mo., and 5,000 ft. from Kansas City, Mo., to the mouth.

At places where there is a concentration of population and property values, the levees would be rolled fill with 10-ft. crown and side slopes of 1 on 3 on the river side and 1 on 4 on the land side, with a 3-ft. freeboard above the design flood. Where space is not available for levees, concrete flood walls would be constructed.

The estimated cost of the levees and appurtenant works is as follows:

Portion of project	Federal		Non-Federal	Total, first cost
	Construction	Bridge raising	Rights-of-way and relocations	
Agricultural	$65,000,000	$ 750,000	$8,250,000	$74,000,000
Municipal	5,400,000	450,000	150,000	6,000,000
	70,400,000	1,200,000		
Total	71,600,000		8,400,000	80,000,000

The reservoir system

Although protection against all past floods of record cannot be accomplished by levees alone, complete protection can and should be provided by completing the reservoirs authorized in the lower part of the basin and by constructing additional reservoirs. In order to provide for the maximum utilization of the waters of the basin, the reservoirs proposed above Sioux City should be multiple-purpose projects. Studies show that the following should be included as a part of the comprehensive plan of development for the Missouri river basin:

Project	Location	Approximate gross storage capacity Acre-feet	Approximate total construction cost
Garrison	Near Garrison, N. Dak.	17,000,000	$130,000,000
Oak Creek	Near Mobridge, S. Dak.	6,000,000	60,000,000
Oahe	Near Pierre, S. Dak.	6,000,000	50,000,000
Fort Randall	Near Wheeler, S. Dak.	6,000,000	75,000,000
Gavins Point	Near Yankton, S. Dak.	200,000	15,000,000
Lower Canyon	Near Livingston, Mont.	2,250,000	35,000,000
Boysen	Near Thermopolis, Wyo.	3,500,000	20,000,000
Total		40,950,000	385,000,000

In connection with the proposed Garrison reservoir, a practical solution to a situation which has long existed in the States of North and South Dakota and which periodically causes much trouble is possible. During excessively dry years the regions in the vicinity of Devils Lake and the James river basin become so short of water that animals are subjected to great suffering and the people to severe hardship. The best over-all use of the multiple-purpose reservoirs would permit a feasible diversion of water from the Missouri river into the Dakotas for domestic use and other purposes. First there must be conserved and stored in the Missouri basin enough water to provide this diversion. This plan proposed provides for such storage in the reservoirs listed. By the time that water is available, there should also be completed pumping facilities and conduits needed to provide the Devils Lake and James river regions at least as much water as they now have during seasons of normal rainfall. Later this flow of water can be increased to provide much additional irrigation. The plan contemplates that there shall be started improvements to provide a diversion of water from the Missouri river into the Dakotas and that this diversion should be progressively increased and improved as time and conditions warrant such improvements.

Economic justification

The comprehensive plan proposed here would provide not only complete protection for this area against all past floods on the Missouri river, but would effect important reductions in flood stages on the lower Mississippi river. In addition, the comprehensive plan would also provide for the most efficient utilization of the waters of the Missouri river basin for all purposes, including irrigation, navigation, power, domestic and sanitary purposes, wildlife, and recreation.

Furthermore, the plan would provide many intangible benefits including:

(1) The saving of lives.

(2) The alleviation of human suffering.

(3) A general stabilization of the economic life of the valley and of interstate commerce.

(4) The encouragement of industrial and civic developments.

Although the construction of the comprehensive plan is justified and should be ultimately accomplished in its entirety, it is recognized that it would not be feasible to initiate the construction of all of the units at one time. Instead, the development should proceed in an orderly, step-by-step manner as circumstances and availability of funds permit. Units selected for the first phase of development should be those which would provide the greatest benefits from progressive step-by-step construction. Table 1 shows projects to be authorized and included in the comprehensive plan. Table 2 shows projects already authorized.

In connection with the development of the multiple-purpose projects, those shown for the Missouri river will provide for the maximum practicable storage of water of the main stem. The water to be impounded in these, as well as the other multiple-purpose structures, will be utilized to produce the maximum practicable development of irrigation, navigation, power, and other purposes. However, sufficient storage will be provided in each reservoir to provide for the needs of local flood protection downstream from the reservoir as well as for the needs of the general comprehensive plan for flood control for the Missouri river basin. To provide for the maximum utilization of the waters stored in multiple-purpose reservoirs, a plan would be worked out for each structure in collaboration with the various water-use agencies involved. The amount of water to be made available to the Bureau of Reclamation for irrigation would be arrived at after close collaboration with that agency. The development of power potentialities would be determined in cooperation with the Federal Power Commission. Water use for other purposes would be arrived at in a similar manner.

Recommendations

It is recommended:

(a) That the general comprehensive plan for flood control and other purposes in the Missouri river basin approved by the act of June 28, 1938, as modified by subsequent acts, be expanded to include the plans presented herein and as expanded be approved for prosecution by the War Department under the direction of the Secretary of War and supervision of the Chief of Engineers.

(b) That all reservoirs constructed under the approved plan shall be constructed, operated, and maintained by the War Department under the direction of the Secretary of War and the supervision of the Chief of Engineers.

(c) That no money appropriated for the prosecution of the works herein recommended shall be expended on the construction of any levee until States, levee districts, or local interests have furnished without cost to the United States all lands, easements, and rights-of-way for levees and have agreed that they will maintain the levees after their completion; maintenance includes normally such matters as cutting grass, removal of weeds, local drainage, and repairs.

(d) That in addition to previous au-

TABLE 1.—PROJECTS TO BE AUTHORIZED

Project	Total cost
Missouri River levees:	
Sioux City, Iowa, to Platte River	$14,500,000
Platte River to Rulo, Nebr.	8,000,000
Rulo, Nebr. to Kansas City, Mo.	15,000,000
Kansas City, Mo., to Jefferson City, Mo.	22,500,000
Jefferson City, Mo., to mouth	14,000,000
Sioux City, Iowa	600,000
Omaha, Nebr.	3,800,000
Council Bluffs, Iowa	1,600,000
Garrison Reservoir	130,000,000
Oak Creek Reservoir	60,000,000
Oahe Reservoir	50,000,000
Fort Randall Reservoir	75,000,000
Gavins Point Reservoir	15,000,000
Medicine Creek Reservoir	2,400,000
Hale Reservoir	7,200,000
Red Willow Reservoir	2,100,000
Enders Reservoir	6,700,000
Beecher Island Reservoir	6,600,000
Boysen Reservoir	20,000,000
Lower Canyon Reservoir	35,000,000
Total	490,000,000

First phase	Second phase	Third phase	Fourth phase
$130,000,000	$124,000,000	$121,000,000	$115,000,000

TABLE 2.—PROJECTS NOW AUTHORIZED [1]

Project	Total cost
Kanopolis Reservoir	[2] $9,000,000
Harlan County Reservoir	[3] 20,000,000
Osceola Reservoir	28,500,000
Tuttle Creek Reservoir	28,000,000
Chillicothe Reservoir	28,500,000
Arlington Reservoir	7,300,000
South Grand Reservoir	10,400,000
Pomme de Terre Reservoir	6,200,000
Richland Reservoir	6,900,000
Cherry Creek Reservoir	[4] 8,200,000
The Kansas Citys, Mo. and Kans.	[5] 18,000,000
Total	171,000,000

First phase	Second phase	Third phase	Fourth phase
$61,000,000	$42,700,000	$41,500,000	$30,800,000

[1] $29,000,000 have been authorized to date.

[2] Partially constructed. Funds needed to complete estimated to be $3,000,000.

[3] Current estimate (including storage for irrigation), $31,000,000.

[4] Current estimate for Cherry Creek project, $11,000,000.

[5] Partially constructed. Estimated additional costs to complete are: Federal cost, $13,000,000; non-Federal, $2,200,000; total, $15,200,000.

thorizations for the Missouri river basin there be authorized to be appropriated a sum adequate to provide for the initiation and prosecution of the expanded general comprehensive plan in a logical step-by-step manner.

The Reclamation Plan

A BILLION DOLLARS' worth of post-war developments in the Missouri River basin are proposed in a report of the Bureau of Reclamation which has been transmitted to the Senate. Fully developed, the plan would provide for irrigating 4,760,400 acres of land in seven states, provide additional water for a half million acres in five states, and yield for sale annually nearly four billion kilowatt-hours of electrical energy.

The Reclamation plan contemplates further use of the waters of the Missouri river in stabilizing the agriculture and economy of a vast basin which includes the Northern Great Plains, where drought periodically deals devastation. The construction proposed would be complementary to that recently suggested by the Secretary of War for flood control and navigation on the river. The reservoirs proposed by the engineers of the Bureau of Reclamation and the Army would protect valuable property from devastating floods; and irrigated areas distributed widely through seven states would supersede some precarious dry farming and stabilize great areas now wholly dependent on dry farming and stock raising.

Anticipating a sudden and tremendous demand for employment, on the cessation of hostilities, the Bureau is recommending that Congress authorize, and, at the proper time, make adequate appropriations for, initial construction on projects in several states. Each of the projects will be justified by the public benefits that it will yield, and all of them will be parts of a unified plan for using beneficially and economically the water resources of the Missouri river and its tributaries. Benefits will include not only flood control and aids to navigation on the lower river, and irrigation and power generation on the upper river and tributaries, but the conservation of wildlife, water supplies and sanitary protection for numerous towns and cities, and widely distributed and much needed recreational facilities throughout the basin.

"This report," said Harry W. Bashore, Commissioner of the Bureau of Reclamation, "is the result of investigations made to find means of developing further the resources of an important part of the West, and, at the same time, alleviating conditions in the Northern Great Plains that have brought distress to thousands of people, and great loss and expense to both the residents of the area and the Nation. The droughts of the past decade cost government agencies, principally Federal, in grants and unpaid loans, more than one and a quarter billion dollars, and those grants and loans were inadequate to the needs, since tens of thousands of families nevertheless were forced to migrate from their abandoned homes. These expenditures are roughly equal to the cost of the proposed development of the waters of the Missouri river system."

Outline of the plan

The foundation of the plan is a system of 90 reservoirs, to impound water during periods of high run-off, to serve the double purpose of reducing flood stages in the streams and conserving water for use in periods of low run-off. These reservoirs will have a combined storage capacity of more than 45,000,000 ac. ft., which is more than twice the average annual run-off of the upper river during the past 10 years. Those dams which would have for their dominant use flood control and aid to navigation would be built and operated by the U. S. Army Corps of Engineers. Those intended principally for irrigation and the generation of power would be built and operated by the Bureau of Reclamation, except such as would be designed primarily for use in irrigating Indian lands. They would be handled by the Office of Indian Affairs.

The reservoirs range in capacity from a few thousand acre-feet, on the tributaries, to 19,600,000 ac. ft., at the Oahe dam, proposed in the Reclamation plan for construction on the Missouri river, 8 mi. above Pierre, S. Dak. This huge reservoir is an excellent example of a multi-purpose project. It would reduce the silt load in the lower river, catch peak run-offs to prevent floods, furnish water for dry-period navigation of the lower river, generate power, and furnish water to irrigate 750,000 ac. of land in the James river basin. In general, the releasing of water from upstream reservoirs will be governed by the requirements of irrigation and power generation, and from the lower reservoirs by navigation needs.

"The ultimate development of the western half of the United States will be determined," said the Commissioner, "by the wisdom and efficiency with which its scant supply of water is used. The Reclamation plan for the Missouri river basin is intended to focus attention on the importance of planning water uses far in advance of actual developments, so that in years to come we will not find that we have hampered development possibilities by having applied precious water extravagantly, or to a single purpose, or to an inferior use, to the exclusion of better uses. We must overlook no opportunity for irrigation in the West, where water, not land, limits the ultimate food-producing possibilities, and thus the general development of the country."

Projects involved

According to the report, the Reclamation plan provides for the irrigating of 4,760,400 additional acres of land and the furnishing of supplemental water to 547,300 ac. of land not now adequately provided with water. Such improvements would affect only about half of one percent of all farm lands in the United States. More than a hundred separate tracts are distributed along the streams of the basin, and large compact areas are to be irrigated in North Dakota and South Dakota. The approximate acreages to be benefited are listed below:

State	New Land (acres)	Supplemental for — acres
Mont.	967,130	346,800
Wyo.	281,560	167,400
Colo.	101,280	1,719
N. Dak.	1,266,440	.....
S. Dak.	961,210	11,300
Nebr.	989,445	19,930
Kans.	193,335	155
	4,760,400	547,304

As an initial step in the development of the basin-wide plan, the Bureau of Reclamation plans to undertake the construction of the following projects, or project features, in six states:

In Montana,
- Canyon Ferry Reservoir
- Glasgow Bench Pumping Irrigation Unit
- Hardin Unit (including Yellowtail Dam)
- Marias Unit
- Missouri-Souris (Montana Division)
- South Bench Unit
- Yellowstone River Pumping Units

In North Dakota,
- Heart River
- Knife River, and
- Missouri-Souris (North Dakota Division) Units
- Missouri River Pumping Units (5)

In South Dakota,
- Angostura
- Grand River (Shadehill-Bluehorse)
- Oahe (James River)
- Rapid Valley Units (including Brennan Reservoir)

In Wyoming,
- Big Horn Pumping Units
- Big Horn Project (Boysen Dam)
- Glendo Reservoir
- Kortes
- Owl Creek
- Paintrock and
- Riverton Units
- Shoshone Project Extensions

In Kansas and Nebraska,
- Bostwick
- Cedar Bluff
- Frenchman-Cambridge
- Kirwin
- North Republican (Wray, Colo.-Nebr.)

Pumping Units

Power development

Seventeen power plants, six of them in Montana, eight in Wyoming, and three in South Dakota, would yield annually 3,809,200,000 kw.-hr. of electrical energy as firm power for sale for domestic, municipal, commercial, and industrial uses. It is proposed to interconnect the new power plants with one another, with other power plants in the Missouri river basin, and with load centers, by means of a network of high-voltage transmission lines. Such interconnection would increase the firm-power capacity of the power plants in the basin, insure more reliable service, and reduce power

costs. The normal growth of the demand for power would absorb the output of the power plants as rapidly as they become available for service. Although the power plants would be subject to the effects of reservoir regulations for irrigation, flood control, and aid to navigation, they would be able to handle a consumers' maximum demand of 624,000 kw. with an installed capacity of 758,500 kw.

In addition to the seventeen power plants that would yield firm power for sale, five other plants would be used almost exclusively to supply power for pumping irrigation water. They would have a total installed capacity of 396,000 kw., and would yield annually 908,500,000 kw.-hr. of seasonal power. This includes partial use of the power plant at Ft. Peck. Three of the plants would develop power at points where water diverted for irrigation and other purposes would be dropped from high canals to lower levels for distribution. One of these, in the James river basin, would operate under a head of 240 ft.

Montana would have a prominent part in the development of the water resources of the basin under the plan proposed by the Bureau of Reclamation. Within its boundaries lie the headwaters of the Missouri river, and a considerable part of the basin of its principal tributary, the Yellowstone river, which actually delivers more water than the Missouri itself. In Montana would be 24 of the 90 reservoirs planned, 6 of the proposed 21 new power plants, and nearly a fifth of the new land to be irrigated, as well as more than half of the irrigated land which would receive supplemental water. The areas to be irrigated are distributed widely over the state, along the Missouri and its tributaries from southwestern to northeastern Montana, and along the Yellowstone, Big Horn, Tongue, and Power rivers in the southern and eastern parts of the state. The meager water supplies would permit only small developments in the Musselshell and Judith basins.

Wyoming would have 23 new reservoirs on the Yellowstone and its tributaries, 3 on the headwaters of streams flowing from the northeastern part of the state north or east to join the Missouri river, and one in southeastern Wyoming, on the North Platte, near Glendo. The combined capacity of the 27 reservoirs would be about three million ac. ft. A proposed 30,000 kw. power plant, with a head of 195 ft., would be located a few miles below Seminoe. Supplemental water would be furnished to 167,400 ac. of irrigated land in the state, and water would be made available for 281,560 ac. not now irrigated. The additions to irrigated land would be made in the Kendrick, Riverton, Shoshone, and Powder river areas.

North Dakota developments would add a million and a quarter acres of irrigated land to its assets, and restore its once famous Devils Lake to its former prominence and value, besides improving its water supplies for domestic and sanitary uses. The irrigated land would be included in many small units along the Missouri river and its western tributaries, large areas in the Crosby-Mohall area, and three tracts on the James river, near New Rockford, Jamestown, and Oakes. Some of the small units would be served by gravity and many by pumping.

The most extensive and the most important of the proposed North Dakota enterprises is the Missouri-Souris unit. It would use Missouri river water, stored in the Fort Peck reservoir. From a diversion dam 4 mi. below the mouth of the Milk river, in northeastern Montana, water would flow 112 mi. along the Missouri river valley to the 5-million ac. ft. Medicine Lake reservoir, to be formed by a dam across Big Muddy creek, 10 mi. northwest of Culbertson, Mont. Near Grenora, N. Dak., water would be pumped from the reservoir into the Souris canal, which would carry it across the divide, into the basin of the Mouse river. About 10 mi. southeast of Crosby, water would be dropped 98 ft. and made to generate sufficient power to lift the water supply out of the Medicine Lake reservoir. Power from Ft. Peck would be used to start the flow through the system. The main canal would be continued to the vicinity of Kenmare, where another drop would develop power for pumping service. Branch canals would distribute water over large areas in Burke, Renville, War, Bottineau, and McHenry counties.

Return flows from the land, and water admitted to the Mouse river from the Souris canal, would be diverted about 8 mi. northeast of Velva into the Devils Lake canal and the Sheyenne river. About 18 mi. northeast of New Rockford, a 105-ft. dam would be constructed, to form a reservoir in the Sheyenne river valley, extending upstream more than 50 mi. From the reservoir, water would be conducted through a lateral canal to Devils Lake, from which a supply would flow to Stump Lake, any surplus continuing on to the Sheyenne river. Sufficient water would be added to the flow of the Sheyenne river to enable it to furnish municipal supplies to 19 towns and cities.

From the Sheyenne river dam, the James river feeder canal would extend southward 18 mi. to deliver the remaining return flow from the Missouri-Souris project into the James river. Such water, supplemented with that of the James river, would irrigate areas near New Rockford, Jamestown, and Oakes.

South Dakota's agricultural resources would be amplified under the plans by the addition of numerous small irrigated areas along the western tributaries of the Missouri river, and along the main stream, but to a much greater extent by the irrigating of a 750,000-ac. tract in the James river valley. Water would be provided to supplement the present supply for 11,300 ac. in the Belle Fourche project, and to irrigate 961,210 ac. of dry land. Large reservoirs on the Missouri river in South Dakota are designed primarily for flood protection and to supply water as an aid to navigation below Sioux City, during the season of low stream flow. In the Reclamation plan, the 19,600,000-ac. ft. Oahe reservoir, extending from the vicinity of Pierre to that of Bismarck, is the principal flood control and navigation feature. It, with a 5,000,000-ac. ft. reservoir at Ft. Randall and a small reservoir at Big Bend, would store water for irrigation, and for navigation in lieu of storage now secured from Ft. Peck reservoir, regulate the stream flow, and yield power. From the Oahe reservoir, water would be pumped into a high canal and carried over into the James river basin, to irrigate 750,000 ac. of land on the west side of the James river, between Aberdeen and Forestburg. Seven reservoirs would be created on the western tributaries, in addition to those named above, which would occupy almost the entire length of the Missouri river channel in South Dakota.

In **Nebraska** the full economic use of remaining water resources in the lower Platte valleys will require the storage of water now passing through power plants, and the utilization of the large run-off of the Loup river for irrigation as well as power. Large irrigation projects would produce great benefits. In the future, it may be advisable to consider the retirement of the Columbus power plant as a large, firm power producer to make way for irrigation. It would be possible to supplement the power supply by transmission from the proposed large dams on the Missouri river.

The report points out the possibility of irrigating about 660,000 ac. along the Loup and Lower Platte rivers, chiefly with water from the Loup, more than 100,000 ac. along the Republican river, and 240,000 by pumping from wells after other developments provide renewed ground-water supplies. The area irrigated in Nebraska would be increased by nearly 900,000 ac.

Kansas, now having only a few thousand acres of irrigated land in the basin of the Kansas river, would have added about 60,000 ac. northwest of Concordia, nearly 50,000 ac. near Gaylord, Osborne, and Beloit, on the Solomon river, 18,000 ac. near Lincoln, on the Saline, and 13,000 ac. near Hays and 40,000 ac. south of Salina, on the Smoky Hill river. Nearly 30,000 ac. would be irrigated on the south fork of the Republican river, in the extreme northwest corner of the state, and 4,500 ac. on Prairie Dog creek, near the Nebraska state line. Eight reservoirs in Kansas, with a capacity of 1,660,000 ac. ft., would not only provide water for irrigation, but would aid in flood control on the lower Missouri river.

Colorado will have no considerable addition to its 1,355,000 ac. of irrigated land on the east slope of the mountains, where trans-mountain diversions are to be made to provide supplemental water for land now irrigated. Small additions of irrigated land in the extreme east end of the state are proposed, by means of Bonny reservoir, on the south fork of the Republican river, near Hale, and Pioneer reservoir, on the Arikariee river, which, like the Bonny reservoir, would be created primarily for flood control. The Wray reservoir, on the north fork of the Republican river, would irrigate 2,080 ac. of dry land, and furnish supplemental water for 3,340 ac. more.

HOW IT WAS DONE

JOB AND SHOP TIPS FROM THE FIELD EDITOR'S NOTEBOOK

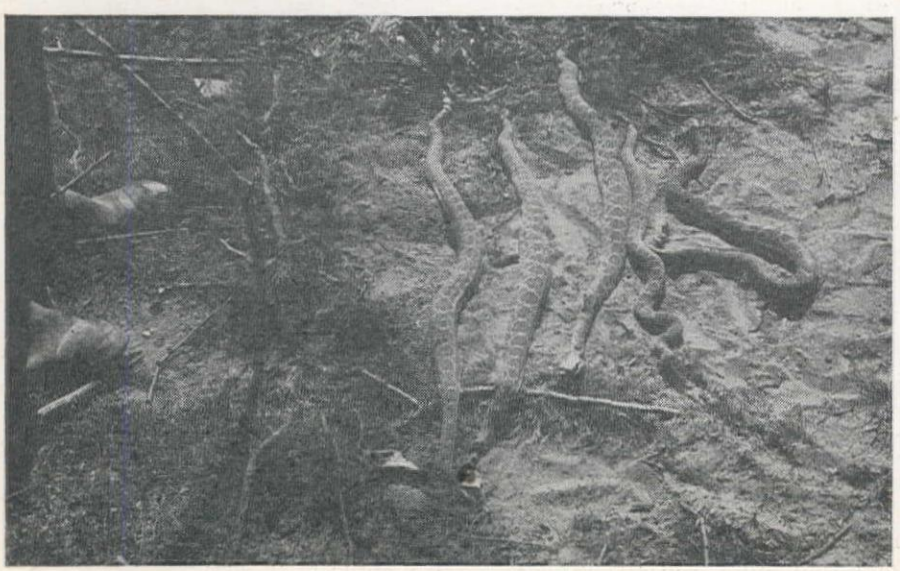
Two-Man Tricycle For Bulb Change

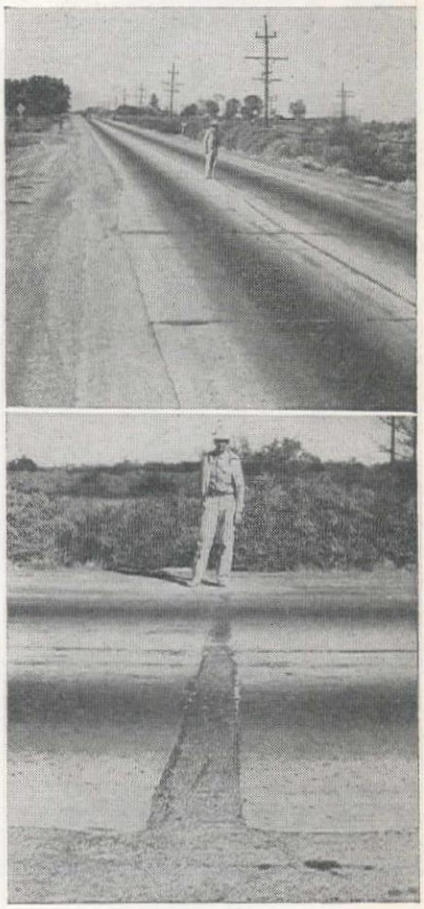
TO FACILITATE the replacement of the average of 400 light globes which burn out weekly in the tunnels and galleries of Grand Coulee Dam, Bureau of Reclamation structure on the Columbia River in Washington, electricians of the Bureau have devised a two-man tricycle, pictured at the left. This movable ladder was fabricated of standard steel pipe and other scrap items in the maintenance shops at the dam, and was welded to a regular bicycle frame, upon which an axle and two wheels were substituted for the conventional rear wheel. About 2,800 lights burn continuously in the interior passageways of the huge reclamation structure, operating on power generated by the 800,000 kw. power plant. The plant is now operating to capacity on a 24-hr. basis, supplying energy to the shipbuilding, metal and other war industries of the Northwest.

Rattlesnakes Add to Hazards Of Arizona Dam Construction

RATTLESNAKES were so plentiful that construction men faced the problem of their destruction before beginning work on Horseshoe dam on the Verde River in Arizona. While working on the concrete lining of the diversion tunnel, workmen encountered a nest of the vipers, and destroyed the five "diamond backs" shown in the picture below, taken by L. L. Lee, office engineer of the Salt River Valley Water Users Association. It was then decided to conduct a snake hunt, and 17 were killed during the afternoon.

The dam will be a rock-fill structure with 60,000 ac. ft. storage capacity. The water will be used to reimburse the lower valley for about 14,000 ac. ft. to be withdrawn annually from the Black River to supply water to the Phelps Dodge Corporation copper reduction plant at Morenci.





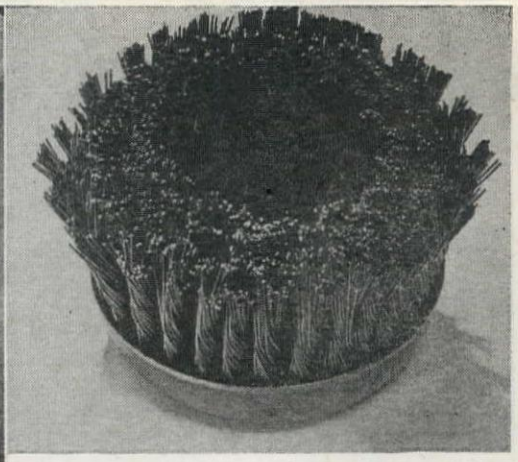
Earthquake Offset Left In California Highway

DISPLACEMENT of Highway 80 near Holtville, California, during the earthquake of May 18, 1940, was remedied by merely filling the V-shaped crack at each end of the disturbed block of concrete with asphaltic paving material. The opening is about 15 in. wide on one side of the pavement and 4 in. on the other.

The earthquake was one of the few in California which left a visible surface trace, and wherever it crossed highways, canals, orchards, or fences, an offset of from 3 to 8 ft. occurred. The State Highway Department and local interests decided on the offset alignment shown above in preference to a complete redesign of the highways affected. This arrangement has resulted in some confusion to fast traffic using the road, but construction of a new highway to regain tangent alignment would have required several miles of work.

J. M. Sheldon, construction superintendent of the Imperial Valley Irrigation District is shown in the photo.

✦



Power Brushing Cleans Bridge Steel for Paint

POWER BRUSHING is used to condition the acres of steel surfaces on the 7 mi. long San Francisco-Oakland Bay Bridge for the application of protective paint. The accompanying photo shows one of the permanent crew of fifteen to twenty men using a portable-tool-driven, steel bristled cup shaped brush. This brush removes fog and spray-deposited salt as well as loose scale and paint from the steel surfaces prior to repainting. The method has proven to be many times faster than any method of hand surface preparation.

The brush itself, as shown in the illustration, is cup-shaped, approximately 3¼ inches in diameter, and heavily filled with coarse .020 S.A. wire, the wires extending ⅛ of an inch out of the cup. Operated in a portable hand tool, the brush spins at 4,200 revolutions per minute. Rotating at this speed, with its coarse wires in contact with the steel surface, the unit speedily brushes away scale and leaves sound clean metal for the reception of paint.

Safety Rules Suggested for Industrial Truck Operators

AS A contribution to the present drive for reduction of accidents, the Elwell-Parker Electric Co., has formulated a set of safety rules for operators of power industrial trucks. These rules are intended to supplement the basic instruction of the operator and to interpret the general precaution to "Drive Carefully." It is pointed out that in most cases it would be advisable to modify them by specific reference to local conditions, such as observance of one-way routes, hints for checking loads before pick-up, etc. The rules are:

1. **Move control levers firmly from one speed to another and without hesitation.** This is to prevent arcing, which pits the contact surfaces of the switch. If you allow these contacts to become damaged you may fail to get the expected response from your control lever at a time when you want it very much.

2. **Keep your load as low as possible when moving.** There is no danger of tipping a load if the center of gravity is low. Keep the load low enough to see over.

3. **Keep your truck behind the load.** If you should get off suddenly, or fall off, then the load will be moving away from you and can do you no harm. When going up steep inclines it is sometimes better to reverse this position and have the truck pull the load.

4. **Avoid making quick or jerky stops.** The momentum of the load may play tricks on you. Be especially careful about stops when you have a load elevated for tiering or stacking.

5. **If your truck has a tilting device—use it.** By tilting the upright toward you the weight of the load is brought back slightly and the balance is improved. This slight tilt of 10 to 15 deg. will avoid spilling the load when rounding corners.

6. **Go easy when approaching danger points.** These are: elevator gates, pits, bridges, inclines, tunnels and tracks. Get the habit of crossing tracks diagonally instead of at right angles.

7. **Be sure to pick up every load squarely.** Then there is no danger of the load shifting while you are in motion. When small boxes in pallet or skid lots are raised above the uprights, be sure that those on the back corners have not shifted to fall on you. Insist on wide load back rests.

8. **Don't cut corners.** You are in danger of having to stop quickly—lose the load—hurt someone or damage the goods.

9. **Keep your truck and floors clean.** Dirt and rubbish make your footing uncertain and may cause trouble if obstructions lodge somewhere in the mechanism. Report rubbish on floors to your foreman. You and your truck are safer on clean runways.

10. **Don't carry passengers.** You need all the room you have, for perfect control of your truck.

11. **Don't allow others to operate your truck.** They may injure someone, or damage the truck or tires. It takes time to get spare parts these days.

12. **Report need for repairs immediately.** Repairs take the least time when they are made promptly.

NEWS OF WESTERN CONSTRUCTION

JULY, 1944

Complete Driving of 13.1-mi. Continental Divide Tunnel

THE CONTINENTAL DIVIDE tunnel of the Colorado-Big Thompson project was holed through on June 9. The 13.1 mi. tunnel will carry water diverted from Grand Lake on the upper Colorado river to the east slope of the Rocky Mountains, where it will furnish supplemental water to the 700,000 ac. of irrigated land in the Colorado Water Conservancy District in the valleys of the South Platte river and its tributaries. Construction operations in the tunnel were described in *Western Construction News* for February, 1944. The final break through occurred at a point 26,500 ft. from the west portal and 42,400 ft. from the east portal.

The tunnel is being built by the Bureau of Reclamation, and the cost of the excavation work has been $6,800,000. Concrete lining to an interior diameter of 9 ft. 9 in. will cost an estimated $3,000,000 more. The lining work will commence at once. The tunnel is the longest ever driven from two headings, it not having been practical to establish any adits. The first 6,600 ft. from the west portal was driven by Platt Rogers, Inc., of Pueblo, Colo., on a contract awarded July 15, 1940. At the same time a contract for 8,000 ft. from the east portal was awarded to S. S. Magoffin Co., of Englewood, Colo. On February 3, 1941, a supplemental contract was awarded to Magoffin for a continuation of work from the east end, and on June 26, 1941, Stiers Brothers Construction Co., of St. Louis, Mo., received the contract to complete the driving from the west portal. All work was suspended between November 15, 1942, and August, 1943, by order of the War Production Board.

It is anticipated that the total diversion to be carried by the tunnel will amount to 320,000 ac. ft. annually. The name of the bore has recently been changed by Congress to the Alva B. Adams tunnel in honor of the late senator from Colorado.

C. H. Howell has been project engineer of the Bureau of Reclamation. Frank R. Purvis has been superintendent for the Magoffin company, and John R. Austin has been in charge of the work for the Stiers company. Austin was ill in a Denver hospital at the time of the holing through on June 9 and the brief ceremony held in the tunnel on June 10. No impressive public ceremony is to be held until next year when the lining is completed.

Oregon Earmarks Monies For Post-war Employment

A REPORT of the Oregon Post-war Development and Readjustment Commission indicates that cash is already on hand or allocated for post-war construction in that state in the amount of $73,000,000, which it is estimated would provide employment for 36,000 men at $1,800 a year for the first twelve months following the war. This is approximately one-third of the estimated unemployment load in the state.

The cash available or allocated is segregated as follows: State cash on hand, $13,541,000; Counties cash on hand, $2,000,000; State Highway Commission, $10,000,000; Portland Moses plan bonds, $24,000,000; Willamette valley development, $20,000,000; Deschutes reclamation project, $1,250,000; Municipalities, $750,000; School districts, $700,000.

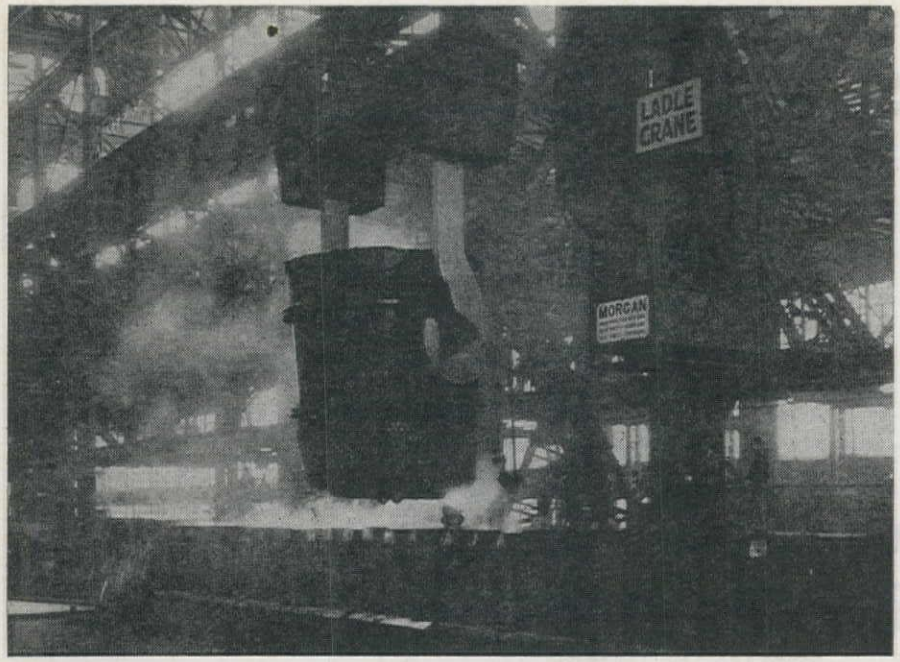
Purchase of City Power By Utility Firm Halted

THE CITY OF San Francisco has received an ultimatum from the Interior Department and the Federal District Court that after August 28 it may not sell electrical energy manufactured by its Hetch Hetchy facilities to the Pacific Gas & Electric Co. or any other private utility company for resale. This action is taken under the Raker Act which concerns development of power in a national park. During the first period of operation of the plant all of its output was sold to the P. G. & E., but for the past year the entire output has been taken by an aluminum plant at Riverbank, Calif. Revenues from sales to this plant amount to $2,400,000. With shutdown of the aluminum plant threatened by federal authorities, it appears the Hetch Hetchy power system will be forced to suspend operations until some new marketing system can be devised.

Two possibilities suggested are a bond

CHINESE OWNED AND OPERATED AIRCRAFT FACTORY ESTABLISHED

ARCHITECT'S DRAWING of the new plant of the China Aircraft Corp., entirely owned and operated by Chinese in San Francisco. The plant is now under construction in San Francisco by Empire Construction Co., and will cost, with machinery, about $500,000. Dr. Hu Seng-Chiu is the founder and chief engineer of the new organization, which will assemble Douglas A-26 bombers for use by Chinese and other United Nations armies. The Chinese characters over the door were personally inscribed by Gen. Chiang Kai-Shek.



KAISER FONTANA STEEL MILL NOW IN FULL PRODUCTION ON WAR WORK BOTTOM POURING of steel ingots at the Kaiser steel mill at Fontana, Calif. Most of the production at the plant has been going into ship plates, but a new contract has recently been awarded for manufacture of shells for the military services. The plant has only recently been completed, and uses solely Western products in its operations, iron ore coming from California, coal being mined in southern Utah.

WPB Now Controls All Softwood Plywood Sales

CONTROL OVER SOFTWOOD plywood is extended by the War Production Board to include all softwood plywood strips, odd sizes, and scrap with surface measurements of more than eight square feet.

Order L-150-a, which restricts the sale of softwood plywood by distributors to purchase orders rated AA-2x or better, formerly excluded all pieces not meeting commercial standards (rejects, cutbacks, strips, odd sizes and scrap). The exemption resulted in some softwood plywood going into unessential use, WPB said. L-150-a as amended, limits exemptions to pieces measuring less than eight square feet. Larger pieces can be completely utilized for military boxing and crating, WPB said.

The amended order also permits the sale of softwood plywood on purchase orders rated AA-3 for use in authorized construction projects. Such purchase orders must be certified as set forth in L-150-a. The purchase of plywood on AA-3 ratings will be authorized only for use in concrete form construction, WPB said.

issue by the city for the purchase of the San Francisco distributing facilities of P. G. & E., so that the city may market its power directly, or a lease arrangement under which the P. G. & E. facilities could be used to convey the power to the city for use solely in the operation of its trolley system, street lighting and other municipal activities. In the first case, it would be necessary to issue about $75,000,000 in bonds and similar proposals have repeatedly been rejected by the San Francisco voters. In the second proposal, the present demand for power by municipal functions would absorb only about 60 per cent of the Hetch Hetchy output. A third proposal, construction of a municipally owned transmission and distribution system, which would cost approximately $50,000,000, would not be possible for the duration of the war.

Parker Reservoir Threatens Town of Needles, California

IT MAY BECOME necessary to evacuate the city of Needles, Calif., because of seepage through the Colorado River dykes now protecting the town and rising ground water augmented by backwater from Parker Dam. At the present time the town of 4,000 people is about 4 ft. below the surface of the river which has been raised by the deposits of silt some 12 ft. in the past four years.

Although dykes are adequate for protection from the normal flow of the river, flood waters frequently threaten to overtop them. It is necessary to pump seepage water from low spots in the city daily.

City officials are investigating higher sites which might be used for a relocation.

Reclamation Bureau Proposes 236 New Irrigation Projects

AN INVENTORY of 236 potential reclamation projects in the 17 western states, which would provide an estimated 135,000 irrigated farms for veterans and war workers when peace comes, has been transmitted to the Senate Committee on Postwar Economic Planning and Policy.

Commissioner Harry W. Bashore of the Bureau of Reclamation, in discussing the inventory before the committee, said that, should these projects be authorized for construction, over 1,250,000 man-years of work would be needed to build them and provide construction materials, equipment, and machinery. About 56 percent of that labor would be used principally in the 31 eastern, southern, and mid-western states, while 44 percent would be required on the construction sites.

The presentation of the inventory was made at the request of Senator Carl Hayden of Arizona, chairman of a subcommittee on roads and reclamation.

"The agricultural development of the West is limited by the water that can be conserved and diverted to arid and semi-arid lands by irrigation," said Commissioner Bashore. "The rainfall in most of the western states is inadequate for crop production. The construction of these projects would provide employment when it will be needed for our returning veterans and demobilized war workers, and would stimulate the agricultural and industrial development of the West. Over 6,700,000 ac. of new land would be put into cultivation and 9,365,000 ac. of productive land now inadequately irrigated would be supplied with sufficient water to guarantee crop production by the irrigation systems outlined in the inventory. About 85,000 new farms would be created on lands brought under irrigation."

Among the multiple-purpose projects would be several power plants with total capacities of 1,765,000 kw. Some of that energy would be needed for pumping irrigation waters and for other operational features in the several states. The potential firm power from projects under study is estimated at about 2,600,000 kw.

Basing his statements on a successful reclamation project in the West, near Boise, Idaho, Commissioner Bashore estimated that these new farms and communities would produce new wealth with which to repay costs of irrigation developments and provide increased purchasing power of over $1,250,000,000 annually. This amount, spent for the manufactured and agricultural products not produced in the irrigated region, would be of substantial benefit to non-western areas.

In preparing the inventory, the Bureau of Reclamation has given consideration to the possibilities and needs for other uses of water and natural resources in the West.

Hydroelectric energy for use on the farms, ranches, and in the homes of the regions would be second only in importance to irrigation on the multiple-purpose projects in the inventory. Much of the modern farm equipment depends on

power for its high efficiency and time-saving factors. Modern households likewise use quantities of electrical equipment which makes for healthy, comfortable homes. Low-cost electric energy from these projects would meet those needs.

Reasonable amounts of energy would also be available for numerous small industries which might spring up in the newly-created communities. Development and processing of vast amounts of minerals and other natural resources, including agricultural products, may be needed in the post-war period, which would require new sources of power.

The storage reservoirs, canals, and ditches also would provide recreational developments and fish and wildlife protection. These features would be worked out in cooperation with the Fish and Wildlife Service, the National Park Service, and other Federal and State agencies.

Water for municipal use in urban areas and for domestic purposes in rural sections would be provided by many of the proposed works.

A summary of the projects by states and the acreages of lands which might be affected is as follows:

State	No. Projects	Irrigation: New Land Acres	Irrigation: Supplemental Water Acres
Ariz.	15	444,000	328,000
Calif.	27	1,689,000	3,506,000
Colo.	19	387,290	1,924,350
Ida.	20	307,550	1,709,260
Kans.	5	103,000	.....
Mont.	33	564,255	84,940
Nebr.	5	96,580	32,485
Nev.	4	25,235	106,000
N. M.	9	50,770	242,580
N. D.	9	403,255	.....
Okla.	9	181,500	6,100
Ore.	15	266,334	92,770
S. D.	6	283,830	14,000
Tex.	12	312,710	585,090
Utah	20	90,500	268,900
Wash.	4	1,131,110	6,000
Wyo.	24	370,720	458,820
Totals ..	236	6,707,639	9,365,295

Housing Restrictions Removed in Portland

CONSTRUCTION of war housing facilities in the Portland, Ore., area has topped all other cities in the nation with a total of 18,504 family and dormitory units. Vanport City, described in the August, 1943, issue of *Western Construction News*, is the largest public housing project in America and McLoughlin Heights in Vancouver is the second largest. A recent reappraisal of housing in the area has indicated a surplus. While 2,000 additional private units are still under construction, the survey shows that there are 3,000 vacant units in the Portland area and another 2,000 in the vicinity of Vancouver. As a result, all occupancy restrictions have been removed covering the sale and rental of private dwellings and the rental of public units.

At the same time, a considerable amount of permanent housing is being constructed. The volume of building in the $5,000 to $7,000 range is almost equal to that in the booming 20's and the prices of permanent housing now changing hands have soared from 150 to 200 per cent of pre-war levels, indicating a great anxiety to secure substantial permanent homes.

WPB Releases Iron and Steel To Power Equipment Makers

IN ORDER to improve the quality and performance of conveying machinery and mechanical power transmission equipment and also to reduce the man-hours used in production of such machinery, the War Production Board has removed restrictions on the use of iron and steel in bunkers, conveyor structures, bins, hoppers, and tanks. At the same time restrictions were lifted on the use of alloy steels for chain and sprockets. The new action is covered in an amendment to Limitation Order L-193. The definition of "line shafting" used in the amendment is given as "Any shaft driving two or more engines or any single length or rigidly coupled lengths of shafting supported by three or more bearings."

San Diego Votes Authority to Secure Colorado River Water

THE COUNTY of San Diego, Calif., has voted to establish a water authority to finance and prepare plans for facilities to bring 100,000,000 gal. of Colorado river water daily to that area, now suffering from a serious deficiency in supply. The Bureau of Reclamation is continuing studies of the two possible methods of transporting the new supply to the San Diego area. One of these is an extension of the Metropolitan Water District aqueduct which now extends to Laguna Beach, and the other possibility is a new aqueduct over the mountains from the vicinity of Yuma, Ariz. Methods of financing are also under consideration and the new board which will be composed of directors from the several cities and unincorporated districts to be served, will consider the several problems involved.

Los Angeles Co-operates In Highway Development

AN AGREEMENT has been signed between the city of Los Angeles and the California Department of Public Works under which two state highway routes in the city limits will serve as a part of the city's freeway network.

Route 165, now known as the Arroyo Seco parkway, extending from Pasadena to Adobe Street in Los Angeles, will be extended through the business section of the city and will ultimately continue to Los Angeles harbor. It will follow a route about a block north and parallel with Figueroa St.

Route 2, now designated as the Hollywood parkway, will parallel Temple St. and the first section will extend from Alameda St. to Sunset Blvd. It will ultimately connect with the Cahuenga freeway now in operation north of Hollywood.

Under the agreement the city of Los Angeles will close or relocate city streets involved in the program and consents to the acquisition of needed land by the state.

Price Board Increases Price Scale For Used Construction Equipment

AN ALTERNATIVE pricing method for sales of used construction equipment limited to tractors, shovels, draglines, cranes and backhoses, urgently needed for essential operations in coal-stripping, logging and petroleum production, has been announced by the Office of Price Administration.

The new alternative pricing method, effective June 14, 1944, provides a sliding scale of prices, in terms of percentages, of new base prices for the equipment. This will increase the present maximum prices by adding 5 percent to 55 percent of the new base price (which is the present applicable ceiling for "as-is" equipment) for each more recent year of manufacture beginning with the year 1939 until a new ceiling of 80 percent of the new base price of the equipment is attained for machines manufactured in 1943.

The 55 percent of new base price formerly applied to machines sold "as-is," with an alternative method for machines of recent manufacture, which permitted sale at a price calculated by subtracting specified annual depreciation rates from the new base price.

New base prices for construction equipment are usually f.o.b. factory prices for the equipment when new, unless established maximum prices are for delivered or installed machines, in which case the new base price is either the delivered or installed price of the equipment when new.

The percentage pricing method provided by today's action, is a third alternative method, designed to bring out a supply of used machines which the War Production Board indicates present owners will not sell at the former permissible maximum prices. The need for the desired construction equipment cannot be met from available production of new equipment, and therefore must be met from the used supply in the hands of contractors. Some of this equipment is now idle or will soon become idle owing to the diminishing programs of construction work.

WASHINGTON NEWS

. . . for the Construction West

By ARNOLD KRUCKMAN

WASHINGTON, D. C.—Two days before Congress quit to go to the conventions, the President sent a letter to Senator John H. Overton of Louisiana, who is head of the Senate Commerce Committee in charge of pertinent hearings, definitely supporting those who are fighting to establish once and for all the prior right to use water for irrigation and other beneficial purposes in the western half of the United States, over navigation.

The issue was stated in the report of the Bureau of Reclamation, submitting to Congress an integrated plan for the development of the Missouri River basin, the plan obviously being in conflict with the report of the Corps of Engineers, based on the Pick plan. The Bureau of Reclamation report states: "The relative allocation of water for irrigation and navigation involves a policy in water use which these agencies cannot establish or modify. Irrigation and storage of any kind, deplete stream flow."

The President wrote formally:

"The action of the committee with respect to the River and Harbor bill is highly gratifying in most respects.

"I am somewhat disturbed, however, by the provision against the construction or acquisition of transmission lines that was inserted in section 6 of the River and Harbor bill. I do not clearly see the necessity for this broad restriction, particularly when Congress would always be asked to appropriate money for any transmission lines that might be planned in connection with these projects, and I foresee that it might unduly hamper the disposition of power in a beneficial manner. I hope this problem will be given some further attention.

"As you yourself recognize, moreover, the problem of the use of the waters of the Missouri River requires further consideration. In my judgment the compromise that you propose does not quite offer the solution. It is my understanding that if the navigation facilities were constructed on the main stem of the river, the water required to make them useful might deplete supplies needed for irrigation.

"I THINK THAT WHEN CONSIDERING THAT PART OF THE COUNTRY IN WHICH THE LAWS OF NATURE INEXORABLY ACCORD TO THE BENEFICIAL CONSUMPTIVE USE OF WATER A PRIMARY ROLE, WE MUST BOW TO THOSE LAWS IN OUR PLANS AND LEGISLATION TO THE FULLEST EXTENT COMPATIBLE WITH THE FULL COMPREHENSIVE DEVELOPMENT OF OUR STREAMS FOR THE GOOD OF THE NATION AS A WHOLE. SEVERAL SUGGESTIONS HAVE BEEN PUT FORWARD IN THE CONGRESS, SOME AS AMENDMENTS TO THE RIVER AND HARBOR BILL, WHICH HAVE MERIT IN FIRMLY ESTABLISHING THE PRIMARY IMPORTANCE OF THE BENEFICIAL CONSUMPTIVE USE OF WATER WITHOUT REQUIRING ANY CESSION OF FEDERAL JURISDICTION UNDER THE COMMERCE CLAUSE OF THE CONSTITUTION. I FULLY AGREE WITH YOU, OF COURSE, THAT ANY MEANS OF SOLUTION THAT MAY BE ADOPTED MUST BE WORKABLE AND EQUITABLE. I REALIZE THE IMMENSE COMPLEXITY OF THE PROBLEM, BUT I HOPE YOU AND YOUR COLLEAGUES WILL FIND A WAY TO WORK IT OUT WITHIN THE GENERAL CONFINES OF THESE PRINCIPLES."

This, of course, refers to the amendments which would specifically make irrigation, power and similar uses the primary duty of water west of the 97th meridian. These amendments were voted down, both by the River and Harbors Committees and by the Flood Control Committees. They were also defeated by political shenanigans in a vote on the floor of the House.

In effect the President now serves notice on the Congress and the Corps of Engineers, as well as on the various interests actively lobbying for the over-all navigational priority, that the huge expenditure authorizations, most stupendous in the nation's history, for the River and Harbor and Flood Control programs do not meet his approval as drafted; obviously a measure that does not meet his approval cannot become law without his signature, unless it is passed over his veto, an improbable outcome.

When Congress went away to the political tournaments both bills were processed for consideration on the floor of the Senate and House. As emphasized by Mr. Roosevelt, nothing has been done to safeguard irrigation and other beneficial uses in the West. The whole business will have to be put through the mill again when Congress gets down to brass tacks, after Labor Day. There is no reason to expect any normal proceedings by the Congress until about the middle of September. Congress really has worked very hard this season and it is entitled to any rest or recreation it may find away from the killing heat of the capital, even if it spends its vacation campaigning.

Other reclamation developments

The Missouri River report by the Bureau of Reclamation, which apparently interests you out there in the West, recommends $200,000,000 for development of the irrigation and power in the Upper Missouri basin, in the first stages. The complete program integrates around the Oahe reservoir on the Missouri in the Dakotas, eight miles above Pierre, S. D., with a capacity of 19,600,000 ac.-ft. It would desilt the stream flow, control floods, regulate water for navigation, generate power, and supply irrigation for 750,000 ac. west of the James river, in eastern South Dakota. Sen. O'Mahoney of Wyoming has already introduced S. 1915 to authorize the initial stage of the program.

The 160-ac. limitation modification clause was thrown out of the bills now pending which affect the Central Valley. On the other hand, the bills carry provision for the building of a reservoir for flood control, by the Engineers, on the Kings River, which would provide water for the irrigation of new lands without cost to the owners. The entire subject of 160-ac. limit modification and the Kings River reservoir is so controversial, with much bitterness focused on Ickes, from California, that the whole problem is befogged and uncertain at this time. Hearings will be held during the recess in California, to develop local opinion.

All potential reclamation projects in the 17 western states were enumerated by Reclamation Commissioner Harry W. Bashore, at the request of Sen. Carl Hayden of Arizona, before the Senate Committee on Postwar Economic Planning and Policy. He presented an inventory of 236 projects, with 6,700,000 ac. of new lands and 9,365,000 ac. of land capable of expanded production. This would total about 135,000 new farms. Power plants added would produce a total of 1,765,000 kw. for pumping and other needed operation.

Sen. Hayden plans to bring the program more insistently to the front in Congress as the timing warrants the action. Plans have been well laid and the campaign to bring the program to the attention of the nation will be furthered by the National Reclamation Association under the direction of Secretary-Manager Floyd O. Hagie. The urgent need for agricultural expansion is well known here, and it is assumed pressure for food, both here and abroad, will rapidly become sharply apparent as the liberated countries gradually begin to function. Bashore estimates the program will absorb 56 per cent of the 1,250,000 man-years of work required in the Eastern, Southern and Mid-western states.

Water supply

Geological Survey reports stream flow for May was subnormal in the Pacific Northwest, central and northern California, southern Arizona and southern New Mexico. In northern and eastern Nevada, southern Utah, northern and western Arizona and in southern California stream flow was above normal. Snow surveys of Soil Conservation Service report great improvement of prospects in the entire Colorado River

basin, as well as most of Utah, and predict ample water for summer needs. California and Nevada snow reports indicate subnormal conditions but probably sufficient supplies for irrigation. The outlook in the Columbia basin is reported as a deficiency of drought proportions.

Bureau of Reclamation has revoked withdrawal of lands of a large part of the Humboldt project in Nevada, and similar action was taken in connection with the lands in the Hondo project in New Mexico, the Klamath and Vale projects, both in Oregon; the Okanogan and Yakima projects, in Washington. Lands in the Anderson Ranch Reservoir area of the Boise project in Idaho were withdrawn from entry late in May.

Willis C. Barrett, sent to China by the State Department as technical adviser to the Chinese National Conservancy Commission, returned to America in June after travelling in the provinces of Szechuan, Kansu, Ningsia, Shensi and Honan, visiting the sites of 25 flood control projects on the Yellow River. He also visited projects under way north of the Nan Mountains, and in the tributary valleys of the Wei River. Barrett went to China from the Imperial Valley Irrigation District in California. He is associated with the U. S. Department of Agriculture.

Power development ceiling

For the time being, under war conditions, it appears to be the judgment of the responsible war Government officials that we have reached the end of expansion in the installation of additional electric power capacity. Over 8,000,000 kw. have been added to the supply. During 1944 approximately 700,000 kw. will be added. Further expansion is temporarily arrested chiefly by need of equipment in Naval vessels, and manpower. They tell us here there is now more aggregate electric power plant installed in Naval vessels than there is in all power installations on land. Department of Commerce says the supply of electric power has kept step with increasing demands, last year's 32,000,000,000 kw. hr. representing 16.8 percent growth above 1942. Last year domestic consumers used 28,800,000,000 kw. hr., more than 1,800,000,000 kw. hr. over 1942 use. Few experts can determine how the increase was used. All agencies now urge conservation. Treasury Department wishes to be recorded as denying any impression abroad that it opposes reduction in rates by any public utility.

Office of Inter-American Affairs

The so-called Rockefeller unit of the war Government, reports many South American nations are actively programming development of water power. Chile, Uruguay, Argentina, Bolivia, Brazil, Colombia and Peru have made extensive enquiries here. Some of these nations have already taken steps to develop long-range projects. Most of the installations are under the supervision of United States firms, and equipment either planned or actually purchased, comes from the United States. American engineers are employed while Latin-American engineers apparently are learning how to do the job.

Federal Power Commission has authorized the California Electric Power Company, Riverside, Calif., to merge its facilities with the electric utility facilities of Leonard P. Wickoff, located at Twenty Nine Palms, San Bernardino Co., Calif. The community is 60 mi. from the nearest point on the CEPC system, and an interconnection will be constructed. Palm Springs District rates will be charged in Twenty Nine Palms, with an estimated saving of $10,000 per year to the customers, and better service.

The road bills

Shortly before the recess the House Roads Committee reported the new $1,500,000,000 postwar construction bill, forecast in these columns last month. The re-written bill was originally introduced by Chairman Robinson of Utah, head of the House Roads Committee. It is reported here the new bill, HR. 4915, is the result chiefly of the interminable squabble that developed in the committee hearings. The representatives of various elements in New England demanded adjustments that were stubbornly opposed with reason by those who represented other sections; and the representatives of Colorado units are reported to have particularly introduced an element of discord that moved the committee to come to the conclusion it would be wise to save money. There was some hint that the Government agencies interested were not convinced that some claims for preferment were unconnected with land development schemes.

While the earlier bill for $3,000,000,000 apportioned funds for Federal-aid highways, for secondary and feeder roads, on a basis of a third each for population, area, and postroad mileage, and for urban roads or a basis of population, the new bill allocates funds for each type one-half for population and a fourth each for area and postroad. This is identical with the first Robinson bill, HR. 2426, sponsored by the American Association of State Highway Officials.

There is now no limitation on the funds immediately available for obligation when construction is valid after the war. At the rate of 60 percent the first year, and 50 percent the second and third years, in matching State funds, the Federal $500,000,000 may be spent each of the 3 successive years. Federal-aid highways, in or out of cities of 10,000 or over, are apportioned $250,000,000; secondary and feeder roads, $125,000,000; and $150,000,000, principal arteries in cities on the Federal-aid system. One and one-half percent may be allocated to any State for surveys, planning, engineering, and economic investigations. Federal funds will pay for all railroad grade separations, and 50 percent of right-of-way and property damage. State forest roads receive $25,000,000 annually; forest development roads and trails, $12,500,000; national park roads and trails, $4,250,000; parkways, $5,000,000.

The Interregional Highway System is incorporated in the Federal-aid system, something over 40,000 mi., as the National System of Interstate Highways. The highest allocation would go to New York, $30,000,000; Texas next with $29,000,000; and California, fifth, with $21,245,000. Other States of the Pacific slope apparently will receive less than $11,000,000 each. The bill will come up for discussion in the House late in Fall.

Meanwhile the general planning program in the various States is delayed by lack of technical and general manpower. This condition also causes marked lags in the program of the Federal Government.

Highway problems of the Office of Defense Transportation hereafter will be supervised by the new Highway Transport Department, which absorbs the Divisions of Motor Transport and Local Transport. This agency, and the Public Roads Administration, recently announced nearly 4,000,000 motor vehicles went out of use in the past two years, and have not been replaced. In the States of the Pacific slope the decrease is: Arizona, 3.2 percent; California, 5.4 percent; Colorado, 4.6 percent; Idaho, 5.3 percent; Montana, 8.2 percent; Nevada, none; New Mexico, 6.1 percent; Oregon, 2.2 percent; Washington, 2.2 percent; Wyoming, 4.7 percent. Utah has had an increase of 2.7 percent, and is the only State in the Union to have more motor vehicles than it had two years ago.

Closing Congress actions

HR. 4625 was enacted in the closing days of the session extending for four years the life of the Alaskan Highway Commission.

As usual, during the last hectic days before the recess for the biennial convention party, Congress passed a number of appropriation acts which cannot be reported competently at this writing. It takes considerable time to disentangle many curious apparent conflicts of the data. Two bills, of primary interest to the Pacific Coast, are the $49,000,000,000 military appropriation for 1945, and the Navy appropriation for $27,500,000,000 cash, plus $5,000,000,000 authorizations. Another appropriation of $3,000,000,000 was designated as the last-minute-catch-all for items not otherwise enumerated or programmed. The Navy appropriation is the biggest on record. Like the military appropriation, it includes a large slice for planes, and for re-conditioning and construction, all of which will be spent in large part on the Pacific Coast. The Army bill carried $15,436,031,795 in new funds. Over $36,000,000,000 consisted of re-appropriations. In the closing days also the President signed the bill for the construction of the Hungry Horse dam in Montana.

Army urges it be known there must be an increase in transport facilities, in port facilities, in railroad plant, and in ships, especially westward across the United States toward the Orient. The present effort is to remove potential bottlenecks by bringing railroads, port facilities, and shipping, on the westward route, to comparative equality. More effort is being expended to bring western railroads up in capacity.

OBITUARIES . . .

George Wiley Jones, for over twenty years Los Angeles county road commissioner, died at Los Angeles on June 13 at the age of 61. He had spent over thirty years with the county government. Coming to California from his native state of Illinois, he joined a Southern Pacific Railway Co. surveying crew in Los Angeles at an early age. Later he went into the employ of a private surveyor and subsequently joined the engineering department of the city. Following that he became associated with the county road department and in 1914 he was made first assistant to Commissioner F. H. Joyer, whom he succeeded in that position five years later. He was a member of the American Society of Civil Engineers.

* * *

D. E. Nickerson, executive secretary of the Oregon State Federation of Labor, on June 30 died at his home in Portland at the age of 56. He had been affiliated with the labor movement since he was 16. Before his appointment as executive secretary, Nickerson had served as vice-president and president of the Federation of Labor. He was a member of the regional war labor board, the Multnomah county civil service commission, the Portland housing authority and the Oregon state postwar planning committee.

* * *

A. H. Koebig, Sr. of the engineering firm of Koebig & Koebig, Los Angeles, Calif., died recently after a long illness. He was 92. He had been a resident of Los Angeles for 60 years and at one time was assistant chief engineer of the A. T. & S. F. Ry. In 1888 he entered private practice and in 1910 took his son, A. H. Koebig, Jr., into partnership, under the firm name of Koebig & Koebig. While he has been inactive in recent years because of ill health, he retained an interest in the firm up to the time of his death.

* * *

Clark Elias Smith, draftsman and building contractor of Pasadena, Calif., died at the age of 42 at the Sawtelle Veterans Hospital of pleural pneumonia. In July, 1942, he enlisted in the Army Air Corps, and was subsequently assigned to a post in Salt Lake City. He was honorably discharged from the service last March because of ill health.

* * *

Edwin Tomlin, 59, president of the British Columbia Cement Co., Ltd., died at Victoria, B. C., recently after a lengthy illness.

* * *

James Bartlett Woodland, retired contractor and carpenter of Monrovia, Calif., died June 18 at the age of 86. He retired from active business in 1928.

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Frank J. Hill, 48-year-old contractor of Sherman Oaks, Calif., was burned to death June 26, when his home was destroyed by fire. His family was away on a vacation trip at the time the fire occurred.

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Walter Wieland of Yakima, Wash., died at the age of 53, after an illness of six months. He has been in the floor contracting business at Yakima for 30 years.

* * *

Jeptha A. Wade, chief engineer of the California Water Service Co., San Jose, Calif., died July 4 in that city. He was an active member of the American Society of Civil Engineers.

* * *

Edson Comstock Harris, contractor of Pasadena, Calif., died June 8 at the age of 84.

Oregon Builders Strive For State License Law

OREGON CONTRACTORS are planning a movement to bring about a state license law for contractors, similar to those now in effect in California and other states. L. C. Simms, president of the Portland Home Builders Association, and other members of his group are preparing a proposed act to be introduced at the next session of the state legislature opening in January, 1945.

The movement stems from a fear of a repetition of unpleasant experiences suffered following the last war. At that time, Portland was over-supplied with amateur carpenters who promptly became "contractors." These men not only undercut prices, but also quality, and gave an unsavory reputation to the entire building profession. It is hoped that establishment of a licensing act will require contractors to possess and maintain certain standards of experience and ability, while denying the right to practice as a contractor to those whose performance and record do not meet the standards. Simms has received favorable support from labor leaders, heavy construction contractors and others concerned with postwar construction.

Pacific Pipeline Wins Natural Gas Contract

CONTRACTS have been let to the Pacific Pipeline Construction Co. for construction of the first two sections of a $4,000,000 natural gas pipeline between the Goleta oil and gas field northwest of Santa Barbara and the city of Los Angeles. The purpose of the new line is to augment the natural gas supply of the city and it is anticipated that a net increase of 7,000,000 cu. ft. per hr. will be made available through the new line. The gas is furnished by the Pacific Lighting Corp., which plans to increase the capacity of its Goleta compressor station and drill two additional wells in the field. Southern Counties Gas Co. is constructing the line from Goleta to Ventura and will convert its pressure plant at the latter city to compress the gas to a discharge pressure of 1,000 lb. per sq. in. The Southern California Gas Co. is constructing the line between Ventura and Los Angeles. The gas will enter the latter company's distribution system at its Haskell Ave. compressor plant in the San Fernando valley. The amount of the two contracts is: Goleta to Ventura, $519,000; Ventura to Los Angeles, $573,000.

Maritime Commission Announces Plan For Surplus War Material Disposal

CARL W. FLESHER, West Coast Regional Director for the U. S. Maritime Commission, announces a unified procedure for disposal of surplus property in which first preference in obtaining material will be given contractors in the shipbuilding industry, then to other government departments or war contractors, industries re-converting to civilian production, and last to competitive bidders. Coordinating agencies for this program are under the direction of the Surplus Property Section of the Procurement Division in Washington, D. C.

Supplies are to be segregated at the shipyard until use or sale of unrequired property is made. If material can be used on other construction, it will be allocated, obviating the purchase of new material.

When the War Production Board requests that available material be sold to persons or firms engaged in war industry, or in re-conversion to civilian production, then a negotiated sale, without competition, may be authorized. Otherwise, property will be advertised for sale with invitations issued for bidding and the bids will be opened in public. All such sales will be conducted by the district purchasing officer of the Commission. Purchasing Officers on the Pacific Coast are located in San Francisco, San Pedro, Portland, Ore., and Seattle, Wash.

Under this set-up the Surplus Property Section in Washington will issue general statements of classes, quantities, and types of material which are available, and will answer specific inquiries from other government departments or war contractors about material on hand. Persons who wish to be on the mailing list for statements must list type of commodities desired. No property will be sold in excess of maximum prices established by the governmental agency having jurisdiction.

The Editor's Mail...

Dear Sir: I trust it is not too late to say that your editorial, "Planning Is Inadequate," in May *Western Construction News*, is to be commended. Telling the truth when truth is not complimentary is dangerous business, now as ever.

Everywhere there has been much talk and little action. It is to be hoped that Builders of the West will succeed in a way that will shame the people whose activity is limited to talk around a well-supplied dinner table.

Wishing you every succes, I am,

Very truly yours,

GILBERT H. HOGUE.

Friant, Calif.

* * *

Dear Sir: Enclosed is a check for a two-year subscription to your publication, also two copies of the Engineers Hand Manual (Griffith Charts).

I had one but my commanding officer saw it and liked it so much that he would not wait for one to be sent to him. Would you mail them first class postage?

Your publication is looked for far in advance by myself and most of the other men. Thanking you in advance,

Yours truly,

JOHN SENSABAUGH.

APO 957, C/o PM, San Francisco.

Bressi-Bevanda Resumes New Mexico Contract

CONTRACT has been re-awarded to Bressi & Bevanda Constructors, Los Angeles, Calif., for earthwork and tunnel construction on the Tucumcari, N. Mex., project of the Bureau of Reclamation. The work embraces a 7,100 ft. tunnel and operations will be carried on from each end. In addition, canal sections adjacent to the portals are part of the contract. The same firm was originally awarded the contract, but work was stopped in November, 1942, on order of the War Production Board. The principal change in specifications is the use of steel for tunnel supports instead of timber because lumber is now a critical construction item. Completion of the project will enable irrigation of 45,000 ac. of land in the Arch Hur Conservancy District.

Duties of Lockheed Engineer Explained at Award Ceremony

J. RUSSELL WEIL, plant engineer of Lockheed Aircraft Corporation in Burbank, Calif., was recently awarded a five-year diamond studded service pin. As a joke, the maintenance department also presented him with a very large edition of a super award on which was inscribed, "A plant engineer is a person who passes as an expert on the basis of being able to turn out, with prolific fortitude, infinite strings of incomprehensible formulae, calculated with micromatic precision, from vague assumptions, which are based on debatable figures, taken from inconclusive experiments, carried out with instruments of problematical accuracy, by a person of doubtful reliability, questionable mentality, for the avowed purpose of annoying and confounding a hopelessly overworked group of key personnel, usually referred to and generally known as Maintenance Supervision."

Northwest Firms Employed to Rebuild Military Equipment

THE ARMY ENGINEERS have brought 22,000 pieces of construction machinery and automotive equipment which have been used in construction of airbases, training camps and other war projects, to the northwest, in which area they are being distributed to the equipment firms for reconditioning prior to reissue to government construction agencies. The equipment has come from Alaska, Canada and offshore bases, and when repaired will be assembled at Engineer Supply Depots for reassignment. The assignment to private business concerns is under the direction of Col. Ralph A. Tudor, District Engineer of Portland.

El Paso Gas Company Votes Bonds for New Construction

THE EL PASO Natural Gas Co. has voted issuance of additional bonds in the amount of $1,500,000 to finance construction of facilities for salvaging natural gas now being wasted in the Lea County, N. Mex., field operated by the company. Included in the project are a dehydration plant, a treating plant, a 4,000 h.p. compressor station and 75 mi. of pipeline. It is anticipated that the new facilities will increase gas supplies in the El Paso-southern New Mexico region by 22,000,000 cu. ft. daily. Work is expected to begin about the first of October.

Carol and Lupescu Will Enjoy Lighted Fountain

AN ORNATE illuminated floating fountain designed by the General Electric Illuminating Laboratory in 1939 for King Carol II of Rumania will follow him to Mexico shortly. The three tons of electrical material was auctioned recently for $2,000 to the municipality of Mexico City, the sole bidder, by Edward H. Barrett, of the Underwriters Salvage Company. The fountain, when completed, will float in a lake at Chapultepec Park within view of the exile residence of Carol and his consort, Elena Lupescu.

Originally intended for the Royal Palace at Bucharest, the fountain is designed to throw several jets of water from twelve to sixty feet in the air, under which blue, red, green, and amber lights play. Carol had fled to Mexico City before it was shipped, and until recently the electrical equipment has been stored in forty-five cases in a New York City warehouse.

Northwest Naval Ammunition Depot Planned on Hood Canal

IT HAS BEEN announced by the headquarters of the 13th Naval District in Seattle, Wash., that 6,500 ac. of land are being acquired near Bangor on the Hood canal for an ammunition depot. Condemnation proceedings have been instituted and owners have been notified to vacate by September 15. A connection will be built from the site to the new rail line now under construction linking Bremerton and Shelton. The combined cost of the ammunition depot and railroad has been estimated at $18,000,000.

Navy Will Build an Advance Base Port on Tacoma Harbor

CONSTRUCTION of an advance base port at the city of Tacoma has been announced by the Navy in Washington, D. C. The establishment will be situated in the tide flats industrial area. The sum of $2,420,000 has been ear-marked for initial construction. Included in the installation will be nine warehouses, an administration building, roads, trackage and improvements on existing buildings to add shop facilities totalling 21,500 sq. ft.

NEW BOOKS...

MASONRY—Published by American Standards Association, 29 West 39th St., New York 18, N. Y. 34 pages, 10½ x 8. Price 50 cents.

One of a series of booklets presenting recommended basic building code requirements being developed by the Building Code Correlating Committee of the Association, this manual introduces recommended code requirements for non-reinforced masonry. It includes definitions and tests of various masonry materials, discusses allowable stresses, lateral support and other requirements, and sets standards for all masonry structures.

PERSONALLY SPEAKING

Guy F. Atkinson, contractor, was awarded the honorary degree of doctor of science by Willamette University, Salem, Ore., at that institution's 102nd annual commencement. Atkinson personally directed the construction of the Roosevelt naval base at Los Angeles, Calif., for which his firm was awarded the Army-Navy "E." He is well known for his work on western dam projects, one of the largest being Grand Coulee dam. The current wartime projects of the Atkinson firm stretch from the Aleutians to Texas.

* * *

Donald S. Walter, engineer for the Bureau of Reclamation, having completed his work at Boulder Dam, where, as field engineer, he was in charge of tunnel modifications and river channel improvements, recently transferred to Anderson Ranch dam in Idaho, where he is field engineer on construction of the earthfill dam and appurtenant structures.

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Prof. A. Diefendorf, head of the civil engineering department of the University of Utah, has been elected president of the Utah Society of Professional Engineers. **A. Le Roy Taylor,** of the University, is first vice-president, and **Elton W. Pace,** second vice-president. **Ralf Rumel Wooley,** engineer of the U. S. Geological Survey, was re-elected secretary for the 20th consecutive year. **R. K. Brown,** named treasurer for the 25th time, received a special silver life membership card.

* * *

W. E. Anderson, district engineer for the Soil Conservation Service at Montrose, Colo., has been transferred to Tucson, Ariz., where he occupies a similar position. He will supervise engineering and construction activities for the Soil Conservation Districts in southwestern Arizona. Among other projects he will be particularly engaged in flood control and bank protection investigations for the Santa Cruz River and its tributaries for possible postwar development. **James S. Webb,** formerly regional engineer of the Grazing Service at Gallup, N. Mex., succeeds Anderson as district engineer at Montrose.

* * *

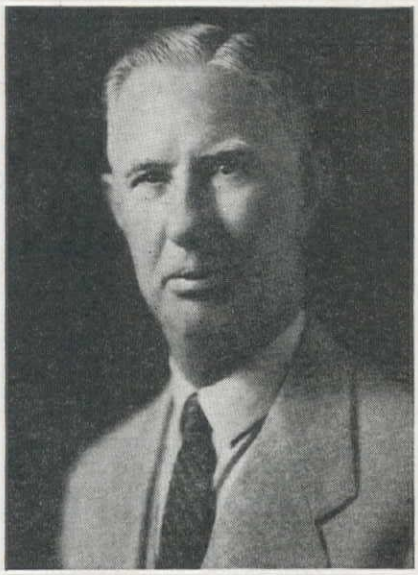
William H. Tuller, formerly manager of the Boise project of the Bureau of Reclamation, has been named regional chief of operations and maintenance in the Bureau's new regional office at Boise. **E. N. Torbert** of Boise will be regional chief of project planning. Tuller will be succeeded by **Forrest Sower,** manager of the Nampa-Meridian reclamation project for the past 10 years.

* * *

E. M. Barber, vice-president of Columbia Steel Co. and engineer in charge of construction of the Geneva, Utah, steel plant for the company, has been assigned new duties as assistant to the vice-president in charge of engineering and operations of the U. S. Steel Company. He will be stationed at Pittsburgh, Pa.

* * *

Harrison R. Baker, a member of the California State Highway Commission, and **John H. Mutchler,** whose terms expire on the Pasadena City Planning Commission, Pasadena, Calif., have been unanimously re-appointed for four year terms by the board of city directors.



DR. GUY F. ATKINSON

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A. E. Holgate, for 7 years assistant right-of-way engineer of the Nevada state highway department and for the past two years on leave of absence working with construction companies on defense projects in Nevada, has opened his own engineering business at 43 Sierra Street in Reno.

* * *

Tom Paul of Sound-Kiewit Construction Co., Seattle, Wash., has been transferred to Los Angeles, Calif., to manage the new office established by the organization in that city. His place on the Board of Directors of the Mountain Pacific Chapter of A.G.C. has been filled by **Paul Jarvis** of Puget Construction Co.

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Lt. Col. Harold E. Hedger, formerly chief engineer of the Los Angeles county flood control district, and now serving on the staff of the chief of engineers in Washington, D. C., has been proposed as head of a new department which will consolidate all public works carried out in Los Angeles county.

* * *

W. R. Southworth, for the past two years assistant superintendent on erection of the Pit No. 5 powerhouse for the Pacific Gas & Electric Co. at Big Bend, Calif., has been appointed by the company as field engineer in connection with additions to the Bellota Sub-station at Stockton, Calif.

* * *

The following men of the Kennett Division of the Bureau of Reclamation are furloughed from their work at Shasta dam while serving in the armed forces: Army—**Charles B. Leighton, Alfred J. Jones, L. T. Irwin, Pierce L. Hussey, Preston F. Jones, James A. Hedges, James M. Chadick, Wood R. Cox, Theodore L. Fenner, Harlan H. Giese, Thomas G. Finlayson;** Navy—**Gilbert N. Ball, James L. Darnell, Jr., Walter M. Enger, Jim L. Hudson, Archie L. Leffler, John R. Bohannon, Harold B. Zimmerman, William J. McCrystle.** These names constitute but a few of the many who have entered the armed services from Kennett Division.

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Robert L. Fosdick, engineer of the National Battery Company, Altadena, Calif., has been awarded the Air Medal in recognition of exceptionally outstanding achievements on many bombing missions over continental Europe. He is serving in England as an engineer-gunner on a Flying Fortress.

* * *

Axel Swanson, assistant superintendent of maintenance in the Colorado state highway department, has resigned from that post because of a dispute over his right to draw salary during a six months' period of illness.

* * *

William Jackson Hart, III, draftsman and engineer at the William Miller Company, Pasadena, Calif., was recently graduated from the U. S. Naval Reserve Midshipmen's School at the University of Notre Dame. He was commissioned as an ensign.

* * *

Howard William Biler, formerly with the engineering department of the Lockheed Aircraft factory in Burbank, Calif., is now serving with the Army Air Corps. He is taking armament training at Lowry Field, Denver, Colo.

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A. B. Mason, formerly designing and field engineer with the International Boundary Commission in El Paso, Tex., has established a private practice in civil engineering at San Benito, Tex.

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William E. Waste has been elected vice-president of Marinship Corporation, owners of an important shipyard at Sausalito, Calif. He has been general manager of the shipbuilding operation since it began in March, 1942.

* * *

J. F. Anderson, formerly administrative assistant and warehouse superintendent for the Kaiser Co. at their Richmond, Calif., plant, has accepted a position as engineer with the Associated Engineers, Beverly Hills, Calif. **Larry Bogart** is chief engineer for this company.

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A. Segel has been appointed city engineer and deputy commissioner of Fresno, Calif. The appointment became effective on July 1.

* * *

Isadore Thompson, formerly associated with Fred W. Kellberg, has opened his own structural engineer consulting service at 58 Sutter St., San Francisco, Calif.

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William A. Bugge has announced his intention to resign as county engineer of

SUPERVISING THE JOBS

Jefferson County, Wash., to take a position with the Asphalt Institute in Portland, Ore.

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P. F. Henderson, for many years an engineer in the Los Angeles, Calif., office of the Indian Service, is now a Commander in the Navy somewhere in the South Pacific.

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Aubrey Davis, Lester H. Brooks and **Melvin W. Oldham,** well known men in the construction industry, have established a firm known as the Dabrol Co., in Oakland, Calif., which will engage in the welding and construction equipment business.

* * *

J. B. Cain, supervisor of construction and maintenance in the Seattle city building department since 1937, has been named chief of that department.

* * *

Virgil C. Buster, recently released by the Navy because of injuries received in the South Pacific, is now working with the J. I. Barnes Construction Co. on their contracts at Terminal Island, Calif.

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T. N. Moore has moved to Imperial Beach, Calif. He is assistant field engineer for the contractor on construction of amphibious training base at Fort Emery. J. H. Pomeroy Co. holds the contract.

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E. D. Beasley, after fifteen months of fighting in the Southwest Pacific, has returned to Texas, where he is general mechanic operator on road maintenance for the Post Engineer at Camp Barkley.

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V. L. Leigh has been named President of the Builders' Exchange at Victoria, B. C. **G. H. Wheaton** is vice-president, **W. J. Hamilton,** secretary-treasurer, and **Walter Luney, J. A. Pollard, H. J. Langdon, A. Davies, J. N. Anderson, G. Ede, F. Hawes, W. Mensizes, C. Bartle** and **D. Smith,** directors.

* * *

Carl James is employed as a scraper and dozer operator by the Soil Conservation Service in Oklahoma.

W. R. ENGSTROM

W. R. Engstrom of the building and engineering firm of Austin Company, with offices in Seattle, Wash., Cleveland, Ohio, and elsewhere, is managing the company's contract for the U. S. Navy at Smiths Cove, Seattle. **Arthur Peterson** has been appointed general superintendent on the work. **Jack Gudsund** is superintendent, assisted by **F. Van Antwerp, Clyde Rettig, E. T. Brown, Martin Carlson, Ed Spangler** and **J. A. Boyd. L. Cavanaugh** is office engineer and **Eugene Royale,** field engineer.

* * *

G. P. Smallwood is general superintendent on construction of personnel and administration buildings for the U. S. Navy at U. S. magazine and net depot, Seal Beach, Calif. Others directing work on the job are **G. C. Schweser,** chief field engineer; **Ed Ogle, Frank Gabrielson** and **Emil Hanson,** carpenter foremen; **W. J. (Mike) Waters** and **F. T. Pinkston,** labor foremen; and **Charles Gauthey,** concrete foreman. This is a $1,468,703 contract recently awarded to Wm. P. Neil Company, Ltd., Los Angeles, Calif.

* * *

On Alaska contracts held by Morrison-Knudsen, various well known superintendents are expediting the work. The location of the projects may not be revealed, but they are given by contract number. On Contract 674 **Carl Cockriel** is superintendent, **Al Versteeg** is clerk, and **Ralph Woolworth** and **Gus Rothert** are key men. On 671 **R. R. Van de Water** is superintendent and **R. C. Borgerding** is clerk. On 892 **Merle H. Rimer** is superintendent. **Howard Hartley** is clerk on this contract. On 678 **Al Mourtsen** is superintendent and **Leonard West** is clerk.

J. Henry Harris is acting as general superintendent on his San Francisco and Richmond, Calif., excavating contracts. He is being assisted by **Frank McIntire** and **Walter Todd,** foremen; **R. H. Wood,** master mechanic; **G. E. Bjorson,** shop foreman; **Byron Justus,** welding foreman; **Lloyd Bush,** transportation dispatcher. **M. McGraw** is office manager.

* * *

Hugh Coker, formerly superintendent for Morrison-Knudsen Co., Inc., on landing strip construction at an airfield in Maricopa Co., Ariz., is now supervising construction for M. H. Hassler, contractor of Santa Ana, Calif., on earth lining and road surfacing work on Coachella Canal in Imperial and Riverside Cos., Calif. **James Morton** is office manager. The contract was let on a bid of $392,560.

* * *

L. W. Prock, who superintended the gravel pit operations for Hein & Bishop at Pit River No. 5 project in northern California, has been appointed job superintendent on plantmix repair work in Lassen and Modoc counties. **Paul Harmsen** is crusher foreman; **Tony Robson,** hot plant foreman, and **Cliff Tapp,** office manager on the $77,333 job recently awarded to E. B. Bishop, Orland, Calif.

* * *

George Thompson is superintendent on two building contracts in Kennewick, Wash., recently awarded to the Seattle construction firm of Strand & Son. Contracts are for 300 privately owned and 200 public trailers at a total cost approximating $210,000. Under the supervision of Thompson, the company recently completed 140 dwelling units in Seattle.

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Capt. Eric E. Mattson is superintending the dredging at the Alameda, Calif., Naval Air Station for the San Francisco Bridge Co., which was awarded the contract at $418,510. Master of the dredge is **J. R. Francis;** chief electrical engineer, **D. L. Hofer;** levee superintendent, **Einar Johnson;** timekeeper and clerk, **W. E. Bundy.**

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Mark Haney is superintending various work on county road and city streets in Benton Co., Wash. This is a $163,877 contract secured by M. E. Nelson Construction Co., Ephrata, Wash. Other key men on the work are **Gus Chopp,** equipment foreman; **Ed Schmidt,** foreman; **Ted Brown,** office manager.

* * *

Laurence Ostberg is general superintendent for Norden Construction Co., Los Angeles, Calif., on a $1,500,000 dwelling project comprising 283 bungalows in Los Angeles. **G. E. Carlson** is project manager and **Jerry Johnson** is general foreman.

* * *

Otto Johnson is in charge of the construction of a $155,527 laundry and shop

building at the Naval Hospital, Mare Island, Calif. The contract is held by Barrett & Hilp, San Francisco. **Robert Smith** is a key man on the same job.

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A. V. Toolson, assisted by **Joe Young,** is superintendent for Gibbons & Reed Co., Salt Lake City contractors, on concrete paving and taxiway extensions at the Army Air Field in Kingman, Ariz. **W. J. McNaughton** is office manager. Contract price is $465,946.

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J. N. McPhee is job superintendent, **I. A. Mabey,** job office manager and **J. W. Lillywhite,** job engineer, for Del E. Webb Construction Co., Phoenix, Ariz., on their more than $2,500,000 contract for additional aviation facilities at the Marine Corps Air Station at El Toro, Calif.

* * *

Curry Green has been named general superintendent by the Brazos Valley Construction Co., Mineral Wells, Tex., on a more than $100,000 contract for road work at Odessa, Tex. **Bob Long** is job superintendent and **R. I. Pruitt** is purchasing agent.

* * *

David Asch, superintendent, is in charge of construction of detention units and miscellaneous buildings at Shoemaker, Calif. **Frederick Mertz** is office manager, and **John Newton** is purchasing agent. This is a $2,452,445 contract awarded to A. Farnell Blair, San Francisco contractor.

* * *

Ruben Haffner is job superintendent, **Howard Walter,** gravel and oiling superintendent, and **Roger Hanson,** office manager, for Stanley H. Arkwright, Inc., Billings, Mont., on that company's $108,408 contract for grading and surfacing 2.2 mi. and constructing drainage structures on the Terry-Glendive road, Mont.

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A. A. Dunn, of the contracting firm of Louis C. Dunn, San Francisco, is supervising work on a $620,254 contract which his firm holds for construction of miscellaneous buildings at the Naval Air Station, Alameda, Calif. **M. W. Garing** is project manager on the job, and **T. P. Williams** is purchasing agent.

* * *

William Hoops, Jr., is job superintendent and **W. Osterloh** is office manager for Hoops Construction Co., Twin Falls, Idaho, on the company's $51,840 contract for 50 mi. of seal coating on State Highway No. 25 and U. S. Highways Nos. 30-N, 30-S and 30 in various Idaho counties.

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R. M. Makemson, assisted by **G. Bonham** as grade foreman, **C. M. Jarnagin** as concrete foreman and **L. W. Tate** as timekeeper, is superintending grading and surfacing work in Navajo county, Ariz., for Wallace & Wallace, Phoenix, Ariz., who received the contract at $163,325.

* * *

L. W. Hanson is in charge of a $489,580 contract for paving open storage areas at the Naval Supply Depot in Clearfield, Utah, for the firm of Gibbons & Reed, Salt Lake City. **C. R. Tillotson** is engineer, **W. H. Bacon** is office manager, and **Elmo Culbert** is timekeeper.

JOE W. DOUGLASS

John Paroline is in charge of the $94,780 contract held by the firm of Piazza & Huntley, San Jose, Calif., for 9.2 mi. of road repair in Butte County, Calif. **Joe W. Douglass** is his assistant.

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Carl E. Larson is superintending construction of additional aviation facilities at the Marine Corps Air Station in Santa Barbara for the contractor, P. J. Walker Co., Los Angeles, Calif., who was recently awarded the contract at $886,666. Project manager is **H. B. Rightmire** and purchasing agent is **Earl H. Doolittle,** both in the Los Angeles office of the contractor.

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George A. Thatcher is superintendent in charge of purchasing on construction of 340 portable shelter units for the FPHA at East Los Angeles, Calif., contract for which was recently let to Geo. B. Thatcher, North Hollywood constructor, at $204,716. Project manager is **H. R. Wattelet.**

* * *

Frank Watt of Frank Watt Construction Co., Portland, Ore., is supervising the construction of four bridges on the Halsey-Harrisburg section of the Pacific Highway, east, under a $59,150 contract. **Chet Sissons** is the assistant superintendent; **L. M. Watt,** timekeeper and purchasing agent.

* * *

Karl Poss is job superintendent for Fredrickson & Watson Construction Co., Oakland, Calif., on construction of additional concrete apron at the Naval Air Station in Alameda, Calif. **Cy Ribisi** is foreman and **Bill Bailey,** office manager. Contract was awarded at $169,000.

* * *

Ralph J. Gibbs is job superintendent for Ross B. Hammond, Portland, Ore., on construction work consisting of buildings, roads, spur tracks, etc. at the Columbia Metals Corporation plant at Salem, Ore. Contract was recently awarded at $124,255.

* * *

Louis Larson is supervising the building of an addition to a recreation building at the Naval Hospital, Farragut, Idaho, for the firm of Clyde Ludberg, Spokane, Wash. **Morrie Hudson** is construction manager on the $77,880 contract.

* * *

Knud Jensen, of the firm of Carl N. Swenson, San Jose, Calif., is supervising that company's $695,661 contract for construction of shop structures and a hangar at Moffett Field, Calif. **Arnold Swenson** is his assistant on the job.

* * *

John W. Farrel is superintending the construction of a carrier landing field and roads at the auxiliary air station at Holtville, Calif., for his firm, Warren-Southwest, Inc., Los Angeles. The contract is for $138,456.

* * *

Leonard Redden is job superintendent, **T. Davis,** office manager, and **Sid Fisher,** project engineer on the $164,704 contract recently awarded to E. W. Duhame, Phoenix, Ariz., for additional hospital facilities in the city of Yuma, Ariz.

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Elwyn W. Simpson is acting as project manager on the $480,000 contract awarded to his firm, Case Construction Co., San Pedro, Calif., for dredging in Morro Bay, Calif. **Chase McCoy** is dredge captain.

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M. H. Willits is job superintendent and **W. F. Knox,** office manager, for the firm of Tuefel & Carlson, Seattle, Wash., on the construction of a $200,000 laundry plant for Model-Washington Laundry Co., in that city.

* * *

Bud Bacus is superintendent and **Roy Copley** is his assistant superintendent for Piazza & Huntley, San Jose, Calif., on that company's $313,045 contract to strengthen two runways at the Oakland, Calif., municipal airport.

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Joe Olson is superintendent for Barrett & Hilp of San Francisco on a $259,140 contract for extension of storage facilities at the submarine center building in Mare Island Navy Yard, Calif.

* * *

G. F. Hyatt, superintendent for Case Construction Co., San Pedro, Calif., is supervising dredge repair work in Oakland, Calif., contract for which was recently awarded this firm at $252,000.

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Leonard Runkle, assisted by **Duane Amens,** is supervising construction of an air field at Port Orford, Ore. This is a $225,237 contract awarded to Leonard & Slate, Portland, Ore.

* * *

C. L. Wright is superintendent on the Austin Company's $1,000,000 contract for construction of 236 dwellings in Los Angeles, Calif. **W. H. Stearns, Jr.,** represents the owner on the job.

* * *

Albert Mangs is superintending the paving and utilities construction for hospital car facilities at Dibble General Hospital, Palo Alto, Calif. Haas Construction Co., San Francisco, secured this contract for $89,961.

UNIT BID SUMMARY

Highway and Street . . .

Montana—Mineral Co.—State—Surf.

Union Construction Co., Inc., Great Falls, Mont., at $484,230 was low bidder before the Montana State Highway Commission on 10.3 mi. of gravel surfacing with plantmix surface coarse on two highways, the first between Lookout Pass and Superior, the second between St. Regis and Tarkio. The largest single item in the bid is that for unclassified excavation and borrow, of which over 600,000 cu. yd. are involved. Another unusually high item is that tor random riprap, over 50,000 cu. yd. being required. The work is to be completed by June 30, 1945. The following unit bids were submitted:

(A) Union Construction Co., Inc.....$484,230
(B) S. Birch & Sons Construction Co..... 488,115
(C) Big Horn Construction Co..... 505,401
(D) Colonial Construction Co..... 572,773
(E) Clifton & Applegate 576,784
(F) McLaughlin, Inc. 599,631
(G) Northwestern Engineering Co.....$599,695
(H) Inland Construction Co..... 605,648
(I) Lowdermilk Bros. 620,884
(J) Max J. Kuney Co..... 674,941
(K) Engineer's estimate 606,225

(1) 638,444 cu. yd. uncl. excav. and borrow
(2) 493 cu. yd. culv. excav.
(3) 7,397,040 sta. yd. overhaul
(4) 109,522 cu. yd. select mat.
(5) 114,914 yd. mi. overhaul on sel. mat'l
(6) 90,237 T. base course crush. grav. surf.
(7) 24,618 T. Gr. "A" top course grav. surf.
(8) 1,735 T. stone chips in place
(9) 4,800 T. binder
(10) 9,600 yd. mi. overhaul on binder
(11) 13,650 gal. watering
(12) 14,513 T. plant mix surf. course
(13) 206,355 gal. 150-200 Pen. asph. cem.
(14) 36,009 gal. prime coat oil with MC-2
(15) 48,195 gal. seal coat oil with 150-200
(16) 482 lin. ft. 18-in. C.M. pipe culv.
(17) 66 lin. ft. 24-in. C.M. pipe culv.
(18) 94 lin. ft. 30-in. C.M. pipe culv.
(19) 80 lin. ft. 48-in. C.M. pipe culv.
(20) 60 lin. ft. 15-in. R.C.P. culv.
(21) 36 lin. ft. 18-in. R.C.P. culv.
(22) 156 lin. ft. 24-in. R.C.P. culv.
(23) 38 lin. ft. 18-in. R.C.P. ex. str.
(24) 114 lin. ft. relay pipe culv.
(25) 33 acre clearing
(26) 26 acre grubbing
(27) 16,924 lin. ft. lam. wood guard rail, cem. post
(28) 51,933 cu. yd. random riprap
(29) 54 ea. conc. sta. marker
(30) 100 ea. conc. r/w mon.
(31) 2 ea. conc. proj. marker
(32) 9.45 MFBM treated lumber
(33) 0.59 MFBM untreated lumber
(34) 12 ea. tr. tim. piles 25-ft. lg.
(35) 1 ea. tr. tim. piles 32-ft. lg.
(36) Lump sum, rev. exist'g str. maint. tr.
(37) 5,000 T. stockpile cr. grav.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
(1)	.20	.18	.19	.27	.23	.23	.28	.28	.30	.30	.23
(2)	1.00	1.50	1.00	1.00	2.00	1.00	1.30	1.90	3.00	2.00	1.00
(3)	.005	.0075	.005	.0075	.005	.005	.01	.005	.005	.01	.01
(4)	.20	.18	.30	.25	.39	.40	.28	.31	.75	.35	.25
(5)	.11	.20	.12	.12	.14	.20	.12	.13	.15	.08	.10
(6)	.65	.69	.70	.80	.85	.70	.90	.65	.90	.80	.75
(7)	.85	.80	.80	.90	1.00	.90	1.10	.95	1.00	.90	.90
(8)	4.00	3.90	3.50	4.00	3.75	7.00	4.00	4.00	3.00	5.00	3.00
(9)	.05	.05	.01	.16	.10	.04	.05	.50	.40	.50	.30
(10)	.01	.05	.01	.08	.05	.02	.12	.13	.15	.08	.15
(11)	1.10	1.50	1.25	2.00	1.50	1.00	1.50	1.50	2.00	1.50	1.50
(12)	2.60	2.75	2.75	2.90	3.50	3.50	3.00	2.75	3.00	2.00	3.00
(13)	.10	.09	.10	.11	.10	.10	.103	.104	.10	.10	.09
(14)	.12	.15	.13	.12	.14	.12	.12	.135	.12	.12	.11
(15)	.14	.12	.13	.12	.13	.13	.11	.12	.11	.12	.13
(16)	3.00	2.50	3.50	1.80	2.90	3.25	2.40	2.60	3.50	3.50	3.00
(17)	4.00	3.40	4.50	2.00	3.95	5.00	3.60	3.90	5.00	5.00	4.00
(18)	6.00	6.45	7.50	2.50	7.10	6.50	6.50	7.00	9.00	7.00	5.00
(19)	12.00	10.10	12.50	4.00	10.95	14.00	12.00	12.60	14.00	12.50	10.00
(20)	2.00	2.10	3.00	1.80	2.25	2.00	2.10	2.00	2.50	3.75	3.00
(21)	3.00	2.50	3.75	2.00	2.85	2.50	2.30	2.60	3.50	4.00	3.50
(22)	4.00	3.75	4.75	2.50	3.15	3.25	3.50	4.30	5.00	5.50	4.50
(23)	4.00	2.75	4.00	3.00	4.20	3.00	2.50	2.90	3.70	4.00	4.50
(24)	2.00	1.00	1.00	2.00	2.00	1.00	1.00	1.90	1.30	2.00	1.00
(25)	200.00	150.00	250.00	100.00	150.00	150.00	150.00	195.00	200.00	250.00	100.00
(26)	200.00	100.00	150.00	100.00	150.00	100.00	150.00	195.00	100.00	100.00	75.00
(27)	1.85	2.00	1.90	1.00	2.40	1.75	1.50	2.70	2.10	2.50	2.00
(28)	1.10	.80	1.25	1.25	1.15	2.00	.80	1.50	1.40	1.00	2.00
(29)	5.00	4.50	5.00	4.00	5.00	4.00	5.50	7.50	5.00	7.50	4.00
(30)	4.00	3.50	4.00	4.00	4.00	3.00	3.40	5.00	4.00	5.00	4.00
(31)	25.00	10.00	25.00	15.00	10.00	15.00	10.00	10.00	10.00	25.00	15.00
(32)	200.00	200.00	175.00	150.00	180.00	200.00	200.00	155.00	170.00	200.00	200.00
(33)	200.00	150.00	175.00	100.00	180.00	100.00	150.00	130.00	120.00	150.00	200.00
(34)	40.00	60.00	65.00	50.00	70.00	30.00	75.00	45.00	70.00	125.00	40.00
(35)	50.00	75.00	100.00	60.00	75.00	40.00	100.00	60.00	90.00	160.00	45.00
(36)	$1,000	$1,000	750.00	$1,500	500.00	$2,000	$2,000	$1,000	500.00	$1,000	400.00
(37)	.85	.70	.80	.75	.75	.90	1.00	.80	.70	.90	.90

Washington—Benton Co.—State—Surf.

M. E. Nelson Construction Co., Inc., Ephrata, with a bid of $163,877 was low to the Washington Department of Highways and has been awarded the contract to construct 8.3 mi. of county road and state highway No. 3 between Richland and Kennewick. Length of time for completion is 90 calendar days. The following unit bids were submitted:

(1) M. E. Nelson Construction Co., Inc...$163,877
(2) Roy L. Bair & Co..... 179,371
(3) Goetz & Brennan.....$181,021
(4) Max J. Kuney..... 228,922

	(1)	(2)	(3)	(4)
Lump sum, clearing and grubbing	$5,000	$3,000	$3,400	$9,000
55,870 cu. yd. unclass. excav. incl. haul of 600 ft	.43	.80	.68	1.10
120 cu. yd. uncl. trench excav. incl. haul of 600 ft	2.00	2.00	2.00	2.00
17,590 cu. yd. sta. overhaul on above materials	.02	.02	.02	.02
888.45 M. cu. yd. sta. overhaul on above materials	6.00	10.00	6.00	6.00
2,850 cu. yd. structure excavation	2.50	2.00	2.00	3.50
444.2 stas. (100 ft.) finishing roadway	15.00	10.00	10.00	5.00
9,140 cu. yd. cr. stone surf. top cr. in place on rdwy	1.95	2.50	2.00	3.00
27,260 cu. yd. ballast in place on roadway	1.45	1.00	1.70	1.90
4,180 M. gal. water	2.00	1.75	2.50	2.00
LIGHT BITUMINOUS SURFACE TREATMENT, METHOD A				
7.1 miles preparation, const. and finishing	150.00	100.00	300.00	200.00
215 T. bit. cement MC-2 in place on roadway	32.00	30.00	36.00	33.00
1,630 cu. yd. furn. and placing cr. cover stone	3.60	3.00	3.75	3.50
BITUMINOUS SURFACE TREATMENT "PLANT MIX" TYPE CLASS F				
110 cu. yd. furn. and place new fine mineral aggre	3.70	3.00	3.75	4.00

(Continued on next page)

LORAINS ARE IN THE THICK OF IT *everywhere!*

In London, Lorain Moto-Cranes clear away wreckage after the London "Blitz".

In the South Pacific, a Lorain Crane salvages a wrecked Jap destroyer.

In Italy, a Lorain scoops up debris from a bombed building to clear the way for the advance.

In the Aleutians, when it isn't snowing or freezing, Lorains have mud conditions such as this to contend with.

THE Turnpike, Radio City, the Alcan, Big Inch, the Pan American Highway and scores of other big-time jobs . . . Lorains are veterans of them all. But never have Lorains tackled jobs as big, as important, or as tough as those you'll find them working on, at the fighting fronts the world over.

Right now, these jobs in Italy, the Aleutians, in Britain and the South Pacific are full-time operations for Lorains, but there are other big jobs coming up; the postwar program of equally important, necessary, at-home jobs.

Lorains will again be available for whatever material handling job that comes your way, but with this essential difference; because of their wartime experiences, improvements and developments, Lorains will be equipped even better, to serve you profitably.

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***LeROI-RIX MACHINERY CO., Los Angeles; CATE EQUIPMENT CO., Salt Lake City; *LIBERTY TRUCKS & PARTS CO., Denver; *COAST EQUIPMENT CO., San Francisco; WILSON EQUIPMENT & SUPPLY CO., Cheyenne, Wyo.; *A. H. COX & CO., Seattle 4, Wash.; *COLUMBIA EQUIPMENT CO., Portland, Ore., Spokane, Wash.; BUNTING TRACTOR CO., LaGrande, Ore. — Boise & Twin Falls, Idaho; STATE TRACTOR & EQUIPMENT CO., Phoenix, Ariz.; CONNELLY MACHINERY COMPANY, Billings & Great Falls, Mont.; SANFORD TRACTOR & EQUIPMENT CO., Reno, Nevada.**

****Carries a representative stock of spare parts***

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thew-Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

10 T. bit. cement MC-2 (pr. coat) in pl. on rdwy.	38.00	40.00	36.00	36.00
25 T. bit. cement MC-2 "Plant Mix"	30.00	28.00	36.00	33.00
580 T. furn. min. aggre. mixing and place. bit. mix.	10.00	7.50	8.50	9.00
NON-SKID SINGLE SEAL TREATMENT—SCHEDULE A				
220 cu. yd. furn. and placing coarse cr. sc. ⅝ in. to ¼ in.	3.60	3.50	4.00	4.00
80 cu. yd. furn. and placing fine cr. sc. ¼ in. to 0	3.75	3.50	4.00	4.00
24 T. bit. cement RC-5 in place on roadway	38.00	40.00	36.00	33.00
MISCELLANEOUS ITEMS				
82.23 cu. yd. con. Class B in place	40.00	50.00	45.00	60.00
1,435 lbs. steel reinforcing bars in place	.12	.10	.10	.15
694 lin. ft. stand. guard rail Type No. 5 in place	1.50	2.50	2.00	2.50
56 only furn. 8 in. x 8 in. tr. gd. rail posts	1.00	3.00	2.00	8.00
3,170 cu. yd. loose riprap Class "A" in place	1.50	4.50	2.50	1.50
8 only conc. right-of-way markers in place	10.00	5.00	2.00	4.00
4 only reflector units complete in place	25.00	10.00	8.00	10.00
30 only asph. conc. traffic buttons in place	6.00	5.00	1.50	5.00
202 lin ft. asph. conc. traffic bars in place	2.25	2.00	1.50	2.00
540 lin. ft. special concrete curb in place	3.00	2.00	1.40	2.00
1 only 72-in. drain gate "Calco Model 100" or equal	500.00	500.00	370.00	500.00
14 only metal meas. box gates complete in place	35.00	15.00	20.00	20.00
858 lin. ft. remov. and replace. exist. cable gd. rail	1.00	1.50	.50	1.25
3 only remov. and resetting exist. pipe drng. inlet	50.00	25.00	5.00	7.00
1 only remov. and resetting existing valve box	100.00	25.00	10.00	40.00
141 only relaying 12-in. conc. pipe headers	10.00	15.00	5.00	12.00
1,551 lin. ft. relaying conc. pipe, 12 in. diam.	1.00	.60	1.00	1.70
791 lin. ft. special conc. irrig. pipe, 4 in. diam., in place	.80	.45	.40	.60
2,790 lin. ft. spec. conc. irrig. pipe, 6 in. diam., in place	1.00	.60	.45	.80
60 lin. ft. wrought steel pipe, 6 in. diam., in place	2.25	3.00	2.50	4.00
44 lin. ft. pl. corr. metal culv. pipe, No. 8 ga., 72 in. diam, in place	20.00	25.00	20.00	30.00
265 lin. ft. pl. conc. or V.C. sewer pipe, 4 in. diam., in place	.80	.45	.40	.60
791 lin. ft. pl. conc. or V.C. sewer pipe, 6 in. diam., in place	1.00	.60	.50	.80
12 lin. ft. pl. conc. or V.C. sewer pipe, 8 in. diam., in place	1.25	.70	.70	1.00
1,170 lin. ft. pl. conc. or V.C. culv pipe, 12 in. diam., in place	1.60	1.40	1.20	1.90
51 lin. ft. pl. conc. or V.C. culv. pipe, 18 in. diam., in place	2.75	2.30	2.00	3.00
423 lin. ft. std. reinf. conc. culv. pipe, 18 in. diam., in place	3.25	3.00	2.25	3.50
81 lin. ft. std. reinf. conc. culv. pipe, 24 in. diam., in place	5.00	4.00	3.50	5.50
28 lin. ft. std. reinf. conc. culv. pipe, 36 in diam, in place	8.00	9.00	7.50	11.00

California—San Diego County—State—Grade & Surf.

Griffith Co., Los Angeles, submitting a bid of $107,957, was the low bidder to the California Div. of Highways, Sacramento, on construction of a city street in San Diego between the Linda Vista housing project and the San Diego river. The total length of the project is about 1.4 mi. and surfacing is to be with plantmix material. Unit bids submitted were as follows:

(1) Griffith Co. $107,957
(2) B. G. Carroll 109,957
(3) Ralph O. Dixson $103,423
(4) J. E. Haddock, Ltd. 119,687

	(1)	(2)	(3)	(4)
850 cu. yd. removing concrete	3.35	3.00	3.00	2.90
Lump sum, clearing and grubbing	$1,700	$1,500	$3,500	$2,000
48,500 cu. yd. roadway excav.	.66	.70	.60	.74
500 cu. yd. structure excav.	3.00	2.00	2.50	5.00
650 cu. yd. ditch and channel excav.	1.85	2.00	.80	1.90
450,000 sta. yds. overhaul	.01	.01	.01	.012
Lump sum, developing water supply and furn. watering equipment	$1,500	$2,300	$2,000	$2,000
1,150 M. gals. applying water	1.60	1.00	2.00	1.55
77 stas. finishing roadway	13.00	15.00	15.00	17.00
4,500 T. imported base material	2.20	1.60	3.00	2.45
43 T. asphaltic emulsion (Sl. Ct. & Pt. Bdr.)	45.00	50.00	35.00	40.00
250 T. screenings (seal coat)	3.00	4.00	5.00	5.50
2,700 T. mineral aggregate (R.M.S.)	2.60	1.70	2.75	2.15
170 T. liquid ashpalt, MC-2 or 3 (R.M.S.)	17.00	22.00	20.00	18.50
21,000 sq. yds. mixing and comptg. R.M.S.	.13	.18	.12	.13
25 T. liquid asphalt., MC-2 (prime coat)	37.00	50.00	30.00	24.00
4,200 T. plant-mixed surfacing	4.20	5.10	4.50	5.00
30 cu. yds. Cl. "A" P.C.C. (structures)	50.00	30.00	45.00	44.00
350 lbs. bar reinf. steel	.10	.10	.10	.10
48 ea. monuments	4.00	3.00	3.50	5.00
200 lin. ft. laminated guard railing	2.15	2.00	3.00	2.50
20 ea. culvert markers	3.60	3.00	3.00	3.50
10 ea. guide posts	5.50	3.00	3.00	4.00
400 lin. ft. 18-in. R.C.P.	3.50	3.00	3.00	3.50
260 lin. ft. 24-in. R.C.P.	4.40	4.00	4.00	4.60
1 ea. timber spillway	30.00	25.00	25.00	40.00
35 lin. ft. timber down drains	1.50	1.50	2.00	1.40
2,400 lin. ft. 10-in. water main	3.40	3.00	4.00	3.75
700 cu. yd. trench excavation	2.40	5.00	3.00	2.80
400 cu. yd. trench backfill	1.85	.50	1.30	2.45
250 cu. yd. sand backfill	2.30	2.50	2.00	3.50

Arizona—Coconino County—State—Pave.

Arizona Sound & Rock Co., Phoenix, was the low bidder at $321,702 to the Arizona State Highway Dept., Phoenix, for grading, drainage, base course, Portland cement concrete pavement and salvaged bituminous shoulders on the Ash Fork-Flagstaff Hiway from 3 mi. west of Flagstaff to 8 mi. west of that city. Contract was awarded to the low bidder. Unit bids submitted were as follows:

(1) Arizona Sand & Rock Co. $321,702
(2) P. D. O. C. 321,756
(3) J. E. Skousen 331,250
(4) Tanner Construction Co. 357,657
(5) Wallace & Wallace $378,428
(6) H. L. Royden 392,765
(7) Western Contracting Corp. 401,198

	(1)	2)	(3)	(4)	(5)	(6)	(7)
61,956 cu. yd. roadway excav. (unclassified)	.78	.65	.95	.75	1.00	1.25	1.60
1,610 cu. yd. drainage excav. (unclassified)	.78	.65	1.25	.85	1.50	1.75	.50
500 lin. ft. crown ditches	.20	.20	.25	.15	.10	.40	.10
590 cu. yd. structural excav. (unclassified)	1.75	2.50	3.50	2.50	2.75	4.50	2.25
101,255 sta. yd. overhaul	.015	.02	.03	.01	.03	.05	.01
4,879 cu. yd. mi. haul	.25	.25	.40	.25	.40	.40	.20
40,380 T. imported borrow	.81	.40	.70	.70	.85	.64	.75
38,910 T. base material	.95	.85	.80	.90	1.00	1.03	.95
6,820 M. gal. sprinkling	1.75	2.00	1.50	2.00	2.20	2.15	2.00
1,420 hr. rolling	3.50	5.50	5.00	3.75	4.50	4.50	4.00
49,558 sq. yd. concrete pavement	3.05	3.40	3.00	3.70	3.50	3.57	3.35
172 cu. yd. Class "A" concrete (incl. cement)	30.00	38.00	32.00	50.00	40.00	50.00	35.00
42 cu. yd. Class "B" concrete (incl. cement)	31.00	35.00	36.00	40.00	39.00	40.00	35.00
654 lb. reinforcing steel (bars)	.14	.15	.20	.10	.10	.15	.15
99 lin. ft. 18-in. plain conc. pipe (except excav.)	3.50	4.00	3.00	4.00	3.80	3.00	5.70
591 lin. ft. 21-in. plain conc. pipe (except excav.)	4.00	4.65	4.00	4.75	4.40	4.00	6.80
70 lin. ft. resetting 24-in. C.M.P.	1.50	1.50	2.50	1.50	1.50	3.00	3.00

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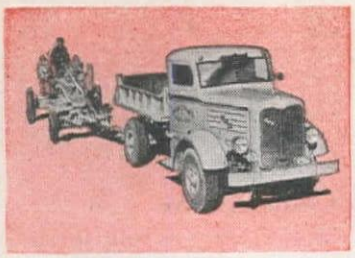


THIS YEAR MORE ROAD MAINTENANCE WITH LESS MANPOWER . . . DEMANDS MORE *Truck-Power!*

The problem of maintaining America's highways this year, with less manpower available, puts still greater responsibilities upon the equipment available. FWDs can be relied upon to do the many necessary jobs to keep roads conditioned for vital service.

Pulling scarifiers and leaning-wheel graders . . . leveling washboard surfaces, ruts and sinkholes with underbody scraper . . . hauling gravel, sand, asphalt heaters for pavement patching . . . and many other heavy duty road maintenance jobs are "all in the day's work" for FWDs. Rugged, powerful and economical in performance, these modern trucks with power in all four wheels offer more "truck-power" as an effective answer to the problem of less manpower.

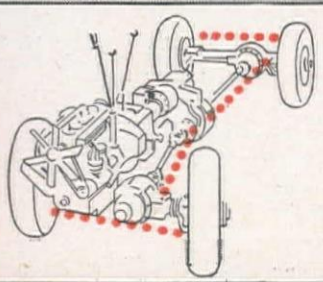
Thus keeping America's roads fit for duty, FWDs speed America's inevitable Victory.

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis. *Canadian Factory: Kitchener, Ontario*

The Oldest and Original Exclusive Builders of Four-Wheel-Drive Trucks

FWD Distributors: **Feenaughty Machinery Co.** Portland—Seattle—Spokane; **Intermountain Equipment Co.** Boise, Idaho, and **Steffeck Equipment Co.** Helena, Montana

FWD TRUCKS



Four-Wheel-Drive... THE BACKBONE OF RUGGED, DEPENDABLE TRUCK HAULING POWER

The true application of four-wheel-drive with center differential provides ability to get through under difficult conditions — increased surety and safety on the road — lower operating cost per ton-mile — long service life.

ARMY E NAVY

BUY MORE WAR BONDS

IN EVERY FIELD WHERE TRUCK QUALITY IS PUT TO THE TEST, FWD'S STAND UP

COMMERCIAL · CONSTRUCTION · UTILITIES · OIL-FIELDS · MILITARY

25 cu. yd. plain riprap	15.00	12.00	10.00	10.00	8.00	4.00	16.00
349 ea. guide posts	3.50	4.00	4.00	5.00	5.00	4.25	5.00
49 ea. R/W markers (Type "B")	4.50	4.50	6.00	5.00	5.00	4.50	5.00
5,978 T. salvaging and relaying bitum. mix (on shoulders, road connections and intersections)	1.45	1.90	2.40	2.00	2.00	1.85	2.60
210 T. cutback asph. (MC-2) (for bitum. mix)	23.00	27.00	24.00	30.00	30.00	29.00	32.00
500 T. screenings	5.00	5.00	6.00	5.00	6.00	6.00	5.00
80 T. emulsified asph. (Cl. "A") (for seal ct.)	30.00	30.00	30.00	35.00	35.00	32.00	60.00
780 T. salvaging and stockpiling bitum. mix	1.20	1.60	1.40	1.25	1.80	1.25	1.25

Washington—Clark County—State—Grade & Pave.

The United Contracting Company, Portland, Ore., submitted the low bid of $92,797 to the Department of Highways, Olympia, and was awarded the contract for improving Grand Ave., between East Seventh St. and the north city limits of the City of Vancouver, Fourth Plain Ave. from Grand Ave. to the east city limits of Vancouver and Secondary State Highway No. 8-A from Vancouver easterly, 3.87 mi., by paving with asphaltic concrete, constructing asphaltic concrete bus stops, screened gravel foot path, concrete curbs and sidewalks, and other incidental items. Time for completion of the project has been set at 120 calendar days from Feb. 1. The following total and unit bids were submitted:

(1) The United Contracting Co. $92,797
(2) Porter W. Yett 93,092
(3) Warren Northwest, Inc. 95,782
(4) J. C. Compton Co. $ 98,290
(5) A. C. Goerig Construction Co. 107,982

	(1)	(2)	(3)	(4)	(5)
4,910 cu. yd. common excav., incl. haul	1.00	.80	1.05	1.00	.75
30 cu. yd. common trench excav., incl. haul	1.75	2.00	1.75	1.50	2.00
370 cu. yd. structure excav.	2.50	2.50	3.00	1.25	2.00
146.3 stas. (100-ft.) finishing roadway	15.00	16.00	12.00	15.00	2.00
2,980 cu. yd. selected roadway bor. in place, incl. haul	1.40	1.00	1.75	1.00	1.30
1,380 cu. yd. crushed stone surf. top course in place	3.50	3.00	3.00	3.60	2.80
1,140 cu. yd. crushed stone surf. base course in place	3.50	3.00	3.00	3.30	2.60
370 cu. yd. one course screened gravel surf. (sidewalk) in place	2.90	3.00	2.50	3.50	6.30
159 M. gal. water	2.50	2.00	2.00	3.00	6.00
TYPE I-1 ASPHALTIC CONCRETE PAVEMENT					
2,796 T. Class "C" wearing course in place	7.75	7.75	7.78	8.25	10.00
4,702 T. Class "E" base course in place	7.50	8.00	7.90	8.25	9.00
MISCELLANEOUS ITEMS					
3,538 lin. ft. spec. conc. curb des. No. 1 std. 14 day 5 sk. mix in pl.	.85	1.00	1.10	1.00	1.00
62 lin. ft. spec. conc. curb des. No. 2 std. 14 day 5 sk. mix in pl.	1.00	1.20	1.40	1.00	1.00
1,997 sq. yd. one crse. cem. conc. sidewlk. std. 14 day 5 sk. mix in pl.	2.20	2.00	2.25	2.00	2.00
8 ea. spec. conc. catch basin des. No. 2 (modified) compl. in pl.	50.00	50.00	50.00	50.00	50.00
22.5 M. spec. brick dry well (brick in place)	76.00	60.00	75.00	75.00	90.00
15 ea. spec. brick dry well (top and cover in place)	60.00	75.00	50.00	100.00	200.00
93 ea. asph. conc. traffic buttons in place	5.00	6.00	4.50	5.00	2.50
350 lin. ft. asph. conc. traffic bars in place	1.00	2.50	1.25	1.00	2.50
6 ea. reflector units Type No. 1 complete in place	2.50	3.50	3.00	5.00	20.00
10 ea. adjusting existing manhole to grade	20.00	3.00	15.00	25.00	25.00
325 sq. yd. removing existing asph. conc. pavement	.40	.40	.50	.50	.25
25 sq. yd. removing existing cem. conc. sidewalk	.40	1.00	.50	1.00	1.00
245 lin. ft. relaying corrugated iron pipe 12-in. diam.	.75	2.00	.50	1.50	.60
252 lin. ft. plain conc. or V.C. sewer pipe 8-in. diam. in pl.	1.00	1.50	1.00	1.00	1.00
627 lin. ft. plain conc. or V.C. culvert pipe 12-in. diam. in pl.	1.50	1.75	1.45	2.00	1.50

New Mexico—McKinley Co.—State—Surfacing

J. E. Skousen, Albuquerque, N. Mex., at $63,057 was low bidder to the State Highway Department and received the contract for surfacing the 42 mi. of U. S. Highway No. 66 between Gallup and Grants, with some structures. Unit bids were received as follows:

(1) J. E. Skousen $63,057
(2) Henry Thygesen & Co., Inc. 72,468
(3) Walter L. Denison $76,734

	(1)	(2)	(3)
300 hr. rolling	4.50	4.00	6.00
20 cu. yd. mortar rubble masonry	20.00	25.00	50.00
80 lin. ft. standard 24-in. reinf. conc. pipe	4.00	6.00	6.00
16 lin. ft. standard 36-in. reinf. conc. pipe	7.00	8.00	10.00
2,600 cu. yd. crushing of surfacing	.80	2.00	1.50
100 cu. yd. hauling and placing base course surf.	1.50	3.50	6.00
7,000 cu. yd. hauling and placing oil treated surf.	2.30	2.40	1.15
5,200 bbl. cutback asphalt Type MC-3	1.50	1.80	1.47
3,000 sq. yd. reprocessing oil mat	.50	.60	.50
300 cu. yd. base course surf. (for pave. repairs)	7.00	3.00	6.00
2,600 bbl. emulsified asph. Type AE-100	1.60	1.80	1.05
100 cu. yd. premixed oil treated surf.	10.00	7.00	18.00
87,000 sq. yd. scarifying and relaying old oil mat	.06	.06	.06
7,500 cu. yd. scarifying and hauling old oil mat and base course	.85	1.00	1.30
2,800 cu. yd. screening stockpiled chats	.90	.70	2.10
360 cu. yd. crushing chats (for seal coat)	2.75	4.50	8.00
2,000 cu. yd. crushing chats (for stockpile)	3.00	4.70	6.00
500 cu. yd. screening sand (for seal coat)	1.00	2.00	5.00
500 cu. yd. screening sand (for stockpile)	1.20	2.30	4.00
2,100 cu. yd. hauling and placing cover material	1.80	1.20	2.40

Utah—Box Elder Co.—State—Pave.

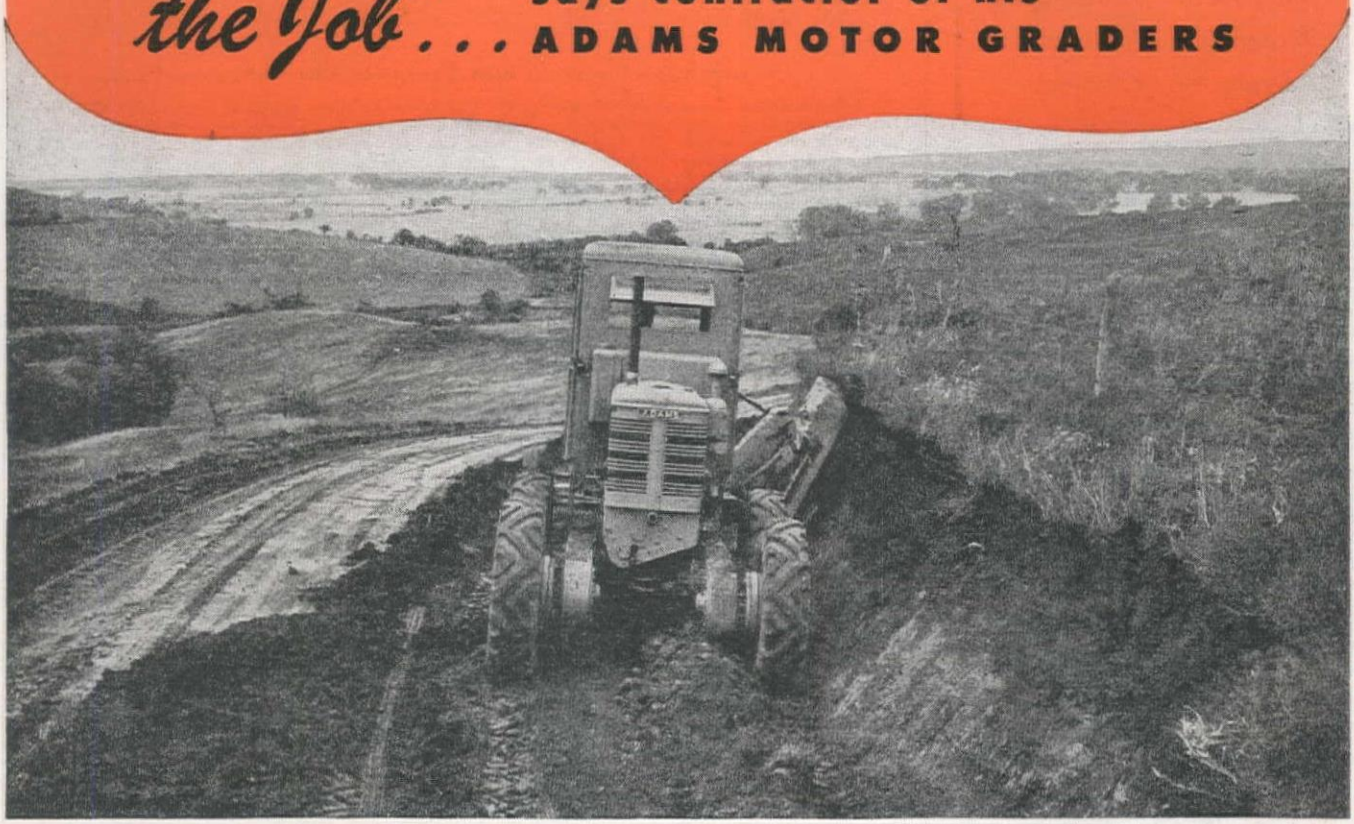
Ora Bundy & Co., Ogden, Utah, submitted the low bid of $121,201 to the Utah State Road Commission, Salt Lake City, for construction of concrete pavement on 2.1 mi. of highway between Brigham and Corinne. Unit bids were submitted as follows:

(1) Ora Bundy & Co. $121,201
(2) W. W. Clyde & Co. 121,353
(3) Olof Nelson Construction Co. 124,019
(4) W. W. Gardner $147,966
(5) Engineer's estimate 115,544

	(1)	(2)	(3)	(4)	(5)
37,000 sq. yd. concrete pavement	2.26	2.50	2.40	2.75	2.35
13,500 gal. bituminous material, Type MC-3	.12	.12	.12	.20	.11
2,100 gal. bituminous material, Type RC-5	.12	.15	.12	.20	.11
90 T. cover material	2.30	3.50	4.00	5.00	2.50
8,200 sq. yd. scarifying and mixing	.30	.25	.30	.45	.07
2.0 miles scarifying existing bit. surface	750.00	300.00	200.00	400.00	300.00
18,700 T. cr. rock or cr. gravel surf. crse.	1.05	.56	.75	1.10	.65
8,000 cu. yd. unclassified excavation	.38	.40	.50	.50	.40
40,000 sta. yd. overhaul, Class "A"	.02	.015	.03	.02	.02
500 yd. mi. overhaul, Class "B"	.16	.20	.30	.22	.20
50 cu. yd. channel excavation	1.50	1.00	1.00	2.00	1.00
300 hr. rolling	3.00	3.50	4.00	5.00	3.00
200 1,000 gal. watering	1.50	2.00	2.00	2.00	1.25
203 lin. ft. 12-in. concrete pipe	1.60	2.00	2.00	2.50	1.75
171 lin. ft. 18-in. concrete pipe	2.40	2.75	2.75	4.00	2.40

(Continued on next page)

"Most Valuable Machines on the Job" . . . says contractor of his ADAMS MOTOR GRADERS



One of a series of ads on Adams motor grader features

"We use our Adams Motor Graders in a dozen and one different ways," says a midwest road contractor, "and because they are so versatile, they are just about the most valuable machines on our jobs. Depending upon the job, of course, we use them for cutting back and finishing banks, for cutting and finishing the ditches, and for bringing the sub-grade to specifications. If the job happens to be a blacktop or stabilization mix, the graders do the mixing and spreading. The scarifier comes in handy many times and I am thinking perhaps we should have one of those bulldozer attachments for the front end of the machine for pushing rubbish off the right-of-way and for minor leveling operations."

Whether you are contractor or highway official, you, too, will find many profitable uses for Adams Motor Graders on the building and maintenance of roads and streets, airfields and flight strips, and in logging and strip-mining operations. If you have work connected with the war effort, perhaps you are eligible to obtain one of the few new machines allocated for this purpose. Talk the matter over with your local Adams dealer.

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 ☆

27 lin. ft. 24-in. concrete pipe	3.50	4.00	4.00	6.00	3.35	
1,162 lin. ft. 12-in. underdrains	1.20	1.00	.90	1.35	.90	
450 cu. yd. excavation for structures	1.00	1.00	2.00	3.00	1.00	
340 cu. yd. gravel backfill	1.40	1.50	1.00	2.00	1.25	
7.0 cu. yd. concrete, Class "A"	35.00	50.00	40.00	35.00	40.00	
12.0 cu. yd. concrete, Class "B"	30.00	40.00	40.00	30.00	40.00	
750 lbs. reinforcing steel	.10	.10	.10	.10	.10	
1,300 lbs. structural steel	.15	.20	.20	.12	.12	
2,110 lin. ft. curb No. 1-C	.90	1.20	1.75	1.45	1.50	
30 ea. removal of trees	5.00	15.00	10.00	12.00	10.00	
690 lin. ft. moving fence	.10	.10	.15	.25	.25	
2,930 lin. ft. fence, Type "A"	.12	.18	.15	.35	.15	
7 ea. 14-ft. gates	24.00	25.00	20.00	30.00	20.00	
3 ea. 4-ft. gates	13.00	12.00	12.00	15.00	8.00	
1 ea. F.A.P. marker	10.00	20.00	25.00	15.00	15.00	

Wyoming—Natrona and Fremont Cos.—State—Surf.

Wyoming Improvement Co., Cheyenne, Wyo., submitted the low bid of $83,148 to the Wyoming State Highway Department for construction of stone chip, seal coat and miscellaneous work on 89.4 mi. of the Casper-Shoshone and Shoshone-Thermopolis roads. The bid was well under the engineer's estimate. The following unit bids were submitted:

(1) Wyoming Improvement Co. ..... $ 83,148
(2) H. W. Read 93,632
(3) Big Horn Construction Co. 96,367
(4) C. C. Warrington 98,129
(5) Teton Construction Co. $106,308
(6) Taggart Construction Co. 120,300
(7) Engineer's estimate 99,670

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
11,500 cu. yd. excavation	.38	.30	.39	.38	.28	.21	.25
12,500 cu. yd. mi. haul	.14	.20	.15	.20	.15	.20	.20
55 hr. roller operation (backfill)	7.50	4.55	5.00	4.00	3.80	4.00	5.00
85 M. gal. watering (backfill and base)	2.50	2.00	2.00	3.00	3.80	2.00	3.50
15 hr. roller operation (base)	7.50	4.55	6.00	4.00	3.80	4.00	5.00
1,330 T. pit run gravel base crse. (2 in. max.)	.65	.78	.70	.80	.70	.80	.65
390 T. pit run gravel surfacing (1 in. max.)	.70	.78	.70	1.00	.75	.90	.75
20 T. med. curing liq. asph. (MC-3)	16.10	16.70	22.00	18.00	19.00	28.00	20.00
10 T. base treatment MC-1	16.10	16.70	22.00	18.00	20.00	31.00	20.00
1,800 T. seal coat RC-3	17.40	18.85	22.00	18.00	20.00	25.00	22.00
40 T. prime seal coat RC-2	17.50	18.85	22.00	18.00	20.00	31.00	22.00
4,100 sq. yd. processing roadway	.10	.065	.08	.10	.20	.10	.10
12,000 T. stone chips	3.52	4.20	3.90	4.60	5.10	5.50	4.25

California—Contra Costa Co.—State—Surf.

A. J. Raisch, San Jose, was the low bidder before the California Division of Highways with his proposal of $134,470 to repair with crusher run base and plantmix surfacing a net distance of 7.5 mi. on State Highway 75 between Route 106 and 2.5 mi. east of Antioch. Unit bids follow:

(1) A. J. Raisch $134,470
(2) Piazza & Huntley 142,131
(3) Lee J. Immel 148,357
(4) M. J. B. Construction Co. $168,481
(5) Charles L. Harney 182,597
(6) J. R. Reeves 191,163

	(1)	(2)	(3)	(4)	(5)	(6)
2,050 cu. yd. roadway excavation	.95	1.20	1.60	1.60	1.20	.75
Lump sum, developing water supply & furn. wtg. equip.	460.00	500.00	400.00	600.00	450.00	500.00
700 M. gal. applying water	1.50	1.50	1.85	2.00	2.70	2.50
24,620 T. crusher run base	2.28	2.50	2.45	2.60	3.00	3.98
57 T. asph. emulsion (pt. bdr. & sl.)	23.00	27.00	19.00	60.00	30.00	25.00
100 T. liq. asph., MC-1 (pr. ct.)	23.50	22.00	19.00	20.00	30.00	18.00
17,900 T. mineral aggreg. (P.M.S.)	3.10	3.30	3.65	4.25	4.50	3.88
983 T. paving asph. (P.M.S.)	16.00	14.00	15.00	18.00	19.00	17.00

Waterway . . .

California—San Luis Obispo Co.—U.S.E.D.—Harbor

Case Construction Co., San Pedro, Calif., and T. E. Connolly Co., San Francisco, Calif., as a joint venture, submitted the low bid of $1,226,600 to the Los Angeles office of the U.S.E.D. for dredging and breakwater construction at Morro Bay where an amphibious training base is to be established by the Navy. Two bidders submitted proposals on the entire project, while three others bid only on stone and concrete work. Schedule A involved the dredging portion of the work, while Schedule B was the stone and concrete. Schedule C included the entire project. The following unit bids were received:

	Sch. "A"	Sch. "B"	"Sch. "C"
(1) Case Construction Co., and T. E. Connolly Co.	$480,000	$786,600	$1,226,600
(2) Western Dredging and Construction Co.	630,000	986,900	1,473,900
(3) Guy F. Atkinson Co.	.....	560,000	.....
(4) Piombo Brothers Co.	.....	671,050	.....
(5) United Concrete Pipe Corp.	.....	874,300	.....

	(1)	(2)	(3)	(4)	(5)
320,000 cu. yd. dredge entrance channel	.30	.42	....	....	....
1,180,000 cu. yd. dredge navy and Morro channels	.30	.42	....	....	....
93,000 T. Cl. "A" stone—new construction	3.00	3.25	1.92	2.25	2.65
133,000 T. Cl. "B" stone—new construction	2.40	3.25	1.83	1.75	2.65
3,700 cu. yd. concrete—new construction	10.00	7.00	7.00	16.50	12.00
20,000 T. Cl. "A" stone—repairs	3.50	3.25	2.75	2.50	4.00
4,000 cu. yd. concrete—repairs	10.00	7.00	6.00	16.50	12.00
40,000 T. quarry waste—revetment levee	1.00	3.25	.75	1.20	2.50
Lump sum, conc. base for navigation light	$1,400	$3,500	$3,150	$4,000	$3,000

Sewerage . . .

California—Los Angeles County—County—Sanitary

Artukovich Bros., Hynes, Calif., submitted a low bid of $64,768 to the Los Angeles County Board of Supervisors for construction of sanitary sewers in El Selinda Ave., Eastern Ave. and other streets, involving a total of approx. 4.2 mi. of sewer. The engineer's stimate for the project amounted to $66,300. The following submitted bids:

(1) Artukovich Bros. $64,768
(2) Tom L. Gogo 68,669
(3) Bebek & Brkich 70,000
(4) V.C.K. Construction Co. 73,017
(5) Burch & Bebek $73,820
(6) M. F. Kemper 75,415
(7) C. O. & W. J. Brand 92,061
(8) Martin Construction Co. 97,489

(Continued on next page)

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MACMILLAN RING-FREE MOTOR OIL

MACMILLAN PETROLEUM CORPORATION
50 West 50th Street, New York 20, N. Y.; 624 S. Michigan Ave., Chicago 5, Ill.; 530 W 6th St., Los Angeles 14, Cal.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1,390	lin. ft. 8-in. VCP main sewer	3.00	2.40	2.25	2.25	2.75	3.00	3.94	4.49
20,800	lin. ft. 8-in. std. VCP main sewer	2.00	1.91	2.10	2.12	2.20	2.17	2.85	2.99
100	lin. ft. 6-in. VCP house connect.	2.00	2.00	1.80	2.15	2.00	1.91	3.00	2.99
5,950	lin. ft. 6-in. std. VCP house conct.	1.25	1.70	1.75	2.00	1.75	1.91	2.06	1.99
81	conc. sewer structures	135.00	180.00	150.00	163.00	150.00	175.00	175.00	199.00
1	trap manhole	175.00	260.00	200.00	200.00	200.00	179.00	190.00	299.00
1	double trap manhole	200.00	300.00	225.00	225.00	225.00	179.00	207.00	349.00
1	install 8-in. pipe in exist. manhole	50.00	150.00	75.00	50.00	50.00	20.00	175.00	149.00

California—Los Angeles Co.—F.W.A.—Interceptor

Bebek & Brkich, Los Angeles, Calif., submitted the low bid of $184,497 to the Federal Works Agency for a sanitary sewer interceptor line between Crenshaw Blvd. and 135th St. in Los Angeles county to Gardena pumping station of the Los Angeles County Sanitation District. The plans were prepared by the Federal Works Agency. The engineer's estimate amounted to $152,000. The following unit bids were submitted:

(1) Bebek & Brkich $184,497
(2) R. A. Wattson Co. 184,964
(3) Burch & Bebek 190,820
(4) George Miller 212,516
(5) Steve Rados 228,581
(6) V C K Construction Co. $228,676
(7) Artukovich Bros. 241,838
(8) P & J Artukovich 283,921
(9) Martin Construction Co. 360,578
(10) J. S. Barrett 364,205

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lump sum,	field office	750.00	150.00	500.00	700.00	750.00	$1,000	500.00	$1,000	$1,000	$1,000
374	lin. ft. 24-in. ext. str. VCP	20.00	9.38	22.00	12.00	15.00	18.00	30.00	30.00	26.00	47.00
2,346	lin. ft. 21-in. same, VCP	8.00	8.75	9.00	9.00	11.50	11.63	11.65	25.00	17.00	31.50
9,412	lin. ft. 24-in. same, VCP	10.50	9.38	11.00	11.50	14.50	12.26	12.75	15.00	23.90	20.60
2,641	lin. ft. 12-in. same, VCP	4.00	6.25	3.50	6.50	3.50	5.41	8.00	5.00	9.40	6.50
2,664	lin. ft. 10-in. same, VCP	3.50	5.00	3.00	6.00	3.00	3.33	7.75	4.00	6.80	4.95
47	ea. std. brick. manhole	300.00	312.50	275.00	450.00	325.00	400.00	300.00	400.00	300.00	440.00
1,050	cu. yd. conc. bed	15.00	18.75	16.00	15.00	13.00	20.00	14.00	15.00	10.00	12.00
500	T. gravel	5.00	5.50	4.00	2.50	4.00	4.00	2.50	5.00	5.00	5.25
1,410	sq. ft. rem. & repl. conc. pav.	.50	.68	.60	.40	.75	1.00	1.00	1.00	.50	.90
38,200	sq. ft. premix repave	.15	.12	.20	.16	.25	.25	.25	.25	.30	.27

Airport . . .

California—Marin Co.—U.S.E.D.—Parking Aprons

Fredrickson & Watson Construction Co., Oakland, Calif., with a proposal of $999,033, was the lowest bidder to the San Francisco office of the U.S.E.D. for a new parking apron at Hamilton Field, and was awarded the contract for the project. Unit bids were as follows:

(1) Fredrickson & Watson Construction Co. ..... $ 999,033
(2) Al Johnson and Western Contracting Corp. 1,060,345
(3) Fredrickson Brothers $1,100,200
(4) Charles L. Harney 1,120,399
(5) A. Teichert & Co. 1,174,362
(6) Guy F. Atkinson Co. 1,216,841

		(1)	(2)	(3)	(4)	(5)	(6)
60,000	T. crushed rock base	1.99	2.30	2.20	2.20	2.37	2.60
112,000	cu. yd. select material	1.19	1.54	1.50	1.70	2.22	1.85
109,040	sq. yd. 12-in. conc. pave. (top reinf. only)	3.65	3.45	4.20	3.90	3.70	4.25
5,880	sq. yd. 12-in. conc. pave. (top and bot. reinf.)	3.85	3.45	4.25	4.10	4.30	4.50
2,560	sq. yd. 6-in. conc. base	2.00	2.65	2.50	2.50	2.50	2.50
2,200,000	lb. reinf. steel	.043	.045	.04	.046	.047	.046
5,000	T. plantmix surf.	5.00	5.50	5.50	5.60	6.00	5.00
260	T. bitum. matl. for plantmix surf.	17.00	19.25	16.50	18.00	18.00	17.50
15	T. bitum. tack coat	29.00	31.50	25.00	25.00	50.00	24.00
16	T. bitum. prime coat	29.00	26.00	25.00	25.00	50.00	24.00
6	T. bitum. seal coat	29.00	23.50	32.00	40.00	50.00	29.00
40	T. cover aggr., for seal coat	4.60	2.72	4.90	5.40	5.00	3.50
1,000	hr. 3-wheel, 10-ton roller	4.60	5.50	5.50	6.40	7.00	5.00
1,000	hr. sheepsfoot roller	5.80	5.50	8.00	12.00	9.00	10.00
21,000	sq. yd. break-up and remove pave.	.49	.90	.70	.80	.75	1.75
3	ea. remove revetments	870.00	$2,500	920.00	$2,200	$1,000	$3,500
Lump sum,	relocate fuel pit	925.00	795.00	480.00	960.00	850.00	500.00
8	ea. abandon manholes	30.00	20.00	20.00	25.00	27.00	75.00
21	ea. catchbasin, steel grate	520.00	400.00	400.00	330.00	480.00	385.00
4	ea. manhole, steel cover	580.00	465.00	480.00	390.00	530.00	400.00
350	ea. tie-down anchors	1.00	.75	1.50	2.50	1.50	1.30
300	lin. ft. 12-in. reinf. conc. pipe	4.05	3.00	3.60	4.20	4.45	5.50
190	lin. ft. 15-in. reinf. conc. pipe	4.65	3.85	3.90	4.80	5.10	6.00
300	lin. ft. 18-in. reinf. conc. pipe	5.80	5.00	4.75	6.00	6.25	6.70
390	lin. ft. 21-in. reinf. conc. pipe	6.95	6.00	5.75	7.20	7.45	7.60
350	lin. ft. 24-in. reinf conc. pipe	10.10	6.90	8.50	10.50	10.50	9.50
830	lin. ft. 27-in. reinf. conc. pipe	10.40	8.00	9.50	10.80	10.75	10.50
1,450	lin. ft. 30-in. reinf. conc. pipe	11.30	10.00	10.75	11.70	11.80	11.50
2,580	lin. ft. 36-in. reinf conc. pipe	14.75	12.00	13.75	15.30	15.37	13.50
530	lin. ft. 48-in. reinf. conc. pipe	20.00	17.00	19.80	20.70	20.20	17.00
1,240	lin. ft. 10-in. steel pipe (sewerline)	4.35	4.52	3.30	4.50	4.00	5.60
2,480	lin. ft. rem. and salv. 10-in. sewer	2.90	4.00	2.20	3.00	3.40	3.75
Lump sum,	6-in. gasoline fuel line	$3,300	$4,500	$3,600	$3.450	$4,000	$3,000
Lump sum,	electrical work	$48,000	$49,700	$45,391	$40,500	$45,000	$41,500
1,240	lin. ft. 12-in. steel sewer pipe	5.50	5.75	3.50	8.10	5.05	6.30
1,240	lin. ft. 14-in. steel sewer pipe	7.25	7.53	3.85	9.90	6.65	....
4	ea. 10-in. gate valve and box	175.00	180.00	220.00	180.00	160.00	100.00
6,500	lin. ft. 12-in. C.I. pipe, 4-ft. trench	6.35	7.50	5.70	5.30	6.57	6.65
5,500	M. gal. water	1.75	1.25	2.00	2.00	1.85	2.00

Arizona—Pima Co.—U.S.E.D.—Parking Apron

P.D.O.C., Phoenix, Ariz., submitted the lowest of two bids in the amount of $225,939 to the Phoenix office of the U. S. Engineer Department for construction of an additional parking apron at Modification Center No. 2 near Tucson. The bids were submitted by:

(1) P.D.O.C. $225,939
(2) Arizona Sand & Rock Co. $263,098

		(1)	(2)
225	sq. yd. rem. and disp. ex. 3-in. bitum. surf.	.25	.55
10	sq. yd. same, 2-in.	.25	1.00
17,560	cu. yd. excav. and grade	.75	.59
61,600	sq. yd. prep. subgrade, gravel base course	.06	.105
11,200	sq. yd. fine grade and compact areas, dust palliative tr.	.06	.10
61,600	sq. yd. load test subgrade for gravel base course	.05	.14
200	lin. ft. remove ex. field drains	.50	.90
24	lin. ft. 21-in. reinf. conc. pipe	6.00	5.00
24	lin. ft. 27-in. reinf. conc. pipe	7.25	6.20

(Continued on next page)

240	lin. ft. 33-in. reinf. conc. pipe	10.00	8.30
120	lin. ft. 36-in. reinf. conc. pipe	11.00	10.00
8	lin. ft. 39-in. reinf. conc. pipe	12.00	15.00
440	lin. ft. 48-in. reinf. conc. pipe	15.50	15.04
3	ea. catch basin, C-2	520.00	400.00
1	ea. catch basin, C-6	$1,025	640.00
2	ea. drainage manhole, C-2	520.00	900.00
Lump sum,	conc. plug, 39-in. drain pipe	50.00	95.00
15	cu. yd. grouted rock, apron and headwall	20.00	15.00
25	cu. yd. grouted rock, ditch lining	20.00	15.00
693	lin. ft. 8-in. VCP sewer	2.00	3.00
340	lin. ft. 6-in. VCP sewer	1.80	2.40
2	ea. surf. clean-out box	55.00	200.00
13	cu. yd. conc. pipe encasement	25.00	18.00
8	ea. rem. ex. cesspool	80.00	125.00
2	ea. std. manhole base	50.00	28.00
8	lin. ft. std. manhole shaft	20.00	21.00
2	ea. manhole frame and cover set	40.00	35.00
1	ea. reinf. conc. manhole with 3 connections	250.00	400.00
1	ea. same, 2 connections	250.00	360.00
Lump sum,	compressed air lines	675.00	450.00
Lump sum,	electrical work	$7,700	$8,500
375	cu. yd. 9-in. grav. base course	2.30	2.75
6,710	cu. yd. 4-in. grav. base course	2.30	2.75
60,800	sq. yd. load test gravel base course	.05	.14
2,715	gal. membrane curing solution	1.10	1.40
60,310	sq. yd. 9-in. PCC pavement	2.48	2.80
50	lin. ft. 6 and 18-in. PCC curb	2.00	1.65
75	ea. tie-down anchor	1.00	2.00
30	T. liq. ash., MC-1, prime coat and dust palliative tr	30.00	34.00
5	T. liq. asph., RC2, tack coat	50.00	34.00
41	T. 85-100 pen. pave. asph.	30.00	36.00
110	T. central plant hot bitum. mix. 1½-in. binder course	5.00	6.00
135	T. same, leveling course	5.00	6.00
300	T. same, 1½-in. wearing course	5.00	6.20
3	T. emuls. asph., seal coat	50.00	40.00
25	T. cover aggre., seal coat	5.00	6.00

Irrigation . . .

Oregon—Deschutes Co.—Bureau of Reclamation—Flume

David A. Richardson, bidding $162,407 (after a stipulation reducing the original bid of $187,196) was low to the Bureau of Reclamation, Bend, Ore., for construction of the Crooked river crossing of the north unit main canal of the Deschutes project. The structure will carry a rectangular concrete flume 10 x 9.5 ft., over which a 13-ft. roadway will be carried. The crossing structure exclusive of approach sections will be 266 ft. long. The following unit bids were submitted:

(1)	David A. Richardson	$162,406	(4)	McLaughlin Construction Co.	$179,977
(2)	Scheumann & Johnson	163,950	(5)	C. J. Montag & Sons	185,510
(3)	Clifford A. Dunn	170,658	(6)	Otis Williams & Co.	285,475

		(1)	(2)	(3)	(4)	(5)	(6)
1,600	cu. yd. excavation, common	10.00	6.00	2.50	.60	7.50	5.00
2,800	cu. yd. excavation, rock	13.00	6.00	7.00	6.00	10.00	5.00
2,600	cu. yd. backfill	.60	1.50	.75	.20	.30	1.00
1,000	cu. yd. compacting backfill	1.00	1.50	1.25	.75	.75	1.00
600	cu. yd. concrete in abutments and pedestals	35.00	30.00	20.00	25.00	50.00	97.50
330	cu. yd. concrete in inlet, check, wasteway, inlet and outlet flumes, and outlet transition	40.00	40.00	29.00	28.00	50.00	97.50
1,520	cu. yd. concrete in bents and spans 1 to 5, inclu...	40.00	55.00	65.00	75.00	50.00	97.50
41,000	lb. placing reinf. bars in inlet, check, wasteway, inlet and outlet flumes, and outlet transition	.03	.03	.05	.04	.04	.04
372,000	lb. placing reinf. bars in bents, abutments, pedestals, and spans 1 to 5, inclusive	.0275	.03	.04	.045	.04	.04
16	weld, welding 1¼ inch square reinforcement bars	5.00	10.00	5.00	7.00	10.00	5.00
200	sq. fr. placing elastic filler material in joints	1.00	1.00	.80	.50	1.00	1.00
180	lin. ft. placing rubber water stops in joints	.70	1.00	1.50	.35	1.00	1.00
8	M.F.B.M. constructing timber railings	40.00	100.00	50.00	90.00	100.00	50.00
7,200	lb. installing radial gate and radial-gate hoist	.05	.10	.14	.06	.10	.10
29,000	lb. installing miscellaneous metalwork	.10	.10	.16	.10	.10	.10

Oregon—Deschutes Co.—Bureau of Reclamation—Structures

McLaughlin Construction Co., Pocatello, Idaho, submitted the low bid of $58,881 to the Bureau of Reclamation, Bend, Ore., for construction of two concrete highway bridges, the city of Prineville railway siphon and the Sherwood Canyon siphon on the north unit main canal of the Deschutes project. The government will furnish all materials except form lumber, nails, wire and sealing compound. The following unit bids were submitted:

(A)	McLaughlin Construction Co.	$ 58,881	(I)	Halvorson Construction Co.	$ 83,395
(B)	David A. Richardson	60,397	(J)	C. J. Montag & Sons	83,871
(C)	Scheumann & Johnson	74,756	(K)	Clifford A. Dunn	89,094
(D)	Oscar Butler & Son	75,046	(L)	A. D. Ford & Son	94,896
(E)	Otis Williams & Co.	75,670	(M)	A. Ritchie & Co.	95,148
(F)	Natt McDougall Co.	78,709	(N)	George Abraham	105,466
(G)	Harry I. Hamilton Co.	79,439	(O)	W. C. Smith and associates	109,925
(H)	Henry L. Horn	82,096			

(1)	10,300 cu. yd. excavation, common	(8)	20 sq. ft. placing elastic joint-filler mat'l
(2)	1,400 cu. yd. excavation, rock	(9)	3,160 lb. placing metal water stops in joints
(3)	9,200 cu. yd. backfill	(10)	40 lin. ft. drill'g 6-in. dia. drainage hole
(4)	1,600 cu. yd. compacting backfill	(11)	1,200 lb. install'g blow-off valve and conn.
(5)	850 cu. yd. riprap	(12)	1,200 lb. install'g miscl. metalwork
(6)	1,208 cu. yd. concrete	(13)	Lump sum, temporary constr. to permit bldg. of C. of P. Ry. siphon
(7)	210,000 lb. placing reinforcement bars		

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)
(1)	.30	1.70	1.00	.95	.70	.90	.40	.65	.75	1.00	1.50	.68	1.25	1.00	.47
(2)	4.00	1.70	3.00	5.25	2.25	6.00	4.00	2.00	5.00	5.00	7.50	4.61	10.00	6.00	7.50
(3)	.20	.20	.40	.53	.40	.40	.40	.60	.30	.60	.70	.49	1.10	.40	1.00
(4)	.75	.70	1.00	1.15	.70	1.00	.50	.50	2.50	.60	.75	.25	2.00	4.00	1.00
(5)	3.50	2.50	4.00	5.55	3.00	4.50	3.50	2.00	3.00	2.50	4.00	3.08	6.00	5.00	6.00
(6)	28.00	25.00	35.00	30.00	35.00	35.00	40.00	30.00	41.50	40.00	29.50	55.35	28.25	48.00	53.50
(7)	.0375	.02	.03	.035	.05	.036	.045	.06	.025	.03	.05	.025	.06	.04	.05
(8)	.50	1.00	2.00	5.00	1.00	1.00	1.00	1.00	.20	1.00	1.00	1.23	.75	2.00	1.00
(9)	.13	.06	.10	.20	.50	.15	.15	.08	.15	.10	.30	.12	.20	.20	.10
(10)	12.00	7.00	10.00	10.00	18.00	3.00	10.00	15.00	5.00	10.00	10.00	3.69	20.00	10.00	10.00
(11)	.11	.05	.10	.20	.10	.15	.25	.06	.15	.10	.30	.10	.20	.20	.20
(12)	.12	.06	.10	.20	.20	.25	.25	.08	.10	.20	.20	.12	.20	.20	.15
(13)	1,300	$400	2,000	1,275	2,500	1,000	3,000	14,700	3,000	2,250	4,000	$984	1,200	4,500	2,400

The Heart of good "CABLE OPERATION"

. . . is in the flexibility, power and dependability of the Cable Power Unit. That's why years of experience have built into Isaacson units the background of successful operation. Brake and clutch fighting has been eliminated, adjustments once made, hold longer. Operator fatigue has given way to increased efficiency. Integral strength is built into the case. It's sealed against lubrication leakage. There are no splines to wear, stick or cause misalignment. Relining is simple and takes but a few minutes—no bearing adjustment required. Smooth, positive longwearing controls. Just a few of the improvements, job-proven, in your Isaacson Kable Power Unit. See your dealer for specifications before you buy.

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ENGINEERED TRACTOR EQUIPMENT

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...

Union Construction Co., Great Falls, Mont., received a $484,229 contract for 10.3 mi. grading, surfacing, and drainage structures on Lookout Pass-Superior and St. Regis-Tarkio roads, by State Highway Commission, Helena, Mont.

Porter W. Yett, Portland, Ore., was awarded a contract at $376,-687 for 8.8 mi. grading and paving on Halsey-Harrisburg section of Pacific Hwy. east, by Oregon State Highway Commission, Portland, Ore.

Bell & Braden, Amarillo, Texas, has a contract at $199,329 for roads, streets and miscellaneous construction at Cactus Ordnance Works, Etter, Tex., by U. S. Engineer Office, Denison, Tex.

Casson & Ball, Hayward, Calif., received a contract at $1,192,962 to widen runways at the Fairfield-Suisun Airdrome, by U. S. Engineer Office, Sacramento, Calif.

Fredrickson & Watson Construction Co., Oakland, Calif., at $999,033 received a contract for a new parking apron at Hamilton Field, Calif., by U. S. Engineer Office, San Francisco, Calif.

Guy F. Atkinson, Long Beach, Calif., secured a contract at $560,-000 for dredging and breakwater construction at Morro Bay, Calif., by U. S. Engineer Office, Los Angeles, Calif.

Bressi and Bevanda Constructors, Inc., Los Angeles, Calif., have a contract at $752,205 for tunnel and canals for the Conchas Canal, Tucumcari Project, New Mexico, by the Bureau of Reclamation, Denver, Colo.

Ford J. Twaits Co., San Francisco, Calif., was awarded a $1,025,-000 contract for construction of a Postal Concentration Center, Oakland, Calif., by U. S. Engineer Office, San Francisco, Calif.

Stolte, Inc., Oakland, Calif., and **The Duncanson-Harrelson Co.,** San Francisco. Calif., were awarded a contract at $2,450,304 for buildings, roads, utilities and other work at Alameda, Calif., by U. S. Engineer Office, San Francisco.

Peter Kiewit Sons' Co., Al Johnson, and **Western Construction Corp.,** Los Angeles, Calif., were awarded a contract at $6,165,-271 for additional landing facilities at Muroc Army Airfield, by U. S. Engineer Office, Los Angeles.

Sound Construction and Engineering Co. and **Peter Kiewit Sons' Co.,** Seattle, Wash., have a $2,156,217 award for 23 mi. of railway in the second section of the Bremerton-Shelton railroad link, by Bureau of Yards & Docks, Washington, D. C.

Pacific Pipe Line Construction Co., Los Angeles, Calif., has been awarded two contracts, one for $519,000 and one for $573,000, to construct a welded steel pipeline from the Goleta gas field to Los Angeles, along with pumping facilities, by Southern California Gas Co., Los Angeles.

ADNUNS LAY WORLD'S TOUGHEST TRACK

Track layout showing pavement varying from 30′ to 60′ wide. Super elevation on curves. Each tank runs 50 miles at speeds up to 30 M.P.H.

Tanks are tested day and night. Flexible bituminous pavement adjusts itself to heavy blows of treads without break in pavement.

Adnun laying last of four courses each 1½" thick and 10′ wide on stabilized base. No forms needed. Parallel strips firmly compacted together.

Thirty-ton tanks, grinding their macerating way around and around the Chrysler testing track in Detroit, reduced to rubble all roads until one of asphaltic concrete was built last year. It has proved to be resilient and rugged enough to withstand the heavy blows of the treads without permitting a break in the pavement, standing up where all others failed.

Two Adnun Pavers put down the 6-in. black top surface on this toughest of tracks—30,000 sq. yds. (9,000 tons) of hot-mix, hot-laid asphaltic concrete—in four courses of 1½ in. each. Results proved again the quality of Adnun work—maximum density, tight joints between strips, smoothest finished surface, all-weather durability against either rubber-shod or steel-shod treads.

Adnun Black Top Pavers were the first in the field. They are the first in performance today. Continuous Course Correction, an exclusive Adnun feature, makes it possible to lay each course more smoothly than the preceding one. This gives better material control and insures maximum density in the pavement. Overlapping action at the Cutter Bar assures a tight joint at the curb or against the paralleled course, thus making forms unnecessary.

Send for the new catalog describing the newest features that make Adnuns more usable and productive than ever. Learn how the Power Cut-Off and Hydraulic Control insure higher Production by providing fatigueless operation.

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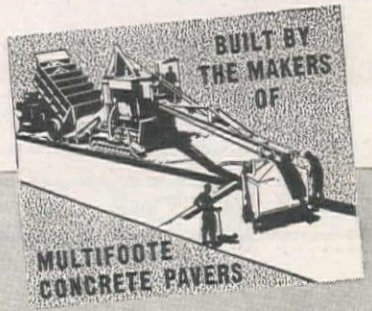


ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION

I. C. Little Construction Co. Dallas, Tex., and **Sherman & Everett, Inc.,** Houston, Tex., have contracts to lay 220 mi. of 12-in. pipeline from the Elk Basin oil pool in southern Montana to Casper, Wyo., by Stanolind Pipeline Co., Casper, Wyo.

Peter Kiewit Sons' Co., Omaha, Nebr., at $952,158, has received a contract for roads, walks and other services at the El Toro Marine Air Station, in Calif., by Bureau of Yards and Docks, Washington, D. C.

Highway and Street...

California

BUTTE CO.—**Lester L. Rice,** Box 1151, Marysville—$10,691 to repair 2.4 mi. with plantmix betw. junction of Rte. 87 & Oroville Airport—by Calif. Div. of Hwys., Sacramento. 6-26

BUTTE CO.—**Piazza & Huntley,** 175 So. Montgomery St., San Jose—$94,780 to repair 7.7 mi. with plantmix surf.; crusher run base on imp. borrow; sealcoat; new plantmix surf. & new crusher run base betw. Nelson & 1.5 mi. No. of Durham—by Calif. Div. of Hwys., Sacramento. 6-6

CONTRA COSTA CO.—**Ransome Co.,** 4030 Hollis St., Emeryville—$11,281 for surfacing & other work on Critchett Ave. from East St. to Essex Ave., Richmond—by City Clerk, Richmond. 6-13

CONTRA COSTA CO.—**Union Paving Co.,** 310 California St., San Francisco—$34,827 for repairing 1.8 mi. with asphalt conc. on roadbed betw. Broadway Tunnel & Orinda Junction—by Calif. Div. of Hwys., Sacramento. 6-7

EL DORADO, PLACER, NEVADA, SACRAMENTO & YOLO COS.—**J. P. Breen,** Box 183, Sacramento—$35,412 to place 56.7 mi. sealcoat at various locations in Dist. III—by Calif. Div. of Hwys., Sacramento. 6-21

HUMBOLDT CO.—**Mercer-Fraser Co.,** 2nd & Commercial Sts., Eureka—$44,755 for repairing 5.1 mi. with plantmix surf. & sealcoat, betw. junction with Rt. 85 & Blue Lake—by Calif. Div. of Hwys., Sacramento. 6-21

KERN CO.—**Clyde W. Wood,** 816 W. 5th St., Los Angeles—

$33,564 for constructing Inyokern-Trona Road—by Board of Supervisors, Bakersfield. 6-20

LASSEN, SISKIYOU & MODOC COS.—**Harms Brothers,** Box 2220, Sacramento—$22,950 for 34.8 mi. sealcoat betw. Constantia & Oregon state line—by Calif. Div. of Hwys., Sacramento. 6-19

LOS ANGELES CO.—**Griffith Co.,** 1060 So. Broadway, Los Angeles—$36,433 for 0.7 mi. grading, plantmix surf. & Port. cement conc. on Figueroa St., betw. Anaheim & "B" Sts., Los Angeles—by Calif. Div. of Hwys., Sacramento. 6-21

LOS ANGELES CO.—**Olympic Contracting Co.,** 124 No. La Brea Ave., Los Angeles—$28,977 for grading & paving with Port. cement conc. & plantmix surfacing 0.3 mi. on Douglas St., betw. Imperial Hwy. & 1400 ft. south in city of El Segundo—by Calif. Div. of Hwys., Sacramento. 6-21

LOS ANGELES CO.—**Oswald Brothers,** 366 E. 58th St., Los Angeles—$49,635 for 1.0 mi. grade & surf. with asph. concrete, betw. Buena Vista St. & No. city limits in Burbank—by Calif. Div. of Hwys., Sacramento. 5-26

LOS ANGELES CO.—**Pacific Rock & Gravel Co.,** 208 W. 8th St., Los Angeles—$16,313 for repairing 2.6 mi. with plantmix surf. on Rte. 9, betw. Monrovia & La Verne—by Calif. Div. of Hwys., Sacramento. 6-5

LOS ANGELES CO.—**Warren-Southwest, Inc.,** 2145 E. 25th St., Los Angeles—$49,985 for grading, paving, etc., of portions of Rodeo Road bet. 120 ft. west of 4th Ave. & Jefferson Blvd., Los Angeles—by Los Angeles Board of Public Works, Los Angeles. 5-31

MADERA CO.—**Stewart & Nuss, Inc.,** Box 866, Fresno—$17,855 to repair approx. 4.1 mi. with plantmix betw. 7.8 & 11.9 mi. north of Madera—by Calif. Div. of Hwys., Sacramento. 6-26

MENDOCINO CO.—**A. Teichert & Co.,** 1846 - 37th St., Sacramento—$35,541 to furn. & place imp. base material on portions of 3.9 mi. & apply sealcoat to new base & exist. surf. betw. Navarro River & Caspar—by Calif. Div. of Hwys., Sacramento. 6-2

ORANGE CO.—**W. E. Hall,** 1025 Westminster Ave., Alhambra—$77,871 for 4.0 mi. grading & surf. with plantmix on untr. rock base & plantmix surf. on Trabuco Road, betw. Rte. 2 & Marine Base & on Central Ave., betw. Rte. 4 & Trabuco Road—by Calif. Div. of Hwys. Sacramento. 6-2

OUR OUTFIT NEEDED ...FOOD AND SUPPLIES

Hello Gang,
--the island is very swampy and the route of supplies to the front lines was almost impassable because most vehicles would bog down. Our outfit was on the front lines in need of food and supplies which we didn't think possible to get.

Sometime later, to our surprise and joy, what should come crashing through the jungles, with water up to the hubs--the Athey Trailer. They brought food and supplies every day. I thought I'd write and tell you how your products are helping--

Your Former Employee
Pvt. Leonard Wilson
U.S. Marine Corps.

Will American Free Enterprise Be Lost When the War is Won?

A Marine in the Southwest Pacific, formerly an Athey employee, wrote the above excerpts in a recent letter. "To our surprise and joy", he writes, "what should come crashing through the jungles, with water up to the hubs—the old Athey Trailer".

To him, the sight of an Athey Trailer and "Caterpillar" Diesel Tractor was a double thrill. It meant food and supplies for his outfit on the front lines and it was like meeting an old friend from home.

Transportation of supplies is a problem on any front—especially in tropical jungles or island outposts where building of haul roads is either impossible or impractical. On such operations Athey Trailers are moving large quantities of material dependably and safely *over footing too difficult for any other means of transportation.*

If you have a hauling problem, we suggest that you discuss it with your nearest Athey-"Caterpillar" Dealer or write direct to Athey Truss Wheel Co., 5631 West 65th Street, Chicago 38, Illinois.

Athey FORGED-TRAK TRAILERS

ORANGE CO.—**Sully-Miller Construction Co.,** 1500 W. 7th St., Long Beach—$66,155 to repair 4.4 mi. net length with plantmix material, imp. borrow & plantmix surf. betw. San Diego Co. line & Doheny Park—by Calif. Div. of Hwys., Sacramento. 6-23

SACRAMENTO CO.—**A. Teichert & Co.,** Box 1113, Sacramento—$47,520 for repairing 8.3 mi. with plantmix surf. betw. McConnell & Sacramento—by Calif. Div. of Hwys., Sacramento. 6-27

SAN BERNARDINO CO.—**George Herz & Co.,** Platt Bldg., San Bernardino—$12,676 for plantmix over existing surf. & sealcoat on 0.5 mi. betw. Verdemont & Devore & on 0.9 mi. betw. Sycamore Ave. & Cajon Creek in the vicinity of San Bernardino —by Calif. Div. of Hwys., Sacramento. 6-19

SAN DIEGO CO.—**Southwest Paving Co.,** Box 339, Roscoe—$50,045 for portions 7.8 mi. net length surfacing with plantmix betw. Escondido & North County line & betw. 6 mi. east of Oceanside & Rte. 77—by Calif. Div. of Hwys., Sacramento. 6-26

SAN FRANCISCO CO.—**M. J. Lynch,** Barneveld & Oakdale Ave., San Francisco—$30,793 for conc. parking lane on Mission St., betw. 20th & 25th Sts., San Francisco—by Dept. of Public Works, San Francisco. 6-21

SAN FRANCISCO CO.—**Pacific Pavement Co.,** 85 Barstow St., San Francisco—$33,853 for repaving of street or sidewalk openings in San Francisco—by Public Utilities Comm., San Francisco. 6-7

SOLANO CO.—**Lee J. Immel,** Box 65, Station "A," Berkeley—$307,900 to repair paving at Navy Yard, Mare Island—by Bur. of Yards & Docks, Washington, D. C. 6-19

SOLANO CO.—**C. M. Syar,** Box 1431, Vallejo—$14,478 for asphalt conc. surf. & other work on Pennsylvania St., betw. Sonoma & Napa Sts., Vallejo—by City Clerk, Vallejo. 6-20

SONOMA & MARIN COS.—**A. G. Raisch,** 2048 Market St., San Francisco—$27,490 for repair portions 2.4 mi. with plantmix surf. betw. Petaluma & San Rafael—by Calif. Div. of Hwys., Sacramento. 6-21

TULARE CO.—**Brown, Doko & Baun,** Dolliver St., Pismo Beach—$62,725 for repairing 2.6 mi. with imp. borrow, untr. rock base & plantmix surf. with sealcoat, betw. Goshen underpass & 3 mi. northerly—by Calif. Div. of Hwys., Sacramento. 6-21

VENTURA CO.—**R. R. Hensler,** 4254 Tujunga Ave., No. Hollywood—$66,675 for repairing portions 7.1 mi. net length with plantmix material & imp. borrow btw. Oxnard & Camarillo—by Calif. Div. of Hwys., Sacramento. 6-23

Idaho

BENEWAH & KOOTENAI COS.—**J. C. Compton Co.,** McMinnville, Ore.—$19,370 to sealcoat 18.7 mi. St. Hwy. 5, Plummer to St. Maries; 6.1 mi. St. Hwy. 7, Santa Junction to Fernwood; & 2.9 mi. of Worley-State Line Road—by Comm. of Public Works, Boise. 6-16

BLAINE & GOODING COS.—**Nick Burggraf,** Box 397, Idaho Falls—$16,175 for crushed gravel surf. in stockpiles adjacent to U. S. Hwy. No. 93—by Comm. of Public Works, Boise. 5-31

BUTTE CO.—**Morrison-Knudsen Co., Inc.,** Box 1515, Boise—$39,967 for 5.1 mi. roadmix bitum. surf. on U. S. Hwy. 93—Alt. in vicinity of Arco, & sealcoating 19.2 mi. of U. S. Hwy. 93—Alt. betw. Arco & the Craters of the Moon—by Comm. of Public Works, Boise. 6-16

CANYON & OWYHEE COS.—**Morrison-Knudsen Co., Inc.,** Box 1515, Boise—$25,920 for 9.0 mi. sealcoat on St. Hwy. 15, Saxton Junct. No.; 12.5 mi. on St. Hwy. 45, No. & So. of Walter's Ferry bridge; 5.2 mi. on U. S. Hwy. 95, Wilder Junct. east; 10.0 mi. St. Hwy. 44, Desert Junct. to Star; & 5.6 mi. U. S. Hwy. 30, Parma Junct. No. —by Comm. of Public Works, Boise. 5-31

GOODING, CAMAS AND LINCOLN COS.—**Triangle Construction Co.,** 3507 Crescent Rim Drive, Boise—$34,178 for bitum. surf. treat. of 16.3 mi. on State Rte. 46 from Fairfield Junction southerly and 2.3 mi. on U. S. 93-Alt. from Blaine-Lincoln Co. line southerly—by Comm. of Public Works, Boise. 6-9

JEROME, CASSIA, TWIN FALLS & MINIDOKA COS.—**Hoops Construction Co.,** Box 431, Twin Falls—$51,940 for 28.6 mi. sealcoat on St. Hwy. 25 btw. Eden and Rupert; 4.5 mi. on Burley-Paul Rd.; 8.9 mi. on U. S. Hwy. 30-N btw. Burley and Montgomery bridge; 4 mi. on U. S. Hwy. 30-S near Declo; and 4.1 mi. on U. S. Hwy. 30 from Murtaugh Overhead east—by Comm. of Public Works, Boise. 6-16

KOOTENAI CO.—**Colonial Construction Co.,** W. 326 First Ave., Spokane, Wash.—$14,435 for crushed rock surf. in stockpiles adjacent to U. S. Hwy. 10 near Wolf Lodge Bay—by Comm. of Public Works, Boise. 5-31

LATAH CO.—**Nyberg Construction Co.**, Box 7, Yardley, Wash.—$29,760 for stockpiling crushed rock surf. and cover coat material near Joel—by Comm. of Public Works, Boise. 6-16

LEMI AND CUSTER COS.—**Nick Burggraf**, Box 397, Idaho Falls—$13,350 for crushed gravel surf. in stockpiles, adjacent to U. S. Hwy. 93 and St. Hwy. 28—Comm. of Public Works, Boise. 5-31

NEZ PERCE CO.—**Northwestern Engineering Co.**, Drawer 1392, Rapid City, S. D.—$31,333 for 12.2 mi. sealcoat on U. S. Hwy. 95, Culdesac to Spalding and 18.4 mi. St. Hwy. 9, Spalding to Lenore—by Comm. of Public Works, Boise. 6-16

ONEIDA AND FRANKLIN COS.—**Carl E. Nelson**, Box 397, Logan, Utah—$54,759 for sealcoating 3.4 mi. at various locations in Oneida Co. and for 1 mi. on Mink Creek Rd. in Oneida and Franklin Cos.—by Comm. of Public Works, Boise. 6-14

TWIN FALLS CO.—**Triangle Construction Co.**, 3507 Crescent Rim Drive, Boise—$21,050 for sealcoating 27.6 mi. U. S. Hwy. 93 from Nevada state line to Hollister — by Comm. of Public Works, Boise. 6-9

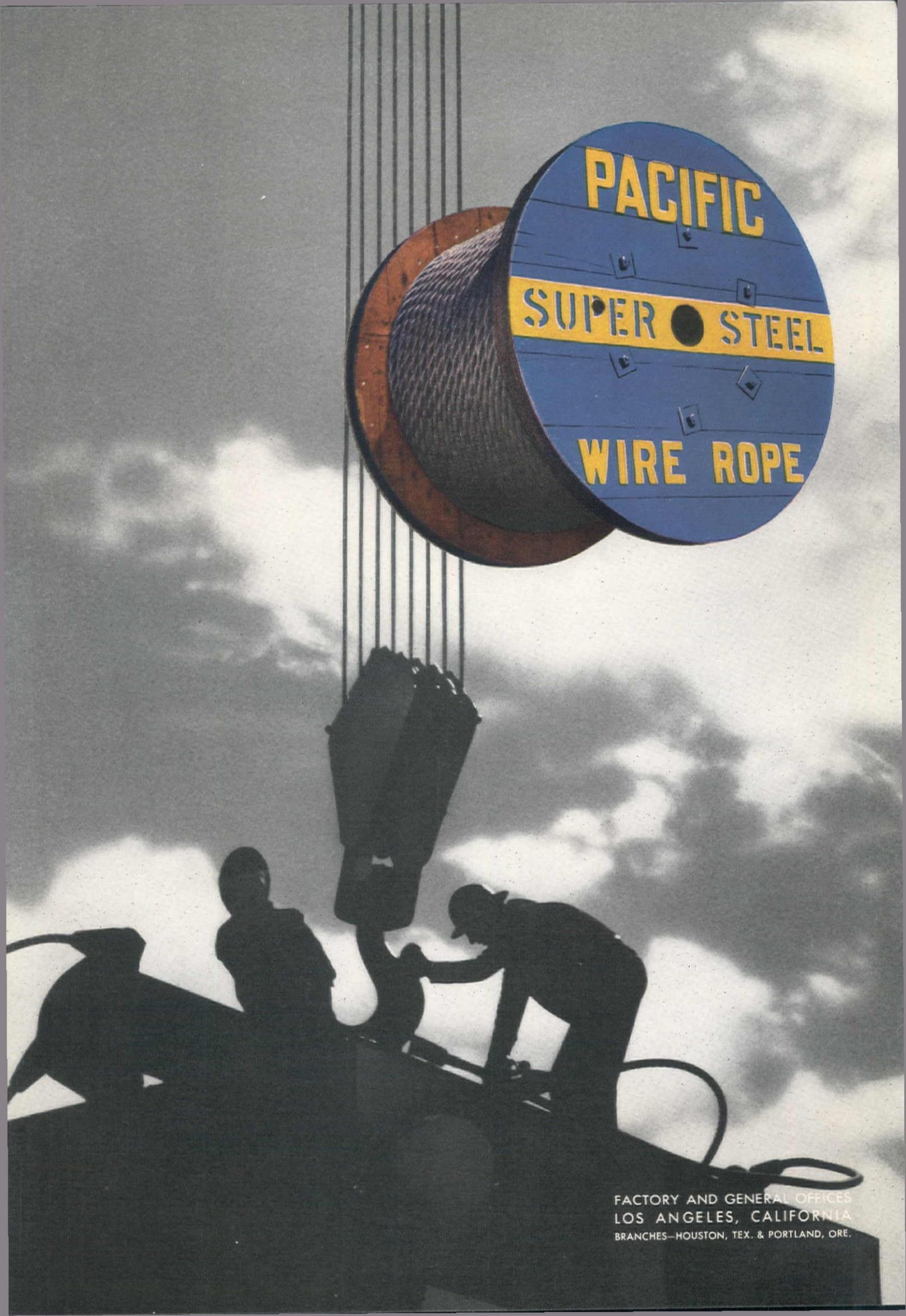
Montana

CUSTER AND FALLON COS. — **Inland Construction Co.**, 3867 Leavenworth St., Omaha, Neb.—$45,713 for 13.7 mi. reconditioning exist. bitum. surf., sealcoat oiling and crushed gravel cover coat on Miles City-Broadus Rd.; 9.6 mi. recond. exist. bitum. surf. and 13 mi. sealcoat oiling and crushed gravel cover coat on Baker-North Dakota State Line Road—by State Hwy. Comm., Helena. 6-26

DANIELS, McCONE, ROOSEVELT AND VALLEY COS. —**Inland Construction Co.**, 3867 Leavenworth St., Omaha, Nebr. —$47,961 for crushing and stockpiling crushed grav. surf.—by State Hwy. Comm., Helena. 6-2

DAWSON, McCONE AND RICHLAND COS.—**Stanley H. Arkwright, Inc.** Billings—$44,634 for crushing and stockpiling 30,000 cu. yds. crushed gravel surf. material — by State Hwy. Comm., Helena. 6-26

MADISON CO.—**Big Horn Construction Co.**, Sheridan, Wyo. —$25,132 for sealcoat oiling and crushed gravel cover coat on



FACTORY AND GENERAL OFFICES
LOS ANGELES, CALIFORNIA
BRANCHES—HOUSTON, TEX. & PORTLAND, ORE.

15.4 mi. of Ennis-Sappington Road and on 23.2 mi. of Madison-Canoy-Ennis Road—by State Hwy. Comm., Helena. 6-2

MINERAL CO. — **Union Construction Co.,** Box 1845, Great Falls—$484,229 for 10.3 mi. grading, surf. and const. drainage strucs. on Lookout Pass-Superior and St. Regis-Tarkio roads—by State Hwy. Comm., Helena. 6-2

MISSOULA AND RAVALLI COS.—**Big Horn Construction Co.,** Sheridan, Wyo.—$29,969 for 8.5 mi. sealcoat and crushed grav. cover coat, U. S. Hwy. 10 from Missoula west to U. S. Hwy. 93 and 34.1 mi. on U. S. Hwy. 93 from Missoula south to point near Victor—by State Hwy. Comm., Helena. 6-2

PRAIRIE CO.—**Stanley H. Arkwright, Inc.,** Billings—$108,408 to grade and surf. 2.2 mi. and const. drainage strucs. on Terry-Glendive Rd.—by State Hwy. Comm., Helena. 6-2

Nevada

WASHOE CO.—**I. Christensen,** Reno—$13,067 for curbs, gutters, sidewalks and alley approaches on Wells Ave., Reno—by City Clerk, Reno. 6-22

New Mexico

McKINLEY CO.—**J. E. Skousen,** 201 Springer Bldg., Albuquerque—$63,057 for approx. 42 mi. base and top course surf., oil processing, sealing and misc. constr. on U. S. Hwy. Rte. 66, betw. Gallup and Grants—by State Hwy. Dept., Santa Fe. 6-2

SAN MIGUEL CO.—**G. I. Martin,** Albuquerque—$20,755 for about 2 mi. grading, drainage structures, base surf., top surf., oil processing and misc. const. on St. Hwy. Rt. No. 66 betw. Las Vegas and Camp Luna—by State Hwy. Dept., Santa Fe. 5-31

North Dakota

ADAMS CO.—**W. H. Noel Co.,** Jamestown—$127,946 for 6 mi. stab. base and bitum. surf., South Dakota line northwesterly and 10.8 mi., Bucyrus northwesterly, on U. S. Hwy. 12 — by State Hwy. Dept., Bismarck. 5-19

DUNN, STARK AND HETTINGER COS.—**W. H. Noel Co.,** Jamestown—$24,899 for 65.6 mi. gravel replenishment on St. Hwy. 8, Richardson, north and south — by State Hwy. Dept., Bismarck. 5-19

Oklahoma

BEAVER CO.—**Layman Construction Co.,** Box 2395, Tulsa—$110,978 for 7.1 mi. grading, gravel base and double bitum. surf. on U. S. Hwy. 270, beginning 3 mi. north of Turpin and extending north to Kansas line—by State Hwy. Comm., Oklahoma City. 5-25

Oregon

LINN CO.—**Frank Watt Construction Co.,** 2020 N. E. 58th Portland—$59,150 for constr. of four bridges on the Halsey-Harrisburg section of the Pacific Hwy. east—by Oregon State Hwy. Comm., Portland. 6-19

LINN CO.—**Porter W. Yett,** 6500 N. E. Ainsworth, Portland—$376,687 for 8.8 mi. grading and paving on Halsey-Harrisburg section of Pacific Hwy. east—by Oregon State Hwy. Comm., Portland. 6-19

MULTNOMAH CO.—**Babler & Conley,** 4617 S. E. Milwaukee, Portland—$25,900 for removal and disposal of approx. 37,000 cu. yds. of rock detritus encroachment on Onconta section of Columbia River Hwy.—by Oregon State Hwy. Comm., Portland. 6-19

YAMHILL CO.—**Western Rock Co.,** Salem—$20,574 for 4.8 mi. of street oiling in Sheridan—by Oregon State Hwy. Comm., Portland. 6-19

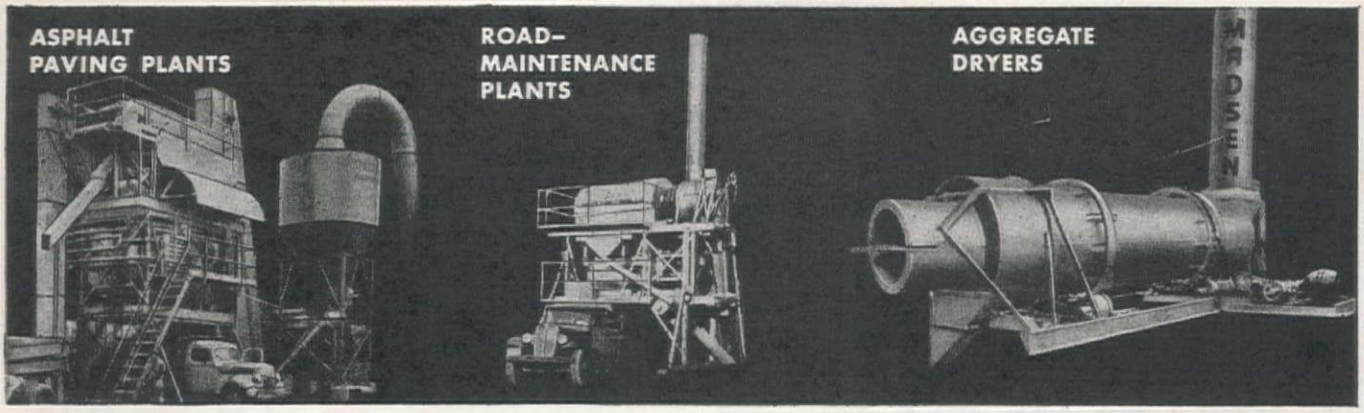
Texas

EASTLAND AND STEPHENS COS.—**D. & H. Construction Co.,** Box 160-B, Rte. 5, Dallas—$30,145 for 46.4 mi. sealcoat on U. S. Hwy. 283 and St. Hwys. 157 and 67—by State Hwy. Dept., Austin. 6-9

LAMPASAS AND SAN SABA COS.—**Holland Page,** Box 1181, Austin— $42,160 for 55.5 mi. sealcoat on U. S. Hwy. 190 and St. Hwys. 74, 284 and 16—by State Hwy. Dept., Austin. 6-9

MILLS AND COMANCHE COS.—**Holland Page,** Box 1181, Austin—$26,603 for 21.3 mi. sealcoat on U. S. Hwys. 84 and 67 and St. Hwys. 284 and 67—by State Hwy. Dept., Austin. 6-9

MOORE CO.—**Bell & Braden,** Herring Hotel Bldg., Amarillo—$199,329 for roads, streets and misc. constr. at Cactus Ordnance Works, Etter—by U. S. Engineer Office, Denison. 6-2

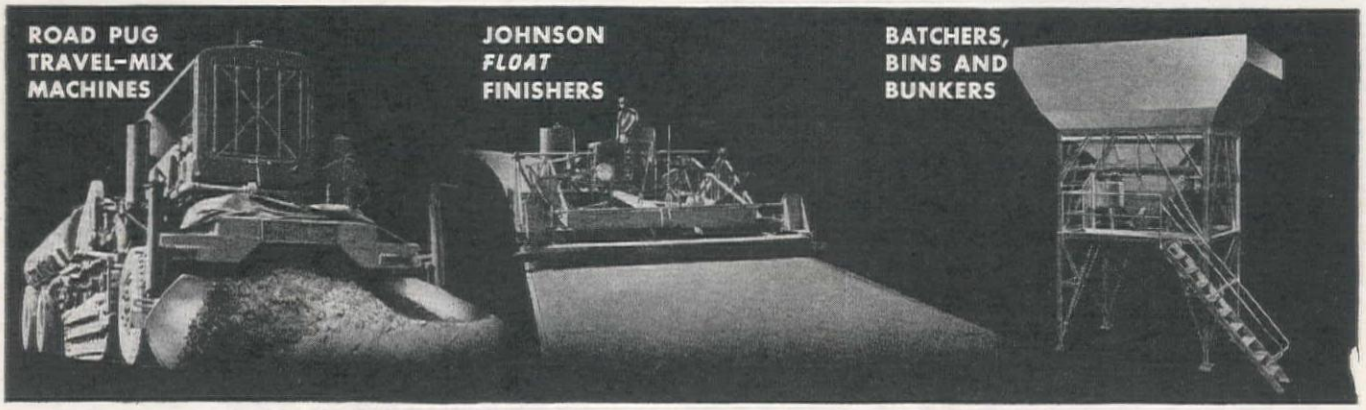


Record Breaking! MADSEN EQUIPMENT

BITUMINOUS MIXING PLANTS
BATCH CAPACITIES—500 to 6000 lbs.
RECORD (3000-lb. Plant)—2414 tons in 12 hours reported by Lewis Construction Co., on the Marine Base at El Toro, Calif.

BITUMINOUS MIXING PLANTS
BATCH CAPACITIES—500 and 1000 lbs.
MIXING SPEED—40-second cycle.
FEATURES—Jack Erection; Unit-Power Transmission; Asphalt Pressure-Injection.

COUNTER-FLOW TYPE DRYERS
SIZES—32- to 72-in. diam. All lengths.
FEATURES—Unit-Power Transmission; Flexible Ring-Sprocket Drive; Oversize Tires and Trunnions; All-Welded Shell.



FOR THE ROAD BUILDER-CONTRACTOR

FOR OIL-MIX, SOIL CEMENT & BASE
CAPACITY per hour—200 to 550 tons.
REPORTED by Phoenix Construction Co. 7920 tons in 20 hrs. to Calif. specifications.
METERED OIL—In ratio to travel speed.

FOR MECHANICAL *FLOAT* FINISHING
WIDTHS—convertible from 10 to18 feet.
SPEED—3065 lineal feet by Roy Houck, Oregon. Consistently finishes pavement to .05 inch, or less, variation in 10 feet.

TRUCK LOADING BATCHERS, ALSO Proportioner Plants; 1- to 6-unit Bins and Bunkers; Screening Plants; Central Mixing Plants; other batcher equipment.
CAPACITIES—From 25 to 400 tons.

Rubber-tired rollers have dual wheels with oscillating axle on walking beam. It kneads the soil as it compacts.

Pug Mill Mixers, weigh batchers, and all types of bin gates and feeders are available at Madsen Iron Works.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA

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MADSEN IRON WORKS
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- ☐ Asphalt Plants
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- ☐ Pug Mill Mixers
- ☐ Road Pugs
- ☐ Batchers
- ☐ Bins & Bunkers
- ☐ Compactors
- ☐ Weigh Batchers

NAME _____

COMPANY _____

ADDRESS _____

Utah

CACHE, RICH AND SUMMIT COS.—**LeGrande Johnson,** Logan—$42,875 for gravel surf. and cover mater. stockpiles—by State Road Comm., Salt Lake City. 5-29

Washington

FRANKLIN CO.—**McAtee & Heathe,** 3527 E. Trent, Spokane—$26,110 to oil 23.6 mi. roadway with light bitum. surf. treatment, Ringold Junction to Cornell—by Director of Hwys., Olympia. 6-6

GRANT CO.—**Standard Asphalt Paving Co.,** 603 Chronicle Bldg., Spokane—$23,655 for total of 16.1 mi. light bitum. surf. treatment, Marlin to Ruff, Ephrata-West Extension and Crescent Bar; also 2.4 mi. single seal treat., Ephrata-West and 2 mi. road-mix in Quincy vicinity—by Grant County Commissioners, Ephrata. 6-7

GRANT, LINCOLN, DOUGLAS AND OKANOGAN COS.—**Standard Asphalt Paving Co.,** Chronicle Bldg., Spokane—$61,727 for 81.8 mi. non-skid single seal treat. on sects. of Prim. St. Hwy. No. 7, Quincy to Ephrata; Stratford to Lincoln Co. line; Lamona to Marlin; and Soap Lake to Coulee City; and for 13.7 mi. Prim. State Hwy. No. 10, Okanogan south—by Director of Hwys., Olympia. 6-7

GRAYS HARBOR AND THURSTON COS.—**J. D. Shotwell,** 1624 Puget Sound Bank Bldg., Tacoma—$37,690 to improve portions of Prim. St. Hwy. No. 9 and secondary State Hwy. Nos. 1-M and 1-N—by Director of Hwys., Olympia. 6-14

JEFFERSON, MASON AND PIERCE COS.—**L. J. Birbeck,** Bremerton—$25,981 to improve portions of Prim. State Hwy. No. 9 (Jefferson Co.) and secondary State Hwy. No. 14-B—by Director of Hwys., Olympia. 6-14

KING CO.—**Northwest Construction Co.,** 3950-6th Ave., N. W., Seattle—$11,315 for asphaltic resurfacing on unit No. 2, Western Ave., Seattle—by Board of Public Works, Seattle. 6-9

KING CO.—**Northwest Construction Co.,** 3950 6th Ave., N. W., Seattle—$12,731 for paving on Second Ave., Renton—by City Council, Renton. 6-22

How Simplified Wire Rope Practice Benefits the Consumer

Simplified Practice for wire rope—as defined in recommendation R198-43 of the National Bureau of Standards—has been in effect since February 15, 1943. The industry has whole-heartedly accepted this reduction in sizes, grades and varieties of wire rope.

The overall reduction is from 973 items to 643, or 33.9 per cent. In the four rope constructions which represent the industry's major tonnage, the reduction is from 352 items to 182, or 48 per cent. We think that simplified practice is proving its worth.

To the consumer, there are obvious benefits in simplification. In nearly all cases he will find a rope available that fits his needs, and in addition he will get quicker deliveries and better service.

So we say to wire rope users: Stick to simplified practice ropes. We'll be glad to help you solve your problems. And, of course, simplified practice does not preclude manufacture and sale of special-purpose ropes, such as those listed in our new Wire Rope Catalogue, No. 165. Write to Bethlehem Steel Co., Bethlehem, Pa., for a copy today.

THESE ARE THE 20 STANDARD TYPES OF WIRE ROPE LISTED IN VARIOUS GRADES IN R198-43

- 6 x 7 wire rope
- 6 x 19 wire rope
- 8 x 19 wire rope
- 6 x 37 wire rope
- 6 x 19 elevator rope
- 8 x 19 elevator rope
- 5 x 19 marline clad rope
- 18 x 7 non-rotating rope
- 6 x 12 galvanized running rope and hawsers
- 6 x 24 galvanized steel mooring lines and hawsers
- 6 x 37 galvanized steel hawsers
- 6 x 25 type "B" flattened strand wire rope
- 6 x 30 type "G" flattened strand wire rope
- 6 x 8 type "D" flattened strand wire rope
- 6 x 6 x 7 tiller rope
- 6 x 7 iron, bright, and galvanized sash cords
- 9 x 4 galvanized mast arm rope
- 6 x 19 marline clad grain-shovel rope flat rope
- 6 x 7 galvanized iron rigging and guy rope

KING CO.—**MacRae Brothers,** 2733 4th Ave., So., Seattle—$137,288 for access road project near Duwamish—by Director of Hwys., Olympia. 5-26

KING CO.—**Valley Construction Co.,** 8423 48th Ave., So., Seattle—$11,356 for asphaltic resurfacing of Western Ave. (Unit No. 1), Seattle—by Board of Public Works, Seattle. 6-9

KING AND PIERCE COS.—**Woodworth & Co., Inc.,** 1200 East "D" St., Tacoma—$63,655 to break up sections of 2.3 mi. conc. pave., backfill with crushed stone surf. and roadway borrow, and to const. asph. conc. pave., pipe drains, and bitum. surf. treat. on east shoulder, Prim. St. Hwy. 1, Ardena Road northerly—by Dir. of Hwys., Olympia. 6-1

PIERCE CO.—**The Harrison Brothers Co.** 225 Wakefield Dr., Tacoma—$36,558 for widening and resurf. with asphalt St. Paul Ave. from 11th to 15th St., and Canal St. from 11th to 21st St., Tacoma—by City of Tacoma. 6-23

SPOKANE CO.—**Inland Asphalt Co.,** 10th and Havana St., Spokane—$22,052 for street surfacing at Spokane Army Depot—by U. S. Engineer Office, Seattle. 6-23

Wyoming

NATRONA AND FREMONT COS.—**Wyoming Improvement Co.,** Cheyenne—$83,148 for 89.4 mi. stone chip seal coat and other work on Casper-Shoshone and Shoshone-Thermopolis Rds.—by State Hwy. Comm., Cheyenne. 6-14

SHERIDAN CO.—**Wyoming Improvement Co.,** Cheyenne—$17,575 for 7.6 mi. stone chip sealcoat and other work on Sheridan-Big Horn Road—by State Hwy. Comm., Cheyenne. 6-14

Bridge & Grade Separation...

Arizona

MOHAVE CO.—**A. S. Vinnell Co.,** 1145 Westminster Ave., Alhambra, Calif.—for grading and constr. of approaches to Arizona side of bridge over Colorado River near Topock—by Santa Fe Railway Co., Los Angeles, Calif. 6-2

Utah

BOX ELDER CO.—**S. E. Faddis,** 271 Edison St., Salt Lake City—$57,689 for a 273.6 ft. span continuous conc. T-beam overpass on U. S. Hwy. 91—by State Road Comm., Salt Lake City. 6-26

BOX ELDER CO.—**Olof Nelson,** Logan—$66,967 for 0.6 mi. approaches to overpass on U. S. Hwy. 91, Alt. betw. Plain City and Hot Springs—by State Road Comm., Salt Lake City. 6-26

Washington

PIERCE CO.—**Prefabricated Lumber Products Inc.,** Tacoma—$29,396 to reconst. timber approaches and deck on Carbon River bridge near Fairfax—by Director of Hwys., Olympia. 6-7

Canada

BRITISH COLUMBIA—**Campbell Contracting Co., Ltd.,** 355 Burrard St., Vancouver—$90,000 for replacement of southeast trestle approach of the New Westminster railway bridge—by Federal Public Works Dept., Ottawa, Ontario.

Airport . . .

California

ALAMEDA CO.—**Piazza & Huntley,** 175 So. Montgomery St., San Jose—$313,045 to strengthen NW-SE and N-S runways at Oakland Municipal Airport, Oakland—by U. S. Engineer Office, San Francisco. 6-16

IMPERIAL CO.—**Warren-Southwest, Inc.,** 2145 E. 25th St., Los Angeles—$138,456 for carrier landing training field and roads at Auxiliary Air Station, Holtville—by Bur. of Yards & Docks, Washington, D. C. 6-22

KERN CO.—**Peter Kiewit Sons' Co., Al Johnson,** & **Western Construction Corp.,** 650 So. Grand, Los Angeles—$6,165,271 for additional landing field facilities at Muroc Army Airfield, Muroc—by U. S. Engineer Office, Los Angeles. 6-30

MARIN CO.—**Fredrickson & Watson Construction Co.,** 873

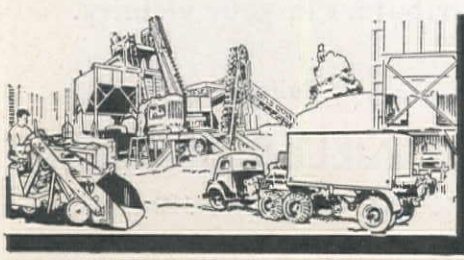
The Mystery of the REAPPEARING CENTRAL MIXING PLANT

Engineered BUTLER Design

Be on the lookout for a Butler central mixing plant; height about 75 feet; wearing a coat of gray paint; last reported in the State of Washington; has also been seen in Texas, Utah, and Indiana. Has a long record of production — nearly 600,000 cubic yards of concrete poured, and more to come. 150 yards per hour for days on end.

Though it sounds something like a mystery novel, there is really nothing mysterious about the remarkable performance of this plant — it is a Butler Engineered Design. Butler engineers have been designing plants for more than twenty years, plants whose efficiency, dependability, and versatility are built in. No wonder, then, that they are as good on their tenth job as on their first.

If you have a concrete job, large or small, be sure to call upon the Butler engineer. His suggestions are available to you regarding central mixing plants, ready mixed concrete plants, bulk cement plants, batch bins, and crushing plants. The first step toward the most successful job is Butler Engineered Design.



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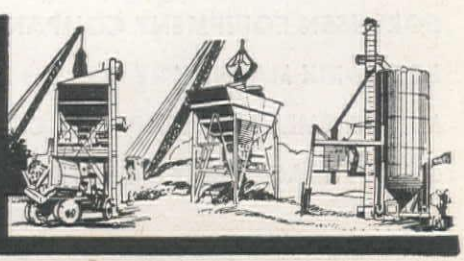


81st Ave., Oakland—$999,033 for a new parking apron at Hamilton Field—by U. S. Engineer Office, San Francisco. 6-26

MARIN CO.—**Charles L. Harney Construction Co.,** 625 Market St., San Francisco—$689,825 for strengthening apron at Hamilton Field—by U. S. Engineer Office, San Francisco. 6-7

ORANGE CO.—**Peter Kiewit Sons' Company,** 1024 Omaha National Bank Bldg., Omaha, Neb.—$952,158 for roads, walks and services at Marine Corps Air Station, El Toro—by Bur. of Yards & Docks, Washington, D. C. 6-8

SAN DIEGO CO.—**Hull-Smale-Robinson, Inc.** 1033 Avalon Blvd., Wilmington—$342,945 for loading facilities for aircraft transport at Naval Air Station, San Diego—by Bur. of Yards & Docks, Washington, D. C. 6-16

SANTA CRUZ CO.—**Granite Construction Co.,** Box 900, Watsonville—$90,754 for runway shoulders at air station, Watsonville—by Bur. of Yards & Docks, Washington, D. C. 6-8

SOLANO CO.—**Casson & Ball,** 22105 Meekland Ave., Hayward—$1,192,962 to widen runways at Fairfield-Suisun Airdrome—by U. S. Engineer Office, Sacramento. 6-13

Nevada

NYE CO.—**A. Teichert & Co.,** Box 1113 and **John C. Gist,** 1020 46th St., Sacramento, Calif.—$53,669 for seal coating runways, taxiways, parking areas and streets; and paving at Tonopah Army Airfield—by U. S. Engineer Office, Sacramento, Calif. 6-2

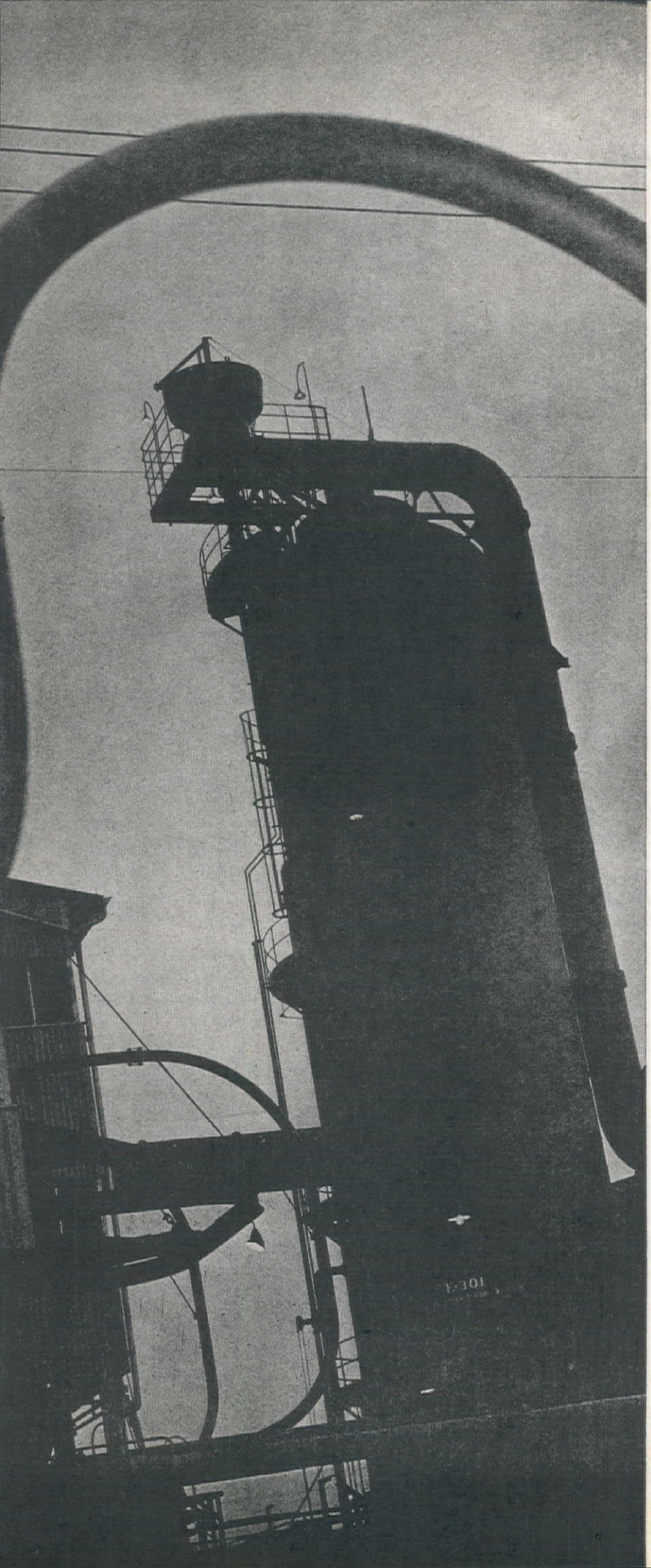
Texas

DALLAS CO.—**Vilbig Construction Co.,** 817 Bourbon St., Dallas—$43,305 for airfield turfing at Hensley Field, Grand Prairie—by U. S. Engineer Office, Denison. 6-2

WARD CO.—**Uvalde Construction Co.,** 2400 Uvalde St., Dallas—$87,905 for reinforcing runways and replacing taxiway at Pyote A. A. F.—by U. S. Engineer Office, Albuquerque, N. M. 6-2

Utah

WEBER CO.—**Reynolds-Ely Construction Co.,** Springville—$40,944 for road and parking areas at Ogden Air Depot, Ogden—by U. S. Engineer Office, Salt Lake City. 6-22



60 foot washboard for butadiene gas

Shown here is a stripper-scrubber, a busy piece of refinery equipment that strips off butadiene gases and then scrubs out impurities—a vital operation in the manufacture of synthetic rubber.

This particular vessel is the largest one of its kind ever built. Although it towers some 60 feet, its steel shell is but one-half an inch thick—a meticulous fabrication job and one logically assigned to the craftsmen of Consolidated Steel Corporation.

Precision work quickly accomplished—today it is continuing to win for the men and women of Consolidated Steel every basic government industrial award, tomorrow it will be devoted to the construction needs of a peacetime America. Inquiries looking to future construction are solicited. Address the president.

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LARGEST INDEPENDENT IN THE WEST

CONSOLIDATED STEEL CORP., LTD., LOS ANGELES
LONG BEACH, WILMINGTON, CALIF.; ORANGE, TEX.

Water Supply . . .

Arizona

COCONINO CO.—**J. H. Welch & Son,** 613 So. Central, Phoenix—$37,027 for water supply line for Indian camps at Navajo Ordnance Depot, Bellemont—by U. S. Engineer Office, Los Angeles Calif. 6-14

California

ALAMEDA CO. — **Macnsons,** 151-161 Tehama St., San Francisco—$17,840 for improving water supply system at Naval Air Station, Livermore—by Bur. of Yards & Docks, Washington, D. C. 6-5

ALAMEDA CO.—**Martin Murphy,** Box 894, Walnut Creek—$10,642 for a 10-in. cast iron main in Santa Rita Road, near Pleasanton—by Public Utilities Comm., San Francisco. 6-21

LOS ANGELES CO.—**Thomas H. Hogan Co.,** 1700 W. Washington Blvd., Los Angeles—$11,175 for a 50,000 gal. steel water tank and piping at Olive View—by Board of Supervisors, Los Angeles. 6-23

LOS ANGELES CO.—**Alex Robertson,** 811 No. Paramount Blvd., Clearwater — $10,560 for water supply system at Bolsa Chica—by U. S. Engineer Office, Los Angeles. 5-24

SAN FRANCISCO CO. — **Cement Gun Construction Co.,** 24 California St., San Francisco—$13,824 to repair auxiliary water system in San Francisco—by Dept. of Public Works, San Francisco. 6-26

SAN FRANCISCO CO.—**Macnsons,** 151-161 Tehama St., San Francisco—$223,449 for replacement of high pressure water system at Treasure Island—by Bur. of Yards & Docks, Washington, D. C. 6-2

Texas

CORYELL CO.—**Layne-Texas Co., Ltd.,** Second Bank Bldg., Houston—$16,766 for water works improvements at Copperas Cove. 6-2

DALLAS CO. — **Layne-Texas Co., Ltd.,** Second Bank Bldg., Houston—$27,250 for water well at Seagoville—by Dept. of Justice, Washington, D. C. 6-20

FOARD CO.—**Panhandle Construction Co.,** Box 1500, Lubbock—$105,000 for extension to water works system at Crowell —by City of Crowell. 6-22

TAYLOR CO.—**Glade Construction Co.,** Century Bldg., Fort Worth—$29,966 for filtration plant improvements and cast iron water mains (Contract No. 3) at Abilene—by City of Abilene. 6-15

TAYLOR CO.—**Holland Page,** Box 1181, Austin—$113,989 for filtration plant improvements and cast iron water mains (Contract No. 2) at Abilene—by City of Abilene. 6-15

Washington

KITSAP CO.—**N. C. Jannsen Drilling Co.,** Box 3185, Seattle—$8,500 for water supply development at Bangor—Navy Public Works Office, Seattle. 6-9

SPOKANE CO.—**Vanhiser & Warren,** Spokane—$6,847 for improvement of water supply lines 1 and 2 at Army Air Depot, Spokane—by U. S. Engineer Office, Seattle. 6-13

Sewerage . . .

California

ALAMEDA CO.—**John Pestana,** 4039 Fruitvale Ave., Oakland —$4,416 for sanitary sewer in portions of Douglas Ave. and 105th Ave., Oakland—by City Clerk, Oakland. 6-2

LOS ANGELES CO.—**Bob Bosnyak,** 2014 Worthen Ave., Los Angeles—$28,913 for sewer in Erwin St., Los Angeles—by Board of Public Works, Los Angeles. 6-26

LOS ANGELES CO.—**Bob Bosnyak,** 2014 Worthen Ave., Los Angeles—for 3,563 lin. ft. 8-in. vitrified clay sanitary sewers in 157th St. and others, for housing project in Los Angeles—by H. H. Wheeler, Los Angeles. 5-29

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4490 W. National Avenue, Milwaukee 14, Wisconsin

LOS ANGELES CO.—**Burch & Bebek,** 5649 Cerritos Ave., Long Beach—$18,036 for sewer in Gage Ave. and Bell Ave., Los Angeles—by Board of Supervisors, Los Angeles. 6-23

LOS ANGELES CO.—**Leko & Radich,** 3014 Worthern Ave., Los Angeles—$6,624 for vitri. sewer in Verdugo Park, Glendale—by City Council, Glendale. 6-7

LOS ANGELES CO.—**Steve Pizula,** 728 So. Clela Ave., Los Angeles—$4,323 for lateral sewers in Sewer Dist. No. 19A-4, Long Beach—by City Mgr., Long Beach. 6-23

LOS ANGELES CO.—**Steve P. Rados,** 2975 San Fernando Road, Los Angeles—$35,923 for sanitary sewer in the Willbrook-Lynwood Area, Los Angeles—by Federal Works Agency, Los Angeles. 6-16

LOS ANGELES CO.—**Edward R. Siple,** 2545 San Fernando Road, Los Angeles—$1,732 for 87 lin. ft. of 12-in. steel welded pipe sewer on pile supports in Ethel Ave., Los Angeles—by Board of Public Works, Los Angeles. 6-14

LOS ANGELES CO.—**V. C. K. Construction Co.,** 5629 Via Corona, Los Angeles—$7,261 for sewer in Barrington Rd., betw. Venice Blvd. and Charnock Rd., Los Angeles—by Board of Public Works, Los Angeles. 5-29

MONTEREY CO.—**Oakland Sewer Construction Co.,** 9915 Walnut St., Oakland—$4,868 for vitri. clay pipe sanitary sewer trunk lines, etc. in Paloma Ave., Margaret and Tampa Sts., Sycamore, Afton and Alisal Rds., Salinas—by Alisal Sanitary Dist., Salinas. 6-7

SAN DIEGO CO.—**J. S. Barrett,** 435 Spreckels Bldg., San Diego—$143,699 for sewage collection system, disposal plant and expansion to water supply system at Naval Ammunition Depot, Fallbrook—by Bur. of Yards & Docks, Washington, D. C. 6-2

SAN DIEGO CO.—**W. D. Haxton,** Broadway Bldg., San Diego—$22,525 for installing sewers to trailer units in San Diego—by Fed. Public Housing Auth., San Francisco. 6-14

SAN DIEGO CO.—**Hoagland - Findlay Engineering Co.,** 3254 Cherry Ave., Long Beach—$24,365 for revisions and additions to sewage plant at Oceanside—by Bur. of Yards & Docks, Washington, D. C. 6-23

SAN FRANCISCO CO.—**M. J. Lynch,** Barneveld and Oakdale Aves., San Francisco—$5,905 for repairing Bush St. sewer from Franklin St. to Van Ness Ave., San Francisco—by Dept. of Public Works, San Francisco. 6-2

SAN FRANCISCO CO.—**Martin Murphy,** Box 894, Walnut Creek—$6,040 to repair Lombard St. sewer in San Francisco—by Dept. of Public Works, San Francisco. 6-21

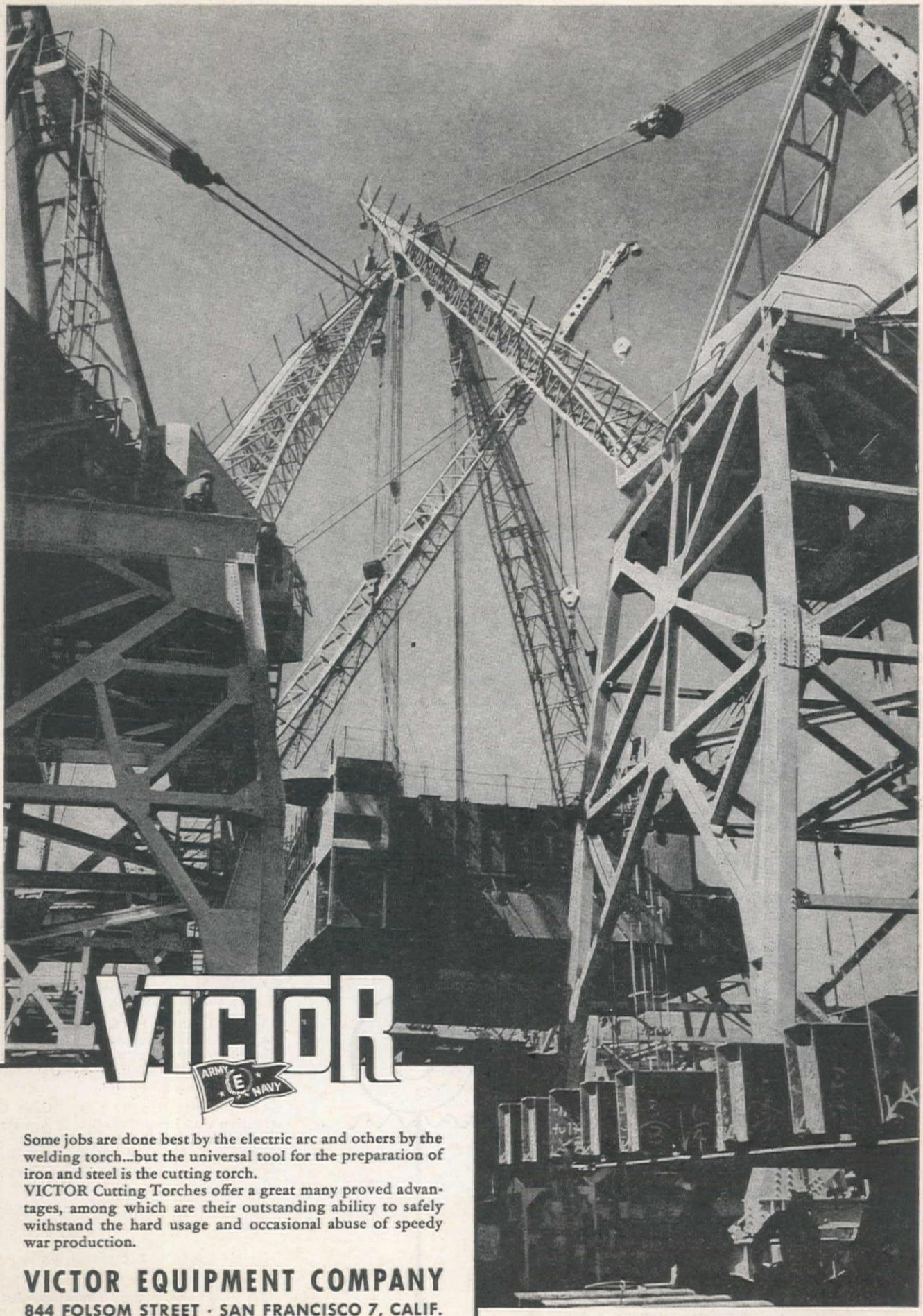
Texas

ATASCOSA CO.—**Trueheart & Caldwell,** 508-9 American Hospital & Life Bldg., San Antonio—for sewer line and small disposal plant at Pleasanton—by City of Pleasanton. 5-24

DALLAS CO.—**Dalton & Cullum,** 602 Great National Life Bldg., Dallas—$10,466 for sanitary sewer extensions and appurtenances at Mesquite. 5-23

Washington

SPOKANE CO.—**W. A. Rushlight,** Spo-



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kane — $18,137 for sub-trunk and lateral sewer in Ray St., 18th Ave. to 11th Ave. and in 11th Ave., Fiske St. to Thor St., Spokane—by City Clerk, Spokane. 6-2

Territories

ALASKA — **M. P. Munter,** Joseph Vance Bldg., Seattle, Wash.—$51,895 for installation of sewers at Anchorage—by Federal Works Agency, Seattle, Wash. 5-26

Waterway . . .

California

ALAMEDA CO. — **Olympian Dredging Co.,** 525 Market St., San Francisco — for dredging at United Engineering Co., Ltd., Alameda — by Bur. of Yards & Docks, Washington, D. C. 6-12

ALAMEDA CO. — **Olympian Dredging Co.,** 525 Market St., San Francisco—$18,630 for dredging at Naval Landing Forces Equipment Depot, Albany — by Bur. of Yards & Docks, Washington, D. C. 5-31

CONTRA COSTA CO. — **J. P. Proctor,** Box 247, Pt. Richmond Station, Richmond —$29,200 for repairs to fender system of Wharf No. 1, southerly end of Garrard Blvd., Richmond — by City Clerk, Richmond. 6-6

ORANGE CO.—**American Pipe & Construction Co.,** 4635 Firestone Blvd., South Gate — for pontoon erection at Newport Beach—by Bur. of Yards & Docks, Washington, D. C. 6-8

SAN DIEGO CO.—**V. R. Dennis Construction Co.,** Box "F," Hillcrest Station, San Diego—$29,400 for riprap sea wall at Naval training center, San Diego—by Bur. of Yards & Docks, Washington, D. C. 6-23

SAN DIEGO CO. — **Walter Trepte,** 631 9th Ave., San Diego — $112,500 for additional docking facils. and repairs to piling supporting bldgs. at 11th Naval District Headquarters, San Diego — by Bureau of Yards & Docks, Washington, D. C. 6-5

SAN FRANCISCO CO.—**Piombo Bros. & Co.,** 1571 Turk St., San Francisco—$34,470 for repairs to sea wall at Treasure Island —by Bur. of Yards & Docks, Washington, D. C. 6-22

SAN FRANCISCO CO.—**Healy Tibbitts Construction Co.,** 1100 Evans Ave., San Francisco—$84,350 for marginal small boat wharf, six floats and small boat dock at Treasure Island—by Bureau of Yards & Docks, Washington, D. C. 6-12

SAN LUIS OBISPO CO.—**Guy F. Atkinson,** 1103 Heartwell Bldg., Long Beach—$560,000 for dredging and breakwater construction at Morro Bay—by U. S. Engineer Office, Los Angeles. 6-8

SAN LUIS OBISPO CO. — **Case Construction Co.,** Berth 109, Box 6, San Pedro, and **T. E. Connolly,** 461 Market St., San Francisco—$480,000 for dredging in Morro Bay—by U. S. Engineer Office, Los Angeles. 6-23

SANTA BARBARA CO. — **Hull-Smale-Robinson,** 1033 Avalon Blvd., Wilmington — $14,325 to repair pier at Santa Rosa Island — by U. S. Engineer Office, Los Angeles. 6-14

SOLANO CO. — **San Francisco Bridge Co.,** 503 Market St., San Francisco—$35,000 for dredging at Naval Ammunition Depot, Mare Island—by Bur. of Yards & Docks, Washington, D. C. 6-14

Oregon

LANE CO.—**Oscar Butler & Son,** 4910 N. E. 42nd St., Portland—$37,000 for reconstructing levee on coast fork of Willamette river near Goshen—by U. S. Engineer Office, Portland. 6-13

Washington

KITSAP CO. — **Puget Sound Bridge & Dredging Co.,** Seattle—$25,000 for dredging at marginal wharf ammunition storage and transshipment facils., Puget Sound—by Bur. of Yards & Docks, Washington, D. C. 6-2

Dam . . .

Idaho

BONNER CO.—**Diamond Drill Contracting Co.,** So. 18 Stone St., Spokane—$39,550 for exploratory drilling at various points in the Clark Fork basin—by U. S. Engineer Office, Seattle. 6-21

Irrigation . . .

Oregon

DESCHUTES CO. — **David A. Richardson,** P. O. Box 2, Winthrop, Wash. — $162,406 for Crooked River crossing, North Unit Main canal, Deschutes Project, located 3 mi. east of Terrebonne—by Bur. of Reclamation, Bend. 6-22

Tunnel . . .

California

INYO CO.—**Morrison-Knudsen Co., Inc.,** Russ Bldg., San Francisco — for driving 3,000 ft. of 8 x 8-ft. tunnel on U. S. Vanadium Corporation's mining property on Pine Creek, north of Bishop—by Vanadium Corporation, Bishop. 6-2

New Mexico

SAN MIGUEL CO.—**Bressi-Bevanda Constructors, Inc.,** 208 West 8th St., Los Angeles, Calif. — $752,205 for tunnel and canals for the Conchas Canal, Tucumcari Project—by Bur. of Reclamation, Denver, Colo. 6-6

Building . . .

Arizona

PIMA CO. — **M. M. Sundt Construction Co.,** 440 So. Park Ave., Tucson—$27,672 for additional trainer bldgs. at Davis-Monthan Field, Tucson — by U. S. Engineer Office, Los Angeles, Calif. 6-23

California

ALAMEDA CO. — **Louis C. Dunn Co.,** 799 Monadnock Bldg., San Francisco — $297,070 for laundry, refrigerated storehouse and bank buildings at Naval Air Station, Alameda — by Bur. of Yards & Docks, Washington, D. C. 6-2

ALAMEDA CO. — **Louis C. Dunn Co.,** 799 Monadnock Bldg., San Francisco — $620,254 for constr. of misc. buildings at the Naval Air Station, Alameda—by Bur.

of Yards & Docks, Washington, D. C. 6-22

ALAMEDA CO.—**H. H. Larsen,** 64 So. Park Street, San Francisco—$138,723 for cadet nurses, WAVES & nurses' quarters, occupational therapy bldg., and alterations to club house at U. S. Naval Hospital, Oak Knoll, Oakland — by Bureau of Yards & Docks, Washington, D. C. 6-2

ALAMEDA CO.—**Martinelli Construction Co.,** 44 Mary Street, San Francisco—$25,-990 for employment office at Naval Supply Depot, Oakland — by Bureau of Yards & Docks, Washington, D. C. 5-31

ALAMEDA CO.—**Ford J. Twaits Co.,** Russ Bldg., San Francisco—$1,025,000 for construction work at Postal Concentration Center, Oakland Port, Oakland—by U. S. Engineer Office, San Francisco. 6-13

KERN CO.—**R. J. Daum,** 6803 West Blvd., Inglewood — $69,688 for raising two steel hangars at Army Airfield, Muroc—by U. S. Engineer Office, Los Angeles. 6-1

KERN CO.—**O. D. Williams, Jr.,** 506 "G" St., Bakersfield—$31,270 for 10 temporary classroom bldgs. at various sites in Bakersfield—by Board of Education, Bakersfield. 6-19

LOS ANGELES CO. — **Capitol Homes,** 5143 Sunset Blvd., Los Angeles—$275,000 for ten 20-room apt. bldgs., the first of 22 to be built in Burbank. Work has started—by self. 6-20

LOS ANGELES CO.—**Charde & Brindle,** 4263 Holly Knoll Drive, Hollywood—for 2-story reinf. concrete office bldg. at 2500 E. 12th St., Los Angeles—by Crown Body & Coach Corp., Los Angeles. 6-12

LOS ANGELES CO. — **Griffith Co.,** 502 Los Angeles Railway Bldg., Los Angeles —$42,970 for asph. and conc. paving, conc. curbs and walks at the Burbank plant—by Lockheed Aircraft Corp., Burbank. 6-23

LOS ANGELES CO. — **Griffith Co.,** 502 Los Angeles Railway Bldg., Los Angeles —$173,960 for addition to administration bldg. at Naval Dry Docks, San Pedro—by Bur. of Yards & Docks, Washington, D. C. 6-2

LOS ANGELES CO.—**Ray Hommes Co.,** 6521 Wilshire Blvd., Los Angeles—$65,-000 for five four-unit frame and stucco apt. bldgs. in Burbank. Work has started—by self. 6-14

LOS ANGELES CO.—**R. & B. Construction Co.,** 6803 West Blvd., Inglewood—$185,000 for eight four-unit and ten triplex apt. bldgs. of frame-stucco constr. in North Hollywood—by self. 6-9

LOS ANGELES CO.—**W. E. Robertson Co.,** 4015 W. Jefferson Blvd., Los Angeles —$600,000 for 46 four-family apt. bldgs. on Glen Oaks Blvd. and Scott Drive, Burbank. Work has started — by Glen Oaks Builders, Inc., Los Angeles. 6-20

LOS ANGELES CO.—**W. C. Smith, Inc.,** 411 W. 5th St., Los Angeles—$64,395 for two arch-type magazines and one double arch-type magazine at Naval Fuel Annex, San Pedro—by Bur. of Yards & Docks, Washington, D. C. 6-16

LOS ANGELES CO. — **Ivan M. Wells Construction Co.,** 201 Linden Drive, Beverly Hills—$50,500 for four nursery bldgs. in Burbank—by Fed. Works Agency, Los Angeles. 6-14

LOS ANGELES AND SAN BERNARDINO COS.—**Robertson Co.,** 730 E. Gage Ave., Los Angeles—$85,000 to dismantle shop bldgs. at Camp Santa Anita, Arcadia, and to transport and re-erect them at Kaiser

Shell Plant, Fontana—by U. S. Engineer Office, Los Angeles. 6-6

LOS ANGELES AND SAN BERNARDINO COS.—**Royal Building Corp.,** 11201 Long Beach Blvd., Lynwood—$76,197 for nursery bldgs. at Bellflower, San Bernardino and Hawthorne—by Federal Works Agency, Los Angeles. 6-2

MARIN CO.—**T. G. Meyer,** 200 Quint St., San Francisco—$84,731 for three hospital bldgs., and utils. to WAC officers' quarters at Hamilton Field—by U. S. Engineer Office, San Francisco. 6-22

MONTEREY CO.—**W. F. Lynn,** 3848 Grand Ave., Oakland—$38,708 for a locomotive house at Fort Ord—by U. S. Engineer Office, San Francisco. 6-22

SAN BERNARDINO CO.—**Swinerton-Walberg Co.,** 225 Bush St., San Francisco—$850,000 to construct a diesel locomotive repair shop, to include concrete pits and platforms, structural steel frame, etc., at Barstow—by A. T. & S. F. Railroad Co., Los Angeles. 6-23

SAN DIEGO CO.—**L. C. Anderson Co.,** 414 Broadway Bldg., San Diego—$49,870 for barracks for Base Company at Naval Supply Depot, San Diego—by Bur. of Yards & Docks, Washington, D. C. 6-2

SAN DIEGO CO.—**Donald & McKee,** 50 East Vine St., Redlands—$64,000 for conversion of 50 family dwelling units at Oceanside—by Fed. Public Housing Auth., San Francisco. 6-12

SAN DIEGO CO.—**Griffith Co.,** 502 Los Angeles Railway Bldg., Los Angeles—$76,650 for additions to dispensary, bus station & signal maint. shop at Camp Elliott, San Diego—by Bur. of Yards & Docks, Washington, D. C. 6-8

SAN DIEGO CO.—**Charles Macomber,** 411 Cherokee Ave., San Diego—$37,388 for 6-classroom addition to Chula Vista junior high school—by Sweetwater Union High School Dist., National City, 6-12

SAN DIEGO CO.—**Trepte Construction Co.,** 631-9th Ave., San Diego—$50,000 for 2-story, reinf. conc., mill-type storage bldg., at 611 Island Ave., San Diego—by the Klauber Wagenheim Co., San Diego. 6-15

SAN DIEGO CO.—**Jack A. Watson,** 517 Broadway Bldg., San Diego—$57,059 for additions to 2 junior high schools in Sweetwater Junior High School Dist.—by Fed. Works Agency, San Diego. 5-31

SAN DIEGO CO.—**E. E. Wikholm,** Box 128, Escondido—$175,885 for 200 prefabricated dwelling units at Oceanside—by Fed. Pub. Housing Auth., San Francisco 6-5

SAN FRANCISCO CO.—**Carl N. Swenson,** 355 Stockton Ave., San Jose—$39,000 for additions to Navy facils. repair shop for United Engineering Co., Ltd., San Francisco—by U. S. Navy Civil Works, San Francisco. 6-22

SOLANO CO.—**Barrett & Hilp,** 918 Harrison St., San Francisco—$155,527 for laundry & shop bldg. at Naval Hospital, Mare Island—by Bur. of Yards & Docks, Washington, D. C. 6-2

SOLANO CO.—**Barrett & Hilp,** 918 Harrison St., San Francisco—$259,140 for extension to Submarine Spare Parts Storage Bldg., Mare Island Navy Yard—by Bur. of Yards & Docks, Washington, D. C. 6-22

SOLANO CO.—**J. A. Bryant,** 1000 Main St., Vallejo—$45,723 for cafeteria bldg. at Vallejo—by Vallejo Housing Authority. 6-22

SOLANO CO.—**De Luca & Son,** 1745 Fil-

bert St., San Francisco—$213,505 for 100 family dwelling units in Fairfield — by Housing Auth., city of Fairfield. 6-2

SOLANO CO.—**D. W. Nicholson Corp.,** 1701 San Leandro Blvd., San Leandro—$493,000 for recreation bldg. at Naval Hospital, Mare Island—by Bur. of Yards & Docks, Washington, D. C. 6-8

SOLANO CO.—**Jere Strizek,** 1916 Broadway, Oakland—$66,435 for bldg. at Benicia Arsenal, Benicia—by U. S. Engineer Office, San Francisco. 6-2

SOLANO CO.—**Jere Strizek,** 1916 Broadway, Oakland—$190,752 for bldgs. & utils. at Benicia Arsenal, Benicia—by U. S. Engineer Office, San Francisco. 6-21

VENTURA CO.—**Shumaker-Evans Construction Co.,** 3000 No. Central Ave., Phoenix, Ariz.—$139,976 for 160 prefabricated dwelling units at Port Hueneme—by Fed. Pub. Housing Auth., San Francisco 6-5

Colorado

ARAPAHOE CO.—**Carlos Bellamy,** 1555 Madison St., Denver—approx. $50,000 for manufacturing plant in Littleton—by Heckethorn Mfg. and Supply Co., Denver. 7-8

DENVER CO.—**Fegles Construction Co., Ltd.,** 711 Wesley-Temple Bldg., Minneapolis, Minn.—$500,000 for shell production manufacturing plant at Denver Ordnance Depot, Denver—by U. S. Engineer Office, Denver. 6-14

EL PASO CO.—**Raymond C. Whitlock,** Denver—$25,463 for a cadet nurses dormitory & addition to cadet nurses' school at Glockner Hospital, Colorado Springs—by Seton School of Nursing, Denver. 6-19

Idaho

BONNER CO.—**Clyde Ludberg,** W. 326 1st Ave., Spokane, Wash.—$77,880 for addition to recreation bldg. at Naval Hospital, Farragut—by Bur. of Yards & Docks, Washington, D. C. 6-14

BONNER CO.—**Sound-Kiewit Construction Co.,** 1012 Northern Life Tower, Seattle, Wash.—$33,911 for incinerator plant at Naval Hospital, Farragut—by Bur. of Yards & Docks, Washington, D. C. 6-14

BONNER CO.—**Sound-Kiewit Construction Co.,** 1012 Northern Life Tower, Seattle, Wash.—$101,483 for dispensary & community bldg. at Farragut—by Bur. of Yards & Docks, Washington, D. C. 6-8

Nevada

MINERAL CO.—**Wm. P. Neil Co., Ltd.,** 4814 Loma Vista Ave., Los Angeles, Calif. —$144,220 for test bldg. at Naval Ammunition Depot, Hawthorne—by Bur. of Yards & Docks, Washington, D. C. 5-29

New Mexico

CURRY CO.—**Western Contracting Corp.,** Sioux City, Iowa—$323,207 for additional constr. at Army Airfield, Clovis—by U. S. Engineer Office, Albuquerque. 6-19

Oregon

CLATSOP CO.—**Lee Hoffman,** Box 1039, Rt. 5, Portland—$71,932 for cold storage bldg. at Astoria Naval Station, Astoria—by Bur. of Yards & Docks, Washington, D. C. 6-26

CLATSOP CO.—**E. E. Settergren,** Henry Bldg., Portland—$53,267 for dependents' facils. at Naval Hospital, Astoria—by Bur. of Yards & Docks, Washington, D. C. 5-27

KLAMATH CO.—**Brennan & Cahoon,** Pendleton—$1,500,000 for additional work & rehabilitation center at Marine barracks, Klamath Falls—by Bur. of Yards & Docks, Washington, D. C. 6-19

LANE CO.—**Douglas & Wolfe,** 3943 Vale Ave., Oakland, Calif.—$75,000 for a wood-frame wood preservative plant at Eugene—by J. H. Baxter Timber Co., San Francisco, Calif. 6-20

MULTNOMAH CO.—**Wegman & Son,** Board of Trade Bldg., Portland—$90,000 for addition to the Riverview Cemetery Association's mausoleum at 7441 S.W. Macadam Road, Portland—by the Assoc. 6-13

Texas

BEXAR CO.—**Crockett & Anderson Co.,** 112 Academy Drive, Austin—$46,712 for hospital supply & service bldg., Fort Sam Houston—by U. S. Engineer Office, Fort Sam Houston. 6-7

DALLAS CO.—**Cowdin Brothers,** 411 So. Haskell St., Dallas—$47,965 for steel market shed at Dallas—by city of Dallas. 5-25

NUECES CO.—**R. P. Farnsworth & Co., Inc.,** Box 4187, Houston 14—$153,031 for admin. bldg. & 2 school bldgs. at Corpus Christi. 6-16

WEBB CO.—**Ray Lanham,** San Antonio—for 24 five-room frame dwellings north of Guadalupe St., and on the Country-Club-Gunnery School Hwy. in Laredo—by Tex-La Builders, Inc., San Antonio. 6-16

WILLIAMSON CO.—**Ricks Construction Co.,** 4709 Shoalwood Ave., Austin—$68,-577 for locker & cold storage plant at Taylor—by Taylor Locker & Cold Storage Co., Taylor. 6-2

Utah

CARBON CO.—**Mead & Mount Construction Co.,** 422 Denver National Bldg., Denver, Colo.—$55,000 for brick railroad station at Helper—by Denver & Rio Grande Western Railroad Co., Denver, Colo. 5-17

SALT LAKE CO.—**Chytraus Construction Co.,** 436 So. 4th West, Salt Lake City—$91,100 for 19 dwelling units in Bonneville Gardens, Salt Lake City—by Varsi and Goodman Co., Salt Lake City. 5-2

SALT LAKE CO.—**Edward Eckman Construction Co.,** Murray—$411,600 for 84 dwelling units in Kensington Gardens, Salt Lake City—by Varsi and Goodman Co., Salt Lake City. 5-2

SALT LAKE CO.—**Jacobsen Construction Co.,** 724 So. 3rd E. St., Salt Lake City—for constr. of a roundhouse in Salt Lake City—by Union Pacific Railroad Co., Chicago, Ill. 5-10

SALT LAKE CO.—**The Chytraus Construction Co.,** 436 So. 4th W., Salt Lake City, 4—$150,000 for 5 brick veneer apt. bldgs. at 10th E. & 5th So. Sts., Salt Lake City—by Sid Eliason, Salt Lake City. 6-5

Washington

GRANT CO.—**G. J. Bouten,** Spokane—$51,880 for brick school bldg. at Moses Lake—by Grant Co. School Dist. 161. 6-2

KING CO.—**J. W. Bailey Construction Co.,** 228 9th Ave., N., Seattle—$198,000 for chapel & addl. hospital facils. at the Naval Hospital, Seattle—by Bur. of Yards & Docks, Washington, D. C. 6-20

KING CO.—**Lease & Leigland,** 1484 Dexter Horton Bldg., Seattle—$337,780 for 12 dormitory bldgs., service bldgs., laundry facils. & community bldg. at Renton—Fed.

Public Housing Auth., Seattle. 6-9

KING CO.—**Sound Construction & Engineering Co.,** 1403 W. 45th St., Seattle—$119,988 for extension to a storehouse at the Naval Station, Seattle—by Bur. of Yards & Docks, Washington, D. C. 6-2

KING CO.—**Teufel & Carlson,** 1141 Henry Bldg., Seattle—$200,000 for laundry plant in Seattle—by Model-Washington Laundry & Dry Cleaning Co., Seattle. 6-6

Foreign

ALBERTA PROV., CANADA — **W. C. Wells,** Wilkie, Saskatchewan—$70,000 for 2 additions to Col. Belcher Military Hospital at Calgary, Alberta—by Dept. of Munitions and Supply, Ottawa, Ontario.

BRITISH COLUMBIA, CANADA — **Allan & Viner Construction Co., Ltd.,** 602 West Hastings St., Vancouver—$65,000 for conversion of bldg. at Hastings St. & Gore Ave., Vancouver, into a 27-suite apt. & store bldg.—by Dept. of Munitions and Supply, Ottawa, Ontario.

Miscellaneous . . .

Arizona

YUMA CO. — **H. B. Nicholson,** 572 Chamber of Commerce Bldg., Los Angeles, Calif.—$48,850 for reconstructing moving target ranges at Army Airfield, Yuma—by U. S. Engineer Office, Los Angeles, Calif. 6-13

California

ALAMEDA CO.—**Dinwiddie Construction Co.,** 210 Crocker Bldg., San Francisco—$579,800 for roads, walks, site utils., gas distrib. system, wharf & boiler house at Oakland—by Bur. of Yards & Docks, Washington, D. C. 6-5

ALAMEDA CO.—**Macco Construction Co.,** Freight & Ferry Sts., Oakland—$119,640 to prepare site at Postal Concentration Center, Oakland Army Base, Oakland—by U. S. Engineer Office, San Francisco. 6-7

ALAMEDA CO.—**Stolte, Inc.,** 8451 San Leandro Blvd., Oakland, and **The Duncanson-Harrelson Co.,** DeYoung Bldg., San Francisco—$2,450,304 for bldgs., roads, utilities & other work at Alameda—by U. S. Engineer Office, San Francisco. 6-9

ALAMEDA CO.—**Healy Tibbitts Construction Co.,** 1100 Evans Ave., San Francisco—$57,580 for pile foundations at Postal Concentration Center, Oakland Army Base, Oakland—by U. S. Engineer Office, San Francisco. 6-7

LOS ANGELES CO.—**Ford J. Twaits Co.,** 451 So. Boylston Ave., Los Angeles—for site develop. & related work for 260-unit prefabricated dwelling project in Wilmington—by Housing Auth., city of Los Angeles. 5-31

LOS ANGELES CO.—**E. C. Nesser,** 4822 W. Jefferson Blvd., Los Angeles—$180,700 to make site improvements for 260 portable dwelling units in South Los Angeles—by Federal Public Housing Authority, San Francisco. 5-9

LOS ANGELES CO.—**Geo. B. Thatcher,** 4074 Laurel Canyon Blvd., North Hollywood—$204,716 to develop sites, etc., for 340 portable shelter units in East Los Angeles—by Fed. Pub. Housing Auth., San Francisco. 5-12

LOS ANGELES CO.—**Wesco Construction Co.,** 2000 Hyperion Ave., Los Angeles—$147,118 to do site work for 220 portable

shelter units, including constr. of 10 utility bldgs. near Watts — by Federal Public Housing Authority, San Francisco. 5-2

LOS ANGELES & VENTURA COS.—**Pacific Pipeline Construction Co.,** 8732 So. Juniper St., Los Angeles — $573,000 to trench, place & backfill for 55 mi. of 18-in. welded steel pipe from Ventura to Haskell Ave. regulator station in No. Hollywood—by Southern California Gas Co., Los Angeles. 6-2

SAN BERNARDINO CO. — **Robert E. McKee,** 4700 San Fernando Road, W., Los Angeles—$105,000 for a car-icing dock in San Bernardino—by Santa Fe Railway Co., Los Angeles. 5-10

SAN BERNARDINO CO. — **Morrison-Knudsen Co.,** 411 W. 5th St., Los Angeles —$39,774 for clearing, grading, drainage & railroads at Kaiser Shell Plant, Fontana—by U. S. Engineer Office, Los Angeles. 5-31

SAN DIEGO CO.—**L. C. Anderson,** 414 Broadway Bldg., San Diego—$45,670 for additional facils. at anti-aircraft training center, Pacific Beach—by Bur. of Yards & Docks, Washington, D. C. 6-23

SAN JOAQUIN CO.—**J. R. Reeves,** Box 1072, Sacramento — $240,429 for paving open storage area & for railroad spur at Lathrop Engineering Depot, Lathrop—by U. S. Engineer Office, Sacramento. 6-6

SAN MATEO CO.—**Parker, Steffens & Pearce,** 135 So. Park, San Francisco—$374,-151 for paving & for building brig, ships service bldg., stores, etc., at San Bruno—by Bur. of Yards & Docks, Washington, D. C. 6-14

SANTA BARBARA & VENTURA COS. —**Pacific Pipeline Construction Co.,** 8732 So. Juniper St., Los Angeles—$519,000 to trench, place & backfill for 36 mi. of 16-in. welded steel pipe, incl. 1.6 mi. for Pacific Lighting Corp., betw. that company's Goleta gas field & the Ventura compressor station—by Southern Counties Gas Co., Los Angeles. 6-2

Colorado

PUEBLO CO. — **Alfred C. Larson,** 944 Osage St., Denver—$59,775 for fire walls & fire doors for warehouses at Pueblo—by U. S. Engineer Office, Denver. 6-5

Montana

VARIOUS COUNTIES — **I. C. Little Construction Co.,** Mercantile Bldg., Dallas, Texas, for laying 140 mi. of 12-in pipeline, and **Sherman & Everett, Inc.,** 522 Barziza, Houston, Texas, for laying 80 mi. of 12-in. pipeline from So. Montana to Casper, Wyo., to serve the Elk Basin pool—by Stanolind Pipeline Co., Casper, Wyo. 5-31

Texas

BANDERA CO.—**Day P. McNeel Co.,** 922 Austin St., San Antonio—for constr. of swimming pool, 100 ft. low water bridge across Medina River, & 2 mi. of flexible base & rock asphalt topping road at Mayan Ranch. 5-29

CAMERON CO. — **J. W. France,** 521 Lawrence Lane, Corpus Christi—for oil line from Willamar Field to Port Isabel, pump station, office & camp dwellings—by Pan-American Pipe Line Co., Houston. 6-6

NUECES CO.—**Day P. McNeel Co.,** 922 Austin St., San Antonio — $81,491 for a training pool at Naval Air Technical Training Center on Ward Island (Corpus Christi)—by Bur. of Yards & Docks, Washington, D. C. 6-16

TARRANT CO.—**American Cyanamid & Chemical Corp.**, New York, N. Y.—$175,000 for additional facils. at plant in Fort Worth—by Defense Plant Corp., Washington, D. C. 6-15

WEBB CO.—**Lee A. Christy**, 503 Builders Exchange Bldg., San Antonio—$37,880 for school & research facilities at Army Airfield, Laredo—by U. S. Engineer Office, Denison. 6-23

Utah

DAVIS CO.—**Gibbons & Reed**, 259 W. 3rd South St., Salt Lake City—approx. $489,580 for paving 1,500,000 sq. ft. storage space at Clearfield Naval Depot—by Bur. of Yards & Docks, Washington, D. C. 6-5

Washington

GRAYS HARBOR CO.—**Grays Harbor Construction Co.**, Box 743, Aberdeen—$26,791 for drainage, grading & paving at anti-aircraft training center, Pacific Beach—by Bur. of Yards & Docks, Washington, D. C. 6-17

KING CO.—**J. W. Bailey Construction Co.**, 228 - 9th Ave., N., Seattle—$373,500 for additions to heating facils. at Naval Station, Seattle—by Bur. of Yards & Docks, Washington, D. C. 6-5

KING CO.—**General Construction Co.**, 3840 Iowa Ave., Seattle—$62,885 for dunnage operating facils. at port of embarkation, Seattle—by U. S. Engineer Office, Seattle. 6-21

KITSAP CO.—**Sound-Kiewit**, 1012 Northern Life Tower, Seattle—$2,156,217 for 23 mi. of railway in second section of Bremerton-Shelton railroad link—by Bur. of Yards & Docks, Washington, D. C. 6-30

Wyoming

VARIOUS COUNTIES—**I. C. Little Construction Co.**, Mercantile Bldg., Dallas, Texas, for laying 140 mi. of 12-in. pipeline, and **Sherman & Everett, Inc.**, 522 Barziza, Houston, Texas, for laying 80 mi. of 12-in. pipeline from So. Montana to Casper, to serve the Elk Basin, Mont., pool—by Stanolind Pipeline Co., Casper. 5-31

Foreign

BRITISH COLUMBIA—**E. H. Shockley**, Victoria, B. C.—approx. $180,000 for work at H.M.C. Dockyards at Esquimalt, involving work on 2 bldgs., roads, sewers, etc.—by Dept. of Munitions and Supply, Vancouver.

PROPOSED PROJECTS

Highway and Street...

Washington

KLAMATH CO.—$145,000 has been approved to pave access & secondary roads leading to the marine corps rehabilitation & training area, Klamath Falls—by Bur. of Yards & Docks, Washington, D. C. 6-6

Bridge...

California

MARIN CO.—Plans have been laid for a campaign for constr. of a $2,250,000 Sausalito lateral extension to the Golden Gate Bridge with National Defense Road Act funds—by Golden Gate Bridge Directors, San Francisco. 5-29

Utah

WEBER CO.—Authorization has been given for constr. of timber crossings at Ogden Arsenal, Ogden, to cost $12,500—by U. S. Engineers, Washington, D. C. 5-25

Airport...

Oregon

CLATSOP CO.—Work on drawings & specifications has started for 4 large projects, including a $500,000 hangar, at Naval auxiliary airfield at Astoria. Approx. overall cost will be $800,000. 6-6

Water Supply...

Texas

HIDALGO CO.—Central Power & Light Co., 220 E. Harriman St., Edinburg, plans new sedimentation basin, chem. treating tanks, & other water plant expansion to increase capacity from 750,000 gal. to 1,500,000 gal. daily. 6-9

Building . . .

Arizona

MARICOPA CO.—The architect has been appointed to draw plans for 50-family dwelling units at Phoenix—by Fed. Pub. Housing Auth., Washington, D. C. 6-14

California

ALAMEDA CO. — Approval has been given for a 13-classroom addition to the Hayward Union High School, Hayward. Grant is $95,000. 6-16

LOS ANGELES CO.—Constr. has been approved for dependents' facilities at Naval Hospital, Long Beach, to cost $422,600—by Bur. of Yards & Docks, Washington, D. C. 6-12

LOS ANGELES CO.—Authorization has been given for a kitchen bldg. for employees of Western Pipe & Steel Co., Shipbuilding Div., Wilmington. Cost, $175,000—by War Production Board, Los Angeles area. 6-5

LOS ANGELES CO.—U. S. Navy has appropriated $680,000 for a 1500-man expansion to the receiving station at Roosevelt Base, Terminal Island. 5-29

Colorado

DENVER CO.—Plans are in preparation for a 4-story reinf. conc. fireproof manufacturing plant on 900 block, So. Broadway, Denver, for the Gates Rubber Co. 6-16

New Mexico

GUADALUPE CO. — The architect has been selected for the building of 40 family dwelling units at Vaughn—by Fed. Pub. Housing Auth., Washington, D. C. 6-14

VALENCIA CO.—Notice has been given of the appointment of the architect for construction of 80 family dwelling units at Belen — by Fed. Pub. Housing Auth., Washington, D. C. 6-14

Oregon

CLATSOP CO.—Approval has been given for a cold storage storehouse, 144 x 82 ft., roads, & utils. at Naval Station, Astoria. Estimated cost, $130,000—by Bur. of Yards & Docks, Washington, D. C. 6-12

DESCHUTES CO. — Working drawings are being prepared for a $100,000 gymnasium for the Junior High School at Redmond—by County School Board, Dist. No. 2, Redmond. 6-14

MARION CO.—Plans are in preparation for a $500,000 five-story hospital at Salem—by directors of the Deaconness Hospital, Salem.

Texas

CAMERON CO.—Richard Gill Co., Gunter Bldg., San Antonio, plans constr. of a tourist court at Brownsville. Approx. cost, $450,000. 6-20

CAMERON CO. — Construction of 200 family units is proposed at Harlingen—by Fed. Pub. Housing Auth., Fort Worth. 5-23

DALLAS CO.—Parkcrest, Inc., Mercantile Bank Bldg., Dallas, plans constr. of 88 apartments in 6 two-story bldgs. located in Dallas. Cost, $250,000. 6-21

NUECES CO.—Navy Dept. has approved $463,990 for improvements at Naval Training Center, Corpus Christi, to include 5 barracks bldgs.—by Bur. of Yards & Docks, Washington, D. C. 5-29

NUECES CO.—Construction of nurses' home & school, to cost approx. $101,800, is planned at Corpus Christi—by City-County Hospital Board, Corpus Christi. 5-25

Washington

CLARK CO.—Working drawings & specifications have been completed for 4 of 6 school bldgs. to be built at Vancouver. Total estimated cost for the 4 is $391,330.

KING CO.—Canada Dry, Inc., New York, N. Y., will build a $260,000 plant at N.E. Halsey St. and 44th Ave., Seattle. 6-19

KITSAP CO.—The Navy has announced an allocation of $6,700,000 for a Naval Ammunition Depot at Bangor on the Hood Canal—by Bur. of Yards & Docks, Washington, D. C. 6-8

SNOHOMISH CO.—The New England Fish Co. has leased the Great Northern dock area at Everett for constr. of a new plant, which will cost approx. $250,000. 6-12

Territories

OAHU, HAWAII — Announcement has been made of the appointment of the architect for work on 250 family dwelling units on Oahu—by Fed. Pub. Housing Auth., Washington, D. C. 6-14

Miscellaneous . . .

Texas

DALLAM CO.—Authorization has been given for hangar, paving & gasoline storage & Dalhart Airfield, Dalhart, to cost $593,000—by U. S. Engineer Office, Tulsa, Okla.

TRADE WINDS

News of Men Who Sell to the Construction West

CALIFORNIA

George W. Gilliland was recently appointed manager of the district sales office of JOSEPH T. RYERSON & SON, INC., Chicago, Ill., at Los Angeles, with offices in the Architects' Building. He has been in the steel business all his life, becoming associated with Ryerson, the nation's largest distributor of steel from stock, in 1934, and before coming to Los Angeles, represented the company in Indianapolis.

☆ ☆ ☆

H. W. Cheney, for the past year advertising and sales promotion manager of the LOCKHEED AIRCRAFT CORPORATION at Burbank, Calif., has transferred to the MACMILLAN PETROLEUM CORPORATION in a similar capacity. Following a three months' tour of the petroleum corporation's offices and distributors throughout the country, Cheney will take up headquarters at the company's main office located at 530 W. 6th St., Los Angeles, Calif.

☆ ☆ ☆

The WEST COAST WIRE & IRON WORKS, located at 154 Main St. in San Francisco, has recently been appointed to represent the ST. LOUIS FIRE DOOR CO., manufacturers of fireproof doors for freight elevators, dumb waiter, industrial, warehouse and airplane hangar doors.

☆ ☆ ☆

E. H. Mintie has been appointed direct factory representative and field engineer for the AIR-MAZE CORPORATION in the states of California and Arizona, succeeding E. G. Treidler, resigned. The corporation, engineers and manufacturers of air and oil filters, oil separators, spark arresters, etc., as well as suppliers of aircraft, engine, compressor and air-conditioning accessories, are located in Cleveland, Ohio. Mintie will be located in Los Angeles.

☆ ☆ ☆

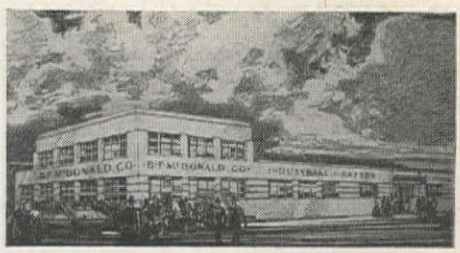
Earl F. Dunkle has been given the post of West Coast operations manager for BYRNE DOORS, INC., engineers and manufacturers of aircraft hangar doors. Dunkle, who is a graduate structural engineer, has for four years been manager of sales in the company's home office in Detroit and is an accomplished designer and consultant.

☆ ☆ ☆

For the third consecutive time, the VICTOR EQUIPMENT COMPANY, San Francisco, Calif., was awarded the star of the Army-Navy "E" Production Award on April 15, 1944.

☆ ☆ ☆

Walter L. Duhig has been appointed Pacific Coast agent for the Distributor Products division of the WATSON-STILLMAN CO., Roselle, N. J., manufacturers of a complete line of forged steel pipe fittings for extremely low temperatures. He will also represent the company on their line of hydraulic valves, high-pressure hand pumps, hydraulic jacks, wire rope shears, and portable pipe benders. Duhig has established offices in the Van Nuys Bldg., Los Angeles.



The new home of the B. F. McDONALD COMPANY is pictured above. The building, a modern Class A structure, occupies an entire block between 51st and 52nd Streets on South Hoover St., Los Angeles, and will house the firm's manufacturing, assembling and executive departments.

As soon as restrictions allow, the building will be reconstructed to provide for executive offices on the second floor. Plans include the construction of a large auditorium, complete with stage and projection equipment, where first aid and safety demonstrations will be given. Also, there will be a lunchroom, and lounges for the personnel, now numbering nearly 100 employees.

McDonald's products are well known in the safety field. Among them are the "T" Hat, an aluminum-alloy safety head protector, the Dustfoe Respirator, the I-Gard, the Burt-Weld Lens, and a variety of other safety devices. In addition to the products it manufactures, the firm also distributes a complete line of equipment which includes safety clothing, first aid materials, gas masks, and miscellaneous devices of every description.

B. F. McDonald has been president of the company since it was founded in 1932. Formerly he was with the U. S. Bureau of Mines.

Besides their Los Angeles office, B. F. McDonald Company also maintains sales and service offices in San Francisco, Calif., and Houston, Texas.

☆ ☆ ☆

J. E. Mayl, vice-president of THE GOODYEAR TIRE & RUBBER CO., INC., who for the past seven years has been attached to the Los Angeles, Calif., office of the company, is returned to Akron to head the Tire Sales Division. Reporting to Mayl in his new office will be the five division sales managers, and C. C. Osmum, manager of trade relations; Victor Holt, head of the tire department; and D. R. Mackenroth, manager of the retail stores division.

☆ ☆ ☆

The GEORGE A. FULLER CO., well known building contractors, announce the death of Robert C. Whiting, vice-president in charge of labor relations for the company. Fuller Company's western office is in Los Angeles. Whiting, who was 66 at the time of his death, joined the Fuller Co. in 1901; he had held the vice-presidency since 1924. He also served as chairman of the Arbitration Board of the Mason Builders Association, was a member of the board of the Master Carpenters Association and was former president of the Building Trades Employers Association.

☆ ☆ ☆

Ralph A. Lewis has been appointed Sales Manager for THE LOS ANGELES STEEL CASTING COMPANY. He has had some 20 years experience in the foundry industry and has been with Los Angeles Steel Casting for 12 years. During this time he served as a sales engineer, specializing in the application of steel castings to the construction field and other western industries. His company has received the Maritime "M" Pennant for its contribution to the shipbuilding program and has developed many new production methods and metallurgical practices.

☆ ☆ ☆

Karl E. Kneiss, manager of the Asphalt and Road Oil Sales Department for TIDE WATER ASSOCIATED OIL COMPANY, died June 13 at the age of 72. Kneiss, who had been with the company since 1907, was treasurer of The Asphalt Institute, Pacific Coast Division, for a number of years and was a member of the Olympic Club.

The UNITED STATES RUBBER COMPANY announces plans for construction of a new $20,000 control and development laboratory at their Los Angeles, Calif., plant. Intensified research due to changing conditions and multiplied problems in the use of new materials has brought about this expansion, and is in line with the company's general extension program. Staff personnel, headed by **C. A. Neville**, includes 128 chemists, development engineers and specialists, and it is expected that this number will be augmented in proportion to the increased facilities.

☆ ☆ ☆

Thomas J. Kehane, commercial vice-president in charge of the Pacific Coast activities for WORTHINGTON PUMP & MACHINERY CORPORATION, will make his headquarters in San Francisco. Kehane has been with Worthington since 1915.

☆ ☆ ☆

H. E. Mechling, 1108 South Hope Street, Los Angeles, has been appointed district representative for ALLIED STEEL PRODUCTS, INC., Cleveland, Ohio, in the states of California, Nevada and Arizona. His job will be to service Allied dealer and jobber distribution in those states. Products represented by the company are: Bulldog Tractor Grip - Lug, Trak - Link Re - Nu Plates, Mango Repointer Bars, and Excelloy Hard Surfacing Overlay Metal.

☆ ☆ ☆

The Eureka, Calif., drydock yard of the CHICAGO BRIDGE AND IRON COMPANY has gained a second extension of the Army-Navy "E" award for continued outstanding performance in the construction of drydocks at Eureka. The yard now flys a pennant with two stars.

☆ ☆ ☆

Dr. Paul Hawley has been appointed director of engineering at CONSOLIDATED ENGINEERING, Pasadena, Calif. **Walter E. Price** is the new director of production. Consolidated manufactures precision instruments used in the production of synthetic rubber, high speed airplane motors and high-octane gasoline.

☆ ☆ ☆

Members of the Equipment Distributors and Manufacturers Association of Southern California met on June 21, to hear a report from **A. F. Garlinghouse** on the recent executive meeting of Associated Equipment Distributors, and to plan activities of the future. Especially discussed were the forthcoming catalog to be issued by A.E.D. and the Annual Convention of the organization next January.

☆ ☆ ☆

PACIFIC NORTHWEST

At their recent annual meeting in Tacoma, Wash., the DOUGLAS FIR PLYWOOD ASSOCIATION formulated important plans for cultivating peacetime markets. One of the most significant developments disclosed at the meeting was the establishment of a research foundation to develop new wood products other than lumber, plywood and pulp. The new experimental institute, formed as a separate corporation, will be known as the Plywood Research

Thomas B. Malarkey

Foundation and will be located in Tacoma. Already $100,000 has been raised for the project.

New officers of the Association are **Thomas B. Malarkey**, president; **Arnold Koutonen**, vice-president; **Herman E. Penzler**, secretary; and **J. P. Simpson**, treasurer. Trustees of the all-industry board are **E. W. Daniels, J. R. Robinson, George H. Royer**, and **Craig L. Spencer.**

G. L. Revell who for the past eight years has been a welding engineer with THE LINCOLN ELECTRIC COMPANY in the San Francisco and Los Angeles offices, is moving to the Portland, Ore., office to succeed **E. H. Weil** as district manager. Weil is now a lieutenant in the Navy. Another transfer to the Portland office is **J. W. Donnelly**, also a welding engineer with several years of experience with Lincoln.

☆ ☆ ☆

F. I. Broaddus of the CATERPILLAR TRACTOR CO. has been appointed District Representative for the Pacific Northwest, covering western Oregon, western Washington and British Columbia. He has been a member of the Caterpillar organization for the past eleven years, and just previous to his transfer to the Western Division in February, he was in charge of specifications, bids, costs and inquiries on tractors and road machinery to the Government. He now expects to establish his home in Portland.

Eugene Caldwell, general manager of the HYSTER COMPANY, Portland, has been elected a vice-president of that organization.

Caldwell, who holds degrees in mechanical and electrical engineering and in law, is also a technical author of note.

Hyster manufactures winches and cranes for use with "Caterpillar" track-type tractors and a complete line of industrial lift trucks. The company has factories at Portland, Ore., and Peoria, Ill.; branch offices in eight principal United States cities; and one in Buenos Aires, South America.

☆ ☆ ☆

All directors of the BOEING AIRPLANE CO. have been reelected. They are **William M. Allen, Harold E. Bowman, Darrah Corbet, Claire L. Egtvedt, P. G. Johnson, Fred P. Laudan, J. E. Schaefer, Dietrich Schmitz** and **H. O. West.** At the same meeting, all present officers of the company and its subsidiary, BOEING AIRCRAFT CO., Se-

attle, were reelected. Boeing Airplane Co. officers are **P. G. Johnson**, president; **Claire L. Egtvedt**, chairman; **H. O. West**, executive vice-president; **J. P. Murray**, vice-president and eastern representative; **Wellwood E. Beall**, vice-president, engineering; and **Harold E. Bowman**, secretary-treasurer.

With the exception of Schaefer and the addition of **Fred P. Laudan**, vice-president, officers of the Boeing Aircraft Co. remain the same.

☆ ☆ ☆

WALLING TRACTOR AND EQUIPMENT CORPORATION, Portland, Ore., is one of the seven new distributors for THE OSGOOD COMPANY and THE GENERAL EXCAVATOR COMPANY, associated excavating and materials handling equipment manufacturers of Marion, Ohio. The Portland firm will serve six counties in southern Washington and the entire state of Oregon. Three Canadian distributors were named among the seven:

H. L. BAXTER, Toronto, Ont., serving the Toronto area and southern Ontario.

ROUSSEAU EQUIPMENT CO., Winnipeg, Manitoba, serving the province of Manitoba.

DOMINION DISTRIBUTORS, LTD., St. John's, Newfoundland, serving the entire crown colony.

F R U E H A U F TRAILER COMPANY announces the death of **Lee J. Cronkhite**, manager of its Portland, Oregon branch. Cronkhite was 46 years old. He had been with Fruehauf since May, 1940.

For six years Cronkhite was manager of J. F. HICKEY MOTOR CAR CO., Tacoma, and was instrumental in making that company the largest and most successful White Truck dealer in America. In 1933 he went to ISAACSON IRON WORKS, first becoming manager of their Portland branch and then manager of their truck equipment division in Seattle. In 1939 he became a partner in the MOTOR TRUCK EQUIPMENT CO., Seattle; and when this company was acquired by Fruehauf in 1940, Cronkhite became manager of their Portland branch, the post he held at the time of his death.

Cronkhite was vice-chairman of The Society of Automotive Engineers, Oregon section, and an active member of the Associated General Contractors of America.

☆ ☆ ☆

INTERMOUNTAIN

The CANNON ELECTRIC DEVELOPMENT COMPANY has announced appointment of two new engineering representatives for the company in the West. They are: FRANKLIN SALES COMPANY, Central Savings Bank, Denver 2, Colorado, and MOUNTAIN STATES ENGINEERING CO., 215 W. Second, Salt Lake City 1, Utah.

☆ ☆ ☆

Maurice Newton and **William D. Thornton** of New York and **John A. Coe** of Waterbury, Conn., have been elected directors of the ANACONDA COPPER MINING CO.

☆ ☆ ☆

CUMMINGS DIESEL SALES OF MONTANA, 4005 West Montana Ave., Billings, is the newest link in the nationwide chain of Cummins Diesel sales and service organizations. Owned and managed by **Glenn W. Stroud**, the new dealership holds the exclusive franchise for the sale of Cummins diesel engines in the territory centering around Billings. The company offers day and night service facilities and a complete line of Cummins replacement parts. Stroud has had much experience in the heavy-duty highway transportation field. For five years past he has been transportation superintendent for HUSKY REFINING COMPANY at Cody, Wyoming, and prior to that he was with SALT CREEK FREIGHTWAYS at Casper, Wyoming.

☆ ☆ ☆

AMONG THE MANUFACTURERS

S. E. Heyerick succeeds the late **Walter H. Hallsteen** as purchasing agent of the ILG ELECTRIC VENTILATING CO., Chicago. Heyerick became associated with Ilg in 1924, serving in the engineering department. Six years later he was transferred to the purchasing department, where he was assistant to Hallsteen until the latter's death in January, 1944. Heyerick is a member of the Ilg Welfare Club and the Ilg Advertising Committee. He is also a member of the Chicago Association of Purchasing Agents.

☆ ☆ ☆

Frank T. Magennis has been named a vice-president of THE GOODYEAR TIRE & RUBBER EXPORT CO. Most of Magennis' service with the company (more than 25 years) has been with the Export Company. His first overseas assignment was as general line salesman in Central America, Colombia, Ecuador, Peru and Bolivia; and for the next several years he covered Central America, the West Indies and South American countries with varying assignments. In 1926 Magennis was made manager of Goodyear Cuba, with headquarters at Havana. After that he was manager of Goodyear interests in Brazil. In 1937 Magennis became vice-president of Goodyear's operations at Buenos Aires, Argentina, and in 1941 he was recalled to this country as assistant manager of the Export Company, the post he held at the time of his new appointment.

☆ ☆ ☆

Richard G. Mackey has been added to the advertising staff of the Radio Division of SYLVANIA ELECTRIC PRODUCTS INC., as editor of Sylvania News. A graduate of the University of Illinois, Mackey's former connection was with a New York construction engineering firm as engineering aide. On one of his assignments he spent eight months in Panama working on a $50,000,000 project for the Navy.

☆ ☆ ☆

H. C. Peters of the T. L. SMITH CO. has been promoted to assistant to the president and vice-president in charge of Engineering, Research and Development. The new general sales manager for the company is **Robert P. Bremner**, former district manager in Milwaukee for the PETOSKEY PORTLAND CEMENT CO.

☆ ☆ ☆

RODGERS HYDRAULIC INCORPORATED, Minneapolis, Minn., announces the appointment of **Clarence W. Pearson** as plant superintendent. Pearson was formerly connected with the Twin Cities Ordnance Plant, acting as General Superintendent of the 30 calibre Ammunition Department. He came to Minneapolis eight years ago and for the past three years has been at the ordnance plant. RODGERS HYDRAULIC INCORPORATED, manufacturers of hydraulic track press equipment for servicing

crawler type tractors and hydraulic presses for industrial and oil markets, is now largely engaged in manufacturing for the Army and Navy.

☆ ☆ ☆

The CONSTRUCTION MACHINERY CO., Waterloo, Iowa, has been awarded the Army-Navy "E" for excellence in production of war materials. Presentation ceremonies took place at Waterloo, May 10.

☆ ☆ ☆

After sixteen years of service with the AMERICAN INSTITUTE OF STEEL CONSTRUCTION, **F. H. Frankland** has resigned as director to enter private practice as a consulting engineer, and will be located at 271 Madison Ave., New York, N. Y.

☆ ☆ ☆

E. H. Dhein, of the War Department, has been appointed a member of the AMERICAN STANDARDS ASSOCIATION'S Committee on Specifications for Fire Tests of Building Construction and Materials. The work of this committee covers fire test methods applicable to those assemblies and structural units which constitute the permanent parts of a building, and the methods of classification of building members on the basis of these tests.

☆ ☆ ☆

Formation of a new division to manufacture and market its recently announced Moduflow heating control system is announced by the MINNEAPOLIS-HONEYWELL REGULATOR COMPANY, Minneapolis, Minn. **Harry C. Jenkins** has been promoted from midwestern zone manager to the managership of the newly created post. Assisting Jenkins are three engineers, **John E. Peterson, Milford G. Bird** and **Bruce F. McLouth**, who for the present will work in the Minneapolis and Chicago offices of the company.

☆ ☆ ☆

Thomas Backus has been made chief engineer of R. G. LeTOURNEAU, INC., in complete charge of designing, detailing, equipment testing and maintenance of quality. He was formerly chief engineer for the FULLER MANUFACTURING COMPANY, Kalamazoo, Mich., before joining up with LeTourneau, and prior to that had been affiliated with General Motors, Willys-Overland, Spicer Manufacturing and Clark Equipment.

☆ ☆ ☆

BARBER-GREENE COMPANY, Aurora, Ill., manufacturers of asphalt equipment, ditchers and other material handling machines, has won for the third time the Army-Navy Production Award for high achievement in the production of war material.

☆ ☆ ☆

As new general works manager of LAPLANT-CHOATE MANUFACTURING CO., INC., Cedar Rapids, Iowa, **C. H. Lage** will have charge of all plant operation and production carried on by the Company. Before joining LaPlant-Choate, Lage was vice-president in charge of manufacturing at the UNIVERSAL UNIT POWER SHOVEL CORP., Milwaukee. This position he held until 1941. Prior to this, he served with CATERPILLAR TRACTOR CO., Peoria, Illinois, as factory division superintendent. Later he was put in charge of planning, which embraced general manufacturing engineering and the analysis of engineering designs. His work for Caterpillar also included investigations of processes, time standards, schedules, tools and equipment, and plant layouts.

☆ ☆ ☆

Paul L. Goldstrohm and **George M. Muschamp** have been elected members of the board of directors of the BROWN INSTRUMENT CO., Philadelphia, manufacturers of precision industrial instruments. Muschamp is vice-president in charge of engineering of the Brown Company and Goldstrohm is vice-president in charge of production.

☆ ☆ ☆

Clair L. Metzger, formerly in charge of tractor tire sales in the Truck and Tractor Tire Division of GOODYEAR TIRE AND RUBBER COMPANY, has been named head of a new division which will be exclusively devoted to tractor tires. Metzger joined Goodyear in 1928 as a special goods salesman in Cincinnati. He has been manager of tractor tire sales since 1943.

☆ ☆ ☆

INFILCO, INC., Chicago, Ill., has received its second Army-Navy "E" award in the form of a white star to be added to the first "E" flag which the employees won on September 17, 1943.

NEW EQUIPMENT

Cleaning Devices

Manufacturer: Tivit Products Co., Torrance, Calif.
Equipment: Metal cleaning equipment.
Features claimed: Specially designed metal processing and cleaning items for truck maintenance, and also a bench-sized spray booth for small parts cleaning; a gas immersion tank with rockwool insulation and automatic heat control; and an automatic feeding steam injector which enables plants equipped with steam boiler lines to operate steam guns with chemically saturated steam without installing a steam machine. At present, most of the company's production is devoted to cleaning and processing tanks for aircraft plants, but their equipment is applicable to construction machinery.

Conduit Coupler

Manufacturer: The Ric-wiL Company, Cleveland, Ohio.
Equipment: Coupler for conduit.
Features claimed: The need for skilled workmen is eliminated in making final field connections on Ric-wiL prefabricated pipe conduit, by the use of this coupler which is adaptable to either mechanical or welded closures. The ends of the conduit are ex-

panded at the factory. A heavy-gauge split connector is then slipped over the opening and clamps are driven onto wedge shaped channels over the lapped joint, making a strong, water-tight coupling. This conduit and coupler are adaptable to underground surfaces or overhead installations.

Explosive Rivet

Manufacturer: E. I. du Pont de Nemours and Company, Wilmington, Del.

Equipment: Explosive rivet.

Features claimed: The rivet is expanded from within along its entire shank by a tiny explosive charge, and thereby fits itself to the hole throughout the entire length of the opening. The rivet is made of aluminum alloy. A rapid rate of insertion is possible because an exact first fit is not required. The explosive charge is detonated when heat is applied to the head. A non-corrosive, non-toxic explosive is used.

Gasoline Feeding System

Manufacturer: American Bosch Corporation, Springfield, Mass.

Equipment: Gasoline injection.

Features claimed: A radically new method of supplying fuel to the cylinders of gasoline engines, this development is now completely devoted to military use, but promises a wider use in the postwar period. The gasoline is delivered uniformly to every cylinder, giving higher efficiency, greater responsiveness, smoother power delivery, and elimination of fire hazard. Backfires are eliminated because the fuel is confined within the engine cylinders. Air is not mixed with the fuel until it reaches the cylinders. All fuels, even lower grades, burn more completely and efficiently, thus delivering a greater proportion of their potential power with corresponding increase of miles per gallon and decrease of cost per mile.

Protective Coating

Manufacturer: The United States Stoneware Co., Akron, Ohio.

Equipment: Resin coating.

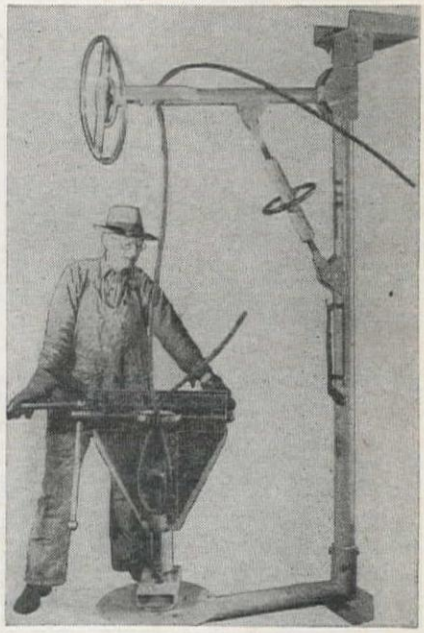
Features claimed: A new protective substance named Duralon. It is a heavy viscous liquid, dark maroon in color. When properly treated it reverts to an extremely hard dense black substance characterized by the lowest water absorption of any organic resin; insolubility in any solvent; high electrical resistivity; absolute stability in storage and handling; and ease of workability. It may in the future be used in molding, but at present it is particularly valuable as an impregnant, laminating or bonding agent, or as a protective coating. No particular surface preparation is required, nor is a prime coat necessary. The material is soft and flexible when applied but with the addition of heat becomes hard and completely stable.

Cable Splicer

Manufacturer: Garlinghouse Brothers, Los Angeles, Calif.

Equipment: Cable splicing rig.

Features claimed: Structurally self-contained unit designed to facilitate the necessary operations in cable splicing. Any standard splicing vise may be attached to the stand which is supported by a ball-bearing revolving base. A quick-opening jaw type gripping vise is readily supplied by spinning a heavy rimmed wheel. Desired tension between the two vises is secured by a vertical adjustment of a tension member through a double acting screw. The top and bottom members of the rig are detachable for compactness in shipping, but the unit may be set up in 10 minutes. It may be mounted either horizontally or vertically. Shelves and hooks are provided for necessary hand tools.



Builder's Calculator

Manufacturer: Greenlee Tool Co., Rockford, Ill.
Equipment: Handy lumber calculator.
Features claimed: This calculator is designed to help the home craftsman solve many of the puzzling problems which develop unexpectedly on a construction job. It is operated by simply whirling the dial. Included in the items which can be read from the calculator are the conversion of linear to board feet, determination of slope per foot in degrees, the com-

parative hardness, weights, shrinkage, warping and ease of working of various woods. In addition there are bit sizes for head, body and thread of standard screws, nail specifications and tips on tool sharpening. The calculator is constructed of heavy varnished cardboard, is soil proof, and measures 6-in. in diameter.

Goggle Cleaner

Manufacturer: The Brite-Ize Company, Chicago, Ill.
Equipment: Goggle cleaning system.
Features claimed: The system includes: (1) Hermetically sealed ampoules of Brite-Ize concentrate, which when mixed with distilled water, makes a full gallon of lens cleaner, and (2) Brite-Ize "cleaning station" dispensers.
The compound is a special detergent which removes

fog, grease, grime and splatter instantly without injury to rim plating, leather, fabric or rubber mountings. The dispensers are of the pressure type charged with air. A touch releases the fluid in a fine mist spray. Being self-contained, the dispenser can be set on any shelf or placed in any convenient spot.

Bulldozer

Manufacturer: La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Ind.
Equipment: Cable-operated trail builder.
Features claimed: Designed for mounting on a Caterpillar D-8 tractor, this unit is simple and positive in operation. The blade can be angled either to right or left or held straight. Ends of the blade can be tilted with a variation of 14 in. and can be raised to a maximum of 50 in., or dropped 72 in. below the ground line. It is of welded steel construction box channel frame, with box plate blade. The cutting bits at either end of the blade are single plates specially formed for greater wear resistance in rock cuts.

Safety Goggles

Manufacturer: American Optical Company, Southbridge, Mass.
Equipment: Plastic safety goggles.
Features claimed: Extremely light in weight without sacrificing strength, these new goggles are good looking and meet high standards of eye protection. They may be worn either by persons requiring only safety protection, or those with defective eyesight requiring lense ground to prescription. They are suitable for workers whose skin is allergic to metal

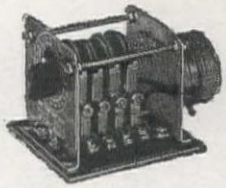
frames, and they are spark-proof. The lense groove is very deep, affording substantial impact resistance.

Mechanical Hand Sander

Manufacturer: National Air Sander, Inc., Rockford, Ill.
Equipment: Small block sander.
Features claimed: This is a small lightweight unit operating at high speed. From the sand paper to the top of the convenient grip it measures 4¼ in. There is no vibration in its operation, and workmen may use it continuously without fatigue. Because of its size, close fillet work is possible. The machine is operated by an air motor sealed by synthetic rubber housing. It operates on pre-lubricated ball bearings. The sand pad does not revolve but moves with a circular motion so that each grain of sand scribes a $\frac{1}{16}$-in. circle. At maximum speed it will operate at 5,000 cycles per minute.

Remote Control Timer

Manufacturer: The R. W. Cramer Company, Inc., Centerbrook, Conn.
Equipment: Multi-contact timer.
Features claimed: This remote control timer is used to control a series of machine operations in definite order or to operate in a predetermined sequence a series of signals, valves or solenoids. The operation is started from a remote control momentary start button, which can be set for one complete cycle or any portion thereof, or for continuous operation. It can also be adjusted so that in the event of power interruption, it must be pressed to resume operation or so that the operation will resume automatically.



Drum Indicator

Manufacturer: Techtmann Industries, Inc., Milwaukee, Wis.
Equipment: Contents indicator.
Features claimed: An adaptation of the U-C indicator which has been on the market for some time to be used with 55-gal. steel drums, has been made which renders it useful on 30-gal. steel drums. It provides a transferable constant check on the supply of liquids in the drum and is easily transferred on the simple operation of screwing into the drum faucet opening. The faucet in turn screws into an opening in the indicator.

LITERATURE FROM MANUFACTURERS...

Iowa Manufacturing Company, Cedar Rapids, Iowa—A 40-page documentary booklet tells a complete story of the Iowa Company and its products from the company's beginning 25 years ago. The story is told mostly in pictures—graphic shots of the plant, the foundry, the service department, the executive offices. A series of ten photographs traces the development of Iowa's one piece portable plant to the present-day Master Tandem. More pictures show Iowa's crushing and screening plants in the field and there are two full pages of scenic construction views. Domestic, Canadian and foreign dealers are listed on one page, together with a large map showing the distribution of Iowa products all over the world.

Charles Bruning Co., Inc., San Francisco, Calif.—A brochure introduces the company's new "Copyflex" 55C continuous printer, especially for photographic materials, and designed for many engineering and industrial uses. Speed and convenience are increased in the new model which provides duplicates of anything typed, printed, photographed or drawn. Clear reproductions are made of pencil tracings or worn and soiled originals. The brochure furnishes full details.

Douglas Fir Plywood Association, Tacoma, Wash.—The Association has published a reprint from material appearing in "The Timberman" for January, 1944, in the form of a booklet, which makes really interesting and informative reading. The many wartime uses of Douglas fir plywood and its postwar possibilities are described in words and pictures. Plywood for hangar doors, for boxcars, for small boats and for forms for concrete barges and buildings are only a few of these uses.

Lidgerwood Manufacturing Company, Elizabeth, N. J.—Bulletin No. C-111 deals with Lidgerwood steam, electric, gasoline and diesel hoists (for which groups complete specifications are given), as well as hoists for special industrial applications and for special mine applications. Hoisting and conveying cableways and cableway hoists are pictured and described on the last page. All equipment is presented in sharply outlined photographs against a bright orange background.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.—A manual, "Personalized Heating Control for Apartments," is described by the company as part of "a program to assist heating engineers, architects, apartment owners and operators in the design of postwar heating systems, incorporating for the first time individual control of apartments in the multiple dwelling field." Thirty-seven of the 58

pages of this comprehensive manual are devoted to various heat controls and engineering data. Also included are eight of the prize winning designs of the $10,000 Personalized Apartment Heating Control Design Contest sponsored by the company.

The Cloroben Corporation, Jersey City, N. J.—A short and to-the-point bulletin on aquatic weed control in drainage and irrigation systems. Pictures and word description tell about Benoclor research and field tests. Methods of using Benoclor for control of above-water and emergent vegetation are shown. The bulletin states that single treatments of Benoclor have eliminated weed growth in canals for periods up to six months but emphasizes that each control project presents an individual problem and success depends on appreciation and appraisal of factors involved.

H. P. Preis Engraving Machine Company, Newark, N. J.—An 8-page bulletin (L43-6) sets forth the advantages of the panto utility engraver Model UE-3. They are: heavier cutter spindle, 4 spindle speeds, more pantograph reductions, forming guide attachment, and depth regulator. Illustrated and described along with Model UE-3 are panto electrical marking equipment, panto acid etching equipment, standard work-holding devices and the panto Model CG inexpensive grinder.

The Ric-wil Company, Cleveland, Ohio—Folder FM-4402 is designed to point out the advantages of central heating in postwar community or group planning. It deals with this subject under five different headings: Central heating for municipalities; for real estate developments; for large and small housing projects; for hospitals and colleges; and for industrial groups.

The C. S. Johnson Company, Champaign, Ill.—Three-color leaflet illustrates and describes Johnson cement chargers, dutchmill plants, bins and silos. This equipment can be bought in small units and enlarged as needs require. Supplementary equipment, such as bucket type elevators and receiving hoppers, is presented on the back page of the leaflet.

The Youngstown Miller Company, Sandusky, Ohio—Bulletin YM-700 covers the company's new Robot Oil Reclaimer. These units are capable of restoring all kinds of lubricating, hydraulic, cutting and vacuum pump oils. The Robot is especially effective in the care of all diesel engines. Capacities range from 4 gallons per hour to 3,000. A flow diagram shows how the Robot works.

Madsen Iron Works, Huntington Park, Calif.—A new booklet (MP-140-W) tells how float finishing for concrete has been mechanized to utmost efficiency with the Johnson Float Finisher. Mechanical features are fully explained, each part being separately pictured and described. Clear answers are given to three important questions about the float finisher: "What will it do?" "What has it done?" and "How does it work?"

Victor Equipment Company, San Francisco, Calif.—Just released is a new Welding Supply Catalog showing a complete line of Victor welding equipment and quoting prices. Brazing alloys, brazing rods, all types of electrodes, goggles, helmets and face shields, and slag hammers are only a few of the items picked at random from the table of contents. Also shown is the Victor line of standard leather safety clothing.

The Farval Corporation, Cleveland, Ohio—Four-page, three-color leaflet explains how the Farval Dualine system can eliminate the hazards due to the manual lubrication of high-up, hard-to-get-at bearings on presses, cranes and other "off the floor" types of equipment. This system sends lubricant under pressure from a central pumping unit to every bearing on the machine. The four big advantages claimed for the Farval system are: Safety for the oiler, positive lubrication for every bearing, a measured amount to each individual bearing, and fresh lubricant at regular intervals. The back page of the leaflet illustrates the various types of Farval systems with a typical application of each system.

Wickwire Spencer Steel Company, New York, N. Y.—The company has out an unusual pocket-size booklet, in two colors, called "Let's Take a Tour with Wick and Spen, the Wire Men." Wick and Spen appear as two fanciful cartoon characters, illustrating how Wickwire Spencer products are used almost continually throughout the day and night by the average American. Factual information is included in an alphabetical listing of the most important of the company's products.

Greene, Tweed & Co., New York, N. Y.—"A Blow Without a Dent" is the title of a new bulletin illustrating and describing Basa replaceable face hammers and the Empire soft face mallets manufactured by Greene, Tweed. Of special interest are the pictures and description of plastic faces and heads available for these hammers and mallets. The bulletin explains the superiority of this plastic to many other materials in various tool uses. Rawhide, copper or babbitt faces may also be had for the Basa hammers and plain or loaded rawhide heads for the Empire mallets. In addition the bulletin gives the various distinctive features of these tools and lists prices.

United States Plywood Corporation, New York 19, N. Y.—"Beautiful Wood for Beautiful Homes" is the title of an elaborate new brochure, the latest undertaking of United States Plywood and The Mengel Company, Louisville, Ky., in their joint campaign to bring about public appreciation of the use of Weldwood Plywood and Mengel doors in homes of every type. The booklet is interestingly written and beautifully illustrated with full-color reproductions of wood-walled rooms. Also, there are many photographs of interiors in wood designed by prominent architects. The practicability of Weldwood Plywood is pointed out—its economy of installation, the virtual absence of maintenance expense, and the fact that it is guaranteed for the life of any home in which it is installed.

Hercules Powder Co., Wilmington, Del.—Spiralok, the first dynamite cartridge equipped with a spiral thread for easy joining, is described in a new booklet. Twelve clearly illustrated steps show how to assemble the cartridges. The booklet further describes Spiralok's exclusive advantages and its usefulness in the field—in seismic and submarine work, in blasting river crossings, etc.

Mine Safety Appliances Company, Pittsburgh, Pa.—Bulletin No. EA-8 announces a new Model "S" gas mask to supplement the Standard Model of the M.S.A. "All-Service" Gas Mask. Like the Standard Model, the new Model "S" is approved by the U. S. Bureau of Mines and has the "All-Vision" facepiece; but it affords additional protection and reduction in breathing resistance through a special filter to protect against toxic dusts, fumes, mists, fogs, and smokes, in addition to gases. The M.S.A. speaking diaphragm is also pictured and described, and prices are quoted.

OPPORTUNITY SECTION

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