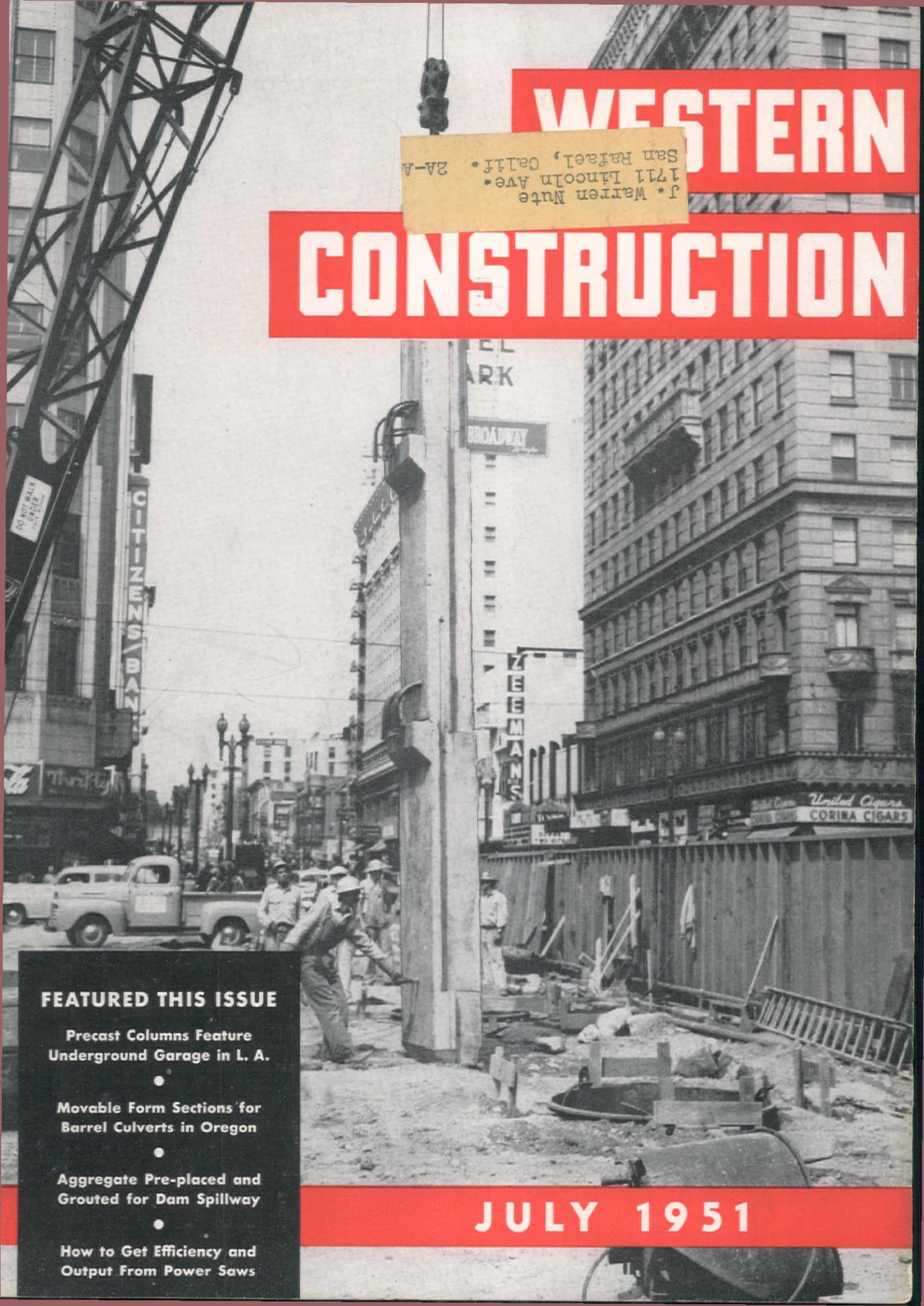
WESTERN CONSTRUCTION



FEATURED THIS ISSUE

Precast Columns Feature Underground Garage in L. A.

•

Movable Form Sections for Barrel Culverts in Oregon

•

Aggregate Pre-placed and Grouted for Dam Spillway

•

How to Get Efficiency and Output From Power Saws

JULY 1951

WEATHER OR NOT
TEXACO MARFAK KEEPS YOUR MAINTENANCE COSTS LOW

ONLY 6 LUBRICANTS NEEDED

The Texaco Simplified Lubrication Plan for Contractors makes it possible to handle *all* your major lubricating needs with *only six* Texaco Lubricants. A Texaco Lubrication Engineer will gladly give you full information on this convenient cost-saving plan. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

COME rain and mud, come blistering heat or freezing cold, *Texaco Marfak stays on the job.* Seals mud and dust out of chassis bearings. Protects against rust. And not even the heavy loads and rough terrain of construction work can jar or squeeze *Texaco Marfak* out of the bearings. No wonder chassis parts last longer, maintenance costs less.

In wheel bearings, *Texaco Marfak Heavy Duty* gives the same long-lasting protection. It guards bearings against wear and rust, and won't leak onto the brakes – an important safety factor. Requires no seasonal change.

MORE THAN 400 MILLION POUNDS OF TEXACO MARFAK HAVE BEEN SOLD

For engine cleanliness, use *Texaco Ursa Oil X***. It's fully detergent and dispersive, guards against harmful sludge and carbon, minimizes wear . . . reduces both maintenance costs and fuel consumption.

To protect crawler track mechanisms, use *Texaco Track Roll Lubricant.* It seals out dirt and moisture, wards off wear and rust.

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Here's a Real Rock Shovel

GUY F. ATKINSON puts his nineteenth NORTHWEST to work

—in a job that isn't Rock.—But, it's tough digging just the same. Look at those tooth marks! And, that's why a Northwest makes money. If you have a *real* Rock Shovel you are sure of output in *any* digging. Built for the tough jobs, it handles the easy jobs, *easily.*

Guy F. Atkinson of San Francisco, has handled all classes of work. This company can own any make of machine it wants to—and Guy Atkinson has just put the nineteenth Northwest to work. That is *18 repeat orders!*

Northwest advantages—ease of upkeep, digging power, smoothness of travel—in short Northwest ability to make money—a result of service, dependability and output has resulted in one out of every three Northwests being a repeat order. You need Northwest qualities on your jobs. You can plan to have them! Join the Northwest Crowd.

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

local NORTHWEST sales agents

BUTTE, MONTANA
Hall-Perry Machinery Co.

SIDNEY, MONTANA
Northland Machinery Co.

MEDFORD, OREGON
Cal - Ore Machinery Co., Inc.

PORTLAND, OREGON
Balzer Machinery Co.

CHEYENNE, WYOMING
Wilson Equip. & Supply Co.

DENVER, COLORADO
Constructors Equipment Co.

SALT LAKE CITY, UTAH
Arnold Machinery Co.

NORTHWEST SALES OFFICES:

LOS ANGELES, CALIF.
3707 Santa Fe Ave.

SAN FRANCISCO, CALIF.
255 Tenth Street

SEATTLE, WASHINGTON
1234 Sixth Ave., South

WESTERN CONSTRUCTION

Volume 26 **JULY 1951** Number 7

ARTICLES

DEPARTMENTS

FRONT COVER

USE OF PRECAST concrete column units placed in drilled holes around the four sides of the underground City Park Garage under Pershing Square in Los Angeles is allowing excavation to the full limits of the perimeter of the structure with only temporary shoring required. Cover view shows one of the precast units ready to be lowered into open caisson. For a complete description of this and other features of the project, see story on page 61.

The Construction and Civil Engineering Publication of the West

Published Monthly by
KING PUBLICATIONS
609 Mission Street
San Francisco 5, California
Phone YUkon 2-4343

Arthur F. King . . . . President
James I. Ballard . . Vice President
L. P. Vrettos . . V.-P. & Treasurer
L. B. King . . . . . Secretary
Franklin B. Lyons . . . Sales Mgr.
E. F. Hubbard . . Circulation Mgr.
R. L. von Thurn . . . Asst. Circ. Mgr.
R. J. Kamlade . . Production Mgr.

Please address all communications to the San Francisco Office

District Offices

NEW YORK OFFICE
Richard J. Murphy, Eastern Manager
107-51 131st Street
Richmond Hill 19, New York
Telephone Jamaica 9-2651

CLEVELAND OFFICE
Richard C. Burns, District Manager
7708 Deerfield Dr.,
Cleveland 29, Ohio
Telephone TUxedo 5-1848

CHICAGO OFFICE
A. C. Petersen, District Manager
3423 Prairie Ave., Brookfield, Ill.
Telephone Brookfield 532

SAN FRANCISCO OFFICE
V. C. Dowdle, District Manager
609 Mission St., San Francisco 5, Calif.
Telephone YUkon 2-4343

LOS ANGELES OFFICE
Jerome E. Badgley, District Manager
1228½ So. Bronson Ave., Los Angeles 19
Telephone REpublic 2-3125

ABC

Subscription Rates

The annual subscription rate is $4 in the United States and countries in the Pan American Postal Union. To Canada, England, Australia and New Zealand, $5 per year; all other countries, $11 per year. Single Copies, 35c

Change of Address

Send your new address along with old address, enclosing if possible your address label, to Circulation Department, Western Construction, 609 Mission St., San Francisco 5, Calif. Allow one month for the change to become effective.

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

B.F.Goodrich

These tires give less trouble —more recaps!

THE ARISS-KNAPP COMPANY of Oakland, California, is engaged in excavating and hauling dirt, rock and gravel in the San Francisco Bay area. They operate 5 semi-dump trucks, 9 regular dump trucks, 2 motor graders and 1 tractor-low-bed trailer. Hauling heavy loads over dirt, gravel, rock and a mixture of all types of roads, the drive wheels of these trucks are all equipped with B. F. Goodrich tires.

Grading contractors operate in all kinds of weather. When dirt surfaces are wet, traction is especially important. Ariss-Knapp has found that the BFG Universal tread offers extra safety. J. A. Wagnon, one of the drivers, says that he likes the way these tires grip and describes them as "really terrific" on all types of driving surfaces.

Then, too, the patented B. F. Goodrich *nylon shock shield* gives added safety . . . added miles. These strong, elastic nylon cords between the tread rubber and the cord body absorb and distribute shocks evenly. It's an exclusive BFG feature that's provided at no extra cost in all tires of 8 or more plies.

Contractors everywhere have found that B. F. Goodrich tires give maximum performance in all operations. They've found that they have fewer road delays and can recap more often. For any on or off-the-road service where extra traction and bruise resistance is necessary, see your local BFG dealer—or write for information. *The B. F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

LIFELINES

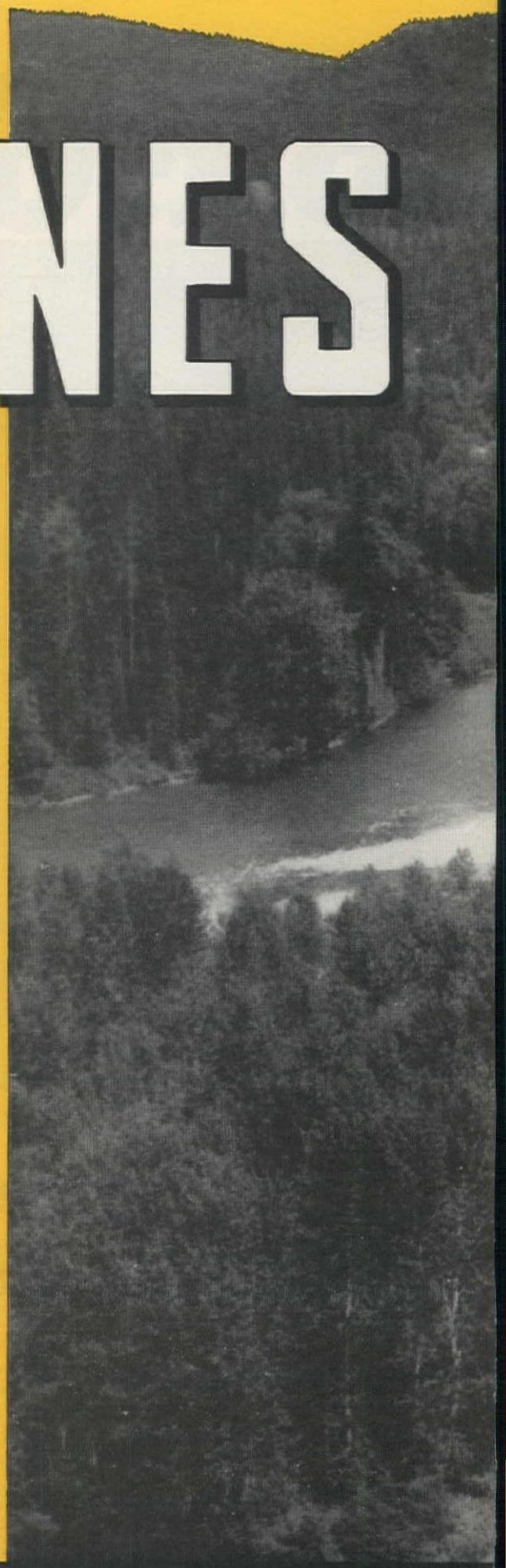
THROUGH LOW-COST AGGREGATE

THE vast networks of American railroads and highways are the arteries of the nation, carrying the output of factories, farms, mines and forests, providing the lifeblood for national security and progress.

America on wheels rolls on aggregate . . . hundreds of millions of tons of aggregate that must be produced at *the lowest possible cost per ton* for UNLIMITED CONSTRUCTION of the high speed roadways so urgently needed.

Cedarapids equipment provides American contractors with the means to keep aggregate production costs at lowest levels . . . consistent big volume output, long-life construction, low operating and maintenance costs, and high quality finished products that meet exacting specifications.

Cedarapids equipment brings OPPORTUNITY UNLIMITED to *you* with bidding advantages you can depend on to beat competition. For complete plants or single units . . . for producing either aggregate or black top . . . see your Cedarapids distributor for details.

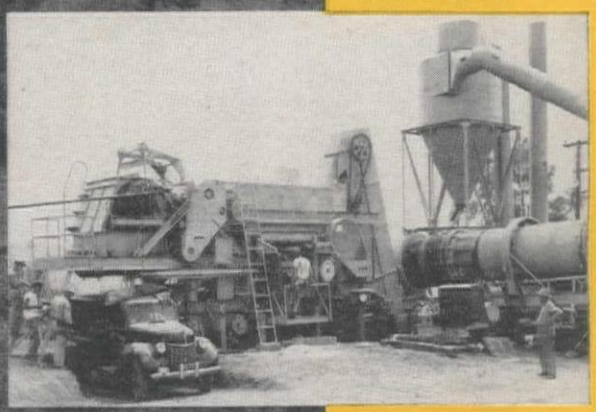


Cedarapids
Built by IOWA
headquarters for
QUALITY EQUIPMENT

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

UNLIMITED

THE UNITIZED PLANT
fits *all* aggregate requirements! The four basic units . . . primary crushers, scalping units, secondary crushers and wet or dry screening units . . . can be used alone or in any combination to produce anywhere from 25 to 250 tons per hour, and more, of any type of aggregate, from riprap to agstone.

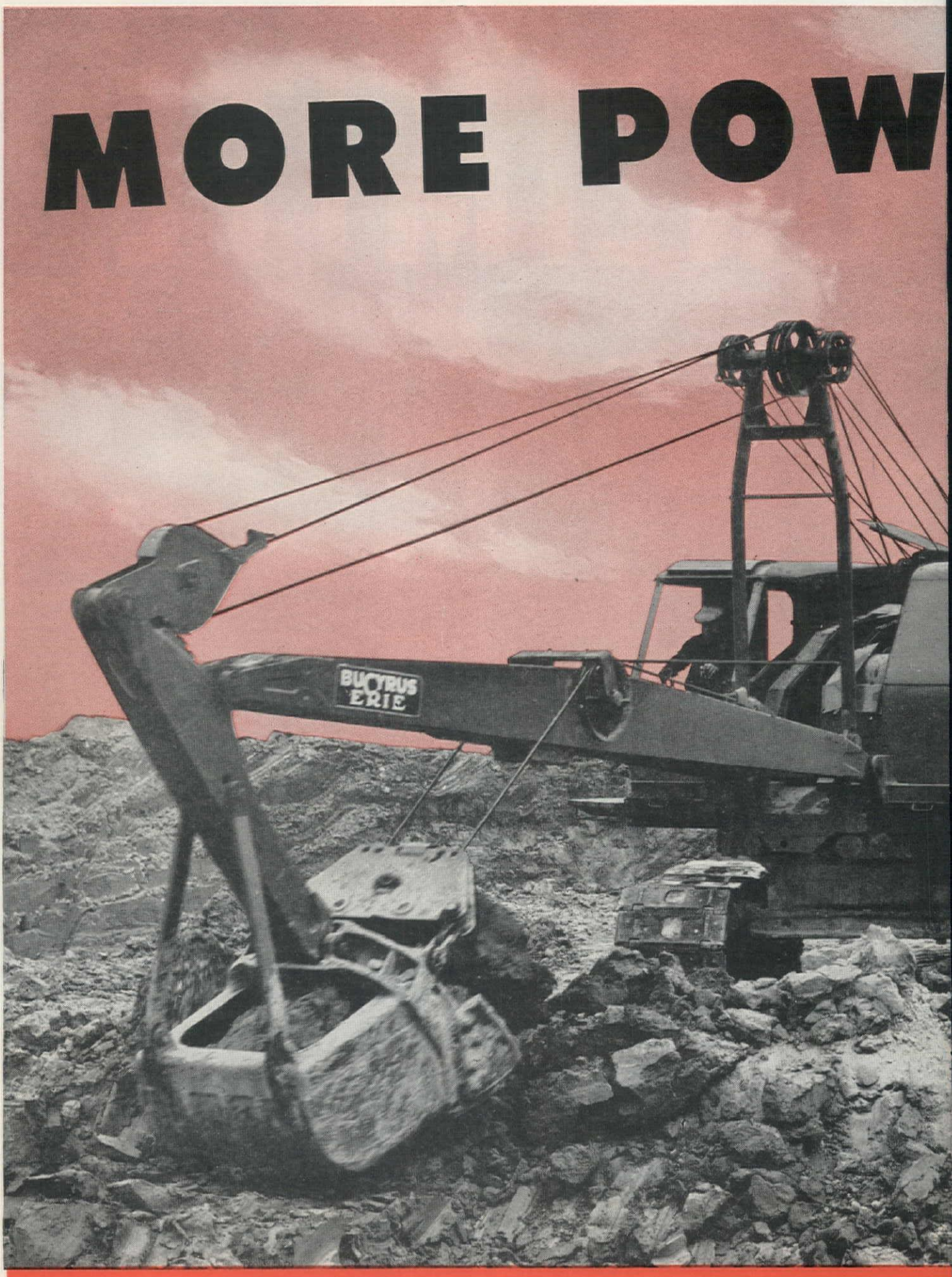


MODEL "FA"
The most portable of the Iowa line of bituminous mixing plants, the Model "FA" is quality built for accuracy of mix and low cost operation on a big variety of work. There's a size and type of Cedarapids plant for every black top job . . . the Model "E" for the biggest to the Patchmaster for the smallest.

Photo by Ewing Galloway

THE IOWA LINE *of Material Handling Equipment Is Distributed by:*

HALL-PERRY MACHINERY CO., Butte, Great Falls, Missoula and Billings, Montana; INTERMOUNTAIN EQUIPMENT CO., Boise and Pocatello, Idaho and Spokane, Washington; WORTHAM MACHINERY CO., 517 W. 17th Street, Cheyenne, Wyoming and Greybull, Rock Springs, Casper and Sheridan, Wyoming; KIMBALL EQUIPMENT CO., 222 W. 17th Street South, P. O. Box 1103, Salt Lake City 10, Utah; H. W. MOORE EQUIPMENT CO., 6th and Acoma Street, P. O. Box 2491, Denver 1, Colorado; CONTRACTORS EQUIPMENT CORP., 2727 S. E. Union Ave., P. O. Box 2191, Portland 14, Oregon; JACK SAHLBERG EQUIPMENT CO., 300 Aurora Avenue, Seattle 9, Washington; CASSON-HALE CORP., 22101 Meekland Avenue, P. O. Box 629, Hayward, Calif.; ARIZONA CEDAR RAPIDS CO., 1726 W. Jackson Street, P. O. Box 6186, Phoenix, Arizona; R. L. HARRISON COMPANY, INC., 1801 N. Fourth Street P. O. Box 1320 Albuquerque, New Mexico; SIERRA MACHINERY CO., 307 Merrill Avenue, P. O. Box 1330, Reno, Nevada; BROWN-BEVIS EQUIPMENT CO., 4900 Santa Fe Avenue, P. O. Box 174 Vernon Station, Los Angeles 58, Calif.


MORE POW
BUCYRUS
ERIE

ER TO YOU

FOR extra output every shift take advantage of the balanced speeds, responsive clutches and brakes, smooth power flow, and heavy-duty engines found in long-lasting Bucyrus-Eries. Direct-connected mechanical controls mean faster digging cycles. Sensitive clutches and brakes provide the all-important operator "feel" resulting in speedy loading and dumping, engine power transferred to the dipper by the most direct means.

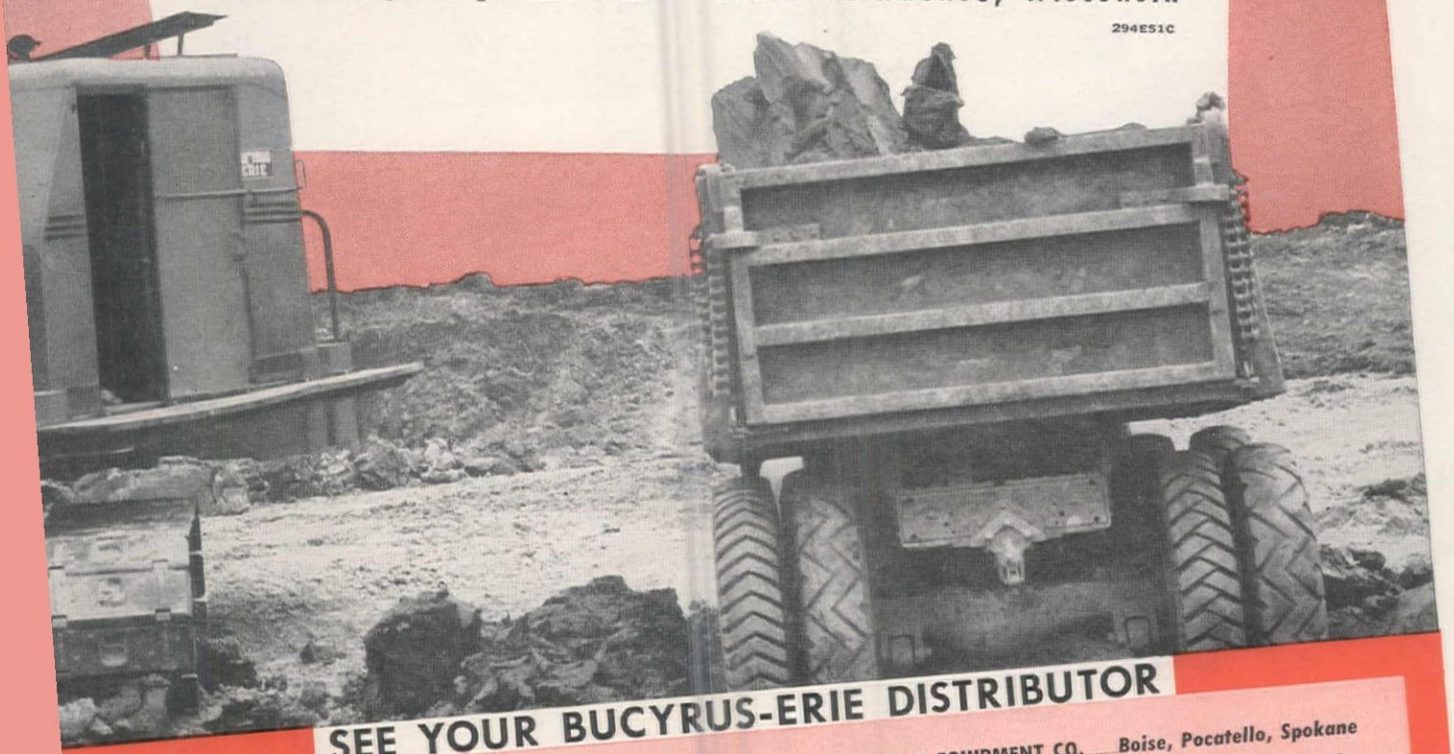
Powerful diesel, gasoline, or single-motor electric power plants are designed to meet all demands of hard excavator and versatile crane service. The liberal use of anti-friction bearings in all models assures smooth power transfer with minimum power loss. Follow the example of leading contractors everywhere — find out why Bucyrus-Eries are

MOST COMPARED . . .

MOST PREFERRED

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

294E51C

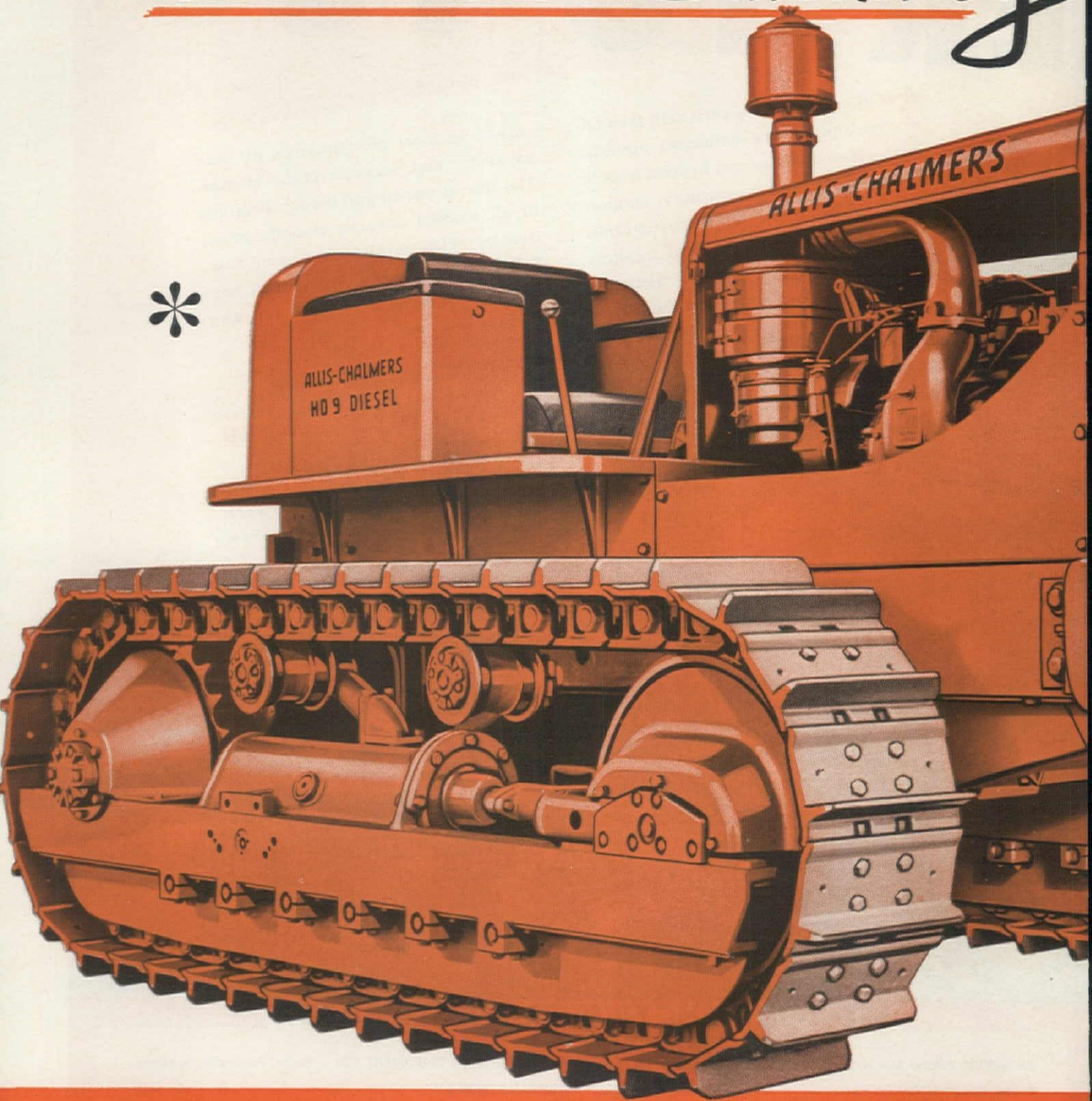


SEE YOUR BUCYRUS-ERIE DISTRIBUTOR

BROWNING-FERRIS MACHINERY CO.	Dallas & Houston
CLYDE EQUIPMENT COMPANY	Portland & Seattle
THE COLORADO BUILDERS' SUPPLY CO.	Denver
CONTRACTORS MACHINERY CO.	San Antonio
CROOK COMPANY	Los Angeles
GREAT NORTHERN TOOL & SUPPLY CO.	Billings
R. L. HARRISON COMPANY, INC.	Albuquerque
INTERMOUNTAIN EQUIPMENT CO.	Boise, Pocatello, Spokane
THE LANG COMPANY	Salt Lake City
THE MERRILL-BROSE COMPANY	San Francisco
NEVADA EQUIPMENT SERVICE	Reno
TRI-STATE EQUIPMENT COMPANY	El Paso & Odessa
WESTMONT TRACTOR & EQUIPMENT CO.	Missoula & Kalispell

SHOVELS • DRAGSHOVELS • DRAGLINES • CLAMSHELLS • CRANES

Here's what WE mean by

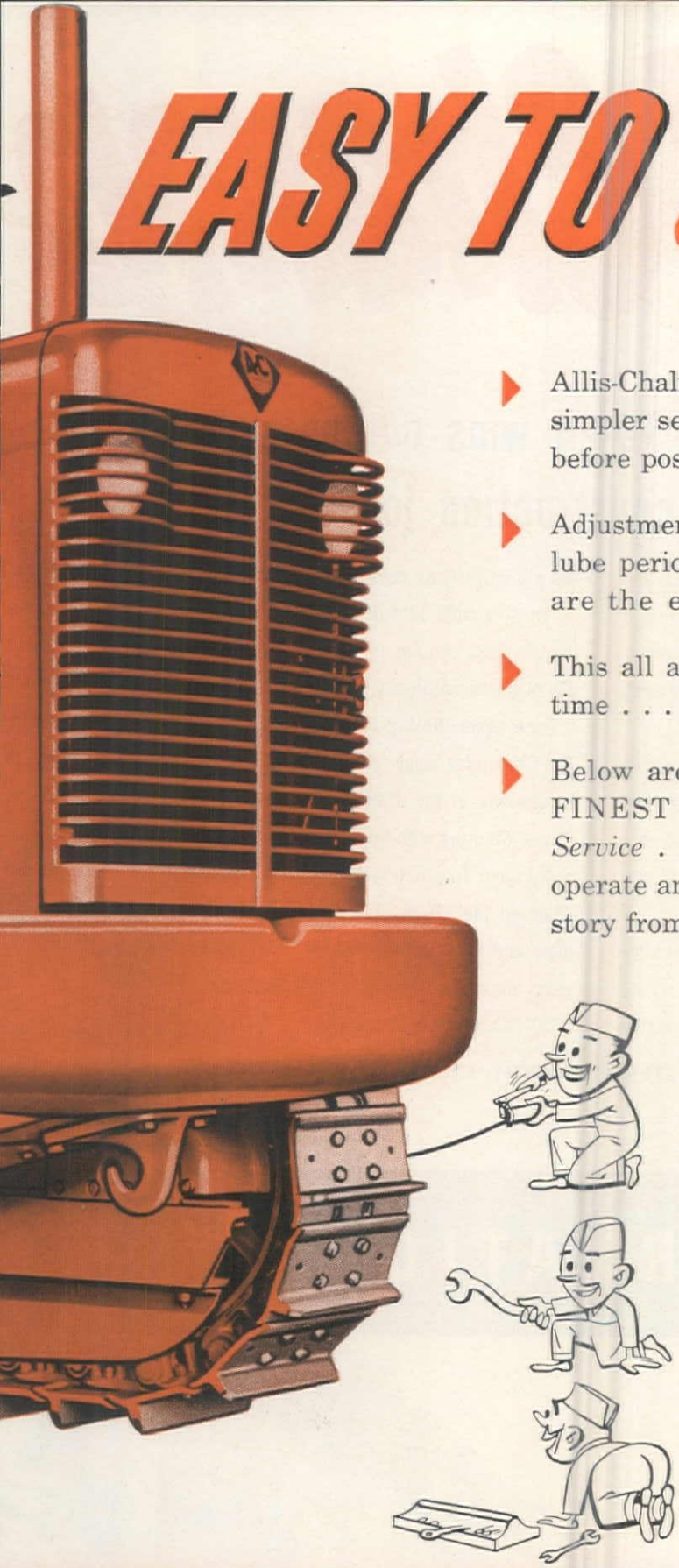


*

HD-5	* HD-9	HD-15	HD-20
40.26 drawbar hp.	70 drawbar hp.	102 drawbar hp.	Hydraulic Torque Converter Drive
11,250 lb.	18,800 lb.	27,850 lb.	175 net engine hp.
			41,000 lb.

• DESIGNED FOR YOUR JOB • BUILT TO TAKE IT • EASY TO OPERATE • EASY TO SERVICE

EASY TO SERVICE



- Allis-Chalmers' new tractor line is blazing the way to simpler servicing with time and money savings never before possible.
- Adjustments are easier . . . lubrication simplified and lube periods greatly extended. Mechanics say these are the easiest tractors they have ever worked on!
- This all adds up to less down time, more producing time . . . longer tractor life at less upkeep cost.
- Below are just a few reasons why this NEWEST, FINEST TRACTOR LINE ON EARTH is *Easy To Service* . . . besides being built to "take it," easy to operate and entirely new in performance. Get the full story from your Allis-Chalmers dealer.

TIME-SAVING LUBRICATION DESIGN—
Only a few lube points, easy to get at — NONE UNDER TRACTORS. You operate 75 HOURS without any greasing — then only one fitting to hit and an oil change to make. (Only exception, torque converter bearings on HD-20). You lubricate the Positive-Seal truck wheels, support rollers and idlers only once every *1,000 HOURS!*

ACCESSIBLE ADJUSTMENTS—*QUICKLY MADE*—
brakes, master clutch, steering clutches. No floor plates to remove for any adjustments. Tracks easier to adjust — simple screw adjustment with automatic lock.

EASY TO REPAIR—
Engine, master clutch, transmission, steering clutches and final drives can be easily removed and repaired or replaced, *without disturbing adjacent assemblies.*

see your ALLIS-CHALMERS dealer

ARIZONA: Phoenix—Neil B. McGinnis Equipment Company. **NORTHERN CALIFORNIA:** Oakland—Buran Equipment Company; Eureka and Willits—Aikins and Williams Tractor Co.; Modesto—J. M. Equipment Co.; Fresno—Peerless Tractor and Equipment, Food Machinery and Chemical Corp.; Salinas and King City—Livingston Bros. Tractor Co.; No. Sacramento, Stockton, Redding—Moore Equipment Company, Inc.; Mountain View—Redwine Tractor Co.; Visalia—Tulare County Tractor Co. **SOUTHERN CALIFORNIA:** Bakersfield—San Joaquin Tractor Co.; Los Angeles, San Diego and Riverside—Shaw Sales & Service Company. **IDAHO:** Idaho Falls and Boise—Southern Idaho Equipment Company. **MONTANA:** Missoula—Mountain Tractor Company; Sidney—Northland Machinery Co.; Billings—Seitz Machinery Company, Inc. **NEVADA:** Elko—C. W. Paul Hardware and Machinery; Reno—Moore Equipment Company, Inc. **OREGON:** Eugene, Roseburg and North Bend—Farm and Industrial Equipment Company; The Dalles—Dielschneider Equip. Oreg. Ltd.; Medford—Tractor Sales and Service, Inc.; Klamath Falls—West Hitchcock Corp.; Portland—Wood Tractor Company. **UTAH:** Salt Lake City—Cate Equipment Company, Inc. **WASHINGTON:** Seattle, Tacoma and Wenatchee—A. H. Cox & Company; Spokane—American Machine Company. **WYOMING:** Casper—Studer Tractor & Equipment Company.

Grand Champ

Carroll Brown's big red TD-24 wins out on Colorado's "toughest road construction job ever!"

This summer, tourists welcomed the new wonder highway to the gleaming trout lakes atop Grand Mesa. But the men who built it called it "The Snake Pit"—a two-mile-high inferno of falling rocks, dynamite-proof basalt, and even prehistoric ice on the high north slopes where the sun never shines.

They had to clear out 300,000 cubic yards of snow before they could start building. They could work only from June to October each year—and they had to make a two-hour trip to the job each day because the air on Grand Mesa was so thin men couldn't stay at the job site.

It took five years and a million dollars to build six miles of highway—nearly a year and two hundred thousand dollars a mile. Carroll Brown, of the Brown Construction Company, finally finished the job with flying colors, and he came up with this conclusion:

"On this most difficult project our company ever tackled, under the severest conditions we ever encountered, the International TD-24 tractor definitely outperformed all competitive equipment."

Once again the big red crawler had proved itself the Champ. The Champ for tough, dogged, never-give-up guts—148 maximum horsepower at the drawbar, 8 speeds forward, 8 reverse, Planet Power Steering with finger-tip control.

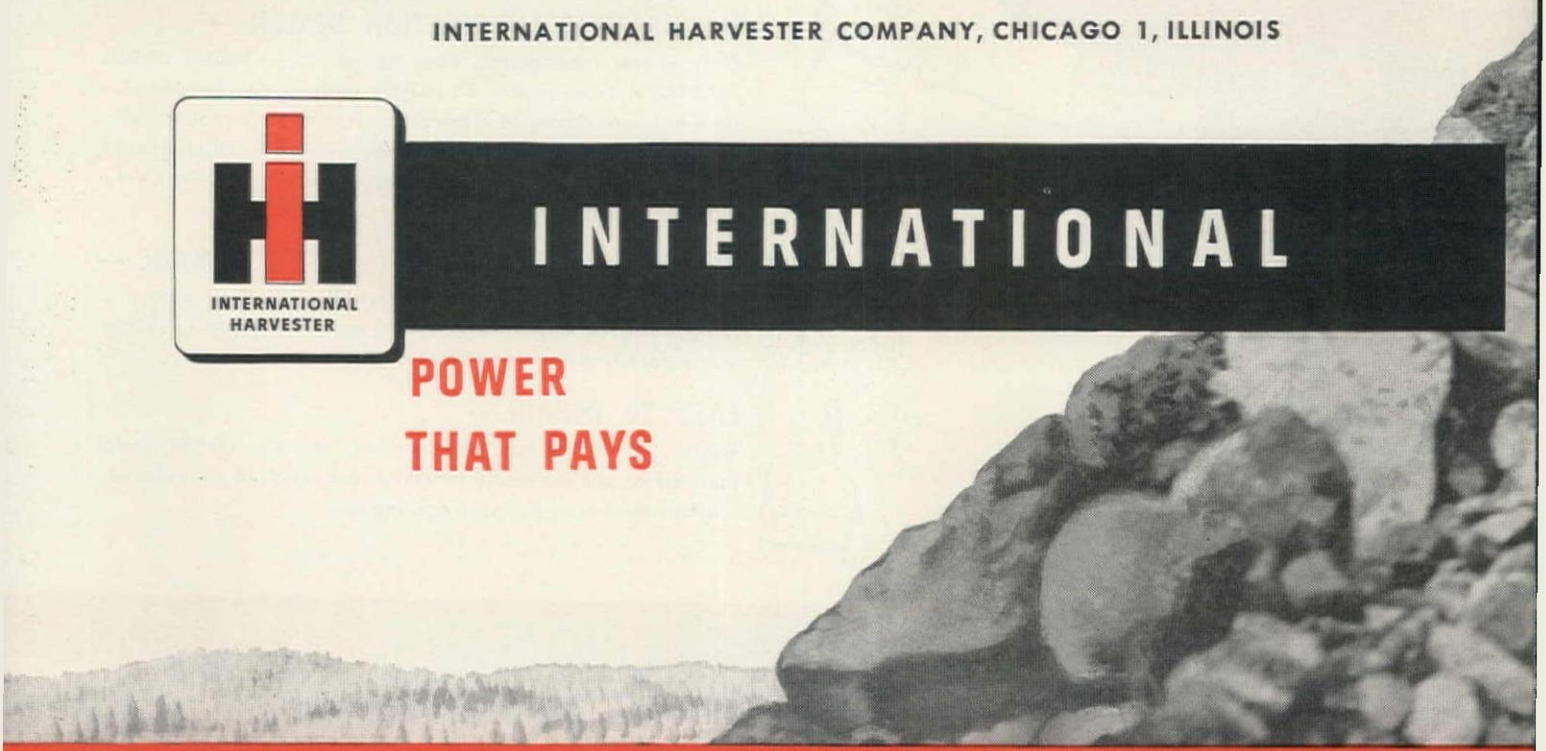
Ask your International Industrial Distributor for the real low-down on the TD-24. It's backed by complete parts supplies and service facilities for the hard-working years ahead. Get the whole story. You'll be a TD-24 man from then on in!

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL HARVESTER

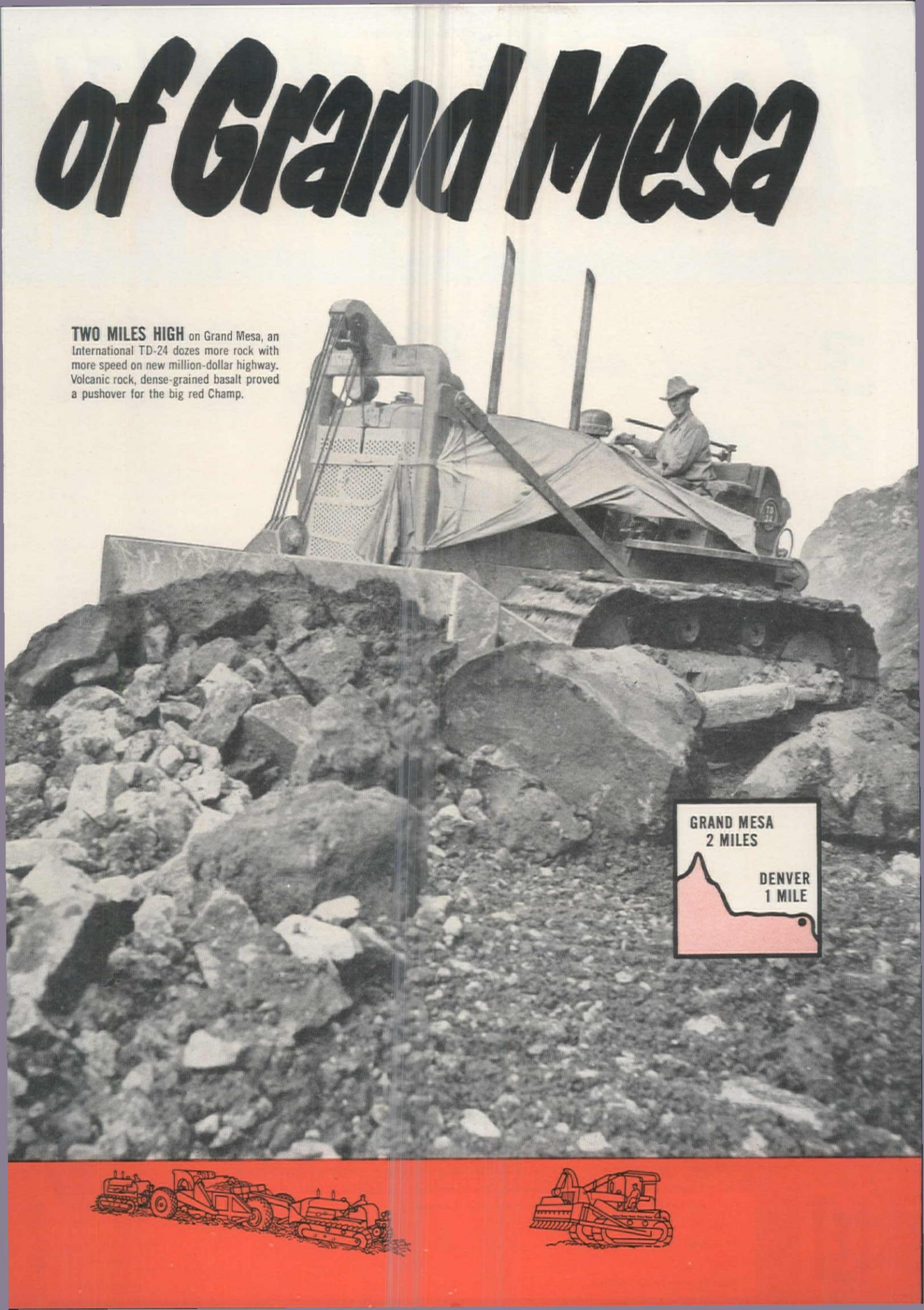
INTERNATIONAL

POWER THAT PAYS



# of Grand Mesa

TWO MILES HIGH on Grand Mesa, an International TD-24 dozes more rock with more speed on new million-dollar highway. Volcanic rock, dense-grained basalt proved a pushover for the big red Champ.



10 GIANT-SIZED speed OAHE DAM fill

3 30-yd. and 7 22-yd. units deliver 667 pay yds. hourly on 1½-mi. cycles

With approximately 3½ million yards of sand, gravel, clay and shale to move on Oahe Dam subcontract at Pierre, South Dakota, Campbell & Collins Joint Venture of Fargo, N.D., assigned 80% of total dirtmoving to 10 giant-sized, rubber-tired A Tournapulls. Seven of the 240 h.p., two-wheel "A" prime movers were coupled to 25-ton (22-yd.) E-25 Carryall Scrapers and three to 35-ton (30-yd.) E-35 Carryalls. Here's a report on how their performance is speeding this Missouri River flood control project:

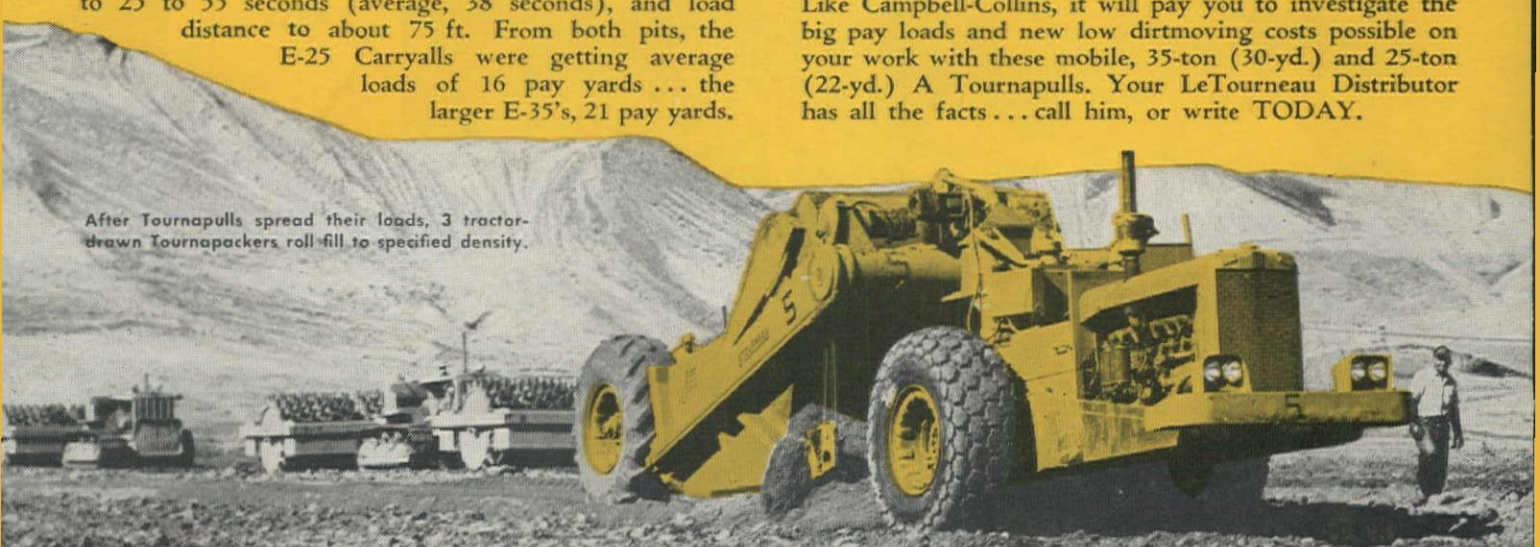
When these pictures were taken, the fleet was hauling tough, sun-baked sandy clay from 2 pits, one with loading on the level and the other with loading down 35% grades. Time and distance for obtaining loads varied widely, even within the same pit, due to necessity of selecting soil to meet U. S. Engineer fill requirements. In the level pit, two 144 h.p. pushers teamed up to help Tournapulls get heaped loads in 70 to 115 seconds (average, 93 seconds) with a load distance 175 to 250 ft. In the downhill pit, using one 144 h.p. pusher, Tournapulls cut load time to 25 to 55 seconds (average, 38 seconds), and load distance to about 75 ft. From both pits, the E-25 Carryalls were getting average loads of 16 pay yards ... the larger E-35's, 21 pay yards.

Haul cycles from both pits averaged 1½ miles . . . with 3700 ft. of favorable 9% grade to dump and 4225 ft. of adverse 1 to 14% grades on return. Giant 4-wheel air brakes — with 1198 sq. in. of braking surface on each wheel — permitted safe use of haul speeds up to 35 m.p.h. Dumping on the run helped each electric-control Tournapull complete a 7,925-ft. round trip every 13.1 minutes. On the basis of 50-minute efficiency, that's 3.8 trips per hour per unit, and an hourly output for each of the 7 E-25 scraper-equipped rigs of 61 cubic yards and for each of the 3 E-35's of 80 cubic yards.

Drive 190 miles to Pierre

Six of these Tournapulls are veterans of another big earthfill project — the Shadehill Dam, built across the Grand River near Lemmon, South Dakota. Their efficiency record on this job for the entire 1949 season was 85%. When their work here was finished, the 6 rigs drove under their own power to Pierre ... a 190-mile trip through main highway traffic.

Like Campbell-Collins, it will pay you to investigate the big pay loads and new low dirtmoving costs possible on your work with these mobile, 35-ton (30-yd.) and 25-ton (22-yd.) A Tournapulls. Your LeTourneau Distributor has all the facts ... call him, or write TODAY.



After Tournapulls spread their loads, 3 tractor-drawn Tournapackers roll fill to specified density.

LETOURNEAU LET EQUIPMENT

Mail today to: **R. G. LeTOURNEAU, Inc., Peoria, Illinois**

☐ Please furnish more information about your BIG Tournapulls.

Name..... Title.....

Company.....

Street..... City, State.....

Type of work to be handled.....

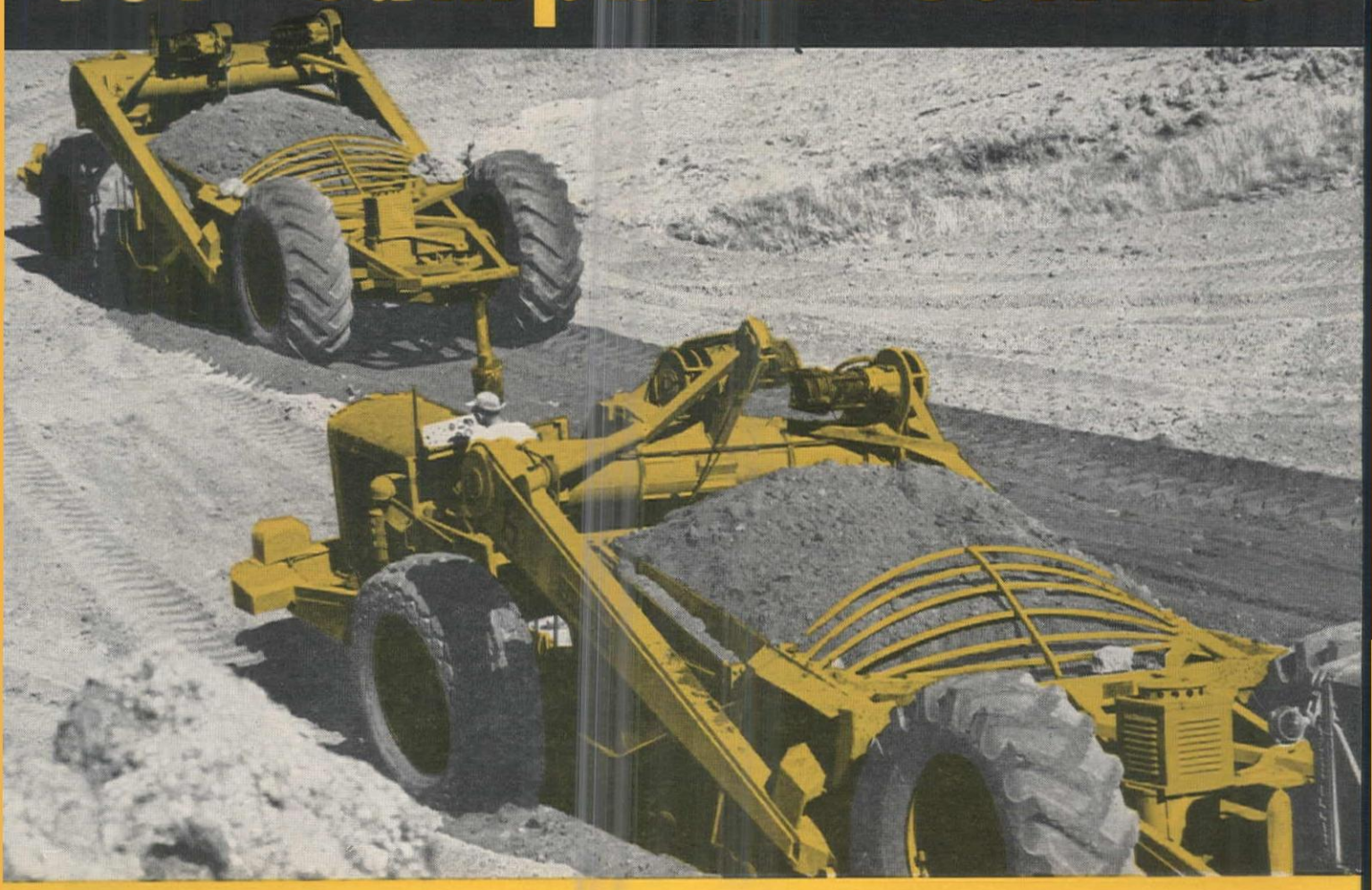
Also interested in:

☐ 35 m.p.h., 15-yd. C Tournapull

☐ 28 m.p.h., 7-yd. D Tournapull

☐ 19 m.p.h. C Tournadozer

"A" TOURNAPULLS for Campbell-Collins



ARIZONA
Arizona Equipment Sales, Inc.
2750 Grand Avenue, P. O. Box 1472, PHOENIX

CALIFORNIA
Capitol Tractor & Equip. Co.
1001 Del Paso Boulevard, P. O. Box 928, SACRAMENTO

Crook Company
2900 Santa Fe Avenue, LOS ANGELES
2314 North Chester Avenue, BAKERSFIELD

COLORADO
The Colorado Builders' Supply Co.
Equipment Division, W. Evans and S. Mariposa Street, DENVER

IDAHO
J. K. Wheeler Machinery Company
POCATELLO

MONTANA
Montana Powder & Equipment Co.
12 East Lawrence Street, P. O. Box 1688, HELENA
3425 1st Avenue, South, P. O. Box 1597, BILLINGS

NEVADA
Sierra Machinery Company
307 Morrill Avenue, P. O. Box 1330, RENO

NEW MEXICO
Contractors' Equip. & Supply Co.
707 North Broadway, ALBUQUERQUE

OREGON
Loggers & Contractors Machy. Co., Inc.
540 Fillmore Street, P. O. Box 352, EUGENE
240 S. E. Clay Street, PORTLAND

UTAH
J. K. Wheeler Machinery Company
1485 South 2nd West Street, SALT LAKE CITY

WASHINGTON
Modern Machinery Company, Inc.
4412 East Trent Avenue, P. O. Box 2152, SPOKANE

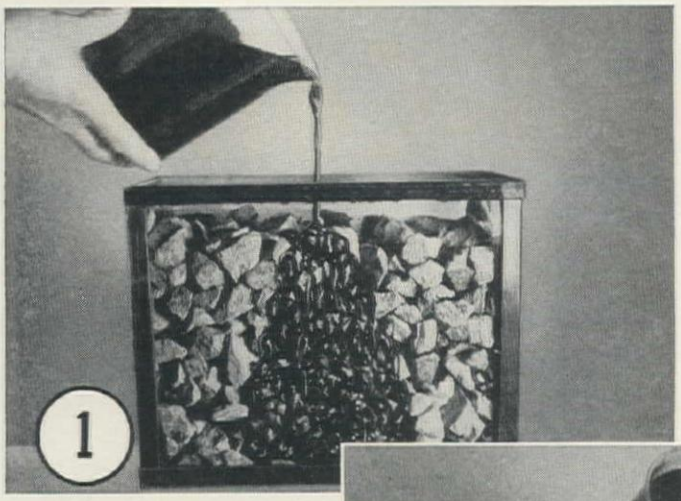
WYOMING
The Colorado Builders' Supply Co.
East Yellowstone Highway, P. O. Box 480, CASPER

Your 3 Basic Paving Problems

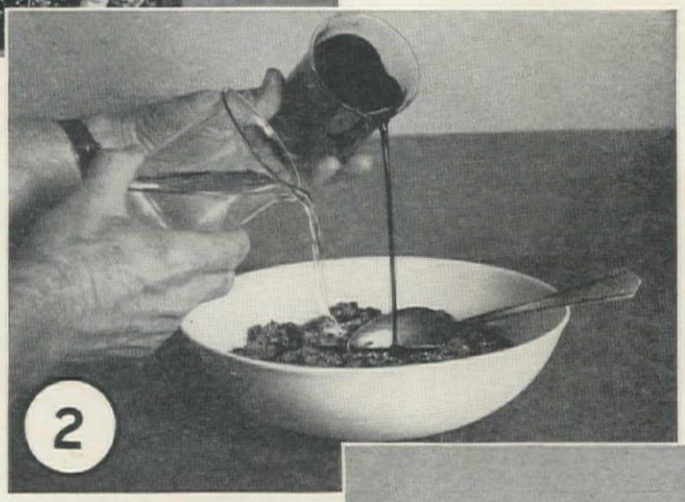
Solved BETTER by Bitumuls

REG. U. S. PAT. OFF.

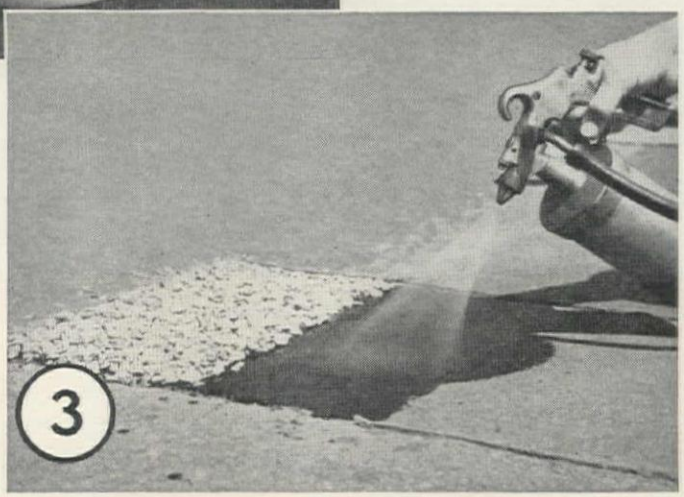
Only BITUMULS can perform these three functions so efficiently and at such low cost. (There are other reasons, too, but these three come first.)



It PENETRATES—
uniformly and deeply — without heating — through closely interlocked stone, damp or dry. In macadam construction, this means STABILITY because BITUMULS tacky asphalt coatings leave the stone in frictional contact.



It COATS DAMP NATIVE MATERIALS—
Only BITUMULS mixes easily and uniformly with damp, dense materials. Nothing else so efficiently treats low-cost sands and native aggregates—and gives early pavement stability with year-'round high bearing value.



It SEALS—
with precision—the RIGHT amount at the RIGHT place. This ease of precise cold application gives unsurpassed uniform, non-skid surface treatments with maximum retention of cover stone.

Whatever your paving needs, they can be filled by a correct BITUMULS specification that has already proved effective many times elsewhere. Our service engineers, skilled in the needs of your area, are ready to help YOU. Wire, phone or write our office nearest you.

Ask for these FREE booklets —data, tables, specifications.

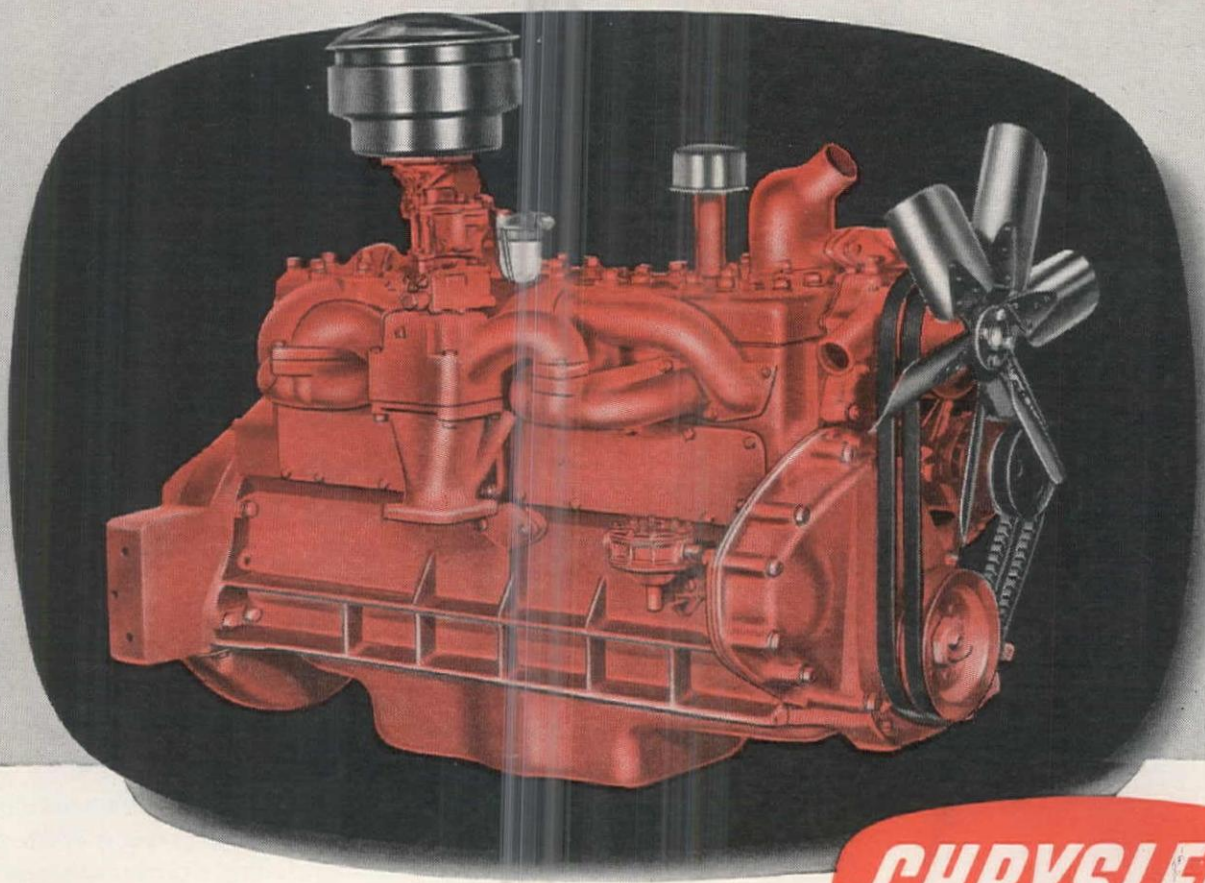
In the East
AMERICAN BITUMULS COMPANY
200 BUSH STREET · SAN FRANCISCO 4, CALIF.
Washington 6, D. C. · Baltimore 3, Md. · Perth Amboy, N. J.
Columbus 15, O. · St. Louis 17, Mo. · Baton Rouge 2, La.
Mobile, Ala. · E. Providence 14, R. I. · San Juan 23, Puerto Rico

In the West
STANCAL ASPHALT & BITUMULS COMPANY
200 BUSH STREET · SAN FRANCISCO 4, CALIF.
Los Angeles, Calif. · Oakland 1, Calif.
Portland 4, Ore. · Seattle, Wash. · Tucson, Ariz.

Ask for our BITUMULS BOOKLETS. They are factual, illustrated, and helpful—a valuable addition to your engineering library.

Bitumuls Penetration Macadam . . ☐
Bitumuls for Maintenance . . . . ☐
Bitumuls Sand-Mix . . . . . ☐
Bitumuls Handbook . . . . . ☐
Hydropel—Admix for concrete . . . ☐
Tennis Courts—Laykold & Grasstex . ☐
Fibrecoat—roof and metal coating . ☐

BUILT FOR INDUSTRIAL POWER NEEDS EVERYWHERE!



Day-in, day-out! . . . developing maximum horsepower with a minimum of down time and at minimum operating cost! That's the outstanding record of Chrysler Industrial Engines on the job!

For Chrysler Industrial Engines are built *solely for industrial use!* They are designed and engineered to meet the *specific working requirements* of each type of equipment they power. Chrysler Industrial Engines can also be adapted to special regional operating conditions.

A letter of inquiry will bring an engineer well qualified to discuss your particular application. Address: **Industrial Engine Division, Chrysler Corporation, Detroit 31, Mich.**

CHRYSLER

HORSEPOWER WITH A PEDIGREE

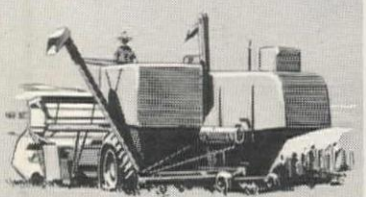
CONSTRUCTION

Chrysler Engines Power: Ditching Machines • Cranes • Truck Mixers • Shovels • Loaders • Yarders • Road Pavers • Concrete Mixers • Crane Carriers • Scoop Tractors

INDUSTRY

Chrysler Engines Power: Air Compressors • Pumps • Hoists • Derricks • Tractors • Generators • Arc Welders • Baling Machines • Winches • Conveyors • Tackle Blocks

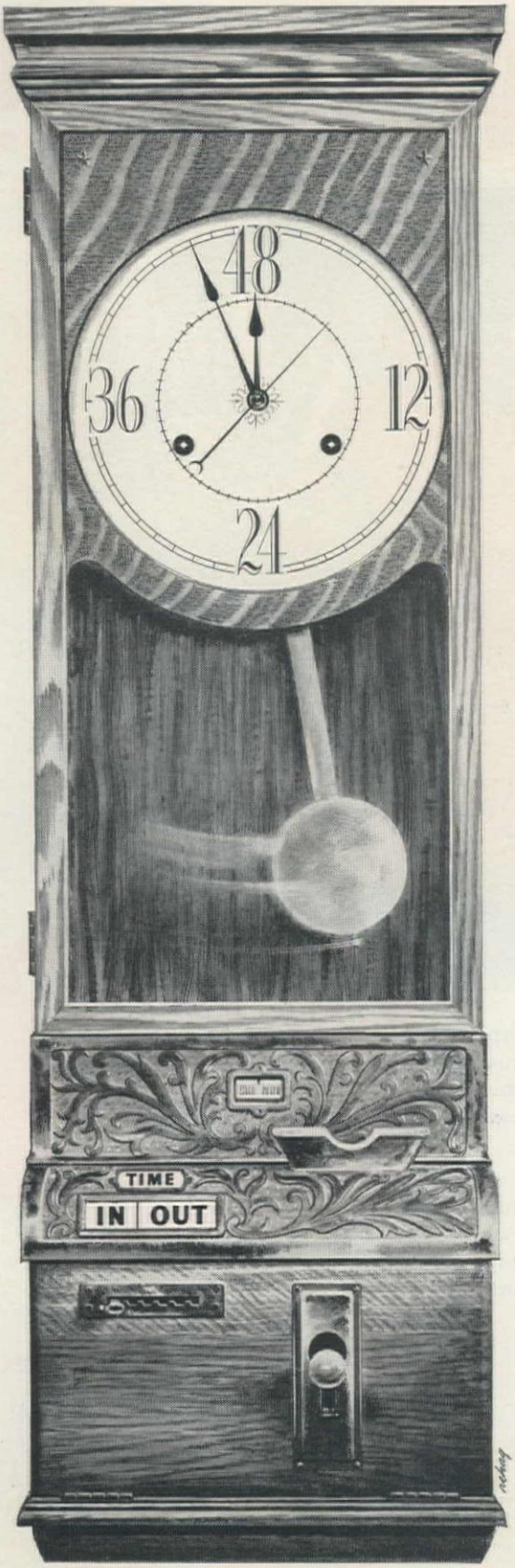
FARMING



Chrysler Engines Power: Tractors • Combines • Hay Choppers • Gang Mowers • Spreaders • Pumps • Feed Mills • Irrigation Equipment • Orchard Sprayers • Sprinklers

OTHER FIELDS

Chrysler Engines Power: Locomotives • Fire Pumps • Motor Coaches • Drilling Equipment • Pulp Machines • Snow Plows • Oil Well Pumps and Drillers • Street Flushers • Air Conditioning Equipment



Too bad it can't be invented!

If someone could invent a day 48 hours long, you can be sure Kaiser Steel would be among the first to adopt it.

But Kaiser Steel *is* working around the 24-hour clock to produce more steel in order to meet pressing Western demands for many products – including structural shapes.

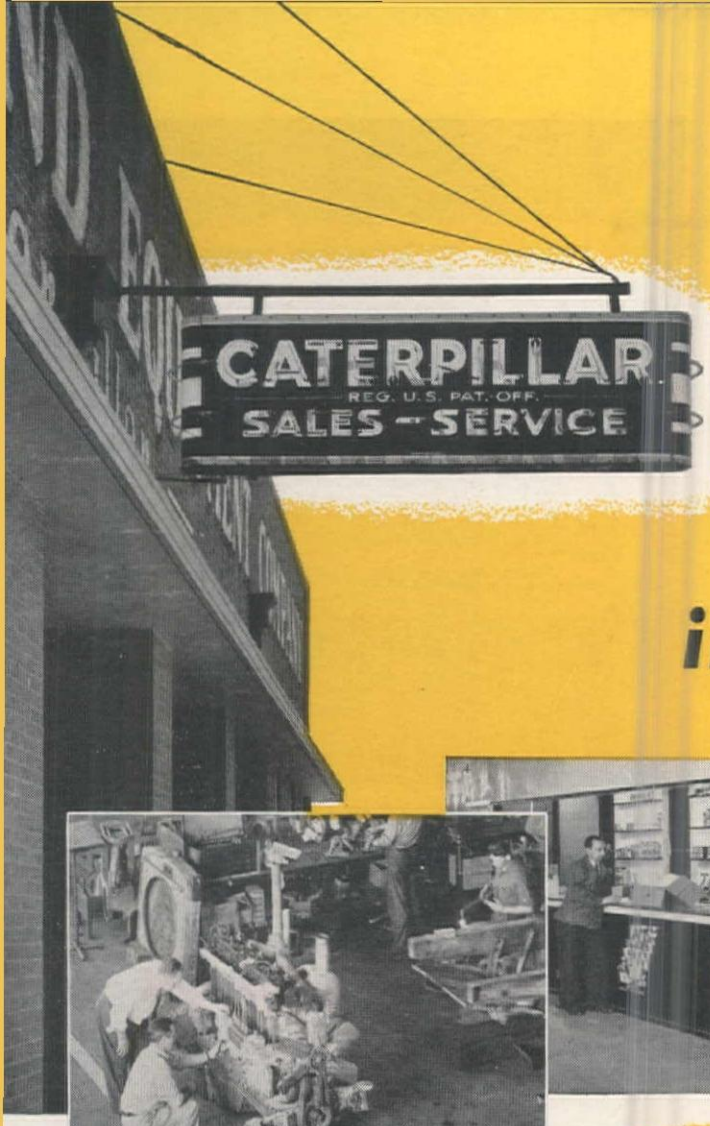
Backing up this work schedule, Kaiser Steel is constantly expanding plant facilities to bring still more steel to the West.

It's good business to do business with

Kaiser Steel

built to serve the West

PROMPT, DEPENDABLE DELIVERY AT COMPETITIVE PRICES • plates • continuous weld pipe • electric weld pipe • hot rolled strip • hot rolled sheet • alloy bars carbon bars • structural shapes • cold rolled strip • cold rolled sheet • special bar sections • semi-finished steels • pig iron • coke oven by-products
For details and specifications, write: **KAISER STEEL CORPORATION, LOS ANGELES, OAKLAND, SEATTLE, PORTLAND, HOUSTON, TULSA, NEW YORK**



Your strong right arm...

in time of need

BECAUSE of the vast defense mobilization program, material shortages and extra production demands have gripped the nation. They affect particularly the heavy industries and the distributors and users of their products. And huge as America's facilities have become in recent years, they still are not large enough to keep pace with both military and civilian needs.

Nevertheless, as an owner of "Caterpillar" products, you are among the more fortunate. Your "Cat" equipment has been built for long life and to withstand severe working conditions. What's more, it is backed by a dealer organization that is world-famous for experience, accessibility, mechanical facilities and field service to keep you going "come hell or high water."

Since World War II, the already large number of "Caterpillar" sales-and-service establishments has increased greatly. Also since that time, "Caterpillar" and its dealers have developed new techniques for restoring and extending the life of "Caterpillar" products. Today, in their own shops, "Caterpillar" dealers can *rebuild* a great many worn or damaged parts which formerly required completely new replacement. In short, every dealer is richly acquainted with scores of modern ways and means for keeping your machines in good working condition. You can help by doing this:

Take your maintenance problems to your "Caterpillar" dealer* BEFORE *parts are worn beyond repair

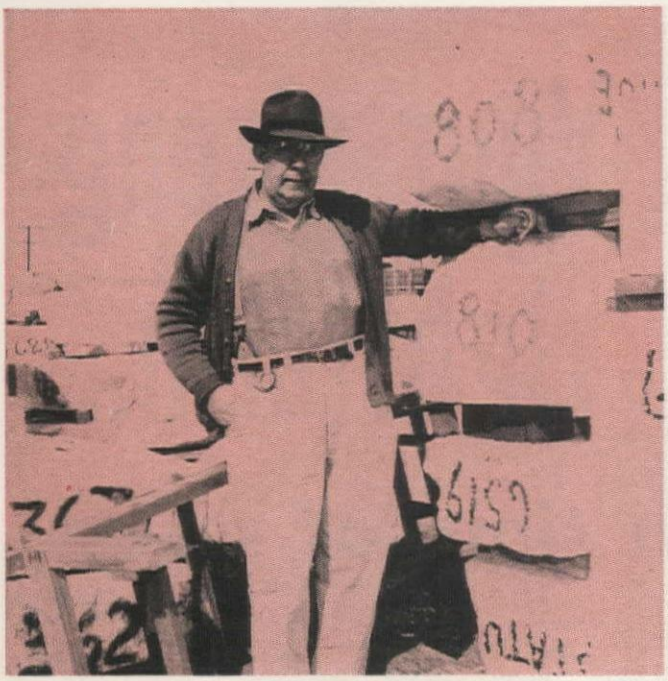
Remember that excessively worn parts can cause damage to mating parts; that track parts, pistons and liners, crankshafts, cylinder heads, radiators and other items usually can be salvaged. Your problems are your dealer's problems. Go see him today. He'll do everything in his power to keep your machines operating. Your combined efforts will be reflected in longer equipment life.

CATERPILLAR TRACTOR CO. • San Leandro, Calif.; Peoria, Ill.

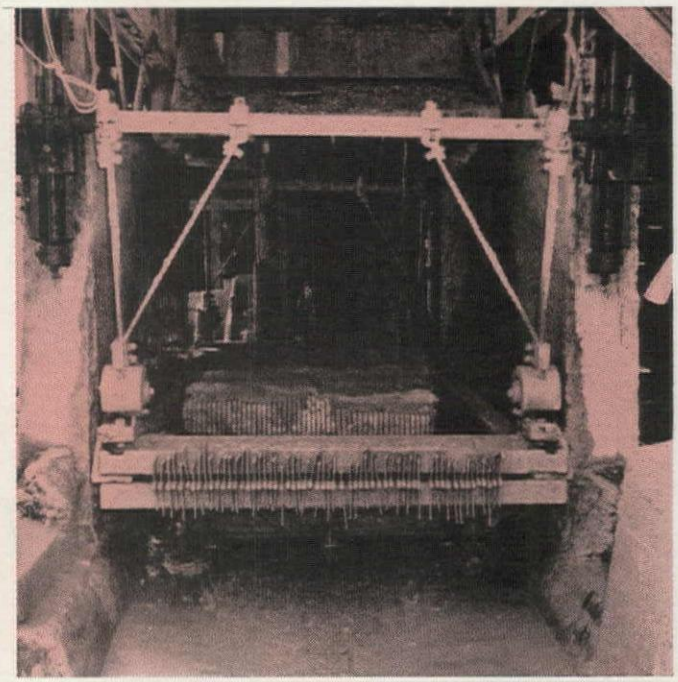
CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



M. A. Burdick, plant superintendent, Southwest Onyx & Marble Company, San Diego

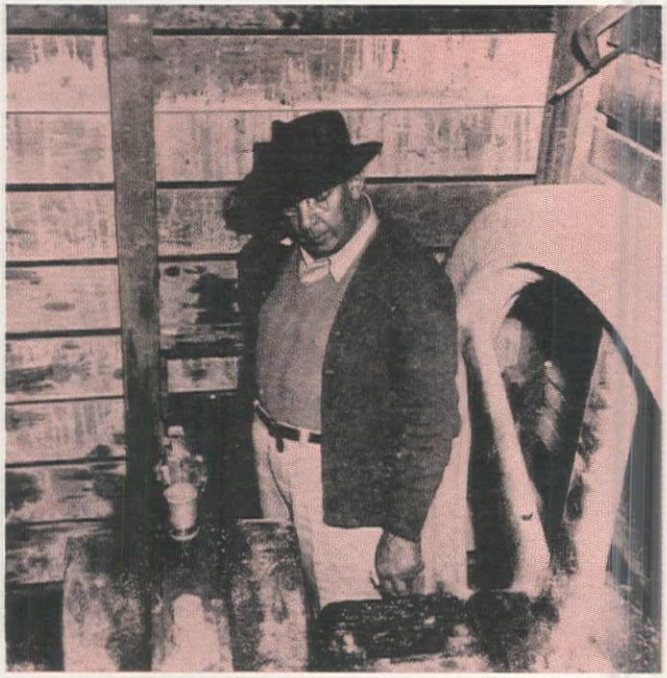


60-blade gang saw cutting a 10-ton block of onyx under severe operating conditions

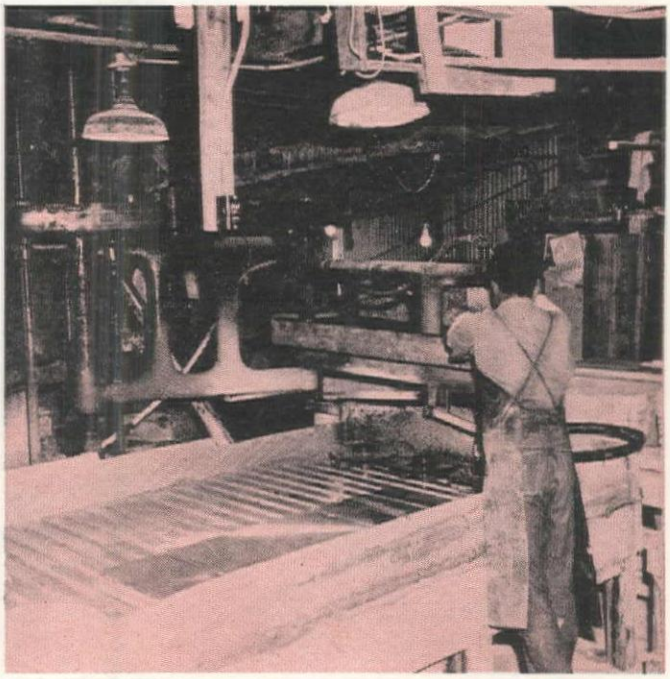
Multi-purpose UNOBA "means tremendous savings ...on maintenance and materials" ...SAYS SAN DIEGO PLANT SUPERINTENDENT

In addition to quarries in Baja California, the Southwest Onyx & Marble Company operates a plant in San Diego. The company's machinery is faced with extreme heat, excessive moisture, and abrasive conditions. About five years ago, the lubrication situation became acute. Plant Superintendent M. A. Burdick recalls: "Our toughest problem was one of attempting to lubricate the large crankpin bearings on our marble gang saws. Longevity of bearing life approximated 6 months. UNOBA was placed on a trial basis in these critical bearings, and amazingly *we have had no bearing loss since . . .*"

76 UNION OIL



Superintendent Burdick examines 14" crankpin bearing now protected by UNOBA



Polishing machine has 11 grease cups, all lubricated by multi-purpose UNOBA

UNOBA grease is the industry's original multi-purpose lubricant that resists *both* heat and water. These outstanding heat and water resistant properties are due to the use of a *barium* soap base—a patented Union Oil Company discovery. Multi-purpose UNOBA sticks to metal surfaces with a tenacity that boiling water can't break. And UNOBA gives protection at temperatures from below freezing to over 300 degrees F., *regardless* of moisture.

Superintendent Burdick says: "Through the use of the same grease, we are able to lubricate our *entire* plant, which means tremendous savings to us on maintenance and materials from year to year." Because of UNOBA's versatility, this multi-purpose grease *simplifies* lubrication. It's *one* grease that answers practically *all* of your heavy lubrication problems, because it performs on jobs formerly requiring many different types and brands of grease. This results in reduced inventories, smaller storage space, less chance of using the wrong lubricant, and lower maintenance costs.

Prove the superiority of multi-purpose UNOBA over a variety of single-purpose lubricants by giving it a trial in bearings operating under *severe* heat and moisture conditions. You will agree with M. A. Burdick when he says: "Thanks to UNOBA grease, we now have the lubrication problem well in hand."

Let your Union Oil Representative tell you the complete UNOBA story, or write Sales Department, Union Oil Company, Los Angeles 17.

COMPANY OF CALIFORNIA

What's behind the Euclid name?

Engineered...for the Job

Of simple design and rugged construction, Euclids are engineered and built specifically for moving earth, rock, coal and ore in off-the-highway service.

There is a Euclid model to meet every requirement in off-the-highway work, and body designs for all types of materials. Capacities of Rear-Dump "Eucs" range from 10 to 34 tons, with diesel engines of 125 to 400 h.p. Top speeds with full payload up to 35.7 m.p.h. . . . semi-rigid or spring mounted drive axle, five or 10 speed transmission.

Bottom-Dump Euclids range in capacity from 13 to 25 cu. yds., have diesel engines of 190 to 300 h.p. . . . top speeds loaded up to 34.4 m.p.h.

Also job proved for high production at low cost are the Euclid Loader and the Euclid Scraper. Write for complete information on the Euclid line of earth moving equipment or call your distributor.

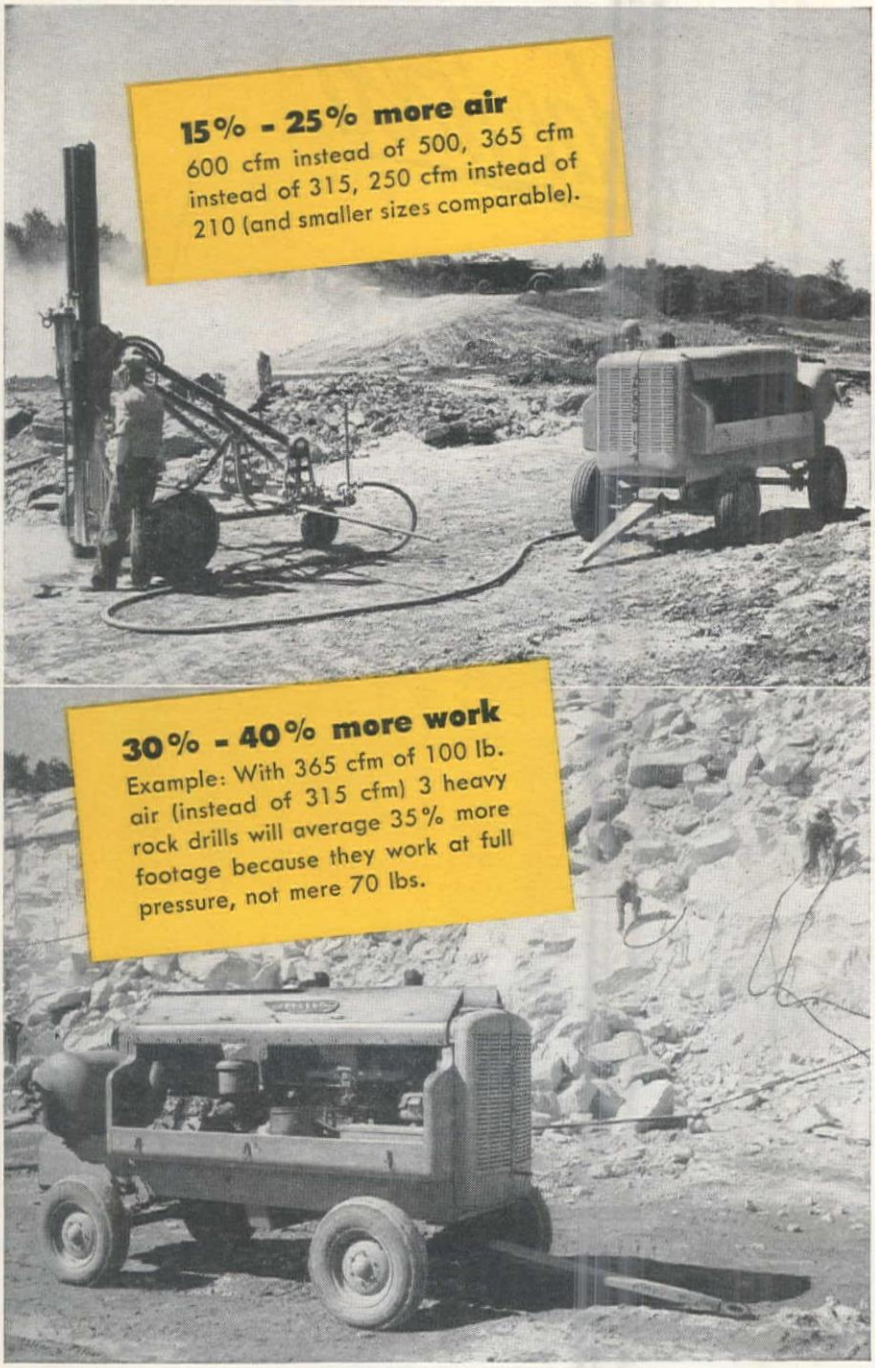
The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

CABLE ADDRESS: YUKLID **CODE: BENTLEY**

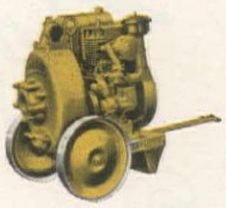
MORE LOADS PER HOUR—
MORE PROFIT PER LOAD

EUCLIDS *Move the Earth*

"new standard" Jaeger Compressors

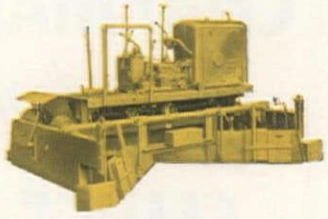


"Air Plus" Compressors, 75 to 600 cfm



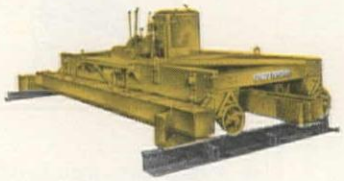
"Sure Prime" Pumps, 3600 to 240,000 gph

"Speedline" Mixers, 3½ S to 16 S



Paver-Type Aggregate Spreaders

Model BP-5 Bituminous Pavers

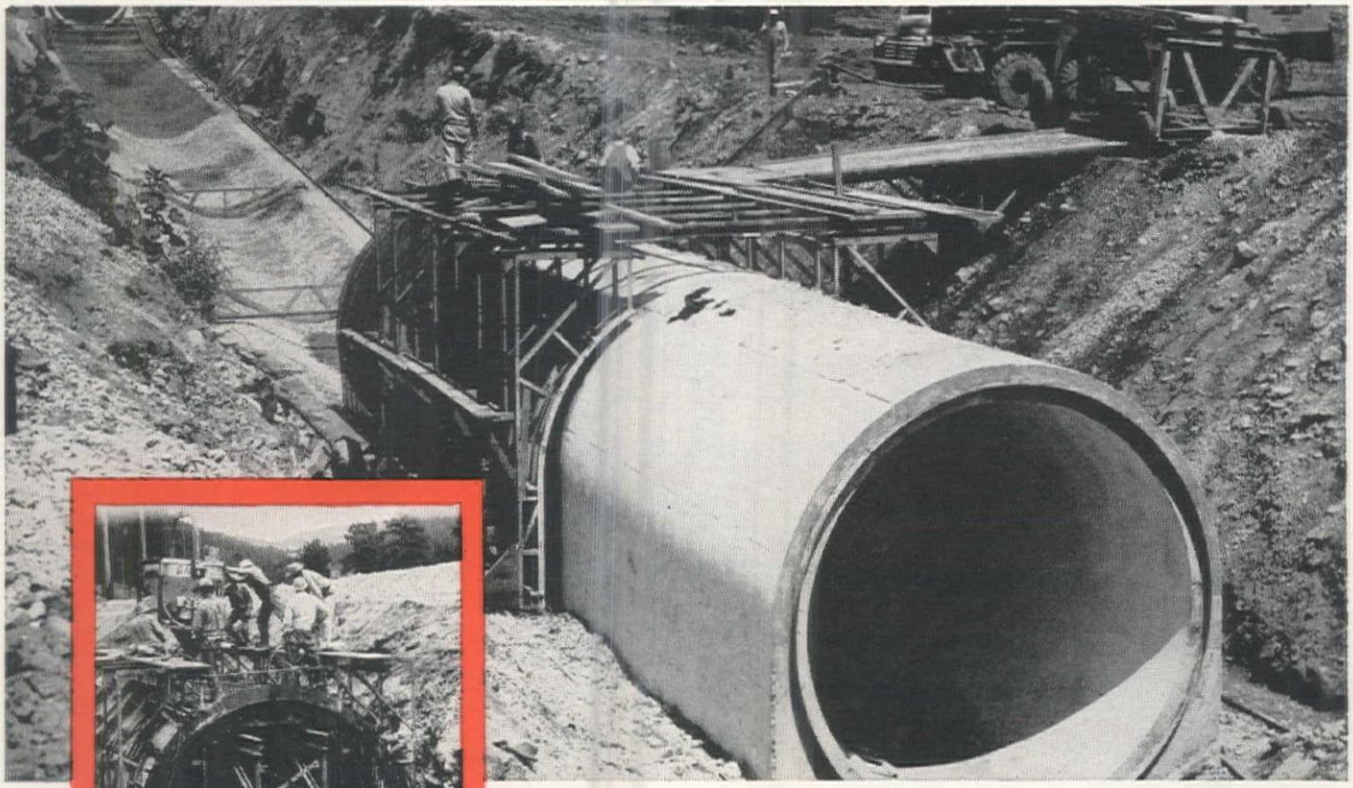


Concrete Screw-and-Screed Spreaders, Diagonal Screed Finishers

Why starve your modern air tools with "old standard" compressors that have not increased their air output in 19 years? Jaeger Air-Plus standards provide the increased air you need to power today's tools at their full efficiency—*at the lowest cost per foot of air of any compressors on the market.*

Sold, Rented, Serviced by

EDWARD R. BACON CO.....San Francisco 10
NELSON EQUIPMENT CO.....Portland 14
WESTERN MACHINERY CO., Salt Lake City, Denver 2, Spokane 11
SHRIVER MACHINERY CO.....Phoenix
J. D. COGGINS & CO.....Albuquerque
SMITH BOOTH USHER CO.....Los Angeles 54
A. H. COX & CO.....Seattle 4 and Wenatchee
THE SAWTOOTH CO.....Boise and Twin Falls, Idaho
TRACTOR & EQUIPMENT CO.....Sidney, Miles City, Glasgow
CENTRAL MACHINERY CO.....Great Falls and Havre
WORTHAM MACHINERY CO.....Cheyenne, Billings



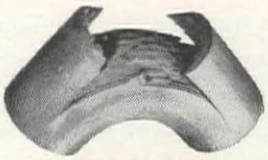
These Siphon WATER STOPS STOP CORROSION too -with BYERS WROUGHT IRON

In constructing these concrete siphons, engineers of the Bureau of Reclamation, U. S. Department of Interior, took decisive steps to forestall excessive maintenance and insure leakproof joints by specifying genuine wrought iron water stops. The main illustration shows a finished section of the siphon laid at the Poudre Supply Canal, near Fort Collins, Colorado. This siphon has an inside diameter of 12'6". The insert photograph shows a section of the 3600-foot Olympus Siphon being poured into a form manufactured by the K-C Construction Supply Company of Denver. This siphon, near Estes Park, Colorado, has an inside diameter of 10'9" and links the Olympus Dam and the Olympus Tunnel. Both siphons are part of the Colorado Big-Thompson Project. Approximately 7500 feet of 3/16" x 8" Byers Wrought Iron plate was used for the water stops on the two siphons. Contractor for both jobs was Peter Kiewit Sons Company of Omaha.

The selection of genuine wrought iron for this service follows accepted design practice, and is endorsed by performance records that testify to the superior durability of this time-tried material.

The complete story of what genuine wrought iron is, how it is made, and why it lasts is condensed in our booklet, THE ABC's OF WROUGHT IRON. Ask for a copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. Export Division: New York, N. Y.



WHY GENUINE WROUGHT IRON LASTS

This notch-fracture test specimen illustrates the unusual fibrous structure of genuine wrought iron—which is responsible for the unusual corrosion resistance of the material. Tiny threads of glass-like silicate slag, distributed through the body of high-purity iron, halt and disperse corrosive attack, and discourage pitting and penetration. They also anchor the initial protective scale, which shields the underlying metal.

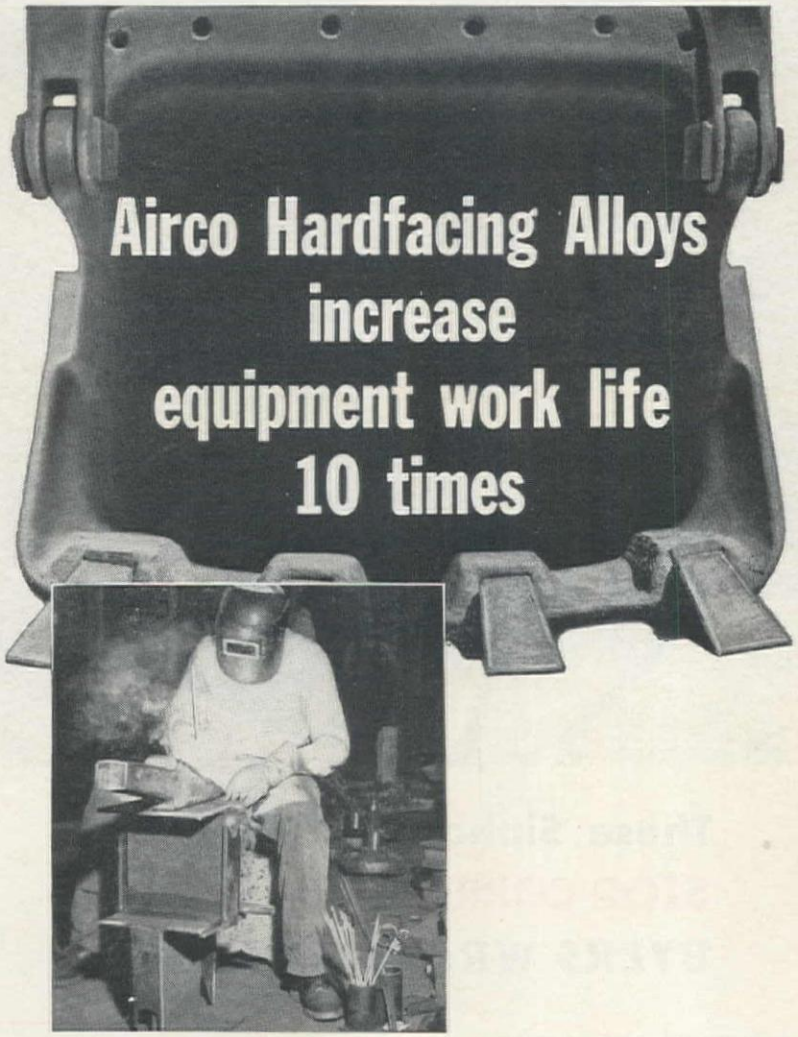
BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY ALLOY AND STAINLESS STEEL PRODUCTS



Airco Hardfacing Alloys increase equipment work life 10 times

Worn machinery and equipment need no longer mean costly replacements. Today, surfaces rebuilt with Airco Hardfacing Alloys add many months to equipment life and, in many cases, improve the operating characteristics.

For example, a large contracting firm found that hardfaced manganese bucket teeth last two to six times longer than untreated teeth. Using Airco Self-Hardening Alloy, they lay a stringer bead along the edges of the bucket teeth. This alloy, designed to counteract impact and abrasive wear because of its tough, homogeneous characteristics, saves thousands of dollars in equipment work life.

But this is only one of the many Airco Hardfacing Alloys used in their welding shop to save time, trouble and money. They follow a conscientious program of hardfacing . . . a program that helps prolong equipment work life and prevents costly "down-time."

You, too, can enjoy these same time and money savings. Your nearby Airco office will gladly show you how these cost-saving Airco Hardfacing Alloys will help you with your particular problem. Write today.

other AIRCO hardfacing alloys

AIRCOLITE No. 59 . . . For reclaiming bucket teeth and lips used in sand and gravel pits—dredge screens—pulverizer hammers—mixer blades, this cast alloy rod is recommended for application where abrasion resistance is particularly important. Deposit acquires a high polish in service, and maintains its high hardness at temperatures up to 800°F. Applied electrically or by gas process. Deposits test from 54-59 on Rockwell "C" scale.

AIRCOLOY No. 6 . . . For refacing exhaust diesel valves on "cats"—cranes—pumps and shovels, Aircoloy No. 6 gives excellent corrosion resistance . . . retains hardness and impact and abrasion resistance at temperatures above 700°F. . . . test from 43-47 on Rockwell "C" scale. While recommended for application by gas process, rods suitable for AC or DC electric application are available.

AIRCO TUNGTUBE . . . When building up grader blades—road plows—dredge pump cutters—scarifier teeth—churn drills, use tungsten carbide particles encased in a steel tube for application by either oxyacetylene method or electric arc—AC or DC. Used as a diamond substitute for earth removal and drilling operations. Hardness of tungsten carbide particles are over 80 Rockwell "C".

★ ★ ★

Air Reduction supplies Oxygen, Acetylene and other industrial gases . . . Calcium Carbide . . . and a complete line of gas cutting machines, gas welding apparatus and supplies, plus arc welders, electrodes and accessories. Ask us about anything pertaining to gas welding and cutting and arc welding . . . we'll be glad to help you.

AIR REDUCTION PACIFIC COMPANY

A Division of Air Reduction Company, Incorporated

AIRCO

SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE

Bakersfield • Fresno • Emeryville • Sacramento • Tacoma

Western Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT: RPM Delo Oils

UNIT: #450 International gasoline engines

CONDITIONS: Heavy hauling

PERIOD: 1½ years

FIRM: Kenneth Poorman Co., Portland, Oregon.

Rings "perfect", only 0.001 cylinder wear after 80,000 miles!

RPM DELO OILS eliminated all stuck rings, scoring and deposit trouble in 21 units like these, hauling loads up to 72,000 pounds on construction jobs. 80,000 miles after switching to RPM DELO Oils a check showed: "Rings so perfect they could have been put back in the engine. Average cylinder wear only 0.001 inch," according to Maintenance Supt. C. H. Johnson, Kenneth Poorman Co., Portland, Ore.

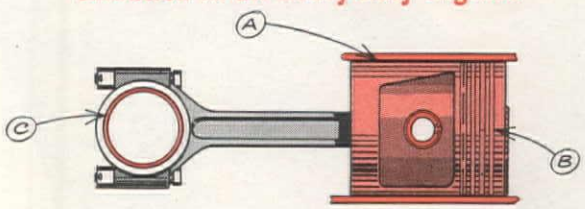
"100,000 MILES IS NOW OUR OVERHAUL PERIOD, but the way RPM DELO Oils perform, I believe we could extend it to 200,000 miles," says Mr. Johnson (left), shown here with Manager Joe Stephani. RPM DELO Oils have made many outstanding service records in all types of heavy-duty gasoline and diesel engines. They will keep your engines clean, reduce wear and cut operating costs. One of these will meet the operating conditions in your heavy-duty engine: RPM DELO Heavy Duty, RPM DELO Special, RPM DELO Supercharged-1 Oil, RPM DELO Supercharged-2 Oil.

FREE BOOKLET on the RPM DELO Oils gives you complete information. Write or ask for it today.

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

RPM DELO LUBRICATING OILS

How RPM DELO Oils reduce wear, corrosion, oxidation in all Heavy-Duty Engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

What's U. S. Rubber doing with crushed rock, limestone and gravel?

TODAY "U. S." belts perform an immense number of different tasks in different fields, making great savings in maintenance and in haulage time. "U. S." develops fabrics and compounds—to make belts that meet today's more rigorous demands on belting performance. "U. S." belts have a reputation for lasting years beyond expectations of operators.

THIS U. S. RUBBER BELT carries crushed limestone in a modern, highly efficient plant in the Midwest. The belt has 220-ft. centers and a 17-degree incline. The high output and high mechanization of this plant would be impossible without such specially designed products as this "U. S." Belt.

GRAVEL PLANT that handles up to 150,000 tons of wet sand per year. The "U. S." belt on the outdoor installation above has been working steadily on this job for over 8 years and is still going strong.

HERE A "U. S." CONVEYOR BELT carries crushed rock from pit to surge pile. It has been in operation 8 to 10 hours a day for several years. Its present excellent condition indicates at least 10 years' service life.

PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

SEE YOUR

MICHIGAN

DISTRIBUTOR

STEFFECK EQUIPMENT CO., INC.
P. O. Box 584
Helena, Montana

●

MODERN MACHINERY CO., INC.
P. O. Box 2152
Spokane 2, Washington

●

WESTERN EQUIPMENT CO.
2244 N.W. Savier St.
Portland 10, Oregon
also
1360 West First Ave.
Eugene, Oregon

●

SPEARS-WELLS MACHINERY CO.
1832 West Ninth St.
Oakland 7, California

●

SMITH BOOTH USHER COMPANY
2001 Santa Fe Ave.
Los Angeles, California

●

THE SAWTOOTH CO.
715 Grove Street
Boise, Idaho

●

HEINER EQUIPMENT & SUPPLY CO.
501 West 7th South
Salt Lake City 4, Utah
also
3301 Walnut St.
Denver 5, Colorado

●

WILSON EQUIPMENT CO.
P. O. Box 218
Cheyenne, Wyoming
also
WILSON EQUIPMENT & SUPPLY
Box 519, 414 S. Elm Street
Casper, Wyoming

●

MICHIGAN SALES & SERVICE CO.
1506 Fifteenth Avenue West
Seattle 99, Washington

●

CONTRACTORS' EQUIP. & SUPPLY CO.
P. O. Box 456
Albuquerque, New Mexico
and
P. O. Box 2039, El Paso Texas

●

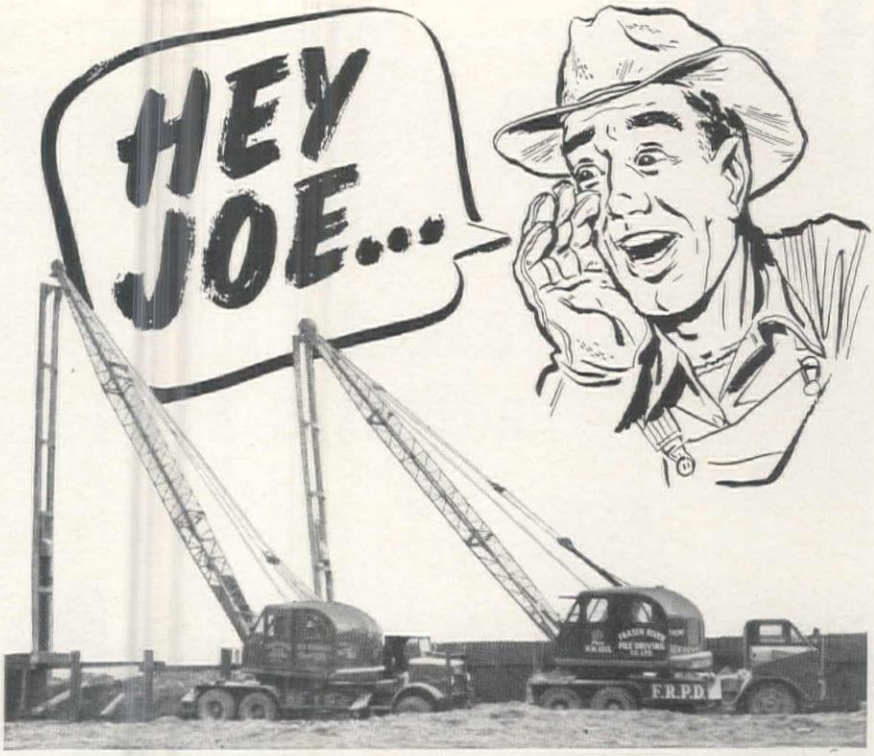
JAMES CASHMAN
107 N. Main Street
Las Vegas, Nevada

●

NEIL B. McGINNIS CO.
P. O. Box 3615
500 South Central Ave
Phoenix, Arizona

●

SMITH, INC.
1620 First Avenue North
Fargo, North Dakota



ANOTHER BREAK IN THE DIKE!

Tough words to hear when you're battling a river on a rampage. But that's what happened during the recent disastrous floods on the Fraser River in British Columbia.

Perhaps you don't have to keep "rivers caged up," but that's an important job for Fraser River Pile Driving Co., Ltd. and their experience *again proves* the unusual mobility and handling ease of MICHIGAN cranes.

Says K. A. Matheson of the above company, "In the City of Mission on the Fraser River, the MICHIGAN cranes did a splendid job owing to their mobility and being able to get from one break in the dikes to another in very short order. In particular the TLDT-20 with remote control was a decided advantage, as it enabled us to do the same work with one less man when labor of this sort was badly needed on other flood-fighting work."

Regardless of your type of work, when you need an excavator-crane . . . investigate MICHIGAN . . . you'll agree it's your best buy!

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

P&H SINGLE PASS STABILIZERS

NOW!

P&H SOIL STABILIZER PROCESSES A 5 FT. WIDTH

No job is too small *(or too large)* for the proved P&H method of Stabilization

Road builders asked for this new P&H Soil Stabilizer . . . to handle smaller jobs, such as streets, alleys, taxiways, parking areas, airports, sub-bases.

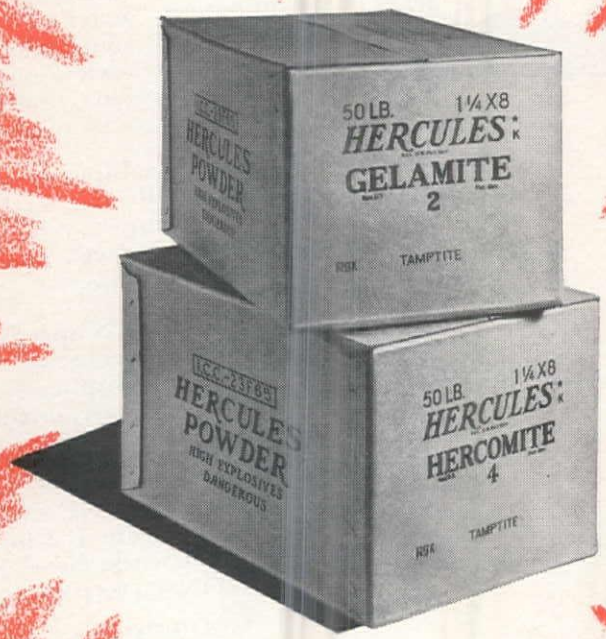
Now, it's ready . . . to bring you all the advantages . . . the same quality controls P&H Soil Stabilizers have proved on jobs all over the country. It's the most practical and economical method of soil stabilization ever developed.

The P&H Model EA-56 is readily maneuverable, easily transported. It performs all of the 8 basic requirements in a *single pass,* processing in 5 ft. strips. Fully controlled by one operator. Operating at a good rate of speed, it cuts time and costs . . . provides high quality bases that insure low maintenance costs.

If you plan any stabilization job involving soil-bituminous, soil-cement, or clay-gravel, be sure you get full information first. Write for Bulletin S-9.

P&H
SINGLE PASS SOIL STABILIZERS
4490 W. National Ave.
Milwaukee 14, Wis.
HARNISCHFEGER CORPORATION

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizers • Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-Assembled Homes



GET MORE E.P.* PER DOLLAR

* Explosive Power determines your dynamite dollar's true value. Get *more* for your money with Hercules Hercomites® and Gelamites®. They give better breakage than older-type explosives . . . are more economical than extra dynamites and gelatins. Among them, there is one for practically every mining, quarrying, and construction need. Write for illustrated booklet, "Hercomites and Gelamites for Lower Blasting Costs."

HERCULES POWDER COMPANY INCORPORATED *Explosives Department, 973 Market St., Wilmington, Del.*

XR51-1R

DEADLINE BEATERS

● Trackson Tractor Equipment is working night and day to help vital construction meet a defense production deadline.

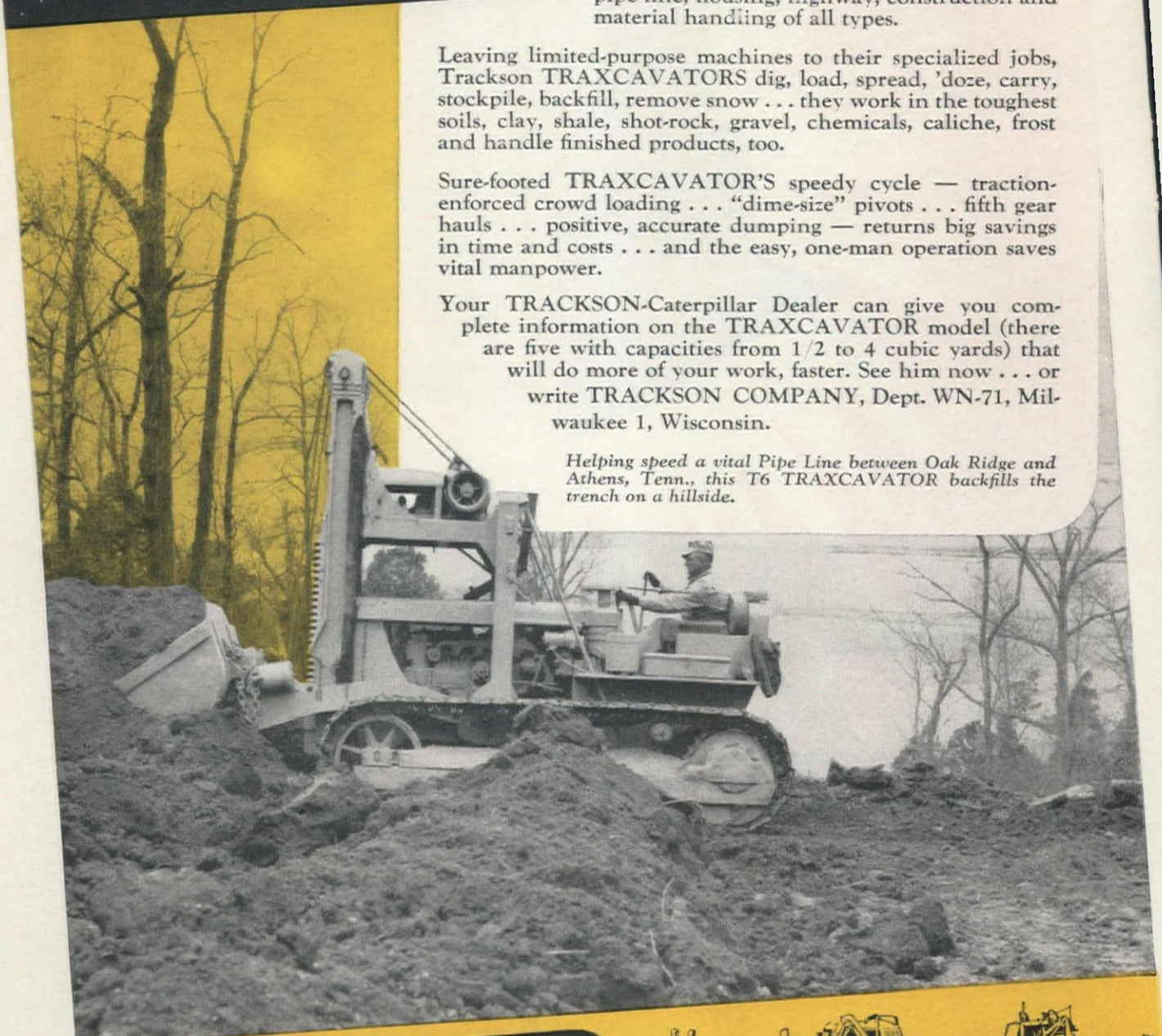
Rough schedules are met head on by Trackson products, including TRAXCAVATORS — PIPE LAYERS — EARTH AUGERS — SWING CRANES — all designed and built to withstand years of long, hard usage. This equipment, matched with the power and capacity of Caterpillar Diesel Tractors, is getting more defense work done faster . . . pipe line, housing, highway, construction and material handling of all types.

Leaving limited-purpose machines to their specialized jobs, Trackson TRAXCAVATORS dig, load, spread, 'doze, carry, stockpile, backfill, remove snow . . . they work in the toughest soils, clay, shale, shot-rock, gravel, chemicals, caliche, frost and handle finished products, too.

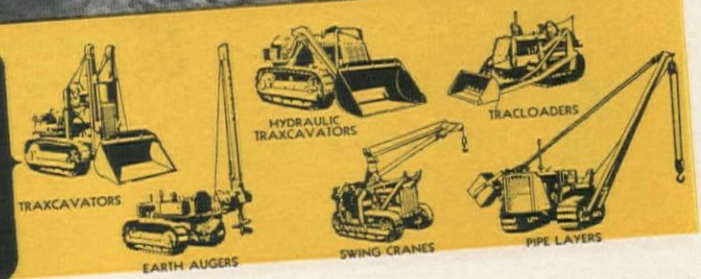
Sure-footed TRAXCAVATOR'S speedy cycle — traction-enforced crowd loading . . . "dime-size" pivots . . . fifth gear hauls . . . positive, accurate dumping — returns big savings in time and costs . . . and the easy, one-man operation saves vital manpower.

Your TRACKSON-Caterpillar Dealer can give you complete information on the TRAXCAVATOR model (there are five with capacities from 1/2 to 4 cubic yards) that will do more of your work, faster. See him now . . . or write TRACKSON COMPANY, Dept. WN-71, Milwaukee 1, Wisconsin.

Helping speed a vital Pipe Line between Oak Ridge and Athens, Tenn., this T6 TRAXCAVATOR backfills the trench on a hillside.



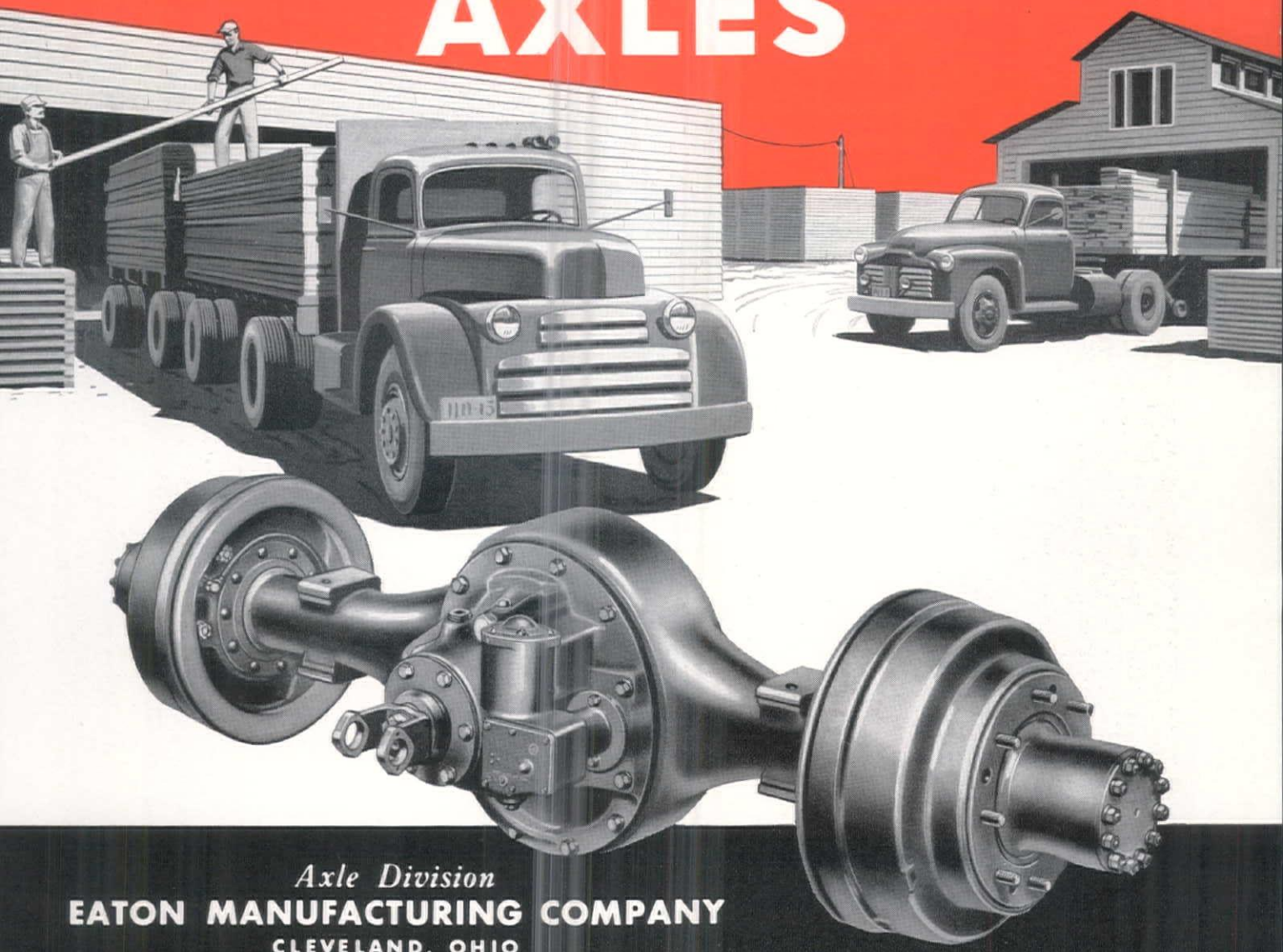
TRACKSON
TRACTOR EQUIPMENT



More Miles Per Day—
More Miles in the Life of Your Trucks

Trucks with Eaton 2-Speed Axles "make time", not only on the open highway, but in city traffic as well. Even more important, Eaton 2-Speed Axles save wear-and-tear on engine and power transmitting parts; keep trucks in service, and add thousands of miles to vehicle life. Many exclusive features combine to give Eaton axles long life with minimum maintenance cost. Planetary gears distribute loads over several gear teeth, dividing the stress. Positive lubrication, even at slow speeds, reduces friction wear. Ask your truck dealer to explain how Eaton 2-Speed Axles pay for themselves over and over.

EATON
2-Speed Truck
AXLES



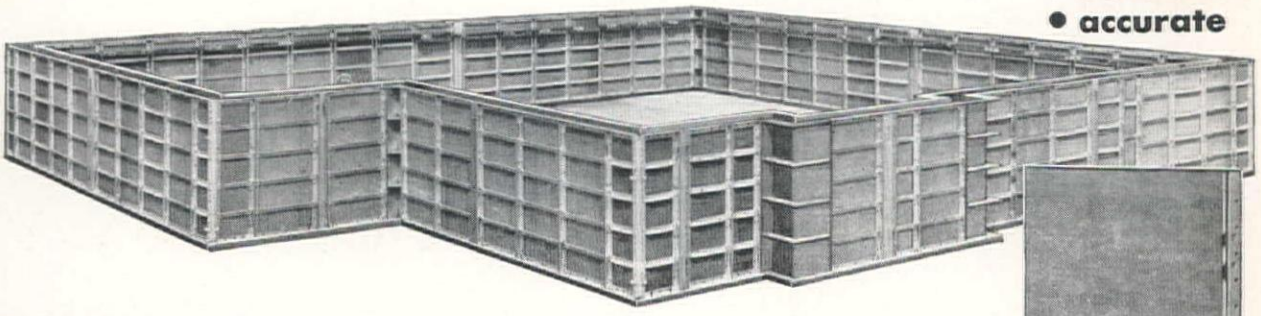
Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

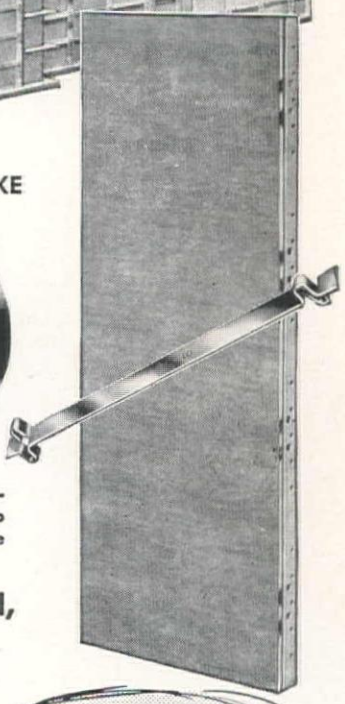
PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

UNI-FORMS take the *Guesswork* out of Forming!

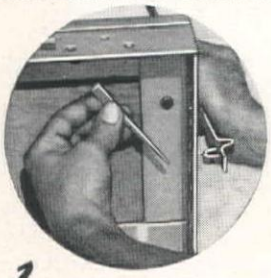
They're

- modern
- easy to use
- automatic
- accurate

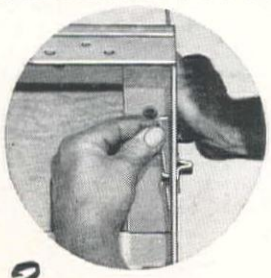




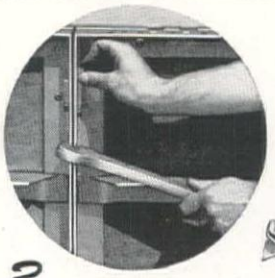
ASSEMBLY OF UNI-FORMS IS FOOLPROOF . . . YOU CAN'T MAKE A MISTAKE



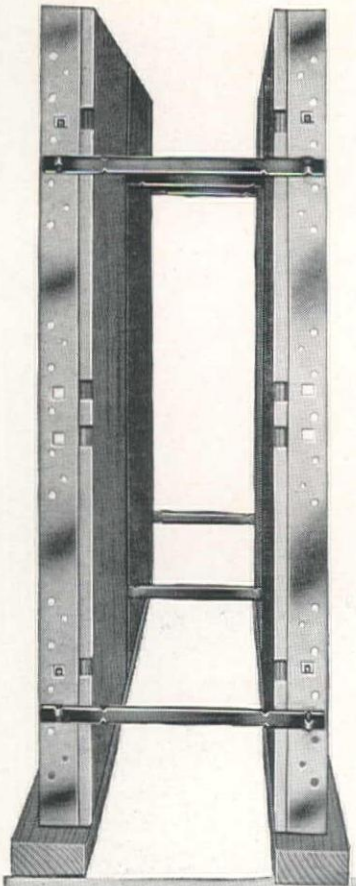
1 The first step in assembly. Put the Uni-Form Tie Loop into the Tie Hole.



2 Drop Tie Key into the Loop. This locks the UNI-FORM and Tie into one integral unit.



3 Bring the next UNI-FORM into position. Drop the second Tie Key into the Loop.



UNI-FORMS Provide Modern, Mechanized, Automatically Accurate Forming

Bigger Profits . . . Better Jobs

UNI-FORMS fit the modern building picture . . . they provide speed, quality and lower building costs. Walls, slabs, beams, columns—in fact any concrete, is UNI-FORMABLE.

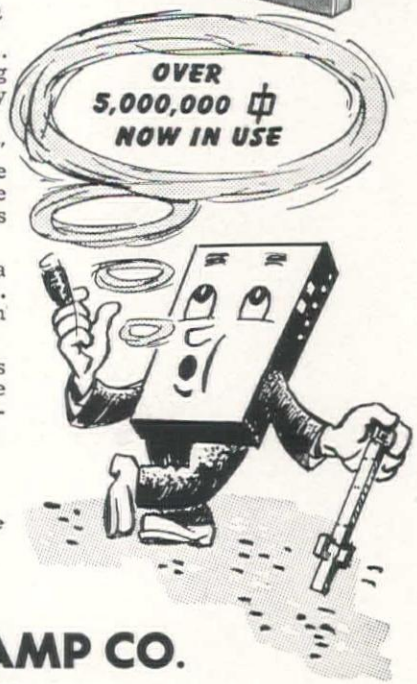
UNI-FORMS are modular in design . . . 2'0" wide, in varying height up to 10'0". They are symmetrical . . . all sizes will member with one another. Fillers are easily handled with angles punched to match the forms.

UNI-FORMS, with Uni-Form Ties, comprise a structural form, ready to receive concrete . . . automatically accurate wall widths from bottom to top . . . alignment on one side only.

UNI-FORMS are not like ordinary wall forms —they are *permanent* equipment . . . only the plywood is expendable—steel frame is indestructible. Many have seen 20 years of service.

Rent a set of UNI-FORMS with a purchase option. "Try before you buy" is our motto.

Ask for Circular SA-13. It gives full information on the Uni-Form System.

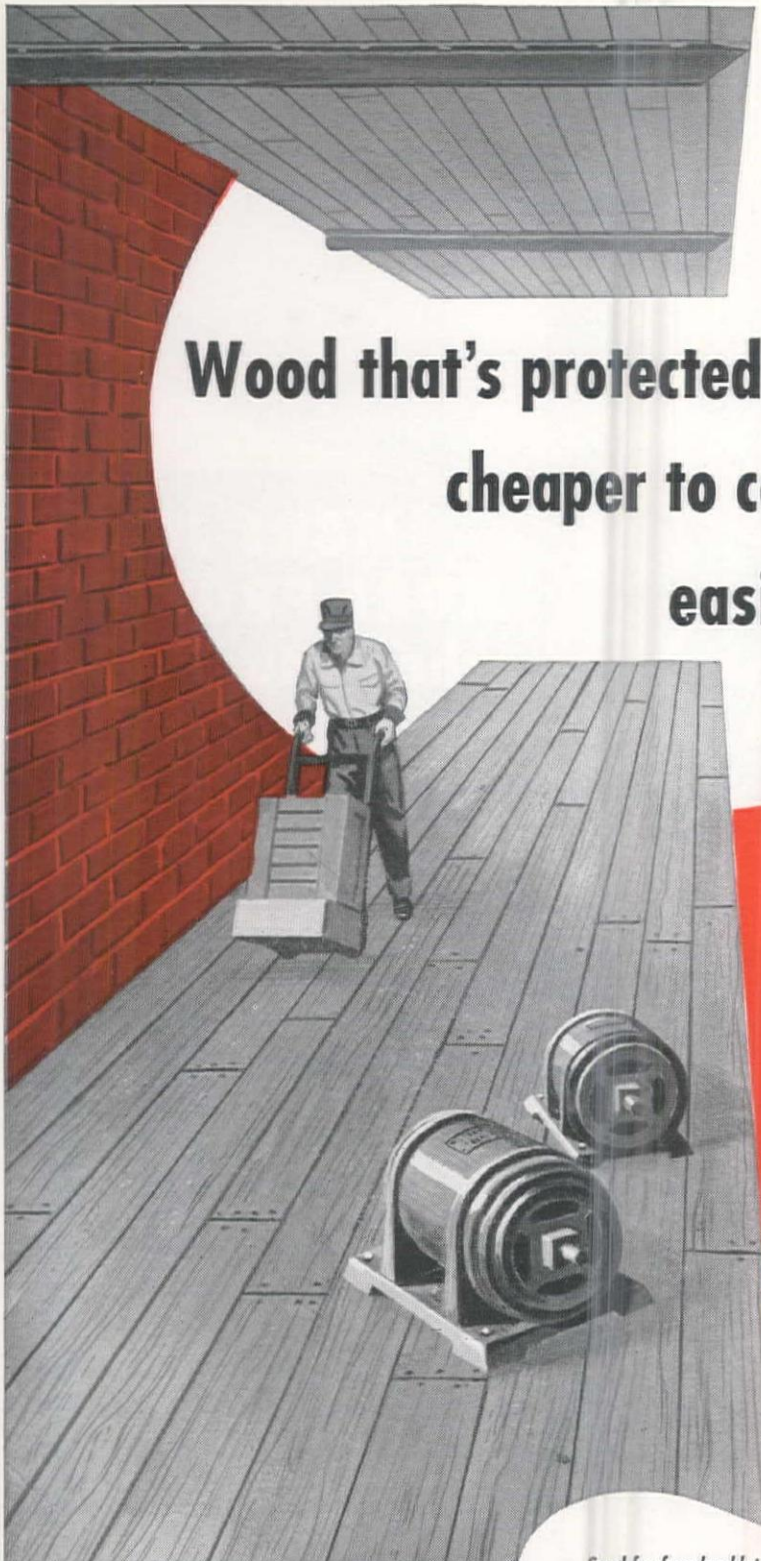


UNIVERSAL FORM CLAMP CO.

SAN LEANDRO (San Francisco), CALIF.
2051-59 WILLIAMS ST., SAN LEANDRO
Phone: LOckhaven 2-2051 ENterprise 1-0132

GENERAL OFFICES AND FACTORY 1236-38 N. KOSTNER, CHICAGO 31, ILL.
Phone: CApitol 7-1600

Form Ties **Form Systems** **Form Clamps** **Spirolocs** **Twistyes** **Concrete Specialties**



Wood that's protected makes new buildings cheaper to construct... easier to maintain!

For your own protection

BUILD WITH Penta -PROTECTED WOOD

PENTA-PROTECTED wood is an excellent building material for many types of construction. It assures you dependable, long-lasting structures that require little maintenance . . . provides superior shock-absorbing and sound-proofing qualities . . . and, in addition *costs less* than other building materials!

Note these advantages of PENTA*:

PENTA protects wood against termites and decay.

PENTA-PROTECTED wood lasts up to *four times longer.*

PENTA leaves the wood clean and easy to handle.

Build wisely, well, and economically . . . with PENTA-PROTECTED wood!

*PENTA is a popular abbreviation of the name of the chemical, PENTAchlorophenol.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

Send for free booklet
"Pointers on Penta"

The Dow Chemical Company
Dept. PE-55
Midland, Michigan

Name_____

Title_____

Company_____

Address_____

City_____ State_____

DOW
Penta
chlorophenol

MORE JOBS, MORE PROFITS when you own a LIMA Paymaster

The LIMA PAYMASTER is a ¾ cu. yd. convertible shovel, crane, dragline and pullshovel designed and built for faster, smoother performance and more versatile application. Regardless of the type of work to be done you can be sure of maximum power, big output and low operating costs.

Ease of convertibility is one of the many "PAYMASTER" features that will enable you to handle a greater volume of work with more profit. Specifications and working ranges are given in bulletin #034-G. Write for a copy.

BALDWIN-LIMA-HAMILTON CORPORATION
LIMA-HAMILTON DIVISION
LIMA, OHIO

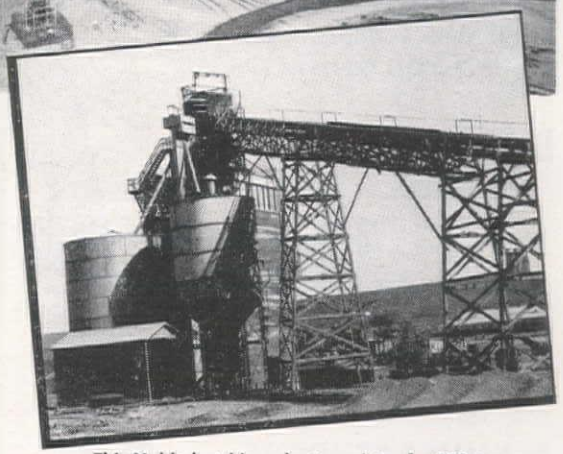
BALDWIN · BLH · LIMA-HAMILTON

Feenaughty Machinery Co., 112 S. E. Belmont St., Portland 14, Oregon; Feenaughty Machinery Co., 600 Front St., Boise, Idaho; Smith Booth Usher Co., 2001 Santa Fe Ave., Los Angeles 54, Calif.; Contractors' Equipment & Supply Co., P. O. Box 456, Albuquerque, N. M.; Modern Machinery Co., Inc., 4412 Trent Ave., Spokane 2, Wash.; Jameson Engineering Sales, 573 Dexter Horton Bldg., Seattle Wash.; H. H. Neilsen Co., 216 Paxton Ave., Salt Lake City, Utah; Cascade Industrial Supply Co., 515 Market St., Klamath Falls, Ore.; Garfield and Company, 1232 Hearst Bldg., San Francisco 3, Calif. Our Seattle Office: 1932 First Ave. South, Seattle 4.

T2103

BALDWIN-LIMA-HAMILTON

SECOND MILLION COMING UP!



This Noble batching plant consists of a 900-ton, 6-compartment bin capable of holding 750 tons of aggregate and 750 bbls. of cement, a 14" x 7" bucket elevator for cement, a Noble full-automatic batching system, and a 7,500-bbl. cement storage silo.

Noble plant batches 958,000 cu. yds. of concrete for first and second sections at McNary Dam; now batching 816,000 yds. for third section.

When McNary Dam Contractors, a joint venture, contracted to pour the 760,000 cu. yds. of concrete for the first section of McNary Dam, they chose a Noble batching plant because—

IT MEETS SPECIFICATIONS. Noble's exclusive photo-relay control of cement weighing is unaffected by heat or humidity; you get quick on-the-nose batches even when cement is hot and difficult to handle—no "unders" to rile inspectors; no "overs" to run up cement costs.

EASILY MOVED, TOO. When McNary Dam Contractors were awarded the second section of the dam (198,000 cu. yds. of concrete), they dismantled this Noble plant, moved it across the Columbia River and re-erected it on the Oregon side. All Noble plants are designed and built for easy transport and quick erection.

WIDE RANGE OF SIZES. Noble standard units include aggregate bins from 80 to 1,500 tons; cement silos from 500 cu. ft. to 7,500 bbls.; weigh hoppers from 1 to 4 yds. No matter what your concrete job—pouring huge dams such as McNary or batching for culverts and curbs—you can have a Noble plant designed to meet your exact needs . . . often from standard units at stock model prices. Let us show you. Wire, write or phone NOW. No obligation.

DESIGNERS AND BUILDERS OF
CEMENT AND AGGREGATE BATCHING PLANTS . . . BULK CEMENT PLANTS . . . AGGREGATE BINS AND CEMENT SILOS . . . STEEL FORMS FOR CONCRETE CONSTRUCTION JOBS . . TUNNEL AND DRILL JUMBOS CONVEYORS AND ELEVATORS . . WEIGH METERING DEVICES

NOBLE CO.

1860-7th STREET • OAKLAND 20, CALIFORNIA • TEMPLEBAR 2-5785

Los Angeles Office: 411 WEST FIFTH STREET • PHONE MUTUAL 8314

Star Machinery Co., Seattle 4, Wash.; Loggers & Contr. Machinery Co., Portland 14, Ore.; Tri-State Equipment Co., Spokane 6, Wash.; Intermountain Equipment Co., Boise, Ida.; Borchert-Ingersoll, Inc., St. Paul 4, Minn.; Sierra Machinery Co., Reno, Nev.; Davis, Hancock & Koster, Inc., Dallas 15, Texas; Western Contr. Supply Co., Chicago 12, Ill.

NOW AVAILABLE FOR 1951

The only directory of its kind for the Western construction industry

CONTAINS COMPLETE LISTINGS TO HELP YOU CONTACT:

DISTRIBUTORS

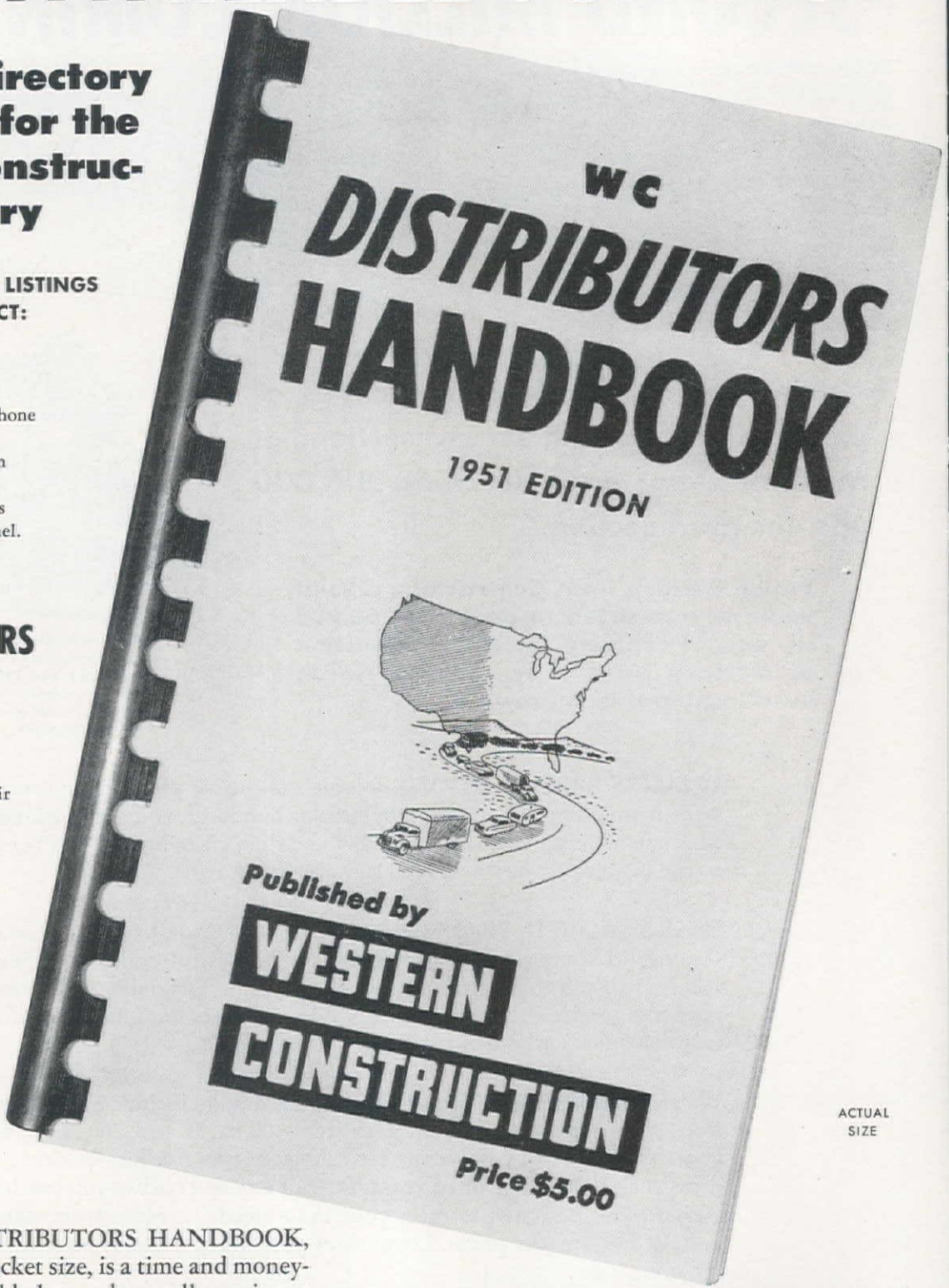
Names, addresses, and phone numbers of construction equipment distributors in the 11 Western States; their branch offices; lines they handle; key personnel. Listing is alphabetical by States.

MANUFACTURERS

Names and addresses of construction equipment manufacturers (listed alphabetically for entire United States); the products they make; their Western branches; key personnel; Western distributors.

PRODUCTS

Alphabetical listing of products with names of all manufacturers making each product.



ACTUAL SIZE

For Contractors, Manufacturers, Distributors, Purchasers, and Salesmen—

The 1951 WC DISTRIBUTORS HANDBOOK, prepared in handy pocket size, is a time and money-saving guide that will help you buy, sell, service or deal with construction equipment in the Western United States.

Single Copies	$5.00 Each
Two to Five Copies	$3.50 Each
SIX OR MORE COPIES	$3.00 Each

USE THIS HANDY ORDER BLANK NOW →

MAIL THIS COUPON TODAY!

WESTERN CONSTRUCTION
609 Mission St., San Francisco 5, Calif.

YES, I enclose $..... for ..... copies of the 1951 DISTRIBUTORS HANDBOOK. (Add 3% sales tax if ordering from a California address.)..

Name.....

Company.....

Address.....

City..... Zone..... State.....

BARRETT* COAL-TAR ENAMELS

PROTECT

AMERICA'S GREATEST PIPELINES

HERE ARE 10 REASONS *WHY...*

1 Products and procedures available for every oil and gas pipeline requirement.

2 Withstand extremely high and low temperatures.

3 High ductility and flexibility.

4 Coatings not damaged by "breathing," nor by back-fill stresses.

5 High dielectric properties.

6 Impermeable to moisture.

7 Resistant to attack by gas and petroleum products.

8 Used by thousands of engineers and contractors.

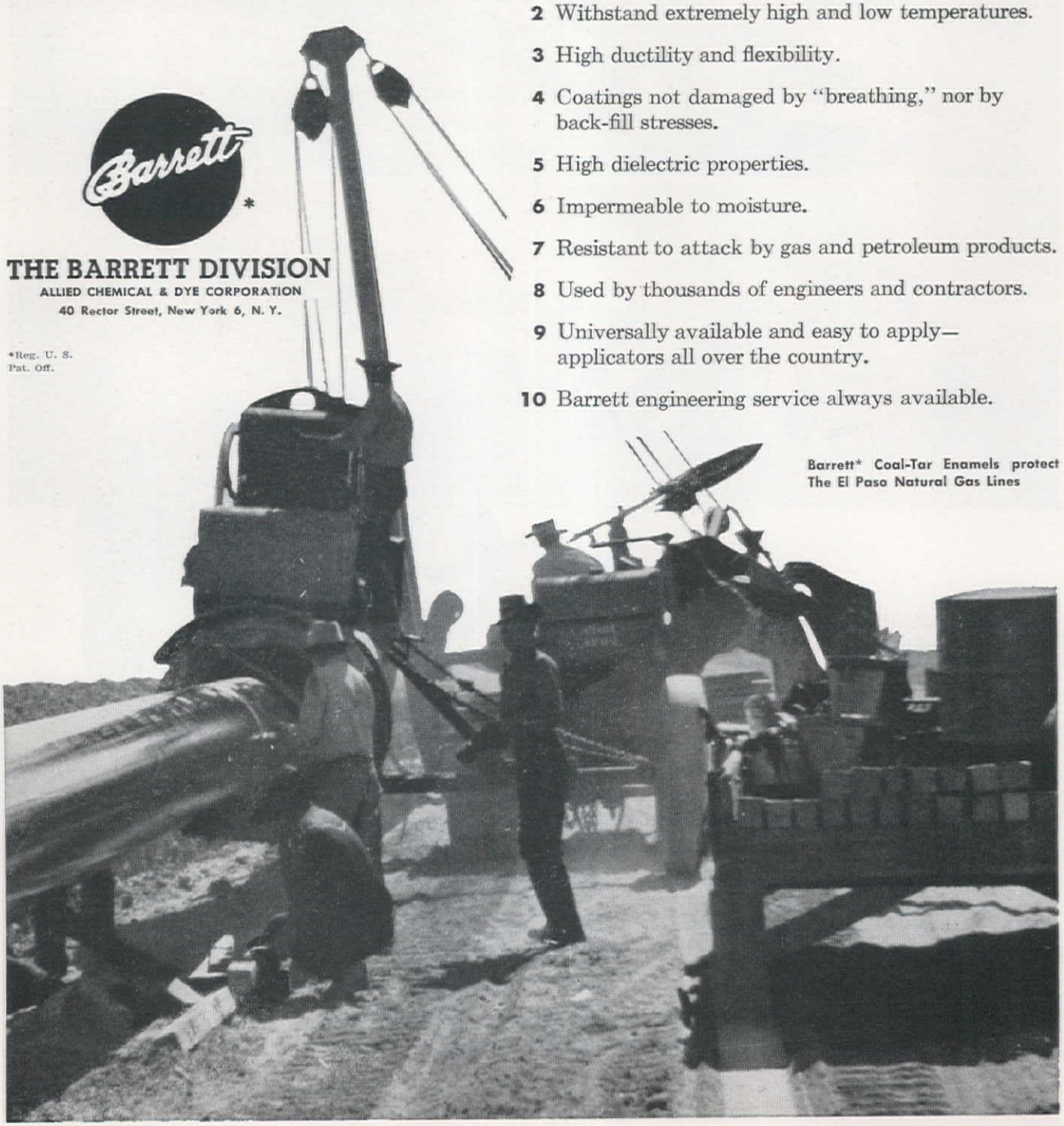
9 Universally available and easy to apply—applicators all over the country.

10 Barrett engineering service always available.

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

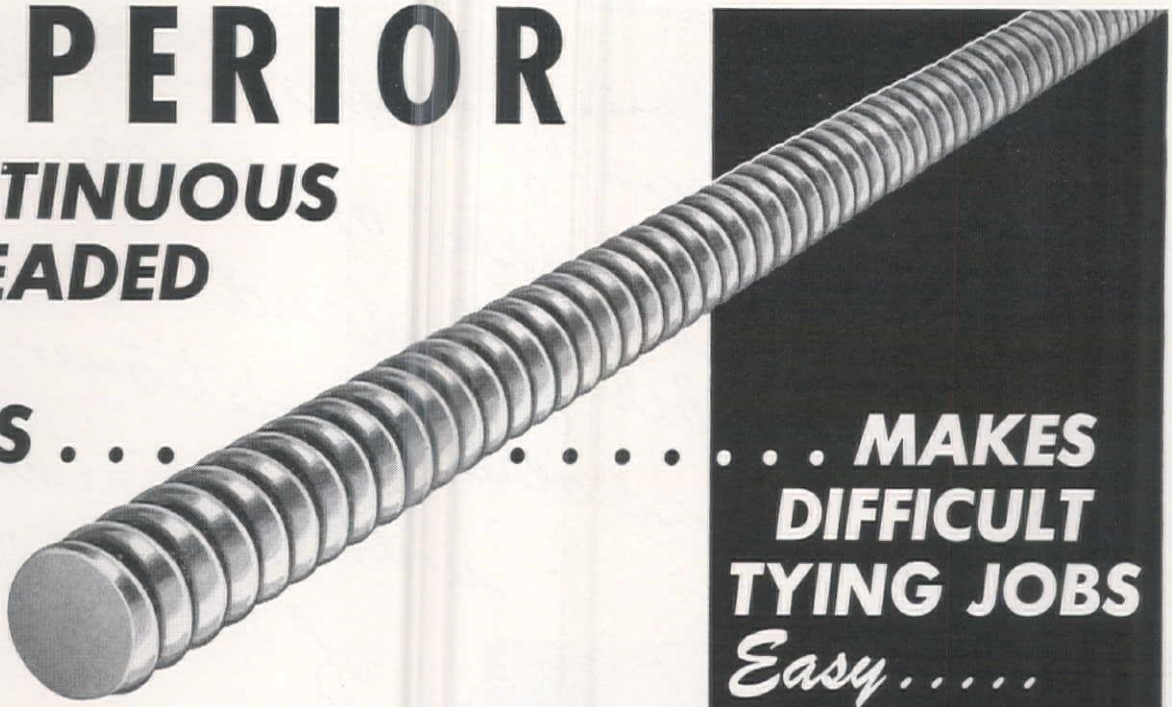
*Reg. U. S. Pat. Off.



Barrett* Coal-Tar Enamels protect The El Paso Natural Gas Lines

SUPERIOR

CONTINUOUS THREADED COIL RODS . . .



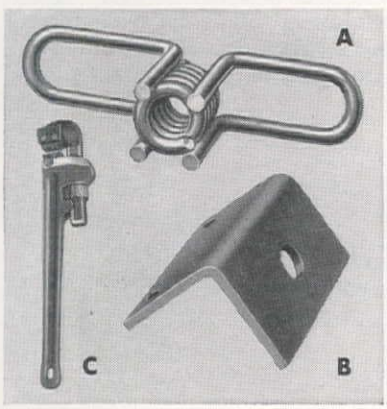
. . . MAKES DIFFICULT TYING JOBS *Easy* . . . . .

Superior Continuous Threaded Coil Rods, with or without Coil Wing Nuts and Corner Brackets, are a valuable supplement to Superior Coil Ties and standard working parts when job conditions are unusual or difficult.

In three typical applications, shown at the right, these Continuous Threaded Rods are used; (1) to tie form corners; (2) as an anchor rod tie down and as coil bolts; and (3) as a coupling for two coil ties providing an adjustable form tie.

Available in ½", ¾", and 1" diameters and in any length up to 10 ft., Superior Continuous Threaded Coil Rods in quantities can be cut to length on the job with a heavy-duty hand Coil Rod Cutter.

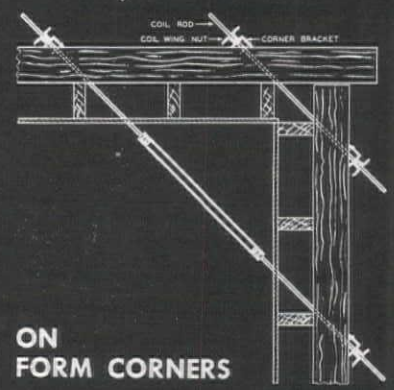
Superior Continuous Threaded Coil Rods are the answer to unusual or difficult tying problems. When you use Superior you are assured of the *best* in design, material, and workmanship.



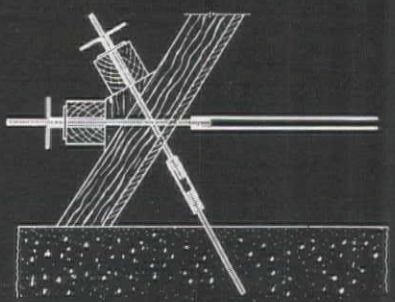
A-COIL WING NUTS
Coarse helix coils form the threads. Easily applied and removed from rod. Develops maximum capacity of rods.

B-CORNER BRACKET
An *exclusive* Superior feature. Provides simple, efficient method of tying form corners and bulkheads.

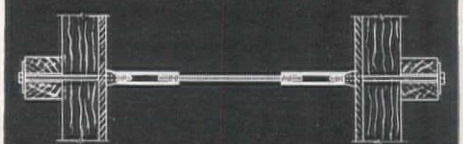
C-SPECIAL COIL ROD WRENCH
Heavy-duty Stillson type wrench with special jaws for gripping and turning Coil Rods with least damage to threads.



ON FORM CORNERS



FOR ANCHORAGE

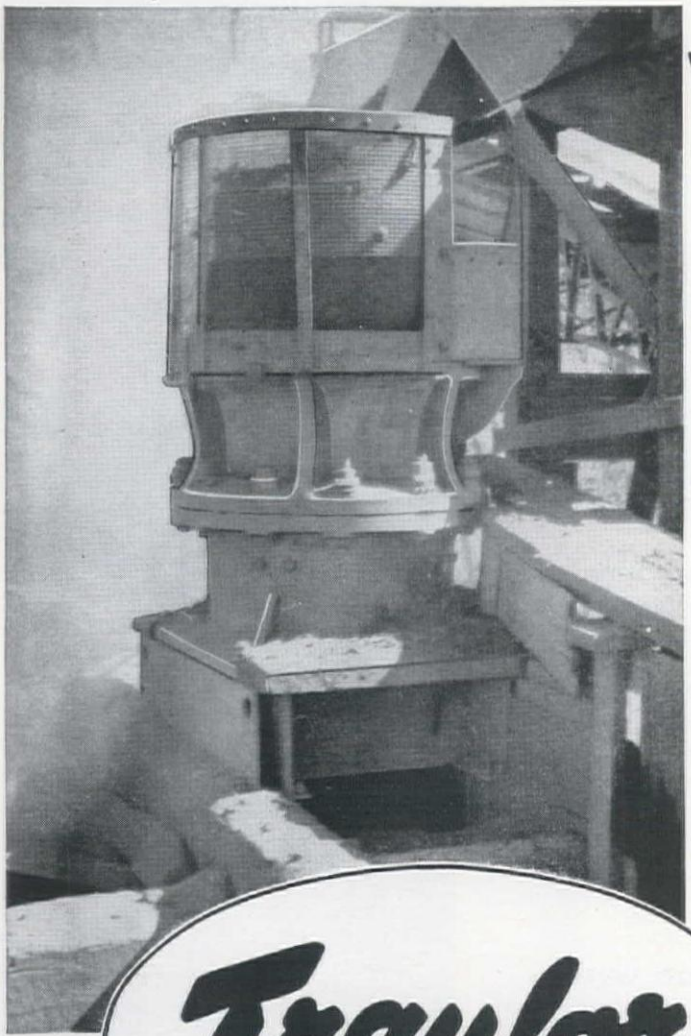


AS AN INTERNAL TIE
Two Coil Ties and a length of Coil Rod make an adjustable form tie and spreader.

SUPERIOR CONCRETE ACCESSORIES, INC.
4110 Wrightwood Avenue, Chicago 39, Illinois
New York Office: 1775 Broadway, New York 19, N. Y.
Pacific Coast Plant: 2100 Williams St., San Leandro, Calif.

REQUEST A COPY OF OUR NEW CATALOG 500 . . .
It contains a valuable table for spacing studs, wales, and form ties.

"We especially like ... their large feed openings ... their ability to stand up under severe conditions with a minimum of repair."



Reports **EARL E. LININGER**

M. C. Lininger & Sons of Medford, Oregon

on their TWO TRAYLOR TY REDUCTION CRUSHERS

The Liningers purchased their first Traylor TY in 1940 . . . eleven years ago. They originally decided on a Traylor TY because of its long range of reduction. Used to reduce very hard river gravel, the first Traylor TY reduced power and maintenance costs to such an extent that a second was purchased in 1944. Both crushers are frequently used in gravel deposits without a primary crusher in front of them. The Liningers' experience with Traylor TY Reduction Crusher operation is no exception. You, too, can profit by their operating economy and efficiency. For details, fill out and mail the coupon today.

Traylor

TY REDUCTION CRUSHERS

TRAYLOR ENGINEERING & MANUFACTURING CO.
161 Mill St., Allentown, Pa.

Please forward bulletin 6112 giving details on a Traylor TY Reduction Crusher.

Name _____

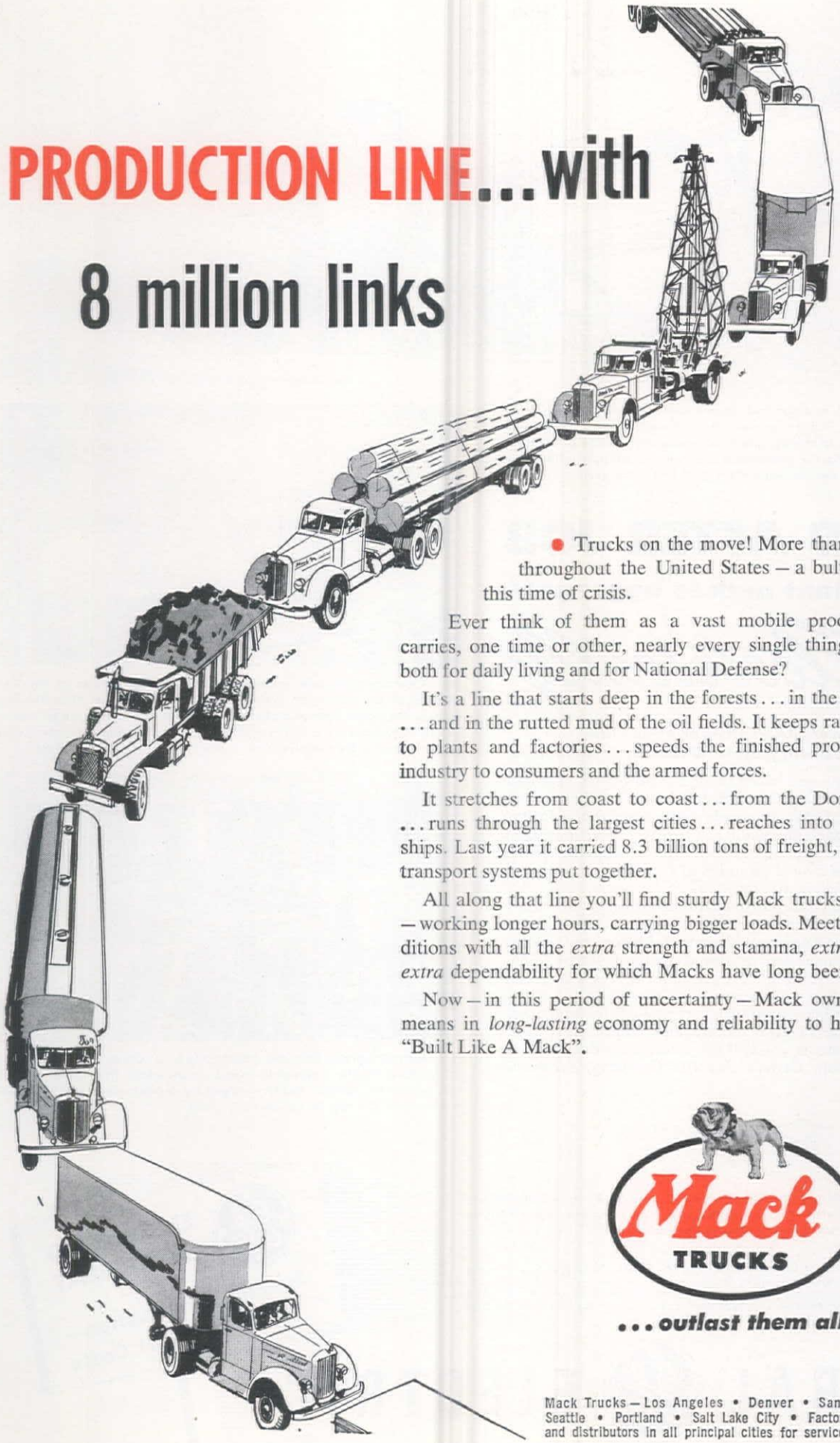
Company _____

Address _____

West Coast Branch: 919 Chester Williams Bldg., Los Angeles, Calif.
Northwest Distr: Balzer Machinery Co., 2136 So. East 8th Avenue, Portland, Oregon

A TRAYLOR LEADS TO GREATER PROFITS

PRODUCTION LINE...with 8 million links



● Trucks on the move! More than 8 million of them throughout the United States — a bulwark of security in this time of crisis.

Ever think of them as a vast mobile production line which carries, one time or other, nearly every single thing we need and use, both for daily living and for National Defense?

It's a line that starts deep in the forests . . . in the mines and quarries . . . and in the rutted mud of the oil fields. It keeps raw materials flowing to plants and factories . . . speeds the finished products of American industry to consumers and the armed forces.

It stretches from coast to coast . . . from the Dominion to the Gulf . . . runs through the largest cities . . . reaches into the smallest townships. Last year it carried 8.3 billion tons of freight, more than all other transport systems put together.

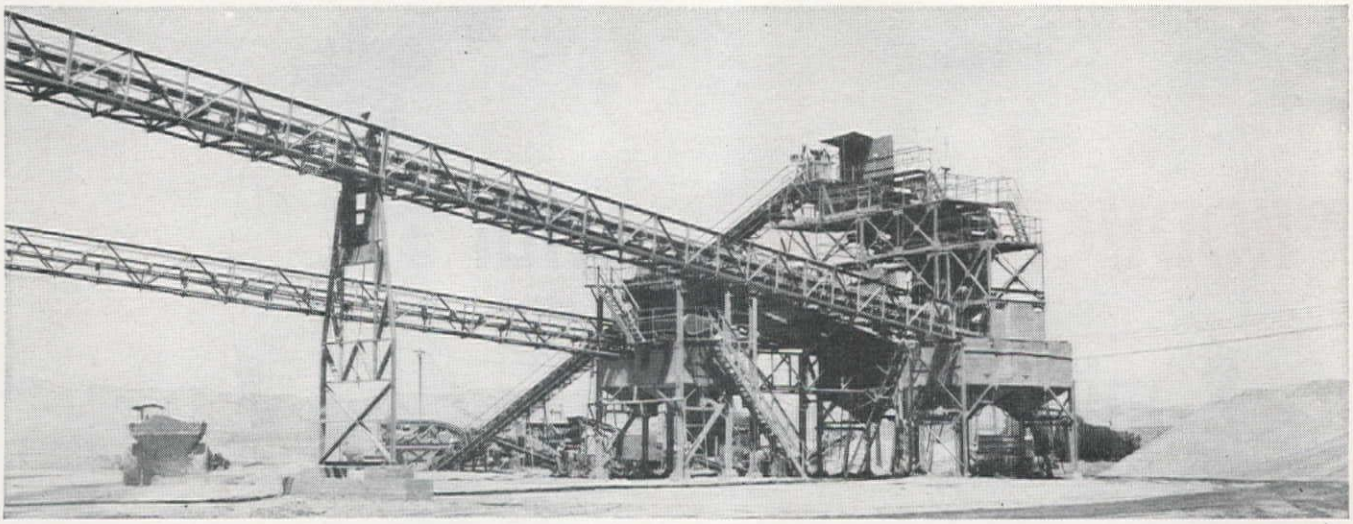
All along that line you'll find sturdy Mack trucks doing double duty — working longer hours, carrying bigger loads. Meeting emergency conditions with all the *extra* strength and stamina, *extra* performance and *extra* dependability for which Macks have long been famous.

Now — in this period of uncertainty — Mack owners realize what it means in *long-lasting* economy and reliability to have trucks that are "Built Like A Mack".

Mack TRUCKS

. . . outlast them all

Mack Trucks — Los Angeles • Denver • San Francisco
Seattle • Portland • Salt Lake City • Factory branches
and distributors in all principal cities for service and parts.



(A) Gravel is processed, and dirt and silt are screened and removed from sand in this washing and classifying plant. From here, the sand and gravel are carried by conveyors to storage piles. Extensive use is made of electric-powered conveyors to provide economical and reliable transportation. G-E motors and control are used throughout the portable arrangement.

ON JOB AFTER JOB

portable plant makes aggregate

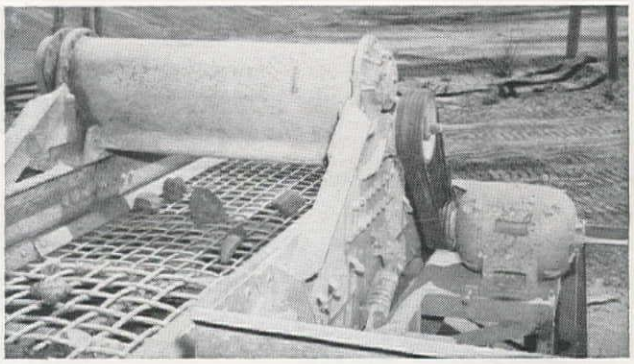
... Electrically

G-E Equipment Powers 245-Tons-per-hour Plant to Process Aggregate Wherever It Is Needed.

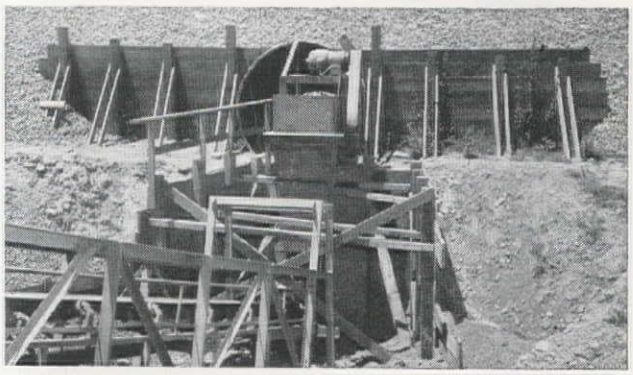
This portable aggregate and batch plant has now been operated by the Western Contracting Corp. on four projects. Shown here set up near Newman, Calif., to supply aggregate for the Delta-Mendota irrigation canal, the plant has recently been moved to Yuma, Ariz., to do a similar job for the Welton-Mohawk canal. In 1946 the plant was moved 20 miles to the Newman site, set up, and put in operation in 10 days.

General Electric co-ordinated motors and control are used throughout. They give plant operators accurate control of the process, and have cut outages to a minimum. Motors range from 7½-hp G-E Pacific gear-motors driving conveyor belts to a 150-hp rock crusher motor. A 75-hp vertical motor drives a deepwell pump to supply the plant with water.

Electrified construction equipment can pay off for you, too. With co-ordinated use of G-E motors and control and G-E power distribution systems you will get safer, more flexible, and more efficient operation. *General Electric Company, Schenectady 5, N. Y.*



(B) Oversize rocks are removed by this scalping screen at the beginning of the conveyor system. A G-E 20-hp motor operates the screen. Maximum flow of material to the screen comes from an apron feeder operated by a G-E variable speed motor remotely controlled with a rheostat by the operator at the top of the washing plant.



(C) Gravel is drawn from the storage pile by a conveyor powered by a 10-hp G-E Pacific adjustable-speed gear-motor. This drive permits low adjustable speeds, easily changed by a pilot motor which is controlled from the top of the washing plant.

Ask him Today!

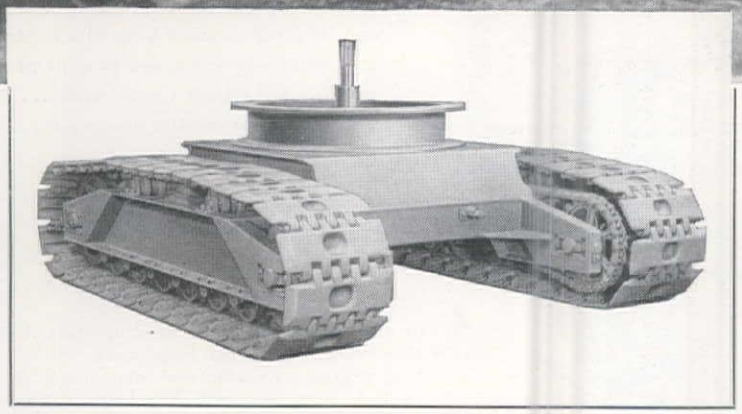
Whether you buy or build construction equipment, your G-E representative can show you how to do a better job—at lower cost—by complete electrification. Write him now, and he'll call on you at your convenience.

WESTERN PLANTS OR SERVICE SHOPS: Anaheim, Denver, Los Angeles, Oakland, Ontario, Portland, Richmond, Salt Lake City, San Diego, San Francisco, San Jose, Seattle.
WESTERN SALES OFFICES: Albuquerque, Bakersfield, Butte, Denver, Eugene, Fresno, Los Angeles, Medford, Oakland, Pasco, Phoenix, Portland, Riverside, Sacramento, Salt Lake City, San Diego, San Francisco, San Jose, Seattle, Spokane, Stockton, Tacoma.

ELECTRIFIED EQUIPMENT
Speeds Construction—
Cuts Costs

GENERAL ELECTRIC

664-17



TOUGH AS A TANK!

LINK-BELT SPEEDER

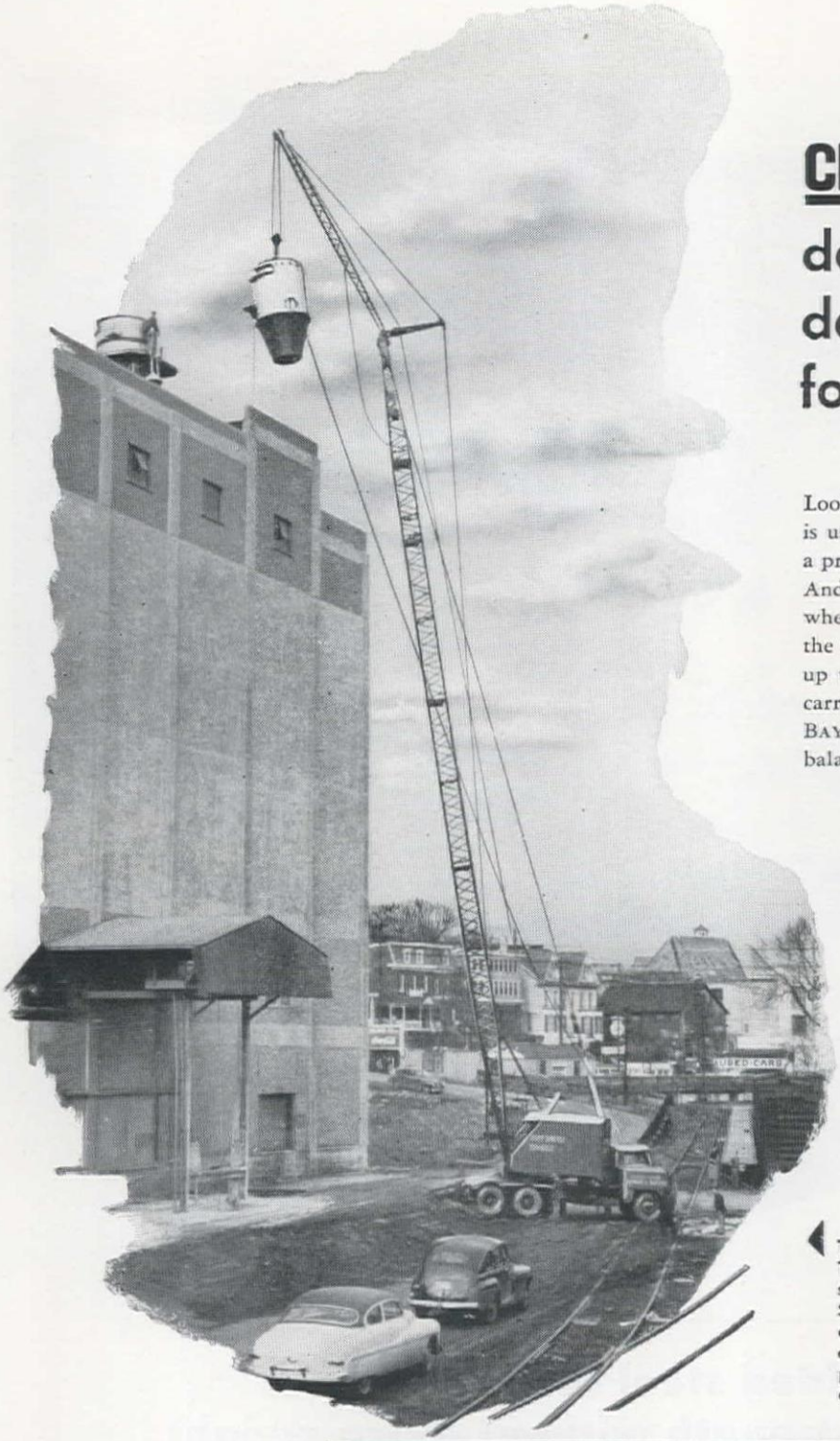
All-welded steel construction means extra strength without extra weight

POUND for pound, the Link-Belt Speeder all-welded frame is stronger than other types of structures. Box section construction adds still more strength, uniting the entire base in one rugged, yet flexible structure by means of unrestricted design. Resistance to impact and twist is greater. Deep recessing and full enclosure of mechanism, flush bottom, and high ground clearance provide maximum protection and maneuverability. Field maintenance is simple and quick. In fact, in every way, Link-Belt Speeder all-welded construction is truly "tough as a tank."

LINK-BELT SPEEDER
CORPORATION

12,506-A

Builders of the most complete line of shovels, cranes and draglines
CEDAR RAPIDS, IOWA



CRANEMOBILE

down-to-earth dependability for high lifts

Look closely . . . you'll see that this contractor is using a BAY CITY CraneMobile to maneuver a pretty big tank right down onto its lag bolts! And that's typical of CraneMobile performance whether the job calls for delicate operations high in the air or the precision handling of heavy loads up to 25 tons near the ground. Both crane and carrier are engineered and built as a unit by BAY CITY to give you a perfectly integrated and balanced mechanism with a low center of gravity.

Because of the design, CraneMobile combines rugged, heavy duty construction with flexible, mobile service and good roadability. CraneMobile gives you more power than you'll need, desirable line speed and accurate boom and load controls. Let us show you why contractors everywhere have learned to depend on the BAY CITY built CraneMobile . . . write for latest catalog or see your nearest dealer.

BAY CITY SHOVELS, INC.
BAY CITY, MICHIGAN

This CraneMobile "180", owned by Forsyth's Transfer and Storage of Hagerstown, Md., is setting a grain processing tank atop the D. A. Stickell & Sons feed mill. The boom sections and 15-ft. jib used here were attached quickly and easily because BAY CITY boom sections are pin-connected and furnished with socketed pendant cables.

CHECK LIST

- 20-25 Ton Capacity
- Pin-Connected Boom
- Hi-Collapsible Gantry
- Independent Power Boom Hoist
- Precision Power Load Lowering
- Removable Counterweight
- Specially Designed Carrier
- High Road Speeds

With a BAY CITY, the collapsible hi-gantry, floating bridle and six parts of line assure positive, safe boom control in every operating position. For additional safety, note the telescopic boom back-stops which are standard equipment. For all the best engineering features . . . look to BAY CITY.

BAY CITY

SALES AND SERVICE

DENVER
Ray Corson Machinery Company
350 Kalamath Street

LOS ANGELES
Brown-Bevis Equipment Company
4900 Santa Fe Avenue

SAN FRANCISCO
Garfield & Company
1232 Hearst Building

PORTLAND
Feenaughty Machinery Company
112 S.E. Belmont Street

SEATTLE
Feenaughty Machinery Company
1028 Sixth Avenue, S.

SPOKANE
Feenaughty Machinery Company
N. 715 Division Street

BOISE
Feenaughty Machinery Company
600 Front Street

HELENA
Neil E. Grimes, Inc.
821 N. Main Street

SALT LAKE CITY
C. H. Jones Equipment Company
1595 So. Second, W.

PHOENIX
Western Machinery Company
124 E. Buchanan Street

THE *FIRST* CARRYALL WAS A FRUEHAUF CARRYALL!

. . AND THEY'RE STILL THE BEST

FRUEHAUF CARRYALL
Model C40L

BUILT TO CARRY *YOUR* LOADS . . . CAPACITIES TO 74 TONS!

YES, the first Carryall was a Fruehauf, built to specifications for a particular hauling job. Today, there are *seventeen standard* models and a host of "specials", designed to fit the requirements of most heavy-equipment users.

Ever mindful of the changing needs in heavy equipment hauling, and always keeping ahead in Trailer engineering and design, Fruehauf is ready to supply you with a modern Carryall to fit your particular hauling job — with either a "standard" or a "special".

For complete information, blueprints or specifications on the Fruehauf Carryall for *your* job, write —

World's Largest Builders of Truck-Trailers

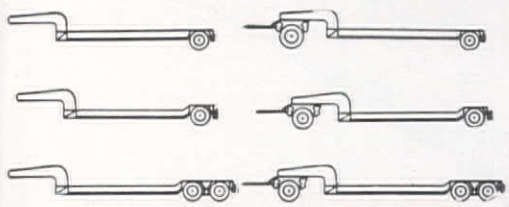
FRUEHAUF TRAILER COMPANY

Western Manufacturing Plant, Los Angeles

Sales and Service: Los Angeles • San Francisco • Portland
Seattle • San Diego • Fresno • Sacramento • Spokane
Billings • Salt Lake City • Boise • Phoenix • Albuquerque
El Paso • Denver

Fruehauf Carryalls are available in capacities from 10 to 74 tons in the standard models . . . to 110 tons in "specials". Frame designs as single- or double-drop "Semi" or full Trailers. No matter what your hauling problem may be, there's a Fruehauf Carryall to fit your job.

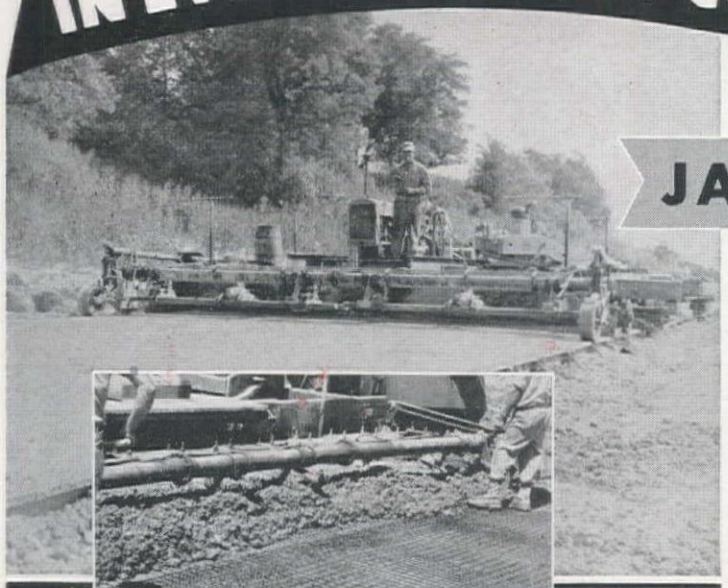
DESIGNED TO *YOUR* SPECIFICATIONS



FRUEHAUF Trailers
"ENGINEERED TRANSPORTATION"

WORLD'S LARGEST BUILDERS OF TRUCK-TRAILERS

for LARGER PROFITS and BETTER RESULTS IN EVERY PHASE OF CONCRETE PAVING!



HIGHWAY and AIRPORT

JACKSON VIBRATORY PAVING TUBE

The JACKSON Paving Tube, which is quickly attached to any standard finisher, provides full width internal vibration through full depth of the slab. The harsher mixes are readily made plastic. Important savings in cement can be made, or important gains in compressive strength and durability achieved when no cement reduction is made. Spreading costs are reduced, finishing progress is much more rapid, complete compaction is accomplished and concrete is perfectly puddled at side-forms and joints. It is adaptable to slabs 6" to 24" thick and quickly adjustable from 10' to 25' widths, in the field. May also be attached to standard spreaders for vibrating the first course in thick slab construction. Write for complete details.

JACKSON SIDE FORM VIBRATOR

Eliminates manual vibrating of concrete at side forms. Saves the better part of two men's labor. Mounts on any modern finisher, Jackson Vibratory Paving Tube or Spreader. Employs two or more vibratory units which are simultaneously lowered into or raised from the concrete by the finisher operator. Units operate close to forms or reinforcement, ride over any obstruction without fouling. Will not penetrate into sub-base. Assures thorough compaction regardless of speed of finisher, no spots missed. Long-wearing, trouble-free. Write for complete facts.

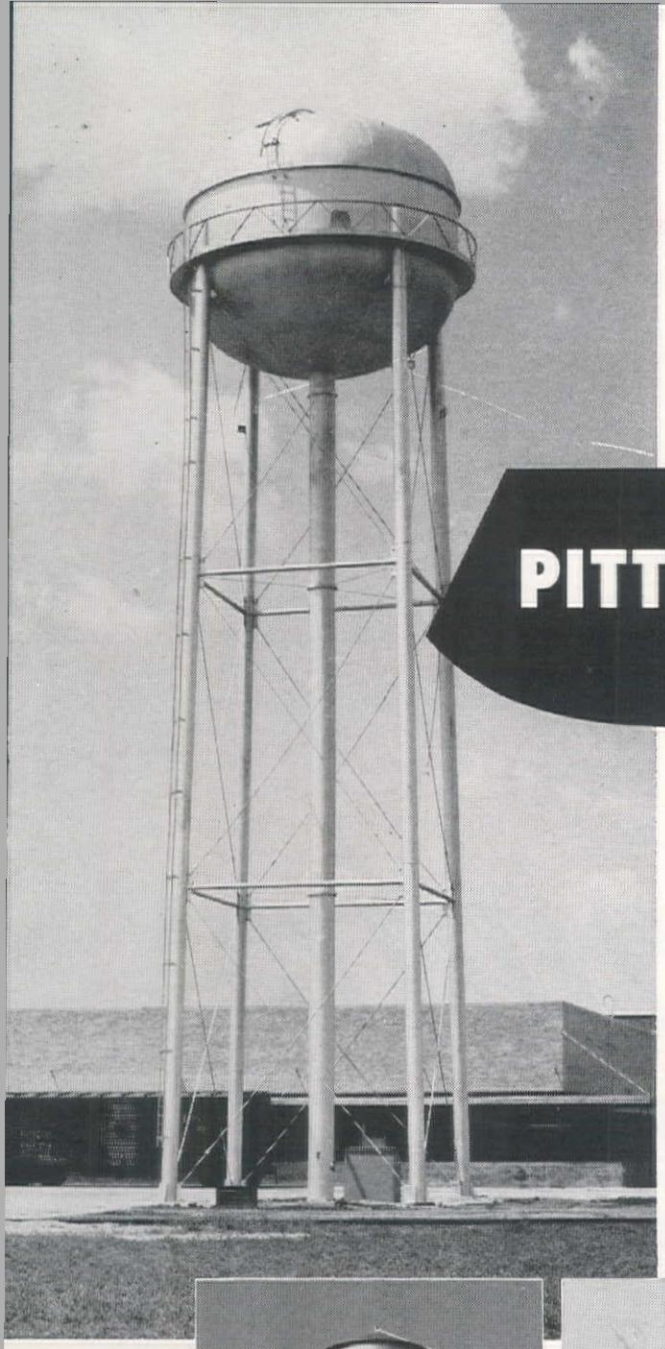
MUNICIPAL PAVING - BRIDGE DECKS HIGHWAY WIDENING and PATCHING, etc.

JACKSON VIBRATORY SCREED

Strikes off to any crown, undercuts at curb or side-form, works right up to and around manholes and other obstructions. With it center joints may be eliminated and full widths (up to 30') poured. Requires only two men on widest slab, due to strong tendency to propel itself. It's the only screed that can be rolled back on 4 rollers for second pass. Contractor has only to secure plank cut to proper length and crown to be set for any job. Powered by Jackson 1.25 KVA Portable Power Plant. Most productive, most versatile of all screeds. Write for details.

VIBRATORS for every type of concrete construction FOR SALE or RENT at your Jackson Distributor.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON - - - - MICH.

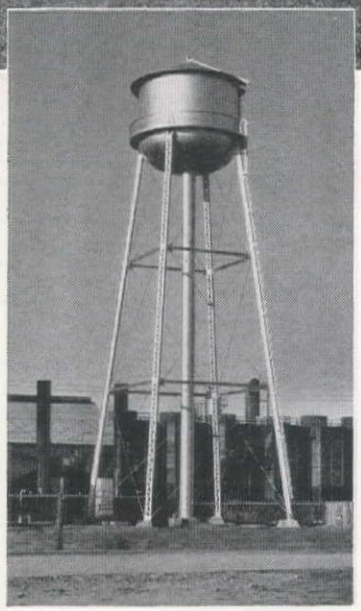


FOR *Essential*
PLANT PROTECTION

PITTSBURGH·DES MOINES

ELEVATED STEEL TANKS

An ever-ready supply of water at dependable pressure contributes greatly to plant security. When a modern Pittsburgh-Des Moines Elevated Steel Tank stands guard over your plant, fire protection problems are lessened, lower insurance rates are gained, better water service is a continual benefit. *Write for our latest 24-page Elevated Tank Brochure.*



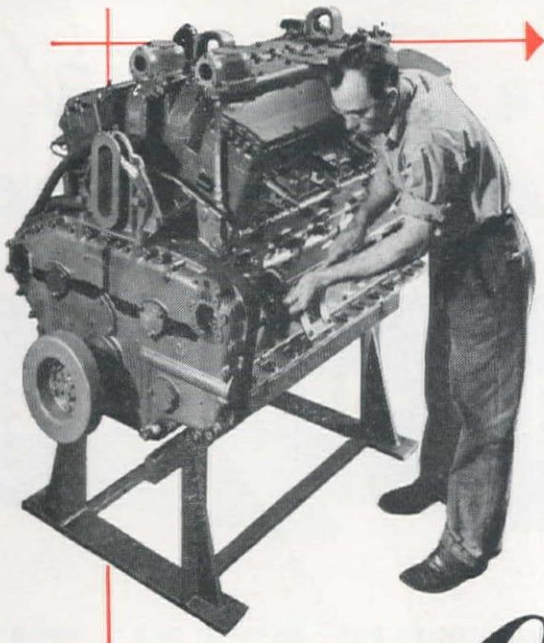
PITTSBURGH·DES MOINES STEEL CO.

Plants at PITTSBURGH, DES MOINES and SANTA CLARA

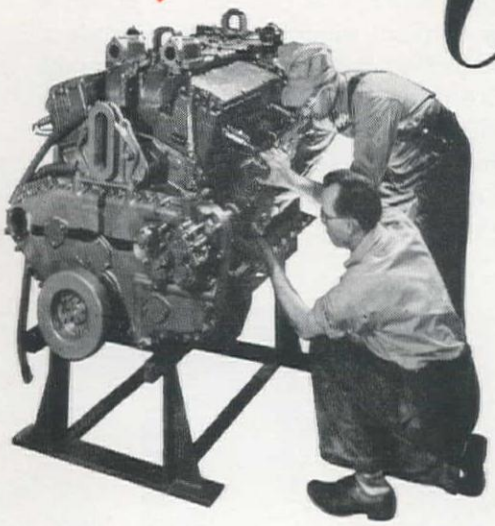
Sales Offices at:

PITTSBURGH (25) . . . . . 3420 Neville Island
NEW YORK (7) . . . . . Room 919, 270 Broadway
CHICAGO (3) . . . . . 1224 First National Bank Bldg.
DES MOINES (8) . . . . . 921 Tuttle Street
DALLAS (1) . . . . . 1225 Praetorian Bldg.
SEATTLE . . . . . 928 Lane Street
SANTA CLARA, CAL. . . . . 627 Alviso Road

BUILT NOT ONCE BUT TWICE!



Cummins is the custom-builder of the Diesel industry. Each engine is built to *fit the job*—and the individual piece of equipment in which it is to be installed. And *every* Cummins engine is built *twice*. First, each engine is assembled, run-in tested. Then it is disassembled completely, and inspected. Finally it is reassembled and tested *again*. This extra care in precision building, Cummins exclusive fuel system, efficient parts and service organization . . . mean *less* "down-time" and *more* power and profits for Cummins users. *See your Cummins dealer.*



Cummins®
CUSTOM BUILT Diesels

Lightweight High-speed Diesel Engines (50-550 hp)
for: on-highway trucks
off-highway trucks • buses
tractors • earthmovers
shovels • cranes
industrial locomotives
air compressors
logging yarders and loaders
drilling rigs
centrifugal pumps
generator sets and power units
work boats and pleasure craft

Diesel power by CUMMINS

CUMMINS Dependable DIESEL

TRADEMARK REG. U. S. PAT. OFF.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: CUMMINS DIESEL EXPORT CORPORATION • Columbus, Indiana, U.S.A. • Cable: CUMDIEX

WATSON & MEEHAN
1960 Folsom St. • San Francisco 3, California
Telephone Market 1-8930
Branch: 248 Palm Avenue, Fresno 3, Calif. *Authorized Sales & Service:* Connell Motor Truck Company, Stockton, Calif.; Frank J. Coyle, Sacramento, Calif.; Connell Motor Truck Company of Redding, Redding, Calif; Fred E. Barnett Company, Eureka, Calif.; Nevada Transit Company, Reno, Nevada.

CUMMINS SERVICE & SALES
1661 McGarry St. • Los Angeles 21, California
Telephone Prospect 1021
Branch: 401 Golden State Highway, Bakersfield, Calif. *Authorized Sales & Service:* Leo's Diesel Service, Blythe, Calif.; Smith's Diesel Sales, Colton, Calif.; Rhyne's Automotive Service, El Centro, Calif.; F. R. Laux Diesel Service, San Diego, Calif.; Newton Automotive Service, Baker, Calif.

CUMMINS DIESEL SALES OF IDAHO, INC.
1204 Front Street • Boise, Idaho • Tel. 3783

CUMMINS DIESEL SALES, INC.
South 155 Sherman Street, Box 2185
Spokane 5, Washington • Tel. Madison 0101

CUMMINS DIESEL SALES OF COLORADO, INC.
2450 Curtis Street • Denver 5, Colorado
Telephone Acoma 5933
Branch: 628½ West Yellowstone Highway, Casper, Wyo.

CUMMINS DIESEL SALES OF MONTANA, INC.
2211-13 Fourth Avenue North
Billings, Montana • Telephone 8904

CUMMINS DIESEL SALES OF WASHINGTON, INC.
2520 Airport Way • Seattle 4, Washington
Telephone Main 7160
Authorized Sales & Service: Kenny's Cummins Diesel Service, Aberdeen, Washington; Motor Service & Machine Works, Ketchikan, Alaska.

CUMMINS & MORAN (5-3)
1350 North 22nd Avenue • Phoenix, Arizona
Telephone 4-4040 and 4-2504
Branch: 1921 North Broadway, Albuquerque, New Mexico. *Authorized Sales & Service:* Cooper Tractor Service, Yuma, Arizona; Stirling Diesel Service, Las Vegas, Nevada; Willis Diesel Engine Service, El Paso, Texas.

CUMMINS DIESEL SALES OF OREGON, INC.
1225-1235 Southeast Grand Avenue
Portland 14, Oregon • Telephone East 7146
Branches: 731 Garfield Street, P. O. Box 367, Eugene, Oregon; Medford, Oregon. *Authorized Sales & Service:* Coos Bay Boat Shop, Coos Bay, Oregon.

CUMMINS INTERMOUNTAIN DIESEL SALES COMPANY
1030 Gale Street • Salt Lake City, Utah
Telephone 9-3768
Authorized Sales & Service: Wally's Chevron Truck Service, Cedar City, Utah.

Now—Free TRUCK SAVER *Inspection*

First step of a complete TRUCK SAVER *plan*

- **Available to all International Truck owners**
- **No cost, no obligation for a 99-point checkup**
- **For a limited 3-month period ending September 30**

How easily you can keep your Internationals operating at peak efficiency in an uncertain future may depend on what you do within the next 90 days.

If you take advantage of our Truck Saver Inspection, you'll be taking the first step toward putting your Internationals in shape for the "come what may" days ahead.

Since this inspection doesn't cost you a penny, you have everything to gain—nothing to lose. You can save dollars now and perhaps many more before the end of 1951.

So get ready now to keep your trucks on the job despite shortages. The sooner you get your free Truck Saver Inspection, the sooner you see practical reasons why you should take advantage of our complete International Truck Saver Plan.

Look what the complete International Truck Saver Plan offers

The complete International Truck Saver Plan has been developed by experts, after a thorough study of today's truck operating problems. It offers these benefits to International Truck operators:

1. Better performance over a longer truck life: trucks are kept in shape to do the most efficient job possible until they can be replaced by new units.

2. Delays minimized in getting new parts: by anticipating future requirements, the demand for needed parts can be accurately estimated.

3. Maintenance costs cut, down time reduced: by preventing major breakdowns, a big saving is effected in both time and money.

4. Truck value maintained: trucks kept in the best possible condition are worth more when it's time for replacement.

Take advantage of the International Truck Saver Plan now

If you want to save yourself trouble and money in the months ahead, you belong in the International Truck Saver Plan.

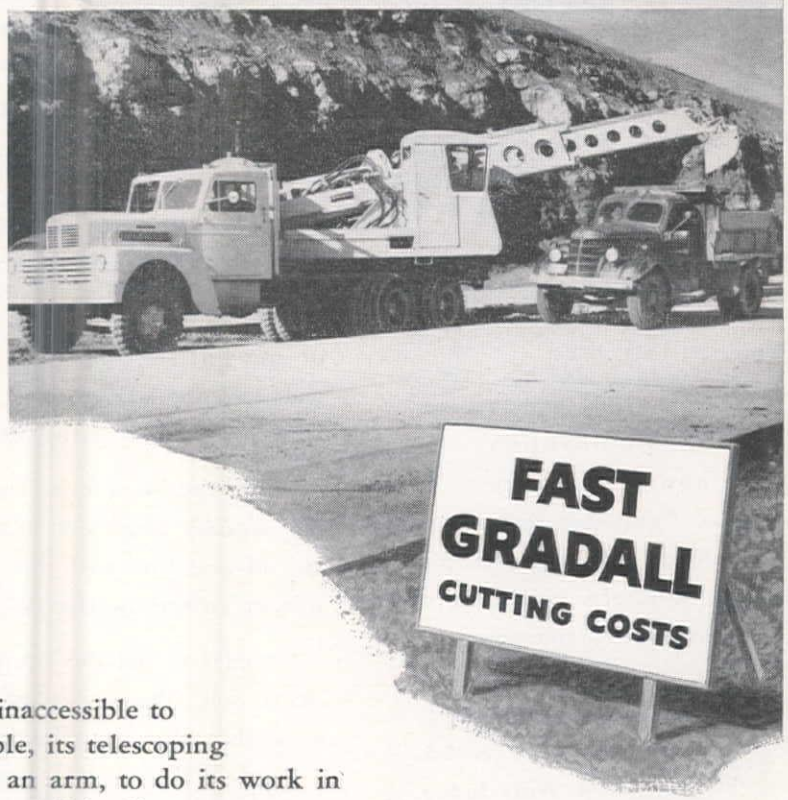
Get your free Truck Saver Inspection—find out from your International Truck Dealer or Branch how the plan can help *you* keep your Internationals going at peak efficiency.

International Harvester Builds
McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks
Industrial Power . . . Refrigerators and Freezers

International Harvester Company • Chicago

INTERNATIONAL TRUCKS

Heavy-duty engineered for the long haul



Are you satisfied with your present hand labor costs? If you're like most construction men, your answer is probably an emphatic "NO"!

Hand labor *is* expensive—because it's *slow*.

But that's *not* the situation when you put a Gradall on the job!

The operator works with large tools, quickly changed for each particular job. He moves large quantities of earth rapidly, with such precision that clean-up hand labor is practically eliminated.

And the Gradall works in "tight" places inaccessible to other machines. Mounted on a 360° turntable, its telescoping boom "reaches out", twists and turns like an arm, to do its work in confining areas not much larger than the Gradall itself. And it's always "ready to go"—ready immediately to be driven to the next job at truck speed.

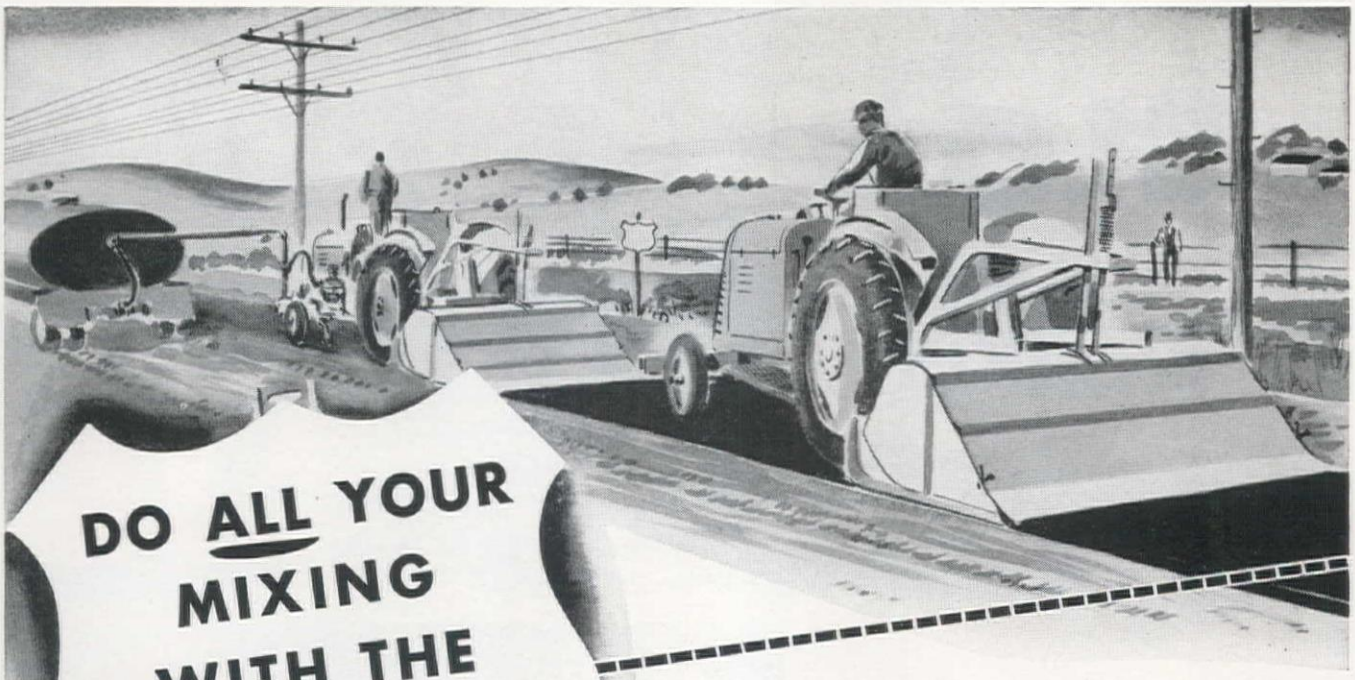
Cut your construction costs on many jobs, such as trenching, excavating, ditching, backfilling, grading, and pavement removal. Arrange a field demonstration with your Gradall Distributor today.

SALES & SERVICE:

N. C. RIBBLE CO. • *Albuquerque, New Mexico*
N. C. RIBBLE MACHINERY CO. • *El Paso, Texas*
COLUMBIA EQUIPMENT CO. • *Portland, Ore.* • *Boise, Idaho* • *Seattle, Wash.*
BROWN BEVIS CO. • *Los Angeles 58, Calif.*
ARIZONA EQUIPMENT SALES, INC. • *Phoenix, Arizona*
CONTRACTORS MACHINERY CO. • *San Francisco 7, Calif.*
WESTERN CONSTRUCTION EQUIPMENT CO. • *Billings, Montana*

Gradall®
DIVISION OF WARNER & SWASEY *Cleveland*

GRADALL—THE MULTI-PURPOSE CONSTRUCTION MACHINE



DO ALL YOUR MIXING WITH THE SEAMAN

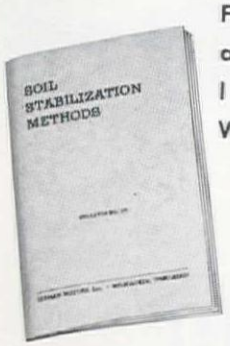
ROAD MIXING with the SEAMAN is the quick, low cost, efficient method. The SEAMAN is engineered and built specifically for that job — just as blades, for example, are built for grading, shoulder work and general maintenance.

The SEAMAN MIXER is designed to mix completely to the bottom of the full selected depth. No unmixed material at the subgrade — and no subgrade material brought up into the mix. Depth control is accurate and positive under all conditions.

And you have complete command of the mix itself at all times. No worries about an unsatisfactory operation even when conditions are adverse, for with the SEAMAN an additional pass to bring the mix up to specification is done quickly and at low cost.

It pays to use the equipment which has been *designed* for its particular job. That's why more and more contractors and highway officials insist that *all* mixing be done with the SEAMAN.

The new, 1951 edition of "Soil Stabilization Methods" is off the press. Completely revised and enlarged, 100 pages of pictures, diagrams and practical construction information. It's FREE. Just ask for Bulletin 25. Write today.



The SEAMAN Self-Propelled (left) is a complete mixing unit which offers full 360 degree operator visibility and accurate control of the mix. It also frees a critical tractor for other work . . .

The SEAMAN TRAV-L-PLANT (right) offers all the advantages of the Self-Propelled unit. It is equipped with tachometer assembly and a volumetric meter is available for the closely controlled application of bitumen. Water also is readily applied.

SEAMAN MOTORS, INC.

285 N. 25TH STREET
MILWAUKEE 3, WIS.

STOODY 105

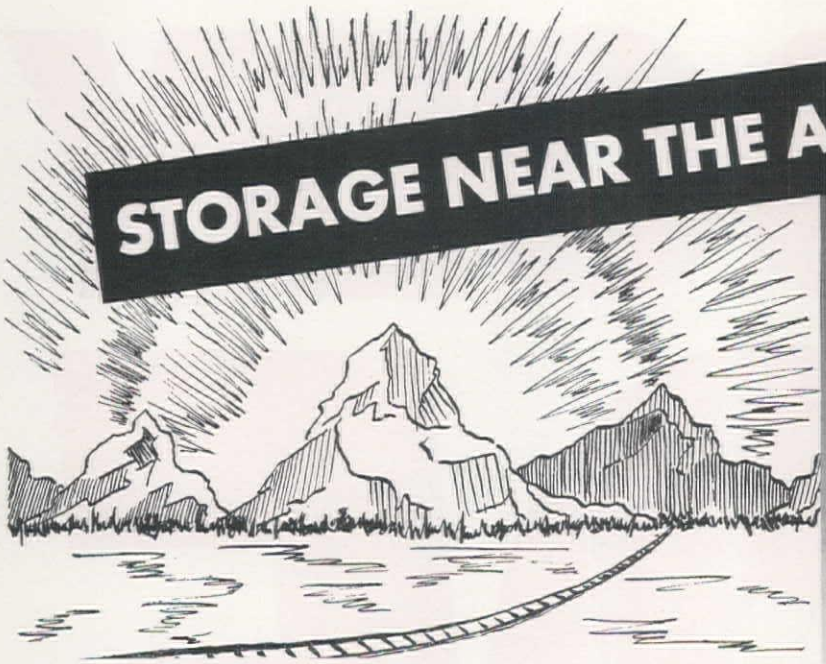
4 years in the field

4 years of proof

on automatic hard-facing of tractor rollers and idlers.

STOODY 105 was the first hard-facing alloy developed for application on tractor parts by the automatic welding process. Its value in increasing equipment life is now proved by four years actual use in the field. Stoody 105 possesses an alloy content which insures *true* hard-facing properties, longer wear! Because of its low cost and speed of application, coupled with uniformity and excellent wear resistance, STOODY 105 is the accepted standard wherever automatic hard-facing is utilized. Try Stoody 105 yourself. Shops equipped to rebuild tractor parts by the automatic process are now located in most areas. Names will be provided upon request or your Stoody dealer will be glad to refer you to your nearest source.

STOODY COMPANY
11956 EAST SLAUSON AVENUE,
WHITTIER, CALIFORNIA

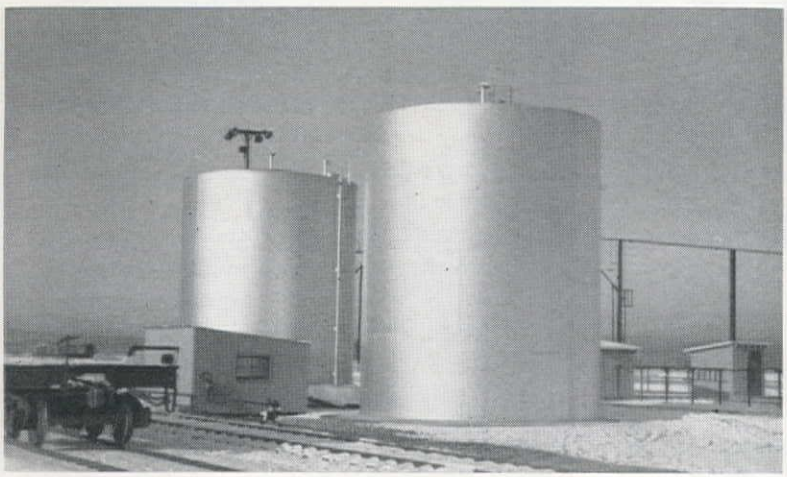


STORAGE NEAR THE ARTIC CIRCLE

ALASKA RAILROAD depends on HORTON TANKS

THROUGH contrasting country of glaciers, lush valleys, and tundra, runs the northern-most railroad on our continent — the Alaska Railroad. Daily several trains carry supplies from Seward on the Gulf of Alaska — north 470 miles — to Fairbanks in the heart of the interior.

The Department of the Interior has operated the line since its inception in 1914. No major repairs or replacements were made, however, from 1923 to 1947, when Congress authorized a 73 million dollar rehabilitation program to meet the increased demands of military defense and the rising civilian population of Alaska.



As part of the rehabilitation program, a 90-acre area in Fairbanks was cleared and a complete new terminal yard was constructed. To serve this new yard, a 50,000-gallon Horton elevated water tank, and two Horton 2,500-bbl. diesel oil storage tanks were erected. Together they provide modern, long-lasting storage facilities that assure efficient year 'round service.

Horton welded structures are used to store water, oil, and other liquids in many parts of the world. Obtain their many inherent advantages for your own plant. Write our nearest office for more complete information or quotations without obligation.

HORTON

WELDED STEEL

STORAGE TANKS

CHICAGO BRIDGE & IRON COMPANY

Plants in Birmingham, Chicago, Salt Lake City, and Greenville, Pa.

Atlanta 3	2183 Healey Building
Birmingham 1	1598 North Fiftieth Street
Boston 10	201 Devonshire Street
Chicago 4	McCormick Building
Cleveland 15	Guildhall Building
Detroit 26	Lafayette Building
Houston 2	National Standard Building
Havana	402 Abreu Building
Los Angeles 17	1544 General Petroleum Building
New York 6	165 Broadway Building
Philadelphia 3	1700 Walnut Street Building
Salt Lake City 4	555 West 17th South Street
San Francisco 4	1569—200 Bush Street
Seattle 1	1355 Henry Building
Tulsa 3	Hunt Building
Washington 6, D. C.	1103 Cafritz Building

WESTERN CONSTRUCTION

July 1951 Vol. 26, No. 7

JAMES I. BALLARD . . . . . Editorial Director
JOHN J. TIMMER . . . . . Managing Editor

Tunnels Set Record in Records

NO OTHER TYPE of construction activity goes in for setting new records as does the work of tunnel driving. Hardly a month goes by that does not bring forth some announcement of a new achievement. Apparently, the spirit of competition is high among tunnel men. By comparison, at least, the claims for distinction in such work as grading, placing concrete, erecting structures and paving are not as urgent, or at least are not as forcefully presented. Of course tunnel progress can be measured so simply and the evidence of progress is so direct and obvious that comparisons day-to-day or month-to-month are easy and make good subjects for job conversation. Also there is so much chance for teamwork in tunneling that competition is the natural situation.

The records themselves are a little more difficult to appraise and appreciate than the spirit in which they are offered. A compilation of the claims, counter-claims and accredited records would be interesting – but probably rather confusing. The factors are so variable that almost any number of records are possible. For example, there can be the record for a day, a week or a month in the same tunnel, or for any other bore of similar size. Then another tunnel of slightly different dimensions permits the record setting to start all over again. Also, there is the case of an unsupported tunnel compared with one having supports, and the placing of steel sets as compared to timbering, with or without lagging in either case. Thus the combinations for establishing tunnel records are almost limitless.

The fact remains that there is a certain spirit in tunnel work that tends to lift it out of the ordinary rut of everyday construction, and adds a challenge to each shift. May these real competitors of the construction game continue to put an element of sport in their work, and continue to report more records. It might be of value if some of the other types of construction could introduce into their operations some of this approach and attitude of the hard-rock men.

Obstructionist Tactics by Truckers

HARMONY – at least a working agreement – between highway departments and the trucking interests is essential to the modernizing of the Western highway network as it will be planned and built during the coming years. Truckers, and their associated interests, need the broad support of public opinion if they are to secure a reasonable reaction to some of their claims for consideration.

Fortunately, this relationship has been relatively better in the West than in other regions of the country. However, the position of the trucking interests will not be improved by the recent Colorado situation where a legislator, who is also an active commercial trucker, was able to block in committee a well considered and carefully outlined plan for a comprehensive program of state highway improvement. The program, in its financing aspects, would have included a readjustment in the allocation of highway taxation, which would have resulted in the inevitable increase in truck rates.

Such tactics will only tend to worsen the situation and will actually do more harm to the truckers than any immediate good. To obstruct or delay any phase of highway development is stupid because it will not only tend to cement public opinion against the truck users of the highway systems, but will also mean that the commercial haulers will face increasing costs as they use the breaking-down roads of today for more years in the future. Operating costs mean more to a trucker than a Sunday driver.

More Advance in the West

THE WEST continues to lead in developments that reflect ingenuity and time-saving techniques in construction. Over the years the list is long, both as to novelty of application and magnitude of use. Two current illustrations show that this enterprise and genius continue.

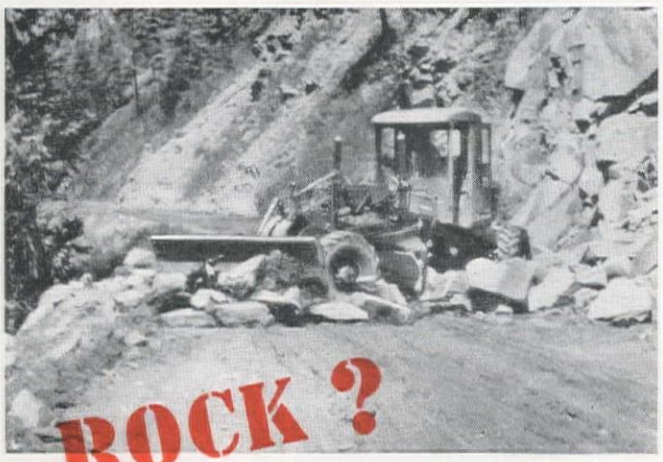
First, there is the application of the precast concrete principle to the underground garage at Pershing Square in Los Angeles. The pre-fabrication of structural members in concrete has been an outstanding development in Southern California. Now precast units are being combined in a notable structure for both temporary and permanent service. By the use of large drilled holes along the perimeter of the site, the columns for the three underground floors can be set to exact line-and-grade and used for supporting the sides of the excavation before being incorporated into the final structure.

Second, the use of pre-placed aggregate, later inundated with pumped grout to produce a concrete of special characteristics, is receiving its most extensive application in Southern California at Whittier Narrows Dam. There is reason to class this development as Eastern, but its history can be traced to a Western origin.

These are not record-breaking aqueducts or dams that are generally accepted as featuring Western leadership. They are generally adaptable techniques which indicate the growing breadth of civil engineering and construction practice in this region.

WESTERN CONSTRUCTION was founded in January 1926 as *Western Construction News. Western Highway Builder,* founded in 1919, was consolidated with *Western Construction News* in April 1932 and subsequently became *Western Construction News and Highways Builder,* which title was later changed in April 1934 to *Western Construction News* and finally in July 1950 to *Western Construction.*

what's YOUR headache...



On an A-W Power Grader the bulldozer becomes a rough, tough tool . . . extra sturdy to match the extra power of ALL-WHEEL DRIVE, and fully up to this job of clearing a rock slide.

Live, climbing power at both ends of the machine keeps it bulldozing steadily through sand where an ordinary grader would find it difficult to travel, let alone work.

On this railroad fill, there is plenty of power and traction to use both blades, with their fingertip hydraulic controls for quick and easy, precision operation.

First, the grader blade with its deep-plowing ability is socked into the ground to undercut the tree roots; then the bulldozer backed by the superpower of ALL-WHEEL DRIVE finishes the job.

The traction and maneuverability of A-W Power Graders make them ideal tools for the Bulldozing jobs found on grading and construction work. Heavily made and reinforced to accommodate the extra power of All-Wheel Drive and Steer, the Bulldozer is an essential for many jobs—a time and money-saver for dozens of others.

AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U. S. A.

Subsidiary of Baldwin-Lima-Hamilton Corporation

ARIZONA—SHRIVER MACHINERY COMPANY.....*Phoenix*
CALIFORNIA—EDWARD R. BACON COMPANY.....*San Francisco 10*
CALIFORNIA—SMITH BOOTH USHER COMPANY.....*Los Angeles 54*
COLORADO—LIBERTY TRUCKS & PARTS COMPANY.....*Denver 1*
IDAHO—COLUMBIA EQUIPMENT COMPANY.....*Boise*
MONTANA—WESTERN CONSTRUCTION EQUIPMENT CO.....*Billings*
MONTANA—WESTERN CONSTRUCTION EQUIPMENT CO.....*Missoula*
NEVADA—C. D. ROEDER EQUIPMENT COMPANY.....*Reno*
NEW MEXICO—N. C. RIBBLE COMPANY.....*Albuquerque*
OREGON—COLUMBIA EQUIPMENT COMPANY.....*Portland 14*
UTAH—WESTERN MACHINERY COMPANY.....*Salt Lake City 13*
WASHINGTON—COLUMBIA EQUIPMENT COMPANY.....*Seattle*
WYOMING—WILSON EQUIPMENT & SUPPLY COMPANY.....*Cheyenne*

Precast Units Support Excavation, Then Form Permanent Walls at

West's Largest Underground Garage

Under Pershing Square in downtown Los Angeles this 3-floor garage is being built to store 2,000 cars — Design features use of precast concrete wall columns set in drilled holes, with precast or gunite wall slabs

USE OF PRECAST concrete column units placed in drilled holes around the four sides of the underground City Park Garage in Los Angeles, together with either precast wall sections or gunite directly on the side of the excavation, represent ingenious design features of interest to engineers, and construction problems of interest to all contractors. This procedure permits the excavation of the entire site, with the exception of a narrow perimeter section, followed by the construction of the central core of the building, and final excavation down the walls with the installation of the precast or gunite panels. General features of this 2000-car garage under Pershing Square being built at an estimated cost of $5,000,000, are reviewed on the following page. This article describes the design provisions, the casting of the wall columns and the sequence of construction operations.

Features of design

The modified flat-slab floor system design features a typical interior floor section 5½ in. thick in the middle third of 27-ft. spans, with straight line variation to a thickness of 16½ in. on a 4-ft. square centered on the 26-in. diameter interior column. The heavily loaded roof section has typical thickness 9-in. in the middle third and 2 ft. 3 in. over the column.

Concrete is designed for a compressive strength of 3,000 p.s.i. at 28 days for the entire structure except that the roof slab, because of heavier duty requirements, is designed for concrete having a strength of 4,000 p.s.i. at 28 days. Prior tests of materials and continuous inspection are required. In the design, economy and efficiency in the use of reinforcing steel is realized by employing new-type deformed bars and following the recommendations for increased working stresses and other provisions now a part of the revised "Building Code Requirements for Reinforced Concrete" (A.C.I. 318-51) of the American Concrete Institute. This procedure eliminated practically all hooks, except that the engineers elected to retain the hook feature as additional assurance of anchorage at non-continuous ends of important structural members. Throughout the three stories, interior column size of 26-in. diameter was maintained constant as a means of reducing the cost of forming.

VIEW AT TOP OF PAGE—

FROM THIS 350 x 600-ft. site at Pershing Square, which will later be completely restored, the contractor excavated an average of 3,500 cu. yd. per night shift, the only time hauling was permitted by the city. Note on the extreme right the wall columns which have been set in drilled holes (see front cover), with the experimental gunite walls supporting the excavation.

The use of precast units for portions of the exterior of the structure was decided upon as the solution of a construction problem and is fully described as a construction feature. Excavating to the full limits of the perimeter of the structure, it was realized, would create hazards of street cave-ins, involve maintenance of the vertical bank some 30 ft. in height, and require an expensive installation of shoring and lagging. The ingenious design developed and adopted obviated the necessity for more than temporary shoring. The procedure is essentially as follows:

Open caissons 6 ft. in diameter are drilled about 30 ft. deep along the outer wall line at intervals of 9 ft., extending from ground surface to footing elevation. These caissons are lined with three telescoping casing sections. These succeeding steps follow: (1) Footings are trimmed out below the bottom casing; (2) a keyway form for the 3 ft. by 1½ ft. precast column, or "A" unit, is placed; (3) concrete is placed in the footing; (4) the keyway is grouted after hardening interval; (5) the A unit is placed, aligned and braced; (6) the lower portion is backfilled by jetting of pervious material; (7) casings are pulled so that backfill is kept above the bottom of casings until the level of the bottom of the top casing is reached, then casings are removed by crane and backfill completed. With the A units thus securely fixed, the original plan contemplated ex-

cavation in successive story heights from the surface and the placing of precast concrete "B" units 6 ft. wide between the A units.

In the detailing of precast A units, provision was made for installing precast intermediate B units 6 ft. wide and 1 story high by slotting the A units, spacing the slots progressively inward for each successive lower story. The construction of the intermediate units by gunite placement was considered as a feasible alternate method. Whether of precast or gunite construction, the B units were designed to serve merely as filler walls between the A units.

The ultimate objective of this carefully planned procedure is, of course, to permit full excavation of the entire building site except for a perimeter section along the street line, where earth remains at surface grade on a narrow berm, then slopes to the line of the first interior footing. Then the central core of the building is constructed, after which excavation along the perimeter is started. The precast wall ("B") units are then installed for the top story only and shoring is placed between A units and the interior core, after which excavation and placing of B units can proceed downward. Excavation can be performed by power shovel except for a half-bay triangle with height of 3 ft. at the wall base, which must be removed by hand. Then concrete is placed in the outer bay up to and including the 1st sub-floor, shores are removed and the roof slab placed.

Construction progress

Ground was broken on Feb. 1, 1951, and actual work started at once. Trees of undesired types or unsuitable for resetting were wrecked and hauled away. Those selected for replanting were boxed and removed to be cared for and preserved.

On February 15 general excavation began with a 2½-yd. dragline placed in night shift operation by C. G. Willis & Sons, excavation subcontractor. The schedule adopted for excavation and removal limited the work to the hours of 6:00 p.m. to 2:00 a.m. in order to minimize traffic problems. Deep excavation for the south half of the site started on March 5, with two shovels of 2½- and 2-yd. capacity removing an average of 3,500 cu. yd. per night shift. Removal of excavation from the site required a maximum number of sixty 7-yd. dump trucks.

Drilling of the perimeter holes for placing the outer footings and precast A units started on March 20 by Casey & Case Foundation Co. as sub-contractors, using four American Hoist & Derrick Co. rigs. Each 30-ft. hole was completed in about 12 drilling hours. Pilot holes were drilled, then reamed to casing size. Some water was encountered and an electric centrifugal pump was used when required. Casings to make up the total depth of nearly 30 ft. were in three telescoping sections, the bottom casing having a diameter of 4½ ft. From the bottom of the casing, workmen trimmed out earth to an additional 2-ft. depth to designed grade and dimension of the bottom of the footing (see drawing).

Mats of reinforcing steel of new type deformed bars were then placed in the footing section. The mats were typically of ¾-in. round bars about 6 in. on centers transverse to the wall axis, with four ¾-in. tie bars in the opposite direction. Next the bottom casing was drilled and tapped and 2 x 6-in. pieces of timber bolted on at four points. To prepare a seat in the footing for the precast A unit, a keyway form beveled on four sides was set and braced against the pieces bolted on the casing to fix grade and alignment.

Concrete for the footing section was

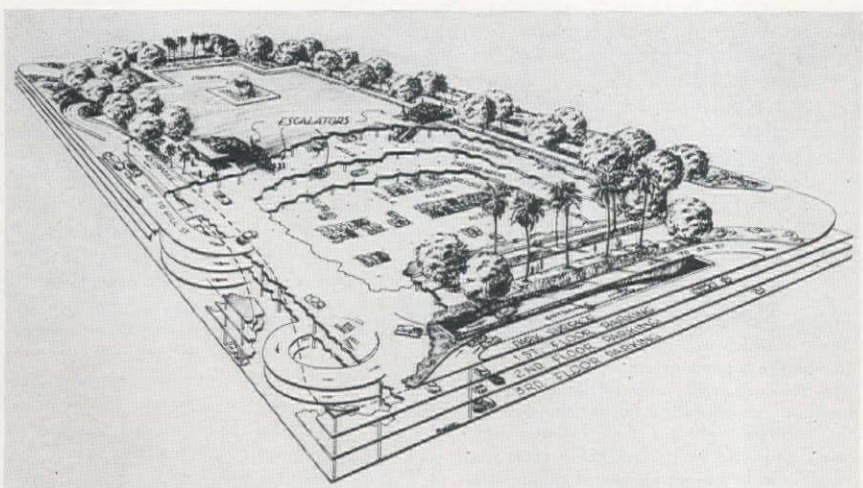
History and Facts About the Pershing Square Underground Garage Project

PRESSING NEED for off-street parking facilities in the downtown area of Los Angeles has been realized for years, and the Pershing Square site has long been considered a natural and ideal location for an underground garage. Comprising a full block, 600 ft. north and south, 350 ft. east and west, it had a potential of strategic location and capacity not to be ignored. However, it was a park site under control of the city's Recreation and Parks Department, and it was no simple matter to solve the policy and legal problems that were involved. After diligent effort, a solution acceptable to all involved authorities was worked out, proposing a 50-year lease conditioned on the maintenance of park features, the building and operation of a structure of approved design and capacity, and requiring return of the property to the city at the end of the 50-year period. On the first offer, late in 1949, no proposals were submitted. Further efforts were made and finally, on September 22, 1950, a contract was entered into with City Park Garage, Inc.

After detailed plans were prepared, emergency restrictions on construction threatened indefinite delay, but in January 1951, on the showing of necessity and possible defense use for public shelter, Federal approval was obtained to proceed with the work.

Interference with street traffic had to be held to minimum. As a result entrance and exit ramps pass under sidewalks, exterior entrance ramps nearly the entire block in length provide space for receiving and handling cars without street congestion. Cars enter and leave the garage parallel to the street and in direction of street traffic flow. Interior circular ramps connect entering ramps to all floors, and up-and-down escalator service is provided between all floors and street level. Ample restroom facilities within garage serve patrons, and separate public restrooms have stair access from the park area. The ventilating system provides six-minute air change cycle. Essential surface features will be restored and maintained in keeping with park use of the area—selected trees to be replanted in "wells" contained in upper column sections of the structure. Familiar Pershing Square features including a fountain, three monuments and two cannon are in storage and will be replaced.

CUTAWAY SKETCH of the garage as it will be completed with park restored.



Builder—City Park Garage, Inc.—Ford J. Twaits, President.

Contractors—Ford J. Twaits Company, Morrison-Knudsen Company, Inc., and T-S Construction Engineers, Inc.

Architect—Stiles Clements Associated Architects and Engineers.

Consulting Engineer — Murray Erick Associates.

Location—Pershing Square Park, Los Angeles. Fifth Street to Sixth Street and Hill Street to Olive Street.

Size—600 x 350 ft.; 3 sub-stories; floor area 630,000 sq. ft.

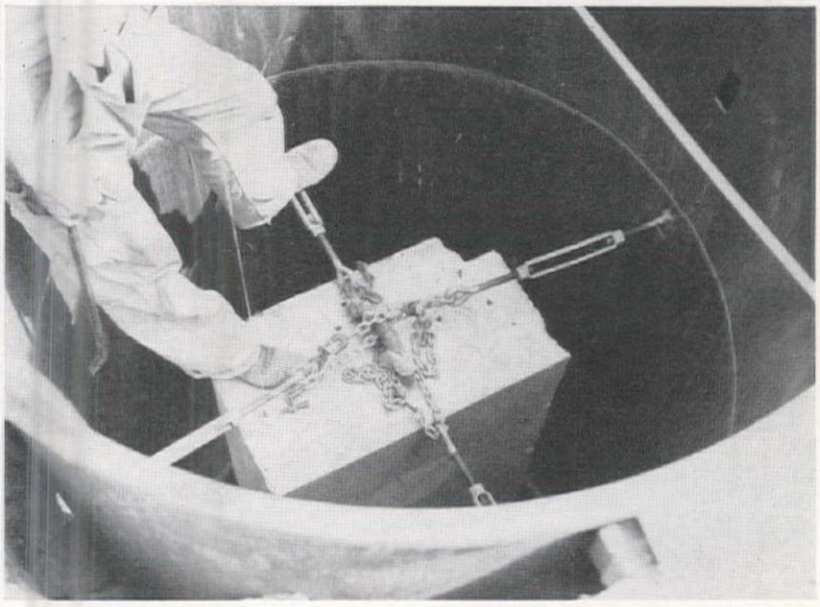
Capacity—About 2,000 cars.

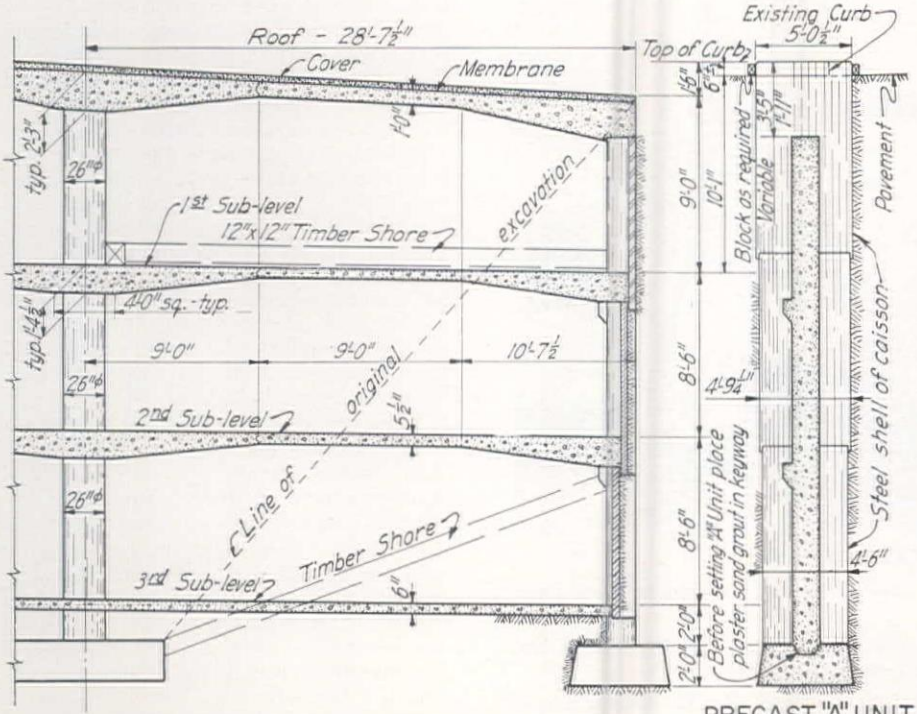
Cost—Estimated at about $5,000,000.

Type—Reinforced concrete; modified flat slab floor system.

Concrete—Estimated quantity — 50,000 cu. yd.

Excavation—Estimated quantity—206,000 cu. yd.





TYPICAL SECTION – WALL UNITS IN PLACE

PRECAST "A" UNIT IN CAISSON

SEQUENCE OF COLUMN PLACING

UPPER LEFT—9½-ton column arrives from casting yard by truck.

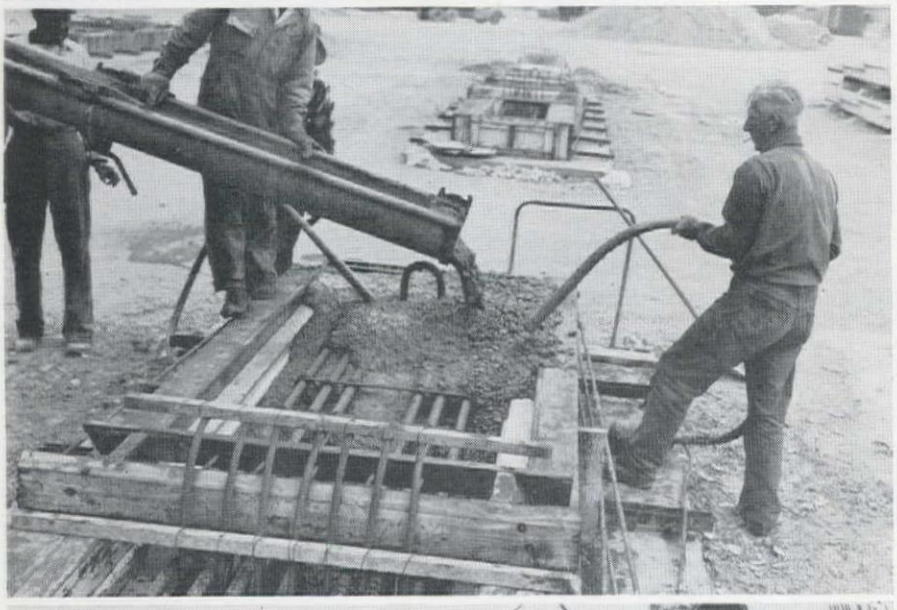
UPPER RIGHT—Crane picks up the unit by the 1¼-in. loop anchored in its end and lowers it into the drilled and cased holes, where the bottom fits into a cast-in-place footing poured in the space trimmed out below the casing (this view also shown on front cover).

LOWER LEFT—The unit has a 3-ft. by 1½-ft. section; 7⅓-sack mix provides concrete strength of 6,000 lb. at 28 days.

LOWER RIGHT—After being set on the footing at the bottom of the casing the column is aligned with turnbuckles and the hole is backfilled with pervious material as the casing is pulled.

★

PRINCIPAL DESIGN FEATURES (left) include 27-ft. spans with 5½-in. thickness in the middle third and 26-in. diameter interior columns maintained to reduce costs. One of the 208 precast wall columns is shown as set in the drilled caisson.



OPERATIONS IN THE CASTING YARD

TOP—Forms anchored on a concrete casting apron have turnbuckled truss-rods to adjust alignment for the 4 to 4½-yd. pour.

CENTER—Mix with 1½-in. maximum size aggregate and 3 to 4-in. slump has 7⅓ sacks of high early strength cement per yard and develops enough strength to be lifted in 48 hr.

BOTTOM—Weighing about 9½ tons, each column is grooved along sides for inserting precast wall slabs. Bent steel permits column to be inserted in caisson and will be bent out to form beam connection.

then placed. In order to permit setting a precast section the following day, a concrete footing mixture was used which produced a strength of 1,600 p.s.i. in 16 hrs., at which time it was ready to receive the 9-ton unit. This provision also allowed early removal of casings, which could be pulled and reset the same day in another hole.

In preparation for setting an A unit, thin cement grout was placed in the keyway section, which is 6 in. deep. Keyway to column tolerance is ¼ in. On the ground surface, a crane picked up the precast unit by the 1¼-in. loop anchored in its end, and lowered it into place in the grouted keyway. Then the unit was aligned at the top in two directions by the use of turnbuckles and chains with grabhooks (see illustration). Lower casing sections were pulled by means of cable slings attached to 3 lugs welded to the casings. Backfilling by jetting pervious material proceeded to the bottom of the upper casing. Then the turnbuckles were removed and the upper casing removed by the crane. The same procedure is repeated in placing each of the A units, 208 in number.

Making and handling precast units

The precast A, or column, units were designed with practically identical cross-sections to simplify forming. However, in the 208 units there were 46 types, because of variations in reinforcement, location of corbels or shelves for floors and ramps, and provision of slots or keyways for the planned precast intermediate units. In general the units had a bottom cross-section of about 3 ft. x 1 ft. 6 in., and weighed about 9½ tons each.

C. D. Wailes Corporation, specialists in precast concrete, manufactured the units and delivered them to the site. The details of plant procedure are of particular interest.

Forms were built on a concrete casting apron, with the side forms lined with plywood and oiled. Steel inserts in the apron provided anchorage to hold the form tight on the bed and in lateral position. Turnbuckled truss-rods provided means for adjustment of alignment.

As in the case of footings at the job site, high early strength of concrete was important to allow early reuse of forms and early handling. The designed mix, containing 7⅓ sacks of cement per cu. yd. and employing calcium chloride admixture, produced the following average compressive strength by test: 1 day—1500 p.s.i.; 2 day—2500; 7 day—4500; and 28 day—6000. The use of concrete of this quality made it practicable to pick up castings at the age of 48 hr.

The typical plant sequence was to set forms in the morning for five units. After noon a crane set the assembled reinforcement in place, supported on precast concrete blocks. Requiring from 4 to 4½ cu. yd. of concrete, each casting was made from one truck load of ready-mixed concrete having aggregate of 1½-in. maximum size. The mix used was usually of 3-in. to 4-in. slump and placement included high-frequency internal vibration.

After 12 hr. forms could be stripped and reset down the line, thus a 24-hr.

cycle of form-use was possible. Five units were made daily, though more could be delivered because yard operations were under way in advance of preparation at the site. The completed units at the age of two days were raised by crane, lifting direct with a strongback so that the casting remained horizontal and strain was minimized.

Again the problem of traffic entered the picture. It was required that deliveries to the site could be made only between the hours of 9 to 11 a.m. and 1 to 3 p.m. Using a flat-bed semi-trailer for hauling, two units per trip were transported, maximum deliveries being eight units per day.

Precast units or gunite sections

It was originally planned to close in the entire exterior of the building with precast units. This was to be accomplished by placing story-height B units spanning 6 ft. between the A units. These B units, 5 in. in thickness, were to lap each other, stepping inward 5½ in. at each sub-floor, so that the lowest of the 3 sections would have its inner face 3 in. out from the interior face of the A unit. Slots or notches formed and cast along the narrow side of the A unit (see illustration) provided guide and seal for placing in this manner, and the work was to progress downward with the excavating and shoring.

It was decided when work was under way that an experiment should be made to determine the feasibility and economy of installing these sections against the excavated vertical bank by means of the cement gun, rather than to precast the sections and haul them to the site. Samples were shot accordingly between upper sections of a row of six A units, to produce five 5-in. wall sections built in the same exact position that precast B units would occupy.

A cut was made for the five sections to a bottom elevation halfway between the roof and the 1st sub-floor level. The bank was trimmed vertical to provide for a net thickness of 5 in. A mat of reinforcing steel of ⅝-in. round bars about 6 in. on centers in each direction was placed for 1-in. clearance on the inner face. In general, additional steel would be needed for distributing stress due to lifting if the precast type of B unit were employed.

At the bottom of the excavated section, a layer of waterproof paper was laid down to insure a clean construction joint for the next gunite panel below. Shooting of gunite was started at the bottom; the notch section provided for lapping the B unit flush with the exterior column face was filled first. A ¾-in. pipe had been installed vertically in this notch, to be pulled later to allow for grouting through a smaller pipe. The gunite placement was then carried systematically back and forth from column to column, building upward to the full thickness determined by wire screeds.

Synchronizing with gunite application by the nozzleman, a blow-pipe or air-hose operator continuously removed rebound and was prepared to blow away any falling dirt ahead of the application.

The moist earth bank remained stable and compact for the time interval required for this gun operation and the trial was considered successful. This method appears to be economical for the particular construction conditions and operational requirements of this project, although it is considered that either gunite or precast B sections will function satisfactorily in the structure.

As of May 18, the first stage of excavation was 87% complete. This estimate excludes berm and perimeter sections and other earth-moving which is scheduled for a later period in the construction operations. On the same date, 176 of the total of 208 precast A units had been placed in final position, and the remaining 32 units were manufactured, delivered or ready for delivery.

The excellent and orderly progress which has characterized the work promises to continue as construction proceeds, and to a marked degree this may be attributed to careful consideration and detailed planning by the designers and builders, together with coordinated control and competent supervision. In the construction of the project, Paul B. Tichenor is in general charge of supervision and Arthur D. Stauffer of engineering. In direct charge on the work, R. H. Kirkman is project manager and the project superintendent is C. A. McMahon. Howard Thompson is project superintendent in charge of the operations of Casey & Case Foundation Co.

AS A TEST, excavation along the wall line was carried down one-half a floor and a 5-in. gunite wall shot directly against the ground in these five panels.

BUILDING UP gunite wall panel starting from waterproof paper at bottom to insure clean joint for next lower panel. Gunite wall is reinforced with ⅝-in. bars at 6-in. centers.

Expensive Built-in-place Forming Eliminated with

Prefabricated Barrel Culvert Forms

View of partially-completed culvert shows stages of construction. First section, in foreground, is completed. Outside forms at second section will be moved into position for third section where reinforcing steel has been set. Note that water is already flowing through the culvert.

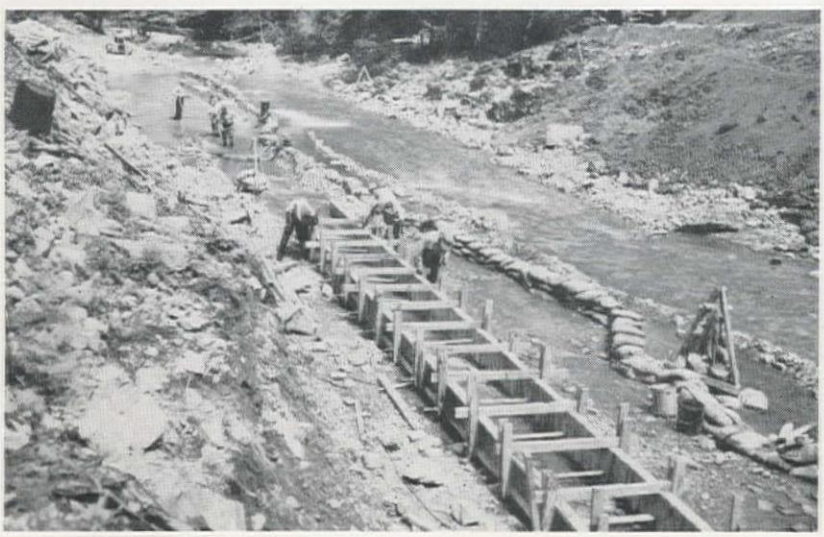
Interchangeable forms speed construction of nine 20-ft. diameter arch-type concrete culverts in Oregon — Turbulent stream diverted by temporary sand bag cofferdams

PREFABRICATED "barrel" forms are eliminating expensive built-in-place forming for the construction of nine 20-ft. diameter arch type concrete culverts, 150 to 335 ft., in length. The culverts will permit a winding, and often raging, mountain stream to pass under a 2.89-mi. relocation of the Pacific Coast Highway (US 99) in the Umpqua National Forest, 3 mi. south of Canyonville, Ore. Construction of the culverts is an important part of Carl M. Halverson's $800,251 contract with the Bureau of Public Roads to replace the present narrow highway with a comparatively straight alignment having a 50-ft. roadbed with a 25-ft. Class D, 3-in. macadam pavement on a 1-ft. rock base.

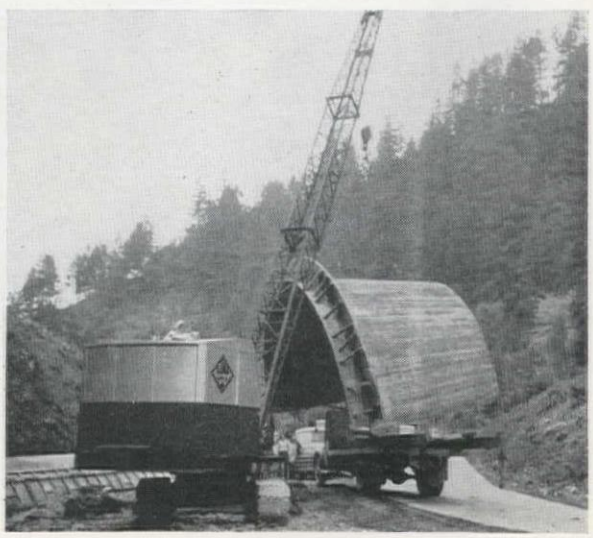
Specifications call for walls of the culverts to be 10 and 12 in. thick, depending on the depth of fill. For fills up to 20 ft., walls are 10 in. thick, and for fills above 20 ft. walls are 12 in. thick. Five of the fills will average 20 ft. and four will average 30 ft. The same inside diameter is maintained for both thicknesses of walls. Culverts have expansion joints every 50 ft. Parapet walls are constructed at each end and curved to meet the slope of the fill. On the inlet end the parapet walls are 12 in. thick and extend 1 ft. 10 in. from the inside surface of the culverts. Outlet parapet walls are 10 in. thick and extend 2 ft. from inside surface of culvert. These outlet ends are constructed so as to be on the angle or skew of the culvert to the fill, and have a 1½ to 1 slope. Of the nine culverts, two have 30 deg. skew (one right and one left); and three have 45 deg. skews. Inlets of the culverts are flared with the opening of 24 ft. decreasing in 12 lin. ft. to the 20-ft. diameter.

Seven of the nine culverts are being built over solid rock. Footings for these —one at each side of the barrel—are 2 ft. high and 3 ft. wide. Footings for the two other culverts are 6 ft. wide at the

Cleaning stream bed and installing forms for footings. In foreground, carpenters work in water to install footing forms. Sand bag cofferdam at right will be used to divert stream when footings are poured. Cleaning crew at work in background.



Inlet form section, weighing 5 tons, arrives at culvert location and is moved into place by crane. Inlets are flared with 24-ft. opening decreasing to 20-ft. diameter.



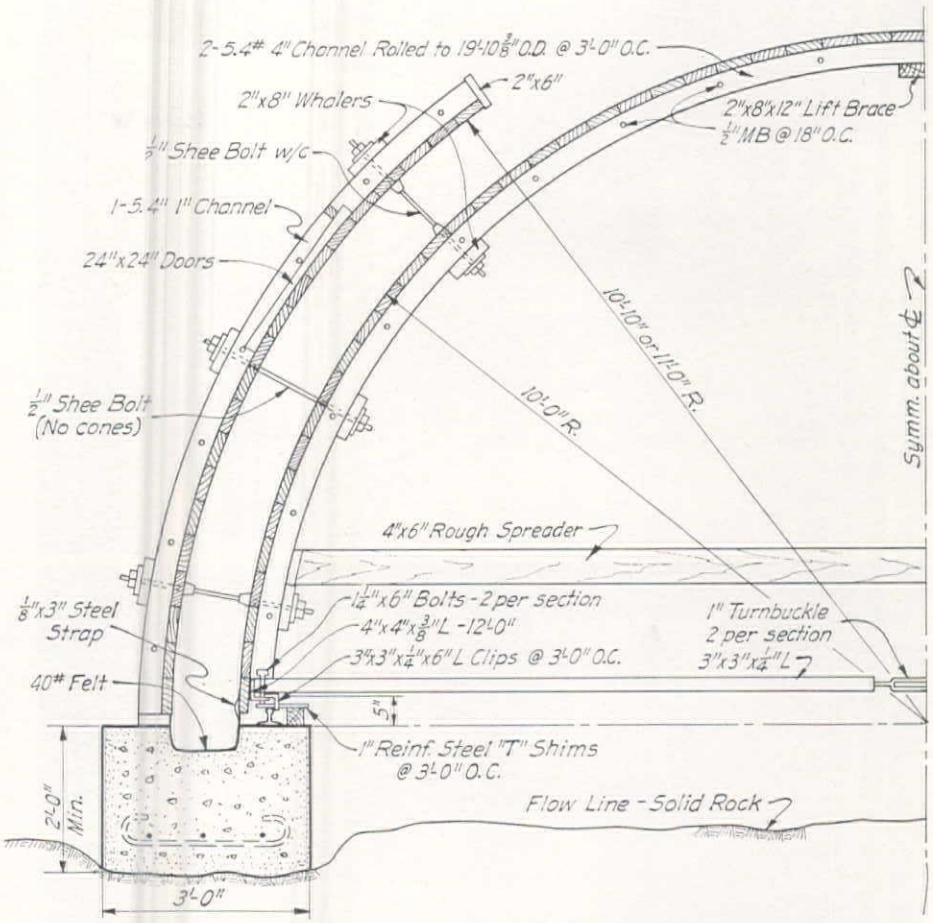
base and 3 ft. wide at top. Rising 2 ft. 9 in. they are battered on the back side. All footings have a keyway running their full length that serves as a construction joint. Keyway widths are the same as the thickness of the arch walls. A layer of 40-lb. felt is placed in the keyway prior to pouring the barrel to allow for expansion of either footing or barrel section. Culverts not on solid rock have an 8-in. reinforced concrete invert. The solid rock serves as invert for the others. In addition to the nine arch type, one 8-ft. box type culvert is included in the project.

Forms

To eliminate extensive built-in-place forming that would require a considerable amount of shoring for the approximately 3,000 lin. ft. of culverts, the contractor devised a system whereby 12-ft. lengths of prefabricated "barrels" curved on the same radius of the arch, can be set on the footings, and assembled to form a 50-ft. section (distance between expansion joints). When this 50 ft. has been poured and the concrete set for four days, the form is loosened and a tractor pulls it ahead on greased rails anchored to the footings.

Seventeen of the 12-ft. form sections, each weighing 6,000 lb. were fabricated on the site and are being used for the entire job. With this number it is possible to work on three culverts simultaneously. The corresponding number of outside forms were also fabricated, plus a special 10,000-lb. flared inlet form. All form sections are interchangeable, in that any outside form section may be used with any inside section.

In design, the form sections have a 4 x 4 x ⅜-in. angle at the base, with steel ribs, rolled to the arc of the barrel, welded to these base angles at 3-ft. centers. Ribs are two 4-in. channels back to back with a solid wood filler between. Fillers were cut to the arch radius from 2 x 10's and 2 x 12's by band saw. When installed between the steel ribs they are 1⅝ x 4-in. and are bolted to the steel. Only one steel rib is used at the end of the sections. Filler is only placed at one end so that when two sections are joined the wood is between two ribs. Over these ribs 2 x 6-in. tongue and grooved sheathing is laid and bolted to the filler. Additional details of form construction appear in the accompanying diagram.



DESIGN for typical form 12 ft. in length. Seventeen of the sections were prefabricated to allow work on three culverts simultaneously, with inside and outside forms interchangeable.

Whalers, three on each side, are 2 x 8's and permanently nailed. Jump whalers, connecting the form sections, are 4-ft. lengths of 2 x 8. Sections of the forms are held together with ½-in. bolts at 3-ft. centers. To maintain the width of the barrels during the concrete placing two 4 x 6 spreaders are laid on the lower whalers, extending horizontally across the section with wooden blocks placed at each end. When the concrete placing is completed and the blocks removed, there will be 2-in. clearance to permit moving the section ahead.

Outside forms

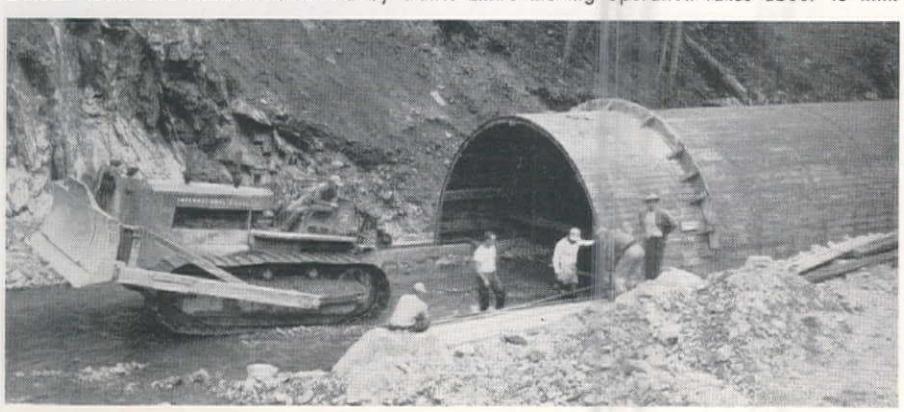
In materials and design, the outside forms are fundamentally the same as the sections used for the inside of the culverts. However, the outside form sections only rise 10 ft. up from the footing, leaving the top of the arch uncovered. When the concrete is topped-out it is rounded off to the proper arc by a curved vibrating screed which rides on the top edges of the outside forms. Two sizes of screeds are used, one having a radius of 10 ft. 10 in. for culverts 10 in. thick, and one with an 11-ft. radius for those 12 in. thick. A single interchangeable motor is used to provide vibration for both screeds.

Two 2-ft. square hinged doors are provided in each 12-ft. outside form section to facilitate concrete placing (see illustration). Concrete is placed and vibrated through the door openings until it reaches their level, about the mid-way point. The doors are then closed and secured with a piece of 2 x 4 wedged in the ribs. The remainder of the concrete placing is done over the top edge of the outside forms.

In erecting the forms ½-in. shebolts on 3-ft. centers pass through the whalers and are screwed into Standard Burke Cones. The cones in turn have been screwed onto a 8-in. piece of ½-in. mild steel bar with threads at each end, and this bar remains in the concrete. Cones are removed with a special wrench and the resulting holes filled. This method of erection keeps the outside and inside forms spread either 10 or 12 in. apart, whichever distance is required.

Although work on the project commenced last October, excessive rainfall, floods and high water held the opera-

AFTER 50-ft. section has been poured and concrete allowed to set for 4 days, inside form is loosened and tractor with special bridle cable pulls it ahead on greased rails anchored to footings. Outside forms are transferred ahead by crane. Entire moving operation takes about 45 min.



TOP—Workmen put finishing touches on form. Doors along center of form are for placing concrete below that level. Doors are closed as concrete is placed above that point.

BOTTOM—Daryl K. Mason (left), culvert superintendent, and Daniel Pantovich, labor foreman, check steel work and preliminary parapet forming on top of one of the culverts.

tions virtually to a standstill during the winter. Work was resumed when conditions permitted and was in full swing early in May. As the culverts are being constructed in the creek or stream bed, the stream has considerable effect on the contractor's operations. Canyon Creek drains a watershed of approximately 40 sq. mi. of forest lands and a ½-in. rainfall in the area often turns the stream into a raging torrent. Prolonged rains, such as occurred last winter, caused major floods.

Two floods and three periods of extreme high water occurred during the past winter to hamper the contractor's operations. On one occasion a flood washed out two gravel plants preventing the contractor from obtaining aggregate for nearly a month and consequently holding up concrete work. On another occasion the high water literally "ran them out" of one culvert location. Due to its temperment and the problems it has caused, Canyon Creek has been dubbed "The Little Amazon" by the men on the job.

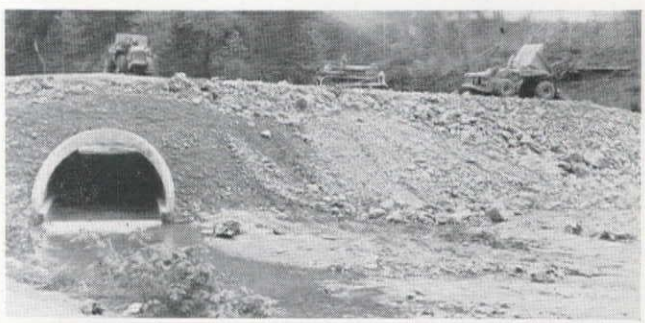
Diverting the turbulent stream to permit installation of the culvert footings is one of the main difficulties encountered by the contractor. At the two locations where the stream does not pass over solid rock it proved economical to dig diversion ditches. But at the other seven locations on the solid rock, any means of temporary diversion is a problem and a permanent form of diversion has been deemed as excessively expensive. It has been decided that sand bags would be the only object that would fit closely against the rock to hold back the water. About 1,500 sand bags are being used on the project to construct a cofferdam, behind which the footings can be formed and poured. The sand bag cofferdam is laid down along the centerline of the culvert, the water diverted, and one footing formed and poured. Then the stream is diverted behind this footing to permit work to be done on the second footing. Clay is used to supplement the sand bags when available, but the supply is limited. Work, other than for these foundations is carried out with the stream passing between the footings.

Preparation of site

In preparing the sites for the culverts the overburden in the streambed, consisting of 1 to 3-ft. layer of silt, gravel and boulders, is stripped off by tractor and scraper. The area is then blasted and brought to grade. In shooting the streambed, powder holes are set at 2½ to 3-ft. centers and vary from 1 to 4 ft. deep. Loading is from ⅝ to ¾ lb. of powder per yd. In some cases 1 lb. per yd. is used. This plan of drilling and shooting is used to lessen the time a dozer has to be in the water for additional clearing; the water, plus the grit and sand, being detrimental to the dozers by getting into gears and bearings. Following the post-shooting dozer work the sand bag cofferdam is erected and all loose material is washed and cleaned from the bed rock with high pressure pumps and hand shovels.

After this cleaning operation the line

Continued on page 94



FINISHED culvert with fill being placed. When completed, fill will rise about 20 ft. above top of culvert.

IN ADDITION to the nine culverts, the project involves 600,000 cu. yd. of cut and fill. At right, a Lima 2½-yd. shovel loads one of three Tournarockers.

Pre-placed Aggregate for Spillway Grouted to Form "Prepakt" Concrete

Heavy foundation slab to support spillway gate piers built by method relatively new in the West—Corps of Engineers select process for Whittier Narrows Dam on Los Angeles County flood control project — Design provides 8-ft. depth of aggregate, with five layers of reinforcing bars, filled with special grout

GROUTING of pre-placed aggregate to produce the concrete spillway slab at the Whittier Narrows Dam was started in May. This work is being carried out by the Prepakt Concrete Co. for Winston Brothers Co., general contractor on the dam, which is the main feature of the $36,000,000 flood control project. A preliminary review of the project and the application of the Prepakt technique was published in *Western Construction*, August, 1950—page 75. Basic principles of Prepakt concrete and a historic background appear with this article.

Details of the project

The Whittier Narrows Dam is one of the many elements in the comprehensive plan for flood control in the Los Angeles County drainage area, a program which involves a total cost estimated at approximately $370,000,000. The project is being constructed by the Los Angeles District of the Corps of Engineers, while the comprehensive program is being carried out cooperatively by the Engineer District and the Los Angeles County Flood Control District.

The Prepakt method features the placing of aggregates which have a grading and maximum size that is economical in grout requirement, and will produce an impermeable concrete attaining compressive strength of at least 3,000 psi. in 90 days. The resulting concrete is free from shrinkage during the setting period, distinctly low in heat of generation, and low in total shrinkage. Low volume change was particularly desirable in order that blocks should have a stability adequate for operation and control of the radial gates. Finally, a slab surface highly resistant to erosion was required.

The Prepakt concrete foundation slab will consist of three monoliths each 180 ft. long on the longitudinal axis of the dam, each 110 ft. wide and 8 ft. thick.

PICTURED AT TOP OF PAGE—

PIER SECTION to support nine 50-ft. radial spillway gates required a 540 x 110-ft. slab of concrete with low volume change to insure stability for proper gate operation. Forms are shown being built for the 8-ft. depth of aggregate.

Each monolith is divided into 3 sections each about 37 ft. wide and transverse waterstops are provided at joints across the structure. Each block contains five mats of reinforcing steel, two close to the bottom of the slab and three in the upper portion. The placing of aggregate and steel began in the middle section of the central monolith.

One adjacent end section, then the other end section in the same section row of the 3 monoliths will be next in sequence, after which construction will shift to a similar pattern in one of the outer rows, and will thus progress to completion. About 18,000 cu. yd. will be required for the job. Steel reinforcing consists of 1¼-in. sq. bars at 6-in. or 12-in. spacing.

Consolidation of the foundation area by means of a preload fill was described in the previous article. First operations in the present construction sequence got under way in April with grading to subgrade elevation and the setting of gate trunnion anchors on blocks of concrete. The ten pier sections in the structure carry the nine radial gates which are 50 ft. wide and 29 ft. high with a radius of 36½ ft.

Placing aggregate

Construction of the Prepakt concrete started late in April with placement of the bottom layer of aggregate to a leveled depth of 6 in. At this stage, 1¼-in. grout pipes 9 ft. long open at the ends were set by lightly driving into the subgrade, spaced 6 ft. on centers in each direction, beginning 3 ft. from the block edges. Grout pipes were, of course, raised from the subgrade before use in

grouting operations. Forms were then erected to enclose the 8-ft. section and to provide waterstops between the monolith section under construction and the sections longitudinally adjacent. The bottom bar mat was placed in position, bar chairs inserted and the second bar mat set at a 6-in. higher elevation. The aggregate was then placed over and around the mats to an elevation 6 in. above the higher mat, producing a layer of aggregate 1 ft. 6 in. in depth, all graded from ⅜ in. to 1½ in. in size.

The middle portion of the aggregate fill for the 8-ft. thickness of block was then placed by clam-shell, dumping in shallow mounds, then filling the valleys, then repeating this procedure, thus building up in roughly horizontal layers the total depth of the middle portion. In this unreinforced middle section, 4½ ft. deep, the aggregate size ranged from ⅜ in. to 7 in. and its upper surface was leveled at an elevation 6 ft. above the bottom of the block.

The next operation was to place a 6-in. layer of the finer aggregate, after which the three top bar mats were put in place and the remainder of a total thickness of 2 ft. of the ⅜-in. to 1½-in. aggregate deposited, holding it initially 2 in. below finished grade to allow for final levelling. The topping of aggregate consists of a 2-in. layer of ⅜-in. to ¾-in. size. This is screeded off to final grade.

Grouting plant

This aggregate fill was kept wet for a full day before the start of grouting operations and allowed to drain. The grouting plant set-up alongside the spillway site consisted of a standard batching plant; a double horizontal drum mixer capable of producing a 41-cu. ft. batch; one primary and 4 secondary gas-powered pumps, the first to pump from primary to secondary agitators, and the secondary units, of about ¼ the primary pump capacity, to deliver grout through the placement system. Two gas-powered paddle-type agitators, the first between mixer and primary pump, the second between primary and secondary pumps, insure that the grout is kept in suspension throughout the system.

The grout pipe line serving the primary pump has a diameter of 2½ in.,

Basic Facts About the History and Principles of Prepakt Concrete

IN 1939 the Intrusion-Prepakt organization was reconditioning a tunnel near Oakland, California for the Santa Fe Railroad. During the progress of the work it was found that large voids existed behind and within the old lining. The problem of how to fill these voids economically provided an opportunity to use the principle of pre-placed aggregate filled with grout — a method which was then scarcely beyond the experimental stage. This tunnel project and the methods employed in producing the concrete were reviewed in rather complete detail in *Western Construction*, February 1939, page 35.

Improving the grout

A that time there were still "bugs" to be overcome, particularly with the specially designed grout. Just one of these problems was to insure the adhesion of the grout to the undersides of the large pieces of aggregate. Obviously the grout had to include a relatively high water content to permit pumping and the water would tend to leave the grout and to form a film on the underside of the aggregate producing a plane of weakness. Work on this problem resulted in the development of an admixture which would hold the solid constituents in suspension and maintain the volume of the grout without shrinkage as it set. This kept the grout in full and complete contact with all surfaces of the aggregate as strength was developed. The success of the admixture—later named "Intrusion Aid" — was demonstrated in the strengths of the resulting concrete, which were increased from values of 1500 psi. without the Aid to strengths well over 4,000 lb. when added.

Development and refinement of the grout and its ingredients have been advanced during the past twelve years. These improvements have been in the direction of: (1) delaying early stiffening to facilitate pumping through supply lines and the voids in the aggregate, (2) eliminating shrinkage during setting, (3) providing the effect of air entraining agents with regard to durability. In connection with increasing fluidity and retarding set it has become the practice to substitute a finely-divided pozzolanic material for part of the cement. Fly ash is one of the materials added with notable success.

With these developments in the grout mix the basic steps for the cementing of pre-placed coarse aggregate to form concrete had been completed. During the same period research has continued and refinements developed in both practice and field procedure. Facilities of the Materials Laboratory of the University of California have been employed in laboratory studies. In fact, the suggestion as to the name "Prepakt Concrete" was made by one of the University laboratory engineers. As a result, although this development cannot be claimed to be distinctly Western in origin, much of its background and history lie in the West. Operations of concrete repair and reconstruction are still carried out by the company under the name of Intrusion-Prepakt, Inc., while new construction is handled by The Prepakt Concrete Co.

Basic principles

As the strength of concrete lies in the amount and load-bearing character of its large size aggregate, it follows that any reduction in mortar content (cement, sand and water) tends to increase its strength—at least with respect to the amount of cement used. When concrete is mixed in the conventional manner and placed in a plastic state it is essential that the mortar content be sufficient to lubricate the mass and keep the coarse aggregate from tending to interlock while in motion. As a result, the aggregate is kept from having a point-to-point contact and strengths per unit of cement will be reduced.

When the coarse aggregate is placed in point-to-point contact and subsequently the voids filled to hold the aggregate in position and add impermeability, the concrete is stronger. Although over-simplified, this basic relationship represents the principle and the advantages of Prepakt Concrete.

The key to the production of this final material is the grout, its characteristics and handling. As already described, this cement mixture must have the ability to maintain sand in suspension as it is pumped through pipes and into the aggregate mass. Further, it must expand rather than shrink as it sets, and setting must be retarded and under control.

The grout mix is varied under different conditions, and has been pumped successfully through pipes more than 2,200 ft. long, and in general develops its initial set within a period of 7 hr.

Characteristics of the product

Characteristics of the final concrete will vary over a wide range, depending on the available aggregate, the mix used and the strength desired. However, as a rough comparison, the materials used in a cubic yard of concrete might be compared as follows:

Material	Ordinary Concrete	Prepakt Concrete
Coarse Aggregate (cu. ft.)	18—21	27*
Fine Aggregate (cu. ft.)	12—14	6
Portland Cement (sacks)	6	4
Alfesil (Mineral Filler) (lb.)	0	150
Conditioning Aid (lb.)	0	5
Water (gal.)	32—35	28—30

*Compacted.

The latest major installation of Prepakt concrete to be made in the West, and one of the larger installations to date, is now being carried out at Whittier Narrows Dam which is part of the Los Angeles flood control program. Field operations on this project are reviewed in the accompanying article.

while the secondary pumps deliver grout to lines of 1¼-in. pipe, each pump supplying two grout hoses. This permitted the connecting of eight grout hoses to the vertical pipes rising above the surface of the aggregate, with the simultaneous delivery at eight points. Pressure, capacity and grout-line length were so balanced that grouting progress in a block was calculated to be about 26 cu. yd. of grout per hour, with hourly vertical rise of not more than 2 ft. and hourly horizontal flow of about 6½ ft. On this basis, grouting of one complete block would require 28 hr. of continuous operation, though the exact time period depends upon job conditions and operational variations.

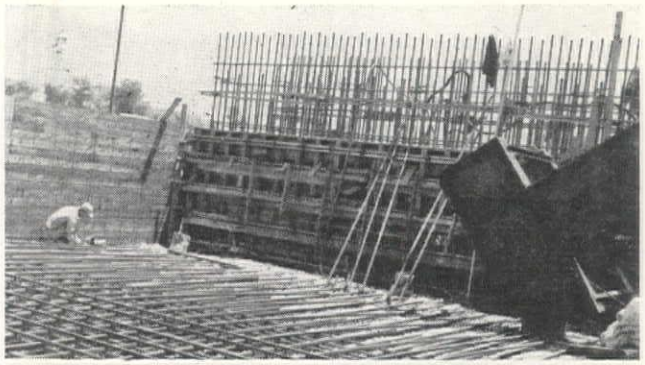
Grouting operations

The sequence of grouting operations began with pumping water through the equipment and lines; followed by pumping grout through to displace all water. Grout hoses were connected to the vertical pipes in the first rows building up a slope of grout within the block by alternate grouting of the first few rows. Slope of the grout is maintained and advances by shifting connections from one transverse row to the next. The vertical pipe inserts are raised as grouting proceeds so that the lower ends remain at least 2 ft. below the grout surface.

When the grout surface reached the upper face of the block, the aggregate surface was trimmed or filled to final grade and a top form applied. This form was faced on the bottom with diamond plaster lath, under which was a fly screen and a final facing of muslin. Heavy steel I-beams are used as weights to hold the top form down, aided by ties extending down the outside of the block to the lower mat of reinforcing.

Top forms and external vibration

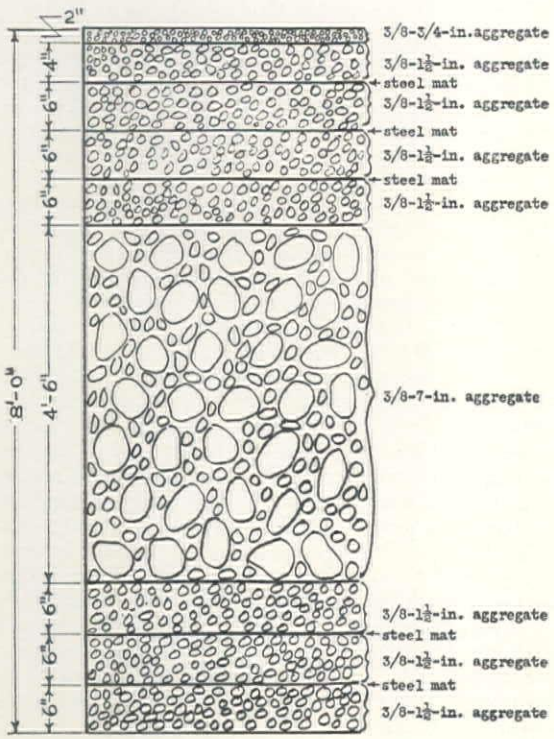
The final stage of grouting was accomplished by inserting pipes through the



REINFORCING MAT is laid directly on aggregate without requiring any system of supports. After placing a mat another layer of aggregate is spread, followed by the next reinforcing.

PUMPING GROUT thru pipes left in the aggregate. As pumping advances the pipes are raised but the lower ends are kept at least 2 ft. below the grout surface. Rise of the grout is limited to 2 ft. per hour.

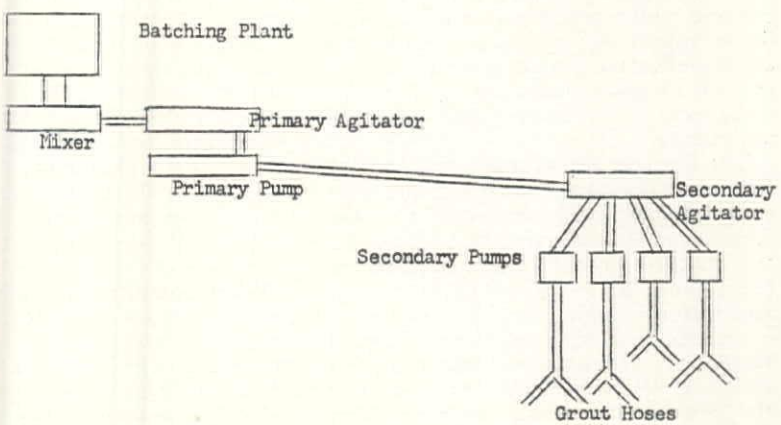
TOP FORM is placed and held down by heavy I-beam, and grout is brought up against the form. This form has a lower facing of screen and cloth to permit escape of air and surface water, while it is vibrated.

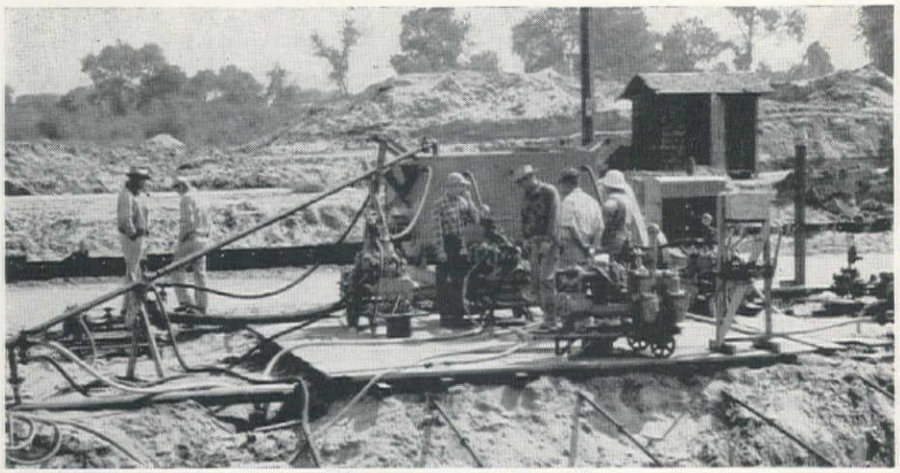


AGGREGATE READY FOR GROUT, AND THE DELIVERY SYSTEM

LEFT—Arrangement of 8-ft. depth of pre-placed aggregate and the reinforcing mats. Reinforcing is laid on the aggregate as it is placed and leveled at the required depth.

BELOW—Through agitators and pumps the grout is delivered from mixer to a hose leading to pipes in the aggregate. At the beginning of the project a water-cement ratio of 8.9 gal. per sack was used. This produced a cement factor of 2.75 sacks per cu. yd. of concrete.





BATTERY OF FOUR secondary pumps delivering grout into pipe lines. An important characteristic of the grout is its ability to maintain the sand in suspension in long delivery lines.

form into the grout below and pumping to fill the section. In this process a pressure of 2 to 5 psi. resulted under the top form and the muslin-faced screen was designed to permit the escape of air and excess water without loss of grout. The top forms during this period, as was the case with the side forms of the block during general grouting, were vibrated externally to assist in securing maximum compaction and to produce a surface condition resistant to erosion effects.

After a period estimated at 24 hrs. following the completion of grouting, the top form is removed

Grout design

A brief review of the nature and proportioning of the grout used in this method will be of interest. The typical grout is composed of Type II cement, Alfesil (Chicago flyash), "Intrusion Aid," which is described as a grout fluidifier, sand passing a #16 screen and having a fineness modulus between 1.5 and 2.0, and an optimum quantity of water. Uniformity and desired fluidity of the grout is controlled by field tests readily made by passing grout samples through a flow cone.

An inverted cone is filled with grout to an exact volume of sample and observation is made of the time required to empty the cone through an opening ½ in. in diameter to its lower end. This apparatus permits quick and easy comparison of the effects of changes of proportions on consistency and fluidity and provides for prompt detection of changes which may have occurred in the line of supply. A similar test method was applied effectively some years ago in the control of grout mixtures used in the construction of cement-bound macadam pavement.

The Prepakt construction at Whittier Narrows was started with a grout mixture composed of 2 parts cement, 1 part Alfesil and 4 parts sand, by volume. To this mixture Intrusion Aid is added in the amount of 1.42 per sack of cement and water is added in the amount required for desired strength and fluidity. In the mix first used, the water-cement ratio was 8.9 gal. per sack of cement and the cement factor was approximately 2.75 sacks per cu. yd. of concrete. Test data and investigations indicate that this grout mixture will produce desired strength and will have satisfactory properties, though it is probable that mixtures differently proportioned might also fulfill the requirements for the work.

Consideration of materials

The choice of materials used in such grouting mixtures and the proportions in which they are used result from the extensive research and experience which have taken place in the development of the Prepakt method. However, the characteristics of the various components seem to show their application to the work: Type II, a modified cement, differs from Type I basically in its property of lower heat generation in hydration. Flyash is favored by many authorities for use in hydraulic structures because of its credited pozzolanic action, believed to assist in long-time build-up of the internal structures and its rounded particles aid in flow of the grout. The Intrusion Aid, called a grout-fluidifier, adds further important factors in carrying out the Prepakt process. Each of these materials would seem to have some effect in bringing about the unusually long period required for initial set, which is about 9 to 12 hr. at a temperature of 70 deg. F. The interval between initial and final set is about the usual time period. The sand grading employed is determined simply on the basis of sizing to permit desired flow and penetration of the aggregate used. Proportioning of the materials aims at securing the desired strength with maximum economy, at the same time maintaining the essential characteristics for grouting under the given conditions.

Personnel

Lt. Col. Wm. R. Shuler is District Engineer at Los Angeles for the Corps of Engineers and the Resident Engineer is J. G. Morgan. Ben Richards is superintendent for Winston Bros. Co. Louis S. Wertz is president of Prepakt Concrete Co., whose project superintendent is Kline McKinzie. R. E. Davis, Jr. is regional representative and field engineer of the company at San Francisco.

Work Advances on Powerhouse and Tunnel at Seattle's Ross Dam

FINAL EXCAVATION work for the powerhouse at Ross Dam is currently being carried out by Ross Powerhouse Contractors on the Skagit River 50 mi. east of Bellingham, Wash. The project is part of the Seattle Board of Public Works power development on the river.

Ross Powerhouse Contractors, a joint venture of Guy F. Atkinson Co., Bressi and Bevanda, A. Teichert & Son Co., and Charles L. Harney, is conducting the work under a $15,000,000 contract which includes completion of the excavation, construction of the steel framework with concrete curtain wall powerhouse, installation of twelve 20 by 19½-ft. spillway gates and their hoists, installation of gates and trash rack at the power tunnel intake structure, and completion of concrete lining of the two intake tunnels, for a distance of 1,800 ft.

Concrete-lined tunnels will have a 24½-ft. inside diameter and each of the two tunnels will branch into two tunnels of 16-ft. inside diameter, which in turn lead to a 16-ft. steel penstock, 235 ft. in length.

When completed the powerhouse will be 130 ft. from the bottom of the draft tube to the roof, with 65 ft. being above ground. It will be 307 ft. in length and 135 ft. in width. Facilities will be provided for four 100,000-kva. generators. Three generators will comprise the initial installation with the first scheduled for operation in December 1952.

One of the major difficulties confronting the contractors is the inaccessability of the site. All materials must be brought to the site by barges traveling over the Diablo Reservoir, which is approximately 5 mi. in length. Materials must be brought to the town of Newhalen by truck or rail, then carried by rail to Diablo Dam and transferred to barges for the water trip. There are no access roads to the site. The contractor is making use of facilities erected during the construction of Ross Dam.

Personnel on the project are: George Wintz, project manager; L. L. Sheddy, assistant project manager; W. H. Wolff, chief engineer for the contractors; C. E. Shevling, resident engineer for Seattle Power and Light; D. L. Collins, master mechanic; M. E. Terry, electrical superintendent; W. H. Bobo, rigger superintendent; R. F. Carscallen, transportation superintendent; W. Mays, carpentry superintendent; K. W. Herr, excavation foreman; T. F. Foran, business manager; J. A. Pednault, personnel and paymaster; J. Snider, office manager; R. E. Ponsford, purchasing agent; Leo Jennett, chief warehouseman, and R. E. Oakley and J. Riley, engineers.

"Paul Bunyan" Canal Water From North for So. Calif.

State completes water resources inventory; studies of areal needs show 675-mile conduit feasible for delivery of supplemental water to south region from Sacramento River basin and north coast

AFTER FOUR YEARS of study, the State Engineer of California, under the direction of the State Water Resources Board, has completed the first stage of a study which will be designated "The California Water Plan." It was authorized by the legislature in 1947 as the preparation of a program for the "full, practicable conservation, control and utilization of the State's water resources, both surface and underground, to meet present and future water needs for all beneficial purposes in all areas of the State."

Bulletins present plan

This year the State Water Resources Board will publish the first of four bulletins resulting from these studies. Bulletin No. 1 will comprise the complete inventory of the State's water resources. Before the end of 1951 it is expected that studies will be completed which will furnish information on the present and ultimate water requirements of the State. This will be published in Bulletin No. 2. With this information on the location and occurrence of the State's waters and on the water requirements in all parts of the State, it will be possible to devise plans to meet the water needs in all areas for all beneficial purposes. Such plans will be presented in Bulletin No. 3. Bulletin No. 4 will constitute a summary of the first three bulletins.

Engineering plans for the control, distribution, and utilization of these waters are currently under study. Certain phases have been developed to the stage that they can be presented in preliminary form. Comparing the ultimate water requirements of the several areas of the State with available water supplies, it is found that the North Coast and Central Coast areas and the Sacramento River basin have available water supplies in excess of their ultimate needs. On the other hand, the San Francisco Bay area, the San Joaquin River Basin (including the Tulare Lake Basin), and the South Pacific Coast, Lahontan and Colorado Desert areas have ultimate water requirements far in excess of their available local water supplies.

North waters available

It is quite evident, therefore, that in any plan for the ultimate development and utilization of the water resources of the State, water must be transferred from the areas of surplus water supply to areas of deficiency. The areas from which these surpluses must come are the Sacramento River Basin and the North Coast. Reservoir sites feasible of development from engineering and geologic standpoints exist in the North Coast area and the Sacramento River Basin. In the North Coast area, more than 50 dam and reservoir sites have been found physically feasible of development to an aggregate reservoir capacity of 16,000,000 ac. ft. and capable of being utilized to produce more than 2,000,000 kw. of electric power, an amount almost equal to all the present hydroelectric power installations in California. In the Sacramento River Basin, reservoir sites in excess of 40 in number and capable of storing more than 15,000,000 ac. ft. of water are also feasible of development. With such installations, the ultimate requirements of those two areas can be met and, in addition, provide surplus waters to areas of deficient water supply.

The plan now contemplated for serving the areas of deficiency would divert water at sea level from the Sacramento-San Joaquin Delta, the central source of supply. For the San Francisco Bay area, the point of diversion would be on Italian Slough near the Alameda-Contra Costa County line in the San Joaquin delta. The water would be lifted by pumping to an elevation of 700 ft., whence it would be conveyed through a 7,000-ft. tunnel to an available regulatory storage site on the north side of Livermore Valley. Releases from this storage would be conveyed through two branch conduits. One branch would bear southerly, serving the south bay shore of Alameda County and the east side of the Santa Clara Valley.

"Paul Bunyan" canal

The conduit to serve the west side of the San Joaquin Valley and areas south of Tehachapi would divert from Old River in the San Joaquin Delta about 5 mi. northwest of Tracy. Water would be lifted to a canal at elevation 225 ft. and would parallel the Delta Mendota Canal to a point near the south line of Merced County, where a pumping plant would lift the water to elevation 400 ft. The canal would then follow grade contour along the west side of the San Joaquin Valley to the Buena Vista hills where another pumping plant would lift the water to elevation 550 ft. Two additional pumping lifts would deliver, through a canal, the water to Pastoria Creek, 3 mi. east of Grapevine, at elevation 1,300 ft. A series of pumping lifts would raise the water to elevation 3,300 ft. to a 6½-mi. tunnel which would convey the water through the Tehachapi mountains to the divide between the Santa Clara River Basin and the desert.

The conduit would then extend along the westerly edge of the Antelope Valley on the desert side of the mountains, passing about 250 ft. above the Fairmont Reservoir on the Los Angeles Aqueduct. It would cross Amargosa Creek and follow the south side of that creek about 450 ft. in elevation above the Palmdale Reservoir, cross Soledad Pass at Vincent and Little Rock Creek below the Little Rock-Palmdale Dam. The course of the conduit would thence be easterly across the Mojave Desert to a portal of a 4-mi. tunnel on the Mojave River at elevation 3,250 ft., terminating in Devil Canyon, a tributary of the Santa Ana River and a source of water for the City of San Bernardino.

The conduit would then follow the south slope of the mountains about 7 mi. north of San Bernardino and Redlands, following southerly to a siphon across the San Gorgonio Pass between Beaumont and Banning. The course of the conduit would then bear southerly along the mountains east of the San Jacinto Valley, passing above Lake Henshaw on the San Luis Rey River and crossing the headwaters of the San Diego and Sweetwater rivers, to a terminus at a tributary of the Tia Juana River at an elevation of 3,150 ft., for a total length of canal of about 675 mi. from the point of diversion in the San Joaquin Delta.

Water to Santa Barbara

A conduit route that would serve Santa Barbara, Ventura, and part of San Luis Obispo counties has also been studied. At a point on the main conduit about 270 mi. from the diversion point in the San Joaquin Delta a series of pumping plants would lift the water to elevation 3,500 ft. in the vicinity of Santiago Creek, near Taft in Kern County, to a tunnel into Quatal Canyon, a tributary of the Cuyama River. With additional conduits water could be delivered from this point to the headwaters of the Sisquoc, Santa Ynez, and Ventura rivers.

The plan of utilizing the Sacramento-San Joaquin Delta as the source of supply and point of diversion has many practical advantages. The point of diversion is below all riparian owners and users of water in the basin above the delta, and therefore, is not subject to objection by such owners. The delta channels are recipient of all the flood flows and return waters from an area of about 50,000 sq. mi. The supply to the delta, therefore, is not dependent on the vagaries of a single stream. Water developed in any part of the Sacramento or San Joaquin River basins could find its way by gravity to the delta, and the same is true of surplus water that would be transferred from the North Coastal area to the Sacramento River Basin.

It is feasible of construction from both engineering and geological standpoints and it is believed would have a first cost less than any other plan and would be capable of serving a complete supplemental water supply for the full development of the South Coast area and the desert areas in Los Angeles, San Bernardino, and Riverside counties.

The estimated annual supplemental water that would be diverted from the delta in accord with this plan is 2,000,-

Concluded on page 127

Record Tunnel Advance at Mining Pit in Utah

By CHARLES HAGEMAN
Project Engineer
The Utah Construction Co.
Ogden, Utah

PAUL C. GUINN and a picked crew made what is believed to be a world record tunnel advance during the month of March for tunnels of the size and type described in the following with 803 ft. driven in 27 working days.

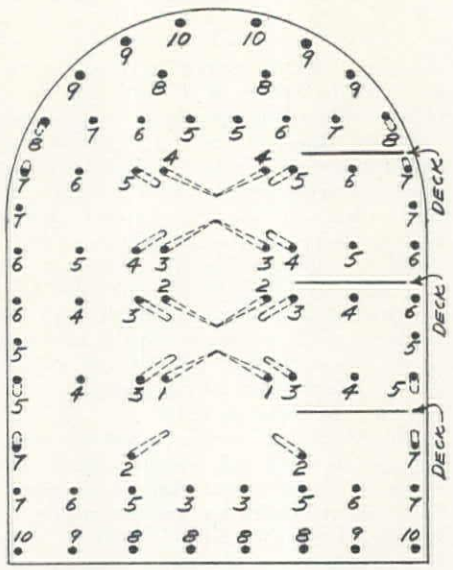
The Utah Construction Co., Salt Lake Division, holds several contracts with the Kennecott Copper Co. for development work in connection with the famous open pit mine at Bingham Canyon, Utah. One of these contracts is for the "5840 Elevation Railroad Tunnel" to be driven into the ore body below the present bottom of the pit, a total projected distance of 7,000 ft.

The net dimensions of the tunnel inside the lining are 18 ft. by 25 ft. Wide flange steel tunnel sets of 31 lb. per ft. and 20 lb. per ft. are used to support the ground, and 2-in. lagging were required from foot block to crown for the entire distance of tunnel driven to date, some 1,800 ft.

Except for about 1,200 ft. of tunnel in the ore body the ground formation is faulted quartzite with intrusions of lime stringers and limestone. The part of the tunnel in the ore body is to be timbered with the view of progressive removal as the pit excavation in the future extends downward and outward, reducing the length of the tunnel. From the portal to the ore body the tunnel will be lined with 10 to 12 in. of concrete on H-beam tunnel sets of the two sizes mentioned, spaced from 4 to 6-ft. centers in accordance with ground conditions. Two-inch lagging is used on the steel sets and 4-in. lagging on the timber sets.

Three-deck jumbo

The structural steel jumbo is 16 ft. high and 36 ft. long with three deck levels. A 2-drum electrically driven car hoist is built into the back part of the jumbo. Drilling equipment on the jumbo consists of eight Gardner-Denver 3½-in. automatic feed drifters rigged for 4-ft. changes. Six of the drifters are mounted on Cleveland power booms.



DRILLING DIAGRAM and blasting order. Levels of the three-deck jumbo are indicated by horizontal lines. Average round is 6.9 ft.

The two bottom drifters are operated from the ground and are mounted on Universals on short bars extending from the bottom chord of the jumbo. Carset carbide detachable bits are used where ground is hard. Liddicoat throw-away bits were used in softer rock and will probably be used in the ore bearing porphyry.

Hauling is done with Goodman 15-ton battery locomotives. Mucking is done with a size 100 Conway shovel with one Conway 75 for standby. The muck cars are 8-yd. capacity, Western dump type, in three strings of eight cars each. Compressed air is furnished by two 3-stage Sullivan compressors of 1,800-cfm. capacity each. A Sutorbilt 22 x 60-in. blower furnishes ventilation through a 22-in. vent pipe.

Blasting and mucking procedure

Actual work in the heading is 7 hr. per shift after allowing for going in-and-out, and for the lunch period. The average number of rounds per 21-hr. day varies between 4 and 5. Length of rounds varies with ground conditions, running from a 5 to an 8-ft. advance.

During the record month of March the average for 116 rounds was 6.9 ft., and the average time required for each round was 4.9 hr. Sequence for a typical round involves:

Drill, load and blast	1½ hr.
Smoke clearing	½ hr.
Mucking	2½ hr.
Timbering (steel sets and lagging)	1 hr.

Considering that every foot of the 803 ft. of tunnel driven that month was supported by steel sets and lagged from footblock to crown, it is apparent that the various functions involved had to click, and the delivery of materials and supplies had to be coordinated with accuracy.

The portal of the tunnel is located within the town of Bingham, which occupies a narrow canyon. As a result, the tunnel muck—25 cu. yd. per ft. of tunnel—has to be dumped 3,500 ft. from the portal. This unusual haulage distance adds to the time and hazards of the dumping operations, which are natural sources of delay resulting from derailments and cars over the dump. Such delays have been minimized on the present job by close attention to the condition of all track, both in the tunnel and outside.

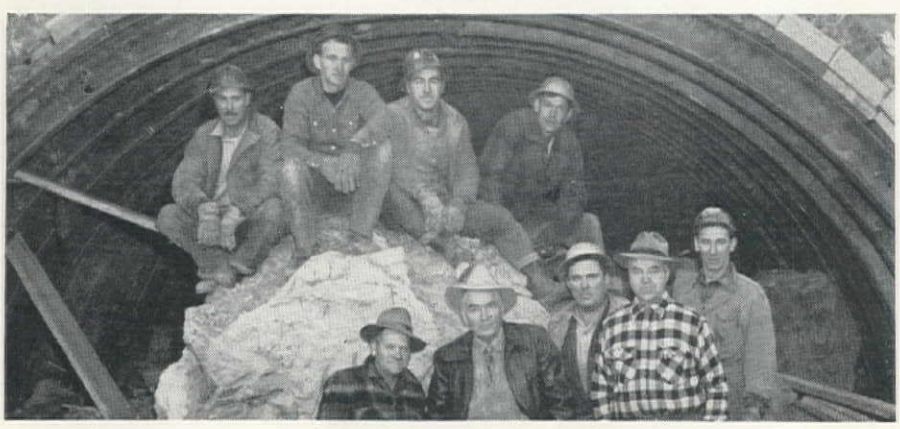
No hinged aprons on jumbo

One of the features which has contributed to the rapid driving on this project is the design and operation of the drill jumbo. It was designed to eliminate hinged aprons at the deck levels and thus save the time of raising and lowering these for each round. This was accomplished by keeping the working space for the muck cars under the jumbo to a minimum side clearance. The main vertical members are 8 ft. 4 in. on centers, which places the inside edge of the working decks 7 ft. 4 in. apart. This arrangement necessitates accurate centering of the muck track in relation to the jumbo track, and also requires keeping them level. The extra care with the track work in the heading automatically produces safe and fast track from the heading to the portal.

Personnel

Paul C. Guinn is general superintendent on the job. Project engineer is Charles Hageman; C. J. Getz, office manager; John F. Tolman, Ray Anderson and Ross Eddington, assistant superintendents; Emmitt Janke, chief electrician; Bob Corbett, master mechanic; and Clarence Shafer, concrete superintendent.

THE CREW of Paul C. Guinn at the portal. Guinn is in foreground center. Charles Hageman, project engineer for The Utah Construction Co. and author of this article, is wearing checkered shirt.



Views on Qualifications for Civil Engineering Licensing

DISCUSSION and editorial comment on the subject of the qualifications necessary to obtain registration as a civil engineer in the State of California appeared in the April issue of *Western Construction* (pages 65 and 75).

Some of the comments and expressions of opinion on this subject received from readers are presented in the following letters, in the interest of finding a logical solution to this controversy.

—Editor.

Required and Not Scorned

Sir:

I have read with amazement the report in your April issue and the editorials regarding the attitude taken by the California State Board for Professional Registration regarding experience prerequisites for candidates.

They could not be "wronger." Practical construction experience should by all means be required, not scorned, and I mean by "practical" the actual doing and directing as a construction man—not as an inspector. Such experience would be a great help in eliminating many of the silly ideas and notions all too many engineers now hold.

Any contractor can list numerous instances in which engineers, licensed or otherwise, have caused much needless expense that accomplished no good to anyone, but only added to the cost of the work. In the long run, of course, the owners and the public have to stand the increased cost. Furthermore, actual construction experience can and will be a very great help to any man who later does designing only.

I have worked many years as a professional engineer and later as a construction man. I know I would have been a better engineer had those experiences been reversed.

Spencer Webb,
Webb and White,
Los Angeles

Honestly Upholding the Law

Sir:

The material presented in your April issue on page 75 is somewhat irrelevant unless you interpret the Board's verdict "Insufficient Engineering Experience" as being biased. Their answer indicates that in their judgment the man did not have sufficient experience and should not be construed otherwise. It will be granted that they can be in error, but as long as they are honestly trying to uphold the law I see no reason to take serious issue with them.

The writer, from personal experience, has always felt that the Board will lean over backward to help a man if they feel he is qualified. This may be less true today than in former years as their work has increased many fold.

The writer does not feel that the contractors should dictate when a man is qualified for a civil engineering license any more than the civil engineers should control the registration of contractors. This preceding statement is not germane to the discussion at hand, since it is specifically stated that the applicant was subordinate to several Registered Engineers.

Two and one-half years as qualifying experience is rather on the meager side when one looks at the statistics. For example, a study prepared by a member of the Sacramento State College staff indicates that a civil engineer is not an engineer until he has had several years experience. In some areas the Associate Grade of engineer requiring four years experience is considered as the one requiring a license.

The most competent men for passing the test as revealed by the examinations are those with 5 to 12 years experience after college. There appears to be no good substitute for experience; therefore, let's acknowledge it and not be too quick to criticize.

Allen H. Brownfield,
President, Structural
Engineers Assn. of
Central Calif.,
Sacramento

It Is Invaluable Experience

Sir:

I should like to comment on the statement presented in your April issue entitled "Is He Qualified for a C. E. License."

Peter Kiewit Sons' Co. for several years has been recruiting and trying to select good, high grade graduate civil engineers from the many engineering schools all over the country. Nearly every applicant, especially those just graduating, pose the same question, i.e., "Will working for your company make me eligible to the state examination to become a Registered Civil Engineer?"

Without question, this is very important to a graduating civil engineer planning a professional career. Almost without exception, however, these men have the opinion that working for an engineering contractor will give them invaluable experience which they would be unable to obtain in any other manner.

Now in regard to the case you have so ably brought out in the open, there are many good arguments pro and con. My arguments may be biased because I feel this situation very definitely deprives the construction industry of some very good material and deprives some young engineers of the opportunities available to them because of this mild "coercion" which very likely originates in some of the classes in most colleges.

I believe the requirement of experience is necessary, but not in its present discriminating form. I can also well understand the professional engineer's viewpoint and desire to maintain a high standard of qualifications for those desiring to become registered. But I am quite certain that this desire is not being accomplished. It seems to me that the answer as to an engineer's qualifications should lie in his ability to pass an examination regardless of his field of experience if he in some way has acquired the realization of the responsibility attached to becoming licensed.

I believe any applicant should have a tenure of experience under qualified engineers whether they are licensed or not. I feel certain that experience gained in the construction field would be of great benefit to every professional engineer and it seems logical to me that experience in construction of engineering works should be an equally important requisite to becoming a professional engineer.

Probably a combination of experience should be a requirement or probably, at the applicant's option, he should be permitted to present one year with an engineering contractor and one year with an engineer or two years with either, providing he can be certified to have had the proper experience in each instance.

This subject is, of course, very controversial and should not be permitted to involve the engineering profession and the contracting profession in a long, drawn out controversy. There must be a common meeting ground where two such closely related professions could agree to the mutual benefit of both as well as the individual graduate engineer who is trying to decide which course to follow. I feel sure that in most instances the contractors' interest lies in the people they employ rather than the desire to employ registered engineers. A contractor in the course of his work needs good engineers as regular members of his organization.

At present, there is a joint committee which is supposed to try to work out a solution for this problem. Because of the fact that everyone interested in this problem is presently extremely busy, it is difficult to spend the time necessary in meetings to arrive at constructive answers. I am a member of this committee and fully realize the importance of the work that could be done, but like others, find it difficult to devote the necessary time. If the construction industry could have representation on the State Board, I feel sure that this matter would receive more attention by the Board. We have many contractors in this state who are registered civil engineers and they thoroughly understand both sides of this matter.

Thos. H. Paul,
Peter Kiewit Sons' Co.,
Arcadia, Calif.

Further pertinent comment appears on the next page

Proper Balance on the Board

Sir:

The April issue of *Western Construction* carried two editorials on the subject of licensing of civil engineers in the State of California. The writer would like to comment.

The editorials clearly outline the construction industry's position in the matter of civil engineers' registration and prequalification requirements. This has been a controversial subject for some time.

The writer attended a meeting with several prominent Los Angeles engineers last year, for a thorough discussion of the same subject. This discussion was precipitated by the efforts of the construction industry to secure the appointment of Ben C. Gerwick of San Francisco as a member of the Civil Engineers License Board. The engineers strongly objected to a contractor being a member of that board, and the contractors' representatives at the committee meeting, Spencer Webb and myself, strongly defended our position that a contractor member was both desirable and necessary in order to maintain the proper balance on the board.

After a rather lengthy and heated discussion, the engineers committee agreed that they would write a letter to the Civil Engineers License Board recommending that the rules for prequalification be amended to include the exact type of training which your editorial lists for the rejected candidate. This type of engineering training was to be accepted, providing that it was obtained under the supervision of a licensed civil engineer.

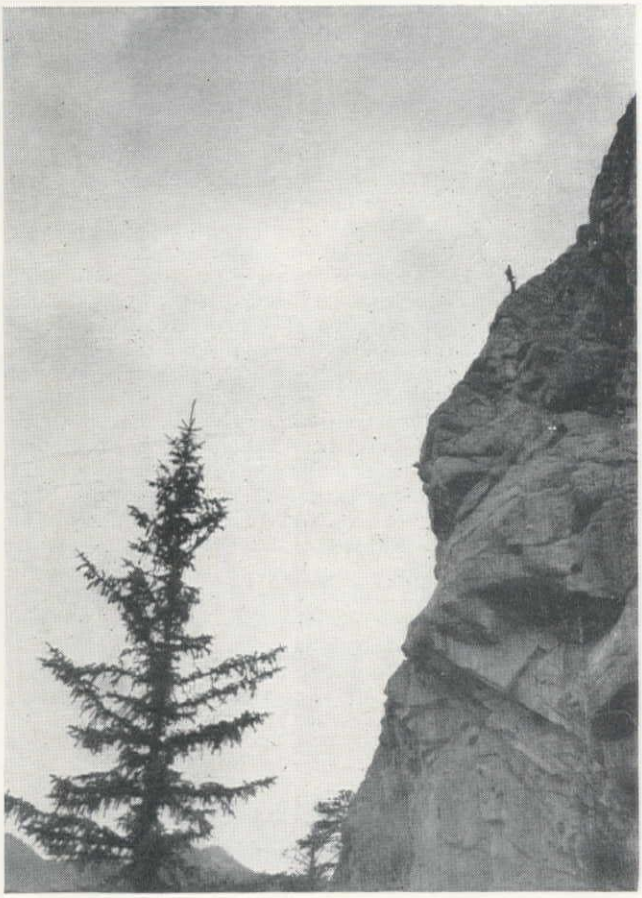
The writer feels that the practice of engineering is not the sole property of a group of technical designers—nor do I believe that a licensed civil engineer must necessarily be qualified to practice all the phases of the engineering profession. I know many qualified sanitary engineers who know nothing about structural design, and I know many qualified structural engineers and highway engineers who know absolutely nothing about the design of a sewage treatment plant.

I believe that the engineering-construction business involves the practice of engineering, and that the construction business needs the services of graduate engineers and registered civil engineers. In order to obtain the services of engineering school graduates, and young engineers who have not obtained their registration certificates, it is important that their experience in the construction business on engineering projects be given consideration for prequalification for a license.

Your editorial is proper; it outlines the issue clearly and concisely, and I would like to request that you continue your efforts until the present inequitable position of the License Board has been modified.

W. W. Hoagland,
Hoagland-Findlay
Engineering Co.,
Long Beach

Preliminary Work Starts for Colorado's Highest Dam



SPECTACULAR VIEW at left shows surveyor working cliff face at the site of Reservoir No. 22 Dam, planned as the highest in Colorado, 340 ft. from base of foundation to top of concrete. The dam, located on South Boulder Creek near Eldorado Springs, will be gravity type; radius arch of 1,740 ft.; maximum section 340 ft. high, 268 ft. thick at base and 25 ft. thick at the top. Reservoir at the dam will provide added storage for City of Denver by regulating use of Moffat Tunnel water. Major contract for the project has been awarded to Macco Corp. of Paramount, Calif., and Puget Sound & Dredging Co., Seattle, Wash. The joint venturers bid approx. $7,000,000 in mid-May.

Courtesy The Engineer's Bulletin

New Funds Help Lewis River Development

AS CONSTRUCTION activities on Pacific Power & Light Company's $26,450,000 Yale hydroelectric project, Oregon, go into full-swing, the firm announces it has negotiated a loan of $13,500,000 on ten-year unsecured bank notes. Obtaining these funds was a major step in the Lewis River power development program.

The Guaranty Trust Company, New York, and other banks agreed to the loan at a rate of 3½%. It is understood that the balance of the money required for completion of the multi-million dollar project will be obtained through the sale of common stock and bonds.

Preferred stockholders are being urged to approve by proxy a temporary resolution which would permit the company to incur more unsecured debt than was originally specified. Completion of the huge dam has many advantages for the power needs of the Northwest. The project can be completed quickly and, when completed, its greatest output will come in the course of the winter months.

Morrison-Knudsen Company, Inc., Boise, Idaho, prime contractor, has crews under way on necessary facilities at the site which is north of Portland, Ore., upstream from the Merwin project. The dam will be of rock fill design and rise about 300 ft. above the river bed. About 3,000,000 cu. yd. of rock will be dumped into the Lewis River for main dam construction. The powerhouse, to be erected on the Clark County side of the river will house two 50,000-kv. generators. Eventually, four are slated for operation.

Record Construction Budget For Colorado Utility

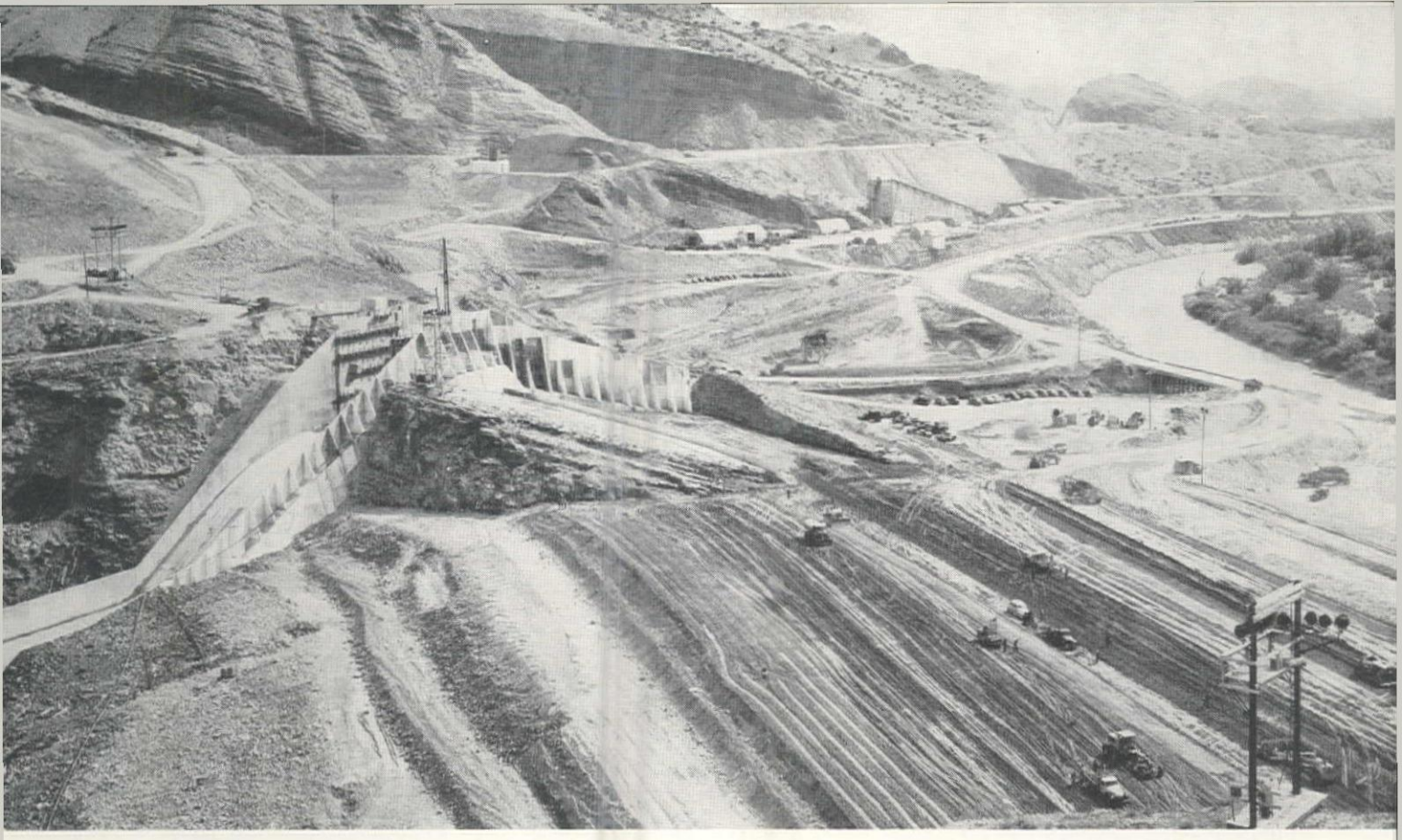
PLANS to spend a record $24,662,000 for construction this year were announced by the Public Service Co. of Colorado. First quarter construction costing $5,389,000 is already under way.

Included in the plan is the third 40,000-kw. generator at the Arapahoe plant, south of Denver, which the company expects to have in operation by November and a 7,500-kw. unit at Grand Junction. Work will get under way on a 60,000-kw. generator for the Lacombe plant, Denver, which is scheduled for completion in 1953.

Nevada Starts Work on Million-Dollar Highway

LAS VEGAS and Pahrump Valley, Nevada, will be linked by a new oiled highway which will be started early this fall. The road will join the picturesque Las Vegas area and the fertile farm lands of Pahrump Valley.

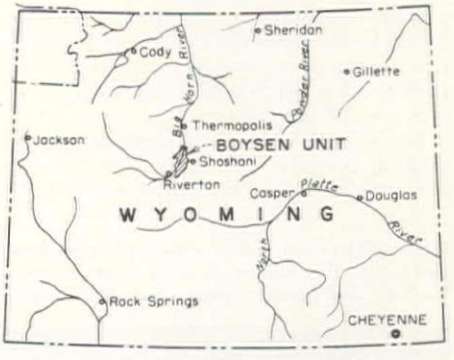
Groups in both areas have been urging the building of such a road since 1945 and many surveys and plans have been considered for its construction. The entire construction project, including sections in Nye County, will cost about $1,000,000.



Design Features and Construction Operations—

The Boysen Dam Project in Wyoming

Multi-purpose project on the Big Horn River for the Bureau of Reclamation in final stages of construction by Morrison-Knudsen Co., Inc., under $13,899,999 contract — Embankment of earthfill structure contains 1,500,000 cu. yd.



FINAL STAGE of construction will be carried out this season on the Boysen Dam project located on the Big Horn River in central Wyoming, with the embankment topped out by early fall and the power plant structure planned for essential completion by the end of the construction season. Relocation of 13 mi. of the Chicago, Burlington and Quincy Railroad at the dam site, included in the contract for construction of the dam and power plant, was completed last September.

By
B. B. KEPFORD
Engineer
Bureau of Reclamation
Thermopolis, Wyoming

Features of the project

The dam and power plant are the major elements of the Boysen Unit, an integral part of the Bureau of Reclamation's Missouri River Basin Project authorized by the Flood Control Act of 1944. Construction of the unit's multiple purpose features makes possible the regulation of flow of the Big Horn River and permits the development of irrigable lands along the river in the Big Horn basin. The unit will also be the source of hydroelectric power for irrigation pumping, industrial development, and rural electrification and will provide for the retention of silt, control of floods, improvement of fish and wildlife, and expansion of recreational facilities.

Boysen Unit was one of the first units to be placed under construction on the basin-wide development. Initial contracts let in 1946 included those for construction of the Government camp, erection of transmission lines to serve the contractor's forces, and relocation of 4½ mi. of U. S. Highway No. 20. Construction under the principal contract for the dam, power plant, and relocation of the C. B. & Q. trackage began in September 1947. Contract was awarded in October 1947 to the Morrison-Knudsen Co., Inc. of Boise, Idaho on its bid of $13,899,-999.30. Unit bids were published in *Western Construction*, October 1947, page 108.

Boysen Dam is an earth and rock fill structure 1,100 ft. long at the crest, 220 ft. high above the foundation, 150 ft. of which is above streambed, and has a volume of approximately 1,500,000 cu. yd. Base width of the dam is 800 ft.; crest width is 30 ft.

Placing of fill for the upstream cofferdam at the dam site was started during

VIEW AT TOP OF PAGE—

PROGRESS of construction on Boysen Dam earth and rock fill embankment (foreground) and concrete spillway (background) is shown in this photograph taken last October from the left abutment of the dam.

the fall of 1949. Work was shut down by freezing temperatures during November but resumed again during March.

The Big Horn River was diverted around the site through a 28-ft. diameter concrete-lined tunnel which runs through the right abutment of the dam and discharges into the spillway stilling basin. This tunnel will be plugged after completion of the power plant. The diversion of the river, completed in December 1949, made possible excavation of the wide cutoff trench below the former stream bed. Excavation was started during March of 1950 and was completed to bedrock, 70 ft. below the river bed, by the end of May 1950.

Well points in cutoff trench

A well-point system was installed by a subcontractor to dewater the cutoff trench. Five stages of well-points (see illustration) were placed with varying heights up to 13 ft. between stages. Individual well-points with 1½-in. risers were placed in larger pipe casing which had been previously jetted into position about 3 to 4 ft. apart. Out-flow from each stage was collected in 8-in. headers. These headers were then pumped into a main 24-in. discharge pipe. Inflow near the bottom was collected in sumps and pumped out. Discharge collected from the sides and bottom of the trench amounted to about 1,250 gpm.

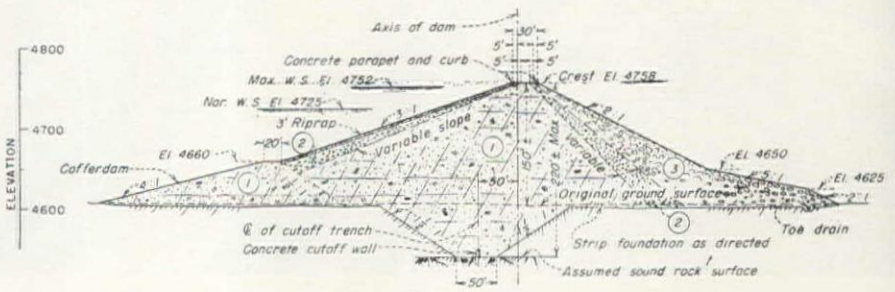
Stripping and grouting foundation

Stripping of the dam foundation was carried on intermittently until completion during May of 1950. This work consisted primarily of removing silt, sand, gravel, shale and weathered sandstone down to solid formation along the central longitudinal axis of the dam. Usable rock was stockpiled for later use in rock portions of the dam.

Grouting of the rock foundation and placing of the concrete cutoff wall closely followed the excavation. The concrete cutoff wall consisted of a base 3 ft. wide and 3 ft. deep placed in a line-drilled trench in the rock, and a non-reinforced wall varying between 5 and 10 ft. in height.

Placing embankment materials

The Boysen Dam embankment consists of three zones of material. Zone I is relatively impervious material and forms the central portion of the dam as well as the upstream cofferdam which is incorporated as part of the completed structure (see drawing of cross-section). Zone II is the semipervious portion and is placed upstream and downstream of Zone I. Zone III is rockfill and is placed downstream of Zone II. A blanket of riprap 3 ft. deep is placed on the upstream slope above the cofferdam.



TYPICAL CROSS-SECTION of the Boysen Dam embankment. Note that upstream cofferdam is incorporated as part of the completed structure.

Filling of the cutoff trench began in June 1949. Placing of the Zone I material was completed in October 1950. Zone II and Zone III placing continued into December. The embankment was placed to an approximate height of 152 ft. above foundation by the end of 1950, leaving about 68 ft. to be placed this season.

Zone I material was obtained from three borrow areas upstream from the dam, a maximum haul distance of 2 mi. Material from two of the borrow areas had a high rock content larger than the 5-in. maximum allowed by the specifications. As moisture content of the borrow areas was very low, additional moisture was provided by diking and irrigating the borrow areas.

Material was loaded by draglines and shovels and hauled by 13-cu. yd. bottom-dump trucks and 10-cu. yd. end-dump trucks. Spreading was accomplished by dozers and patrols after which rock over 5 in. in size was removed by hand, loaded into mobile equipment and stockpiled for later use. Compaction of the 6-in. lifts of material was accomplished by 12 passes of a standard Bureau tamping roller. Unit weight of the compacted Zone I material averaged 142 lb. per cu. ft. wet density at 8.2% moisture and containing 32% rock over ¼-in. size. Zone II and Zone III materials were obtained from stockpiles from previous excavations and from borrow areas. Riprap was also obtained from stockpiled materials.

Settlement recorded

Installation of embankment settlement apparatus to record consolidation and piezometer tips to measure pore pressures proceeded with embankment construction. The embankment settlement installations were placed at two

FIVE LIFTS of well points were used to de-water the cutoff trench 70 ft. below streambed level. This system, including sump pumps in the bottom, handled 1,250 gpm. Concrete cutoff wall in place ready for impervious fill.

USING existing railroad tunnel through right abutment the 15-ft. diam. penstock for power development and 66-in. outlet pipe were installed during last season.

locations in the Zone I fill, 120 ft. apart near the center of the dam, straddling the cutoff wall. The consolidation recording units were placed at intervals of 5 ft. in elevation. Readings during December of 1950 showed 1.81 ft. of settlement under 149 ft. of fill. Piezometer tips placed in the embankment are connected by means of plastic tubing to gages located in a terminal well at the downstream toe of the dam. Periodic readings thus far show very low pore pressures on all 34 installed tips.

Spillway work

The spillway consists of a concrete-lined channel on the right abutment of the dam. Capacity of the spillway is 20,000 sec. ft. controlled by two 30-ft. by 25-ft. radial gates. The spillway has a width of 66 ft. and an overall length of 472 ft., with the crest located 25 ft. below the normal reservoir level and 85 ft. above the normal tailwater surface below the power plant.

Excavation for the spillway was essentially completed during 1948. Concrete placement began during 1949 and is now complete except for the roadway bridge which spans the spillway. Concrete volume will amount to approximately 19,700 cu. yd.

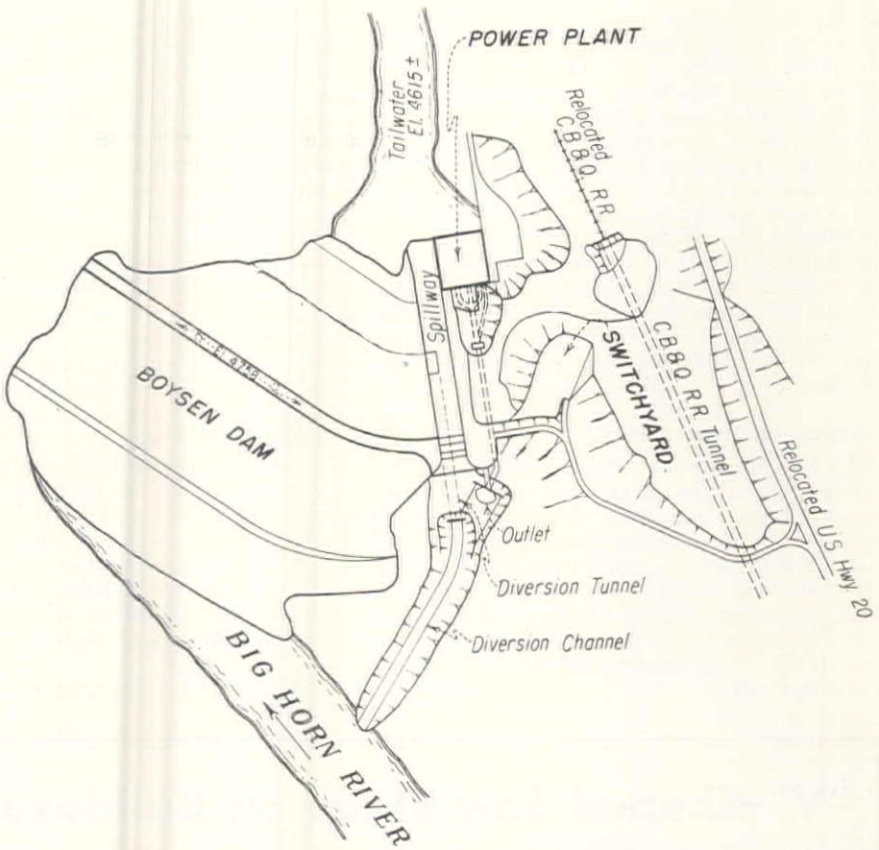
Concrete aggregates were obtained from terraced gravel deposits lying along the river bottom about 6 mi. south of the dam site. A gravel processing plant was constructed by the prime contractor near the deposits. A typical concrete mix for the spillway using Type II cement showed a 28-day strength of 3,850 psi. with 2.5-in. slump and a water-cement ratio of 0.48. Entrained air was 4.1%, the mix proportions being cement, 1.00; sand, 2.00; and gravel, 5.30.

Power plant and penstocks

The power plant is located adjacent to the downstream edge of the spillway. The building is a reinforced concrete structure containing two generating units, each consisting of a 7,500-kw. generator driven by a 10,500-hp. hydraulic turbine.

Water for operation of the turbines will be carried through a 15-ft. diameter steel penstock which divides into two 10½-ft. penstocks. A 66-in. outlet pipe placed above the penstock has a common trashrack structure with the penstock. The existing C. B. & Q. railroad tunnel through the right abutment of the dam was enlarged and utilized to provide passageway for the penstock and outlet pipe. After installation of the steel tubes the tunnel will be sealed by concrete encasement and grouting of the surrounding rock.

Field fabrication of the 15-ft. diameter penstock sections too large for shipment was accomplished at Boysen during 1950. The remainder of the sections consisting of the 10½-ft. penstock and the 5½-ft. outlet pipe were shop fabricated. Installation began during November in the old railroad tunnel soon after release of the former track, and is still under way. Concrete placing in the trashrack structure began last September and will be completed this season.



PLAN OF BOYSEN DAM AND APPURTENANT STRUCTURES

Excavation for the power plant was recently completed. This work proceeded rapidly after release of the former railroad line. A major part of the excavation was in a dense diorite formation and this rock was either stockpiled or placed directly in the Zone III portion of the dam.

Power plant equipment

Foundation concrete placement has been started for the power plant structure. The contractor is to complete the structure and place all equipment embedded in the concrete. Another contract will be let to install the remainder of the equipment in the power plant. Annual production from the completed plant is expected to be 72,000,000 kw-hr.

Switchyard for the power plant and connecting transmission lines is located on the right abutment above the power plant. Site grading was performed by the prime contractor, but installation of equipment will be made under the completion contract for the power plant. Transmission lines are to connect with Kortes Power Plant, south of Casper, Wyoming, and Buffalo Bill Power Plant near Cody, Wyoming, in the northwestern portion of the State. Other lines will feed into the general network in the Big Horn Basin of Wyoming.

Reservoir features

Boysen reservoir will have a total storage capacity of 1,493,000 ac. ft. Of this amount, 560,000 ac. ft. will be provided for active storage and the remainder will be used for flood control and dead storage. At maximum level, about 31,000 ac. will be inundated.

Clearing of the reservoir area is now in progress. A total of seven contracts were awarded for clearing 12,722 ac., and work was started during the latter part of 1950. Patches of cottonwood trees along the river bottom are being cleared, but sagebrush and greasewood will not be removed.

Relocation of the C. B. & Q. railroad required construction of 13 mi. of roadway and track and two sidings. Major structures were a 7,130-ft. tunnel and seven bridges. Sub-structures for the bridges and the tunnel were constructed by the contractor, with superstructures fabricated and erected by the American Bridge Co. Construction of the railroad roadway and placement of the ballast and track were completed by subcontractors.

Concrete-lined railroad tunnel

Construction of the railroad roadway and tunnel began during the fall of 1947. The north portal of the tunnel is situated near the power plant, and track subgrade at this point is 28 ft. below normal reservoir level. The tunnel is located on tangent and a rising grade of 0.50% from north to south. Finished width is 17 ft., and height from subgrade to crown of arch is 25 ft., 8½ in. It is located through a region of highly faulted and folded sedimentary formations, and 8-in. wide flange structural steel members were used to support the roof and sides. These steel members were spaced at varying intervals depending upon the type of rock encountered.

The concrete tunnel lining has a minimum thickness of 2 ft. Grouting of the surrounding rock followed the placing

of the lining. Access to the tunnel for mucking and concreting operations was provided at three cut-and-cover sections. Tunnel ventilation is provided by three fan units having a capacity each of 200,000 cu. ft. per min. Two fan units were located in one fanhouse. The two fanhouses are reinforced concrete structures located directly over the tunnel and connected by vertical shafts. The 129-lb. rail for the tunnel was welded into 975-ft. lengths at Bonneville, Wyoming. These long sections were placed on flat cars and hauled to the tunnel for placing. For the remainder of the track outside the tunnel a 90-lb. rail was used.

Excavation for relocation

Excavation amounted to 2,900,000 cu. yd. of material for the railroad roadway. Rock encountered was relatively soft sedimentary formations consisting primarily of sandstone, siltstone and shale. Roadway excavation was bid unclassified. A major portion of the material was common excavation and was moved by an elevating loader and 13-cu. yd. bottom-dump trucks.

The railroad tunnel was driven simultaneously from two headings. Pattern drilling was made for each round consisting of approximately 100 holes, 10 ft. deep. Shooting was made with 10 delays from the center outward. Electric overshot muckers mounted on tractor frames and other equipment were used to load and haul the excavated material to areas outside the tunnel.

Concrete for the railroad tunnel was batched and mixed in a central plant and hauled to the tunnel by means of 4-cu. yd. agitators mounted on end-dump trucks. Two double pumping units were used for placing pumped concrete. Tunnel lining and invert placement sections were 50 ft. or 75 ft. long.

The seven bridges required for the relocation consisted of one precast concrete span bridge, five deck plate girder bridges and one combination girder and deck truss span bridge. This last bridge, spanning the Big Horn River, has an overall length of 557 ft., and erection of the superstructures was completed in 1949.

Ceremonies dedicating completion of the railroad relocation were held at the south portal of the tunnel on August 5, 1950. Speakers at the dedication included Wyoming State officials, Reclamation Association officials, the contractor's representative and Bureau of Reclamation officials. Regular train traffic was started over the new line on September 5, 1950.

Personnel

Boysen Unit is located in the Big Horn District of Region 6 of the Bureau of Reclamation. The dam was designed and is being constructed under the direction of L. N. McClellan, Chief Engineer of the Bureau of Reclamation and Director of the Branch of Design and Construction. Kenneth F. Vernon is Regional Director at Billings, Mont., and G. R. Rollins is project engineer at Thermopolis, Wyo. At Boysen Dam, Theodore E. Mann is field engineer and Maurice C. Wren is chief inspector.

For Morrison-Knudsen Company, Inc., B. Williams is project manager, George Piedmont, general superintendend and Royal R. King, job engineer.

"V"-Shaped Saw Blade on Bulldozer Fells 24-Inch Trees

AN OUTSTANDING innovation on the Boysen Dam project is the machine pictured below, introduced by Mid-States Construction Co. for clearing trees in the reservoir area. Trees up to 24 in. in diameter fall with a single swipe of the 6-ft. long "V"-shaped saw blade which is attached to a bulldozer.

With the use of the big saw, which has teeth on each side, a single dozer can fell as many trees as could be cut by five chain saws and crews. The operation is simple, with the dozer operator guiding the saw so that it strikes the tree near the point of the cutting edge and then forcing the saw through the trunk, cutting with a single pass cottonwood trees with a diameter up to 24 in. A single unit can clear up to 5 acres of dense timber in 8 hr. In areas with lesser cover, 10 ac. can be cleared in an 8-hr. shift.

WITH SAW BLADE introduced on the Boysen Dam project, one machine and operator can manage amazing speed in clearing trees. Blade can be set close to ground to help clean-up. Machine shown is owned by Watkins and Pennington of Fort Collins, Colo.

The saw blade, introduced by Mid-States, was soon adopted by six other contractors engaged in reservoir clearing operations at the Bureau of Reclamation dam. The blade, which makes it possible to cut the trees at ground level, has several variations at Boysen, with six contractors engaged in clearing work using slightly different blades and teeth arrangement. Some of the blades are finely cut and kept sharp; others work with a tearing action and do not require sharpening.

A saw with a single blade has been adapted for use in cutting pine and cottonwood trees in the clearing of the reservoir area for the Bureau's Keyhole Dam on the Belle Fourche River near Moorcroft, Wyo. The blade in use there by Lamb Construction Co. of Lush, Wyo., is shorter and more adaptable to the terrain and cover at the reservoir site.

The six contracting firms presently engaged in clearing operations at Boysen are Asbell Brothers of Riverton, Wyo.; Lichty Construction Company and Brasel and Whitehead of Riverton; A. M. Conrad of Big Piney, Wyo.; Watkins and Pennington of Fort Collins, Colo.; Linquist, Olson and Company of Cambridge, Minn.; and Mid-States Construction Company. C. L. Hubner Company of Denver recently completed a clearing contract. The total area to be cleared under the seven contracts amounts to 12,722 acres, of which 3,610 acres were classified as heavy timber.

$29,000,000 Army Project In Utah Desert Area

Work active under number of major contracts at Dugway Proving Ground—Project includes rehabilitation of World War II camp at site and adding extensive facilities to provide permanent location for Chemical Corps

A PROJECT representing a total $29,000,000 expenditure is actively under way at the Dugway Proving Ground located about 60 mi. southwest of Salt Lake City, near the southern end of the Great Salt Lake Desert. The work, which is being carried out under the direction of the Salt Lake Area office of the Corps of Engineers, involves rehabilitation of the World War II camp at this site and the adding of extensive facilities to provide a permanent location for the Chemical Corps. Major recent and active contracts on the project are shown in the accompanying list. A 400-unit Wherry Housing Project to be awarded shortly represents another estimated $4,000,000 addition to the construction program at Dugway.

In 1949 the Dugway Proving Ground project was undertaken as a permanent facility of the Chemical Corps. It is now desired to complete construction at Dugway as soon as possible, and this will be substantially by the end of 1951. Facilities will be of the permanent type in concrete and steel, housing a considerable amount of scientific equipment. Consequently, the four to six months' construction time of the World War II wooden camps could not be anticipated.

A camp of the "theatre of operations" type was built on Government Creek in 1943, and served the war-time testing programs of that period. A rehabilitation program amounting to approximately $1,000,000 is under way on this existing temporary camp, which will transform it into a useful continuing adjunct of the newer project.

Details of the project

The Proving Ground is a square tract about 30 by 30 mi. in extent in Dugway Valley, two mountain ranges west of Salt Lake City. Access is over a paved highway (U. S. 40, and Utah 36) through Tooele and over Johnson's Pass, across the Stansbury Mountains and Skull Valley to the edge of the Great Salt Lake Desert. On the easterly margin is Easy Area situated in a pleasant little valley facing southerly, which will contain the administrative office and other structures, the quarters, barracks, dormitories and the community facilities, including post exchange, school, fire house and chapel and hospital. About $10,000,000 will be spent here.

About 10 mi. to the west along Dugway Road lies Dog Area, the World War II Camp which is being rehabilitated, provided with new water system and approximately a dozen new buildings containing laboratories and warehouses. Just north of Dog Area across Government Creek is Able Area where a new air strip, operations buildings and laboratories are being constructed to cost around $2,500,000. About 2 mi. southwesterly lies Charlie Area, the World War II chemical storage yard where a surveillance building for arctic, tropic and desert testing is being constructed, together with several warehouses and shops.

Several miles west of "Dog" lies "Baker" Area on the edge of the Salt Flats where an air-conditioned bacteriological laboratory is being built with power plant and auxiliary buildings at a cost of $2,500,000. Seven miles west of "Baker" is the half mile grid, a test area for observation of the effects of various operations. This area contains a pipe grid served by vacuum pumps with numerous inlets for sampling the results of tests.

Last winter was occupied largely with planning and preparation of working drawings by a force of 250 architects, engineers and draftsmen in five offices in three cities. The principal architect-engineer contracts are held by Ashton, Evans and Brazier of Salt Lake City and the Ralph M. Parsons Co. of Los Angeles, with supervision by the Area Office in Salt Lake, which operates under the San Francisco District, Corps of Engineers. Salt Lake is quite strategically located for this work with good airplane and train services to both San Francisco and Los Angeles. Present plans for Dugway Proving Ground call for expenditure of some $29,000,000 during the current year, about as follows:

New Construction	$22,000,000
Wherry Housing	4,000,000
Rehabilitation of World War II Camp	1,000,000
Engineering and Overhead	2,000,000
Total	$29,000,000

The government construction camp provides housing and barracks for 800 men, and cafeteria-commissary for approximately 2,000 men, together with recreation hall and outdoor movies. These facilities also include a 200-trailer camp. All of these facilities are available to contractors' personnel. Total employment at Dugway will reach about 3,000 during next month; contractors have provided additional facilities for their men, beyond those allotted by the Government.

The architect-engineer contracts let last year were later expanded to call for designing all of the hundred-odd project structures and placing them under contract during the spring. The first block of these plans were advertised in February for more than $10,000,000 worth of work:

(a) Roads and site grading (gravel and base course with a 2-in. asphalt surface) on approximately 20 mi. of road. Construction of base course and asphalt and concrete paving on a 200x8,000-ft. runway and site grading and compacting earth foundations for grade slab buildings in all areas; (b) Electrical distribution system consisting of about 20 mi. of pole line carrying 12.5 kv. and lower voltage circuits, together with installation of sub-stations and switch gear; (c) Water distribution and sewer systems for Easy and Dog Areas: approxi-

Concluded on page 95

Major Contracts for Dugway Proving Ground Project

Contractor	Work Involves	Amount	Approx. Completion
Joseph K. Thayn	Cebar Test Facilities	$ 160,937	December 1950
Stolte, Inc.	Rehabilitation—Phase I	277,117	January 1951
Olson Construction Co.	Remodeling Chem. Lab.	128,751	May 1951
Tolboe & Harlin Construction Co.	Rehabilitation—Phase III	117,485	April 1951
Jacobsen Construction Co.	Contractor's Temporary Housing	813,574	April 1951
Wheelwright Construction Co.	½-Mi. Sq. Grid	253,230	March 1951
Moore & Roberts and B & R Construction Co.	11 Buildings	4,250,000	February 1952
W. W. Clyde & Company	Roads, Parking, Runway	1,134,000	October 1951
J. Kenneth Thayn	Water and Sewer Systems	853,186	November 1951
C. L. Electric Co.	Electrical Dist. System	295,177	November 1951
M. J. Brock & Sons, Inc., and R. J. Daum Construction Co.	Area "A"	1,382,133	March 1952
Jacobsen Construction Co.	Area "B"	2,544,000	March 1952
Christiansen Brothers	Construction of Machine Shop "Easy Area"	391,351	May 1951
David M. Sweeney and Triangle Bldg. Co.	3 Buildings in Dog Area	340,134	December 1951
Cahill-Mooney Construction Co.	11 Bldgs. in "E" Area	2,467,550	December 1951
Christiansen Bros.	Combined Oper. Bldgs. "E" Area	912,044	December 1951
Germer, Abbott & Waldron Co.	Paving Granite Peak Road	185,947	August 1951

How to Get Efficiency and Output From Your Power Saws

Knowing what your power saw can do, and paying attention to the details of maintenance and electrical requirements, can result in increased performance with fewer breakdowns

By
WILLIAM DUDLEY
Southern California Manager, DeWalt Inc.

KNOWING what a power saw can and cannot do will save cutting time and man-hours on any construction job, and practically eliminate costly breakdown and lost repair-time. Because a power saw is a relatively uncomplicated piece of machinery that is both easy to operate and repair, contractors do not have to spend a great deal of time investigating their possibilities and requirements. But the returns they obtain from these investigations could easily be enormous.

Relatively few things need to be considered in an effort to keep your cutting time down while increasing performance without added repair time. If you know how to set up your saw and give it the few inexpensive things it requires, you will find that the saw will run longer without expensive breakdown; if you know the potentialities of your power saw you will find many new and money-saving ways to fit them into your woodcutting.

Giving sufficient electrical current to permit utilization of the potential of your power saw, and giving it the proper maintenance are two fundamental steps that will be taken by anybody interested in putting efficiency and profit into woodcutting operations. Keeping these two things in mind during cutting operations will help to obtain the maximum service from your power saw.

Electrical requirements

It would be wasteful to use a dray horse to pull a pony cart. It would likewise be wasteful to flood more voltage than is necessary into a motor. On the other hand, it would be killing to hitch a 7½-hp. power saw to a trickle of electricity. And to ask either the dray horse or the pony to work without their just portion of feed and care would lead to a breakdown, and the purchase of a new horse. The same can be applied to such a thing as a power saw. It too needs fundamental considerations, and the giving of them can be the difference between its long life and breakdown at the wrong time.

The voltage entering the motor of your power saw should be the voltage specified by the manufacturer of the saw. Voltage should be checked at the switch terminal. General Electric has an A-C Volt Ammeter on the market which is one of the best volt ammeters available for checking the voltage in the lines coming into your motor.

Check fuses and wires

Two other things that should be noted under the heading of "Electrical Requirements." Wires carrying the current to the motor should be sufficient to carry the voltage coming into it, and fuses should afford ample protection to the motor. Two tables on this page provide the information you need in the way of fuses and wires.

There are, as well, certain things that you should not do while checking the voltage of your power saw. NEVER check the voltage at the power entrance. (The power entrance is the place where the power is tapped from the main power line.) Also, do not use pocket testers. They do NOT show the voltage drop at the motor.

Maintenance

Maintenance is another thing that should be considered by owners of power saws interested in efficiency and accuracy. Most power saws are relatively simple machines with few moving parts that are subject to wear. However, each machine has its particular danger points, and they should be known when you buy and start to use your power saw. If that is not the case, consult the power saw representative in your area. There is always one on hand, and he is more than willing to show you the few tricks that will keep your machine in the best possible condition.

Proper Wire Sizes for Installing Power Saws

Wire Sizes—
Brown and Sharp Gauge

h.p. of motor	110-220 volts	220-240 volts
1	12	12
2	10	12
3	6	8
5	2	6
7½	2	4

Table is for one motor only. For multiple operations consult your local power company.

These wire sizes should be used when the motor is between 60 and 100 ft. from the power source. For distances less than 60 ft., use a wire size that is one even size smaller; for distances between 100 and 160 ft., use a wire that is one even size larger; for distances between 160 and 200 ft., use a wire that is two even sizes larger.

Lubrication should be given particular attention. Generally, no oil and grease should be used on the arm of a radial arm power saw. The bearing tracks should be cleaned with carbon tetrachloride and wiped dry with a clean cloth. That is because oil will attract wood dust. Carbon tetrachloride will dissolve the gums and resins that adhere to the arm tracks of the saw.

Radial arm power saws have a number of clamps and handles that control the positioning of the tool arbor. The adjustments that can be made on those handles and clamps, which are designed to eliminate unnecessary wear on certain parts of the machine, are simple in certain machines, difficult in others. But in all cases the adjustments required should be known and made. The roller bearings, the arm tracks, the pivot point of the arm, and the pivot points of the yoke and motor are the places where wear is most likely to set in. They should be periodically checked for tension, cleanliness and alignment. If you are not certain about the adjustments that should be made on your power saw, contact your power saw representative. Within one-half hour he can show you the main points to be aware of and how they can be maintained in the best possible condition.

Baby your blades

Saw blades are another item that should be kept in tip-top shape. They must be sharp, properly filed, and run at the proper speeds. Also, keep your blades clean if you want to get the best performance and maximum life from them. Gum and dirt clinging to a saw blade are deadly enemies to blade efficiency and life. The amount of damage that results from gummed-up blades is surprising . . . and costly. Extend the life and efficiency of your saw blades by occasionally dipping them in hot water and wiping with a clean cloth. Never scrape saw blades with a sharp tool. That causes small cracks; and larger cracks and breakage are a natural result.

Radial saw potential

Most radial saws are many machines compacted into one. They have three

pivot points that permit the tool arbor of the machine to be swung and/or turned into almost any conceivable position. The arm of most radial power saws can be swung 360 deg. horizontally; the motor yoke of radial arm power saws can be swung 360 deg. horizontally; and the motor of most radial saws can be swung 360 deg. vertically. Combining any two or all of these three potentials will permit you to place the tool arbor of your power saw in almost any position. In addition to that, various tools can be placed on the tool arbor of your power saw. Inasmuch as you can place a saw blade, dado head, sander, grinder, router, shaping or moulding head on the arbor while it is in most positions, you can use your power saws for almost unlimited applications.

Take advantage of versatility

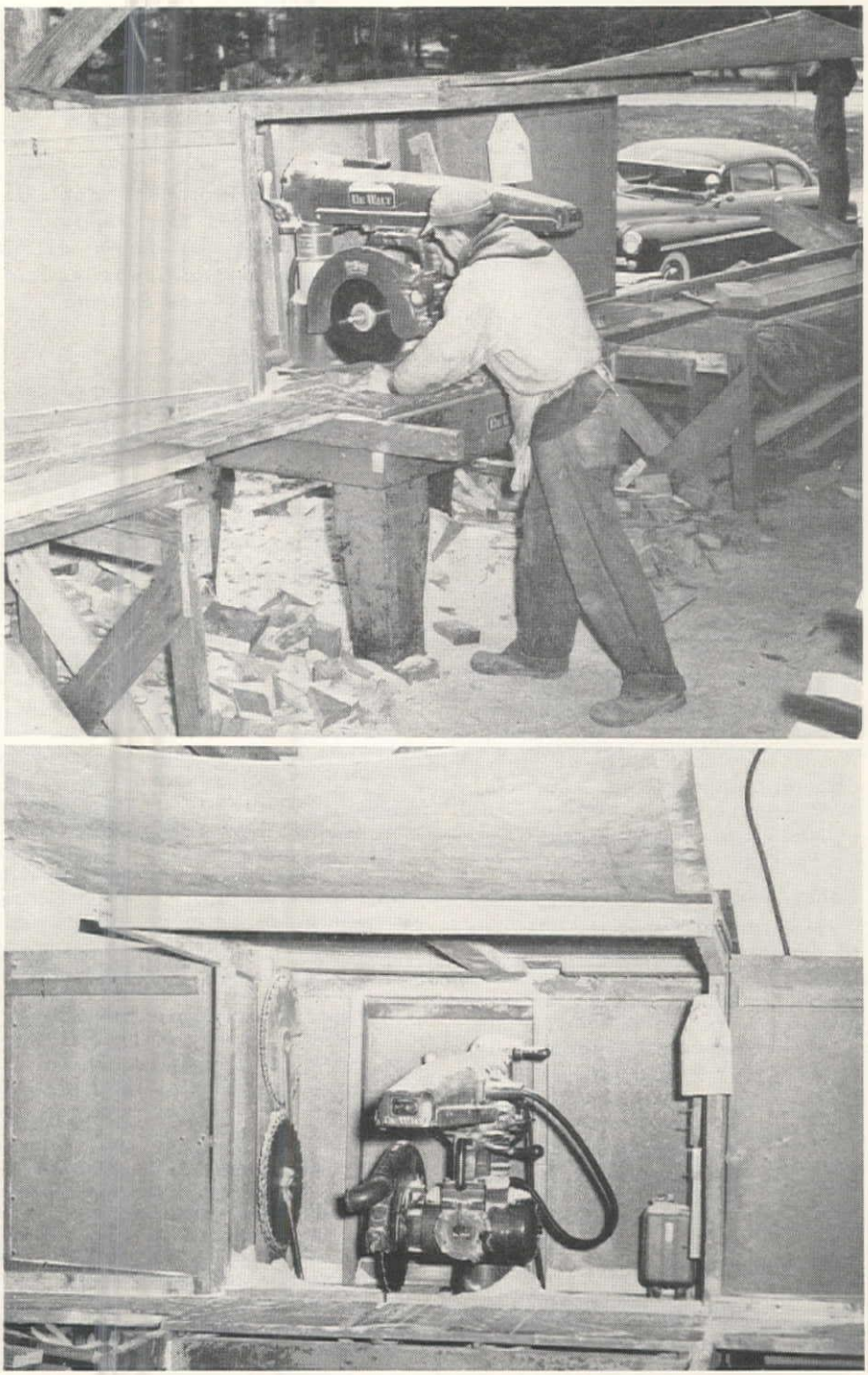
The number of times that a power saw is used for one operation when it could be performing two or three time-saving jobs is large. Too often contractors limit their power saw to merely cross-cut or rip when it could be used for that as well as a number of other operations. A radial arm power saw is a versatile tool that can perform almost unlimited wood cutting, finishing and shaping jobs. Cutting, shaping and finishing jobs that sometimes are given over to manual completion or a less powerful and more awkward to operate machine can be quickly and easily dispatched by radial arm power saws.

Plowing is one such operation. Radial arm power saws plow as well as they rip. Grooves and other dado head cuts such as rabbeting are also naturals for power saws. Bevel ripping is another operation that you will find an easy one for the radial arm power saw. Some are better than others for the job at hand. But you will find that your radial arm power saw can be used in many ways on various jobs. It would be a good idea to ask your power saw representative to review the potentialities of your saw which, in all probability, will open up new possibilities on your job.

Fuse Protection for Power Saw Motors

Motor	115 volts	220 volts	440 volts
½ h.p.	25 amp.	25 amp.	25 amp.
1 h.p.	30 amp.	30 amp.	30 amp.
2 h.p. 1 phase	30 amp.*	20 amp.*	
3 h.p. 1 phase	60 amp.	30 amp.	
3 h.p. 3 phase	30 amp.	20 amp.	15 amp.
5 h.p. 3 phase		40 amp.	20 amp.
5 h.p. 1 phase		60 amp.	
7½ h.p.		60 amp.	30 amp.

This *Fusetron table shows average fuse protection. However, it should be noted that local power conditions and various motors may introduce a variation. Local power company can give more detailed information on local conditions.



TOP—Cutting form lumber for concrete work is a universal use for power saws where proper installation, maintenance and layout of the shop makes for efficiency and time-saving.

BOTTOM—Protection of a power saw can be provided at small cost by this type of plywood cover, with hinged sides and top, built directly on the table of the saw.

Remember that your power saw, like any other piece of good equipment, is primarily a time- and money-saver. The more you use it, the more you will be able to save in time and in money. In other words, when you have your requirements in mind, find out how much of your cutting job your power saw can handle. The ideal cutting shed is one that will have "material to be cut" coming in at one end, passing down conveyors and out the other end to be used on the job. If you can perform that feat on your particular job, you will find your savings growing fast. You will have eliminated the biggest money eater on any wood-cutting job—handling.

Know the potential

Summarizing, use power saws where you can: know the potential of power saws and ask power saw representatives for suggestions in setting up your cutting shed. While using power saws, give close attention to the small details of maintenance and electricity that they require. Remember that the person who sold your power saw to you knows the saw.

Washington Standardizes Maintenance Shop Design

Highway department adopts design for three new buildings to house offices, equipment storage and servicing at Chehalis, Goldendale and Ephrata

By K. G. MILLER
Associate Highway Engineer
Washington Department of Highways

TO SECURE the advantages of uniformity in the design and function for its Division Headquarters Offices and Shops, the Washington Department of Highways is introducing standardization in three new buildings at Chehalis, Goldendale and Ephrata. These structures will serve as division headquarters providing modern facilities for offices, shops and equipment storage.

The Department of Highways is divided into six districts, with headquarters at Seattle, Wenatchee, Olympia, Vancouver, Yakima and Spokane. For maintenance purposes these six districts have been redivided into 23 maintenance divisions. One district has three divisions and the other five districts have four divisions each. Each division is located geographically for maintenance on approximately 275 mi. of primary and secondary highways. A division headquarters is located at the site of each district headquarters, except District No. 3 at Olympia. The remaining 18 division headquarters are situated in or near larger towns and cities, as nearly as possible in the center of the division as regards road mileage.

Policy, problems and development

It is the policy of the Department to maintain shelter for all mobile equipment and also for any materials and supplies which are subject to deterioration if left uncovered. The complement of such equipment, material and supplies assigned to be stored in each division is approximately the same. All major overhaul of equipment is accomplished at the various district headquarters shops. Each division shop is equipped for servicing and making minor repairs and adjustments on its own equipment.

During the past 25 years the development and expansion of the highway system has necessitated relocation of some of these headquarters due, in some instances, to the lack of storage and building space. In other places the original buildings were only of a temporary nature and have since deteriorated to such an extent that repairs and maintenance are no longer advisable.

During these years the construction of the divisions offices and shops was more or less individual matter as regards design, arrangement and construction. W. A. Bugge, Director of Highways, and R. P. Newland, Maintenance Engineer, are currently attempting to standardize these installations whenever replacements or relocations are necessary. During the past year the department contracted with an architectural firm to design and furnish plans and specifications for new buildings.

Contracts have recently been awarded for the three projects at division headquarters at Chehalis, Goldendale and Ephrata. Each of these structures may serve as headquarters for one or more maintenance section crews. Also, facilities are available for one or more resident engineering parties with the necessary office space, drafting room and storage facilities.

Fuel and station service is available not only to highway department cars but all state owned vehicles including transient car pool operators. Replacement and repair parts and stores are kept to a minimum. However, maintenance materials such as lumber, steel, road oils, bitumels, pre-mix patching materials, salt, etc., may be stored in considerable quantities.

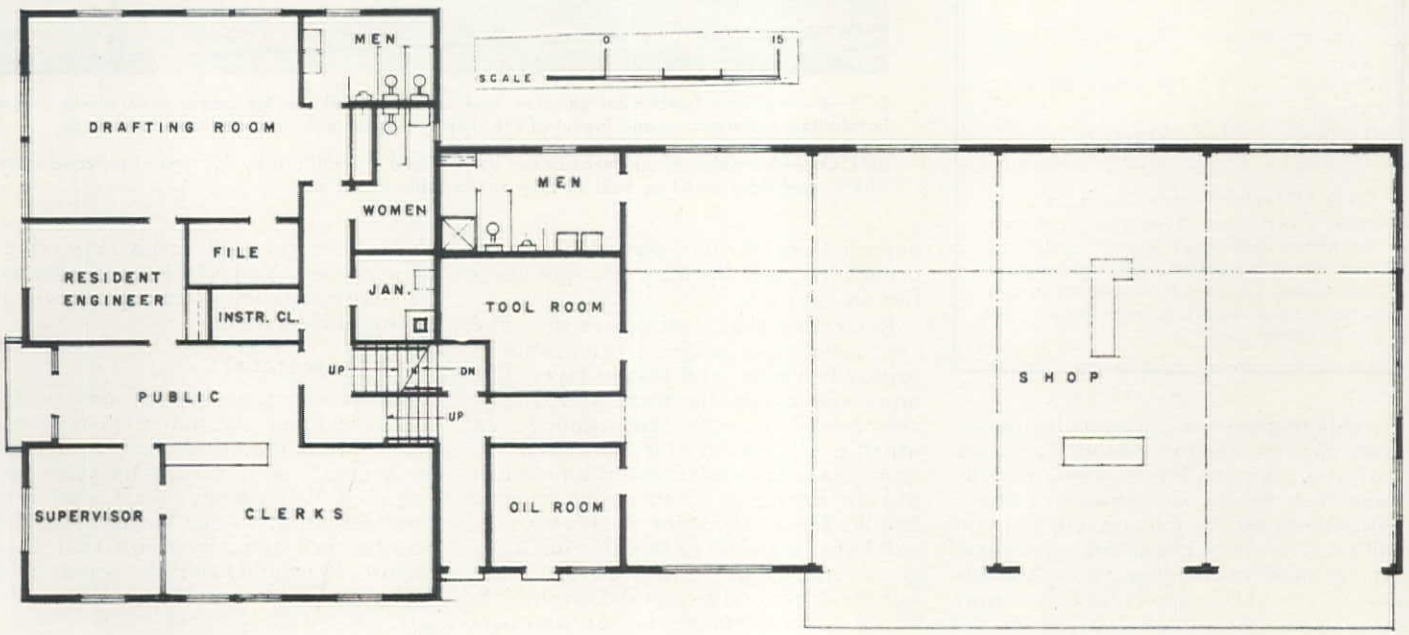
In the new standard plans consideration was given to accessibility to storage tanks and loading platforms, access to and from highways and streets and turning area for heavy equipment and trailers.

The accompanying floor plan was designed on the premise that a basement could be constructed for the boiler plant and additional storage space. At the Chehalis site the water table is so near the surface as to make a basement impossible; the length of the building was extended to provide additional space. Also, if additional space is indicated at some future date the main building may be extended or provided with an ell at minimum expense, and with little or no interruption to normal operations.

Architectural features

All buildings are of similar type and shape, which is plain gable in a "T" shaped plan. Each has a 36 by 49-ft. office section. The shop area at Ephrata and Goldendale is 36 by 83 ft. and the Chehalis shop wing is 36 by 99 ft. Because of ground water conditions there is no basement at the Chehalis building, the boiler room being centrally located between the shop wing and office area.

On the first floor of the office area (see floor plan), spaces are provided for public reception, resident engineer's office, supervisor's office, clerical office, drafting room, drafting storage, instru-



FLOOR PLAN for standard headquarters building, with boiler room located in the basement. Additional storage space is also provided in the basement. Space above the office section is a second story containing bunk rooms and showers for maintenance crews and storage for the shops.

ment storage, men and women's toilets, and a janitor's closet.

The second floor of the office area is divided into two large bunk rooms for transient maintenance crews' sleeping quarters, a private bedroom for visiting highway officials, toilet and shower facilities, and a linen storage room. The second floor of the Chehalis building was left unfinished and is roughed in for mechanical facilities and will eventually provide the same facilities as at the Ephrata and Goldendale buildings.

The shop wing consists of ample shop and garage area with heavy duty hoisting equipment, to handle maintenance work on the largest equipment used by the highway maintenance department. An oil room, tool room, and a shower and toilet room for the shop staff are also located in the shop wing. Above the oil and tool room is a mezzanine floor which will serve as a parts storage room with an overhead crane-way for handling large parts to and from the parts storage room.

The office and shop areas are separated by a one hour fire wall from the concrete floor slab to the underside of the roof sheathing, to check the spread of fire from one area to the other.

The shop wing at Ephrata and Goldendale has a radiant heated concrete floor slab to provide complete working comfort for the shop employees at all times during the year, especially during the below-zero cold of Eastern Washington winters. The Chehalis shop and garage area is heated by large unit heaters. Heating for the office wing in all buildings is handled by convectors. Two inch blanket type insulation in the ceilings will be installed in all three buildings.

All rooms and areas throughout the building are well lighted during the day with large steel sash. Electric lighting throughout the building is incandescent and is engineered to provide proper lighting for each room condition.

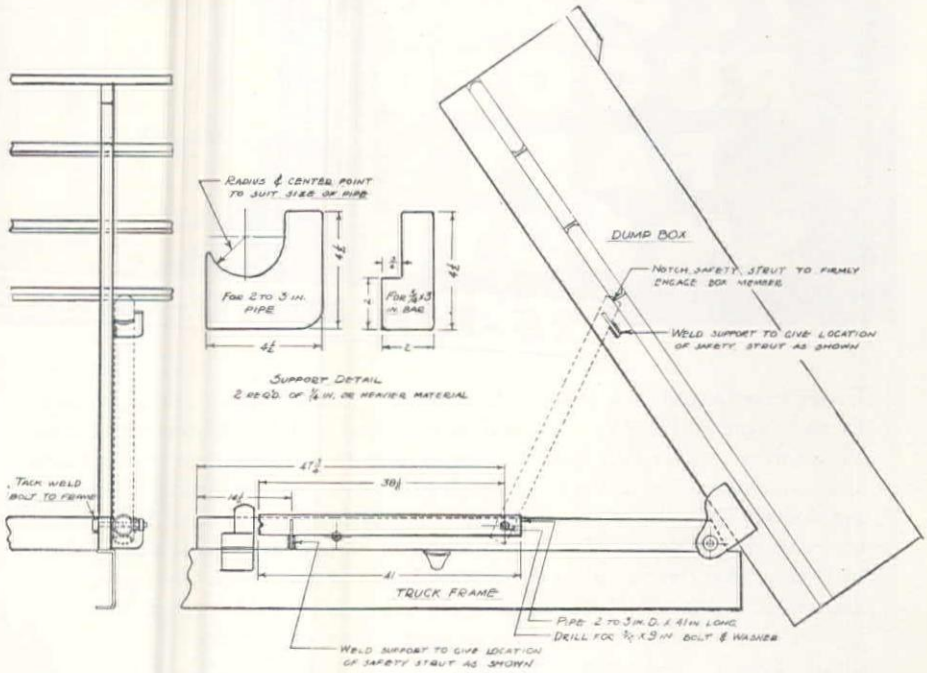
Garage and shop employees in all three buildings are protected against carbon monoxide fumes by an underfloor exhaust system from each bay which carries the exhaust gases from equipment to the end wall of the shop and from there by ductwork up to a fan which exhausts through a louver high on the shop gable end.

In addition to the main building there are additional storage sheds for housing equipment and perishable materials, as well as storing tools and other maintenance requirements of section crews. Loading platforms are provided for handling heavy freight to and from trucks. Road oils are stored in elevated tanks for facility in loading into distributors.

Designs of the three headquarters buildings were prepared by Wohleb & Wohleb, architects, and G. Stacey Bennett, associate, of Olympia, Wash.

The general contractors on the projects are: Chehalis, Pakar Construction Co., Chehalis; the Ephrata building is being constructed by the Cherf Brothers Construction Co. of Ephrata; and the Goldendale building is being constructed by Charles R. Schmiedeskamp of Portland, Ore.

Safety Strut Keeps Dump Truck Box Where It Belongs at the Right Time



A SAFETY STRUT for dump trucks to prevent the box from dropping on anyone who may be working beneath has been developed by Peter Kiewit Sons' Co., Omaha, Nebr. Details of the strut are shown in the accompanying pictures and drawings.

The strut is made of 3-in. iron pipe bolted to the frame of the truck with a ¾-in. bolt. It is notched at the end so that when it is in the raised position resting on the welded support bracket on the box it is also engaged with the box crossmember. When the box is down, the pipe rests in a horizontal position in a bracket welded to the truck frame.

Pictures and drawings shown here were sent to *Western Construction* by Jim Symonds of Grand Island, Nebr., equipment superintendent for Peter Kiewit Sons' Co.

BELOW—Dump truck belonging to Peter Kiewit Sons' Co. equipped with the strut. The firm has sent photos and the detailed drawing shown above to all district offices with the suggestion that all dump trucks be equipped with the safety feature.

RIGHT—When box is down, strut rests in horizontal position.

IT'S BIG RUGGED FAST SMOOTH

LORAIN 50 SERIES

25-Ton MOTO-CRANE

Everything about the 25-ton Lorain-50 "Series" Moto-Crane is new! From the ground up the "50" is designed and built for 25-ton capacities. These new rubber-tire Moto-Cranes are not modifications, reworkings and "up-ratings" of previous models. However, in designing these new machines, Thew-Lorain has drawn heavily from its unequalled record of over thirty years of experience and "know-how" acquired since building the first rubber-tire "truck-crane" in 1918. The new Lorain-50 "Series" Moto-Cranes are just what you'd expect the leader to produce—a *bigger, stronger, safer, better* machine. Your Thew-Lorain Distributor can provide full facts!

THE THEW SHOVEL CO., LORAIN, OHIO

25-Ton Crane Boom

- Wider, deeper, stronger
- Quick action pin-connections
- Usable in 100-ft. lengths—130-ft. with extensions
- 6-part direct hoist line reeving with 3-sheave boom head
- Convertible to clam, drag, shovel, hoe, pile driver

Throttle Control

- Smoothest acceleration for raising or lowering loads
- No jerks, jolts or bounces
- A wider range of raising and lowering speeds
- Pin-point precision for spotting loads

25-Ton Turntable

- *Hydraulic Coupling* gives the smoothest operation—no jolts, bounces
- New, wider shoe type swing clutches
- Turntable rollers on anti-friction bearings
- Uniform-stress Center Pin design

25-Ton Carrier

- Built specially for 25-ton crane and 1-yard shovel stresses and impacts
- Box section frames deeper, stronger
- 220 H.P. gas engine
- 10 forward speeds (30 M.P.H.); 2 reverse speeds
- Man-saving, air-assist steering

YOUR THEW® LORAIN DISTRIBUTOR SPEEDS PARTS TO YOUR JOB

Get a copy of new **LORAIN** *catalog from your nearest Thew-Lorain Distributor*

ANDREWS EQUIPMENT SERVICE OF WASHINGTON, INC.
Spokane, Wash.

CATE EQUIPMENT CO.
Salt Lake City 4, Utah

CENTRAL MACHINERY CO.
Great Falls, Havre and Lewistown, Mont.

COAST EQUIPMENT CO.
San Francisco 3, California

J. D. COGGINS CO.
1717 No. 2nd, Alberquerque, New Mexico

A. H. COX & COMPANY
Seattle 4, Tacoma & Wenatchee, Wash.

P. L. CROOKS & CO., INC.
Portland 10, Ore.

GENERAL EQUIPMENT CO.
Reno, Nevada

LE ROI-RIX MACHINERY CO.
Los Angeles 22. Branches: Bakersfield, Long Beach 6, Calif.

McCOY COMPANY
Denver 17, Colo. Branches: Sterling, Monte Vista & Grand Junction, Colo.

MOUNTAIN TRACTOR CO.
Missoula and Kalispell, Mont.

LEE REDMAN EQUIPMENT CO.
Phoenix, Arizona

SOUTHERN IDAHO EQUIPMENT CO.
Idaho Falls, Boise and Twin Falls, Idaho

TRACTOR & EQUIPMENT CO.
Sidney, Mont. Branches: Miles City, Glasgow, Mont.

WORTHAM MACHINERY CO.
Cheyenne, Wyo. and Billings, Mont. Branches: Sheridan, Greybull, Casper and Rock Springs, Wyo.

YUKON EQUIPMENT CO. (for Alaska)
Seattle, Wash. Branches at Fairbanks and Anchorage, Alaska

Latest Equipment Speeds Cement-Treated Base Job

COORDINATED USE of the latest equipment is speeding completion of cement-treated base construction on 5.88 mi. of freeway development 1½ miles west of Livermore, Calif. Laid prior to pouring two lanes of Portland cement concrete pavement, the cement-treated base is included as part of a $700,000 project that will when completed make this section of Highway 50 a four-lane divided highway. Fredrickson & Watson Co., Oakland, is the contractor.

In an area that is relatively level with only occasional slight rises, virtually no cutting was required in preparing the roadbed. After grading, the base of the roadbed was built up with 16 in. of imported gravel soil, 12 in. to provide a sub-base and 4 in. to be part of the cement-treated base.

In carrying out the cement-treated base operation, the contractor is making use of the following equipment: Wood Roadmixer; Caterpillar D-8 tractor; Allis-Chalmers AC 19 tractor; Johnson sub-grader; 12-ton 3-wheel roller; 8-ton tandem roller; sizer and spreader. A Tournapull crane is used occasionally for moving the sub-grader.

The crew for the operation includes the foreman, two tractor operators, mixer operator, roller operators, three laborers, and the Tournapull crane operator.

Equipment other than rollers and tractors is supplied with small wheels to ride on the header boards, or during work on the second lane with the wheels on one side riding on the previously laid pavement.

Following initial roadbed preparation and installation of header boards, the operation is carried out in the following sequence:

1. **Subgrading:** Drawn by the International AC 19, the sub-grader is pulled over the strip cutting the base to the desired grade. Excess earth removed by the sub-grader is carried by conveyor belt and wasted to one side. The sub-grader operating motor is started and stopped by the tractor operator.

2. **Windrowing:** After sub-grading a strip the tractor is detached and returned to pull the sizer, which places the earth base to be treated in a windrow. The sizer is equipped with teeth in front of the windrowing blades to loosen the earth for easy piling.

3. **Cement:** Sacks of Permanente cement are brought alongside the route on a flat bed truck. Laborers open the sacks and spread the cement on top of the windrow. The amount of the cement used, from 2 to 4% of the quantity of the soil, is determined by tests and is based on the average unit weight of the soil at about 95% compaction. All sacks are burnt to prevent them from becoming troublesome during equipment operations.

Due to the small amount of cement used each day (150 bbl.), it has been found to be more economical to place by hand rather than tie up a large bulk cement carrier.

4. **Mixing:** The Wood Roadmixer, drawn by the Caterpillar D-8 tractor, then moves over the cement-capped windrow mixing the earth and cement. Water for the mix is supplied at the rate of from 5½ to 7½%, or 3 gal. per lin. ft. of windrow, by a rubber tire-mounted 850-gal. tank towed by a horizontal bar projecting from the rear of the mixer. A power-takeoff from the tractor supplies power for the mixing operation. This unit moves at the rate of about 19 ft. per min.

5. **Spreading:** A spreader, pulled from the rear of the mixer, spreads the windrow deposited by the mixer over the area between the header boards. One of the laborers is in constant attendance of the spreader to insure that no large clumps of the newly treated soil escape the spreader.

6. **First rolling:** The 12-ton three-wheel roller follows behind the spreader compacting the cement-treated base.

7. **Second sub-grading operation:** Immediately following the roller the sub-grader, moved from its first operation to this position in the chain by the Tournapull crane, cuts the base to grade.

8. **Second rolling:** The 8-ton tandem roller follows the sub-grader.

Following the second roll the cement-treated base is ready for an application of asphaltic emulsion and the paving operation.

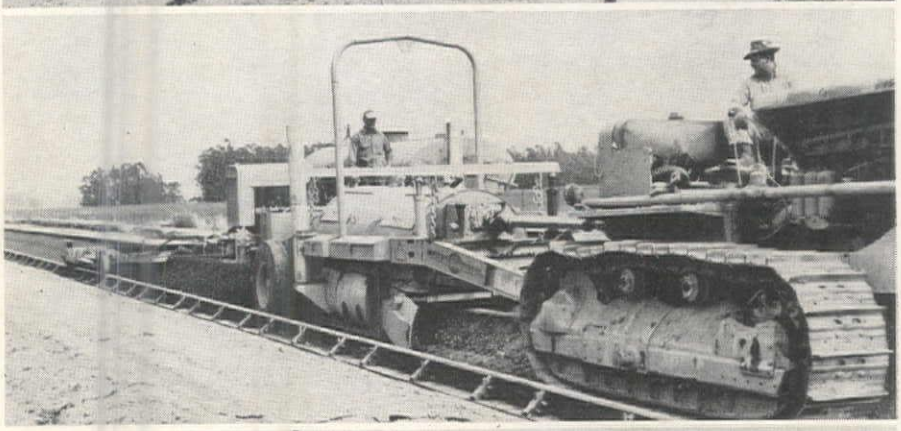
Production

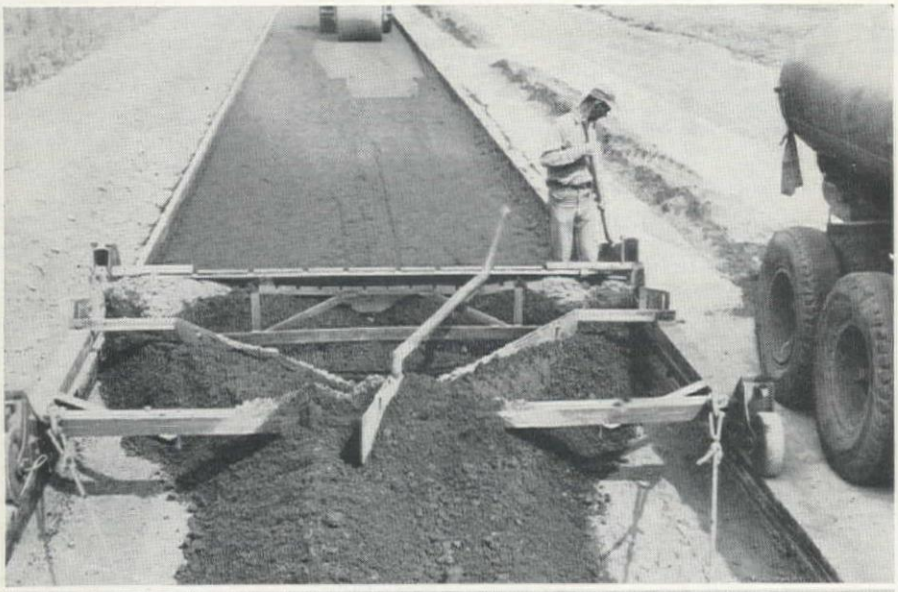
Using this method of operation the

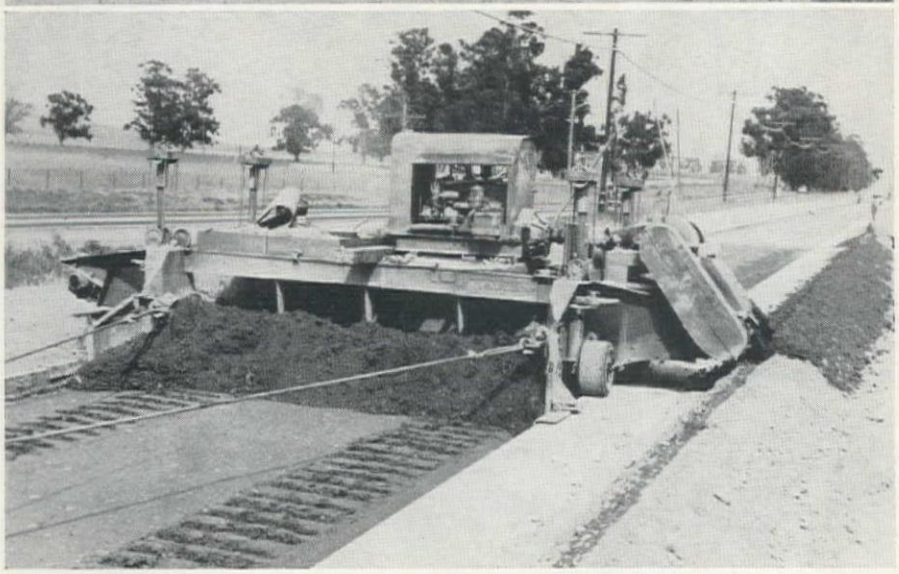
TOP—After strip is subgraded, tractor-pulled sizer prepares earth in windrow.

CENTER—Tractor pulls mixer and spreader at rate of about 19 ft. per min.

BOTTOM—Water is supplied from 850-gal. tank towed by bar from rear of mixer.







TOP—Spreader pulled behind mixer spreads mixed material between header boards.

CENTER—Tournapull crane lifts sub-grader for moving to new work location.

BOTTOM—Sub-grader follows roller to cut base to grade.

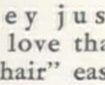
contractor states that from 8,000 to 10,000 ft. can be completed each day. However, on this particular operation, use of header boards and the fact that the machinery could not be moved over the first pavement until cured 10 days, or to 600 lb., slowed down the operation.

Personnel

Robert Calou is superintendent for Fredrickson & Watson, with Clifford D. (Stan) Stanhope foreman of the cement treating operation. Edward Carstad is resident engineer for the California Division of Highways.

Ever wonder why you *never* see a scowling, fagged operator on the Baker, A-C team? Here's why:

They just plain love that "doze-in-your-armchair" ease of control; that positive hold without throttle jockeying; that fraction-of-an-inch accuracy . . . that quick, direct lift; that positive down-pressure which puts almost all the tractor weight on the cutting edge; *and* the "roll-action" of the blade which leaves more tractor power for push. Because "Easy DOZE It!"



That's why you see the Baker, A-C team more and more wherever dirt has to be moved fast and efficiently. When operators *prefer* it, you can count on it being the best money-maker.

Specify Baker Bulldozers, Gradebuilders or Root Rippers for your new A-C Tractors . . . Baker makes engine-mounted hydraulic control models and cable-control models for the entire line of Allis-Chalmers crawlers. See your Baker, A-C Dealer. THE BAKER MANUFACTURING COMPANY, Springfield, Illinois.

Easy doze it!

P.S.: Baker is the PIONEER and the SPECIALIST in bulldozers

They're sold together

A-C BAKER

Seitz Machinery Company, Inc.
Billings, Montana

Mountain Tractor Company
Missoula, Montana

Northland Machinery Company
Sidney, Montana

•

Harry Cornelius Company
Albuquerque, New Mexico

Smith Machinery Company, Inc.
Roswell, New Mexico

•

Dielschneider Equipment Oregon, Ltd.
The Dalles, Oregon

Farm & Industrial Equipment Co.
Eugene, Oregon

West-Hitchcock Corporation
Klamath Falls, Oregon

Oregon Tractor Company
LeGrande, Oregon

Tractor Sales & Service, Inc.
Medford, Oregon

Umatilla Tractor Company
Pendleton, Oregon

Wood Tractor Company
Portland, Oregon

•

Cate Equipment Company, Inc.
Salt Lake City, Utah

•

A. H. Cox & Company
Seattle, Washington
Wenatchee, Washington
Tacoma, Washington

Northern Harris
Walla Walla, Washington

Yukon Equipment, Inc.
Seattle, Washington

American Machine Co.
Spokane, Washington

•

Studer Tractor & Equipment Co.
Casper, Wyoming

HOW IT WAS DONE...

330,000-Cu. Yd. Slide Cleared on Tunnel Road

A MAJOR traffic tieup resulted last winter from a slide on the Bay Area's Tunnel Road between Oakland and Orinda, Calif., a stretch of four-lane highway where as many as 55,000 cars have been counted in a 16-hr. check. With the advent of spring, state highway engineers were faced with the chore of clearing away the several hundred thousand yards of earth that oozed out to cover the vital traffic artery December 9, 1950, during exceptionally heavy rainfall.

The slide took place at a point one mile west of Orinda, at the same place a 100,000-cu. yd. slide occurred in 1937 while the road was being built. The 1950 version involved a slice that extended back some 700 ft. from the road, to a height of about 300 ft. Heavy earth-moving equipment was rushed to the scene, and 27 hours later traffic, which had been blocked, was flowing again by means of a four-lane detour, 600 ft. long, built around the edge of the slide area. Construction of the detour involved movement of some 10,000 cu. yd. of sticky material.

VIEW of clean-up operations on the Tunnel Road slide in late April 1951. Slide began December 9, 1950, temporarily blocking four-lane highway between Oakland and Orinda, Calif. Loose material from the estimated 330,000-cu. yd. slide was bulldozed down the slope to be hauled away for use as road fill.

Three bulldozer-equipped Caterpillar D7 Tractors, owned by Contractor Lloyd Rodoni of Los Gatos, Calif., a Lorain 75 shovel owned by A. J. McCosker of Berkeley, and a fleet of five eight-yard trucks owned by Stephens Trucking, Stockton, were put on the job for final cleanup starting in mid-April. The D7s pushed material down the steep hillside to feed the shovel which was loading an average of 1,200 yards a day into the trucks. The loose material was hauled a mile and used as fill.

One of the D7s was assigned the chore of carving out a trench high up on the hill to aid in carrying off water from underground springs in the area. The trench is to be filled with rock and water carried by perforated drains to nearby gulch where a main spring is located. This spring was reported flowing at the rate of 43,000 gallons a day on January 30, 1951.

The face of the bank in the slide area will be finished off and compacted by the tractors and drains, 50 ft. apart, will drain to the line system, carrying future moisture down the hill. About 8,000 ft. of drains are being installed—2½-in. pipe 150-200 ft. long—and the hill is being benched off in order to stabilize it.

FROM COAST TO COAST more and more contractors depend on LaPLANT-CHOATE *MOTOR SCRAPERS* to complete every job profitably and on schedule

THESE are but a few of the many enterprising contractors who depend on the big profit-making advantages of big-producing earthmovers. *They own LaPlant-Choate Motor Scrapers!* Whether they own single units or fleets, they know they can keep ahead of schedule and make money on every job.

When you choose a TS300 Motor Scraper, you get *more* than an earthmover. You get the ability to haul extra yards each trip, make extra trips per hour. You get LaPlant-Choate *dependability* . . . peak performance day after day . . . low-cost operation and maintenance that reduce earthmoving costs . . . the long, dependable service life that protects your investment.

Ask Motor Scraper owners and operators why they're 100% sold on TS300 advantages. See your LaPlant-Choate distributor for complete details. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa

VILLA CONTRACTING CO.
WESTFIELD, NEW JERSEY
This well-known contractor started his contract on the New Jersey Turnpike with ten LaPlant-Choate Motor Scrapers. The line-up of his TS300 fleet is shown below.

LaPLANT-CHOATE

INDUSTRIAL EQUIPMENT COMPANY
6441 Santa Fe Avenue LOS ANGELES 11, CALIFORNIA

WESTERN EQUIPMENT COMPANY
O. Box 2196, 3400 E. Olive St. SPOKANE, WASHINGTON

COLUMBIA EQUIPMENT CO.
1240 S. E. 12th Ave. PORTLAND 14, OREGON
5030 1st Ave. South SEATTLE, WASHINGTON

WESTERN CONSTRUCTION EQUIPMENT CO.
505 N. 24th Street BILLINGS, MONTANA
Stephens & Mount Ave. MISSOULA, MONTANA

ENGINEERING SALES SERVICE, INC.
410 Capitol Boulevard BOISE, IDAHO

STUDER TRACTOR & EQUIP. CO.
East Yellowstone Hwy., P. O. Box 779, CASPER, WYOMING

GENERAL EQUIPMENT COMPANY
1201 East 2nd Street RENO, NEVADA

EQUIPMENT SALES CO.
720 So. 19th Avenue PHOENIX, ARIZONA

ARNOLD MACHINERY CO., INC.
433 West Second South St. Salt Lake City 1, Utah

N. C. RIBBLE CO.
1304 N. Fourth St. ALBUQUERQUE, NEW MEXICO

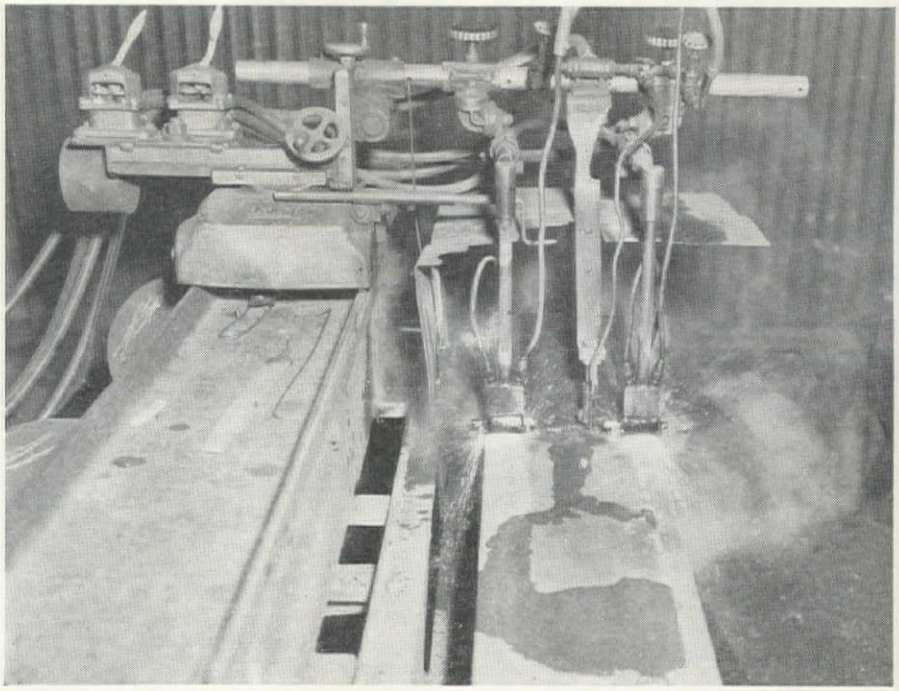
Automatic Methods for Hardening Dozer Blades

BULLDOZER BLADES that will wear much longer than ordinary blades are being produced by a Seattle firm by flame-hardening. The flame-hardening is done automatically at high speeds.

Two Oxweld flame-hardening heads, mounted on a CM-37 machine, are used to harden both edges of the center blades simultaneously. The job is done while the blades are still hot from a bevel-cutting operation, so warping is eliminated. The depth of hardness is ¼ in., and the speed of hardening is 10 to 12 in. per minute. The amount of hardness obtained in 550 to 600 Brinell.

Side-cutter blades are handled a little differently. Both sides of one edge of the blades are hardened at the same time. Two Oxweld flame-hardening heads, mounted on a CM-16 machine, are used. The depth of hardness is 3/16 in. and the hardening speed is 9 in. per min.

The blades are made from rolled steel. Blade sections up to 21 ft. long, 10 in. wide, and 1 inch thick, are hardened.



TWO EDGES of a bulldozer center blade being flame-hardened simultaneously by two Oxweld flame-hardening heads. The hardening is done automatically at high speeds.

Test Shows Water-Filled Tires Wear Well If Used at Low Speeds

SUBSTANTIAL INCREASES in tire life and lowered operating costs for tires used in underground mining and run at low speeds (less than 5 mph.) may be accomplished through substitution of 100% water filling for the conventional air pressure method, tests completed recently by Goodyear Tire & Rubber Company show. The tests were conducted over a period of two years, being made with tires used on various types of underground mining equipment believed representative of these operations.

Use of the 100% water filling method permits adequate pressure to be maintained constantly until the tire is worn out or punctured, the tests disclose. In a 100% water-filled tire, internal pressure varies with the load, giving minimum pressure when load is light and increased pressure as load increases. This keeps the flexing of the tire within reasonable limits, reducing cord fatigue in the sidewalls. No time need be spent checking pressures since there is no seepage as is possible with use of air.

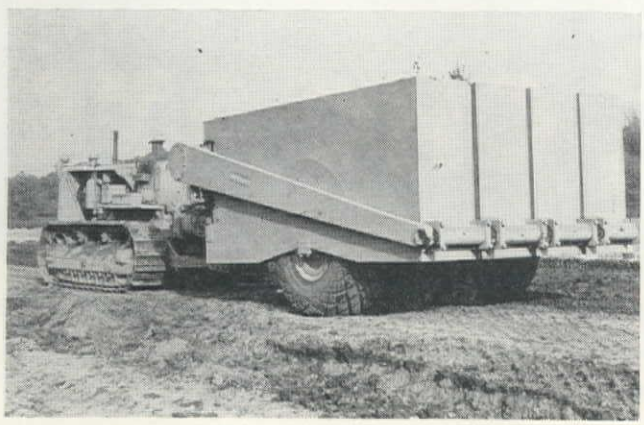
Operators report water-filled tires ride and steer better than those which are air inflated. Bounce is also less, due to the dampening effect of water. Rolling resistance is decreased; hence each battery recharge gives longer service and more productive machine time is realized. Elimination of air removes the hazard of dust caused by tire blowouts. The rush of water from a punctured tire cannot be dangerous.

All these advantages add up to reduced costs for service and maintenance, in addition to longer tire life. The water filling of this type of tires means fewer tire failures and, therefore, less loss of production from this cause. It eliminates the need for inflation equipment and personnel for checking and inflating tires underground.

Filling of mine tires with water to the recommended pressure is accomplished with a special high-pressure positive-displacement pump having suitable connections for tire valves. The pump may be obtained by mine operators from shuttle car manufacturers.

Big Pneumatic Roller on Whittier Narrows Dam Job

IN USE on fill at Whittier Narrows Dam (see story this issue, page 69) is this new oscillating compaction roller manufactured by Southwest Welding and Manufacturing Co. of Alhambra, Calif. The roller has four separate weight-box units, each equipped with a pneumatic-tired wheel. View shows manner in which four separate units are hinged at rear, and smooth surface after tires have passed over fill. On side hills and core trench at the dam, four complete passes were adequate. Constant compaction weight is uniform because each of the weight-box units oscillates independently over varying ground surface. The roller can be used with any combination of from three to six weight-box units.



Back Hoe Digs Sewer Trenches

TO HANDLE trenching for new sewer connections on the Brookside housing project in San Diego, subcontractor H. J. Wulft of Long Beach drove in a Schield Bantam Back Hoe mounted on a G.M.C. 6 x 6 truck. The Back Hoe, working in sandstone material, was used to dig 5 to 6-ft. depths and averaged 100 ft. per hour.

REPORTS *from the* COURTS

By
HOWARD S. BURNSIDE
Registered Professional Engineer
Attorney at Law

Discrimination Against Plumbing Fixtures

PLAINTIFF was engaged in selling plumbing fixtures some of which consisted of new materials having imperfections and known as Grade B fixtures. Plaintiff also supplied concrete water tanks. Under the authority of a city ordinance prohibiting installation of defective or broken fixtures and requiring china water tanks, the city plumbing inspector refused installation of plaintiff's materials. Plaintiff thereupon sued to enjoin enforcement of the ordinance with respect to his materials and prevailed after appeal to the Supreme Court of Arizona.

The inspector testified he would not permit installation of a fixture with a slight blemish on the ground that it violated the ordinance and would impair the public health. The court could not agree with such a strict interpretation of the ordinance. "The plumbing inspector would have a right to refuse such a permit if the fixtures were broken or defective to the extent that the defects would impair the operating efficiency thereof."[1] The language "defective or broken plumbing fixtures" as applied to fixtures whose operating efficiency is not impaired by the defect is deemed indefinite and uncertain. Strict application of such language would be monopolistic and oppressive against sellers or users of B Grade fixtures and in violation of constitutional rights. "An ordinance of a regulatory nature must be clear, certain and definite so that the average man may with due care after reading the same understand whether he will incur a penalty for his actions or not. Otherwise it is void for uncertainty . . ."[2]

Regarding the concrete water tanks, it was contended that these tanks were susceptible to germ breeding and that there was danger of contamination of the water supply line. However, the court found that these alleged hazards were not supported by the evidence and enjoined the refusal to permit installation solely because they were made of concrete.

Another portion of the opinion held that it was a reasonable regulation of plumbing installation to require manufacturers marking of fittings and fixtures with weight or quality and maker's name; but it was discriminatory to allow some stores to label fixtures with their own brands while requiring plaintiff's fixtures to be factory labelled.

[1] Thrift Hardware and Supply Co. v. City of Phoenix et al, 222 P. 2nd 994.

[2] 19 R.C.L. 819, 114.

Official Immunity in Firing Engineering Aid

PLAINTIFF was employed as an Engineering Aid I by Los Angeles County, having been selected from a civil service eligible list. The county charter provided for a period of probation during which time he could be discharged or reduced with the consent of the county civil service commission. Before the expiration of his six-months probationary period he was terminated. Thereupon plaintiff sued the County Engineer and his assistant chief deputy alleging that they presented false evidence to gain approval by the commission of the discharge. Damages were also alleged.

The defendants stated, in proper legal form, that even if all the allegations were true plaintiff still did not have any ground for the suit. The defendants' view was upheld. "The complaint for malicious prosecution by a discharged civil service employee against the department head . . . is a collateral attack on the commission's order discharging plaintiff. Moreover in order successfully to attack a discharge ordered with the consent of the commission a complaint must allege extrinsic fraud employed in procuring such consent. Reasons for the discharge of an engineering aid during his probationary service are not required."[1] Note that alleging the presentation of false evidence is not the legal equivalent of alleging extrinsic fraud.

In discharging the plaintiff, the defendants acted in their official capacity. "They are therefore immune against judgment for their orders as heads of the Department of Engineering and Surveying. Such immunity is absolute and extends to all their acts. It protects them in their exercise of judgment and discretion in the discharge of their duties.

In these situations the general rule is that one seeking relief in the law courts must first invoke and exhaust his administrative remedies; that is, there must first be recourse to the appropriate administrative agency set up to settle or review the case. Here, by observing that it had not been done, the court intimated that a hearing before the commission should have been requested or a demand made to revoke the discharge.

[1] Oppenheimer v. Arnold et al, 99 A.C.A. 1043, 222 P. 2d 940.

Liability from Operation Of Water System

IT IS BASIC that if a person uses his property so as to cause injury to another's property he will be liable for the damages. A municipal corporation may be subject to liability just as a natural person. In the case noted here the operation of a municipal water system caused damage. Although the purifying process was claimed to be the "most modern known to science" and another method of disposing of sediment was not apparent the city was nevertheless liable.

The system consisted of a dam across a flowing stream, reservoir, spillway, filtration plant and incidental facilities. A return channel which carried solid matter removed in filtering back to the stream channel was located on city land opposite plaintiff's land.

Plaintiff complained that this method of refuse disposal filled water holes in the stream on his land with silt and mud so that they became boggy; and he lost livestock. Also, discharge of surplus water over the spillway caused overflow of his lands. He conceded there was no negligence in the construction of the dam or treating plant. Negligent operation of the filtration plant and spillway was the issue.

The city argued that the method of disposal of accumulated sediment could not be remedied by the expenditure of labor or money. In commenting on this argument the court said, "We cannot concede the correctness of defendant's contention that the disposal of the sediment from the purification plant in the manner shown by the testimony is the only possible manner for disposing of it. The possibilities of engineering achievement are so unlimited that it cannot be said as a matter of law that the dangerous condition in the bed of the creek resulting from the discharge of this sediment therein cannot be remedied and abated by the expenditure of labor and money."[1]

[1] City of Henryetta v. Runyan, 219 P2d 220.

Deflated Dollar Affects Verdicts

"IT HAS BEEN NOTED in numerous recent cases that in view of the decreased value of the dollar, verdicts (for money damages) that might, in earlier years, have been held to be excessive, can no longer be so considered."[1]

[1] Barnett v. Furst 222 P 2d 470.

Prefabricated Barrel Culvert Forms

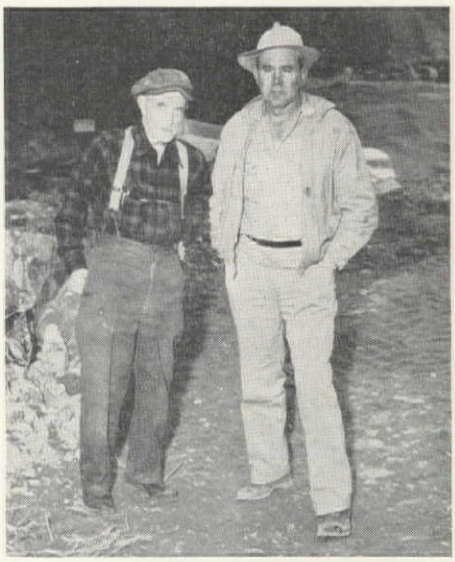
. . . Continued from page 68

for the footings is reestablished and staked. Due to the rock it is necessary to support the stakes with piles of rock. The irregular surface of the blasted or natural rock however tends to key in the footings and provide better bond for the concrete.

Footing forms, prefabricated in sections and cut to fit with electric hand saws, are set and the cleaning crew makes another pass over the footing area to remove any loose particles of sand and gravel that drifted in during the forming.

After the footings have been poured and set for a sufficient length of time a narrow rail is anchored along their full length. Using one of two Lima Paymaster ¾-ton cranes, the 12-ft. form sections are set on these rails and assembled. Two 1½-in. cap screws on each side of the 12-ft. section are screwed down to raise the form to exact grade. Cap screws extend through the longitudinal angle bars that serve as base pieces for the section. After the form is in position the reinforcing steel, rolled to the proper arc, is installed. About 296,000 lb. of reinforcing steel is being used in the culverts. As the curved bars or hoops are cumbersome and hard to handle they are made up in bundles and lifted by crane to a truck for moving to location needed. After the steel is set the outside forms are placed by crane and attached as previously described.

Concrete, supplied by a subcontractor, is brought to the site in 3-yd. Dumpcrete trucks, and placed between the forms with crane and 1-yd. Gar-Bro bucket. To supply concrete the subcontractor has established a small plant at the project headquarters. About 50 yd. of concrete is required for each 50-ft. pour and a total of 3,300 yd. will be used. Type II cement, 6½ sacks per cu. yd. is being used. Concrete is designed for 3,000 lb. in 28 days. A 21-day cure is required before fill is placed on culverts. The water method of curing is being used. It is interesting to note that there is less than a ⅛-in. sag in the forms when the concrete is placed on them.



R. A. Mack (left), resident engineer for the Bureau of Public Roads, and R. E. Robertson, general superintendent for Carl M. Halvorson Co.

After the concrete has set for four days the forms are moved ahead for the next pour. In this operation the shebolts are removed, the screw jacks used to lower the form assembly, and the blocks removed from the ends of the spreaders. Two turnbuckles, connected to each side of a 12-ft. section with steel angle bars, are taken up to draw the sides of the barrel inward, and away from the concrete. After this work is complete a special bridle is attached to the bottom of the ribs and a tractor is used to move the entire assembly. Five sections or 60 lin. ft. of form are usually moved at one time. However, eight sections, or 96 lin. ft. of forms have been moved at one time. After the preliminary loosening is completed it takes an average of 30 to 45 min. to move the form assembly. Outside forms remain in position during the moving operation and are transferred ahead for the next pour by crane when needed.

As five sections total 60 ft. in length and only a 50-ft. pour is required between expansion joints, it is necessary to construct a 10 or 12-in. strip or retaining wall around the inside form at the 50-ft. mark to serve as an end form for the concrete. Forming for skews and parapet walls at the ends of the culverts is carried out by attaching 2 x 4 studs flat on 16-in. centers to the outside form.

Then ⅜-in. plywood is curved down along the row of studs, and a ¾ x 2½-in. cap, band sawed to curvature desired, is placed along the top of the plywood.

When a culvert is complete the entire form is pulled out and the 12-ft. sections uncoupled and lifted away as they emerge. Damage to form sections during handling has been non-existent. Only one rib has been broken thus far. This was due to the section having become swollen by water.

The 18-man crew being used on the culvert work includes: a superintendent, carpenter and labor foremen, two crane operators, four carpenters, and nine laborers. Powdermen and tractor operators are borrowed from other work on the project when needed.

Normally a full 8-hr. shift is required to move and set inside forms; one day to set steel in a common 50-ft. section and another one-half day to set and attach outside forms. Five hours are required to place concrete in a 50-ft. section. Five men are used for the placing, in addition to those transporting the concrete.

In addition to the culvert work the Halverson Co. contract includes 600,000 yd. of cut with proportionate fill, and construction of 1½ mi. of detour road. About 400,000 yd. of this excavation is in hard rock. The project is scheduled for completion this fall.

Personnel

R. E. Robertson is general superintendent for Carl M. Halverson, Portland, with Daryl K. Mason assisting as culvert superintendent. Henry Schitz is carpentry foreman and Daniel Pantovich, labor foreman. R. A. Mack is resident engineer for the Bureau of Public Roads and Ray Wesley is assistant resident engineer. W. H. Lynch is division engineer of Division 8 of Portland.

Glen Ousley, Eugene, Ore., is subcontractor for concrete. Steel is supplied by Mercer Steel Co., Portland, and placed on the job by Lane Steel Co., Eugene. Babbler Bros., Portland, is subcontractor for the paving.

$29,000,000 Army Project In Southwestern Utah

. . . Continued from page 81

mately 40,000 ft. of water and sewer pipe; two zeolite water treatment plants and one sewage treatment plant; (d) Construction of all buildings and utilities and Area Able; (e) Construction of all buildings and utilities in Area Baker; and (f) Construction of first group of buildings in Area Easy.

Building construction will be largely grade slab with light weight block or precast concrete slab wall construction. Alternate bids are taken on pre-cast concrete. Several buildings in Easy Area (barracks and quarters) will be of 2-3 story concrete construction with block or precast filler walls. All construction will be permanent type.

Col. H. G. Gerdes is area engineer, Salt Lake City Area, in direct charge of the Dugway Project. Col. K. M. Moore is District Engineer at San Francisco.

CONSTRUCTION DESIGN CHART

By
JAMES R. GRIFFITH
Seattle, Wash.

CXXXIII . . . Estimated Weight of Welded Steel Roof Trusses

A RATHER complete tabulation of dead-load weights of welded steel roof trusses is given in Catalog No. 100, Seidelhuber Iron & Bronze Works.[1] The design of the trusses, according to the catalog, was based on the following factors:

Unit tensile stress = 16,000 psi.
Truss spacing = 20 ft.
Roof live load = 25 psf.
Ceiling live-load = 15 psf.
(used only in certain cases)

The reference recommends that variations in unit live load and stress limits be cared for by proportional truss spacings.

Since the catalog obviously listed actual weights of trusses, they would not follow any set formula. Having obtained permission[2] to use the dead-load data, I plotted the weights against spans of four specific truss types, to logarithmic coordinates. Curves were averaged through the plotted points. These average curves were in turn reduced to the accompanying nomographic form. Some variations will, as a consequence, show up. On the central scale, the span limits for each type of truss are listed. While it would be possible to project values outside of these limits, they should be used with caution. The chart may be solved by the use of a single straight line drawn from the span through the proper truss type. I have drawn on the chart a solution line for the following assumed conditions:

Bowstring roof truss
Span = 70 ft.

As will be noted, the dead-load weight of the truss is about 3,000 lb., which agrees with the value listed in the catalog.[1]

The basic design in the original catalog[1] used the following panel combinations:

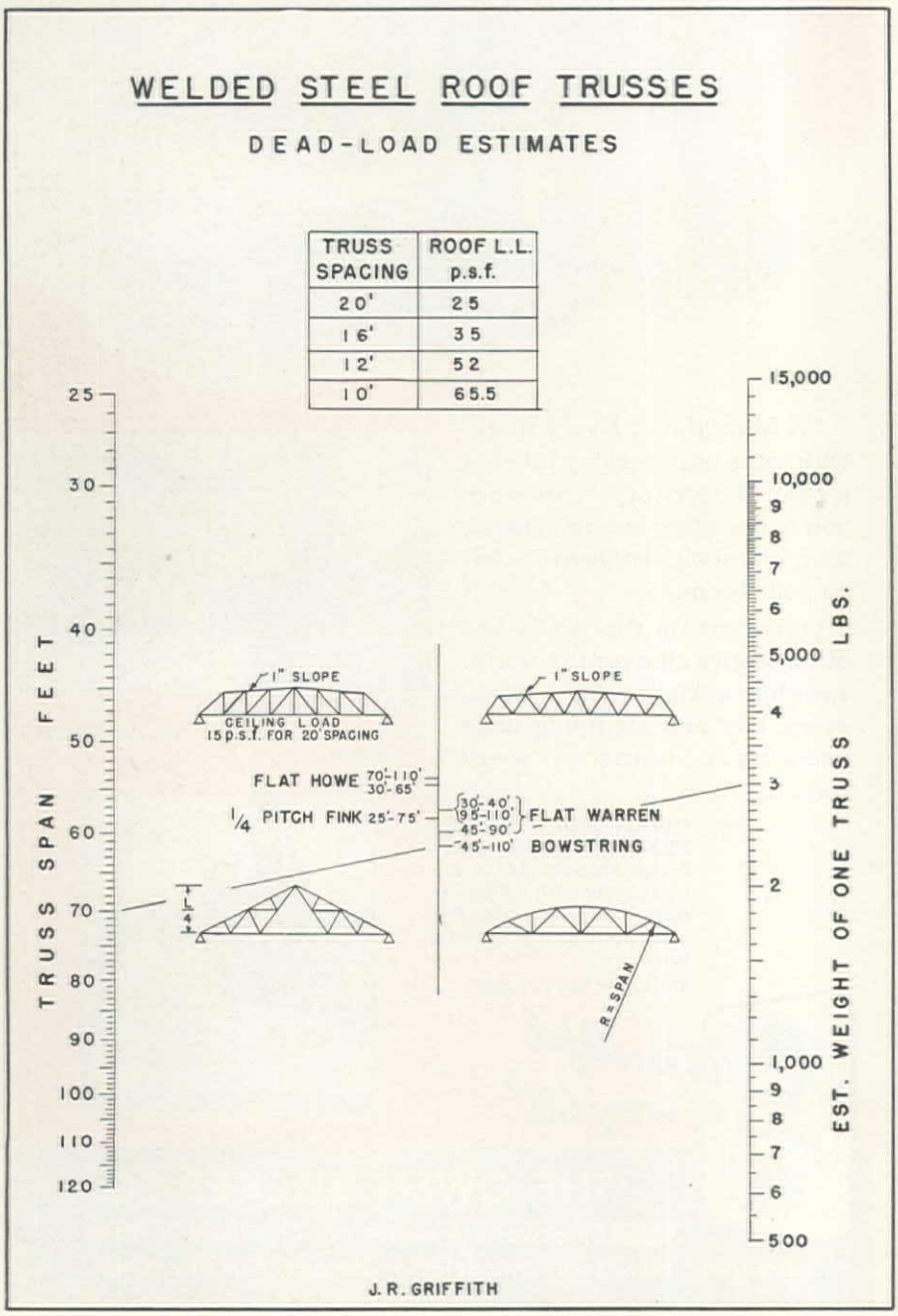
No. Panels	*Truss Span*
4	25—40
6	45—60
8	65—75
10	80—95
12	100—120

Since the cost of fabricated steel is estimated on the basis of total weight, the chart affords a means of quickly computing the probable cost of a truss. It is obvious from the chart that the bowstring roof truss is the most economical in weight. The flat Howe truss is the only truss shown on the chart which was designed for a ceiling load.

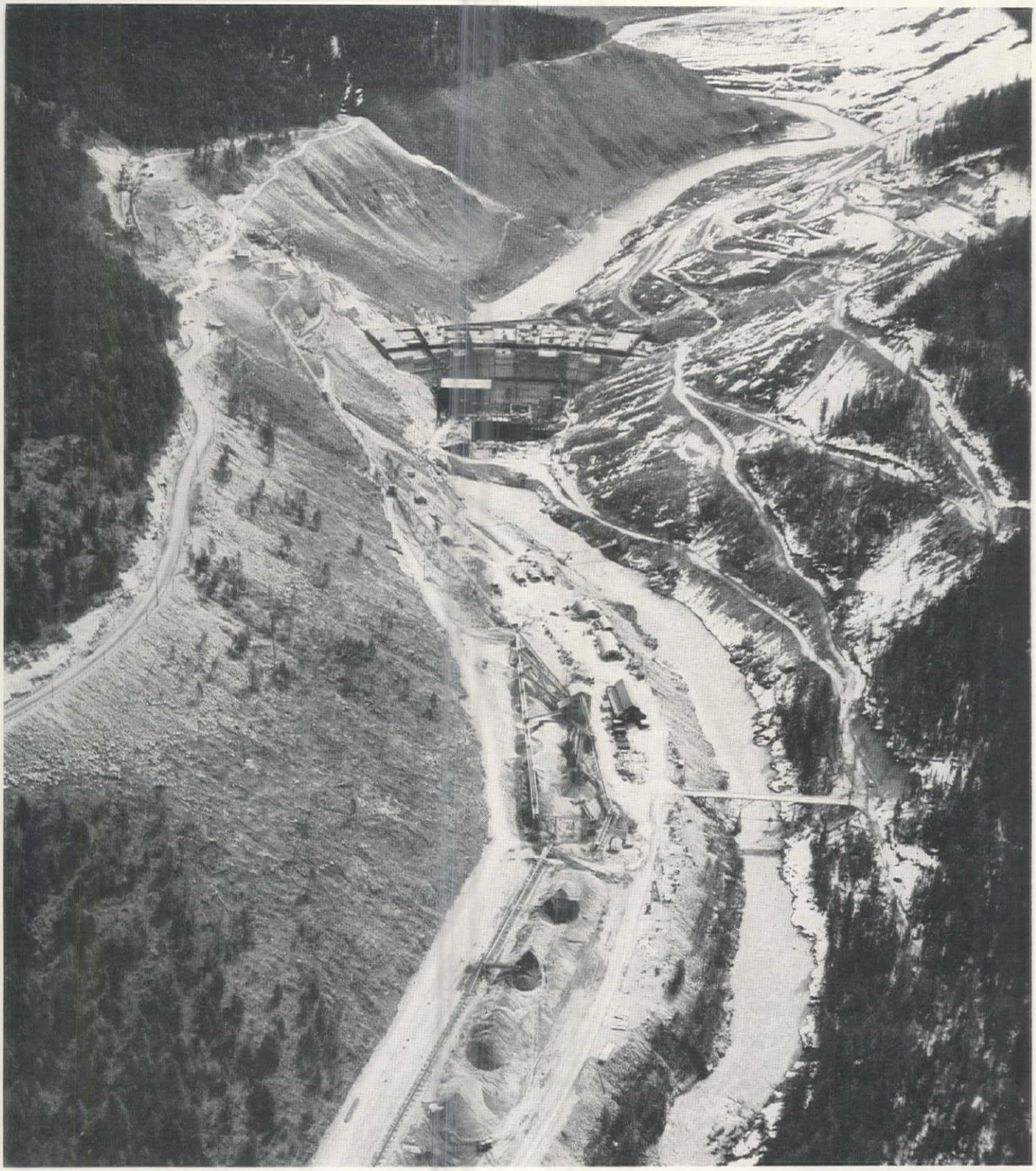
The roof slope of the Howe and Warren trusses included on the chart is 1 in. per ft. for average drainage conditions. Changes in roof slope will have an appreciable effect on the total weight of a truss. Since it was impossible to include all variations of truss type, and roof slope, on the chart, the reader should refer to the original catalog for further information.

The original idea for this chart came to me when an acquaintance of mine came for help in deriving a formula for computing total weights of welded steel roof trusses. He said that he had tabulated weights for various combinations but would never show me these tabular results. When I later came across the tabulation of weights in the Seidelhuber Catalog, I felt sure that here was the source of information my friend was using.

[1] Seattle, Washington.
[2] W. A. Meacham, Chief Engineer, December 1948.



Aggregate to Concrete at Hungry Horse Dam



START of the materials into Hungry Horse Dam being built by the Bureau of Reclamation in Montana is the 400,000-ton raw storage in the foreground. From this 900-ft. length of storage the aggregate moves by belt to the processing plant and then into stockpiles of the finished sizes. Next comes a 1,600-ft. conveyor which moves the blended sand and four sizes of coarse aggregate to the mixing plant high on the left side of the actual dam site.

Cement and the pozzolan (fly ash) are delivered to the mixing plant in 150-bbl. trailers along the highway at the extreme left.

Cableways which move concrete from mixing plant into the dam span 2,415 ft. from the tail towers traveling on radial track at the left to a common head tower high on the right.

All of these operations and the construction plant equipment of General-Shea-Morrison, general contractors for Hungry Horse Dam, were reviewed in a two-part article in *Western Construction*, April and May, 1950.

NEWS OF WESTERN CONSTRUCTION

JULY, 1951

Grand Coulee Pumping Plant in Operation

A MILESTONE was reached June 14 when the big Grand Coulee pumping plant on the Columbia Basin Project in eastern Washington went into regular operation. Secretary of the Interior Oscar L. Chapman gave the signal to start the pumps at the plant by long distance telephone from Washington, D. C. Reclamation's Columbia River District Manager H. A. Parker was at the other end of the line at the pumping station to relay the signal to the operating personnel at the plant.

Secretary Chapman's signal energized a world's record 65,000-hp. motor to turn the first of the pumps at the plant. Columbia River water backed up behind Grand Coulee Dam is now passing through this pump at the rate of 72,000 gal. per min., and is being lifted 280 ft. into the Grand Coulee.

The pump is the first of 12 and will be used to test and prime the irrigation reservoir in the Grand Coulee this year. A sizable lake already is forming in the Coulee from test pumping which has been under way for several weeks. The first official delivery of irrigation water will be available for 87,000 acres in the Columbia Basin Project next spring.

Byron Jackson Co., Los Angeles, and the Pelton Water Wheel Co., San Francisco, hold the contract for furnishing the first six pumps. The General Electric Co. is furnishing and installing the 65,000-hp. motors for the first two units.

General construction of the plant is being carried out by Morrison-Knudsen Co., Inc., and Peter Kiewit Sons' Co. A complete description of the project was presented in the July 1950 issue of *Western Construction.*

Plans for Irrigation Project in Colorado

RELIEF of a serious water shortage on 5,400 ac. of farm land a supply of irrigation water for 1,900 ac. of new land in west-central Colorado could be provided by the Silt reclamation project on Rifle and Elk Creeks in Garfield County, Colo., according to the Bureau of Reclamation. The project is a participating unit in the comprehensive Colorado River storage project.

Project plans involve construction of Rifle Gap Dam and Reservoir, the diversion of stream flow in East Rifle Creek, and rehabilitation and improvement of existing water-distributing system. The dam would be an earth-fill structure 126 ft. high and 800 ft. long.

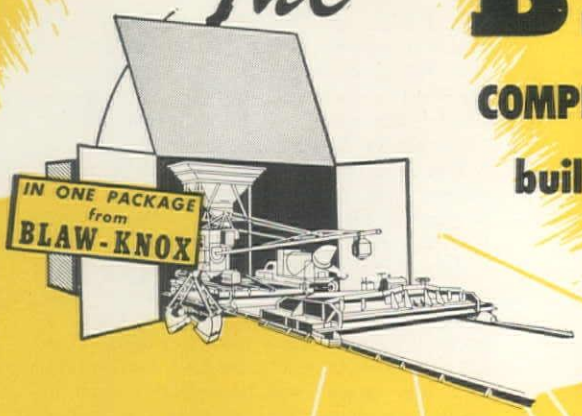
Total construction cost of the Silt Project is estimated at $3,190,000. Of this amount, $3,116,400 would be allocated to irrigation benefits, and would be repaid to the Government over a period of fifty years by the water users and through revenues credited to the Upper Colorado River Account. This is a special account to be established to which will be credited revenues from power sales from hydroelectric plants of the main Colorado River Storage Project, from participating projects within the natural confines of the Upper Colorado River Basin, and under certain conditions from the Central Utah Project.

INVERTED BEAM SLAB FOR WORLD'S LARGEST SUBURBAN STORE

WHEN COMPLETED, the new May Company department store being erected in the $250,000,000 planned community of Lakewood near Los Angeles will be the world's largest suburban store. Of steel reinforced concrete, the structure will consist of three main floors with mezzanine floors between each in the central portion of the building. Unusually wide column spacing of 58 ft. on center through the north-south axis required the use of inverted reinforced concrete beams to equalize bearing loads on the foundation. A uniform bearing load of between 800 and 1,200 psf. was obtained on fine silt and sand. T & S Construction Co. is the general contractor; F. J. Huxtable is project superintendent. About 2,000 tons of reinforcing bars, rolled at Bethlehem Pacific's Los Angeles steel plant, was furnished and fabricated by Joseph T. Ryerson Co. for the job.

The BLAW-KNOX

COMPLETE PACKAGE of concrete paving equipment builds the country's superhighways and airports



ALL over the country, contractors working the big contracts like Edens Superhighway or the Pennsylvania Turnpike are utilizing the advantages of the *one-source* "Complete Package" of concrete paving equipment.

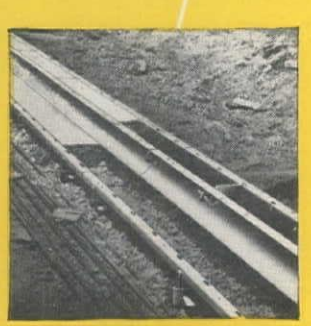
Here's how the Blaw-Knox "Complete Package" simplifies your problems and adds to your profit. You get every single piece of equipment you need for the job, and each piece is matched to the others to give you the assembly-line production that keeps you ahead of schedule.

In addition, you get all the benefits of *one source* of supply . . . all your equipment on *one order,* in *one shipment,* and all covered by *one financial arrangement.* The field performance of each machine is backed by *one undivided responsibility.* One dependable distributor organization provides a ready source for service or parts.

When so many contractors are profiting with "package" equipment, why don't you make sure of the bidding advantages you get with the Blaw-Knox "Complete Package"? Ask your Blaw-Knox distributor for details today.

Blaw-Knox Subgrader rides on Blaw-Knox Steel Road Forms on the Taconic Parkway job near Poughkeepsie, New York.

Blaw-Knox Paving Spreader and Finishing Machine at work on Edens Superhighway between Chicago and Milwaukee.



Steel Curb and Gutter Forms. One set handles every curb, curb and gutter, integral curb or sidewalk job.

Blaw-Knox Clamshell Buckets are available in a size and type to fit your job.

Blaw-Knox Steel Road Forms are self-aligning, easy to set and strip.

Blaw-Knox Portable Aggregate Batching Plants and Portable Bulk Cement Plants on the Pennsylvania Turnpike.

BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX CO., Farmers Bank Bldg., Pittsburgh 22, Pa.

New York • Chicago • Philadelphia • Birmingham • Washington • San Francisco

GET THE "COMPLETE PACKAGE" DETAILS FROM YOUR **BLAW-KNOX** *DISTRIBUTOR*

818 Monadnock Bldg., 681 Market St., San Francisco 5, Calif.

Central Mixing Plant

Concrete Bucket

Hi-Boy Trukmixer

Truck Mixer Loading Plant

Construction Men Wanted For Seabee Reserve

SEABEES are badly needed by the Navy to strengthen its Inactive Volunteer Reserve program. The Navy is interested in men with construction trade experience who will enlist primarily in the inactive Reserve.

Recalls to active duty will not be made unless the rating specialty is vitally needed to fill a billet in an active Naval Construction Battalion.

The Navy recognizes the necessity of a well trained Seabee Reserve and will grant full Navy credit for the type of civilian experience a man has had. This applies both to veterans and non-veterans. The former will be enlisted in their highest wartime rating, plus credit for postwar construction experience.

The Inactive Reserve is in addition to the Organized Reserve who hold weekly meetings where they put into practice the latest construction techniques. For each meeting attended they receive a full day's pay.

Volunteer Reservists do not hold meetings nor draw pay unless they apply for and are accepted for two weeks annual training duty. They may, however, participate in Volunteer Seabee Reserve Units on a non-pay basis. For this participation they will receive points towards Reserve retirement.

Approximately 60 different construction trades are represented in the Seabee organization. These skills are combined into 14 Navy ratings. These are:

Surveyors; Construction Electricians (General, Power, Communications);

Drivers (Equipment Operators); Mechanics (Diesel and Gas);

Builders (Light and Heavy); Steelworkers (Structural and Riggers);

Utility Man; and two non-rated classifications: Construction Man and Construction Apprentice.

A man's qualifications are evaluated against an established scale by a board composed of Civil Engineer Corps officers and Seabee chief petty officers. By this means a man is given a rating in keeping with his training and abilities.

Additional information is available at every Naval Reserve Training Center or through local Navy Recruiting offices.

Frenchman Hills Tunnel Project Started

INITIAL DRIVING operations are under way by United Pipe and Concrete Corp. and Ralph A. Bell $2,175,314 on the Frenchman Hills tunnel project 25 mi. south of Quincy, Wash. With a length of 9,280 ft. portal to portal and a 13.63-ft. drop in elevation from inlet to outlet, the tunnel, when completed will be a part of the Columbia Basin water distribution system being developed by the Bureau of Reclamation.

Material at the entrance portal is caliche or hard pan which is difficult to drill and shoot. It also tends to ravel and stop drill steel from coming out easily, or partly filling hole after steel was removed, or both. Borings show that the material changes to rock a short

distance from the opening. Borings also show that the last 300 ft. of the tunnel will be dirt with rock at the invert level.

Due to the ample time allowed for completion of the tunnel (completion date is October 18, 1953), the contractor has elected to drive from only one end, thus eliminating a double camp.

It is expected that 78,000 cu. yd. of excavation will be required for the tunnel which is to be a horseshoe type with a 7-ft. radius, 11½ ft. at the invert and having a radius of 14 ft. at the springline. Finished tunnel will be 14 ft. with a minimum of 7 in. of concrete lining. The estimated lining of 20,250 cu. yd. of concrete will be dry batched and moved into the tunnel for final mixing. Rings for supporting the tunnel will be 6-in. "H" beams, centers to be determined by quality of ground.

As driving operations got under way, construction of office, powder storage facilities, change house and necessary shops was being completed. No camp will be maintained for the project. Facilities include an underground dugout-type powder house with a storage capacity of 30,000 lb.

The contract for the tunnel also includes digging a 300-ft. inlet ditch, 40 ft. wide at the bottom and 15 ft. deep, and an outlet ditch 800 ft. long, 32 ft. wide at the bottom and 16½ ft. deep.

KEY MEN on the Frenchman Hills tunnel project. Standing, left to right: *J. R. (Blackie) Premo*, walking boss; *C. C. Harris*, general superintendent for United Concrete Pipe Corp. and *Ralph A. Bell*, and *C. L. MacDougel*, Bureau of Reclamation engineer.

It was necessary to build 2 mi. of access road and 5 mi. of power line to serve the project.

The equipment schedule includes: No. 100 Conway Mucker with 1-yd. bucket; twenty 6-yd. hauling cars (a new type built by Ray Moran of Virginia City, Nev.); General Electric 10-ton battery locomotive; Drill carriage with five hydraulic jibs and five Gardner-Denver D-99 drills; two Sullivan 600 compressors; two Gardner-Denver 365 cfm. compressors; and a 10,000-cfm. Ingersoll-Rand fan.

C. C. Harris is general superintendent for the project with J. R. "Blackie" Premo and June Brown as walking bosses. Niel Logan and E. P. Brown will serve as shifters. F. L. McCune will act as resident engineer for the Bureau of Reclamation.

New label tells you quick it's TIGER BRAND!

... the rope that spools evenly, resists kinking, handles easily!

This new label tells you quick it's American Tiger Brand wire rope, and it's the right rope for any equipment use—for lumbering, mining, petroleum or construction. Here's why it gives you top service...

It stands up under toughest tests because Tiger Brand is rigidly controlled all the way from raw ore to finished product by United States Steel, of which Columbia Steel Company is the Western producing member.

It spools evenly on drums and gets right on the job with a minimum of break-in time. And those high-tensile steel wires just won't quit! To get all the stamina that's engineered into American Tiger Brand, here's a tip ...

It works hard longer when you take advantage of the services of a Field Specialist. For free consultation, contact your Tiger Brand distributor or write Columbia Steel Company, Room 1422, San Francisco 4.

U·S·S TIGER BRAND Wire Rope

UNITED STATES STEEL

NEWS IN BRIEF

More Power to Oregon

LICENSE for a proposed hydroelectric project on the Klamath River in Klamath County, Ore., has been requested from the Federal Power Commission by the California-Oregon Power Company, of Medford, Ore. The proposed project would be known as the Big Bend No. 2 Development and would be located in the region of Klamath Falls and Keno, Ore. The total project cost is estimated at $8,173,880.

The development would include a concrete gravity-type diversion dam approximately 52 ft. high and 310 ft. long; a temporary regulating dam to provide a reservoir with approximately 1,150 acre-feet of pondage; a 16-ft. diameter conduit about 4,400 ft. long; a steel penstock 16 ft. in diameter and 600 ft. long; a powerhouse, about one mile downstream from the diversion dam, with two remotely controlled 25,000-kw. generators each connected to a turbine with capacity of 37,000 hp.; a substation on the powerhouse structure, and a transmission line approximately ¼ mile long.

The energy generated would be sold through the company's transmission and distribution system to its customers in southern Oregon and northern California.

Power on the Provo Project?

THE GOVERNMENT proposes to build an 8,000-kw. capacity hydroelectric plant at the Deer Creek Dam on the Provo River Project in Utah. Early construction of the plant has been urged by the Provo River Water Users Association whose repayment contract with the Bureau of Reclamation provides for installation of the plant either by the Bureau or by the Association itself. Penstocks, powerhouse substructure and other features were installed as part of the dam which was completed in 1941. The plant would furnish an estimated 24,000,000 kw.-hr. of energy annually for north-central Utah. A finding of feasibility is under preparation by the Bureau of Reclamation.

Long Forest Road in Montana

CONSTRUCTION of a 47-mi. long Forest Service road on the west side of the Hungry Horse Reservoir on the South Fork of Montana's Flathead River started early in July under contracts awarded by the Bureau of Reclamation. Hoops Construction Co., Twin Falls, Idaho, is building 24.5 mi. of the new road along the upper end of the 34-mi. long, 3,500,000-acre-foot reservoir under a $953,432 contract. Construction of the second section of road, 22.5 mi. along the downstream half of the reservoir, is being handled by Miller and Strong, Eugene, Ore., under a $1,179,410 contract.

The new road, which is scheduled for completion in 1953, will provide access to an estimated 1,500,000,000 board feet of mature merchantable timber, and will open up an area capable of producing 20,000,000 board feet annually on a sustained yield basis.

New Bids for Denver Sewerage

CONTRACTS totalling approximately $1,826,360 will be let by the City of Denver, Colo., for construction of four new sewer projects in the city. All bids received May 29 for construction of the Valverde district sanitary sewer system were rejected by Improvements Manager Thomas P. Campbell on grounds that they were too far above the $260,620 amount estimated by the city.

No plans have been announced to readvertise for bids on the Valverde project, but three other projects are up for bidding. Calls are out for construction of a $1,114,260 storm sewer east of the Park Hill Golf Course, a $282,600 sanitary sewer system in the same area and a $115,500 sanitary sewer system in the Cherry Creek district.

Vaquero Water Project Approved

EFFORTS to cope with a serious flood threat in the Santa Maria Valley, Calif., were rewarded when the Valley Water Conservation district approved an Army district engineer's survey for the $25,000,000 Vaquero Water Project.

In addition to dispelling flood threats the huge project would also serve to restore underground water supplies which are rapidly dwindling in the area. Representatives of six different agencies were present when the plan was approved. The Corps of Engineers, Bureau of Reclamation, county supervisors, U. S. Soil Conservation Service, Santa Maria Soil Conservation District and U. S. Forest Service sent representatives to hear the plan which calls for channel improvements on the Santa Maria River from Fugler's Point to the Pacific Ocean. Some 35,000 acres of farm land will receive the benefits of the project, which would salvage 18,500 acre-feet of water a year.

Estimated cost of the Vaquero Dam is $14,000,000. Levees and channel improvements would cost an additional $11,000,000.

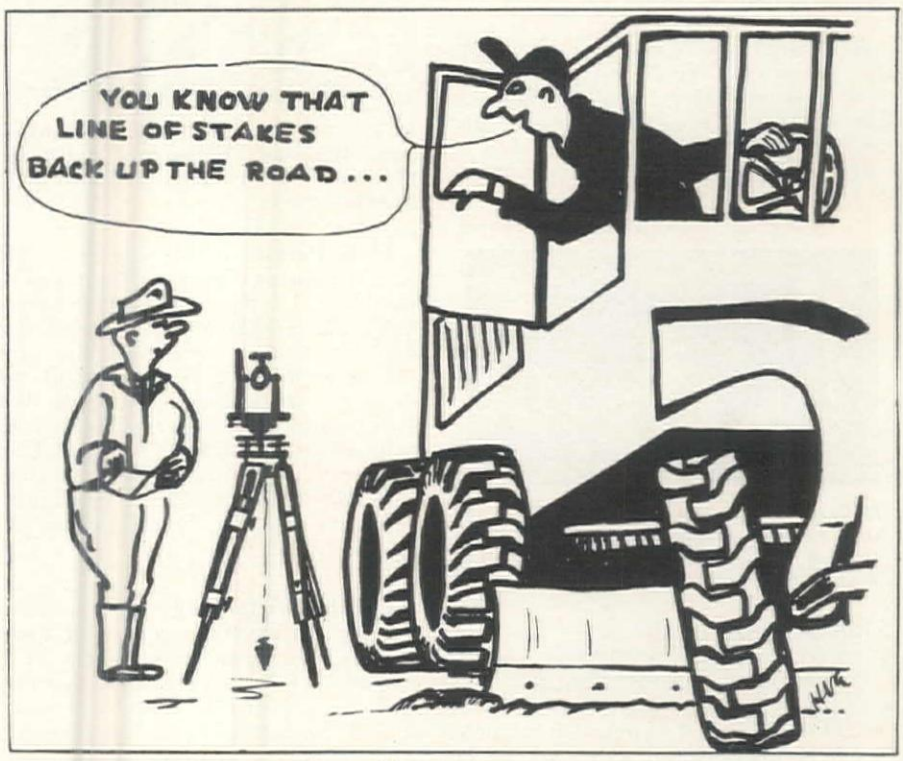
Bid Calls for USBR Projects

BID CALLS were released by the Bureau of Reclamation last month for several major Western construction projects. For the Cachuma Project, Calif., calls were issued for construction of the 102-ft. Glen Anne Dam near Goleta, and the 6,000-ft. long Sheffield tunnel near Santa Barbara.

Calls were issued for construction of the 415-ft. long, 115-ft. high Rattlesnake Dam on the Colorado-Big Thompson project, and construction bids for the Potholes East Canal and Ringold Wasteway near Othello, Wash., on Columbia Basin Project were also called.

Lateral, drains and canal bank construction for the Klamath Project, Oregon-California were issued, along with calls for rehabilitation of the Bumping Lake Dam near American River, Wash., Yakima Project.

Down-time Dopes . . . . . by Anderson



Drawn for *Western Construction* by Harold V. Anderson

ENGINEERS ON THE MOVE

New chairman of the water management subcommittee on the Columbia Basin water resources projects is **Frank A. Banks.** He was formerly the project engineer on the Grand Coulee project. Banks will now devote himself to coordinating activities with agencies connected with Columbia water uses and problems.

* * *

H. Gossweiler is now the construction engineer with Morrison-Knudsen Company, Inc., on the construction of Yale Dam, Yacolt, Wash. He was formerly with the same firm on construction of Lookout Point Dam in Lowell, Ore.

* * *

Major John G. McClone, Corps of Engineers, United States Army, received the tribute of the Associated General Contractors of America at a ceremony in his honor held at the San Francisco, Calif., Presidio. McClone received the Association's praises for the way in which he has advanced the Engineer Reserve Units sponsored by the Northern California Chapter of the Association.

* * *

Vice Admiral John J. Manning (CEC) USN., Ret., becomes the president and director of James Stewart & Co., Inc., engineer and construction firm. He will head all operations of the 107-year-old construction firm. Manning was formerly chief of civil engineers and chief of the Bureau of Yards and Docks of the Navy Dept.

* * *

A. M. Smith, state engineer of Nevada and director of the National Reclamation Association, resigns his post as state engineer. Though he is also resigning from many of his other activities he will remain active in reclamation affairs from his Carson City, Nev., home.

* * *

Robert F. Olds **(left), retiring chief of the Corps of Engineers Operation Branch, *Mrs. Olds*, and *Gen. O. E. Walsh.* (See item below.)**

Robert F. Olds, chief of the Corps of Engineers' operations branch, North Pacific division, retires after 25 years with the Corps and other federal agencies. Olds was guest of honor at a luncheon held in Portland, Ore., where he received many tributes and gifts from his district and division associates. Olds served as government engineer on the Panama Canal during his long career.

* * *

L. J. Stephenson, formerly contract superintendent and projects manager at the San Francisco Naval Shipyard, is now engaged as resident engineer with Edwards & Kelcey, Frederic R. Harris and O. J. Porter Co., consulting engineers on the stabilizing and grading contracts for the New Jersey Turnpike Authority. He was recently appointed section resident engineer for the paving contracts on section 6 of the turnpike.

* * *

Lt. Col. Thomas H. Lipscomb is now District Engineer, Portland District, Corps of Engineers. Lipscomb replaces **Colonel Donald S. Burns,** who is now South Pacific Division Engineer, San Francisco, Calif.

* * *

R. C. "Cy" Perkins **takes over duties as State Highway Engineer of Arizona, replacing *W. C. Lefebvre*, who retires. (See item below.)**

R. C. Perkins is the new State Highway Engineer, Arizona Highway Department. He has been with the department since 1926 when he entered the department as a resident engineer. Until his appointment, Perkins had been deputy state engineer for eight years. It was under his supervision that such projects as Navajo Bridge, Tempe Bridge, U. S. Route 60 from Springerville to Globe and the construction between Miami and Superior were accomplished.

* * *

Carl H. Wittenberg is now partner of the general contracting firm of Ford J. Twaits Co., with headquarters in Los Angeles. He was previously associated with Twaits in Los Angeles from 1920 to 1930. Since then he has spent ten years with Columbia Steel Co., serving as division manager in Los Angeles, and more recently as executive vice-president of Gladding, McBean & Co. He will act as general manager of the Twaits Company. The company is at present engaged in construction of the 2,000-car underground garage at Pershing Square in downtown Los Angeles (see lead article this issue).

*

Wittenberg

Larson

Vaud E. Larson becomes the head of the Bureau of Reclamation's Region 3 Branch of Project Planning. He was formerly a key engineer in lower Colorado River basin investigations. Larson succeeds **E. G. Nielson,** who is now assistant to the Regional Director.

* * *

Earle V. Miller takes over as highway engineer for Idaho on July 1. He was formerly deputy highway engineer for Arizona. **James Reid,** formerly chief engineer in Idaho, stays on as assistant highway engineer. Miller has been with the Arizona department since 1923 and his work concerned design, location and administrative tasks. Prior to 1923 he had been with the Oregon State Highway Commission.

* * *

L. H. Walther, formerly county road engineer at Yreka, Calif., is now associated with A. H. Clabby in a private engineering practice at Medford, Ore.

* * *

Dr. Ivan C. Crawford, well-known civil engineer and educator, retires from his post as Dean of the School of Engineering, University of Michigan, to accept a position as professor of civil engineering at Denver University. Crawford was at one time Dean of Engineering at the University of Idaho. His assignment at Denver University will consist of

CALENDAR OF MEETINGS

Aug. 14-16—National Conference on Prestressed Concrete, at the Massachusetts Institute of Technology, Cambridge, Mass.

Sept. 24-25—American Water Works Association, Rocky Mountain Section, annual convention at Cosmopolitan Hotel, Denver.

Sept. 24-27—Institute of Traffic Engineers, annual convention at Ambassador Hotel, Los Angeles.

October 11-13—Structural Engineers Association of California, annual convention, at Yosemite Park, Calif.

October 22-25—American Society of Civil Engineers, Annual Convention, at New York City, N. Y.

October 23-26—California Section, American Water Works Association, annual meeting, at Fairmont Hotel, San Francisco.

teaching special courses in the engineering field for advanced students and engaging in special research work concerning the industrial needs of the Colorado and Rocky Mountain region. Crawford received his B.S. from the University of Colorado in 1912.

* * *

After 38 years of service with the California State Division of Highways, **Harry C. Darling,** senior highway engineer, retires from the division's District IV. Darling worked on numerous assignments in District III before transferring to District IV and for 25 years was in charge of highway location in that area.

* * *

Charles Vogel resigns as road commissioner for Tuolumne County, Calif. and joins David Bohannon Industries, San Mateo, Calif., contractor.

* * *

Gaetan M. Zucco **takes a leave from Bethlehem Pacific to return to active duty with Corps of Engineers, to command the 498th Engineer Aviation Brigade (see item).**

Gaetan M. Zucco, newly appointed contracting manager for Bethlehem Pacific, Los Angeles, Calif. district, takes a leave of absence from the company to return to active duty with the U. S. Army Corps of Engineers. Zucco now commands at Fort Leonard Wood, Mo., the 498th Engineer Aviation Brigade. The Brigade, as a Reserve Unit, was sponsored by the Mountain Pacific Chapter of the Associated General Contractors of America and is composed of numerous Seattle, Wash., men prominent in engineering and architectural circles.

* * *

Frank G. Scussel is promoted to Chief of the Resources and Development Division of the Bureau of Reclamation's Regional Branch of Power Utilization. Scussel has been assistant chief of the division since April, 1949. He succeeds **Leslie M. Alexander,** who became assistant Regional power manager shortly before his recall to active duty with the Air Force. Scussel resides in Boulder City, Nevada.

* * *

San Francisco, Calif., played host to the Western Chapters Conference of the Associated General Contractors of America. Representatives of chapters in the 11 Western States gathered to discuss mutual problems and hear a report on national labor problems delivered by **James D. Marshall,** assistant managing director from Washington, D. C. **John H. Sellen** of Seattle, Wash., was elected chairman of the Western Chapters Conference and **E. B. Hickok,** manager of the Seattle Chapter, became secretary for the coming year.

DEATHS

Alfred Neuffer, 54, contracting manager for the Los Angeles, Calif., district of Bethlehem Pacific Coast Steel, died in Lima, Peru, March 26 from a heart attack. Neuffer was vacationing in South America.

* * *

William F. Eitelgeorge, 85, retired sewer contractor, died April 2 in Los Angeles, Calif.

* * *

Charles Henry Davis, 86, civil engineer, died June 3 in a New York hospital. Davis was noted for first advocating and designing the railroad tunnels under the Hudson River. He was also the founder of the Columbia University School of Highway Engineering and the American Association of State Highway Officials.

* * *

John A. McEachern, chairman of the board of directors of General Construction Co., died in his home at Seattle, Wash.

* * *

Chris J. Pfrang, 78, prominent San Francisco Bay Area builder, died in Oakland, Calif.

* * *

A. J. Raisch, 90, paving contractor, died May 23 in San Francisco, Calif., following an illness of several months.

SUPERVISING THE JOBS

Don McNeil and **Jack Seaton** have formed the J & D Construction Company at Burns Lake, B. C.

* * *

A. G. Wood is superintendent for John Rocca Construction Co., San Rafael, on construction of bridges and culverts on the new highway north of San Rafael. Rocca is subcontractor to Granite Construction Co.

* * *

Davis A. Paul, Mill Valley, Calif., general contractor, is constructing a service station for Marin Petroleum Co. at San Anselmo, Calif., and also the Mill Valley Baptist Church. **Wiley "Buck" Stewart** and **E. L. "Ed" Ramey** are foremen.

* * *

Bill Rives **(left), asst. superintendent, and** ***Guy F. Atkinson*** **confer at McNary Dam. Atkinson's firm is a joint venturer on the $58,416,459 completion project.**

* * *

Utah Construction Company has **George W. Foster** as job superintendent on driving two 1,400-ft. slopes and sinking a 400-ft. concrete-lined air shaft for Colorado Fuel & Iron Corporation at the new Allen Mine location near Stonewall, Colo. **W. M. Glade** is the office manager and purchasing agent for the project.

* * *

Anderson Bridge Construction Co., Tacoma, Wash., is constructing the Skookumchuck River bridge in Lewis County, Wash. **Fred Michel** is job superintendent and **Axel Malmstrom** is concrete foreman on the $314,475 job.

* * *

In Strathmore, Calif., high school construction is being supervised by **Herb Lembeke,** for Ralph Utter, Tulare, Calif. contractor. The project will cost $185,000.

* * *

In Tucson, Ariz., **L. A. Miller** is the job superintendent on construction of a $400,000 one-story brick and structural steel group of buildings for Infilco, Inc. **Virgil Baker** is job superintendent for construction of a $250,000 Safeway store building, also in Tucson. In Randolph, Ariz., **Jim Drouillard** is job superintendent for a group of one-story masonry and steel buildings being constructed for a school for the Arizona Children's Colony. All three projects are contracts of Murray J. Shiff Construction Company, Tucson, Ariz.

* * *

"Pete" Pace is job superintendent for Fredrickson & Watson Construction Co., Oakland, Calif., on the grading and surfacing of about 5 mi. of highway between Chular and Spence Underpass in Monterey County, Calif. **Bernard Fredrickson** is project manager for the $513,377 job.

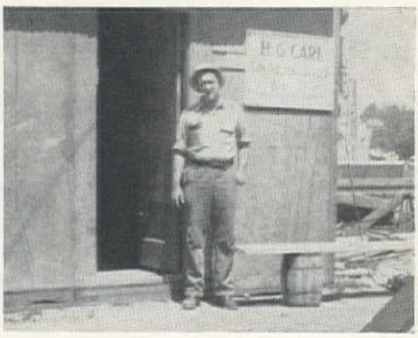
* * *

L. W. Bates is supervising the $500,000 high school construction in Central Point, Ore. His assistant is **Rodney Smith** and **H. N. Lankins** is job superintendent. Camp foreman is **M. C. Haines** and **L. C. Rawlings** is labor foreman.

* * *

Harry Tobey is general superintendent, **Dean Stone,** job superintendent, and **Alf Hjort,** resident manager on Alaskan Way Viaduct pile driving, near Seattle, Wash. Raymond Concrete Pile Co. has the pile driving subcontract from general contractor Morrison-Knudsen Co., Inc. Piledriver foreman is **Del Walker** and **Eddie Engelbrecht** is concrete foreman.

* * *



Leon Murphy, **formerly foreman on Davis and Detroit Dam projects, is now supervising construction of West Salem Jr. High School.**

* * *

Charles Dinelli is general superintendent for E. E. Lowell, contractor, on the $450,000 construction of a sanitary sewer system for the City of Antioch, Calif. **Wesley Rogers** is assistant superintendent on the project which should be completed by mid-October.

* * *

Construction of Bald Mountain pressure tunnel and access roads on the Colorado-Big Thompson project is being supervised by **Frank Merrick. F. G. Peterson** is project manager and **R. L. Wahl** is the office and administrative manager for Winston Bros. Co., Minneapolis, Minn. The firm has a contract from the Bureau of Reclamation for $1,691,262.

* * *

Near Ephrata, Wash. where J. A. Terteling & Sons, has two schedules of work involved in construction of a 16.9-mi. extension of the East Low Canal, **Alfred Perry** is job superintendent, **Vern Hash** is in charge of excavation and **Jim Erwin** is the engineer.

* * *

Highway construction about 6 mi. in length near Paso Robles, Calif. is being supervised by **Bob Osborne** for the Madonna Construction Co., San Luis Obispo, Calif. **John Hosich** is grading foreman, **Forrest Bodenheimer** is in charge of structures and **Dan Borrvelori** is master mechanic. **George Victorino** is foreman on the $625,665 job.

* * *

V. A. Stanford is general superintendent for Don M. Drake Construction Co. on construction of the food technology building and Withycomb Hall at Oregon State College, Corvallis, **Don M. Drake** is project manager and **Larry A. Bernardi** is assistant superintendent. **Ron M. Blakley** is expeditor, **Jim Russell** is lab foreman on the project which will cost over $3,000,000. **Orval Slick** is mechanical superintendent for Tide-Bay Co., subcontractor on plumbing and heating.

* * *

Slayton, Oregon is the site of the new Immaculate Conception Catholic Church construction. **Leo Minden** is the general superintendent for **A. N. Minden** on the contract, which is approximately $200,000.

* * *

Donald J. Konen is job superintendent, **Claude Lacey** is grading foreman and **Wilfred Nowling** is crushing foreman for J. F. Konen Construction Co., Lewiston, Ida., on the $230,018 highway construction along 6.5 miles of PSH No. 3, Rocky Hollow to Field Springs Park, Asotin County, Wash.

* * *

Dave Heimbigner is job superintendent for McAtee & Heathe, Spokane, Wash., on the $138,795 construction on several state highways in Chelan, Grant and Douglas Counties, Wash. **Lester Harp** is foreman on the surfacing with non-skid single seal treatment on the 144 miles involved in the project.

* * *

Construction of the Great Falls-Armington highway in Cascade County, Mont., is under the supervision of **Roy B. Olson,** Project Manager for the Albert C. Lalonde Co.

* * *

Jess Willis is job superintendent for Peter Kiewit Sons' Co., Sheridan, Wyo., on the grading, curb and gutter, storm sewer construction on 1.444 miles of Thermopolis streets in Hot Springs County. Cost of the project is $273,681.

Continued on page 113

NEW *alkaline* Shell X-100 Motor Oil neutralizes Acid Action

It's not *friction* but *acid action* that causes 90% of engine wear! To neutralize the harmful effect of the pint or more of acid formed in average daily driving, Shell Research has produced an *alkaline* motor oil—Shell X-100. Fortified with alkaline "X" safety factors, it neutralizes the acid action, prolonging your engine's life.

In addition, this new premium heavy duty motor oil possesses cleaning factors which help prevent deposits that would foul your engine.

Shell X-100 is the finest motor oil money can buy. Let your Shell dealer give your engine the protection of this new alkaline Shell X-100 Motor Oil today.

It's Incomparable

CONTRACTS

A Summary of Bids and Awards For Major Projects in the West

★★

Alaska

$3,167,260—**J. C. Boespflug Construction Co.** and **S. Birch & Sons,** 1912 - 4th Ave., Seattle, Wash.—Low bid for construction of seven organizational maintenance buildings at Ft. Richardson; by Corps of Engineers.

$2,415,870—**J. C. Boespflug Construction Co.** and **S. Birch & Sons,** 1912 - 4th Ave., Seattle, Wash.—Low bid for construction of two organizational maintenance shops at Ladd and two at Eielson Air Force Base; by Corps of Engineers.

$4,177,715—**J. C. Boespflug Construction Co.,** 1912 - 4th Ave., Seattle, Wash.—Low bid for construction of a 9,500-kw. heating and power plant; by Alaska Railroad and Chugach Electric Cooperative Assn., Inc.

$4,247,000—**Haddock Engineers Ltd. & Assos.,** Santa Fe, N. Mex.—Low bid for construction of housing, runway and taxiway projects and alterations to waterfront installations at Kodiak Naval Base; by Bureau of Yards and Docks.

$3,424,930—**A. J. Hopper Co.,** 243 Langton, San Francisco, Calif. —Low bid for regrading and surfacing 57.6 mi. of Section E, Richardson Highway; by Alaska Road Commission.

$2,880,000—**Nelse Mortensen & Co., Inc.,** 1021 Westlake, No. Seattle, Wash.—Low bid for construction of family housing and security fencing; by Corps of Engineers.

$697,255—**Munter Construction Co., Inc.,** 1428 Joseph Vance Bldg., Seattle, Wash.—Contract awarded for work on the Loop Revision section of the Alaska Railroad, Seward subdivision; by Alaska Railroad.

$2,709,402—**S. Patti Construction Co.** and **MacDonald Construction Co.,** Anchorage—Contract awarded for construction of 23 eight-family living quarters at Ft. Richardson; by Corps of Engineers.

$688,065—**J. S. Ramstad Construction Co., Inc.,** Box 1454, Anchorage—Low bid for railroad construction including 2.2 mi. of railroad grade, installation of culvert pipe on the Loop Revision section; by Alaska Railroad.

$589,430—**Stock & Grove, Inc.,** Anchorage—Low bid for construction of bridges and highways, Seward-Anchorage highway; by Bureau of Public Roads.

California

$1,021,920—**Gibbons & Reed Co.,** 259 W. 3rd So. St., Salt Lake City, Utah—Low bid for schedules I and II, earthwork and structures, Yuma levee, Lower Colorado River District, Arizona-California-Nevada; by Bureau of Reclamation.

$758,220—**Guy F. Atkinson Co.,** 223rd St. and Santa Fe Ave., San Diego—Low bid for construction of a bridge of steel beam type over the San Diego River control channel on Morena Blvd. The bridge will have a concrete deck on reinforced concrete piers and abutments; by San Diego City Council.

$470,991—**Basich Bros. Construction Co., R. L. & N. L. Basich,** 3850 S. San Gabriel Blvd., San Gabriel—Contract awarded for highway improvements in Imperial County between Dixieland and El Centro, about 46.0 mi. plant-mixed surfacing over the existing surface; by State Division of Highways.

$2,000,000 approx.—**Bechtel Corp.,** Mills Tower, San Francisco—Contract awarded for pipe line salvaging and replacement in Mojave desert; by General Petroleum Corp.

$1,359,902—**Bein Construction Co.,** 139 So. Beverly Dr., Beverly Hills—Low bid for construction of a steel frame elementary school; by Rivera School District.

$367,190—**G. M. Carr, Bati Rocca** and **John Burman & Sons,** 2750 Harrison Ave., Eureka—Low bid for construction of a

structural steel and reinforced concrete bridge to be located at the north fork of the Mad River about 7.5 mi. east of Blue Lake, and about ½ mi. of approaches to be graded and surfaced with plant-mixed surfacing, Humboldt County; by State Division of Highways.

$642,690—**T. E. Connolly,** 461 Market St., San Francisco—Low bid for diversion tunnel and access road construction to power plant on Folsom Reservoir project; by Corps of Engineers.

$1,631,055—**Duncanson-Harrelson & Stolte, Inc.,** 8451 San Leandro St., Oakland—Contract awarded for construction of a bascule type bridge across San Leandro Bay, between Bay Farm Island and Alameda; by State Division of Highways.

$190,535—**Al Erickson & Co.,** P. O. Box 384, Napa—Low bid for construction of a bridge and about 0.8 mi. of approaches to be constructed across Cosumnes River near Bridge House in Sacramento County; by State Division of Highways.

$183,825—**R. A. Erwin,** P. O. 244, Colton—Low bid for highway construction, grading and cement treated base to be constructed and surfaced with plant-mix surfacing on Hole and Holden Aves., between E. Riverside city limits and Arlington Ave.; by State Division of Highways.

$372,754—**Frederickson & Kasler,** 212 - 15th St., Sacramento—Contract awarded for grading and paving about 1.3 mi. with plant-mixed surfacing on cement treated base and an existing pavement, and outer highways to be constructed to provide a 4-lane divided highway in Ventura County, from Santa Clara River bridge through Montalvo; by State Division of Highways.

$1,303,595—**Griffith Co.,** 1060 Broadway, Los Angeles—Low bid for grading and paving about 0.9 mi. of the Ramona Freeway in Alhambra between Hellman Ave. and 8th St. and three bridges to be constructed; by State Division of Highways.

$596,740—**Harms Bros.,** 5261 Stockton Blvd., Sacramento—Low bid for highway improvements in Tuolumne County between Jamestown and Sonora about 3.3 mi. in length to be graded and surfaced with plant-mix surfacing on untreated rock base, culvert construction and an existing bridge to be widened; by State Division of Highways.

$989,675—**Charles MacClosky,** 112 Market St., San Francisco—Low bid for widening the existing bridge across San Luis Rey River and its approaches to be widened by constructing plant-mix surfacing on Portland cement concrete base.

$274,101—**McGuire & Hester,** 796 - 66th Ave., Oakland—Low bid for sewage separation project on the Adeline-Sacramento system in Berkeley; by City of Berkeley.

$207,310—**C. K. Moseman,** 600 Alameda de las Pulgas, Belmont—Low bid for county highway construction in Butte County, under the tracks of the Western Pacific Railroad and Southern Pacific Railroad and at High Sierra Pine Mills, near City of Oroville; two underpasses and a bridge to be constructed; by State Division of Highways.

$163,255—**Munn and Perkins,** P. O. 1092, Modesto—Low bid for surfacing about 5 mi. near Cathay Junction with plant-mixed surfacing on untreated rock base; by State Division of Highways.

$180,525—**Oswald Bros. Co.,** 366 E. 38th St., Los Angeles—Low bid for widening existing pavement with untreated rock base and surfacing with plant-mixed surfacing, between Freeman Blvd. and Sepulveda Blvd.; by State Division of Highways.

$913,869—**George W. Peterson** and **Jack W. Baker,** 6170½ Santa Monica Blvd., Los Angeles—Low bid for construction of two reinforced concrete bridges and storm drain and sanitary sewer system on Hollywood Freeway at Bronson Ave. and Gower St.; by State Division of Highways.

$313,615—**Richter Bros.,** P. O. Box 1511, Oroville—Low bid for highway improvements in Sierra County, about 0.8 mi.-length to be graded and bituminous surfacing treatment applied; by State Division of Highways.

$734,272—**Manuel Smith,** 313 Syndicate Bldg., Oakland—Contract awarded for Unit 1 construction of main trunk lines and appurtenant work in Monterey County; by Seaside Sanitation District.

$538,365—**Peter Sorenson,** 927 Arguello St., Redwood City—Low bid for sewage treatment plant construction in San Mateo County; by Menlo Park Sanitary District.

$334,073—**Stolte, Inc.,** 8451 San Leandro St., Oakland—Contract awarded for Unit 2 sewage pumping and treatment works and appurtenant construction, Monterey County; by Seaside Sanitation District.

$191,925—**Thomas Construction Co.,** 4841 Harvey, Fresno—Low bid for construction of box girder bridge to be constructed north of Plymouth, and approaches to be graded and surfaced; by State Division of Highways.

$669,920—**Webb & White,** 7220½ Melrose Ave., Los Angeles—Low bid for grading and paving 0.6 mi. of Harbor Freeway between 4th and Temple Sts.; by State Division of Highways.

$2,439,708—**Winston Bros.,** 1532 S. California St., Monrovia—Low bid for state highway construction on Santa Ana Freeway, between Broadway in Santa Ana and First St., a railroad underpass, five highway separation structures and a pedestrian crossing and about 2.8 mi. to be graded and a portion to be surfaced with portland cement concrete pavement on cement treated subgrade, and appurtenant work; by State Division of Highways.

$1,634,441—**Winston Bros.,** 1532 S. California, Monrovia—Low bid for construction of five bridges and grading and surfacing about 0.6 mi. with portland cement concrete and imported base material on the Hollywood Freeway between Cahuenga Blvd. and Gower St., Los Angeles; by State Division of Highways.

Colorado

$7,000,000 approx.—**Macco Corp.** and **Puget Sound Bridge & Dredging Co.**—Low bid for diversion work, water tunnel drilling, grout and drainage hole construction on south Boulder Creek west of Eldorado Springs; by City and County of Denver.

Idaho

$111,640—**Valley Crushing Co.,** Shoshone—Low bid for constructing and surfacing 1½ mi. of Roseberry-Donnelly-Norwood Rd. and about 10 additional miles in Valley County; by State Highway Department.

Montana

$953,430—**Hoops Construction Co.,** Box 431, Twin Falls, Idaho—Low bid for schedule 1 construction of 24.5 mi. of roadway along Hungry Horse Reservoir; by Bureau of Reclamation.

$1,179,408—**Miller & Strong, Inc.,** 3871 Royal Rd., Eugene, Ore.—Low bid on schedule 2 construction of 22.5 mi. of road extending southeast from a point .4 mi. upstream from Hungry Horse Dam to the point which marks the end of schedule 1; by Bureau of Reclamation.

$259,640—**Carl E. Nelson,** P. O. Box 397, Logan, Utah—Low bid for surfacing the Yellowstone Trail for a length of 12.2 mi. in the Cabinet National Forest; by Bureau of Public Roads.

$2,322,335—**Nilson-Smith Construction Co., Kiely Construction Co.** and **Northwest Engineering Co.,** Great Falls — Contract awarded for paving airfield and related work at Great Falls Air Force Base; by Corps of Engineers.

$168,263—**O'Brien Construction Co.,** P. O. Box 1801, Great Falls—Contract awarded for grading and gravel surfacing on 5.4 mi. of the Somers-Big Fork Rd., Flathead County; by State Highway Department.

$152,595—**Ed Tangmo,** Milltown—Contract awarded for grading, gravel surfacing along 5.1 mi. of the Round Butte-Ronan Rd., Lake County; by State Highway Department.

New Mexico

$572,850—**Armstrong & Armstrong,** P. O. Box 873, Roswell—Contract awarded for highway work in Luna County on 12.044 mi. of the Lordsburg-Deming roadway; by State Highway Department.

$198,335—**W. T. Bookout Construction Co.,** Box 298, Las Vegas—Contract awarded for highway construction along 20.259 mi. of the Datil-Horse Springs roadway; by State Highway Department.

$200,190—**G. I. Martin,** 520 Tulane, Albuquerque — Contract awarded for highway construction in Torrance County along 11.638 mi. of the Vaughn-Corona roadway; by State Highway Department.

$185,983—**Henry Thygesen & Co.,** Box 876, Albuquerque—Contract awarded for highway construction in Colfax and Union Counties along Raton-Des Moines and Raton-New Mexico to Colorado State line, about 43.188 mi. in length; by State Highway Department.

Oregon

$1,393,007—**Guy F. Atkinson Co.,** 806 Cascade Bldg., Portland—Low bid for construction of Willow Creek Dam and Big Butte

Springs intake line and appurtenant work; by Medford Water Commission.

$591,810—**Babler Bros. and Rogers Construction Co.,** 4617 S. E. Milwaukie Ave., Portland—Low bid for widening and paving roads in Deschutes, Harney, and Lake Counties; by State Highway Commission.

$309,920—**Bay Construction Co.,** 1762 Airport Way, Seattle, Wash.—Low bid for construction of the Big Eddy-Maupin 230-kv. transmission line, Wasco County; by Bonneville Power Administration.

$383,880—**R. A. Heintz Construction Co.,** 8101 N. E. Union Ave., Portland—Low bid for street construction projects in the City of Portland.

$419,920—**Peter Kiewit Sons' Co.,** P. O. Box 491, Longview, Wash.—Low bid for highway paving in Morrow and Gilliam Counties; by State Highway Commission.

$694,039—**P. S. Lord,** P. O. Box 4505, Portland—Low bid for construction of a lateral system, Grand Ave. unit of the intercepting sewer and sewage treatment plant; by City of Portland.

$401,920—**Warren-Northwest,** P. O. 5072, Portland—Low bid for highway paving and appurtenant work in Harney County; by State Highway Commission.

Utah

$373,120—**W. W. Clyde & Co.,** Springville—Contract awarded for highway construction along U. S. No. 40, Mountain Dell and Lambs Canyon in Salt Lake County about 2.581 mi. in length, to be a plant-mixed bituminous surfaced road; by State Road Commission.

$144,215—**W. C. Mendenhall,** Springville—Low bid for highway construction along U. S. 91, Mona and Nephi in Juab County, to be 7.008 mi. in length, plant-mixed bituminous surfacing to to be applied; by State Road Commission.

$1,360,608—**Moore & Roberts** and **B. & R. Construction Co.,** 693 Mission St., San Francisco, Calif.—Low bid for the construction of seven buildings in Area E, Dugway project; by Atomic Energy Commission.

$3,576,202—**Fred A. Rumph & Co.,** 144 San Antonio Dr., Long Beach, Calif.—Low bid on the construction of a 400-unit housing project, Area E, Dugway project; Atomic Energy Commission.

Washington

$322,385—**American Pipe & Construction Co.,** 3428 Terminal Annex, Los Angeles, Calif.—Low bid for supplying of pipe for last stage construction of City of Tacoma's water line improvement program; by City of Tacoma.

$1,171,692—**Roy L. Bair & Co.,** 1220 Ide Ave., Spokane—Contract awarded for the construction of 7 barracks buildings and other facilities, Fairchild Air Force Base; by Corps of Engineers.

$2,051,320—**S. Birch and Sans Construction Company** and **McLaughlin Construction Co.,** 314 Ford Bldg., Great Falls, Mont.—Low bid for runway construction of 10,000 ft. at Fairchild Air Force Base; by Corps of Engineers.

$1,061,020—**Carbon Bros. & Plath,** 3430 N. Cook, Spokane—Low bid for 7 barrack buildings to be constructed at Fairchild Air Force Base, and other miscellaneous work; by Corps of Engineers.

$367,960—**Goetz & Brennan,** Seaboard Bldg., Seattle—Low bid for construction of two reinforced concrete bridges and miscellaneous improvements along 5.28 mi. of PSH No. 1-A, Snohomish to Lake Stevens; by State Highway Department.

$433,880—**F. R. Hewitt,** Parkwater, Wash.—Low bid for draining, grading, surfacing and stockpiling along 6.7 mi. of PSH No. 3, Pullman to Idaho state line in Whitman County and a light bituminous surface treatment to be applied; by State Highway Department.

$3,724,710—**Peter Kiewit Sons' Co.,** P. O. Box 491, Longview—Low bid for construction of 8,000-ft. jet-plane runway strip, U. S. Naval Air Base, Whidby Island; by 13th Naval District.

$3,837,750—**Lease & Leigland,** 1501 No. 35th St., Seattle—Low bid on three schedules of construction of 16 barracks buildings and two related structures, Larson Air Force Base; by Corps of Engineers.

$712,430—**Manson Construction & Engineering Co.,** 821 Alaskan Way, Seattle—Low bid for Everett shipyard rehabilitation, Piers A, B and C; by 13th Naval District.

Morrison-Knudsen Co., Inc., 603 Hoge Bldg.—Contract for excavation on site of the $50,000,000 Alcoa plant, Wenatchee, Wash.; by Alcoa.

$1,425,010—**Minnis & Shilling** and **United Concrete Pipe Corp.,** 3144 W. 11th St., Eugene, Ore.—Low bid for 12 mi. of earthwork, asphaltic membrane lining, pipe lines and miscellaneous structures at Moses Lake, Columbia Basin Project; by Bureau of Reclamation.

$187,170—**Thomas Scalzo,** 3211 Airport Way, Seattle—Contract awarded for highway improvement, Winslow to Agate Pass Highway, Bainbridge Island; by State Highway Department.

$3,744,210—**Sound Construction & Engineering Co.,** 1300 Aloha St., Seattle—Low bid for the construction of radio-chemistry building, Hanford Works laboratory center; by General Electric Co.

SUPERVISING THE JOBS

. . . Continued from page 106

Work started June 1 on the construction of a bascule type bridge between Bay Farm Island and Alameda, Calif. **George W. Fink** is job superintendent for Duncanson - Harrelson Co. - Stolte, Inc., joint venturers on the $1,631,050 project. **M. W. Milot** is field engineer on the project for the California State Division of Highways.

* * *

C. L. Earsley is job superintendent for Henry Thygesen, Albuquerque, N. M., contractor, on highway construction in Colfax and Union Counties, N. M. **Earl Shannon** is assisting on the $185,985 project, which is 43.188 miles in length.

* * *

Harold B. Shannon is general superintendent for the Martin Green Construction Co. of Los Angeles on its contract for embankment work on Lucky Peak Dam, near Boise, Idaho. Other members of the supervisory staff were indicated in the June issue, page 138.

* * *

N. A. Nelson is general superintendent on the grading, drainage and base course surfacing work over the Green River on the Granger Junction-Green River Road, Wyo. **T. A. Close** is job superintendent for the N. A. Nelson Construction Co. on this $278,400 project, and **Frederic Randall** is carpenter foreman.

* * *

Dominguez channel construction in Los Angeles, Calif., is being supervised by **Earnest Redfearn** for North H. Plunkett, Long Beach, Calif., contractor. **Joe Castillo** is concrete foreman on the job.

* * *

Leonard School construction in Grants Pass, Ore., is under the supervision of **H. B. Mofe.** Ashland & Dodson, contractor, has **Howard Hanna** as foreman.

* * *

At Rapid City, So. Dak., where seventeen two-story barracks buildings are being constructed by Southwest Construction Co., Chicago, Ill. **Elmer Clausen** is general superintendent and **Orville Habeck** is general foreman. **John Davis** is engineer, **J. L. Neibert** is project manager, and **Larry Clausen** is office manager. Cost of the project is about $2,000,000.

* * *

Alfred Rumley is general superintendent for Ralph Utter, Tulare, Calif., contractor, on construction of a $175,000 elementary school in Tipton, Calif.

* * *

The sewer disposal project in Porterville, Calif., is being supervised by **R. S. Quiram** for E. F. Quiram & Sons. The firm is in charge of excavating and installing septic tanks for the project.

* * *

William Rowland is superintendent for Fredrickson Bros. Construction Co. on state highway construction north of Fortuna, Calif. **R. T. Edwards** is grade foreman and **Warren A. Miles** is master mechanic. **W. J. Slate** is foreman for construction of Vanduzen Bridge and **Don Davis** is office manager.

* * *

Dean P. Stone is job superintendent for the Raymond Concrete Pile Co. on the Alaskan Way Viaduct, Seattle, Wash.

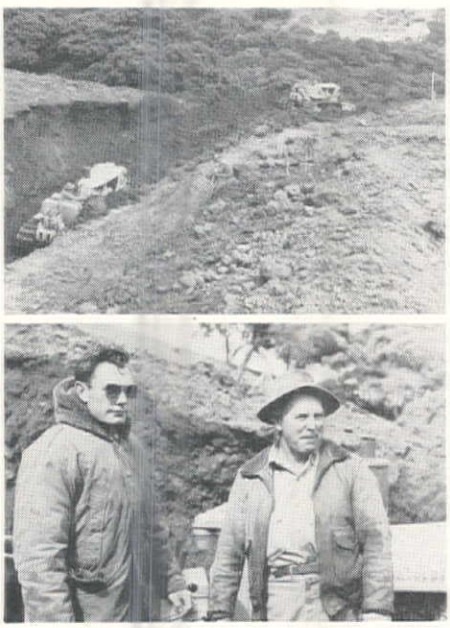
* * *

Wesley O. Orrestad is general superintendent on the building construction in Wenatchee, Wash., for the National Bank of Commerce. **Avery Dunning** is the carpenter foreman for the Vandivort Construction Co. and H. Halvorson, Inc., Spokane contractors on the $287,000 project.

* * *

W. Stoneburner, Louis Wicks and **William Wicks** are partners in the newly formed United Construction Co., Olympia, Washington.

* * *



***Lloyd Rodoni*, Los Gatos, Calif., contractor (right) and son *Don*, with their fleet of Caterpillar D7 tractors, played an important role in the clean-up of the road slide described on page 90 of this issue. Top view shows their tractors constructing drainage trench on hillside above slide area.**

* * *

Rudy Preblich is superintendent for **C. S. Phillips,** Petaluma, Calif., on construction of the Santa Rosa, Calif., Veterans Memorial Auditorium. **Harley Pendelbury** is assistant superintendent on the $650,000 project.

* * *

Grading and bridge construction west of La Grande, Ore. is being supervised by **Henry Walder** for Valley Construction Co.

* * *

Coast Construction and Engineering Co., Junction City, Ore. has several jobs under way in the Pacific Northwest. **John Jeke** is supervising the $174,000 construction of a 72-in. outfall sewer on Polk St. in Eugene, Ore. **Gaylord Robison** is superintendent on the $100,090 McKenzie Water District project which involves 94,000 ft. of water pipe. Sewer construction in Corvallis is being supervised by **Lee Gardner.**

* * *

John Nielson is general superintendent and **Ben "Bud" Cagle** is carpenter foreman on the $500,000 construction of the Corvallis Plaza Apartments, Corvallis, Ore. **M. W. Lindsey** is detail man on the 48-room, 6-story project.

* * *

Mike Strahon is superintendent for Industrial Builders on the Springfield Junior High School construction, Springfield, Ore. **Don Strahon** is carpenter foreman. The job is to cost in excess of $500,000.

* * *

In Eugene, Oregon where the Lane Tower Apartments are being built, **George Kimports** is superintendent and **Raymond Johnston** is carpenter foreman. **Bert Beckelmeier** is labor foreman on the concrete structure job which will have 122 apartments and cost over $1,000,000. Coates Construction Co. has the contract.

* * *

Ross B. Hammond, Portland, Ore. contractor, has several jobs under way in the Portland area. Eugene High School construction, a million-dollar project, is being supervised by **Ralph Gibbs. Ed Relyea** is carpenter foreman and **Louis Salchenberg** is labor foreman. Sacred Heart Hospital construction in Eugene is being supervised by **Bill Probst. R. Parrish** is carpenter foreman and **Paul Tubbs** is labor foreman. The University of Oregon's new Science building is another project that is under way and **J. N. Biglin** is the superintendent. **James Sharp** is carpenter foreman on this job.

* * *

Construction of Meridian Dam in Lowell, Ore. by joint venturers, Morrison-Knudsen Co., Peter Kiewit Sons' Co., Inc. and Macco Corporation is being supervised by **L. E. Steelman. Harold Maxwell** is his assistant. **Grant Peacock** is in charge of dirt moving; **Al Smithies** is concrete superintendent and **S. T. Brown** is superintendent on aggregate plant. **Leonard Kinyon** is master mechanic, **Floyd Mercer** is chief electrician and **D. W. Lutes** is project engineer. **Guy McGee** is field engineer and **D. M. Dugan** is office manager. **A. E. Crooks** is purchasing agent.

* * *

J. M. Solvik is superintendent for Howard Halvorson, contractor on construction of Bonneville Substation, Goshen, Ore.

* * *

Construction of the tuberculosis treatment unit of the Oregon State Hospital, Salem, Ore. is being supervised by **Howard Post** for Viesco and Post, contractor. **R. Roy** is carpenter foreman on the job and **Charles "Chuck" Rogers** is labor foreman. **M. E. Jones** is representing the State.

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

Bucyrus-Erie Co. will be in its new location at 120 Freeway St., South San Francisco, Calif., July 1. According to JACK SACKETT, district manager, the new quarters will provide more spacious office facilities, larger floor space for servicing and extra yard space for storage of equipment.

☆ ☆ ☆

BERT SLATER is the newly appointed sales manager of *Cate Equipment Co.*, Salt Lake City, Utah. ROBERT EVANS, formerly office manager, becomes a member of sales staff covering city sales. IRVIN BRIERLEY, formerly parts manager joins the sales staff and will cover the northern part of Utah and part of Wyoming. G. E. APROBERTS, formerly salesman covering the mining interests becomes manager of the mining division.

☆ ☆ ☆

Atlas Mineral Products Company, Mertztown, Pa., announces that RAY OSTER, 606 South Hill St., Los Angeles, Calif., will handle the sale of corrosion resistant cements in that area, and HUGH G. LAWSON, 417 South Hill Street, Los Angeles, will handle the sales of jointing materials for water and sewer pipe in the same area.

☆ ☆ ☆

Western Asbestos Company, San Francisco, Calif., is now an approved applicator for the Nelson stud welding method of installing industrial corrugated and flat asbestos-cement roofing and siding materials. The franchise was issued by *Nelson Stud Welding Division* of *Morton Gregory Corporation* to cover all of the Northern California area.

☆ ☆ ☆

RICHARD E. STIEGLE is promoted to the position of sales manager, Eastern tractor equipment sales division of the *Hyster Company.* Stiegle leaves the firm's Portland, Ore., plant to headquarter in Peoria, Ill.

☆ ☆ ☆

Additions to the *Sterling Electric Motors, Inc.*, sales and engineering staff include: JOHN F. INGLE, district manager, 1066 Howard St., San Francisco, Calif., to serve central and northern California and western Nevada and MELVIN MAXHAM and JOHN MALLOY, Los Angeles, Calif., sales staff.

☆ ☆ ☆

A. O. Smith Corp., Milwaukee, Wis., enters the LPG carburetion business. Arrangements have been completed with the *Hughes Carburetor Co.*, Oklahoma City, Okla., for A. O. Smith to acquire manufacturing and sales rights for an LPG carburetion adapter unit developed by L. L. Hughes. Marketing plans call for a unique and simplified packaged merchandising program built around the sale of complete conversion kits. Through its nationwide Product Service Division, A. O. Smith will provide field service and warehouse the carburetion equipment.

☆ ☆ ☆

New *General Motors Diesel Engine* distributor for the State of Arizona is *O'Connell Brothers, Inc.*, 505 North Central Ave., Phoenix. Expansion plans are already under way by the new distributor. The new line includes 2, 3, 4 and 6-cylinder Single Diesel Engine units and multiple engine units up to 24 cylinders in power ranges from 32 to 780 hp.

The Republic Supply Company of California is speeding construction of its new Northern division main headquarters at San Leandro, Calif. Upon completion, the new plant and pipeyard will occupy a ten acre site which is convenient to company offices in Fresno, San Jose and Stockton, Calif. This installation replaces present regional headquarters at Emeryville, Calif. The firm just opened its expanded facilities at Ventura, Calif.

☆ ☆ ☆

HERMAN L. SMITH is now general sales manager for the *Richkraft Company,* Chicago, Ill., manufacturer of building papers and reflective insulation.

☆ ☆ ☆

Collins Equipment Company, Inc., becomes distributor for Kenworth trucks in the State of Texas, according to the *Kenworth Motor Truck Corporation,* Seattle, Wash. The new distributor will carry a large and complete stock of replacement parts in addition to Kenworth on and off-highway trucks.

☆ ☆ ☆

Continued expansion of *General Electric Company's* construction materials department on the West Coast seems imminent. C. C. WALKER, G-E vice president and general manager of the department, indicated that the manufacture of wires and cables in this area provides better service for local customers. Walker was inspecting the firm's facilities at 1034-66th Avenue, Oakland, Calif., where WALTER J. DELEHANTY is plant manager.

☆ ☆ ☆

Twenty-five years of a successful business partnership was celebrated in Salt Lake City, Utah, by the *Arnold Machinery Company, Inc.*, and the *Northwest Engineering Company.* The Arnold firm has represented Northwest products in the Salt Lake area for twenty-five years, and

Superior Concrete Accessories Occupies New Pacific Coast Offices

Superior Concrete Accessories, Inc., manufacturers of concrete accessories, has just occupied its new Pacific Coast office and factory at 2100 Williams Street, San Leandro, Calif. The new building (see illustration) more than doubles the floor space available for production and together with additional machinery a new machine shop and complete facilities for testing, the plant has a greatly increased production capacity. Previous to the move, Superior was located in Oakland at 2026 Livingston Street. H. G. BALLOU, or "Gill" as he is known to most of the contractors on the Pacific Coast, has been in charge of the Pacific Coast activities. The Austin Company was the general contractor for the new building, work on which was started on January 25 and rushed to completion, with Superior moving in and production established, by the first of June. An increased volume of defense orders necessitated early completion of the plant. L. H. UMBACH, president of the firm, whose Chicago plant is located at 4110 Wrightwood Avenue, Chicago, Ill., was a West Coast visitor during the time the new plant was being occupied.

NEW HOME of *Four Wheel Drive Pacific Company* at 2700 South Broadway in Los Angeles. The new building gives the firm 10,000 sq. ft. under roof and 4,000 sq. ft. of yard space to provide convenient parking for customers. The new quarters provide modern parts and service facilities.

it was the first regularly franchised dealer for Northwest Engineering Company. JACK FARRELL, district representative of Northwest presented a plaque to L. E. ARNOLD, former president and now chairman of the board of Arnold Machinery Company, Inc.

☆ ☆ ☆

JOHN JORGENSEN is the new president of *Western Traction Co.*, 2230 - 3rd St., San Francisco, Calif. Jorgensen succeeds HOMER KNOX who retires. The firm also announces that the *Chicago Pneumatic Tool Co.* line of equipment will now be handled in addition to the other well known lines.

☆ ☆ ☆

MITCHELL C. KING, formerly with *Bunting Tractor Co.*, Twin Falls, Idaho, is now general manager of *Pioneer Machinery Co.'s* new store at American Falls. DETTMAR C. DAVIS is now parts manager at American Falls.

☆ ☆ ☆

Heil Equipment Co. of Northern California, San Francisco, is now distributor for *Unit Manufacturing Co.'s* utility hoist in the Northern California area.

☆ ☆ ☆

Kenworth Motor Truck Corporation's new warehouse, completed recently, provides the home factory with 28,800 square feet of additional storage space. The new structure is located directly behind Kenworth's main plant in Seattle, Wash. About 5,400 square feet of the warehouse space will be devoted to the storage of service parts material; the remainder of space will be used for storage of production materials. Transite siding (compressed asbestos and cement), was used in the construction of the building. The warehouse was built by the *Structural Steel Division of Pacific Car and Foundry Company.*

☆ ☆ ☆

C. F. GOFF and H. J. SCHULZE, *United States Rubber Company* sales branch operating managers, have exchanged assignments. Goff goes to Los Angeles, Calif., from Seattle, Wash., and Schulze moves from Los Angeles to Seattle. Both men have been with the firm many years and have had branch service in many cities.

☆ ☆ ☆

Territorial assignment changes in *Pabco Products Inc.*, Oakland, Calif., include DIXON CHUBBUCK's transfer from the Arizona territory to Los Angeles to specialize in asbestos-cement roofing and siding sales. CARTER SCHRIBER leaves Santa Barbara, Calif., to cover the Arizona post. ED STALDER, formerly of the headquarters staff in San Francisco, moves to Santa Barbara, while JOHN SUTHERLAND joins Pabco to replace Stalder in the office. LEO LAPLANT leaves the headquarters office group to cover the Oakland territory and is replaced by ROBERT WILLIAMS, Pabco newcomer.

PAUL B. SHOEMAKER is now vice president in charge of sales for *Masonite Corporation*, Chicago, Ill. He had been vice-president and director of sales for *Georgia-Pacific Plywood Company.*

☆ ☆ ☆

Two construction machinery men, ROBERT E. BLACKWELL and R. S. COLEMAN, have organized *Blackwell-Coleman Equipment Co.*, S. 118 Division, Spokane, Wash., for the distribution of construction machinery.

☆ ☆ ☆

PAUL CHILLE comes to the West Coast from the *Wisconsin Motor Corp.*, Milwaukee, Wis. He holds the title of West Coast service representative for the firm. Chille will headquarter with *E. E. Richter & Son*, 5725 Hollis Street, Emeryville,

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

Continued from page 115

Calif. Richter & Son are Pacific Coast representatives for the Wisconsin Motor Corp. and have recently been appointed Northern California distributors for the Mercury Centrifugal Clutches, manufactured for application on gasoline engines by *Automatic Steel Products, Inc.*, Canton, Ohio.

☆ ☆ ☆

***Noel J. Redmond*, (right) president of the Blue Diamond Corporation of Los Angeles, was elected president of the Gypsum Association during the group's recent annual meeting here. He is being congratulated by *Meade M. Morris* of Chicago, (left) retiring president, and *Lloyd H. Yeager* of Chicago, general manager of the association. The association is comprised of gypsum producers in all parts of the country.**

☆ ☆ ☆

Modern Machinery of Spokane, Wash., *Capitol Tractor and Equipment Co.* of North Sacramento, Calif., and *Crook Company*, Los Angeles and Bakersfield, Calif., were named outstanding distributors for 1950 in the Western district by *R. G. LeTourneau, Inc.*, heavy construction equipment manufacturer. They were awarded first, second and third place certificates of merchandising achievement, respectively.

☆ ☆ ☆

Holcomb

RALPH D. HOLCOMB assumes management of the new Pacific Coast Division of *Harnischfeger Corporation*, Milwaukee, Wis. He will take charge of all operations for P&H on the West Coast, including the manufacture of overhead cranes at the new plant in Los Angeles, Calif. Sales and service facilities for eleven Pacific Coast and Mountain States will be directed from the new division headquarters, supplemented by branch offices in Los Angeles, San Francisco, Seattle and Denver. Holcomb has been with Harnischfeger Corporation for 22 years. In the past he was manager of the firm's Memphis and San Francisco district offices, and held executive sales positions at the home office in Milwaukee.

UNIT BID PRICES

Selected Bid Abstracts for Typical Western Projects

Bridge and Grade Separation . . .

Bascule Bridge Across San Leandro Bay

California—Alameda County—State. The Duncanson-Harrelson Co. and Stolte, Inc., Richmond, joint venturers, with a bid of $1,641,057, were low before the State Division of Highways for construction of a bascule bridge across San Leandro Bay, between Bay Farm Island and Alameda. Unit prices were as follows:

(1) The Duncanson-Harrelson Co. and Stolte, Inc. $1,631,057
(2) Ben C. Gerwick, Inc. 1,670,286
(3) Healy Tibbitts Construction Co. $1,690,022
(4) Guy F. Atkinson Co. 1,707,588

	(1)	(2)	(3)	(4)
8,630 cu. yd. structure excav. (type "A")	13.50	15.00	14.00	10.00
320 cu. yd. structure excav. (type "B")	3.00	2.00	4.00	4.00
28 M.F.B.M. treated Douglas firm timber	500.00	300.00	525.00	600.00
4,430 cu. yd. Class "A" P.C.C. (footing block)	20.00	37.00	22.00	30.00
4,320 cu. yd. Class "A" P.C.C. (structures)	60.00	52.00	60.00	42.00
60 lin. ft. rubber waterstops	7.00	4.00	4.00	6.00
2,479,000 lb. structural steel	.16	.166	.18	.18
Lump sum, painting	$51,000	$45,000	$48,000	$60,000
15,600 lb. misc. iron and steel	.80	.40	.80	.72
6,160 lin. ft. furn. treated Douglas fir piling	1.60	1.50	1.60	1.50
21,586 lin. ft. furn. untreated Douglas fir piling	.80	1.00	.80	.75
457 ea. driving timber piles	50.00	50.00	35.00	40.00
18,500 lin. ft. furnishing conc. piling	5.25	5.00	5.50	5.50
216 ea. driving concrete piles	300.00	200.00	130.00	150.00
1,882 lin. ft. steel railing	9.00	8.00	9.00	8.50
783,000 lb. bar reinf. steel	.125	.12	.105	.11
6,060 sq. ft. open steel floor	4.00	4.00	5.00	3.50
418 cu. yd. heavyweight concrete	100.00	90.00	150.00	170.00
17 cu. yd. lightweight concrete	100.00	100.00	60.00	150.00
Lump sum, machinery shelters	$4,000	$5,000	$5,000	$5,000
Lump sum, control house	$17,500	$16,000	$30,000	$17,500
Lump sum, machinery	$150,000	$160,000	$140,000	$200,000
Lump sum, misc. mechanical equip.	$11,000	$11,000	$12,000	$15,000
Lump sum, vehicular traffic gates	$10,000	$8,000	$9,000	$10,000
Lump sum, pedestrian traffic gate	$4,000	$3,000	$4,000	$5,000
Lump sum, barrier	$15,000	$17,000	$18,000	$17,500
Lump sum, installing signs	300.00	300.00	500.00	250.00
Lump sum, electrical equipment	$85,000	$98,000	$105,000	$126,000

Concrete Box Culvert, 12 x 18 ft.

Utah—Garfield County—State. L. A. Young, Richfield, Utah, with a bid of $13,335, was low before the State Road Commission for construction of State Road No. 22 near Antimony and a double 12-ft. by 8-ft. concrete box construction. Unit bids were as follows:

(1) L. A. Young $13,335
(2) Reynolds Construction Co. 15,415
(3) F. R. Knowlton & Sons 15,540
(4) R. K. McCullough $15,711
(5) Thorn Incorporated 21,005
(6) Engineer's estimate 13,965

	(1)	(2)	(3)	(4)	(5)	(6)
200 cu. yd. excav. for structs.	2.00	3.00	6.00	4.70	6.00	5.00
129 cu. yd. concrete, Class "A"	65.00	75.00	72.00	76.00	95.00	65.00
25,000 lb. reinforcing steel	.14	.16	.16	.17	.20	.15
1,100 lb. structural steel	.50	.40	.32	.47	.50	.30
1 ea. removal of existing struct.	500.00	700.00	700.00	200.00	200.00	500.00

Reinforced Concrete Slab Bridge

California—Kern County—State. Tumblin Company, Bakersfield, with a bid of $42,505, was low before the State Division of Highways for construction of a State highway across Goose Lake slough, about 10 mi. south of Shafter, a reinforced concrete slab bridge on concrete piers and abutments, with concrete pile foundations to be constructed. Unit prices were as follows:

(1) Tumblin Company $42,505
(2) Norman I. Fadel 47,703
(3) Thomas Construction Co. 48,936
(4) E. G. Perham 49,436
(5) C. B. Tuttle Co. $50,880
(6) Volpa Brothers 52,171
— Walter Kaucher 52,938
— McClain Construction Co., Inc. 57,847

	(1)	(2)	(3)	(4)	(5)	(6)
700 cu. yd. structure excavation	2.40	2.00	5.00	3.00	3.00	3.00
100 cu. yd. structure backfill (embankments)	1.15	3.00	4.75	4.00	3.00	5.00
18 ton untreated rock base	4.50	3.00	13.50	10.00	6.00	4.50
12 ton plant-mixed surfacing	8.00	8.50	25.00	20.00	10.00	27.00
540 cu. yd. Class "A" P.C.C.	40.00	45.00	45.00	45.00	48.00	50.00
1,903 lin. ft. cast-in-place conc. piling (drilled holes)	5.00	5.80	6.00	6.00	6.00	6.00
72,600 lb. bar reinforcing steel	.105	.11	.10	.11	.11	.10
160 lb. miscellaneous steel	.35	.50	.50	1.00	.50	.50
2 ea. clearance markers	10.00	10.00	15.00	20.00	10.00	8.00
296 lin. ft. corrugated metal bridge railing	4.35	6.00	3.40	7.00	7.00	10.00
108 lin. ft. corrugated metal guard railing	4.00	6.00	3.00	5.00	7.00	4.00

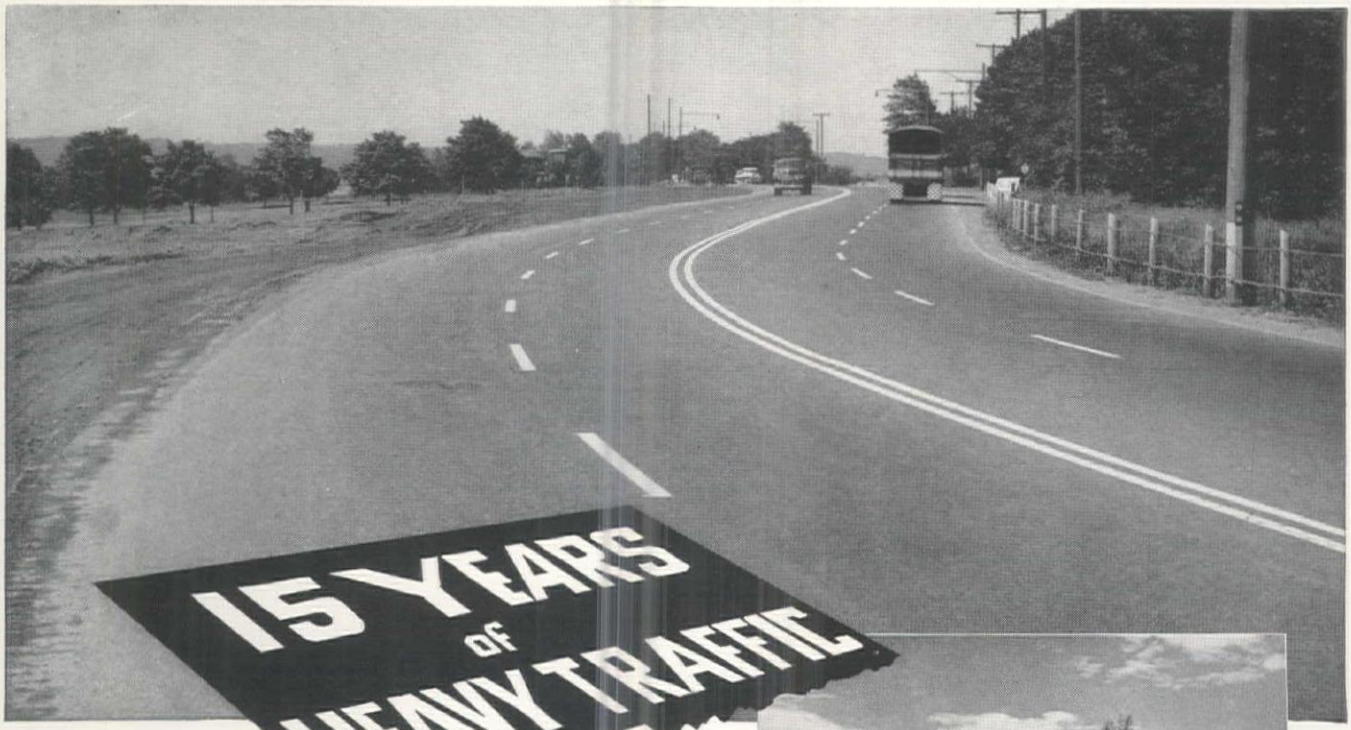
County Bridge of Reinforced Concrete

Washington—Jefferson County—State. Manson Construction & Engineering Co., Seattle, with a bid of $321,042, was low before the State highway department for construction of Jefferson County Road Portage Canal Bridge and access road to be 0.127 mi. in length. Unit prices were as follows:

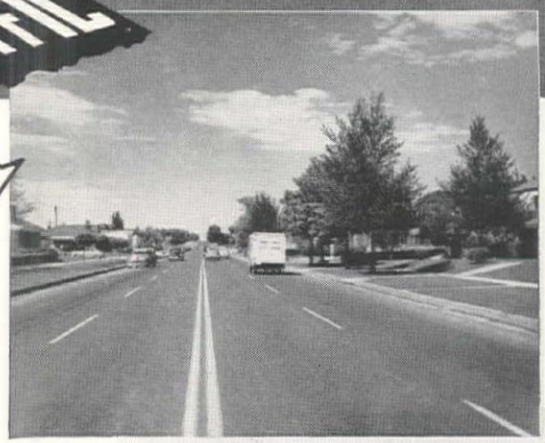
(1) Manson Construction & Engineering Co. $321,042
(2) Benne H. Campbell, Inc. 321,245
(3) M. P. Butler $339,935
(4) MacRae Bros. 362,360

	(1)	(2)	(3)	(4)
600 cu. yd. structure excavation	12.00	10.00	30.00	12.00

(Continued on next page)



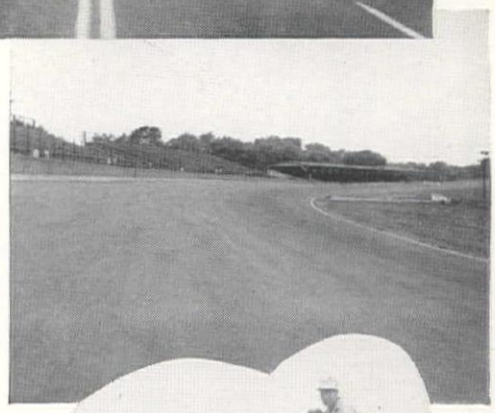
15 YEARS of HEAVY TRAFFIC



ADNUN ROADS

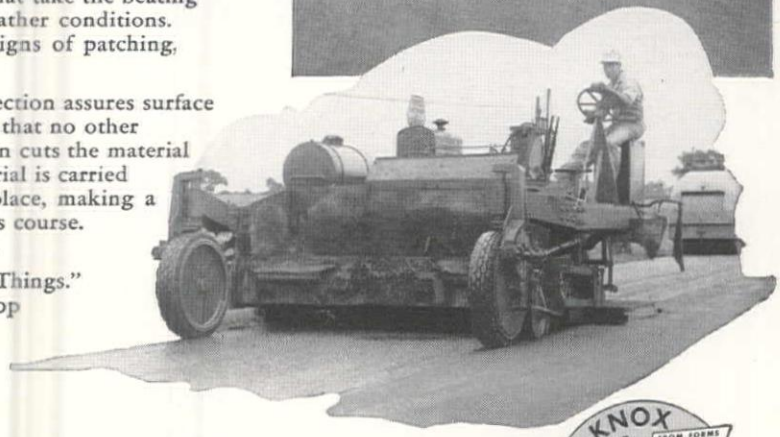
are long life roads . . .

THE best testimonial to Adnun design is the excellent condition of the miles of Adnun laid roads that have carried 15 to 16 years of heavy traffic. The oldest machine laid roads in the world are Adnun Roads. Look at the heavily traveled highway above—a part of the Hamilton-Brantford road in Ontario, one of Canada's main arteries—laid in 1936. The one below—Colorado Blvd.—one of Denver's well known streets laid in 1935. And the bottom picture—part of the Indianapolis Speedway laid in 1936.



These are but a few of many photographs in our files that show prominent traffic arteries in city, state and county systems. These are roadways that bear heavy traffic counts: Streets that take the beating of trucking and speed under a full range of weather conditions. Note the eveness of wear *clear across,* the few signs of patching, the freedom from breakdown.

The Adnun principle of continuous Course Correction assures surface smoothness and a uniformity of course thickness that no other paver can equal. The Oscillating Cutter Bar action cuts the material off at the proper level and does not tear it. Material is carried up to the parallel course and is compacted in place, making a tight joint, a joint that will not throw a car off its course. *The Adnun builds longer life roads and safer roads.*



You will be interested in the booklet, "11 Basic Things." It will give you some new thinking on black top paving equipment. Send for it.

THE FOOTE COMPANY, INC.
Subsidiary of Blaw-Knox Co.
1940 State Street Nunda, New York

ADNUN
TRADE MARK REGISTERED

BLACK TOP PAVER

NEWS of MANUFACTURERS

New facilities to cost $6,000,000 are involved in the major expansion of engine production capacity program of *Cummins Engine Company, Inc.*, Columbus, Ind. This third major expansion program within the past nine months will increase production capacity at Cummins at least 50 per cent over the 1950 record high level.

☆ ☆ ☆

HECTOR P. BONCHER, general manager, *Dresser Manufacturing Division*, Dallas, Tex., is a new vice president of *Dresser Industries, Inc.*

☆ ☆ ☆

L. B. MCKNIGHT is now executive vice president of the *Chain Belt Company*, Milwaukee, Wis. He has been a vice president and director since 1948 and first joined the company in 1927.

☆ ☆ ☆

Ovestrud

Pioneer Engineering Works, Inc., Minneapolis, Minn., announces several changes in management personnel. EUGENE C. BAUER, formerly vice chairman of the board of directors, becomes chairman, and MELVIN OVESTRUD is the new president of the firm. K. E. BRUNSDALE is now first vice president and O. J. ELLERTSON, CARL R. ROLF become vice presidents. ROY W. SARGENT is assistant secretary to A. J. FRYSTAK, secretary. ROY L. SLAMA is assistant treasurer. LEWIS W. YERK retires as president of the firm, but will maintain a directorship and consultant position.

☆ ☆ ☆

J. J. LLANSO is the new general export manager for *Worthington Pump and Machinery Corporation*, Harrison, N. J. He comes from the post of vice president and manager of *Worthington, Ltd.*, Buenos Aires, Argentina.

☆ ☆ ☆

The new general manager of the building products divsion of *L. Sonneborn Sons, Inc.*, is ALEXANDER RUBIN. Rubin had been branch manager in Baltimore, Md., before coming to the New York office three years ago.

☆ ☆ ☆

ORREN S. LESLIE assumes the managerial duties of the Beloit, Wis., works of *Fairbanks, Morse & Co.* He has been with *General Motors Corporation* subsidiaries for 22 years.

☆ ☆ ☆

Less than 12 months after 300 acres of unimproved land near Joliet, Ill., was acquired, *Caterpillar Tractor Co.* has produced its first scraper in a new plant still under construction. The scraper was as-

Continued on page 120

UNIT BID PRICES . . . CONTINUED

	(1)	(2)	(3)	(4)
Lump sum, shoring and cribs	$28,000	$40,000	$45,000	$38,200
Lump sum, fender system	$26,000	$32,000	$23,000	$36,700
83 cu. yd. concrete, Class AX, in place	100.00	75.00	75.00	84.00
1,326 cu. yd. concrete, Class A, in place	97.00	85.00	75.00	84.00
275 cu. yd. concrete, Class F, in place	45.00	40.00	60.00	84.00
321 cu. yd. concrete, Class H, in place	30.00	30.00	60.00	84.00
445,000 lb. steel reinforcing bars, in place	.125	.12	.13	.12
140,000 lb. structural carbon steel, in place	.20	.21	.25	.27
1,340 lin. ft. steel handrail, in place	11.00	12.00	13.00	13.50
2 only reflector units, in place	25.00	25.00	15.00	25.00
Lump sum, lighting system, complete, in place	$2,500	$4,751	$2,200	$2,500

Dam . . .

Drilling and Grouting Foundations at Granby Dam

Colorado—Colorado-Big Thompson Project—Bureau of Reclamation. Jones Core Drilling Company, Dallas, Tex., with a bid of $64,662, was low before the Bureau of Reclamation for drilling and grouting foundations for Dikes 1 and 2, Granby Dam and Dikes, Colorado-Big Thompson Project. Unit prices were as follows:

(1) James Core Drilling Company ..... $ 64,662
(2) Mott Core Drilling Company, Inc..... 85,620
(3) C. M. Hanes Construction Company.. 111,630
(4) Boyles Bros. Drilling Company $122,100
(5) Selby Drilling Corp. 127,100
(6) Engineer's estimate 93,975

	(1)	(2)	(3)	(4)	(5)	(6)
1,400 lin. ft. drilling grout holes through overburden at upstream toe	1.50	3.40	3.50	5.00	5.00	4.00
3,000 lin. ft. drilling grout holes through dike embkmt.	3.00	3.95	3.75	5.00	7.40	3.00
4,700 lin. ft. drilling grout holes in formation in stage betw. depths of 0 ft. and 35 ft.	3.00	3.40	3.25	5.00	5.00	3.00
2,100 lin. ft. drilling grout holes in formation in stage betw. depth of 35 ft. and 60 ft.	3.50	3.40	3.25	5.00	5.00	3.25
300 lin. ft. drilling grout holes in formation in stage betw. depths of 60 ft. and 110 ft.	4.00	3.40	6.00	5.00	5.00	3.50
Lump sum, pressure grouting, first 1,000 cu. ft.	$2,500	$2,750	$19,580	$5,000	$10,000	$5,000
10,000 cu. ft. pressure grouting, over 1,000 cu. ft.	1.50	2.00	3.24	4.00	3.00	3.00
2,800 bbl. furnishing and handling cement	4.79	7.90	7.00	7.00	8.00	8.00

Grouting Construction Joints at Kortes Dam

Wyoming—Missouri River Basin Project—Bureau of Reclamation. C. M. Haines Construction Company, Denver, Colo., with a bid of $12,425, was sole bidder before the Bureau of Reclamation for construction joint grouting of Kortes Dam. Unit prices were as follows:

(1) C. M. Haines Construction Company....$12,425
(2) Engineer's estimate..... $6,975

	(1)	(2)
Lump sum, pressure grouting contraction joints, first 25 cu. ft.	$7,800	$4,750
150 cu. ft. pressure grouting contraction joints, over 25 cu. ft.	12.00	6.00
Lump sum, patching concrete, disposal of grout waste and final clean-up	$2,500	$1,000
50 bbl. furnishing and handling cement	6.50	6.50

Highway and Street . . .

Hydraulic Embankment and Drainage on Columbia River Highway

Oregon—Hood River and Wasco Counties—State. General Construction Co., Portland, Ore., with a bid of $1,074,350, was low before the State Highway Commission for construction of the Hood River-Mosier section of the Columbia River highway, including hydraulic embankment. Unit prices were as follows:

(1) General Construction Co. $1,074,350
(2) Manson Construction & Engineering Co. and Osberg Construction Co. 1,226,610
(3) Puget Sound Bridge & Dredging Co. 1,265,994

	(1)	(2)	(3)
4,500,000 cu. yd. hydraulic embankment in place	.225	.26	.2745
25,000 cu. yd. extra for steep slope embankment	.30	.70	.10
1,300 cu. yd. structural excav., unclassified	10.00	3.00	2.00
370 lin. ft. 18-in. corru. metal pipe, protected invert	6.00	5.00	3.20
560 lin. ft. 18-in. extra strength corru. metal pipe, protected invert	7.00	5.50	3.65
220 lin. ft. 24-in. corru. metal pipe, protected invert	8.50	6.00	4.85
200 lin. ft. 24-in. extra strength corru. metal pipe, protected invert	10.00	7.00	6.15
630 lin. ft. 36-in. extra strength corru. metal pipe, protected invert	18.00	12.00	11.30
1,000 lin. ft. 42-in. extra strength corru. metal pipe, protected invert	20.00	20.00	13.00

Gravel Base and Road-mix Surfacing

California—Modoc County—State. Tyson & Watters, Inc., Sacramento, with a bid of $155,677, was low before the State Division of Highways for construction of a county highway between 4.0 mi. north of Lake City and Fort Bidwell, about 12.5 mi. in length to be surfaced with gravel base and road-mixed surfacing. Unit prices were as follows:

(1) Tyson & Watters $155,677
(2) Clements & Co. 173,887
(3) Harms Bros. $205,917

	(1)	(2)	(3)
14 cu. yd. removing concrete	12.00	25.00	24.00
2,300 cu. yd. roadway excavation	.60	1.25	1.00
500 cu. yd. structure excavation	4.00	4.00	4.50
300 cu. yd. ditch and channel excavation	1.50	4.00	3.00
50,000 sta. yd. overhaul	.01	.02	.02
4,100 ton imported borrow	.80	1.15	.80
Lump sum, develop. water supply and furn. watering equip.	$2,000	$2,000	$4,300
525 M. gal. applying water	2.40	2.50	3.00
659 sta. finishing roadway	6.50	5.00	8.00
47,200 ton gravel base	.96	1.15	1.50

(Continued on next page)

UNDERGROUND OR ON THE SURFACE

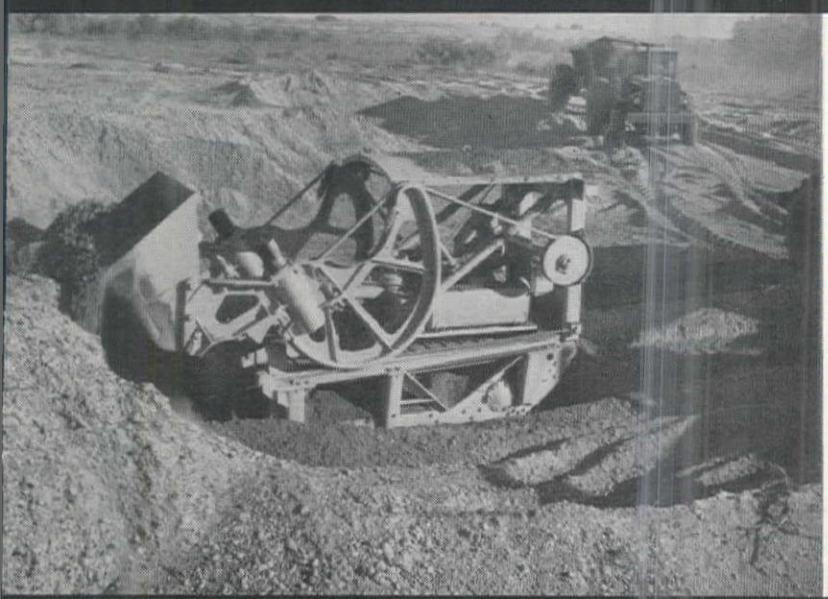
The Eimco 104 is at home underground or on the surface loading rock, sand or gravel.

This versatile loading machine, designed specially for rock loading, has found wide application in handling many different materials.

The 104 is powered by either diesel engine or electric motor. It is a sturdily built heavy-duty machine for continuous round-the-clock loading.

No turning necessary — the 104 will discharge overhead into the waiting truck. The operator controls the bucket speed, rate of discharge and brake to hold the bucket in any position with a single handle.

A continuous power supply permits bucket operation independent of tractor movements — this provides crowding and digging action unobtainable in ordinary front end loaders.



Let Eimco's handle your loading for a bigger profit. Write for information.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 10, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES:

NEW YORK, 51-52 SOUTH STREET • CHICAGO, 3319 SOUTH WALLACE STREET
BIRMINGHAM, ALA., 3140 FAYETTE AVE. • DULUTH, MINN., 216 E. SUPERIOR ST.
EL PASO, TEXAS, MILLS BUILDING • BERKELEY, CALIFORNIA, P. O. BOX 240
KELLOGG, IDAHO, 307 DIVISION STREET

IN FRANCE: SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND: EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

A312

NEWS of MANUFACTURERS

Continued from page 118

sembled from parts supplied from the company's Peoria factory and sub-contractors in Cedar Rapids, Iowa, and Gary, Ind. The new 920-ft. by 720-ft. plant will eventually produce a large portion of the company's line of bulldozers, scrapers, wagons and rippers.

☆ ☆ ☆

New manager of architectural products promotion for *Gladding, McBean & Co.*, Los Angeles, Calif., is ALBERT E. BARNES. Barnes returns to the company to assist with company-wide architectural contacts.

☆ ☆ ☆

SAMUEL H. PALMER, 62, pioneer in wire screen manufacturing, died March 18. A resident of Portland, Ore., for 34 years, he founded the *Western Fence & Wire Works* in 1932 in the city of Portland.

☆ ☆ ☆

W. J. MCBRIAN, *Caterpillar Tractor Co.* vice president in charge of purchasing, finance and office operations, accepts the position of vice chairman of the Munitions Board, a governmental agency in Washington, D. C. He will be on loan to the government for several months.

London

☆ ☆ ☆

MEL J. LONDON is the newly-appointed general sales manager for *Calaveras Cement Company*. He has been a member of the California firm's sales organization for the past six years.

☆ ☆ ☆

JAMES W. O'CONNOR and J. W. GULLEDGE are new members of *R. G. Le Tourneau, Inc.'s* field engineering staff. Before joining the Peoria, Ill., firm, O'Connor served with the Seabees and then with the Massachusetts State Highway Dept. Gulledge was a Navy mine technician in World War II and later was with the California State Highway Division.

☆ ☆ ☆

Calaveras Cement Company launches a $2,235,106 expansion program which will increase production capacity at its San Andreas, Calif., plant by 50%. The addition of a fourth kiln is the largest item in the planned expansion.

☆ ☆ ☆

GEORGE M. BUNKER, president, and all other officers of *The Trailmobile Company* were re-elected at the annual meeting of company directors in Cincinnati, Ohio.

☆ ☆ ☆

Douglas Fir Plywood Association, Tacoma, Wash., expresses agreement with a new government order requiring manufac-

UNIT BID PRICES . . . CONTINUED

		(1)	(2)	(3)
75	ton liquid asphalt, SC-2 or SC-3 (prime coat)	34.00	40.00	50.00
19	ton liquid asphalt, MC-3 or MC-4 (tack coat)	34.00	45.00	55.00
16,550	ton mineral aggregate (road-mixed surf.)	1.04	2.00	2.20
910	ton liquid asph., MC-3 or MC-4 (road-mixed surf.)	34.00	36.00	36.00
156,000	sq. yd. mixing and compacting road-mixed surf.	.178	.10	.12
42	cu. yd. Class "A" P.C.C. (structures)	85.00	80.00	100.00
260	cu. yd. sacked concrete riprap	28.00	30.00	45.00
138	lin. ft. corrugated metal guard railing	6.00	5.00	5.50
112	lin. ft. 12-in. CMP (16 gauge)	3.50	3.00	2.75
6	lin. ft. 15-in. CMP (16 gauge)	4.00	5.00	4.00
90	lin. ft. 18-in. CMP (16 gauge)	4.40	4.00	4.00
48	lin. ft. 30-in. CMP (14 gauge)	7.40	6.00	7.50
130	lin. ft. 36-in. CMP (14 gauge)	9.00	7.00	8.75
66	lin. ft. 36-in. x 22-in. CMP arch (14 gauge)	8.25	7.00	7.75
1	ea. metal end section for 12-in. CMP	25.00	15.00	25.00
1	ea. metal and section for 30-in. CMP	95.00	75.00	120.00
200	lin. ft. salvaging existing pipe culverts	1.80	1.00	1.50
4,600	lb. bar reinforcing steel	.15	.20	.25
660	lb. structural steel I-beams	.30	.15	.40

Grading, Drainage and Asphaltic Concrete Pavement

Washington—Pierce County—Department of Highways—The Harrison Bros. Co., Tacoma, Wash., with a bid of $70,506, was low before the State Department of Highways for construction of a county road, Pioneer Way, to be 1.456 mi. in length. Unit bids were as follows:

(1) The Harrison Bros. Co. $70,506
(2) Woodworth & Company, Inc. $72,010

		(1)	(2)
Lump sum,	clearing and grubbing	750.00	$1,500
11,629	cu. yd. uncl. excav. incl. haul	.47	.55
45	cu. yd. common trench excav. incl. haul	2.00	3.00
14,055	cu. yd. uncl. borrow incl. haul	.75	.60
753	cu. yd. structure excavation	1.50	2.00
7.5	days mechanical tamper	50.00	40.00
1,100	lin. ft. slope treatment, Class B	.10	.20
76.88	sta. (100-ft.) finishing roadway	6.00	20.00
698	cu. yd. gravel backfill in place	3.00	4.00
1,130	cu. yd. cr. stone surf. top course in place	3.00	2.90
50	M. gal. water in place	3.00	3.50
	TYPE I-1 ASPHALTIC CONCRETE PAVEMENT		
1,729	ton Class C wearing course in place	7.75	7.50
2,295	ton Class L leveling course in place	7.75	7.50
	OTHER ITEMS		
915	lin. ft. Type A precast white reflect. curb in place	1.90	2.25
1,000	lin. ft. Type C precast white reflecting curb in place	2.50	2.75
8	only precast white reflecting traffic buttons in place	10.00	2.00
5	only special catch basin in place	100.00	90.00
41	lin. ft. standard beam guard rail in place	4.00	5.00
1	only special monument in place	25.00	25.00
317	sq. yd. removing concrete pavement	1.00	1.50
207	lin. ft. plain conc. culv. pipe 12-in. diam. in place	1.88	1.90
492	lin. ft. std. reinf. conc. culv. pipe 18-in. diam. in place	3.75	3.50
81	lin. ft. std. reinf. conc. culv. pipe 24-in. diam. in place	5.50	5.30
1,483	lin. ft. perf. conc. drain pipe 8-in. diam. in place	1.72	1.65
375	lin. ft. perf. conc. drain pipe 12-in. diam. in place	2.25	2.50
4	only special manhole in place	200.00	225.00
2	cu. yd. concrete Class C in place	100.00	50.00
2	only illuminated terminal nosing Type No. 1 in place	150.00	50.00
1	only illuminated terminal nosing Type No. 2 in place	155.00	50.00
Lump sum,	lighting system complete in place	$1,910	$2,500

Stockpiling Crushed Stone, Screenings and Ballast

Washington—Grays Harbor County—Washington Department of Highways—Smith Bros. General Contractors, Inc., Vancouver, Wash., with a bid of $193,123.10, was low bidder for stockpiling on primary state highway No. 13, Joe Creek to Pacific County line. Unit bids were as follows:

(1) Smith Bros. General Contractors, Inc. $193,123.10
(2) Pacific Sand & Gravel Co. 216,179.00
(3) Baulne & Frieske Construction Co. 278,367.00
(4) N. Fiorito Co. $281,740.40
(5) L. J. Birbeck 299,729.00
(6) J. D. Shotwell Company 389,552.00

		(1)	(2)	(3)	(4)	(5)	(6)
7.7	acres clearing	700.00	850.00	500.00	500.00	500.00	$1,500
7.7	acres grubbing	500.00	850.00	500.00	500.00	$1,000	$1,500
30,000	cu. yd. stripping bor. and surf. pit, incl. haul	.26	.50	.85	.60	.40	1.00
30	lin. ft. pl. conc. culv. pipe, 12-in. diam., in place	3.50	2.00	3.00	2.00	2.00	3.00
	Stockpile Site No. 3420						
29,640	ton ballast in stockpile	1.51	1.55	2.25	2.41	2.60	3.00
7,330	ton cr. stone surf. top crse. in stkpl.	1.68	1.80	2.45	2.41	2.60	3.25
1,540	ton cr. stone surf. base crse. in stkpl.	1.65	1.60	2.40	2.41	2.60	3.25
	Natural Aggregate for Non-skid Single Seal Treatment, Schedule A, in Stockpile						
600	ton crse. cr. screen. ⅝-in. to ¼-in. in stkpl.	1.86	2.30	2.55	2.56	2.60	3.50
130	ton fine cr. screen. ¼-in. to 0 in stkpl.	1.86	2.30	2.55	2.56	2.60	3.50
	Stockpile Site No. 3466						
35,660	ton ballast in stockpile	1.78	1.85	2.45	2.61	2.85	3.40
11,290	ton cr. stone surf. top crse. in stkpl.	1.95	2.10	2.65	2.61	2.90	3.65
2,430	ton cr. stone surf. base crse. in stkpl.	1.90	1.90	2.60	2.61	2.90	3.65
	General Aggregate for Type I-1 Asphaltic Concrete Pavement in Stockpile						
4,620	ton crse. cr. screenings ⅝-in. to ¼-in. in stkpl.	2.13	2.60	2.75	2.76	2.90	4.00
3,780	ton fine cr. screenings ¼-in. to 0 in stkpl.	2.13	2.60	2.75	2.76	2.90	4.00
	Stockpile Site No. 3418 Natural Aggregate for Non-skid Single Seal Treatment, Schedule A, in Stockpile						
2,430	ton crse. cr. screenings ⅝-in. to ¼-in. in stkpl.	2.36	2.90	2.75	3.11	2.80	3.75
540	ton fine cr. screenings ¼-in. to 0 in stkpl.	2.36	2.90	2.75	3.11	2.80	3.75

turers of softwood plywood to reserve 20 per cent of each month's production to meet growing military needs. The Association feels that this order assures adequate military supplies and at the same time leaves a "high volume of plywood for every-day civilian uses such as houses, concrete forms," etc.

☆ ☆ ☆

Skilsaw, Inc., Chicago, Ill., manufacturers of portable power tools, announces purchase of the controlling interest in *Loud-Wendel, Inc.*, Middleport, N. Y., manufacturers of circular wood saws, dado sets and industrial knives. The move assures Skilsaw of a constant source of high quality saw blades, according to BOLTON SULLIVAN, president of Skilsaw, Inc. The Middleport firm is valued at $400,000, has a modern plant with 10,000 feet of floor space and $150,000 in the latest plant machinery, plus a large inventory.

☆ ☆ ☆

All directors of the *Calaveras Cement Co.*, San Andreas, Calif., were re-elected and WILLIAM W. MEIN, JR., is the new president of the company. WILLIAM W. MEIN, former president, becomes chairman of the board. H. C. "PAT" MAGINN is now executive vice president and A. A. HOFFMAN, consulting engineer, is a newly elected vice president.

☆ ☆ ☆

Construction is in progress in Seattle, Wash., on the new $1,000,000 *Seidelhuber Steel Rolling Mill* plant, a completely integrated steel strip operation, which will provide the region with its first Seattle-produced steel strip. The complete rolling mill will be completed and producing 4,500 tons of strip steel per month by December, 1952.

☆ ☆ ☆

BRUCE V. WALCH becomes manager of the field service department of the *Four Wheel Drive Auto Co.*, Clintonville, Wis. He will direct the activities of the FWD far flung field service organization. Walch has been with the firm since 1927.

☆ ☆ ☆

Ceco Steel Products Corporation is continuing an expansion of its main plant in Chicago and its branch plants which began in 1950. Plans include construction of a 50,000 square foot warehouse-fabricating plant at Kansas City, and expansion of a new and larger district plant, warehouse and office building opened in Birmingham, Ala.

☆ ☆ ☆

GEORGE W. MORK becomes chief engineer of *The Heil Co.*, Milwaukee, Wis. He will assist ARNOLD F. MEYER, vice president in charge of engineering, in the development of a broader road machinery program for the company. Mork has been chief engineer of the Tractor Equipment Division of *Bucyrus-Erie Company* for the last 13 years.

☆ ☆ ☆

R. G. LeTourneau, Inc., earthmoving equipment manufacturer with headquarters at Peoria., Ill., is constructing its own steel mill at Longview, Tex. Critical short-

Continued on page 122

NEWS of MANUFACTURERS

Continued from page 121

ages made it necessary for the company to take this step and the National Production Authority granted LeTourneau a Certificate of Necessity. The mill, whose foundation has already been poured, is expected to be in operation by the end of this year and will be capable of turning out 1,000 tons per day of finished steel plate 144 inches wide, ranging in thickness from 3/16 in. to 12 in.

☆ ☆ ☆

Emery Air Freight Corp. is establishing a Northwest office at 2400 Occidental Avenue, Seattle 4, Wash. The firm has been serving the Northwest for high-speed pick-up and delivery of parts and supplies but intends to improve service with establishment of the district office. In charge at the new office will be JAMES T. CAMPBELL.

☆ ☆ ☆

C. M. MARATTA becomes chief consulting engineer of *The Timken Roller Bearing Company*, Canton, Ohio. Maratta has been with the firm since 1917 and has been prominent in the supervision of construction of new buildings and plants.

☆ ☆ ☆

JOSEPH G. SURMACZ steps into the newly created post of chief industrial engineer of *Harnischfeger Corporation*, Milwaukee, Wis. DAVID A. DREWERY will assist Surmacz as plant industrial engineer.

Columbia Flood Crest Reduced at Grand Coulee

THE PEAK STAGE of the Columbia River spring flood crest was reduced by slightly more than a foot in the Portland-Vancouver area by use of 640,000 acre-feet of storage space in the reservoir back of Grand Coulee Dam, known as Franklin D. Roosevelt Lake.

The plan to reduce the flood crest resulted from a three-way agreement reached April 16, 1951, by the Corps of Engineers, Bureau of Reclamation and the Bonneville Power Administration, according to a joint announcement by Brig. General O. E. Walsh, North Pacific Division Engineer of the Corps of Engineers, and Harold T. Nelson, Regional Director of the Bureau of Reclamation.

Use of the storage during the recent flood crest the last week of May resulted in a reduction of the crest discharge, as measured at The Dalles, from approximately 638,000 to 602,000 cu. ft. per sec., and the peak stage in the Portland metropolitan area of the river, which suffered such heavy damage in the 1948 flood, by more than a foot.

In order to achieve this reduction in the peak stage of the flood, Grand Coulee Dam was operated by the Bureau of Reclamation on daily requests from the Corps of Engineers.

UNIT BID PRICES . . . CONTINUED

Heavy Grading, Drainage and Piping on Pacific Highway

Oregon—Lane County—State Highway Department. McNutt Bros., Eugene, with a bid of $493,914, was low before the Oregon State Highway Department for work on the Judkins Point-Goshen section of the Pacific Highway. Unit bids were as follows:

(1) McNutt Bros. $493,914
(2) Guy F. Atkinson Co. 514,342
(3) Peter Kiewit Sons' Co. 521,777
(4) M. L. & C. R. O'Neill 544,814
(5) E. C. Hall Co. & Leonard & Slate Ore. Ltd. $554,023
(6) R. A. Heintz Construction Co. 596,906
(7) Kuckenberg Construction Co. 604,304
(8) K. L. Goulter Co. 668,432

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All specified clearing and grubbing	$18,950	$29,100	$17,000	$45,000	$19,500	$40,000	$12,000	$30,640
350 sq. yd. removal of pavement	1.50	2.60	.80	7.00	1.00	1.00	1.00	1.00
1,200 cu. yd. struct. excav., unclass.	4.00	5.20	3.00	3.00	4.00	3.50	5.00	5.00
230 cu. yd. trench excav., unclass.	3.00	2.60	2.30	3.00	2.50	1.50	2.00	2.00
682,000 cu. yd. gen'l excav., unclass.	.54	.55	.59	.55	.59	.67	.68	.74
2,072,000 yd. sta. short overhaul	.012	.009	.01	.02	.02	.01	.015	.015
18,700 cu. yd. sta. long overhaul	.50	.63	.60	.40	.60	.50	.60	.50
13,000 cu. yd. placing topsoil	.90	1.25	.90	.70	.75	.85	1.50	1.00
6,000 yd. mi. truck haul on topsoil	.25	.26	.15	.18	.30	.20	.20	.25
All specified, finishing roadbed and other areas	$2,000	$6,000	$2,200	$8,500	$10,000	$3,000	$5,000	$4,000
20,000 lin. ft. rounding cutbanks	.20	.20	.10	.15	.20	.15	.25	.25
1,000 lin. ft. 12-in. conc. pipe	1.65	1.75	2.00	2.25	2.00	1.93	2.10	2.25
1,030 lin. ft. 18-in. conc. pipe	3.00	3.25	4.00	3.50	3.80	3.50	3.75	4.00
450 lin. ft. 24-in. conc. pipe	4.20	4.50	5.50	4.25	5.25	4.85	5.00	5.50
140 lin. ft. 36-in. conc. pipe	7.95	8.50	9.40	7.50	9.00	8.50	9.00	12.00
200 lin. ft. 18-in. ex. str. conc. pipe	3.45	3.80	4.50	4.50	4.25	3.95	4.25	4.50
200 lin. ft. 24-in. ex. str. conc. pipe	4.90	5.35	6.50	5.75	6.50	5.60	6.00	6.50
160 lin. ft. 6-in. conc. drain pipe	.80	1.10	.85	1.25	1.25	.85	3.00	1.00
520 lin. ft. 8-in. perf. conc. dr. pipe	1.07	1.50	1.10	1.50	1.50	1.20	3.25	1.25
30 lin. ft. extra for installing pipe under pavement	10.00	4.00	17.00	7.00	5.00	10.00	5.00	5.00
150 cu. yd. 3/8-in. - 0 backfill in drains	5.00	5.20	5.00	4.50	5.00	4.50	4.00	5.00
430 cu. yd. Class "A" conc.	56.00	51.00	57.00	55.00	55.00	53.00	50.00	65.00
66,600 lb. metal reinforcement	.12	.095	.115	.12	.12	.115	.12	.13
1,500 M. gal. sprinkling	2.00	2.60	2.00	2.00	2.00	2.50	3.00	2.50

Sewerage . . .

Vitrified Clay Sewer Installation

Arizona—Pima County—City. M. M. Sundt Construction Co., Tucson, with a bid of $93,858 was low before the city engineer, Tucson, for the construction of the Monterey Addition District Sewer Improvement. Unit prices were as follows:

(1) M. M. Sundt Construction Co. $93,858
(2) Pioneer Constructors 93,882
(3) Martin Construction Company $97,331
(4) San Xavier Rock and Sand Company 97,370

	(1)	(2)	(3)	(4)
20,382 lin. ft. 8-in. vitrified clay sewer main.	1.55	1.50	1.653	1.40
2,509 lin. ft. 6-in. vitrified clay sewer main.	1.25	1.25	1.42	1.25
12,216 lin. ft. 4-in. vitrified clay house conn. sewer	.89	.98	1.05	1.00
12,858 cu. yd. trench excav. for main sewer incl. backfill	2.30	2.25	2.00	2.50
4,187 cu. yd. trench excav. for house connection sewers	2.30	2.50	2.80	2.75
376 cu. yd. manhole excavation	2.00	4.75	3.00	3.00
32 ea. top 4.5 ft. of std. 4-ft. diam. manhole inc. ring and cover	126.00	125.00	145.00	155.00
81 vert. ft. addtn. depth of std. 4-ft. diam. manhole below 4.5 ft.	18.00	17.50	15.00	17.00
34 ea. standard cleanouts	30.00	27.50	60.00	38.50
350 sq. yd. asphaltic pavement to be removed and replace	5.12	1.90	2.25	3.00

Irrigation . . .

Earthwork and Structures on Columbia Basin Project

Washington—Columbia Basin Project—Bureau of Reclamation—J. A. Terteling and Sons, Inc., Boise, Idaho, was low before the Bureau of Reclamation with a bid of $2,888,491 for Schedule I construction of earthwork and structures on East Low Canal and Lind Coulee Wasteway, Columbia Basin project. Unit bids were as follows:

(1) J. A. Terteling and Sons, Inc. $2,888,491
(2) United Concrete Pipe Corp., Minnis and Shilling, and Ralph A. Bell 3,101,840
(3) Peter Kiewit Sons' Company 3,596,985
(4) Western Contracting Corporation $3,649,852
(5) Morrison-Knudsen Company, Inc. 3,832,055
(6) Engineers Estimate 3,976,905

	(1)	(2)	(3)	(4)	(5)	(6)
185,000 cu. yd. excavation common, for canal	.135	.20	.13	.15	.20	.18
120,000 cu. yd. excavation rock, for canal	1.11	1.25	1.00	1.00	1.25	1.10
4,000 cu. yd. excavation for core banks	.20	.24	.33	.20	.30	.25
5,000 cu. yd. compacting embankment	.31	.15	.33	.18	.28	.40
324,700 cu. yd. excavation common, for structures	.32	.36	.45	.50	.35	.60
16,940 cu. yd. excavation rock, for structures	3.10	1.70	4.00	2.00	2.70	2.50
262,740 cu. yd. backfill	.17	.23	.45	.25	.30	.40
12,970 cu. yd. compacting backfill	3.40	3.00	3.00	3.00	3.65	2.50
1,940 sq. yd. dry-rock paving	4.10	5.00	8.00	3.50	7.20	5.00
380 lin. ft. furn. matls. and constr. graded sand and gravel drain with 6-in. sewer pipe	5.30	2.00	3.00	2.20	2.50	2.00
45,510 cu. yd. concrete in structures	21.25	25.00	30.70	35.50	35.00	33.00
65 cu. yd. concrete in paving slabs	28.90	40.00	55.00	32.28	55.00	30.00
68,362 bbl. furnishing and handling cement	4.67	5.10	5.00	5.00	6.45	5.00
10,490,000 lbs. furnishing and placing reinforcement bars	.094	.0965	.107	.10	.102	.13
17,000 cu. yd. furn. and handling sand and coarse aggregate for conc. and mortar and grout	5.02	3.00	3.10	4.50	5.00	4.00
812 sq. ft. furn. and placing elastic filler matl.	1.40	1.70	2.50	1.93	2.50	2.00

(Continued on next page)

NEW BOOKS . . .

Architectural Graphic Standards — By Charles G. Ramsey and Harold R. Sleeper. Published by John Wiley & Sons, Inc., New York, N. Y., 614 pages. Price $10.00.

Widely known in architectural circles as a valuable reference book, "Architectural Graphic Standards" now makes its appearance in a much larger fourth edition. The authors have added 368 new plates and revised 151 plates of the third edition so that the new volume includes 566 plates 9½ in. by 11½ in. in size. The 50-page index is about twice the size of the third edition index and contains approximately 12,000 entries cross-indexed under convenient headings. Information is presented by means of illustrations giving details on the processes and materials required in architectural and allied fields. Standards are followed wherever standards have been set, and where there are no set standards modern usage is the guide. New subjects in the fourth edition include fireplaces, precast concrete joists, modern wall types, corrugated wire glass roofing and siding, steel stairs, modular casement windows, eaves and watertables for flat roofs, fiber board and wall board for interiors and many other aids to architects, draftsmen, engineers and builders.

* * *

Standard Practices for Low and Medium Speed Stationary Diesel Engines — By the Diesel Engine Manufacturers Association, One North LaSalle Street, Chicago 2, Ill. Price, $5.00.

Recent developments in the diesel engine manufacturing industry have prompted a revision of the 1946 edition of this book. The final product is the coordinated effort of members of the engineering and sales staffs of firms belonging to Diesel Engine Manufacturers Association, and each of the book's seventeen chapters has been carefully brought up to date and clarified. Sections dealing with fuel engines, operation and maintenance, starting systems, and a variety of new additions included in an appendix have been incorporated in the new edition. In chapters on definitions, performance and equipment, diesel engine construction, governors and speed regulations, torsional vibrations and critical speeds and many others, readers will find helpful suggestions, maintenance tips and answers to many questions on the diesel engine. It is designed to serve consulting engineers, buyers, users and manufacturers of diesels and give them up-to-date diesel data.

* * *

General Report, Welfare in the Construction Industry, Seasonal Unemployment in the Construction Industry—By the Building, Civil Engineering and Public Works Committee, Third Session, Geneva, Switzerland, 1951. Published by the International Labour Office (Washington Branch, 1825 Jefferson Place, N. W., Washington 6, D. C. 88, 40 and 98 pages respectively, 9½ x 6¼. Prices 50¢, 25¢ and 25¢.

These three booklets contain all the business discussed by this committee of the International Labour Organization. The **General Report** discusses actions taken in various countries on the basis of previous committee discussions, reports on studies and inquiries and recent events and trends. **Welfare in the Construction Industry** describes conditions making for special problems, welfare development possibilities and

Continued on page 124

NEW BOOKS . . .

. . . Continued from page 123

conclusions reached. **Seasonal Unemployment in the Construction Industry** is a discussion of the patterns and causes of seasonal unemployment and the benefits to be derived from eliminating it. The first section discusses the problem, and the second section is devoted to proposed remedies. An appendix features a questionnaire on the problem and statistical sources.

* * *

The Behavior of Engineering Metals—By H. W. Gillett. Published by John Wiley & Sons, Inc., New York, N. Y. 395 pages, 6 x 9¼. Price $6.50.

This book was written by a prominent metallurgist for non-metallurgists who must select metals alloys for engineering purposes. All along the line, the book emphasizes the practical rather than the theoretical approach to the problem of using the right metal. The behavior of the metals is stressed—not the reason for the behavior. As far as possible the author has avoided the use of highly technical terms. Roughly the first third of the book is devoted to the fundamental ideas of metallurgy with terms and examples. The author then discusses the behavior pattern of the metals and alloys most commonly used for commercial purposes, and the final chapters are devoted to factors which should be considered in selecting the material. References are included in an appendix for more extensive technical and simplified reading.

* * *

New Lessons In Arc Welding—By The Lincoln Electric Company, 13010 Coit Road, Cleveland, Ohio. 320 pages, 6 x 9. Price, $1.00.

This new volume contains 61 tested welding lessons, 163 pages of practical welding information including welding mild steel, alloys, sheet metal and pipe. New procedures and processes in the welding industry are included and topics such as Hidden arc welding, metals identification, joint selection and use of welding in making common machine parts highlight the informative book. This material is designed for easy understanding since it is based upon lessons and instructions given at the Lincoln Arc Welding School. Practical situations rather than theoretical problems are contained in the volume and attention is given to both the fundamentals of welding and advanced problems. Pictures and drawings accompany the textual material.

* * *

Anti-friction Bearing Design for Movable Span Bridges—Published by The Torrington Company, Bantam Bearings Division, South Bend, Indiana, 63 pages, 14 x 10.

This well-illustrated, cloth-bound book covers the application of anti-friction bearings to all types of movable span bridges. A limited number of copies are available to bridge engineers who request the book on their company stationery. Bearing applications to vertical lifts, double bascule, single bascule, retractile bridges and even to the floating bridge at Lake Washington are discussed. Several of the bridges discussed in the book are located in the West including the Lewiston-Clarkston Bridge, Washington and Idaho, Heim Bridge, Los Angeles, Calif., and the Mossdale Highway Bridge, Mossdale, Calif. Material is presented a clear, concise fashion with informative drawings and charts.

UNIT BID PRICES . . . CONTINUED

		(1)	(2)	(3)	(4)	(5)	(6)
27,800	lin. ft placing rubber water stops	.67	.60	1.50	.80	1.00	1.25
1.5	m.b.m. furn. and erecting untreated timber in structures	215.00	350.00	210.00	275.00	260.00	230.00
32	m.b.m. furn. and erecting treated timber in structures	245.00	400.00	250.00	309.00	340.00	275.00
23,500	lb. furn. and installing blow-off valves and connections	1.24	.70	.85	1.00	1.00	.75
28,000	lb. installing gates and gate hoists	.10	.10	.16	.13	.15	.12
19,000	lb. furn. and installing miscl. metalwork	.41	.43	.30	.55	.50	.60
200	lin. ft. furn. and installing elect. metal conduits ¾-in. and less in diam.	1.10	2.00	2.00	1.86	2.50	1.75
260	lin. ft. furn. and installing elect. metal conduits 1½-in. in diam.	2.25	2.50	2.50	2.15	4.80	2.00
20	lin. ft. furn. and installing elect. metal conduits 2½-in. in diam.	4.50	3.00	3.00	2.65	5.50	2.50
180	lb. furn. and installing elect. conductors and ground wires	2.25	1.80	1.00	2.15	2.30	2.00
3,500	cu. yd. placing pit-run gravel road surfacing and railroad ballast	.67	1.00	.75	.67	.40	1.20
14,000	mi. cu. yd. hauling matl. for road surfacing and and railroad ballast	.17	.15	.65	.13	.60	.25
988,000	lb. placing reinf. bars furn. by the Govt.	.04	.04	.05	.03	.06	.06

Norton Siphon on the Gila Project

Arizona—Gila Project—Bureau of Reclamation. R. A. Wattson Company, North Hollywood, Calif. with a bid of $283,168, was low before the Bureau of Reclamation for Schdeule I, Norton Siphon construction, on the Wellton-Mohawk Division of the Mohawk Canal, Gila Project. Unit prices were as follows:

(1) R. A. Wattson Co. $283,168
(2) Western Contracting Corp. 353,452
(3) Engineer's estimate $182,352

		(1)	(2)	(3)
44,000	cu. yd. excavation for structures	1.47	2.28	.82
38,700	cu. yd. backfill about structures	.45	1.00	.55
2,200	cu. yd. compacting backfill	2.50	3.30	2.50
3,000	cu. yd. riprap	6.50	3.60	2.50
95	cu. yd. concrete in structures	85.00	94.00	80.00
1,800	bbl. furnishing and handling cement	5.00	5.50	5.00
14,000	lb. furnishing and placing reinforcement bars	.15	.15	.15
55	s.f. furnishing and placing ½-in. electric filler matl. in joints	2.00	2.00	2.00
70	s.f. furnishing and placing 1-in. electric filler matl. in joints	2.00	3.00	2.50
146	lin. ft. placing rubber water stops in joints	3.00	3.20	2.00
1,270	lin. ft. furnishing, laying, and testing 96-in. precast-concrete pipe	123.00	137.50	73.00

Water Supply . . .

12-In. Water Distribution System

Montana—Valley County—Corps of Engineers—S. J. Daniel and Sons, Inc., Glendive, Mont., with a bid of $37,470, were low before the Corps of Engineers for construction of 12-inch water line from storage reservoir to camp distribution system, Fort Peck. Unit bids were as follows:

(1) S. J. Daniel and Sons, Inc. $37,470
(2) E. H. Blakeslee Construction Co. 39,205
(3) Long Construction Company, Inc. 40,244
(4) L. & S. Improvement Company 40,432
(5) Elmer Johnson 42,626
(6) Government Estimate 58,185
— Paul R. Lee and Montana Air Conditioning Co., Inc. $44,867
— Northwestern Engineering Co. 47,732
— Hilde Construction Co., Inc. 54,298
— McLaughlin Construction Co. 61,195
— Delzer Construction Co. 66,064

		(1)	(2)	(3)	(4)	(5)	(6)
5,760	lin. ft. furn. and installing 12-in. pipe	6.47	6.73	6.90	7.00	7.37	10.00
Lump sum,	installing Gov't-furn. 6-in. hydrant, feeder line, auxiliary valve and valve box	125.00	230.00	250.00	50.00	100.00	275.00
Lump sum,	furn. and installing street washer, complete with feeder line and corporation cock	78.50	211.00	250.00	62.00	75.00	310.00

Power . . .

Complete Switchyard at Hungry Horse Dam

Montana — Hungry Horse Project — Bureau of Reclamation. Grafe-Shirley-Lane Company, Los Angeles, Calif., with a bid of $1,792,782 was low before the Bureau of Reclamation for completion of Hungry Horse Dam, power plant and high-voltage switchyard (power plant and dam unit prices appeared in WESTERN CONSTRUCTION May 1951—page 128). Principal features of the switchyard construction are all required excavation, backfill, and gravel surfacing; construction of all concrete footings and foundations for service building, switchyard steel structures and equipment, and transformer-circuit towers, and construction of the cable trench in the switchyard; duct bank construction and manhole structure in the switchyard and between the switchyard and the power plant; chain-link fence construction and erection of the switchyard steel structures; construction of the switchyard service building, including erection of the prefabricated building and installation of the heating equipment and installation of all accessory hydraulic and mechanical equipment, piping, electrical materials, equipment and fixtures. Unit bids were as follows:

(1) Grafe-Shirley-Lane Company $1,792,782
(2) Donovan, James, Wismer and Becker 1,846,108
(3) General-Shea-Morrison $1,893,226
(4) Guy F. Atkinson 1,893,234
(5) Engineer's estimate 1,112,527

SCHEDULE 2—SWITCHYARD

		(1)	(2)	(3)	(4)	(5)
2,700	cu. yd. excav. for conc. constr. and trenches	8.00	19.90	4.00	7.00	5.00
2,030	cu. yd. backfill	2.80	5.07	3.00	4.00	1.00
310	cu. yd. gravel fill, gravel pockets, and gravel surf.	6.00	16 35	5.00	14.00	4.00
360	lin. ft. drilling holes for anchor bars and grouting bars in place	3.00	4.55	4.00	3.00	2.50

(Continued on next page)

		(1)	(2)	(3)	(4)	(5)
18,000	lb. furn. and placing reinf. bars ½-in. round and smaller	.165	.306	.20	.16	.18
19,100	lb. furn. and placing reinf. bars ⅝-in. to ⅞-in. round	.16	.282	.18	.15	.18
2,200	lb. furn. and placing reinf. bars 1-in. round and larger	.15	.268	.16	.15	.17
315	cu. yd. conc. in switchyard foundations	70.00	111.65	70.00	65.00	50.00
150	cu. yd. concrete in duct line	50.00	103.20	70.00	54.00	40.00
15	cu. yd. concrete in switchyard serv. bldg.	75.00	147.50	100.00	110.00	50.00
170	sq. ft. furn. and placing preformed bituminous-fiber joint matl.	1.00	1.63	1.00	1.50	2.00
750	lb. furn. and installing miscl. metalwork in duct line, switchyard, and serv. bldg.	1.00	1.22	3.00	1 80	.60
8,700	lb. furn. and installing tr. cover, gratings, and hatch cover in switchyd. and switchyd. serv. bldg.	.50	.80	1.00	.41	.40
110	lin. ft. furn. and installing cable trays in duct line manholes and switchyard cable trench	6.00	26.90	24.00	2.50	2.00
150	lb. furn. and installing cable racks in switchyard cable trench	1.00	1.00	2.00	3.00	.60
540	lb. furn. and installing anchor bolts	.70	1.16	2.30	1.50	.50
750	lin. ft. furn. and erecting chain-link fence	3.50	6.67	8.00	6.50	5.00
4,500	lb. furn. and placing stub angles and tie downs	.30	.71	1.35	.48	.40
162,000	lb. erecting transformer circuit towers and switch-yard structs. for electrical installations	.10	.0947	.10	.095	.08
Lump sum,	furn. and constr. serv. bldg.	$3,400	$5,340	$2,500	$2,600	$3,500
1,000	lb. installing motor-driven gear-type oil pumping units	.50	1.43	.32	2.00	.25
Lump sum,	installing portable fire extinguishers	60.00	125.00	150.00	90.00	75.00
14	name plate, installing name plates	2.00	11.80	4.00	7.00	5.00
30,000	lb. installing oil storage tanks	.08	.094	.11	.06	.10
2,700	lb. furn. and installing class R piping systems	.70	3.64	2.65	2.40	.60
4,200	lb. furn. and installing class S piping systems	1.10	2.88	1.90	2.20	.70
330	lb. furn. and installing class T piping systems	1.10	2.05	1.90	.90	.60
70	lb. furn. and installing flexible hose connections	6.00	20.40	19.00	10.00	2.50
70	lb. furn. and installing pipe hangers and supports	1.20	4.70	4.00	2.40	1.00
15	lin. ft. furn. and installing embedded elect. metal conduit 1-in. in diam. in the switchyard	1.00	2.00	2.00	3.00	1.00
170	lin. ft. installing embedded elect. metal conduit 1½-in. in diam. in manhole EYC for temp. bypass construction	1.50	1.90	4.00	1.60	1.40
680	lin. ft. furn. and installing embedded elect. metal conduit 2-in. in diam. in the switchyard	2.00	2.11	4.00	1.90	1.90
15	lin. ft. installing embedded elect. metal conduit 2½-in. in diam. in manhole BYC for temp. bypass construction	3.00	6.50	5.00	4.50	2.50
130	lin. ft. furn. and installing embedded elect. metal conduit 5-in. in diam. in the switchyard	5.00	10.90	10.00	7.50	4.50
2,300	lin. ft. furn. and installing exposed elect. metal conduit 1¼-in. or less in diam. in the switchyd.	2.00	2.78	3.00	1.40	1.10
25	lin. ft. furn. and installing exposed elect. metal conduit larger than 1¼-in. but not larger than 2½-in. in diam. in the switchyard	2.50	6.00	6.00	3.30	2.00
27,000	lin. ft. installing embedded elect. nonmetallic conduit 2-in. in diam. for manholes EYC to EYF in duct bank	1.00	.422	.90	1.00	.60
3,000	lin. ft. installing embedded elect. nonmetallic conduit 4-in. in diam. from manhole EYC to manhole EYF in the duct bank	1.50	.583	1.00	1.10	1.25
135	lin. ft. furn. and installing temp. wooden bypass enclosure for temp. bypass cable route betw. manhole EYB and manhole EYC	4.00	8.30	5.00	5.00	10.00
4,000	lin. ft. furn. and installing No. 12 AWG 600-volt insulated elect. conductor in the switchyard	.10	.39	.21	.105	.10
250	lin. ft. furn. and installing No. 10 AWG 600-volt insulated elect. conductor in the switchyard	.10	.152	.30	.30	.13
50	lin. ft. furn. and installing No. 8 AWG 600-volt insulated elect. conductor in the switchyard	.10	.36	.40	.30	.16
700	lin. ft. furn. and installing No. 6 AWG 600-volt insulated elect. conductor in the switchyard	.20	.30	.40	.20	.21
50	lin. ft. furn. and installing No. 2 AWG 600-volt insulated elect. conductor in the switchyard	.20	.68	.50	.50	.35
4,100	lin. ft. installing single-conductor No. 2/0 AWG 600-volt insulated elect. cable from distribution board BSA in the power plant to switchyard via temporary bypass cable route	.25	.252	.25	.28	.25
3,960	lin. ft. installing single-conductor No. 2/0 AWG 600-volt insulated elect. cable from distribution board BSA in the power plant to switchyard via permanent duct bank route	.25	.252	.25	.30	.25
5,900	lin. ft. installing single conductor No. 1/0 AWG 600-volt insulated elect. cable from distribution board DSA in the power plant to serv. bldg. via temp. bypass cable route	.30	.224	.25	.21	.21
5,500	lin. ft. installing single-conductor No. 1/0 AWG 600-volt insulated elect. cable for distrib. board DSA in the power plant to serv. bldg. via perm. duct bank route	.30	.227	.25	.21	.21
1,810	lin. ft. installing 5-conductor No. 19/25 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via temp. bypass cable route	.30	.354	.30	.30	.24
1,670	lin. ft. installing 5-conductor No. 19/25 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via perm. duct bank route	.30	.25	.30	.30	.24
1,870	lin. ft. installing 7-conductor No. 19/25 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switch yard via temp. bypass cable route	.30	.40	.30	.40	.30
1,730	lin. ft. installing 7-condctor No. 19/25 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via perm. duct bank route	.30	.289	.30	.40	.30
200	lin. ft. installing 9-conductor No. 19/25 AWG 600-volt insulated elect. cable in the switchyard	.30	.50	.50	.50	.36
4,200	lin. ft. installing 12-conductor No. 19/25 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via temporary by-pass cable route	.36	.653	.65	.50	.45
3,920	lin. ft. installing 12-conductor No. 19/25 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via perm. duct bank route	.36	.452	.65	.50	.45
300	lin. ft. installing 2-conductor No. 19/22 AWG 600-volt insulated elect. cable in the switchyard	.20	.21	.13	.20	.18

(Continued on next page)

UNIT BID PRICES . . . CONTINUED

	(1)	(2)	(3)	(4)	(5)
4,140 lin. ft. installing 3-conductor No. 19/22 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via temp. by-pass cable route	.20	.252	.15	.20	.20
3,860 lin. ft. installing 3-conductor No. 19/22 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via perm. duct bank route	.20	.174	.15	.20	.20
2,060 lin. ft. installing 9-conductor No. 19/22 AWG 600-volt insulated elect. cable from the temp. location of the control board in the power plant to switchyard via temporary by-pass cable route	.50	.48	.50	.45	.36
1,920 lin. ft. installing 9-conductor No. 19/22 AWG 600-volt insulated elect. cable from the temporary location of the control board in the power plant to switchyard via perm. duct bank route	.50	.33	.50	.45	.36
100 lin. ft. installing 5-conductor No. 19/22 AWG 600-volt insulated elect. cable in the switchyard	.25	.40	.27	.30	.24
1,790 lin. ft. installing 9-conductor No. 19/22 AWG 600-volt insulated elect. cable in the switchyard	.50	.53	.50	.50	.36
7,600 lin. ft. furn. and installing 775,000-circular mil ACSR bare conductor from power plant to switchyard	4.00	1.76	2.40	1.15	.95
2,200 lin. ft. furn. and installing 500,000 circular mil hollow copper cable for high-voltage buses in switchyard	6.00	6.92	8.50	4.70	2.00
161,000 lb. installing 230/196 kilovolt oil circuit breakers in switchyard	.05	.06	.07	.035	.06
75,000 lb. installing 196-kilovolt disconnecting switches in switchyard	.05	.058	.24	.023	.06
235 lin. ft. furn. and installing 1¼-in. iron-pipe-size copper tubing, connectors, and fittings for buses in switchyard	3.00	4.55	14.00	1.00	1.40
3,750 lb. assembling and installing 230-kilovolt coupling capacitors and 800-ampere wave traps in switchyard	.14	.20	.40	.18	.15
300 lb. installing potential device adjustment units in switchyard service building	1.00	.67	1.00	.45	.30
1,750 lin. ft. furn. and installing buried No. 4/0 AWG bare copper grounding cable in switchyard and at transformer-circuit-towers	3.00	2.00	1.70	.50	1.50
700 lin. ft. furn. and installing No. 4/0 AWG bare stranded single-conductor cable for exposed grounding of various items of the switchyard, switchyard service building, manholes, and transformer-circuit-towers to ground mat	4.00	2.00	2.00	.52	1.50
600 lb. furn. and installing ¾-inch copperweld ground rods in the switchyard	2.00	1.32	3.00	.52	.75
2,400 lin. ft. furn. and installing buried No. 4/0 AWG bare stranded, single-conductor copper grounded cable from manhole EYB to switchyard via temporary bypass cable route	3.00	.91	1.65	.65	1.50
270 lin. ft. furn. and installing buried No. 4/0 AWG bare stranded, single-conductor copper gounding cable from manhole EYB to manhole EYC	3.00	.91	1.70	.65	1.50
300 lb. furn. and installing elect. distribution panel boards in switchyard service building	3.00	3.42	10.00	3.00	1.75
144 lb. furn. and installing steel brackets for supporting lighting fixtures on steel structs. in switchyard	2.25	1.37	1.75	.50	.50
670 lb. furn. and installing 25-kva distribution transformer in switchyard service building	1.50	2.32	3.00	.80	.70
75 lb. furn. and installing steel brackets for supporting panel boards in switchyard service building	2.25	1.40	2.00	.60	.50
26 fixtures furn. and installing incandescent lighting fixtures in switchyard and switchyard service building	50.00	74.70	45.00	90.00	50.00

Transmission Line on the Colorado-Big Thompson Project

Colorado—Larimer County—Bureau of Reclamation. Malcolm W. Larson, Denver, with a bid of $377,808, was low before the Bureau of Reclamation for construction of Flatiron-Ft. Collins-Cheyenne Tap 115-kv. transmission line of the Colorado-Big Thompson project. Unit bids were as follows:

(1) Malcolm W. Larson $377,808
(2) Trans-Electric Co. 397,604
(3) Donovan Construction Company 400,176
(4) Utilities Construction Company $418,137
(5) Engineer's estimate 363,414

	(1)	(2)	(3	(4)	(5)
Lump sum, clearing land and right-of-way	$7,800	$4,000	$2,390	$36,110	$10,000
1 struct. constructing type-HS struct. with 50-ft. poles	376.00	395.55	427.00	350.00	330.00
12 struct. constructing type-HS struct. with 55-ft. poles	396.00	438.75	486.00	375.00	355.00
80 struct. constructing type-HS struct. with 60-ft. poles	416.00	465.75	526.00	410.00	382.00
170 struct. constructing type-HS struct. with 65-ft. poles	440.00	506.25	568.00	440.00	411.00
12 struct. constructing type-HS struct. with 70-ft. poles	464.00	553.50	615.00	470.00	442.00
2 struct. constructing type-HS struct. with 75-ft. poles	490.00	621.00	665.00	520.00	475.00
1 struct. constructing type-HS struct. with 80-ft. poles	514.00	729.00	730.00	575.00	510.00
1 struct. constructing type-HSB struct. with 60-ft. poles	367.00	537.30	590.00	460.00	432.00
1 struct. constructing type-HSB struct. with 65-ft. poles	391.00	562.95	630.00	495.00	461.00
2 struct. constructing type-HSB struct. with 70-ft. poles	415.00	614.25	680.00	530.00	492.50
1 struct. constructing type-HSB struct. with 75-ft. poles	441.00	688.50	745.00	575.00	525.00
1 struct. constructing type-HA struct. with 55-ft. poles	349.00	486.00	510.00	405.00	370.00
1 struct. constructing type-HA struct. with 60-ft. poles	369.00	513.00	550.00	435.00	397.00
1 struct. constructing type-HA struct. with 65-ft. poles	393.00	553.50	600.00	465.00	426.00
1 struct. constructing type-HA struct. with 70-ft. poles	417.00	594.00	650.00	500.00	457.00
1 struct. constructing type-HA struct. with 75-ft. poles	443.00	634.50	710.00	550.00	490.00
1 struct. constr. type-3A struct. with 55-ft. max. pole length	434.00	567.00	610.00	525.00	437.00
1 struct. constr. type-3A struct. with 60-ft. max. pole length	455.00	627.75	660.00	465.00	477.00
1 struct. constr. type-3A struct. with 65-ft. max. pole length	488.00	668.25	720.00	610.00	520.00
1 struct. constr. type-3A struct. with 70-ft. max. pole length	522.00	735.75	790.00	660.00	566.00
1 struct. constr. type-3A struct. with 75-ft. max. pole length	560.00	837.00	860.00	720.00	615.00
1 struct. constr. type-3AB struct. with 55-ft. max. pole length	451.00	621.00	630.00	550.00	452.00
1 struct. constr. type-3AB struct. with 60-ft. max. pole length	481.00	661.00	690.00	585.00	492.00
1 struct. constr. type-3AB struct. with 65-ft. max. pole length	515.00	702.00	740.00	635.00	535.00
1 struct. constr. type-3AB struct. with 70-ft. max. pole length	539.00	769.50	810.00	690.00	581.00
1 struct. constr. type-3AC struct. with 55 ft. max. pole length	627.00	815.00	790.00	725.00	532.00
1 struct. constr. type-3AC struct. with 60-ft. max. pole length	656.00	874.00	830.00	770.00	572.00
1 struct. constr. type-3AC struct. with 65-ft. max. pole length	690.00	897.00	910.00	820.00	615.00

(Continued on next page)

		(1)	(2)	(3)	(4)	(5)
1	struct. constr. type-3AC struct. with 70-ft. max. pole length	726.00	920.00	980.00	875.00	661.00
1	struct. constr. type-3AT struct. with 55-ft. max. pole length	457.00	816.75	730.00	555.00	477.00
1	struct. constr. type-3AT struct. with 60-ft. max. pole length	487.00	850.50	770.00	600.00	517.00
1	struct. constr. type-3AT struct. with 65-ft. max. pole length	511.00	877.50	830.00	645.00	560.00
1	struct. constr. type-3AT struct. with 70-ft. max. pole length	545.00	938.25	900.00	695.00	606.00
1	struct. constr. type-3T struct. with 55-ft. max. pole length	609.00	857.25	820.00	705.00	562.00
2	struct. constr. type-3T struct. with 60-ft. max. pole length	629.00	987.75	880.00	750.00	602.00
2	struct. constr. type-3T struct. with 65-ft. max. pole length	663.00	958.50	940.00	795.00	645.00
2	struct. constr. type-3T struct. with 70-ft. max. pole length	697.00	$1,012	$1,010	845.00	691.00
1	struct. constr. type-4BT struct. with 70-ft. max. pole length	757.00	931.50	$1,320	$1,130	700.00
1	struct. constr. type-3DE struct. with 70-ft. max. pole length	653.00	900.00	880.00	760.00	650.00
2	struct. constr. type-4SWT switch struct. w. 75-ft. max. lgth.	$5,541	$6,000	$7,400	$7,500	$4,500
301	X-brace assembl. and attach. X-brace for 12-ft. pole spacing	43.00	47.25	46.00	45.00	35.00
5	X-brace assembl. and attach. X-brace for 14-ft. and 14-ft. 6-in. pole spacing	44.00	64.15	50.00	47.00	40.00
145	guy constructing single guy	27.00	24.30	27.00	28.00	20.00
115	guy double guy	32.00	40.50	37.00	40.00	30.00
2	guy constructing stub guy with 60-ft. pole	170.00	209.25	240.00	255.00	175.00
1	guy constructing stub guy with 65-ft. pole	180.00	222.75	270.00	270.00	195.00
260	anchor placing plate or cone anchor	25.00	22.95	12.00	20.00	20.00
5	anchor placing grouted anchor	23.00	13.50	11.00	20.00	25.00
100	protector installing guy protector	7.00	6.75	9.00	8.20	7.00
1,005	assembly assembl. and attach. suspension-insulator assembly with 7 insulator units	25.00	27.00	39.00	27.00	30.00
15	assembly assembl. and attach. suspension-insulator assembly with 8 insulator units	28.00	32.40	44.00	30.00	34.00
36	assembly assembl. and attach. suspension-insulator assembly with 9 insulator units	30.00	35.10	48.00	33.00	38.00
6	assembly assembl. and attach. double suspension-insulator assembly with 9 insulator units per string and single yoke plate	66.00	67.50	98.00	74.00	80.00
12	assembly assembl. and attach. tension-insulator assembly with 9 insulator units	37.00	35.10	65.00	55.00	40.00
78	assembly assembl. and attach. double tension-insulator assembly with 9 insulator units per string and double strain yoke	76.00	67.50	118.00	100.00	85.00
36	mi. stringing three 397,500-circular mil ACSR conductors	$3,330	$3,245	$2,450	$3,400	$3,300
150	damper attaching vibration damper to ACSR conductor	8.00	8.80	11.00	10.00	8.00
6	weight attaching 50-lb. hold-down weight for suspension insulators	10.00	14.85	30.00	10.00	15.00
3	weight attaching 100-lb. hold-down weight for suspension insulators	17.00	30.40	43.00	15.00	30.00
3	weight attaching 180-lb. hold-down weight for suspension insulators	31.00	33.75	60.00	25.00	55.00
36	mi. string two 3/8-in. galv.-steel overhead ground wires	850.00	600.00	730.00	800.00	700.00
24	damper attaching vibration damper to overhead ground wire	5.00	5.75	8.00	7.50	8.00
225	post placing fence ground post and grounding fences	9.00	6.20	9.00	8.00	7.00
100	gate constructing barbed-wire gate	35.00	100.00	23.00	20.00	25.00

Miscellaneous . . .

Diamond Core Drilling

Washington—Pend Oreille County—Public Utility District No. 1—Jeffries Bros., Richmond, Calif. with a bid of $19,920, was low bidder before Public Utility District No. 1 for diamond core drilling near Newport. Unit bids were as follows:

(1) Jeffries Bros. $19,920
(2) Lynch Bros. 20,885
(3) Vivian Bros. 24,125
(4) Nichols & Thompson $31,890
(5) Engineer's estimate 23,760

	(1)	(2)	(3)	(4)	(5)
Lump sum, mobilization	700.00	$2,000	$2,500	$1,800	$1,000
Lump sum, special drilling equipment	$2,400	....*	....*	$3,000	$2,500
10 ea. river hole set-up	50.00	150.00	175.00	125.00	75.00
13 ea. land hole set-up	40.00	75.00	125.00	80.00	30.00
500 lin. ft. river hole drilling	13.00	11.00	12.00	22.00	17.00
1,000 lin. ft. land hole drilling	7.00	7.50	9.00	10.50	8.00
300 lin. ft. casing	1.00	2.20	2.50	3.15	2.00
200 hr. sampling and testing	8.00	10.00	9.00	8.75	8.00
30 ea. core boxes	5.00	10.00	10.00	6.00	4.00
Lump sum, engineer office	250.00	450.00	400.00	425.00	300.00

* Remains property of contractor.

"Paul Bunyan" Canal For Southern California

. . . Continued from page 73

000 ac. ft. for about 1,000,000 ac. on the west and south sides of the San Joaquin Valley, 2,500,000 ac. ft. for the South Pacific Coast area, and 2,500,000 ac. ft. for the desert area, or a total of 7,000,000 ac. ft.

Partial supply on hand

A study of the available water supply in the Sacramento-San Joaquin Delta over the past ten years shows that a demand of 600,000 ac. ft. per month could have been met over and above the demands of salinity control, delta consumptive use, irrigation of delta uplands, and full continuous operation of the Delta-Mendota Canal (4,600 cfs.) and Contra Costa Canal (325 cfs.) for a minimum period of 5 months to a maximum of 8 months in any one year. To furnish a demand of 600,000 ac. ft. per month throughout the year would require supplemental storage in the Sacramento River Basin or in the North Coast area.

The objective of this project would be to furnish a water supply to supplement existing supplies, including California's rights (5,362,000 ac. ft annually) to the waters of the Colorado River presently available to areas south of Tehachapi.

Personnel

These studies are going forward under the direction of A. D. Edmonston, State Engineer of California, and chief of the Division of Water Resources. P. H. Van Etten is assistant state engineer. W. L. Berry, supervising hydraulic engineer, is in direct charge of statewide water resources investigations.

NEW EQUIPMENT

MORE COMPLETE INFORMATION about any of the new equipment or products briefly described on the following pages may be obtained at no charge. Send your request to Equipment Service, Western Construction, 609 Mission St., San Francisco 5, Calif. For quicker service, designate items by number.

★★★

701

New power transmission chain drive has high velocity

Features claimed: Whole new fields of applications are now possible with the new Hy-Vo Chain Drive, which offers the combined effectiveness of a gear drive with the smoothness and lack of vibration of a belt. The new device makes possible single drive units capable of transmitting as much as 5,000 hp. at linear speeds up to 6,500 ft. per min., or rotative speeds up to 3,600 rpm. A Hy-Vo drive only 2 in. wide has transmitted as much as 500 hp. This power transmission will allow development and use of much smaller and less expensive power plants. The device eliminates the need for wide, unwieldy units with costly shaft extensions, outboard bearings, mounts and other accessories presently required for high-speed engines. Applications for the new chain drive will be found in many fields such as quarry operations, cement and asphalt manufacturing, irrigation and any field where a heavy-duty, high-speed drive is required.

Manufacturer: Morse Chain Company, 7601 Central Avenue., Detroit, Mich.

702

One-man saw does two-men saw jobs

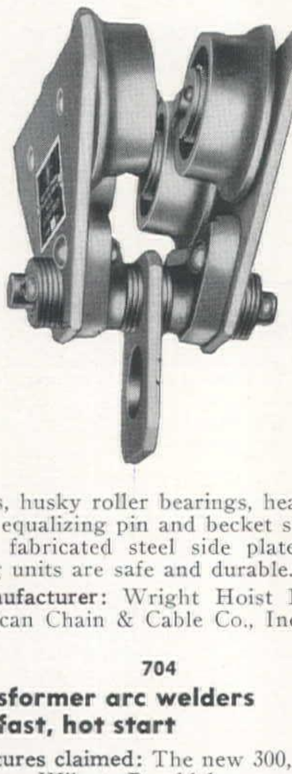
Features claimed: Lighter and more powerful, the new model 26LCS is a 27-lb., 4-hp. gasoline-powered chain saw. Fast cutting speed is assured by two unique features: a narrow-kerf chain which does less waste cutting and thus requires less power to drive, and an efficient Gilmer belt drive which eliminates drive gears that eat up engine power. Perfect balance, with the weight close to the operator's body, plus simple pivot action makes this saw easy to handle on all cuts. There is just one control, a throttle button on the handle.

Manufacturer: Homelite Corporation, Port Chester, N. Y.

703

New trolleys available from 1/2 to 3-ton capacity

Features claimed: Compact and lightweight, these trolleys have chilled tread wheels, husky roller bearings, heavy steel axles, equalizing pin and becket strap and heavy fabricated steel side plates. Easy rolling units are safe and durable.



Manufacturer: Wright Hoist Division, American Chain & Cable Co., Inc., York, Pa.

704

Transformer arc welders give fast, hot start

Features claimed: The new 300, 400 and 500-amp. Wilson Bumblebee arc welders have sturdy construction, compactness and are light weight. They feature instant arc-starting, wide current range, easy-to-operate controls and minimum maintenance.

Manufacturer: Air Reduction Pacific Company, 1614 Mills Tower, San Francisco, Calif.

705

Actuators to operate valves and gates

Features claimed: Designed for the operation of gate valves, plug valves, dampers, diaphragm valves, butterfly valves and sluice gates, and developed as a standard product, is a line of valve actuators. These actuators are basically Ledeen Cylinders, equipped with brackets, valves, controls, and couplings to make them suitable for almost any type of operation required. They can be adapted to any make, size, and type of valve; to operate against any line pressure; to work on any fluid medium, and with any pressure available. They can be arranged for on-and-off service, or for positioning services.

Manufacturer: Ledeen Manufacturing Co., 1602 So. San Pedro St., Los Angeles, Calif.

706

Clear coating minimizes flying glass hazard

Features claimed: Shatterbond is a clear, brushable or sprayable coating, applied to glass to minimize flying glass hazard and guard against entry of dangerous radioactive dust by reducing broken apertures. Developed during the war, the product is now available for civilian use.

Manufacturer: The Wilbur & Williams Company, Brighton, Mass.

707

Exterior masonry coating solves many problems

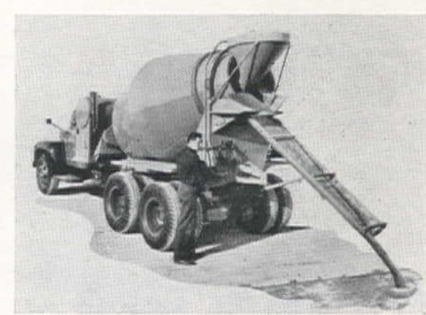
Features claimed: The problem of patching and painting stucco, cement and masonry of all types in one coat application is solved with Silicated Rubber Coat Exterior Finish. This new finish is said to bridge hairline cracks, acting as filler and finish coat combined. It leaves an almost indestructible finish, comes ready-mixed in white or can be had as concentrated additive for mixing with Rubber Coat Tints.

Manufacturer: The Wilbur & Williams Company, 130 Lincoln St., Boston, Mass.

708

Challenge truck mixers in every size

Features claimed: Truck mixers are available in sizes ranging from 3 yd. to 6 yd. The 3-yd. size (4¼-yd. agitator) weighs 4,010 lb., and has 153-cu. ft. drum volume; the 4-yd. size (5⅛-yd. agitator) weighs 5,090 lb., and has a 195-cu. ft. drum volume; the 5-yd. size (6¼-yd. agitator) weighs 6,430 lb., and has a 241-cu. ft. drum volume; the 6-yd. size (7¼-yd. agitator) weighs 6,615 lb., and has a 290-cu. ft. drum volume; and the 6½-yd. size (8-yd. agitator) weighs 7,120 lb., and has a 313-cu. ft. drum volume. Concrete is thoroughly mixed and delivered without segregation right down to the end of the load, regardless of slump.



Manufacturer: Challenge Manufacturing Co. **National distributor:** Cook Bros. Equipment Co., 1815 No. Broadway, Los Angeles 31, Calif.

709

Map filing simplified with plastic map sticks

Features claimed: Mounting of maps, tracings, drawings and blueprints is simplified with these new plastic map sticks. Drawings, etc., snap on sticks without tools, nails or glue, and smooth plastic grippers hold maps to the stick by tension. The sticks are quickly detachable from the

paper. Maps fit quickly into the plastic grips, can be rolled easily and stored in tubes for easy filing and reference.

Manufacturer: Ross-Martin Company, Tulsa, Okla.

710

Ripping, dozing possible in one operation

Features claimed: Brush and rock removal for construction and maintenance of roads is speeded by the use of this new ripper attachment. Twelve models of the

Hensley Rippers are available to fit all standard bulldozers and scrapers. The equipment is easy to transport, attaches quickly and is strong enough for any job. The shanks of the Rippers have the benefit of the full weight of the dozer blade. They are angled for automatic digging into the rock, shale or soil. The instrument will dig to a depth of 12 in. in one pass if there is not an excessive amount of rock in the surface. Two 6-in. passes provide adequate ripping action when a large amount of rock or shale is encountered.

Manufacturer: Hensley Equipment Co., 878 Joaquin Ave., San Leandro, Calif.

711

New electric hoists offer better balance

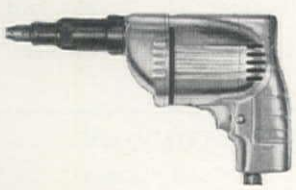
Features claimed: These electric hoists are made with a shorter, deeper drum and are lighter and better balanced. They are ideal for hook suspension. As the highest capacity offered is 1000 lb., the hoists use two parts of 3/16-in. Trulay cable, a smaller load hook and a smaller trolley. The hoists have shaved gears and the lower limit switch is standard equipment.

Manufacturer: Wright Hoist Division, American Chain & Cable Co., Inc., York, Pa.

712

Line of pistol grip screwdrivers added by Thor

Features claimed: This new Thor line, identified as the "ED" series, is available in thirteen attachment and speed variations



for driving up to No. 12 screws and for setting nuts up to ¼-in. thread. Fashioned after Thor Silver Line drills, all ED models are from 30 to 35% lighter in weight, and will deliver more power, pound for pound, than any tools in the same capacity range. This series of screwdrivers are available in speeds of 500, 800, and 1,100 rpm. in all straight and 25-deg. angle attachment models, and 660 and 880 rpm. in right angle models, with positive, kick-out and double slip clutches.

Manufacturer: Independent Pneumatic Tool Co., 175 North State St., Aurora, Ill.

713

Diesel line offered for stationary service

Features claimed: Designed for continuous duty stationary generating service, this new line of diesels includes models from two to eight clyinders, developing 90, 135, 180, 225, 270 and 360 hp. at 600 rpm., in the EV series. The turbo-charged EVS series is offered in four, six and eight cylinder sizes rated 240, 360, and 480 hp. at the same speed. All models have bore and stroke dimensions of 8¾ in. by 11½ in. Although the engines are totally enclosed immediate access to all working parts is effected through large, non-resonant doors on both sides of the frame. These doors, remarkably light considering their strength, lay open the engine from ports to the crankshaft.

Manufacturer: Lister-Blackstone, Inc., 420 Lexington Ave., New York, N. Y.

714

Foreign electric hammers make American debut

Features claimed: Kango Electric Hammer line consists of three size hammers: heavy duty, medium duty and light duty and a large variety of special tools to suit many jobs. The heavy duty hammer is 22 in. long, weighs 21 lb., and strikes 1,300 blows per minute. There are 53 different

tools and 119 additional variations of them. The Kango hammer consists of a striker reciprocated by two centrifugal weights. The weights are attached to bevel gearing which, in turn, is driven through a spline shaft by a specially developed rugged electric motor. These hammers are designed to effect faster production and give less fatigue to operators.

Manufacturer: Allied Tools, Inc., 321 Central Ave., Newark, N. J.

715

Super sweeper designed for Ford tractor

Features claimed: Clean-up operations undertaken by cities, airports, contractors and highway departments will be speeded by the addition of a new sweeper designed especially for mounting on Ford tractors. The broom may be attached or removed within a half hour and all shafts are heavy duty and turn on ball bearings. The broom can be raised 8 in. by a finger tip hydraulic control. Every moving part is fully protected for operation safety. The broom easily

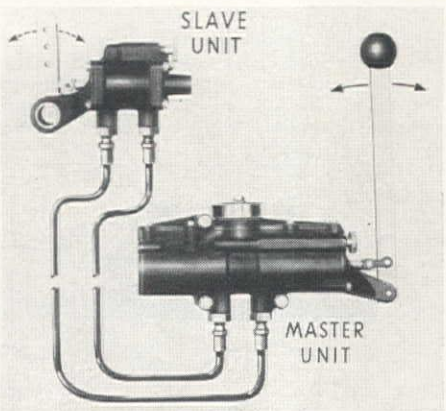
tilts to adjust itself to any surface on which it is applied. There is a full length dust hood over the broom to protect the operator. Broom is driven by rear power take-off at fixed ratio to engine speed, providing efficient sweeping at all tractor travel speeds. Sweeps a 5-ft. swath at a 30-deg. angle depositing debris outside of tractor wheels. Fibre or steel brushes are available.

Manufacturer: Meili-Blumberg Corp., New Holstein, Wis.

716

New hydraulic remote control system

Features claimed: The complete remote control system consists of a master unit and



a slave unit interconnected by two small tubes. Motion applied to the actuating lever of the master unit is accurately duplicated by the slave unit lever. It has positive load carrying ability in both directions because its operation is not dependent upon springs, compressed air or valves. This control system provides for expansion and contraction of both fluid and metal due to temperature changes in a manner that guarantees synchronization between master and slave units. The control system eliminates bell cranks, rods, linkage, cables, gears, sprockets and chains with their inherent disadvantages of backlash, wear and lubrication, thus giving smoother operation and greater rigidity under load. The device is self-contained and compact and requires no external power source. It is ideal for manipulation of throttles and other controls.

Manufacturer: Superdraulic Corporation, 14256 Wyoming Avenue, Detroit, Mich.

717

Field lubricators add more speed and quality

Features claimed: Graco's field lubricators, redesigned for better, faster lubrication of contractor's equipment right at the job site, are now available. Design of the new Lubers falls in two general classifications: (1) ready-to-work, completely assembled units, and (2) "job-planned" units, selected and assembled by the contractor to meet his particular needs. "Job-planned"

Convoy Lubers consist of pumps, hose reels, and other major component parts ordered in any quantity or combination.

All grades of grease and oil required for "big rig" lubrication are pumped directly from original containers (or from lubricant hoppers if desired) and dispensed through reel-mounted 30-ft. hoses. Two types of air-operated pumps are available, the Mogul, exceptionally high volume delivery, and the Standard, designed for average greasing requirements.

Manufacturer: Gray Company, Inc., Graco Square, Minneapolis, Minn.

718

High-lift midget tractor is easy to maneuver

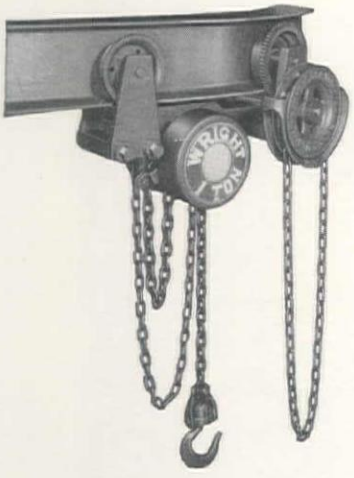
Features claimed: Model M-6 with the High-Lift features a two-speed transmission, final drive running in oil, fully shielded bogey carriage and spring loaded front idler wheels. It's small and easy to maneuver, pivoting within its own length, making a labor saving tool for contractors loading skip mixers and small trucks, and leveling operations where larger machines cannot work.

Manufacturer: Mead Specialties Co., 4114 No. Knox Ave., Chicago, Ill.

719

Army type trolley hoist, ½ to 3 tons

Features claimed: The Wright Safeway Army Type Trolley Hoist is made in capacities from ½ ton to 3 tons and is available with a special load bar and either a pair of two-wheel plain trolleys or one plain and one geared two-wheel trolley. The Plain Trolley assembly has chilled tread wheels equipped with New Departure ball bearings, steel side plate and connections to load bar. Adjustable for a wide range of



beam sizes, and can be changed from plain to geared or vice versa in a few minutes time as both the plain and geared mountings are identical. The Geared Trolley is constructed like the plain trolley except that the wheels are furnished with gear rings having cut teeth, pinions with cut teeth handwheel, hand chain and hand chain guide. Thrust rollers are mounted to insure proper alignment of the assembly whether on straight or curved track.

Manufacturer: Wright Hoist Division, American Chain & Cable Company, York, Penn.

720

New bituminous distributor and circulating bar

Features claimed: A full circulating spray bar 24 ft. in width and so light that one man can lift it, is now available. This is the bar and folding type which can be quickly folded for traveling to and from the job. Since its weight is less than half that

of steel, the "Lite-Wate" circulating bar greatly reduces the load at the rear of the "Spray Master." Mounted on a Littleford distributor, this device sprays by pressure and circulates materials by vacuum, assuring clean even starts, instant shut-off without drip, and suck-back of any material left in bar after spraying. Lengths of bar may be added quickly by loosening only two bolts. The new "Spray Master" bituminous distributor has been refined to embody many labor-saving features.

Manufacturer: Littleford Bros., Inc., 453 E. Pearl St., Cincinnati, Ohio.

721

Stabilizer makes all ladders sure-footed

Features claimed: The Hydra-Lizer (hydraulic ladder-stabilizer) is an adjustable steel attachment for the lower end of

straight or extension ladders. It provides safe footing for ladders in places where the two legs would not be on the same level, and can be used on any surface regardless of contour. It is listed by Underwriters' Laboratories.

Manufacturer: Mine Safety Appliances, Braddock, Thomas and Meade Sts., Pittsburgh, Pa.

722

Rotary snow plow mounts on crawler tractor

Features claimed: This successful adaptation of the Sno-Flyr is now designed to mount on a Caterpillar D-7 for more speed and efficiency in snow clearing. Crawler addition makes the plow easily maneuverable under the toughest conditions with crawler versatility in close quarters, plus five forward and four reverse speeds. Power comes from two engines mounted on a special counterbalancing platform at rear of tractor. Diesel or gasoline engines with 200 or more hp. may be used, as specified. The entire plow assembly, driving motors and supporting frames are mounted on the D-7 as a single integrated unit, and can be removed by a light crane to free tractor for summer use.

Manufacturer: Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn.

723

Crane adaptor cuts pipe handling time

Features claimed: The Back Hoe Crane Adaptor is a development which saves considerable time handling pipe replacements or new installations, which previously required costly one-purpose equipment and extra work crews for trenching, hoisting and backfilling operations. This development makes it possible for one crew with a truck-mounted Bantam Back Hoe to dig 100 ft. of 5-ft. trench per hour. This device converts to crane hoist on the job in 5 min. for lowering pipe, valves, etc. into trench

and hooks on fast-change Bantam Backfill Blade, to backfill own trench at rate of 350 ft. to 400 ft. per hour. The Adaptor fits standard ⅜-yd. Bantam Back Hoe and uses the same boom, stick and one-man operation with full circle-swing for economical spotting of gas, water, oil or sewer pipe sections weighing up to 2½ tons.

Manufacturer: Schield Bantam Co., 220 Park St., Waverly, Iowa.

724

Truck scale goes easily from job to job

Features claimed: The Portable Truck Scale can be moved from one location to the next merely by removing 6 nuts which hold the side arms in place. The rest of the scale is easily lifted as a unit. Scale can be moved and readied for use in minutes. No adjustments are necessary. Extra large rugged steel bases support each scale and no pits or concrete footings are required. The scale is furnished complete with chrome plated weighbeam, extremely accurate. Other vital parts are heavily electroplated to prevent rust and corrosion. The scale can be truck-loaded with a light crane or winch. Special front-end loading eyes are provided for winch loading. Special capacities: 18, 20 and 30 tons with deck lengths from 18 to 30 ft. Special sizes are available to fit any particular application.

Manufacturer: The Thurman Machine Co., Columbus, Ohio.

725

Dumpy level for construction, irrigation

Features claimed: The Builder's Dumpy Level is a shorter, more compact instrument and is specially designed for construction and irrigation work. The telescope is 13 in. long with external focusing and with a 1-3/16-in. objective lens. Achromatic lenses produce flat field and a magnification

of 19 diameters. A spiral screw in the eyepiece provides accurate focusing on crosshairs. Its effective aperture is 1⅛ in. with a minimum focus of 6 ft. and a true field of 1½ deg. The spirit level, 5¼ in. long is sensitive to 60 seconds of arc per 0.1 inch graduation. The complete instrument weighs 7¾ lb.

Manufacturer: Leupold & Stevens Instruments, Inc., 4445 N. E. Glisan St., Portland, Ore.

726

Efficient bending with new tool

Features claimed: This efficient little tool for making perfect offsets and bends up to 180 deg. in ⅜-in., ½-in. and ⅝-in. O.D., K and L Copper Tubing, brass, Bundy Weld, steel and other light gage tubing, is the latest addition to the bending equipment line. The tool is made from a special strong light weight metal, is fast and simple to operate, and no vise or fixtures are required. Since all three sizes are combined in one and the same tool, it is called the "3 in One" (model No. 1200), and has no loose parts. The tool weight 5 lbs.

Manufacturer: Tal Bender, Inc., Milwaukee 2, Wis.

727

Truck mixers rugged, light in weight

Features claimed: Power take off from truck transmission operates the HI-LO concrete mixers and is also adaptable with separate engine drive. Both the HI-LO and

HI-LO Jr. truck mixers are ruggedly built, light in weight and fast to charge, with controlled discharge fast or slow as desired. The HI-LO Jr. mixer installed on a single axle truck normally can carry up to 3 cu. yd. of mixed concrete, and not exceed the single axle weight limitation of 1,800 lb. which prevails in many states. Featuring visible mixing action the open top, stationary drum mixer with revolving blade action produces a kneading, folding and blading which provides a homogeneous mix and prevents segregation, assuring uniform consistency from batch to batch. Action is obtained by means of a rotor that revolves on a horizontal steel shaft, parallel to the truck axle.

Manufacturer: Concrete Transport Mixer Co., 4982 Fyler Ave., St. Louis, Mo.

728

Fork lift added to power-wheelbarrow

Features claimed: Designed to speed material handling operations in industrial plants, shops and in construction work, the new power driven fork lift increases the versatility of the Moto-Bug by quick handling of pallets, boxes, barrels, crates, etc. It has a 1,000-lb. lift capacity and raises the load to a maximum height of 30 in. Better balance is assured by the forks titling to the rear when being raised, and they are adjustable to a maximum width of 33 in. The device handles easily in close quarters, narrow aisles and through doorways. Direct steering to dual rear wheels allows machine to turn in its own length. A 4-hp. gasoline engine furnishes power for both forward and reverse travel and lifting loads. Total weight of the Moto-Bug with the fork lift attachment is 1,400 lb.

Manufacturer: Koehring Company, 3038 W. Concordia, Milwaukee, Wis.

729

Electric generators require new power for TV needs

Features claimed: The advent of the commercial development of radio relay has brought about another new requirement for gasoline and diesel powered electric generating equipment. These units are used to meet the need for stand-by power at many microwave-relay towers which are already flashing television programs across large sections of the country. An extensive line of solid injection, compression ignition, 4-stroke cycle, diesel engines that are comparable in BMEP with the better types of gasoline engines. These engines are built in 2, 4, 6 and 8 cylinder sizes in 14 series and a total of 29 models. They have a power range from 12 to 500 hp. Cubic inch displacement starts at 113 and reaches a maximum of 1,468. The company also builds a line of gasoline and gas operated internal combustion engines of the L head type in 2, 4, and 6 cylinders, 16 series and 35 models with from 39 to 935 cu. in. displacement.

Manufacturer: Hercules Motors Corporation, Market and E. 11th, Canton, Ohio.

NEW LITERATURE

YOU MAY OBTAIN any of the publications reviewed below. Send your request to Western Construction, 609 Mission St., San Francisco 5, Calif. The literature is free, unless otherwise indicated. Please designate the desired items by number.

★★★★★★★★★★★★★★★★★★★★★★★★★★

730

Build-up for bulldozers

Easy reading and pictures of on-the-job applications highlight **Caterpillar Tractor Company's** brochure entitled "Let's Talk Bulldozers." Features of Caterpillar bulldozers are fully explained and diagrammed for ready reference, and the booklet explains how easy blade adjustments boost production. A chart breakdown of optional D8 transmissions providing special reverse speeds for various job applications is included in the 16-page bulletin.

731

Eliminate sewer failures

"Help Prevent Sewer Failures Before They Happen," shows how corrugated metal sewer structures have sufficient strength and material durability to meet sewer problems. Issued by **Armco Drainage & Metal Products, Inc.**, Middletown, Ohio, the booklet describes how Armco sewers can be used to meet practically all service conditions and have ample strength for long service. Available in long lengths and with strong positive joints, these structures can be laid on almost any foundation without danger of disjointing, misalignment or excessive infiltration. Inspection reports on Armco structures used under many conditions are shown. Installation instructions are also included.

732

Galion service manual

This new service manual does not waste words, but it tells a quick complete picture story of how to service and maintain your Galion quick hoist. "Snoopy," a galloping gremlin, explains the diagram of the hoist and part pictures make for operational understanding. A handy list of sales and service representatives from coast to coast is included in this **Galion All-Steel Body Company** release.

733

Mobile equipment hydraulics

Vickers Incorporated, Detroit, Mich., offers a new catalog which gives specifications, charts and design details for oil hydraulic power packs, pumps, new series multiple unit valves and steering boosters and motors of "Vikers Hydraulics for Mobile Equipment."

734

Concrete mixer improvements

A new bulletin on the complete line of improved Rex Hi-Discharge Moto Mixers is now being offered by the **Chain Belt Company**, Milwaukee, Wis. The improvements which increase the efficiency of the machine are shown and described in detail. For example, to increase engine efficiency and improve the quality of concrete, there is a newly designed chain drum drive system, consisting of an improved transmission, fluid drive coupling and a new single strand chain drum drive. Illustrations are used in the description of the new features.

735

High speed diesel tractor

An interesting broadside on the DW20, Caterpillar's new high speed Diesel tractor for lower cost earthmoving, is a new release of **Caterpillar Tractor Company**, Peoria, Ill. Included in the material is a large scale cutaway of the DW20 keyed to features of the machine, along with information of the No. 20 Scraper, W20 Wagon and No. 20S Bulldozer, all designed and built for the tractor.

736

Caterpillar product round-up

Another issue in the annual series of "Caterpillar Products" is now available from the **Caterpillar Tractor Co.**, Peoria, Ill. This booklet, complete with pictures and specifications, of all but two of the Caterpillar products, contains 81 items in all. The list of line additions ranges from tractors to tool bars.

737

Fastener facts

Industrial Fastener Institute, Cleveland, Ohio, offers a new 20-page booklet on the history, functions, production, components and characteristics of fasteners. Among the helpful information included is a chart which serves as a corrosion guide, and several articles appear which should be of interest to fastener users.

738

Lowdown on loaders

Lull Manufacturing Co., Minneapolis, Minn., has compiled a folder which features 18 questions any potential loader purchaser should ask himself before buying, and 63 reasons why the Lull Shoveloader is the best buy. Specifications are included for three models of the Shoveloader and various attachments for the machine are shown.

739

Masonry anchoring line

Indexed for ready-reference, and illustrated with photographs, diagrams and charts, **U. S. Expansion Bolt Co.**, York, Pa., offers a 25-page catalog on its complete line of Masonry Anchoring Devices and allied products. Index tabs guide the reader to material on any item in the line and there he will find information to assist him in installation of the proper item.

740

Highway striping equipment

Kelly-Creswell Company, Xenia, Ohio, is offering a complete description of its highway striping equipment in a series of folders now available. Striping equipment for municipal, industrial and highway needs is fully described in the bulletins. There is an industrial striping folder, a letter size bulletin on the Model D highway striper which applies one, two or three stripes simultaneously, and a bulletin on the new automatic intermittent, or broken-line control mechanism.

741

Bay City's ¾-yd. series

In a new glossy-paper, 20-page catalog, **Bay City Shovels, Inc.**, offers a chance to get well acquainted with the features of its ¾-yard series, crawler-mounted shovel, crane, dragline, clamshell and hoe. The catalog features the heavy duty design and construction of this convertible machine for

excavating, erecting and material handling. Each feature of the equipment is vividly portrayed in photograph form, starting with the base machine and going through all the attachments. Pictures of the various attachments in action are included.

742

Info on rear-dump Euclids

Two models of the 22-ton rear dump Euclid trucks are explained and photographed in a new 16-page bulletin just issued by **Euclid Road Machinery Co.**, Cleveland, Ohio. The catalog explains many of the important parts such as the planetary drive axle, transmission, frame, hoists, etc., and it contains specification data on the complete units.

743

Battery service bulletin

Those who use large numbers of storage batteries should find a particular interest in a new bulletin about Battery AD-X2. This chemical compound designed to decrease sulfation and increase the life of storage batteries is fully explained in the bulletin and detailed instructions for servicing lead acid batteries and re-processing junk batteries, using the compound, are given in this **Pioneers, Inc.** release.

744

Nozzles, necks and flanges

To anyone having a specific interest in pressure vessel work, Taylor Forge Catalog 501 is now available. This 50-page, firmly-bound, completely indexed book describes and illustrates Taylor Forge Nozzles, Welding Necks and Large Diameter Flanges. It includes data covering standards of the Tubular Equipment Manufacturers Association, and the **Taylor Forge & Pipe Works** "Modern Flange Design" publication is also part of this catalog. Illustrations, photographs, specifications and diagrams round out this excellent reference book for those in pressure vessel work.

745

Concrete vibrator line

In a concise, well-illustrated bulletin, **Marvel Equipment Corporation**, Brooklyn, N. Y., introduces the advantages of its line of concrete vibrators. Pictures and thorough descriptions of the gasoline models and electric models along with specifications for each model are included in the 4-page bulletin. The vibrator heads, drive shaft casings, flexible shafts and power engines used are described and dimensions are given in a convenient chart for the vibrator heads. Pictures are included of two models of grinders powered by electric motors and gasoline engines, and attention is given to the various mountings each implement may have depending upon the requirements of the particular job.

746

Plastic-surfaced plywood

This catalog is designed as a reference manual for those who use plastic surfaced plywood. It describes the types of plastic surfaced Douglas fir plywood, properties of the overlay panels and some of the countless applications in building and industry. Recommendations for use of the new premium-surface panel material are also included. This is the first folder on this subject, and it is published by the **Douglas Fir Plywood Association.**

747

Equipment in defense

Caterpillar Tractor Co., Peoria, Ill., is distributing approximately one-half million copies of its new booklet, "Seeds of Victory" in the interest of national defense production. The 48-page booklet shows Caterpillar products in action in the defense program; many phases of mining, lumbering and agricultural production are shown along with pictures of equipment being used by the military. The booklet urges maximum efficiency from all phases of the economy and shows equipment which can aid industry and agriculture on the production and military fronts.

748

Side-dump trailer line

Four letter-size, one-page bulletins are available from **Easton Car & Construction Company**, Easton, Pa., describing the TP line of side-dump trailers for mining and quarry haulage. Bulletin 2-A1 describes models with capacities of 14, 17, and 20 tons, and bulletins 3-, 4-, 5-A7 describe and diagram each model separately and in more detail.

749

Flame hardening reprint

"Flame Hardening of Large Surfaces," a 6-page article by J. J. Barry which originally appeared in "The Welding Journal," is now available in reprint form from **Air Reduction Pacific Co.**, San Francisco, Calif. The article discusses fundamental principles covering the adaption of flame hardening to present day needs. Historical development of the process and equipment as well as a description of modern methods

and application is discussed. Information regarding the new Airco High Capacity flame hardening torch is included and 17 photographs are used to illustrate principles involved.

750

Advantages of pre-mixing concrete

"12 Ways to Set Up for Central Mixing" is the name of a 4-page pamphlet released by the Dumpcrete Division of **Maxon Construction Company, Inc.**, Dayton, Ohio. The pamphlet is designed to show the economies and increased production that can be gained through pre-mixing and delivery of concrete in non-agitating equipment. Twelve different types of central mixing plants are illustrated and briefly described.

751

Bituminous pavement salvaged

In a step-by-step picture story, **Hyster Company,** Portland, Ore., shows the use of its grid roller for the salvaging of bituminous pavement. Each stage of the process is shown from the breaking of the pavement to the ultimate resurfacing with the same material. Descriptions of each step are included along with the time required for the operation.

752

Logging block booklet offered

In a 24-page booklet, **Berger Engineering Company,** Seattle, Wash., offers a complete guide to its line of haulback blocks, rafting blocks, rigger blocks, high lead blocks, skidder lead blocks, etc. Each item is pictured and detailed descriptions of characteristics, uses, number, weight, list price and size are given. Diagrams are included which show some of the blocks in action on logging operations.

753

Economy in public spending

A booklet called "Battlefield" just released by the **Structural Clay Products Institute,** Washington, D. C., seeks to explain the importance of considering total cost in these times of great public spending. Total cost is understood to mean initial cost plus maintenance, and this bulletin shows photographs and gives information to prove that careful planning is necessary if defense structures are to serve a useful purpose after the current emergency has passed.

754

Water control aids

Armco Drainage & Metal Products, Inc. offers aid to drainage and irrigation engineers in solving the problems of controlling or regulating water. "Water Control Problems Vanish When You Count to 7" is a new folder which tells how Armco Gates meet water control needs in seven days. Photographs show typical applications of some of the twenty-seven different models of Armco Gates.

755

Portable roller catalog

Galion Iron Works & Mfg. Co., Galion, Ohio, announces publication of a new bulletin describing the features of the firm's new portable roller. Catalog No. 350 is in four colors and includes specifications, together with detailed descriptions and photographs of the many construction and operation features of the roller.

756

Directions on wall forms

Complete details are given for the erection of Symons Forms including panel alignment, stripping, spacing of ties, safe work load for ties and pressure per square foot that the forms will stand, in this revised 8-page booklet just issued by **Symons Clamp & Mfg. Co.,** Chicago, Ill. "Symons Wall Form Directions" booklet also includes information and illustrations on the many accessories that are available for use with Symons Forms.

757

Sanitary landfill

Another helpful piece of descriptive literature is now available from the **Caterpillar Tractor Co.,** Peoria, Ill. This booklet contains a practical approach to the problems of sanitary landfill, and the material is presented in story form with action cartoons. Textual material is inserted to point out how to start such a project, area requirements, selecting a site, proper equipment selection and many more informative suggestions.

758

Conveyors especially for construction

The Fairfield Engineering Company, Portable Division, Marion, Ohio, is issuing Bulletin 450 which fully describes and illustrates the firm's new line of conveyors designed especially for the construction field. The All-Aluminum Utility Conveyor, one-man operated, weighs but 100 lb., and handles sand, gravel, cinders, lime, etc. The Light Weight Troughed Belt Conveyor has high capacity, designed to handle sand, lime, gravel, crushed stone, ore, etc. The Heavy Duty model is designed for unloading direct to trucks. These types and others are displayed in the illustrated folder.

759

Easy installation of plywood

United States Plywood Corporation, New York, N. Y., offers a brochure on the best methods for easy installation of Weldwood plywood. Many illustrations explain the best approach for carpenters and builders for erecting room panels, roof and wall sheathing, interior and exterior grade Weldtex. Proper use of moldings, Weldwood glue, Firzite, Satinlac and Micarta are explained in "Building Better with Weldwood Plywood."

760

Protective maintenance urged

Cummins Engine Company, Columbus, Ind., issues a service bulletin entitled "Protective Maintenance Increases Profits," to highlight its maintenance program for Cummins Diesel owners. Although the guide does not fit every operation, it will give the operator a basic protective maintenance program which can be changed as the experience of the owner dictates.

761

Pine publications listed

A revised schedule listing the organization's entire file of 78 promotional, educational and technical publications is offered by the **Western Pine Association,** Portland, Ore. The listing gives the title of each publication and a short description of its contents and application in the consumer, building, dealer, education or technical fields. It also contains an order blank with a convenient check-off for specification of quantity and imprinting. Dated April 1, 1951, the schedule supersedes a previous issue of a year ago.

762

Masonry cutting tips

"How to Cut Blade Costs in Masonry Cutting" is the title of a new booklet which contains illustrated instructions on how to figure blade costs in masonry cutting before starting full cutting operations. **Eveready BrikSaw Company,** Chicago, Ill, intends the booklet for the use of the contractor or operator whose profit or loss on the job might be determined by his knowledge of the following facts: Pre-determining blade cost; facts about abrasive and diamond blades; how many cuts to expect per blade, etc.

763

Athey pocket catalog

Designed to quickly provide thumbnail sketches of all the products made and sold by the **Athey Products Corporation,** Chicago, Ill., this pocket-size reference catalog is valuable to those interested in heavy construction equipment. Pictures and specifications highlight the convenient pamphlet. It provides immediate reference and eliminates the necessity of referring to files or catalogs.

764

Concrete curb construction

Construction of concrete curbs on the existing slab without drilling holes through the pavement, is described in a bulletin just released by **Pacific Engineering Sales Co.,** Los Angeles, Calif. Pacific Clamp set-ups for all standard curb jobs are described and special applications are shown. These two-piece, all-steel, self-locking clamps are used with wood curb forms and handle any curb job in general use. Bulletin 151 fully explains Pacific Clamp features.

765

Smaller mining loader

In a 4-page bulletin released by **Goodman Manufacturing Company,** Chicago, Ill. the firm's 860 Loader for trackless mining is thoroughly described. Pertinent information regarding the operation, design and individual features is included in the bulletin.

Space is sold as advertisers' inches. All advertisements in this section are ⅛ in. short of contracted space to allow for borders and composition.

CLASSIFIED SECTION

Rates are $6.50 a column inch. Copy should be sent in by the 10th of preceding month if proofs are required; by the 15th if no proofs are required.

766
Carburetor detergent info

Now available from **Gumout Division, Pennsylvania Refining Co.**, Cleveland, Ohio, is a new instruction folder on carburetor cleaning. The 4-page folder is designed to help dealers establish a carburetor cleaning service. A diagrammatic sketch showing the "16 Passports to Carburetor Trouble" is included in the folder along with the methods of cleaning carburetors with Gumout.

767
Manual on hydraulic control

A handy pocket-sized guide on the operation and care of the direct acting hydraulic control of P&H power cranes and shovels is announced by the **Harnischfeger Corporation**, Milwaukee, Wis. The guide is designed to tell operators how to get utmost efficiency out of this modern system. The correct procedure for dismantling, adjusting and replacing parts as well as complete information on hydraulic control are contained in the 28-page booklet. Free copies are available for owners and operators of power shovels and truck cranes.

768
"Cat" scrapers

"'Cat' Scrapers Built for Your Job" is the title of a new booklet just released by **Caterpillar Tractor Co.**, Peoria, Ill. The 16-page fully illustrated booklet describes the design, haul features, dozer type ejection on the fill, spreading, and open top bowl design for easy shovel loading. The photographs are action pictures on-the-job.

769
Reclaiming broken bits

The "Hole-Saver," newest tool in the **Rock Bit Sales & Service Co.**'s line, is fully described in a new 4-page pocket size folder just released by the Philadelphia, Pa. firm. Sectional drawings show how this outside fishing sleeve which is attached to conventional steel is force threaded in a left-hand direction onto the broken end of any of the following sizes lost steel: ⅞-in. Hex or Q. O.; 1-in. Hex. or C. O.; 1⅛-in. or 1¼-in. Round to save both bit and the hole.

J.K. WHEELER MACHINERY CO.

1485 So. Second West, Salt Lake City 4, Utah

Used Equipment Inventory List

1—1500 Gallon Etnyre Bituminous Distributor with front mounted engine, mounted 10 wheel K8B 1HC Truck—Both truck and distributor very little used (200,000 Gal.).

4—5-6 Ton Mack Gasoline Four-wheel Drive—Dual on Rear—8 Cu. Yd. Dump Beds with Hydraulic Twin Telescopic Type Hoists—Here is a deal for someone who has use for these units.

1—STANDARD, Almost New 1500 Lb. Batch Stationary Bituminous Oil Plant, complete with Tanks, Steam Boiler, D13000 Cat. Engine, "Ready To Go"; portable, skid mounted, with 5th Wheel arrangement on each unit, with set of Dollies for easy, quick moving. "PRICED TO SELL!"

1—Adnun 12' Lay-Down Machine—very little used.

2—12' Buckeye Spreaders with Agitators; equipped with 6 wheels—very little used.

1—Model LS-85 L-B-S Shovel & Dragline Combination, powered with D8800 Engine and equipped with 1 yard bucket.

1—Model YR 12-15 Yard LeTourneau Scraper.

1—Model LS—8-11 Yd. LeTourneau Scraper.

1—1500 4 Compartment Fuel Tank mounted on Dodge Truck, with air Compressor and Air Actuated Lubricating equipment.

1—Heavy Duty 3 Tooth Road Rooter—A1 condition.

1—Model LP 12-15 Yd. LeTourneau Carryall Scraper—Almost new.

1—D8 Caterpillar Tractor, 1H5265 SP with Angledozer and with 2 Drum LeTourneau Power Unit.

1—D7 Caterpillar Tractor, 9G1358 SP with Bulldozer & 2 Drum LeTourneau Power Unit, BH 1464C50. AT "GIVE AWAY PRICE."

1—D7 Caterpillar Tractor, with Bulldozer & 2 Drum LeTourneau Power Unit. Old, but offered at "GIVE AWAY PRICE."

1—12 Yard LeTourneau Carryall Scraper, 2661Y12.

1—8 Yard LeTourneau Carryall Scraper, 508J.

1—D10 Caterpillar Auto Patrol, 9F1063-5H89.

1—Seaman Pulverizer, Model MHD-72, with extra set of tines.

1—Model 511 Diesel Adams Motor Grader with 12' blade—in running condition.

1—1941 Diamond T Dump Truck, Model 968-A-0239, Motor No. 130219, Ser. #96840288—with Winch & A Frame for Derrick.

1—Jaeger 7-S Concrete Mixer, Model 7EL-4P, Serial #71969.

1—Model 70 Buckeye ¾ Yd. Shovel & Dragline Combination, Ser. #4964-W-972507. "NEAR NEW."

FOR SALE

DOLLIES—WHEELS TIRES

120 TIRES: 750x20-8 ply—Unused Recaps
120 TUBES: Heavy Duty Butyl—New
120 WHEELS: 6 Hole—Std. Budd—20"—Surplus New
All Above Mounted and Inflated
30 AXLES: 2½" sq.—Timken Bearings—15,000#—70"—Surplus New
Above Assembled Make 30—4 Wheel Dollies

Gerard J. Murphy Co.
603 DENHAM BLDG., DENVER 2, COLORADO
Phone Alpine 6797

SOLD • RENTED • REPAIRED
Transits • Levels
Steel Tapes • Compasses
PORTLAND INSTRUMENT CO.
334 S.W. 5th nr. Stark,
PORTLAND 4, ORE., AT 3598

FOR SALE

Bucyrus-Erie 22-B Diesel Backhoe, Shovel or Dragline
Monighan 9-W—200' Boom
Lorain 820 Dragline Serial 17243
D-8-N Hyster Winch
Northwest 25 Dragline or Shovel
Northwest 95 Dragline
Caterpillar D-8 Tractors—Serial 2U7358 and 2U-3936
Cleveland Backfill Tamping Machine
Cleveland 95 Ditching Machines
Barber-Greene Model 44-C 5' 3" deep
Buckeye Model 160 Trencher
D-2 Front End Loader—Serial 5U336
HD-5 Front End Loader—Serial 2446
Caterpillar #12 Grader—Like new

A. C. R. CO.
19615 Nottingham Rd., Cleveland 10, Ohio

STOP that WATER

WITH FORMULA NO. 640. A clear liquid which penetrates 1" or more into concrete, brick, stucco, etc., seals—holds 1250 lbs. per sq. ft. hydrostatic pressure. Cuts costs: Applies quickly—no mixing—no cleanup—no furring—no membranes. Write for technical data—free sample. Haynes Products Co., Omaha, Neb.

TRACTOR, TRACK RAILS, ROLLERS AND FRONT IDLERS

Rebuilt with special rod, by our Automatic welding process. 40-60% savings, plus greater wear.

McCARON BROS. Baldwin Park, Calif. Fleetwood 7-1275

FOR SALE

Eleven 13 yd. bottom-dump Euclids. One Model 78 Northwest Shovel powered with a Murphy Diesel. One Model 6 Northwest combination shovel dragline. One 27-E Multifoote Paver.

MODERN MACHINERY CO., INC.
P. O. Box 2152, Spokane, Washington
Telephone: Keystone 9353

FOR SALE
USED CONSTRUCTION EQUIPMENT

CONCRETE BATCH PLANT

Complete with:

Noble Model CA-505 Cement and Aggregate Batch Plant
Pozzolan storage silo, screw elevators, etc.
Aggregate loading conveyor, 548′, 30″ belt, complete with electric motor.
Mixer Koehring Model 1125 (Tilt Type, 4 cu. yd.)

CRUSHING AND SCREENING PLANT

Complete with:

Crushers, #36 Kennedy-Van Saun Gyratory
Traylor Type TY Reduction
Symons Standard Cone
Sand Classifier, Conveyco Model 10400V
Scrubber Washer, Conveyco Double Screw
Feeders, Vibrating screens, Bucket type elevator
Belt conveyors, etc.
Capacity—200 T.P.H., Quarry granite rock

15-TON ELECTRIC CABLEWAY

Complete with:

Movable Tower with Lidgerwood Hoist, Compressors, DC Generator, 15 ton carriage, tail tower rigging, and all necessary controls including 1300 ft. of main line cable and complete communication system.

MISCELLANEOUS OTHER EQUIPMENT

Caterpillar Tractors, Trucks, Portable Compressors, Pumps, Wagon Drills, Welding Machines, Concrete Vibrators, 30 ft. Collapsible Steel Tunnel Forms, etc.

This equipment is owned by Southern California Edison Company and is located at Big Creek #4 Project near North Fork, California.

For prices and further information contact ONLY

BECHTEL CORPORATION

4620 Seville Avenue · Vernon, California · Phone LOgan 5-5441

All items subject to prior sale.

INDEX TO ADVERTISERS
★ IN THIS ISSUE ★