WESTERN CONSTRUCTION

THE FIRST BUCKET of concrete swings into place August 5th at Detroit Dam in Oregon. Consolidated Builders, Inc., will place a total of 1,450,000 cu. yd. for this Corps of Engineers project.

FEATURED THIS ISSUE

New Method for Rejuvenating Old Rough Asphaltic Pavement

•

Significance of Changes in Bureau of Reclamation Specs

•

Hydro-Plant Construction on North Umpqua River in Oregon

SEPTEMBER 1950

REDUCE COSTS

of compressor operation by using the air compressor oils exactly suited to YOUR operating conditions...TEXACO

Air compressors operate under a variety of conditions – and there is no one oil that will do a highly satisfactory lubricating job under all of them. But there is a Texaco air compressor oil to meet every requirement. Follow the recommendations of your Texaco Lubrication Engineer and – whatever your conditions – you'll assure more efficient, more trouble-free performance . . . reduced wear and lower maintenance costs.

For instance, where conditions tend to produce rust in any part of the system, there are Texaco *rust-inhibited* air compressor oils designed to prevent it. If service is very severe and carbon and gum are problems, one of the Texaco *heavy-duty* air compressor oils will assure clean operation. Under "wet" cylinder conditions, use a Texaco *compounded* air compressor oil . . . and a Texaco *straight mineral* air compressor oil for normal conditions.

Also follow your Texaco Lubrication Engineer's recommendations for lubrication of your drills. *Texaco Rock Drill Lubricants EP* are "extreme pressure" lubricants designed to protect against wear and rust . . . assure longer drill life and lower maintenance costs.

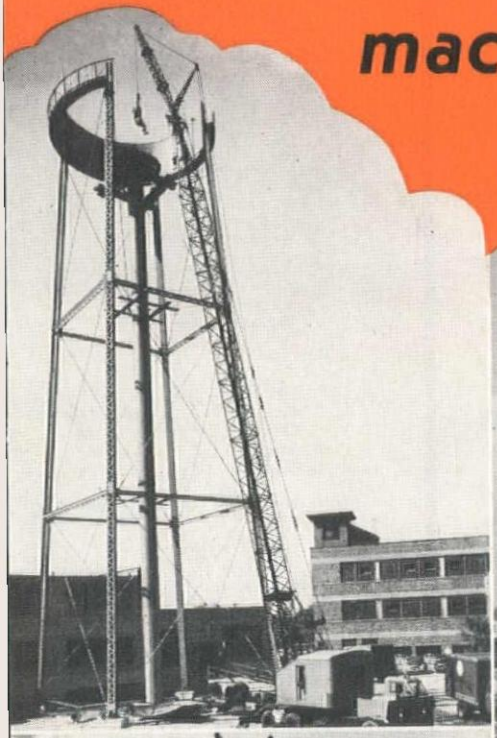
Talk to a Texaco Lubrication Engineer about these cost-saving lubricants. Call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

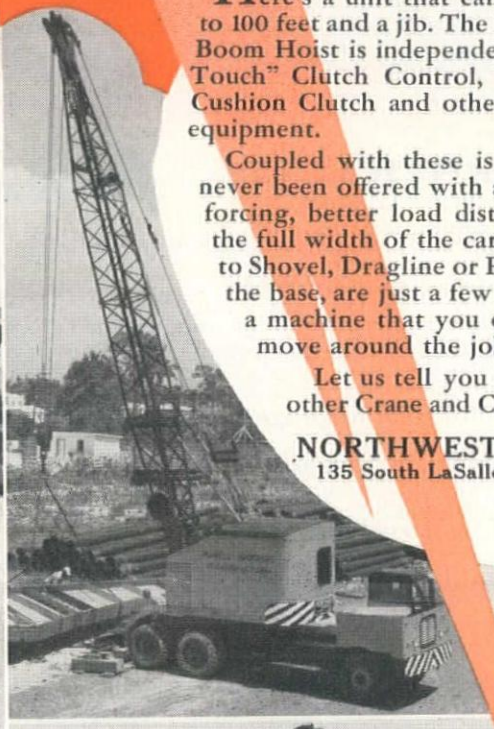
TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

THINK— what this machine can do for You!





Here's a unit that can get around! It handles booms from 30 to 100 feet and a jib. The Northwest High-Speed, Power-Controlled Boom Hoist is independent of all other operations. The "Feather-Touch" Clutch Control, Uniform Pressure Swing Clutches, the Cushion Clutch and other Northwest advantages are standard equipment.

Coupled with these is the Carrier, the like of which has never been offered with a Truck Crane. Better frame reenforcing, better load distribution, outriggers that extend the full width of the carrier, easy conversion from Crane to Shovel, Dragline or Pullshovel without repositioning the base, are just a few of its many advantages. Here's a machine that you can move on the job fast and move around the job fast.

Let us tell you more about it. There is no other Crane and Carrier combination like this.

NORTHWEST ENGINEERING CO.
135 South LaSalle Street, Chicago 3, Illinois

local NORTHWEST sales agents

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

CHEYENNE, WYOMING
Wilson Equip. & Supply Co.

BUTTE, MONTANA
Hall-Perry Machinery Co.

PHOENIX, ARIZONA
State Tractor & Equip. Co.

DENVER, COLORADO
Constructors Equipment Co.

SIDNEY, MONTANA
Northland Machinery Co.

PORTLAND, OREGON
Balzer Machinery Co.

SALT LAKE CITY, UTAH
Arnold Machinery Co.

WEIGH ALL THE ADVANTAGES

WHETHER SHOVEL, CRANE, DRAGLINE, PULLSHOVEL or TRUCK CRANE a star on every job!

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 25 **SEPTEMBER 1950** Number 9

FEATURE ARTICLES

DEPARTMENTS

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
V. C. Dowdle . . Advertising Mgr.
E. F. Hubbard . Circulation Mgr.
R. J. Kamlade . Production Mgr.

Please address all communications to the San Francisco Office

District Offices

NEW YORK OFFICE
Franklin B. Lyons, District Manager
Weston Road, Georgetown, Conn.
Telephone Georgetown 374

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
R. C. Williams, 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 6
Telephone REpublic 2-3125

WASHINGTON OFFICE
Arnold Kruckman, Washington Editor
1120 Vermont Ave., N.W.
Washington 5, D. C.
Telephone DIstrict 8822

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, $11.00 per year. Single Copies, 35¢

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

Double nylon shock shield lengthens tire life

THE tires in this picture have been in daily quarry service for the Tyrone Rock Products Company of Tyrone, Georgia, for more than two years. And it's estimated that they are good for at least two more!

Four trucks such as that shown, haul 8-ton loads of granite to the crusher, travelling over sharp-edged rock. Tire service has been more than satisfactory.

The tread of the tires used, B. F. Goodrich Universals, is specially compounded to resist cutting. And the tread provides sure traction, forward or backward.

All B. F. Goodrich off-the-road tires have bruise protection in the form of a *double nylon shock shield* . . . layers of nylon cord built between the tread and body plies. Under impact, the strong, elastic nylon shields the cord body, distributes impacts and strains.

Only B. F. Goodrich gives you the added protection of the patented nylon shock shield; only B. F. Goodrich gives the added savings of (1) greater average mileage (2) less danger of tread separation (3) greater bruise resistance (4) more recappable tires.

There's a specially designed type and tread design for every need. See the B.F.Goodrich retailer. And specify B.F.Goodrich tires on new equipment. You can get nylon shock shield protection at no extra cost. *The B.F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Award for Achievement . . . to a Westerner

Kaiser Steel is now one of the major suppliers of structural shapes to the West—evidence that it has won its spurs in this basic industry.

If you're a Kaiser Steel customer, you're familiar with the reasons for Kaiser Steel's rapid expansion: An integrated operation from the mining of coal and ore to production of finished shapes. Modern, *nearby* facilities producing a wide range of quality shapes. And a record for dependability unsurpassed in the industry.

Little wonder that experienced construction engineers know this:

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**

how to please more taxpayers

all winter ... all year

on a limited budget

You can stretch your snow dollars, as well as your road and street dollars, by investing in equipment with all-round, all-year usefulness — versatile Allis-Chalmers Motor Graders.

They are not tied down to special jobs. Allis-Chalmers Motor Graders are designed and engineered for toughest snow removal work . . . as well as for handling grading, scarifying, oil mix, ditching and bank sloping.

An exclusive tubular frame absorbs shocks and strains, also protects control rods. Tandem chain drive and proper weight distribution provides the traction to keep driving ahead in toughest snow plowing. There is instant starting and operation on diesel fuel . . . smooth, economical, dependable 2-cycle diesel power. High travel speeds enable you to go quickly from one job to another. Every operator comfort . . . cabs and other accessories.

There is a right size Allis-Chalmers Motor Grader to fit your needs . . . and pocketbook. Get the full story from your A-C dealer . . . NOW! Make your SNOW DOLLARS BUY MORE.

CHOOSE THE GRADER TO FIT THE JOB FROM THIS COMPLETE LINE

A-C MOTOR GRADERS with Baker "V" Plows

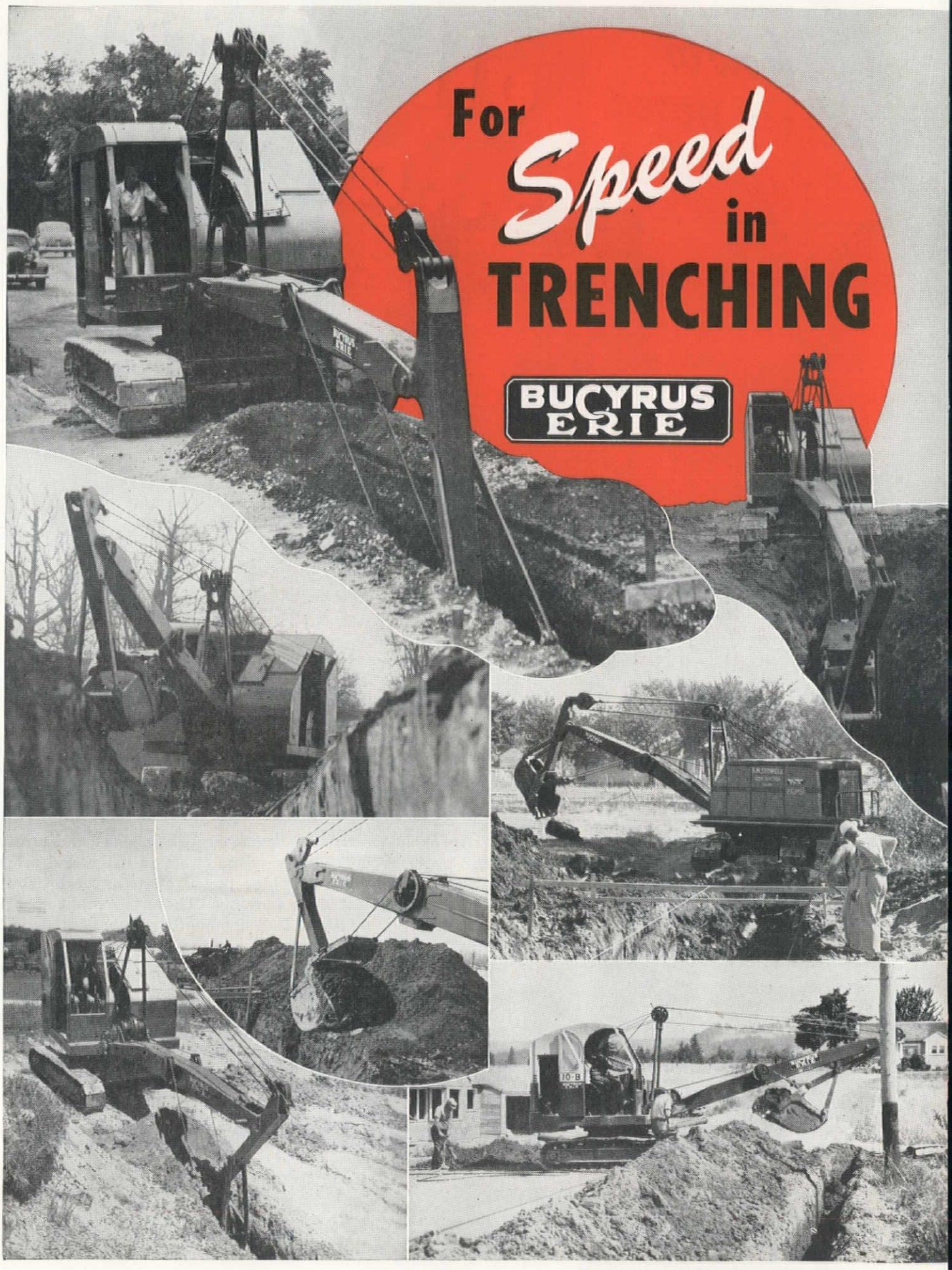
MODEL	BRAKE HP.	ENGINE
AD-4	104	2-Cycle Diesel
AD-3	78	2-Cycle Diesel
BD-3	78	2-Cycle Diesel
BD-2	50.5	2-Cycle Diesel
D	34.7	Gasoline

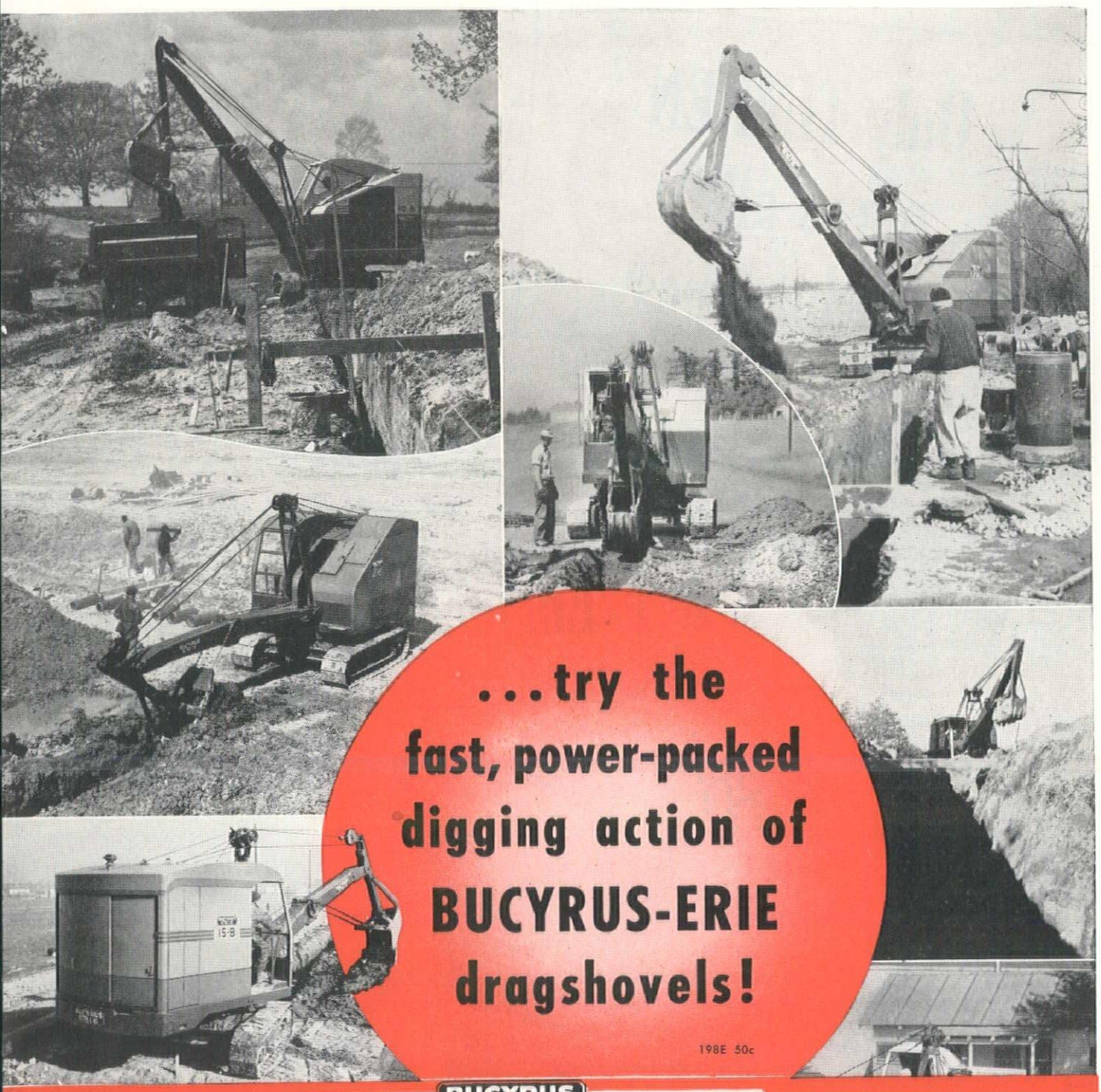
(Wings available for AD and BD models . . . scarifiers for all models, for removing ice. Also: snow bucket for Model D.)

LOAD or PLOW SNOW with the versatile Model D . . . scarify, maintain roads and streets. Only low-cost motor grader with tandem drive and other big grader features.

SEE YOUR **ALLIS-CHALMERS** DEALER

ARIZONA: Phoenix—Neil B. McGinnis. **NORTHERN CALIFORNIA: Oakland and Eureka**—Buran Equipment Company; **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 Santa Barbara**—Shaw Sales & Service Company. **IDAHO: Idaho Falls and Boise**—Southern Idaho Equipment Company. **MONTANA: Missoula**—Mountain Tractor Company; **Sidney**—Northland Machinery Company; **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 Co.; The **Dalles**—Dielschneider Equip. Oreg. Ltd.; **La Grande**—Oregon Tractor Company; **Medford**—Tractor Sales and Service, Inc.; **Klamath Falls**—West Hitchcock Corp.; **Portland**—Wood Tractor Company. **UTAH: Salt Lake City**—Cate Equipment Co., Inc. **WASHINGTON: Seattle, Tacoma and Wenatchee**—A. H. Cox & Company; **Walla Walla**—Northern Harris; **Spokane**—American Machinery Company. **WYOMING: Casper**—Studer Tractor & Equipment Co.


For Speed in TRENCHING
BUCYRUS ERIE



...try the fast, power-packed digging action of BUCYRUS-ERIE dragshovels!

198E 50c

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 COMPANY	BOISE, POCATELLO, SPOKANE
THE LANG COMPANY	SALT LAKE CITY
THE MERRILL-BROSE COMPANY	SAN FRANCISCO
NEVADA EQUIPMENT SERVICE	RENO, NEVADA
THE O. S. STAPLEY COMPANY	PHOENIX
TRI-STATE EQUIPMENT COMPANY	EL PASO
WESTMONT TRACTOR & EQUIPMENT COMPANY	MISSOULA & KALISPELL

Only TIMKEN® offers all 3 rock bit types

1 MULTI-USE

...and a complete Rock Bit Engineering Service!

2 CARBIDE INSERT

3 ONE-USE "SPIRALOCK"

HERE'S real help in getting the *best* removable rock bit for your particular drilling job! Whether you're looking for lowest bit cost, lowest cost per foot of hole, greatest possible drilling speed, or any other advantage, you're sure of getting it with the Timken® Rock Bit Engineering Service. That's because Timken offers *all three* types of bits:

1 MULTI-USE—gives lowest cost per foot of hole when full increment of drill steel can be drilled and when control and reconditioning of bits are correct.

2 CARBIDE INSERT—for extremely hard and abrasive ground. Drillers spend less time changing bits.

3 ONE-USE "SPIRALOCK"—for use where reconditioning is impractical or undesirable. Lowest unit cost. New "Spiralock" union.

You can rely on the recommendation of the Timken Rock Bit Engineering Service. It's the world's largest field engineering organization devoted exclusively to rock bit problems.

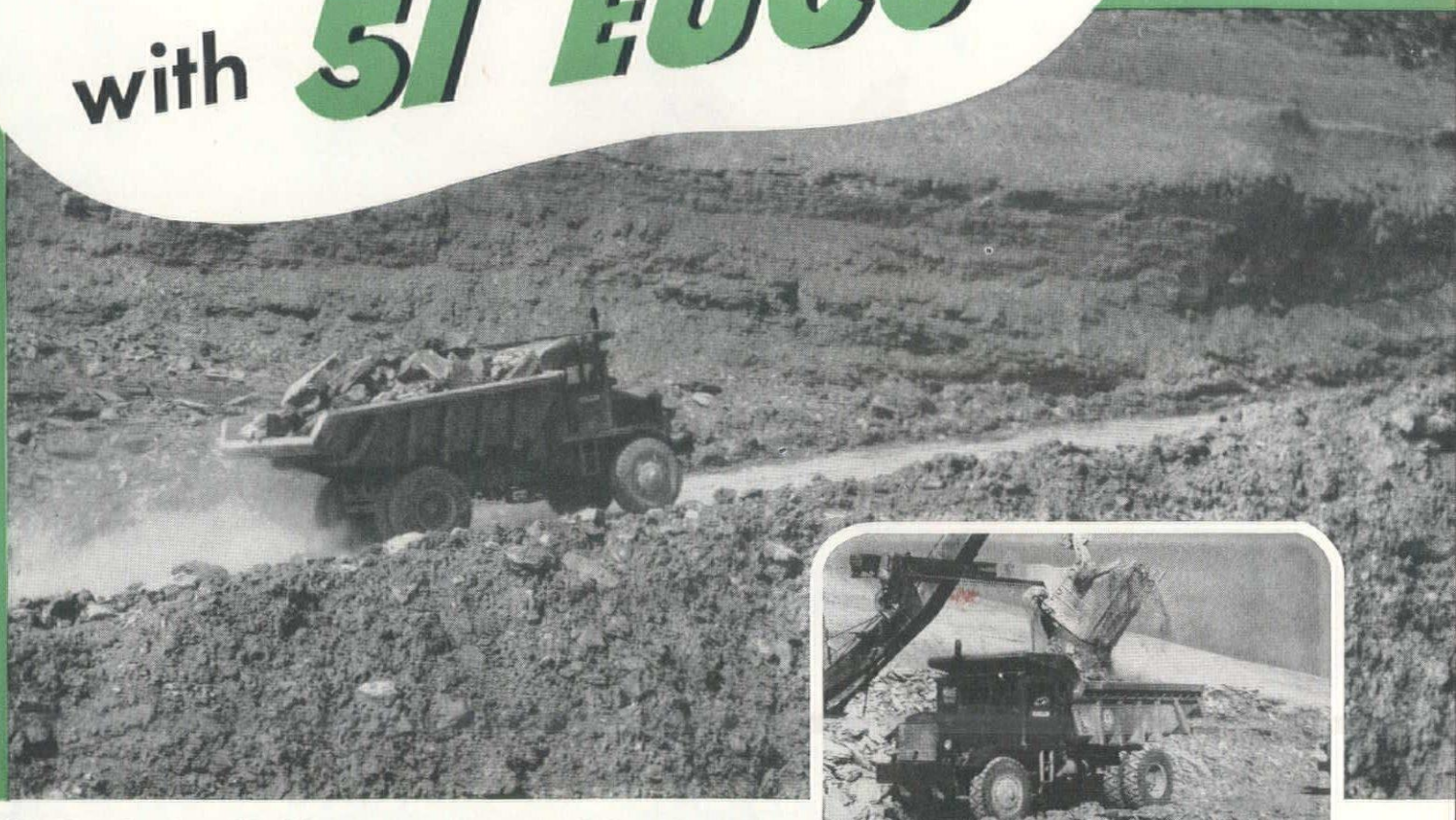
FREE BOOKLET! *A "must" for everyone who buys rock bits. Shows full line of bits in actual-size photos, with detailed descriptions. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".*

TIMKEN

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

. . . your best bet for the best bit
. . . for every job

OPERATION TUNNELS with 51 "EUCS"



This 15-ton Rear-Dump "Euc" loaded with rock excavation climbs a 10 per cent grade at Bowerston, Ohio. Contractor is Hunkin-Conkey Construction Co.

One of the "Eucs" owned by Latrobe Construction Company is loaded with rock and shale by a 2½ yd. shovel.

At Rochez Brothers' job near Reed's Mill, O., a "Euc" dumps its 15-ton load of rock over a waste bank.

On contracts totaling 6,500,000 cu. yds. of excavation for relocating the main-line roadbed of the Pennsylvania Railroad in Ohio, 51 "Eucs" are hauling most of the yardage which consists of rock, dirt, and heavy shale.

This relocation will eliminate four single-line tunnels and replace them with double track through large cuts. The material is shovel-loaded into the "Eucs" for hauls averaging one-half mile in length with grades up to 10 per cent.

The speed, large capacity, and rugged staying power of Euclids enable the three contractors on these jobs to stay ahead of schedule. Because they are built for long life and dependable performance in heavy off-the-highway service, Euclids cut hauling costs—they move more loads per hour at more profit per load.

Ask your Euclid Distributor or branch to show you performance data on these and other jobs. There is a Euclid model to meet your requirements for off-the-highway hauling of earth, ore, coal, or rock.

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

CABLE ADDRESS—YUKLID CODE—BENTLEY

EUCLID THE PIONEER

EUCLIDS *Move the Earth*

The New INTERNATIONAL TD-24

HERE'S WHAT THE

Positive all-weather starting on gasoline, with quick change-over to full diesel operation, all from the seat.

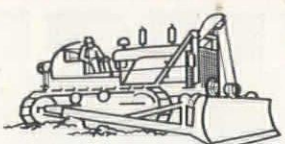
Separate reverse lever for quick change of direction. The tractor moves in the direction the lever is moved.

Self load and run with scrapers of 17-yard capacity—and shift gears on-the-go with the rolling load.

Cut waste shifting time out of work cycles; provide the best speed for every operation, 8 speeds in each direction!

INTERNATIONAL HARVESTER

INTERNATIONAL



CHAMPION of Crawlers

"The TD-24's work right along on slopes so steep we have to cut them down before other tractors can climb them even without loads," says Bob Rardin of Rardin Brothers, Akron, Ohio. "They are fast tractors, easy to shift and have plenty of power. This combination really moves dirt." His TD-24 was equipped with a bulldozer.

"It will out-buck any tractor I've ever run," says Harold Wooley's operator, Drain, Oregon, "and sure push dirt up hill—and climb steep grades." His TD-24 works regularly on 30% to 50% grades, building mountain roads.

"I wouldn't have anything else," says another Oregon operator. He works for V. R. Russell & Sons of Valsetz. "It's sure fine on bulldozing; best dirt mover I ever got hold of."

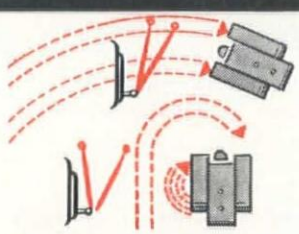
That's the way owners and operators talk about the International TD-24 Crawler. It has earned their praise, for it does everything any other big tractor can do, *plus many things that NO other tractor can do*. The TD-24's versatility makes it the most useful and profitable earth-mover in any equipment line-up.

Visit your International Industrial Power Distributor for a demonstration. Then ask yourself how long you can get along without this big red worker and the extra earnings it will produce.

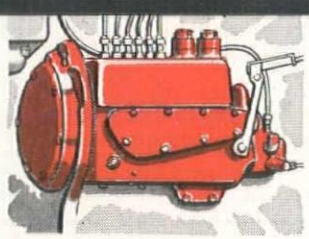
INTERNATIONAL HARVESTER COMPANY
Chicago

TD-24 CAN DO FOR YOU

Instant speed change up or down one speed, or stop, without declutching. Planet Power drive does it!



Planet Power steering puts turns with power on both tracks, feathered turns and pivot turns at your fingertips.



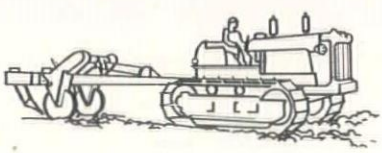
Torque Control feature of fuel injection pump increases engine torque when needed to overcome overloads.

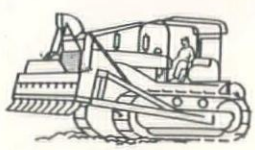
Work on grades up to 100%. Its power, ground contact, balance and lubrication are right for licking any grade.

Handle heaviest loads on gradual turns as easily as straightaway because both tracks are powered in the turn!

Push or pull through tough going. The engine delivers extra "power" when its r.p.m. is pulled down by load.

INDUSTRIAL POWER





Brand New Cedarapids

Built by IOWA

LARGER SCREENING CAPACITY

The large double deck (48" x 14'0") low angle Cedarapids Horizontal Vibrating Screen gives the extra screening area needed for big volume production on material with heavy fines content or contaminated with excessive amounts ot soil, sand, clay and semi-wet material. Cedarapids Horizontal Screens are famous for their high capacity production at the lowest possible cost.

LARGER CONVEYORS

30" width conveyors are used in the Super Tandem Plant (instead of the 24" conveyors that are standard on the Junior Tandem) to take care of the increased capacity resulting from the larger screening area.

UNDERSCREEN SAND EJECTOR CONVEYOR

By means of the ejector conveyor control gate and the 48" x 7'6" Sand Ejector Conveyor that is built into the screen base frame, it is possible to remove all fines from the material or blend them into the crushed aggregate to meet the strictest specifications.

CONTROL PANEL IS EXTRA—WHEN REQUIRED

A controller is furnished with each vibrator, containing an operating switch, an electronic valve and a dial rheostat which varies the power of the vibration, permitting the controller to be set at the point which gives the best results. The electronic valve changes alternating current to pulsating waves with a time interval between each wave to give the vibrators a long stroke.

SYNTRON VIBRATORS EXTRA—IF REQUIRED

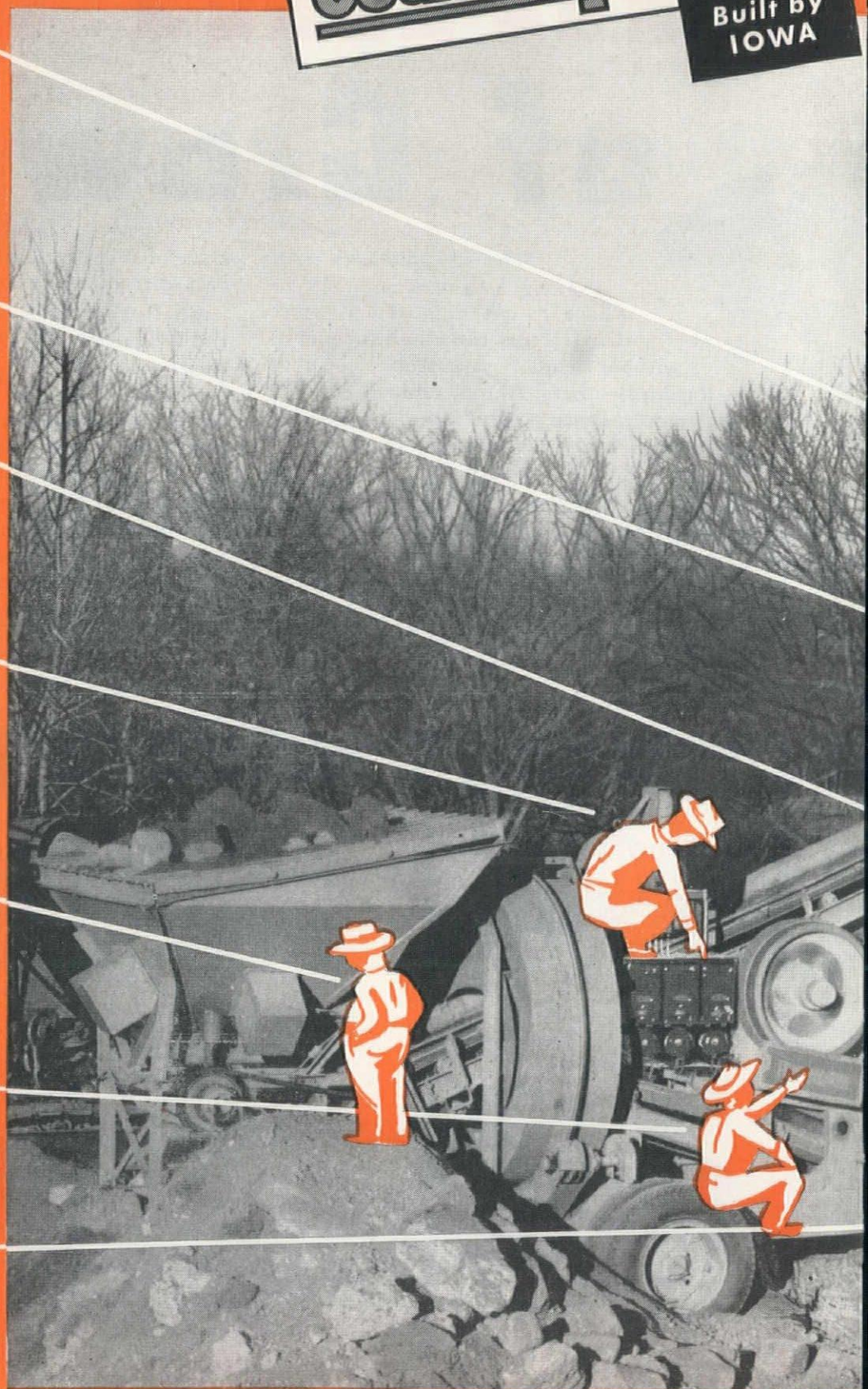
As extra equipment, six Syntron Vibrators are available for use on the hopper and under the screen bin to make stubborn materials flow freely, eliminate arching and plugging of wet material and to eliminate air pockets and voids, making it possible to produce aggregate in pits previously considered unworkable.

JAW CRUSHER

The Super Tandem uses either the 1024 or 1036 Jaw Crusher, the same as the Junior Tandem. All Cedarapids Jaw Crushers are engineered to give exceptionally high crushing capacity and the most economical operating cost per ton of finished product.

ROLL CRUSHER

For secondary crushing, the Super Tandem uses the same 2416 Cedarapids Roll Crusher used on the Junior Tandem. Manganese steel roll shells, large, heavy flywheels and other quality construction features assure maximum long life and thrifty operation.



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

HALL-PERRY MACHINERY CO., Butte, Great Falls, Missoula and Billings, Mont.; INTERMOUNTAIN EQUIPMENT CO., Boise and Pocatello, Idaho, and Spokane, Wash.; WORTHAM MACHINERY CO., Cheyenne, Wyo.; KIMBALL EQUIPMENT CO., Salt Lake City, Utah; H. W. MOORE EQUIPMENT COMPANY, Denver, Colo.; A. H. COX AND COMPANY, 1757 First Avenue South, Seattle, Wash.; CONTRACTORS EQUIPMENT CORP., Portland, Oregon; CASSON-HALE CORP., Hayward, Calif; ARIZONA CEDAR RAPIDS CO., Phoenix, Ariz.; R. L. HARRISON CO., INC., Albuquerque, N. M.; SIERRA MACHINERY CO., Reno, Nevada; BROWN-BEVIS EQUIPMENT CO., Los Angeles, Calif.

SUPER TANDEM

for BIG VOLUME, LOW COST aggregate production

HERE'S the newest star in the Cedarapids line of quality engineered crushing and screening plants. The Super Tandem retains all the high crushing capacity of the Junior Tandem Plant, with an additional 45% increase in screening area to fill the need for a plant that can process material containing high percentages of fines or contaminated material. The Super Tandem produces two sizes of finished product, with capacities conservatively rated from 70 to 120 tons per hour of average material under normal operating conditions. Capacities are based on average gravel crushing to 1″ and minus with 33 1/3 oversize to be crushed.

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

Check YOUR output against

HAUL one way	TRIPS per hour (per unit)	PAY YARDS per hour (per unit)	Name of Owner	Job Description	Type of Material	Job Conditions
50'-300'	31	310	Moss Construction Co. *Paris, Ill.*	2 C Tournapulls leveling 160,000 yds. for Logan County Airport at Lincoln, Ill.	Common earth and clay.	No established haul roads due to scattered grading. Occasional heavy rains.
150'	Not measured	125 self-loaded	Griggs County Soil Conservation District, *Cooperstown, N. D.*	1 D Roadster digs 250 yd. drainage ditch near Aneta, N. D.	Sandy loam.	Normal.
175'	35	90 self-loaded	Griggs County Soil Conservation District, *Cooperstown, N. D.*	1 D Roadster digs drainage ditch on farm near Cooperstown, N. D.	Black loam.	Typical drainage ditching.
200'	42	450	Elmer Anderson, Contractor *Lyle, Minn.*	2 C Tournapulls on 169,000 yd. Stevens County road job south of Alberta, Minn.	Loam and clay.	Average.
200'	30	150 self-loaded	Roy Jones, Contractor *Ipswich, S. D.*	1 D Roadster building series of 1500 yd. soil conservation dams in Edmunds County. Schedule includes one dam per day.	Sandy clay and gravel.	Material sun-baked, extremely dry.
200'	25	137.5 self-loaded	Roy Kohl, Contractor *Springfield, Ohio*	1 D Roadster grading 45,000 yds. for industrial plant site at Yellow Springs, Ohio.	Mostly loam, clay; with occasional gravel.	Good weather, level grades.
325'	15	176.5	Escritorio Tecnico C. F. Bereta e Novi, *Sao Paulo, Brazil*	3 C Tournapulls grade 1,045,000 yds. for new Sao Paulo government housing project in Cazingui, Brazil.	Heavy, wet clay.	Continuous tropical rains soak material, cut working time to 3 days a week.
300'-400'	22.9	125 self-loaded	C. H. Wilhelm, Contractor *Faulkton, S. D.*	1 D Roadster on soil conservation dam near Faulkton, S. D.	Dry, sandy clay.	Hard material. 15-19% grades on return haul.
300'-500'	20	120 self-loaded	William Cinader, Contractor *Clawson, Mich.*	1 D Roadster levels 25,000 yd. subgrade for 550-home Royal Oak subdivision near Detroit, Mich.	Topsoil and clay.	Tight quarters . . . hauling and spreading among houses and foundations.
425'	20	80 self-loaded	Demonstration for Cleburne County Highway Dept., *Heflin, Ala.*	1 D Roadster on county road improvement near Heflin, Ala.	Hard, rocky clay.	Tough material required rooting, loaded with high voids.
500'	24	Not measured	Orleans Construction Co. *Philadelphia, Pa.*	2 D Roadsters on 450,000 yd. leveling for Lynnewood Gardens Housing project, Philadelphia, Pa.	Sand, topsoil.	Up 20% approach grade to top of stockpile.
500'	17	170	John F. Walser, Contractor *Pontiac, Mich.*	2 C Tournapulls build settling area for sewage disposal system at Camp Grayling, Mich.	White Michigan sand.	Very loose, very abrasive material.
500'	14.25	150	Anderson Bros. *Rockford, Ill.*	1 C Tournapull on 100,000 yd. levee to protect canning plant site at Mendota, Ill.	Sticky clay and topsoil.	Haul road often 12" deep in water.
550'	16	176	Vernie Jarl, Contractor *Gresham, Ore.*	3 C Tournapulls on 5¼ mile, 410,000 yd. relocation of Rt. 101 near Tillamook, Ore.	Sand, gravel, hardpan, clay, and loamy topsoil.	Material saturated by continual heavy rainfall.
600'	20	200	R. V. McElroy Construction Co. *Decatur, Ill.*	1 C Tournapull on 663,000 yd. bridge approaches and relocation of U. S. 40 near Greenup, Ill.	Hard-packed clay.	Return 200' up 21% grade to cut.
600'	20	200	Isbell Construction Co. *Reno, Nev.*	2 C Tournapulls on 17.6 mi., 316,000 yd. road construction near Elko, Nev.	Mixed sandstone, clay, loam.	15% return grade. 6500' altitudes.
600'	13	117	Central Waterways Irrigation & Navigation Com. *New Delhi, India*	2 C Tournapulls on 25,000,000 yd. Hirakud Dam across Mahanadi River in India.	Hard, rocky clay.	100' of 20% grade. Very rough haul road.
600'	11	135	Haley, Chisholm and Morris Construction Co. *Charlottesville, Va.*	1 C Tournapull on 1,200,000 yd. expansion of railroad yard at Russell, Ky.	Loose, dead sand.	Tough-loading material. Unstable haul road.
650'	23.5	235	Moss Construction Co. *Paris, Ill.*	2 C Tournapulls leveling 160,000 yds. for Logan County Airport, Lincoln, Ill.	Common earth and clay.	No established haul rbads. Very heavy rains.
660'	17.6	Not measured self-loaded	Sugden & Sivier, Inc. *Hazel Park, Mich.*	4 D Roadsters move 450,000 yds. for new race track near Detroit, Mich.	Topsoil.	Precision spreading.
700'	15	75 self-loaded	Sorenson Bros. *Murray, Utah*	1 D Roadster land-levels 15,000 yds. at Jeremy Ranch, Salt Lake City, Utah.	All clay.	Rough haul roads.
700'	13	117	Schultz and Lindsay *Fargo, N. D.*	2 C Tournapulls on 380,000 yd. Riverdale, N. D., housing project for Garrison Dam workers.	Sandy clay and loam.	Normal.
700'	15	150	B. G. Young & Sons *Johnson City, Tenn.*	2 C Tournapulls grade 130,000 yds. for airport at Greeneville.	Common earth.	Haul up 6% grade.
650'-750'	10	100	Peterman Bros. *Yazoo, Miss.*	2 C Tournapulls strip 65,000 yds. of overburden from gravel pit at Crenshaw, Miss.	Sticky, wet clay, loam.	"Shut-down" weather conditions. 250' haul up 12% grade, 310' over hub — deep, soft fill.
800'	18	180	Isbell Construction Co. *Reno, Nev.*	2 C Tournapulls on 17.65 mi., 316,000 yd. road construction north of Elko, Nev.	Sand, loam.	7% adverse grade on return. 6500' altitude.
800'	14	84	Nappe Construction Co., Inc. *Burbank, Calif.*	2 D Roadsters grade 90,000 yds. for new housing project at Van Nuys, Calif.	Sandy loam.	Average.
850'	7	Not measured	Henry Thygesen, Contractor *Albuquerque, N. M.*	1 C Tournapull on highway construction near Belen, N. M.	Loose, powdery blow-sand.	Cuts sprinkled to speed loading. Loose footing all the way.
800'-1000'	7	77	Vernie Jarl, Contractor *Gresham, Ore.*	3 C Tournapulls on 5¼ mile, 410,000 yd. relocation of Rt. 101 south of Tillamook, Ore.	Sand, gravel, hardpan, clay and topsoil.	Material saturated by heaviest rainfall in U. S.
950'	16.5	90 self-loaded	Roy Kohl, Contractor *Springfield, Ohio*	1 D Roadster grading 45,000 yds. for new industrial plant in Yellow Springs, Ohio.	Loam, clay; gravel in spots.	Haul grades up to 10%.
1000'	11.5	115	Green Construction Co. *Oaktown, Ind.*	2 new C Tournapulls, 5 Super C Tournapulls finish 500,000 yd. airport at Owensboro, Ky., 165 days ahead of schedule.	Heavy, water-logged clay.	October rains made job unworkable for all units except new Tournapulls.
1000'	16	144	"Dirtmovers" *Minneapolis, Minn.*	2 C Tournapulls grade 45,000 yd. addition to Wold Chamberlain Airport, Minneapolis.	High-void sod, topsoil.	Normal . . . material dry.
1100'	8	104	Cia. Azucarera Vertientes, *Cespedes, Cuba*	4 C Tournapulls on 170,000 yd. earthfill dam in Central Estrella, Cuba.	Hardpan, clay, and sand.	Haul up 3 to 25% grades.

LETOURNEAU PEORIA, ILLINOIS

JOB-PROVED Over 6750 Built and Shipped

TOURNAPULLS

PROVED BY 13 YEARS OF RUBBER-TIRED TOURNAPULL PERFORMANCE

these TOURNAPULL JOBS

HAUL one way	TRIPS per hour (per unit)	PAY YARDS per hour (per unit)	Name of Owner	Job Description	Type of Material	Job Conditions
1100'	13.3	70 self-loaded	Lawrence County Highway Dept. *Moulton, Ala.*	1 D Roadster on 11 miles of new farm-to-market road near Moulton, Ala.	Typical Alabama red clay.	Average conditions.
1100'	17	104	Lawrence County Highway Dept. *Moulton, Ala.*	1 D Roadster pusher-loaded on same Moulton road job.	Alabama red clay.	Average conditions.
1200'	15	150	Curahee Construction Co. *Toccoa, Ga.*	3 C Tournapulls build 376,000 yd. fill across shallow lake for Central Florida through highway near Haines City.	Loose, hard-loading sand.	Haul 600' over sand, 600' over new road bed.
1200'	10	50 self-loaded	Rhoten & Frysinger Construction Co. *Columbus, Ohio*	1 D Roadster used as finishing tool on 10-mile, 178,000 yd. subgrade for U. S. 30 in Crawford and Wyandot Counties, Ohio.	Topsoil, clay and silt.	Load around poles, culverts. Share haul road with rock trucks, other traffic.
1250'	14	84	Hutchinson & Wyatt *Sandyville, W. Va.*	2 D Roadsters extend taxiways at Kanawha County Airport, Charleston, W. Va.	Rock-hard, sun-baked clay.	Extremely dry, tough material.
1250'	12	125	Haley, Chisholm & Morris Construction Co. *Charlottesville, Va.*	1 C Tournapull on 1,200,000 yd. railroad yard expansion at Russell, Ky.	Loose, abrasive sand.	Rough, pitted haul.
1250'	9	103.5	Anderson & Davenport *Springfield, Ill.*	2 C Tournapulls on 155,000 yd. grading for Murdale Airport near Carbondale.	Sandy loam.	Ideal weather, material; but rough haul roads.
1400'	10	105	Haley, Chisholm & Morris Construction Co. *Charlottesville, Va.*	1 C Tournapull on 1,200,000 yd. expansion of railyard at Russell, Ky.	Sand.	Pitted, uneven haul road.
1500'	20	200	Peterman Bros. *Yazoo, Miss.*	2 C Tournapulls strip 65,000 yds. of overburden from gravel pit at Crenshaw, Miss.	Common earth, clay.	Up 12% grade for 250' . . . otherwise excellent haul roads permitting travel in 4th gear.
1600'	9.5	114	A. F. Schams, Contractor *LaCrosse, Wis.*	1 C Tournapull on 120,000 yd. overpass fill for U. S. 12 and 18 near Mauston, Wis.	Swamp sand.	Material loaded under water, hauled up 4 to 8% grades. Poor footing.
1600'	17.5	105	Sugden & Sivier, Inc. *Hazel Park, Mich.*	4 D Roadsters grade, build 450,000 yd. race track near Detroit, Mich.	Fill 9" sand, 8" clay, 3½" topsoil and clay.	Precision spreading, banking on track. Travel through traffic on paved roads.
1700'	10	50 self-loaded	Sam Glasgow, Contractor *Glenside, Pa.*	1 D Roadster, leveling industrial plant site in Philadelphia, Pa.	Sandy clay.	Average conditions.
2000'	9	108	Nello L. Teer Co. *Durham, N. C.*	4 C Tournapulls build 450,000 yd., 1100' embankment across tidal inlet swamp on U. S. 50 between Washington and Annapolis, Md.	Ocean silt and sand.	Steep cuts. Material dumped to displace soft swamp muck.
2350'	8	36 self-loaded	Demonstration for Cleburne County Highway Dept., *Heflin, Ala.*	1 D Roadster on cut and fill work for secondary road near Tuscumbia, Ala.	Common earth.	Normal.
2400'	8.2	78	Moen Bros., Inc. *Moorhead, Minn.*	2 C Tournapulls rebuilding 370,000 yd., 13.3 miles of Hwy. 81 north of Shelly, Minn.	Tough, sticky gumbo.	Haul over rough, soggy roads.
2625'	14.3	163.5	Rogelio Viesca, Contractor *Mexico City, Mexico*	2 C Tournapulls widen embankment for spur rail line to Pemex Refinery, Atzcapotzalco, Mexico.	Compacted topsoil.	Hard, dry material.
2640'	10	60	W. B. Bennett Paving, Ltd. *Oshawa, Ontario*	2 D Roadsters handle 9,000 yd. subgrade for city street in Oshawa, Ont.	Sandy clay mixed with small stones and old road-surfacing material.	Load around man holes, gas lines in street. Haul ½ mi. through traffic and across busy intersections.
3000'	7	70	R. V. McElroy Construction Co. *Decatur, Ill.*	1 C Tournapull on 663,000 yd. relocation of U. S. Hwy. 40 near Greenup, Ill.	Hard-packed clay.	Return 400' up 17 to 21% grades. Spongy fill.
3200'	7	42	Chippewa County Highway Dept. *Chippewa Falls, Wis.*	3 D Roadsters on 100,000 yd. relocation of Highway M in Chippewa County, Wis.	Glacial sand.	Abrasive materials. Level haul.
3100'-3350'	6.4	32 self-loaded	Griggs County Soil Conservation District *Cooperstown, N. D.*	1 D Roadster repairs township road in Griggs County, N. D.	Hard, dry clay.	Hilly.
3750'	10	100	Wylie Brothers *Albuquerque, N. M.*	2 C Tournapulls handle 89% of 163,000 yd. highway job east of Hobbs, N. M.	Sandy clay.	Haul 500' across field, make sharp turn on to highway, travel 3250' in traffic.
3500'-4000'	7.5	82.5	Nello L. Teer Co. *Durham, N. C.*	4 C Tournapulls build 450,000 yd. 1100' embankment across tidal swamp for relocation of U. S. 50 between Washington and Annapolis, Md.	Ocean silt and sand.	Steep cuts. Material spread on soft swamp fill to displace muck.
4000'	8	80	R. V. McElroy Construction Co. *Decatur, Ill.*	1 C Tournapull on 663,000 yd. relocation of U. S. Hwy. 40 near Greenup, Ill.	Clay.	Return 400' up 17 to 21% grades. Spongy fill.
4000'	5	35	Noel Brothers *Greeneville, Tenn.*	1 D Roadster filling in between foundation walls and columns of tobacco warehouse at Greeneville, Tenn.	Extremely hard, dry clay.	Load, dump in narrow lanes between warehouse walls, columns.
4400'	5	22.5 self-loaded	Dane County Highway Dept. *Madison, Wis.*	3 D Roadsters improve city streets in Verona, Wis.	Sand, gravel.	Haul through traffic. Spread in soft mud holes.
4500'	5.5	60.5	G. F. Tatt, Contractor *Northville, Mich.*	2 C Tournapulls handle final grading on 1,000,000 yd. expansion of Wayne Major Airport near Detroit, Mich.	Sand, clay, and topsoil.	Thin cuts, shallow fills, good weather.
5940'	5	Not measured	John F. Walser, Contractor *Pontiac, Mich.*	2 C Tournapulls grade, gravel 3 mi. of access roads in Camp Grayling, Mich.	Gravel, sandy loam.	Loose, abrasive material.
7920'	4	48	A. L. Dyer & Sons *McBrides, Mich.*	3 C Tournapulls on 5 mi., 210,000 yd. Hwy. 57 job west of Carson City, Mich.	Topsoil, clay and fine dune sand.	Part of haul over existing highway through heavy traffic.

Note { C TOURNAPULL — 13.5 yds., speeds to 35 m.p.h.
D ROADSTER — 7 yds., speeds to 28 m.p.h.

Short hauls or long—

all types of scraper materials, under all job conditions, big jobs, little jobs, anywhere dirt is moved . . . Tournapull speed, versatility, and low cost of operation add up to lowest net-cost-per-yard. Check YOUR job records against those listed above . . . then see your LeTourneau Distributor for complete information on what these electric control, rubber-tired Tournapulls can do for YOU.

"DEPENDABLE... on Burning Sand or Mountain Pass!"

HIS OUTFIT IS JUST FINISHING A DESERT PROJECT WHERE THE TEMPERATURE REACHED 110°. NEXT WEEK HE MOVES TO A ROCKY MOUNTAIN PASS • HIGHEST ELEVATION, 10,057 FEET. THAT'S WHY HE USES GARDNER-DENVER PORTABLES. THEY KEEP WORKING ANYWHERE.

Gardner-Denver Portable Compressors are available in sizes from 105 to 500 cu. ft. actual capacity.

Ask the men who go after the big jobs—the tough jobs! They'll tell you that two-stage Gardner-Denver Portable Compressors assure full capacity air at *any* altitude—under *all* weather and temperature conditions. Completely water-jacketed cylinders eliminate cold, unlubricated starts—require no "cooling off" periods even in torrid desert heat. For better compressor performance that gets the job done faster, choose Gardner-Denver water-cooled Portables!

USE COMPRESSED AIR FOR SAFETY CONVENIENCE FLEXIBILITY

GARDNER-DENVER SINCE 1859

Gardner-Denver Company, Quincy, Illinois

Western Branch Offices: Butte, Montana; Denver, Colorado; Los Angeles, California; Salt Lake City, Utah; San Franicsco, California; Seattle, Washington; Wallace, Idaho; El Paso, Texas.

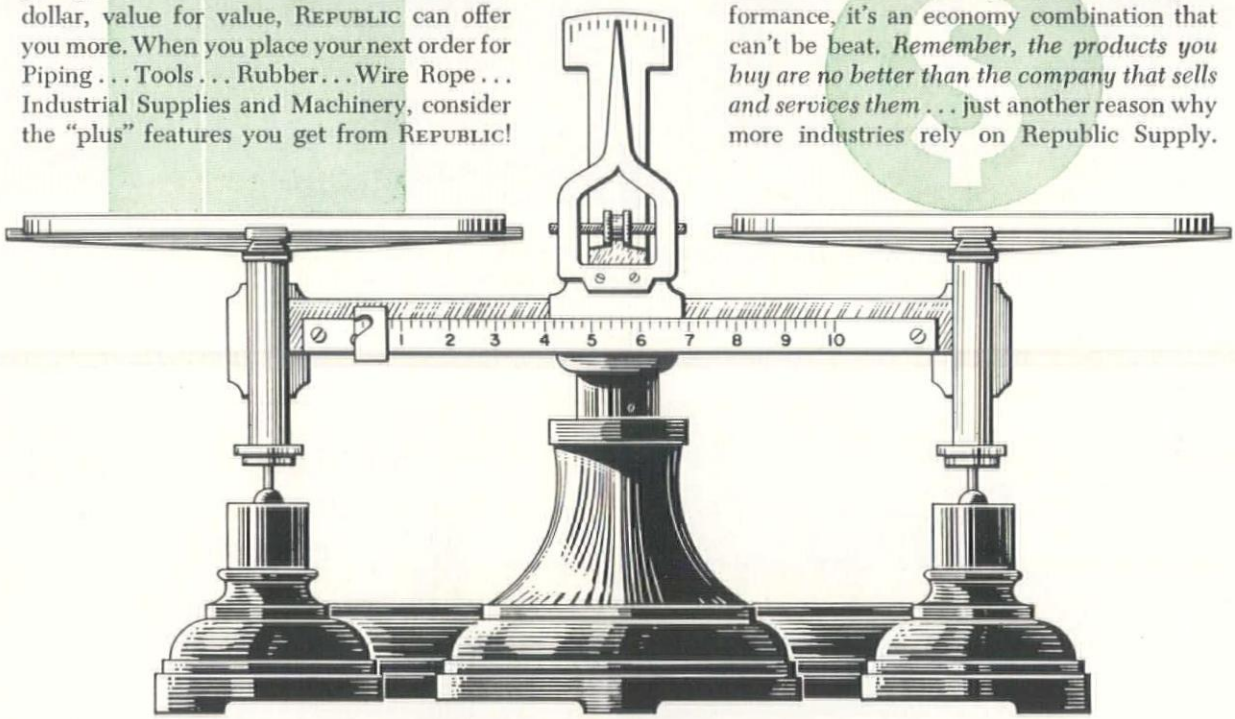
In Perfect Balance

QUALITY

The Republic Supply Company of California represents over 300 leading manufacturers, with more than 25,000 products. These manufacturers build quality products that are made to last longer, perform better, and give greater customer satisfaction. Dollar for dollar, value for value, REPUBLIC can offer you more. When you place your next order for Piping . . . Tools . . . Rubber . . . Wire Rope . . . Industrial Supplies and Machinery, consider the "plus" features you get from REPUBLIC!

PRICE

Quality products cut unit sales costs because they produce quantity sales! That's how REPUBLIC meets competitive bids, and at the same time can offer top-quality products that cost you less in the long run. When you add REPUBLIC service to quality product performance, it's an economy combination that can't be beat. *Remember, the products you buy are no better than the company that sells and services them* . . . just another reason why more industries rely on Republic Supply.



CALL REPUBLIC

THE REPUBLIC SUPPLY COMPANY OF CALIFORNIA

AN INDEPENDENTLY OWNED AND OPERATED COMPANY SERVING WESTERN INDUSTRY

Piping • Tools • Rubber • Wire Rope • Industrial Supplies • Machinery

LOS ANGELES · OAKLAND · SANTA FE SPRINGS · BAKERSFIELD · WILMINGTON · HUNTINGTON BEACH
LONG BEACH · STOCKTON · SAN JOSE · VENTURA · GARDENA · AVENAL
FRESNO · SANTA MARIA · CUYAMA · NEWHALL · TAFT

STANDARD ENGINEER'S REPORT

DATA

PRODUCT Standard Diesel Fuel

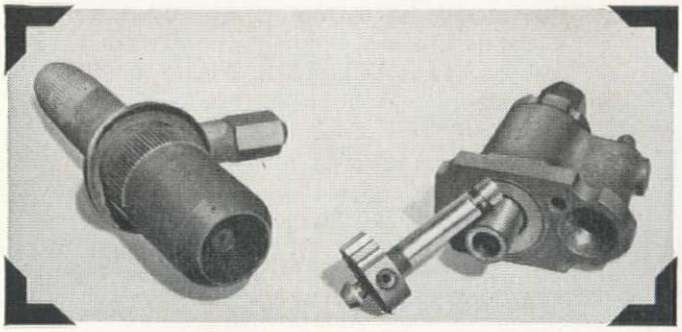
UNITS High-speed diesel engines

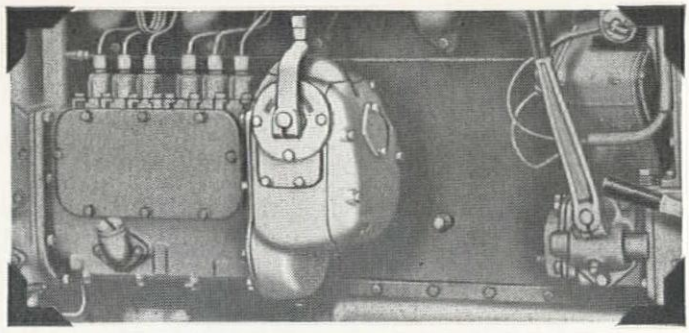
CONDITIONS Heavy duty service—overloads, heavy dust

PERIOD 10 years

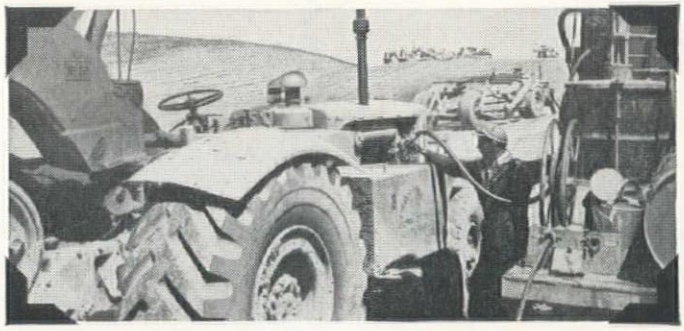
FIRM Parish Bros., Benicia, Calif.

Specially handled diesel fuel helps increase injector life





BURNING STANDARD DIESEL FUEL in their engines and using special precautions to keep it clean has lengthened considerably the service periods of injector pumps and valves for Parish Brothers, highway builders, Benicia, California. The unit above from one of their DW-10 Caterpillars gave the unusual service of 16,000 hours! STANDARD Diesel Fuel helped get this extra service and cut fuel parts expense because it is completely refined, then carefully handled to insure cleanliness from refinery to consumer.



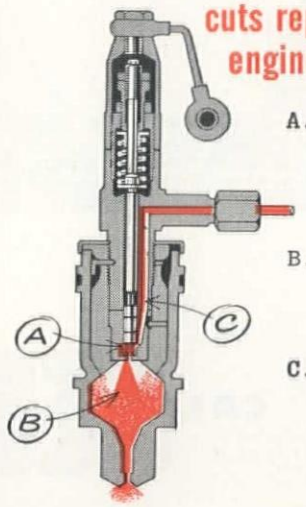
FUELING A HIGH-SPEED TRACTOR with a "wet hose" to avoid getting dirt in the fuel tank. Parish Brothers use STANDARD Diesel Fuel in engines powering many other types of diesel equipment, including stationary units on air compressors, pumps, shovels, etc.

FREE FOLDER tells how to keep fuel clean... gives more information about STANDARD Diesel Fuel, and STANDARD Automotive Diesel Fuel for certain high-speed engines that require a premium-quality high-cetane fuel. Write or ask for it today.

STANDARD DIESEL FUEL

TRADEMARK REG. U.S. PAT. OFF

How STANDARD Diesel Fuel cuts repairs and ups engine efficiency



A. Complete distillation and 100% cleanliness prevent wear of fuel parts and plugging of passages.

B. Atomizes easily and completely—delivers full power throughout distillation range.

C. Has sufficient body to lubricate moving fuel parts, but flows freely even in extremely cold weather.

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

Q HOW MANY DAYS IN A WEEK?

A "TWENTY-ONE,"

says
Geo. W. Longfellow

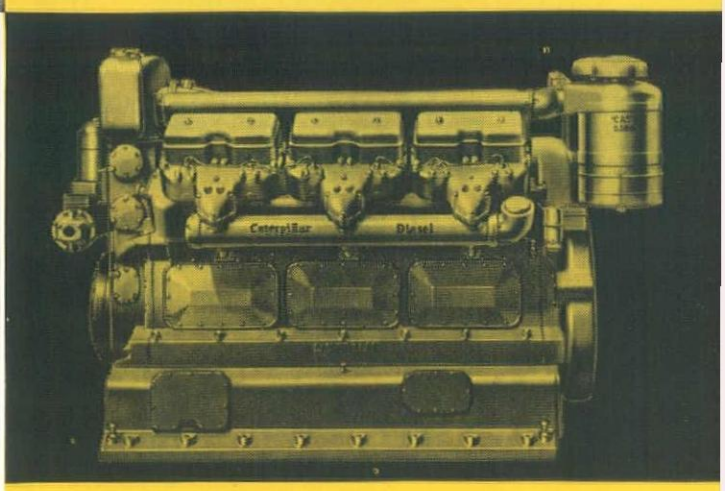
Mr. Longfellow is right—when you look upon twenty-four-hour going as the equivalent of three normal working days. That is the equipment-torturing schedule followed on the channel relocation project at East Alton, Ill.

Speaking with pride of the recently installed "Cat" D386 Engine that drives his big Bucyrus-Monighan walking dragline, Mr. Longfellow said: "She's working a '21-day' week, has plenty of power—and can really take it."

Running continuously for long stretches at varying capacities is one of the performance feats so typical of "Caterpillar" Engines. Delivering their full horsepower output whenever called upon is another. Compactness, easy installation, economical fuel consumption, minimum maintenance costs, and almost incredibly long life are still other advantages for high production and maximum profits. They are swaying contractors everywhere toward specifying "Cat" Engines with the new equipment they buy and to replace "ailing" or inadequate units in old equipment.

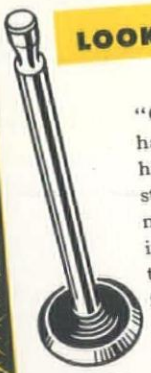
A "Cat" Diesel may be just the thing for giving *your* crane, shovel, dragline or dredge a new lease on life—or the extra power it needs to make it more productive. Let your "Caterpillar" dealer make a survey and a cost estimate. He's as near as your telephone.

CATERPILLAR, SAN LEANDRO, CALIF.; PEORIA, ILL.
REG. U.S. PAT. OFF.



The powerful "Cat" D386 installed in the Longfellow dragline develops 400 hp. max.; 360 hp. rated; 320 hp. continuous, at 1200 rpm. and with full equipment except radiator fan.

LOOK UNDER THE HIDE



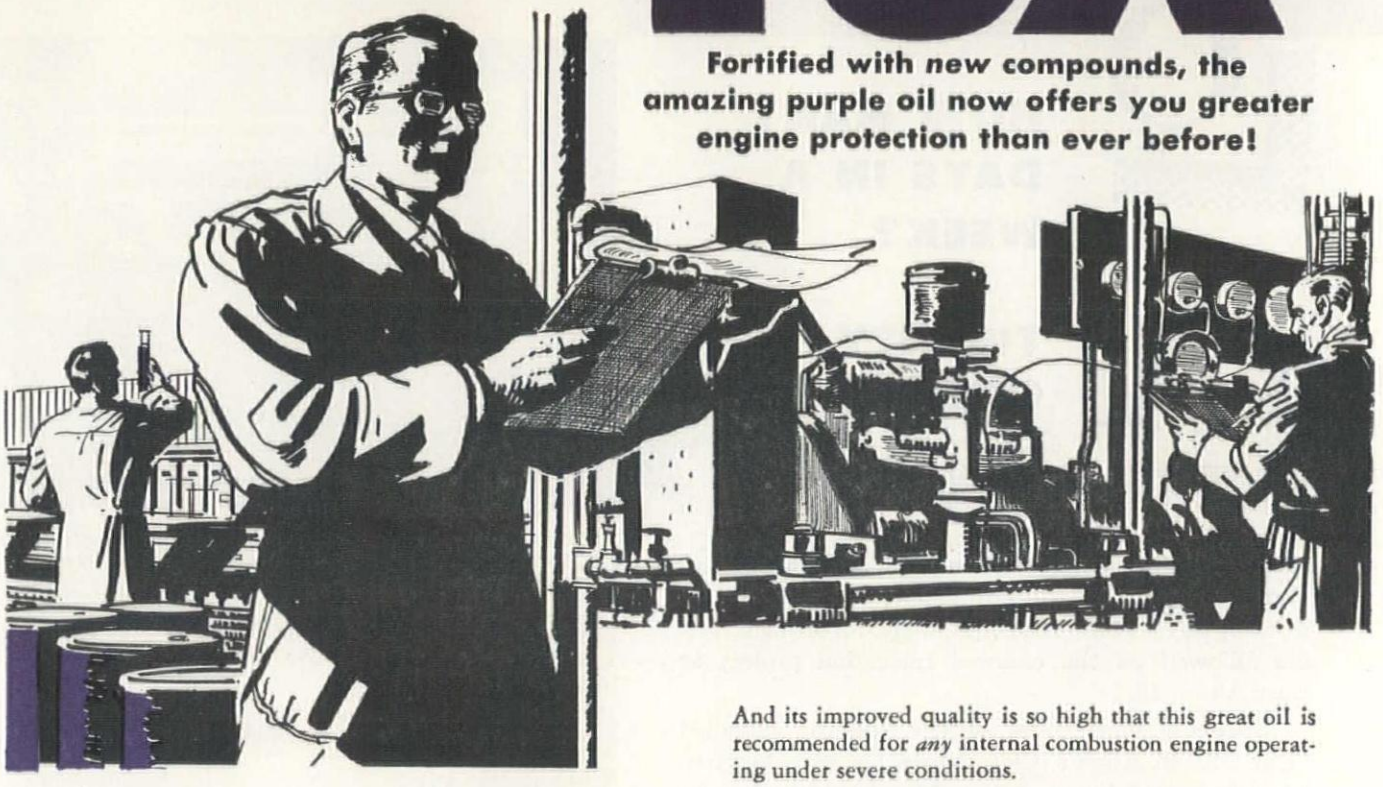
"Caterpillar" intake and exhaust valves are made of highly alloyed, heat-resistant steels. Their ample size, close machining and heat-treat specifications have resulted in thousands of hours of trouble-free valve operation. Valve and rocker arm designs are matched to reduce wear. *Look under the hide for "Caterpillar" quality and long-life features—they may not show on the outside but they show up in performance.*

CATERPILLAR
REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACTORS
MOTOR GRADERS • EARTHMOVING EQUIPMENT

Have you heard about the *NEW* T5X?

Fortified with *new* compounds, the amazing purple oil now offers you greater engine protection than ever before!



Surpasses "Supplement 1" specifications

The amazing *purple* oil is now better than ever! With even greater alkaline reserve, oxidation resistance, detergency and other upgraded qualities, the *new* T5X surpasses the exacting standards of U. S. Army Specification 2-104B, *Supplement 1.*

Its superiority has been clearly established in both the Coordinating Research Council gasoline engine tests and the rugged "Caterpillar" Diesel tests.

Protects any internal combustion engine

Powerful *new* additives have been compounded with a high VI, pure 100% paraffin base to form the *new* T5X. And its improved quality is so high that this great oil is recommended for *any* internal combustion engine operating under severe conditions.

Proved under critical field conditions

Field tests made by outside companies under critical operating conditions have *also* proved the amazing stability and performance of the *new* T5X in all types of equipment —including trucks, tractors, construction equipment, marine engines and varied types of stationary engines.

Substantially reduces engine wear

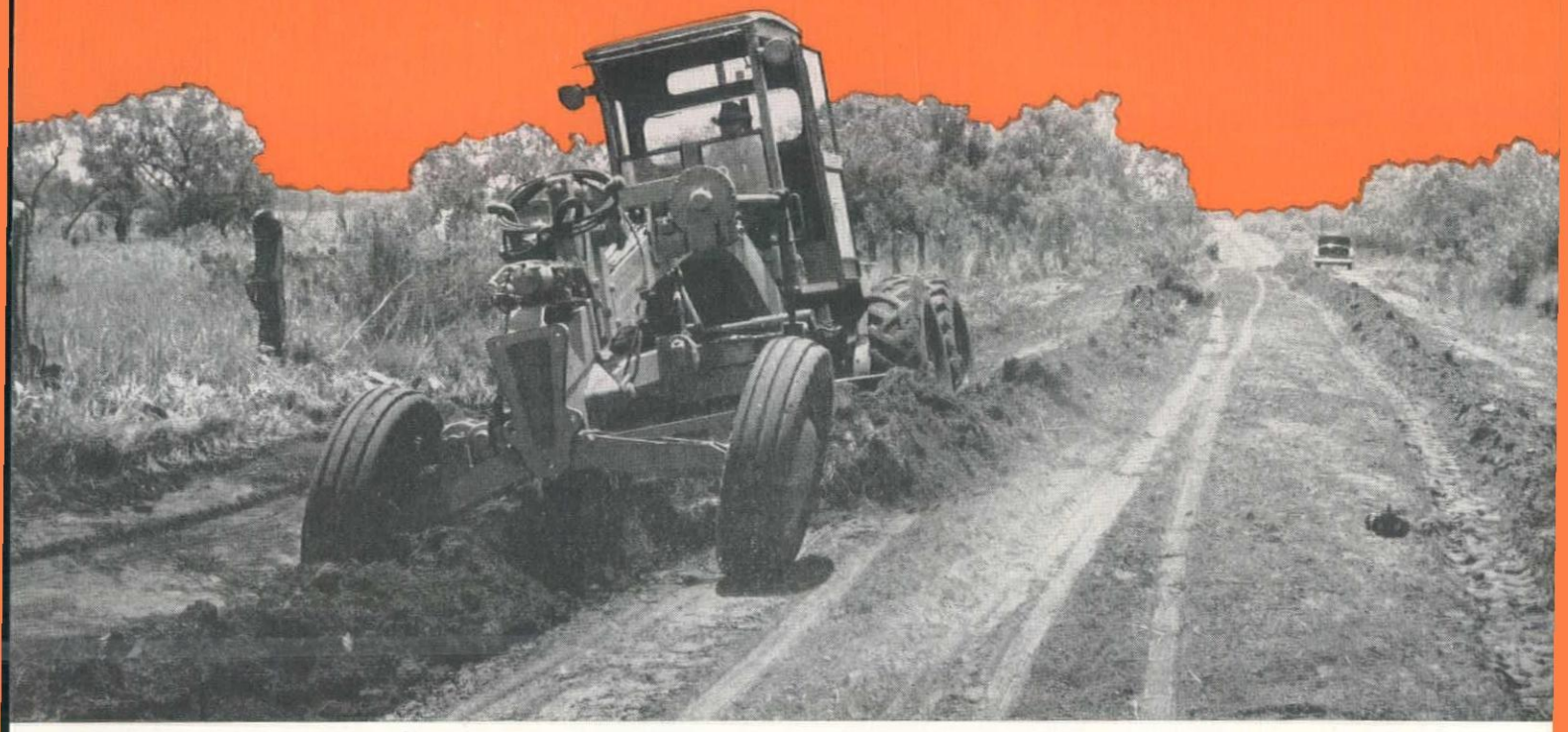
What the new, unusually high quality of T5X means to *you* is the opportunity for increased engine efficiency, less wear and lower maintenance and repair costs. And you can prove this for yourself by giving the *new* T5X a trial in your *own* equipment operating under severe conditions.

For full information about the new T5X, call your Union Oil Representative. Or write, wire or call Sales Dept., Union Oil Company, Los Angeles 17, Calif.

76 UNION OIL COMPANY OF CALIFORNIA

Adams No. 610

King of all Heavy-Duty Motor Graders



"The real heavy-duty champ of motor graders"—"Does 30% more work" . . . That's what owners say about the Adams No. 610 after two years of toughest service.

A big, rugged machine (weighing up to 27,000 lbs.), the No. 610 is engineered to utilize the full torque of its 100-hp. diesel engine—*in all gears.* It's a machine that carries the punch and rugged staying power to tackle and whip biggest, roughest grading jobs.

What's more, the No. 610 offers a combination of operating advantages not to be found in any other motor grader, regardless of size:

Push-Button Starting from Cab—standard.

Power Steering of Mechanical-Hydraulic Type—standard. All advantages of mechanical steering, with power doing the work.

Large, Wide-Tread Tires—for maximum traction and flotation.

8 Overlapping Forward Speeds, 2 Reverse. High transport speed of 25 mph.

Extra Wide Blade (28 in.)—to utilize the great capacity of the No. 610.

Let your local Adams dealer give you complete information on the No. 610—the greatest of all heavy-duty motor graders.

J. D. ADAMS MANUFACTURING COMPANY • INDIANAPOLIS, INDIANA

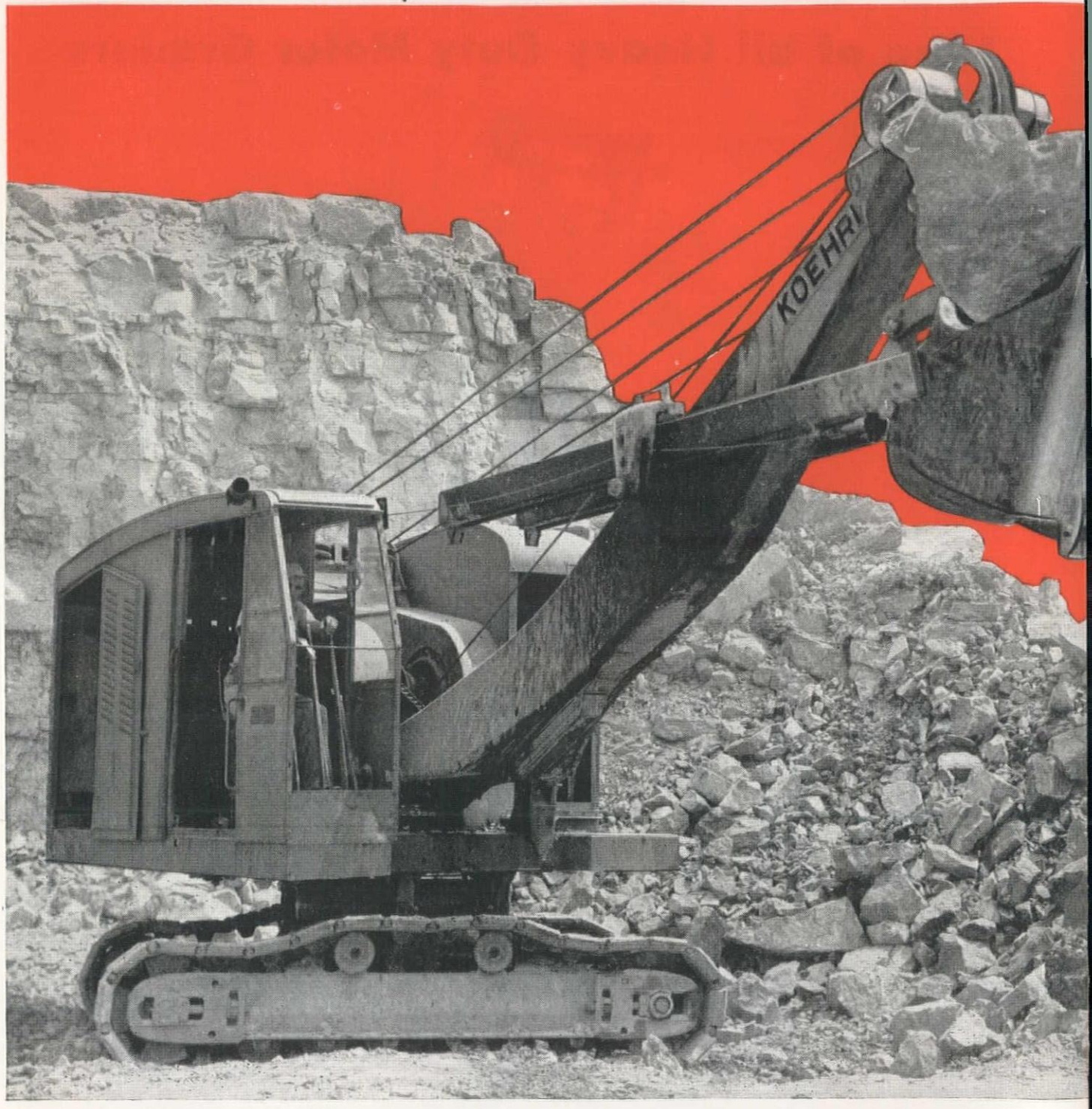
See Your Local ADAMS Dealer

CALIFORNIA DISTRIBUTORS

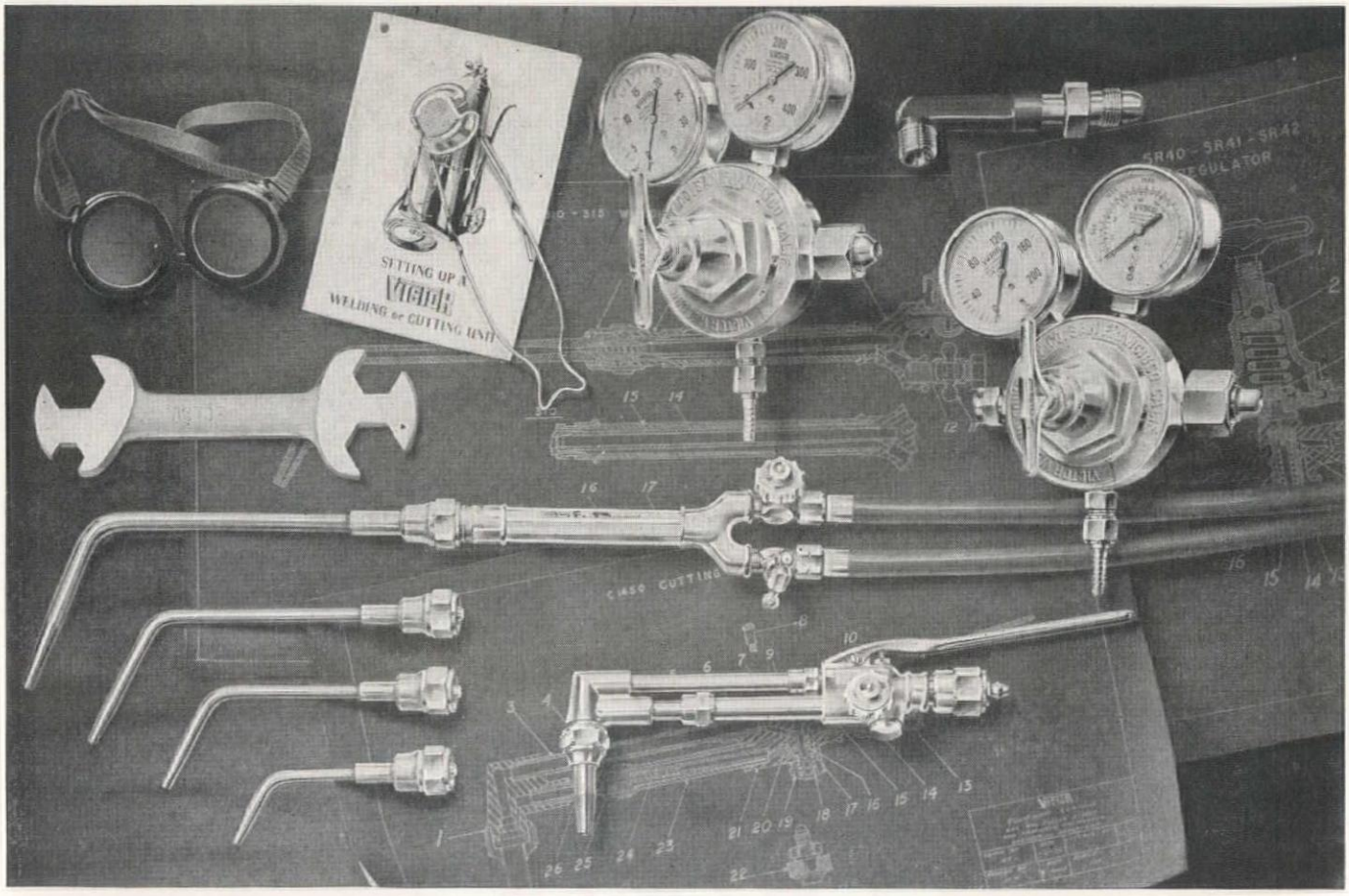
Bakersfield—Kern County Eqpt. Co., Inc.
Eureka—Tony Gosselin
Fresno—Allied Equipment Company
Los Angeles—Crook Company
Merced—Scarborough-Hunt, Inc.
Modesto—Stanislaus Imp. & Hdwe. Co.
Oakland—Bay Cities Equipment, Inc.
Redding—Sullivan & Crowe Eqpt. Co.
Riverside—Braman-Dickerson Co.
Sacramento—Sacramento Valley Trac. Co.
Salinas—Farmers Mercantile Company
San Diego—Southern Eqpt. & Supply Co.
San Jose—Valley Equipment Co.
Santa Maria—Hanson Eqpt. Co.
Santa Rosa—Stevenson Eqpt. Co.
Stockton—Inland Equipment Corp.
Stratford—Orton's Eqpt. Co.
Visalia—Exeter Mercantile Co.
Woodland—Ray D. Henderson, Inc.

DISTRIBUTORS ALSO IN Seattle and Spokane, Washington . . . Portland, Eugene, Roseburg, Albany, Klamath Falls and Central Point, Oregon . . . Denver, Colorado . . . Phoenix, Arizona . . . Billings, Great Falls, Missoula and Kalispell, Montana . . . Boise and Pocatello, Idaho . . . Reno and Las Vegas, Nevada . . . Salt Lake City, Utah . . . Albuquerque, New Mexico . . . Fairbanks, Alaska.

When you compare



Pacific Hoist & Derrick Co., Seattle, Washington
Western Machinery Co., Spokane, Washington
Columbia Equipment Co.
Boise, Idaho; Portland, Oregon
Harron, Rickard & McCone Co. of Southern
California, Los Angeles, California
McKelvy Machinery Co., Denver, Colorado
Kimball Equipment Co., Salt Lake City, Utah
Neil B. McGinnis Co., Phoenix, Arizona
The Harry Cornelius Co., Albuquerque, New Mexico
San Joaquin Tractor Co., Bakersfield, California
Engineering Sales Service, Inc., Boise, Idaho
Koehring Company, West Coast Division,
Stockton, California



YOU HAVE UNLIMITED OPPORTUNITY FOR EXPANSION with VICTOR BASIC WELDING & CUTTING UNITS

The flexibility and wide range of Unit WC-26, shown here, enable you to do all usual welding and cutting operations, either in production or maintenance work. For special jobs such as hard-facing, multi-flame heating, deseaming, brazing, descaling, you simply add suitable tip, nozzle or attachment.

Keep your investment in apparatus low by starting with VICTOR's basic units . . . expand them as your need arises.

VICTOR apparatus is designed for faultless, economical operation. See your VICTOR distributor for free demonstration TODAY.

VICTOR

Welding and Cutting Equipment Since 1910

Hard-facing alloys. Regulators for all gases. Machine and hand torches for welding, preheating, cutting, flame hardening and descaling. Portable flame cutting machines. Blasting nozzles. Cylinder manifolds. Cylinder trucks. Emergency pack-type flame cutting outfits. Fluxes. Write today for free descriptive literature.

VICTOR EQUIPMENT COMPANY

844 Folsom Street
SAN FRANCISCO 7, CALIFORNIA

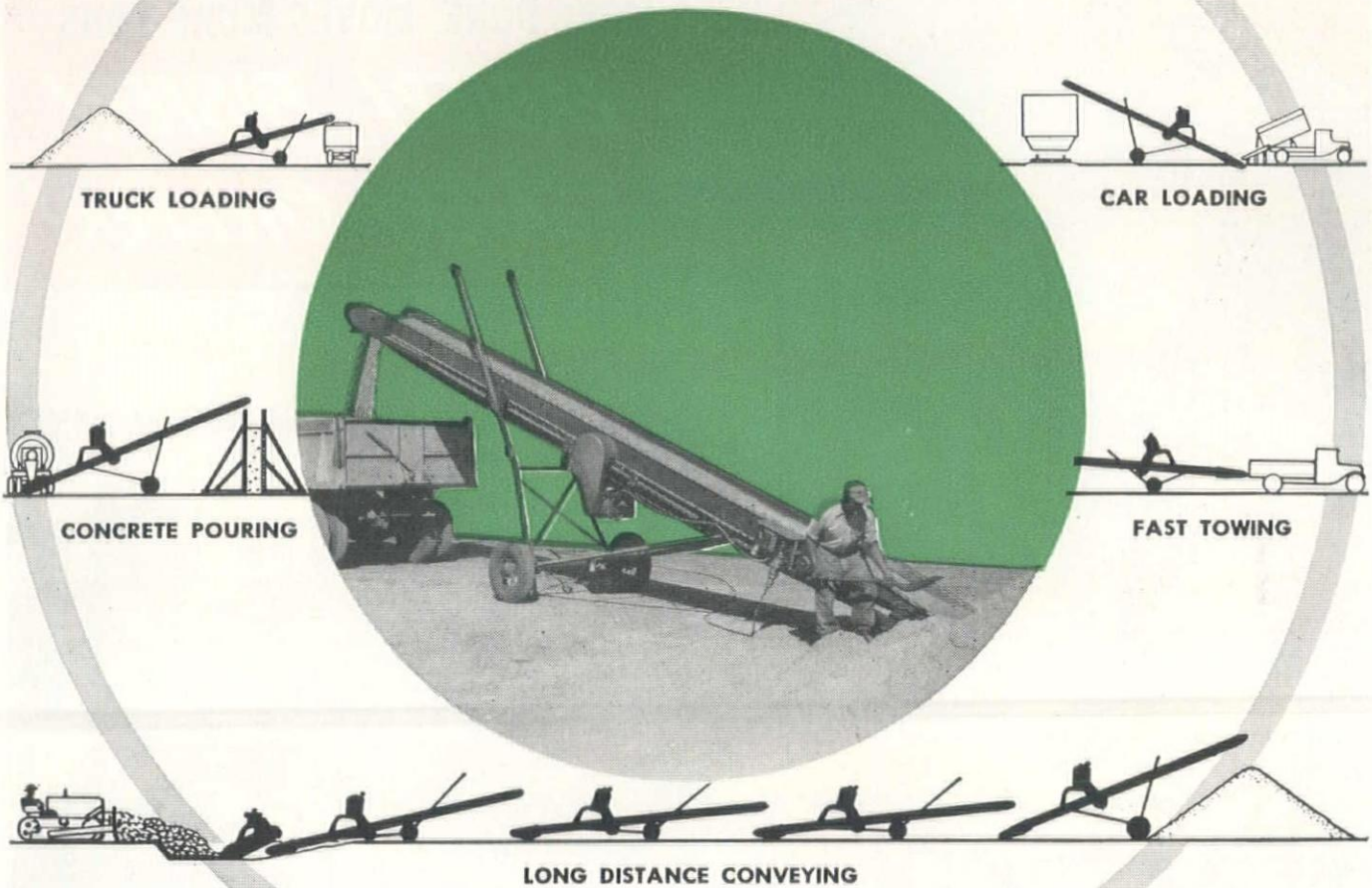
3821 Santa Fe Avenue
LOS ANGELES 11, CALIFORNIA

1312 W. Lake Street
CHICAGO 7, ILLINOIS

There's a Branch or Distributor to serve you in Portland, Spokane, Seattle, Salt Lake City, Casper, Great Falls, Anchorage, Boise, Denver, Tucson, Phoenix, Albuquerque, Oakland, San Diego, Fresno, Ventura, Sacramento.

Barber-Greene

ALL-PURPOSE, ALL-MATERIAL PORTABLE CONVEYORS



VERSATILE • LOW COST • ONE-MAN OPERATION

These highly useful Barber-Greene Conveyors can help you load, unload and transfer all classes of bulk materials or packaged goods faster, at lower cost and *with a smaller labor force*. Easy to tow to and from the job, they are quickly set up and operated by one man. They are truly *all-material* conveyors: They set new standards of efficiency in handling stone, sand, gravel, coal, coke, ashes, bulk chemicals, bagged or boxed material — even wet concrete.

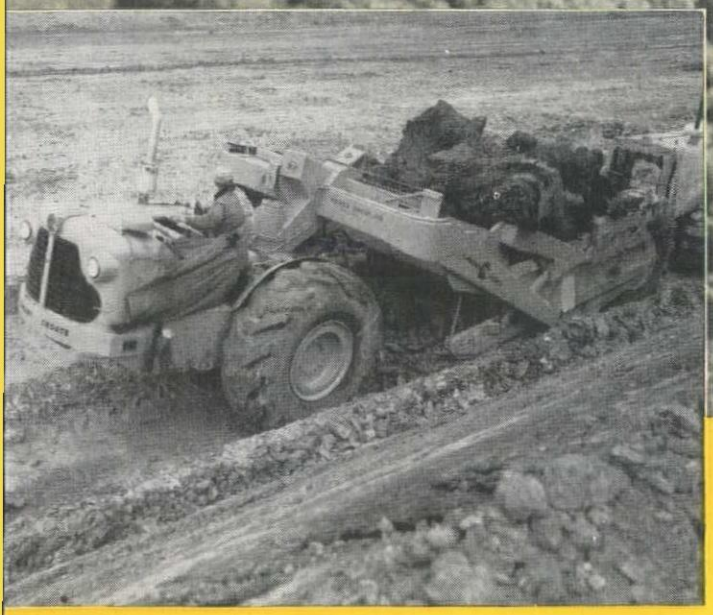
Available in many sizes (lengths from 25′ to 60′; belt widths from 18″ to 30″) with advanced features that include full swiveling pneumatic-tired wheels, lighter, stronger frames, V-belt drives and antifriction bearings. Gasoline, electric, or Diesel power.

Get full information from your nearest Barber-Greene Distributors, or write Barber-Greene Company, Aurora, Illinois.

FOR SALE BY:

BROWN-BEVIS EQUIPMENT CO., Los Angeles 58, California; COLUMBIA EQUIPMENT CO., Spokane, Washington, Seattle, Washington, Boise, Idaho, Portland 14, Oregon; WILSON EQUIPMENT & SUPPLY CO., Cheyenne, Wyoming, Casper Wyoming; CONTRACTORS' EQUIPMENT & SUPPLY CO., Albuquerque, New Mexico; RAY CORSON MACHINERY CO., Denver 9, Colorado; JENISON MACHINERY CO., San Francisco 7, California; WESTERN CONSTRUCTION EQUIPMENT CO., Billings, Montana, Missoula, Montana; KIMBALL EQUIPMENT COMPANY, Salt Lake City 10, Utah; STATE TRACTOR & EQUIPMENT CO., Phoenix, Arizona.

13 LPC MOTOR SCRAPERS MOVING 3½ MILLION TOUGH YARDS!



LIST & CLARK, General Contractor, and PERRY McGLONE, Sub-Contractor, are using LaPLANT-CHOATE MOTOR SCRAPERS on the Burlington R. R. relocation job in Northwest Missouri

3½ MILLION YARDS of tough heavy material to be moved on a job 42 miles long! That's the kind of earthmoving that calls for rugged, broad shouldered power, big capacity and dependable high speed operation. List & Clark with seven TS-300's and Perry McGlone with six depend on LPC Motor Scraper performance to lick this tough job at a profit-setting pace.

The Motor Scraper has many high production features worth knowing about—ask your LPC Distributor to show you these units in action—get the whole story from men who own or operate them. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa — LaPlant-Choate Sales and Service, 1022 77th Avenue, Oakland, California.

LaPLANT CHOATE

INDUSTRIAL EQUIPMENT COMPANY
4441 Santa Fe Avenue LOS ANGELES 11, CALIFORNIA

LaPLANT-CHOATE SALES AND SERVICE
1022 - 77th Avenue OAKLAND, CALIFORNIA

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

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

GENERAL EQUIPMENT COMPANY
1201 East 2nd Street RENO, NEVADA

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

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

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

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

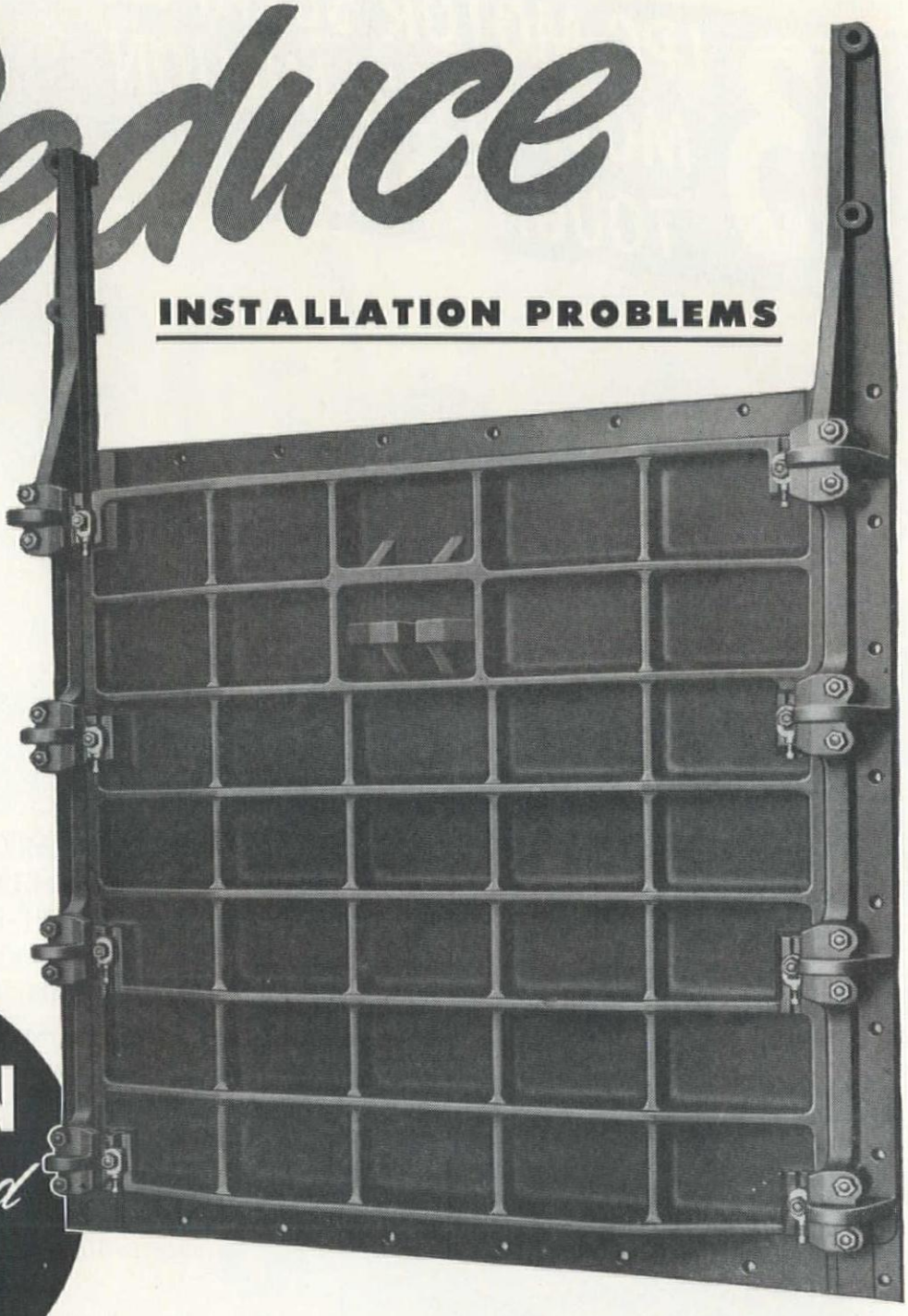
H. W. MOORE EQUIPMENT CO.
Sixth and Acoma Streets DENVER 1, COLORADO

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

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

Reduce

INSTALLATION PROBLEMS



NO MATCH-MARKING IN THE FIELD

WITH **CHAPMAN** *Standardized* **SLUICE GATES**

You'll save lots of installation time with these Chapman *standardized* sluice gates. Each one is designed with interchangeable stems and couplings so that match-marking in the field is unnecessary.

What's more, Chapman Sluice Gates may be obtained with any type of operating control—manual, hydraulic cylinder, or motor unit. For additional information send for your copy of Chapman's Sluice Gate Handbook.

THE CHAPMAN VALVE MFG. CO.

INDIAN ORCHARD, MASSACHUSETTS

An even better WOOLDRIDGE Terra Cobra

MORE POWER AND SPEED 225 horsepower Cummins Diesel Engine increases grade-ability, results in bigger pay loads, faster hauls, more profit. Extra power reserve means longer engine life—less down-time—more production.

BIGGER TIRES Big 24:00 x 25 24-ply low-pressure tires give increased traction, flotation, load-carrying capacity.

OTHER NEW FEATURES New curved ejector and wide apron opening mean faster dumping of all materials—increased ground clearance affords greater maneuverability—improved form-fitting seat means greater operator comfort—plus many other new advantages.

PROVED PERFORMANCE Ruggedness, simplicity, ease of servicing, fast-loading—all are proved Terra Cobra points of leadership—adding up to bigger profits for every equipment dollar you invest in the GREATER NEW TERRA COBRA.

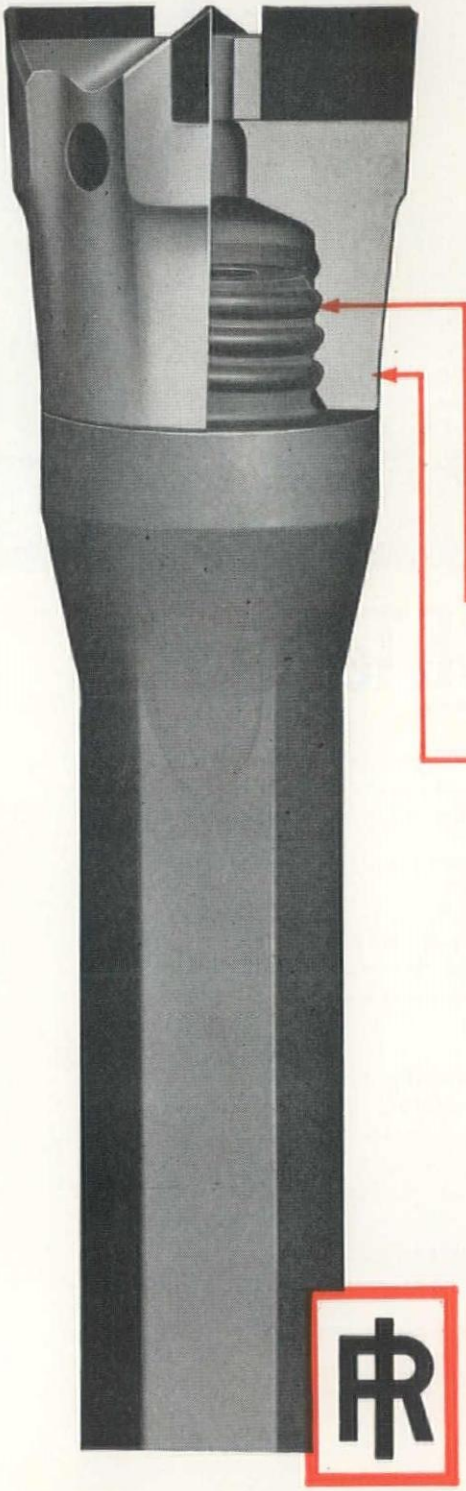
For full details, contact your Wooldridge Distributor or write for Bulletin No. TC-706

WOOLDRIDGE MANUFACTURING COMPANY
Sunnyvale, Calif. • 4710 W. Division St., Chicago 51, Ill.

WOOLDRIDGE EARTHMOVING EQUIPMENT

PROVED AND APPROVED FOR EVERY TYPE OF EARTH-MOVING JOB

Now CARSET JACKBITS give even better performance



. . . with this new attachment developed exclusively for use with tungsten carbide bits

(Series 100 Carset Jackbits)

The experience gained in the field with hundreds of thousands of Carset Jackbits, has enabled Ingersoll-Rand engineers to develop an attachment that matches the revolutionary performance and long life of Carset Jackbits. It is the only attachment now available designed primarily for use with tungsten carbide bits.

This new attachment incorporates a patented 38-degree reverse buttress thread. After exhaustive tests, it was selected as the best design to cushion and absorb the destructive reciprocating and rotational forces that tend to wear bit threads or break the threaded extensions on drill rods.

In addition, the attachment permits appreciably more metal in the skirt walls of Carset Jackbits which greatly increases their body strength. This added metal makes the strongest possible bits. This is particularly important in small bit sizes.

In short, even greater economies are now possible from Carset Jackbits. This new attachment is designed to give trouble-free service for the life of the bit.

The Ingersoll-Rand Series 100 attachment is offered in four sizes and covers bit gauges from 1⅜ inches to 3 inches. It is easy to make this attachment...upset the drill rods on a sharpener and form the threads on an engine lathe or a Toledo threading machine. Write today for full information to Ingersoll-Rand Company, New York, or any of our 27 domestic branches.

CARSET JACKBIT

SET WITH CARBOLOY INSERTS

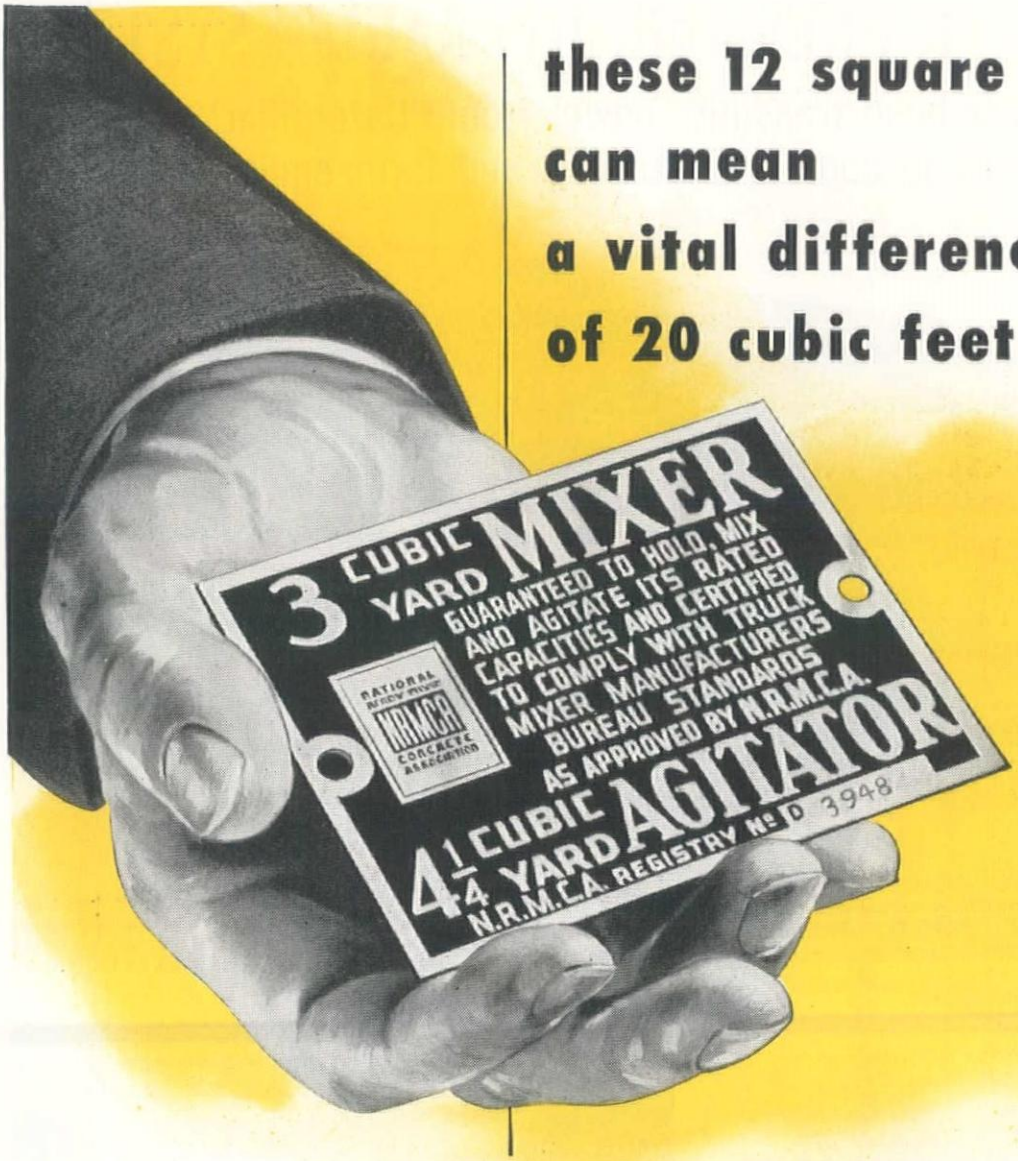
Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

469-15

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

these 12 square inches can mean a vital difference of 20 cubic feet



Every architect, engineer and contractor knows that a concrete mixer drum must provide elbow room for the materials to mix properly.

Concrete authorities have accurately determined the proportions of such *free mixing space* needed in truck mixers and agitators to insure high strength, quality concrete.

Your eye cannot detect that a machine which claims 3 cubic yards capacity as a truck mixer actually has 20 cubic feet less than the minimum requirement for good mixing—***but it can always see that such a non-standard truck mixer never bears this rating plate.***

Look for this rating plate on the truck mixers that supply your jobs. It guarantees that the supplier is maintaining these quality standards on which the $250,000,000 ready-mixed concrete industry has been built.

The Bureau rating plate is available to any manufacturer who meets its quality standards and requirements

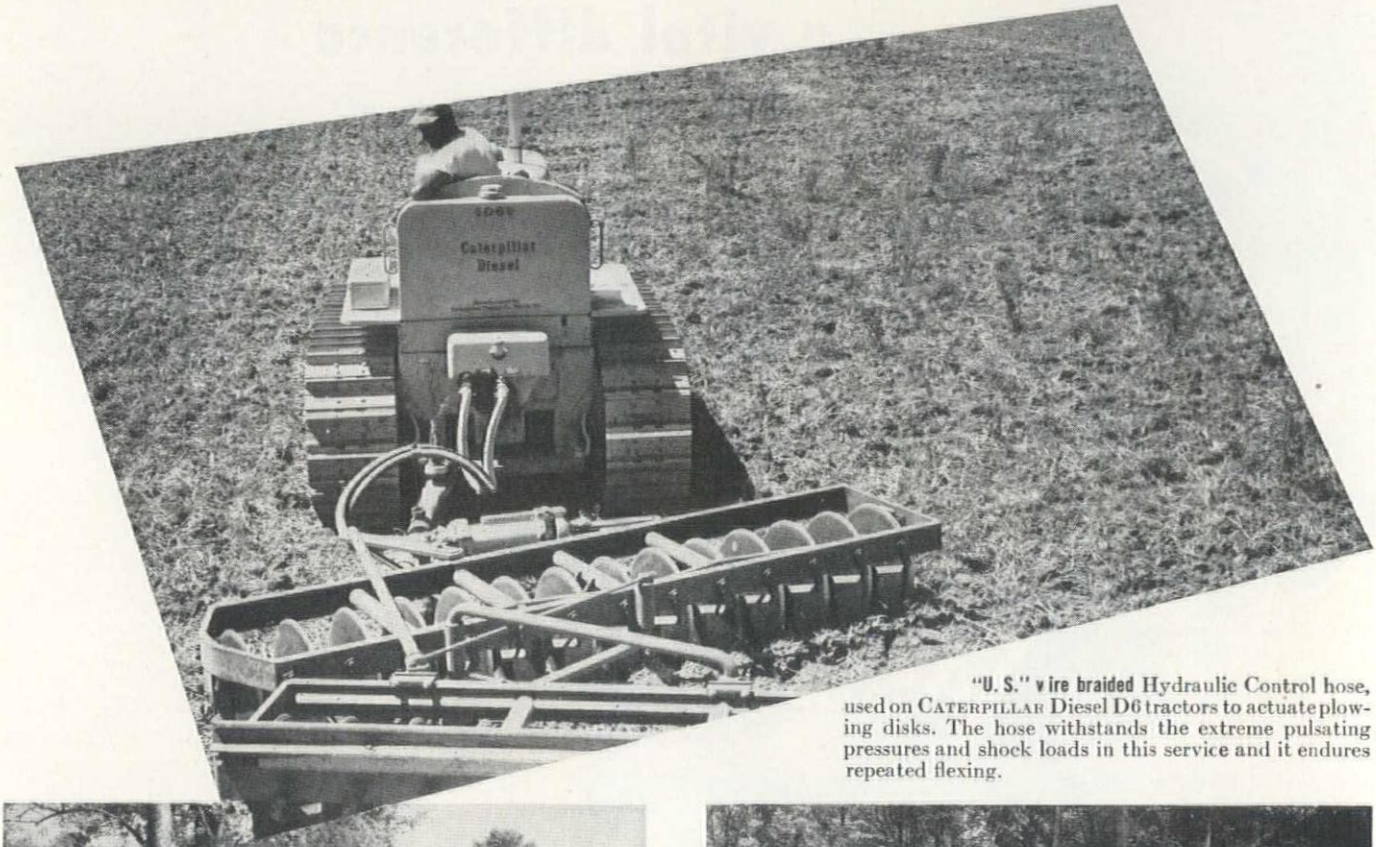
Affiliated with The National Ready Mixed Concrete Association

Truck Mixer Manufacturers Bureau

BLAW-KNOX DIVISION
Pittsburgh, Pa.
CHAIN BELT COMPANY
Milwaukee, Wis.
CONCRETE TRANSPORT MIXER CO.
St. Louis, Mo.
THE JAEGER MACHINE COMPANY
Columbus, Ohio
WORTHINGTON PUMP & MACHINERY CORP.
Dunellen, N. J.
THE T. L. SMITH COMPANY
Milwaukee, Wis.

VEINS FOR HIGH-PRESSURE HYDRAULIC SYSTEMS

U. S. Rubber hose transmits power from "Caterpillar" Diesel Tractors to dam, road-building, and farm equipment



"U. S." wire braided Hydraulic Control hose, used on CATERPILLAR Diesel D6 tractors to actuate plowing disks. The hose withstands the extreme pulsating pressures and shock loads in this service and it endures repeated flexing.

Building dams for farm ponds in soil erosion is among the many hydraulic applications of the "U. S." Hydraulic Control hose. On such equipment as hydraulic lifts, bulldozers, snow plows . . . this hose proves its resistance to abrasion and the action of oils, greases, and solvents.

Scraper building a timber access road uses "U. S." braided Hydraulic Control hose. The weather-resistant, oil-resistant neoprene cover is bonded tightly to carcass. High hydrostatic strength is built into the hose through the use of high tensile braided steel wires.

When you work with any kind of hydraulically activated equipment, make sure you get full thrust and steady power by using United States Rubber Company's hose. And if you have an unusual problem, ask "U. S." technicians to work it out for you. Write to

PRODUCTS OF

U.S.RUBBER

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

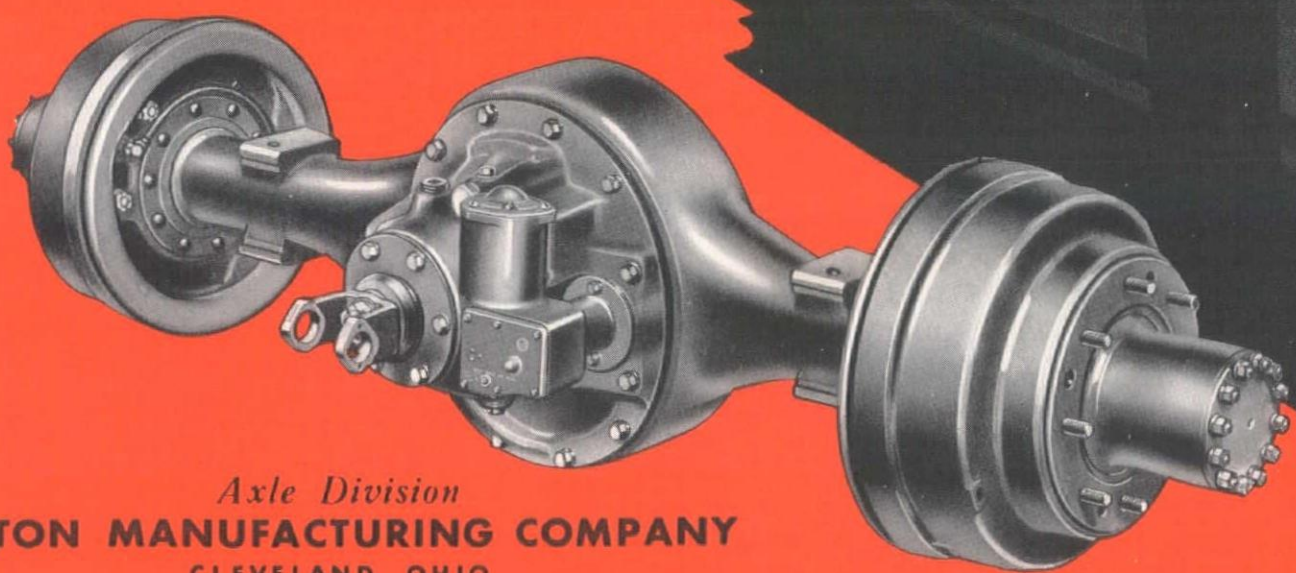
MECHANICAL GOODS DIVISION, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

EATON
2-Speed Truck
AXLES

pay for themselves seven different ways

Faster Trips • More Pay-Load Miles
Longer Truck Life • Lower Operating Costs
Lower Maintenance Costs
Less Shop-time • Higher Trade-in Value

The advantages which Eaton 2-Speed Axles contribute to truck operation are made possible because they double the available number of gear ratios. With a flick of his finger, the driver can select a ratio best suited for pulling power or speed. This reduces strain and wear on engine and truck, cuts gas and oil consumption, saves running time. Ask your truck dealer to prove that Eaton Axles more than pay for themselves. Available for most trucks of the 1½-ton class and larger.



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

Operators know . . .
there's no "quitting time" for a

LULL Shoveloader

All Lull Shoveloaders are powered with the LULL Precision-Built Hydraulic PUMP. The already famous LULL Precision-Built PUMP maintains a pressure of 1000 lbs. per sq. in. indefinitely without pressure or volume loss. The foaming, overheating, or backlashing of oil is practically eliminated in all LULL PUMPS.

SWEEP MORE IN LESS TIME with a Fully Automatic LULL Fluid-Driven SUPER SWEEPER

Now the operator of a Lull Super Sweeper never leaves his seat. Lull Power Hydraulic Controls at his finger-tips start or stop broom, regulate the speed of rotation, raise or lower broom . . . or set broom at any angle from 35° left to 35° right in a matter of seconds, independent of tractor motion. Lull Super Sweeper is the ideal for airports, streets, industrial plants, universities or institutions, parking lots or strip mining.

LULL STANDARD SWEEPERS with manual height and angle control available at low prices.

Hour after hour . . . month after month . . . rugged strong Lull Shoveloaders are digging . . . lifting . . . loading . . . transporting . . . scraping . . . and bulldozing faster and better . . . and at LOWER COST!

Operators have learned from long experience to depend on sturdy Shoveloader construction for continuous round the clock performance.

Value-packed with exclusive features, the Lull Shoveloader handles more jobs and costs less to own. Eight models to choose from with a wide variety of interchangeable attachments. Send in the coupon today and get the facts on the Shoveloader built to do your job.

MAIL COUPON TODAY for complete details.

LULL Manufacturing Company
3612 East 44th Street, Minneapolis 6, Minn.
Please send illustrated literature on:

☐ THE LULL SHOVELOADER
☐ THE LULL SUPER SWEEPER
☐ 5′ ☐ 6′ ☐ 7′′

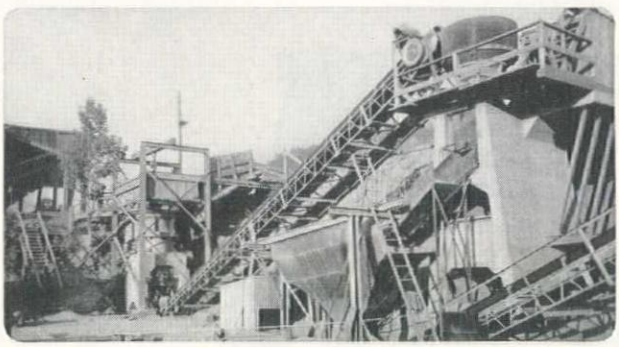
Name..... Title.....
Company .....
Address ..... State.....
City..... 9 • • • • •

LULL Manufacturing Company
3612 East 44th Street Minneapolis 6, Minn.

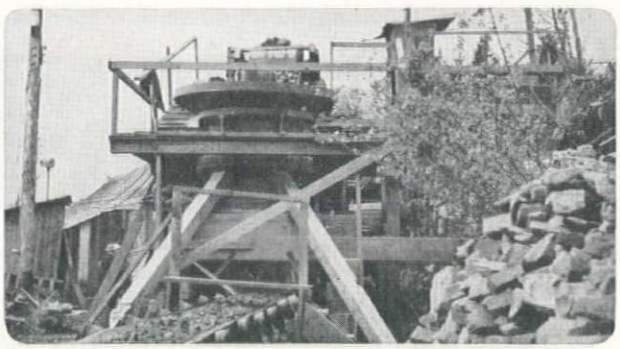
Designers and Builders of The Largest Line of Allied Equipment for Industrial Wheel Type Tractors

SHOVELOADERS ● UNIVERSAL LOADERS ● FLUID-DRIVEN SWEEPERS ● LULLDOZERS ● SHOULDER MAINTAINERS

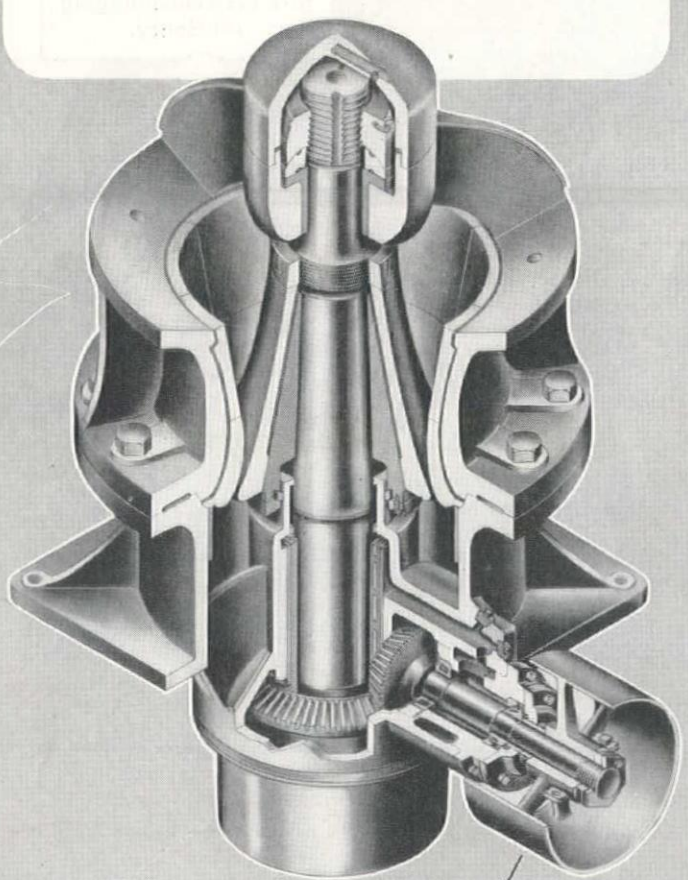
Job-Produced Aggregate Costs Less . . .



The cost of aggregate used on large construction projects can be reduced by producing it on the job with a Traylor TY Reduction Crusher. This rugged machine is unrivalled for simplicity of design and trouble-free operation. With a bare minimum of maintenance, it assures a *steady* flow of a *uniform* product, remarkably free from slabs and fines.



A TRAYLOR TY's great working range offers greater "job-flexibility" than several less adjustable machines. With a Traylor TY on the job you are sure of having the *right* product at the *right* time . . . in the *right* amount. Plan now to cut aggregate costs and increase profits on your next job with a Traylor TY Reduction Crusher.



When Traylor Curved Concaves and Bell Heads are on the job

power is used efficiently as a direct crushing force. Curved crushing surfaces check lifting and churning of material . . . reduce power loss and excessive waste fines. The increased capacity of each succeeding zone in the crushing chamber eliminates choking and packing . . . assures continuous, trouble-free production to keep pace with the tightest schedule. Write for bulletin 5112 for more complete details on a Traylor TY Reduction Crusher.

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

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

Traylor

Rotary Kilns, Coolers and Dryers
Grinding Mills · Crushing Rolls
Jaw, Reduction and Gyratory Crushers

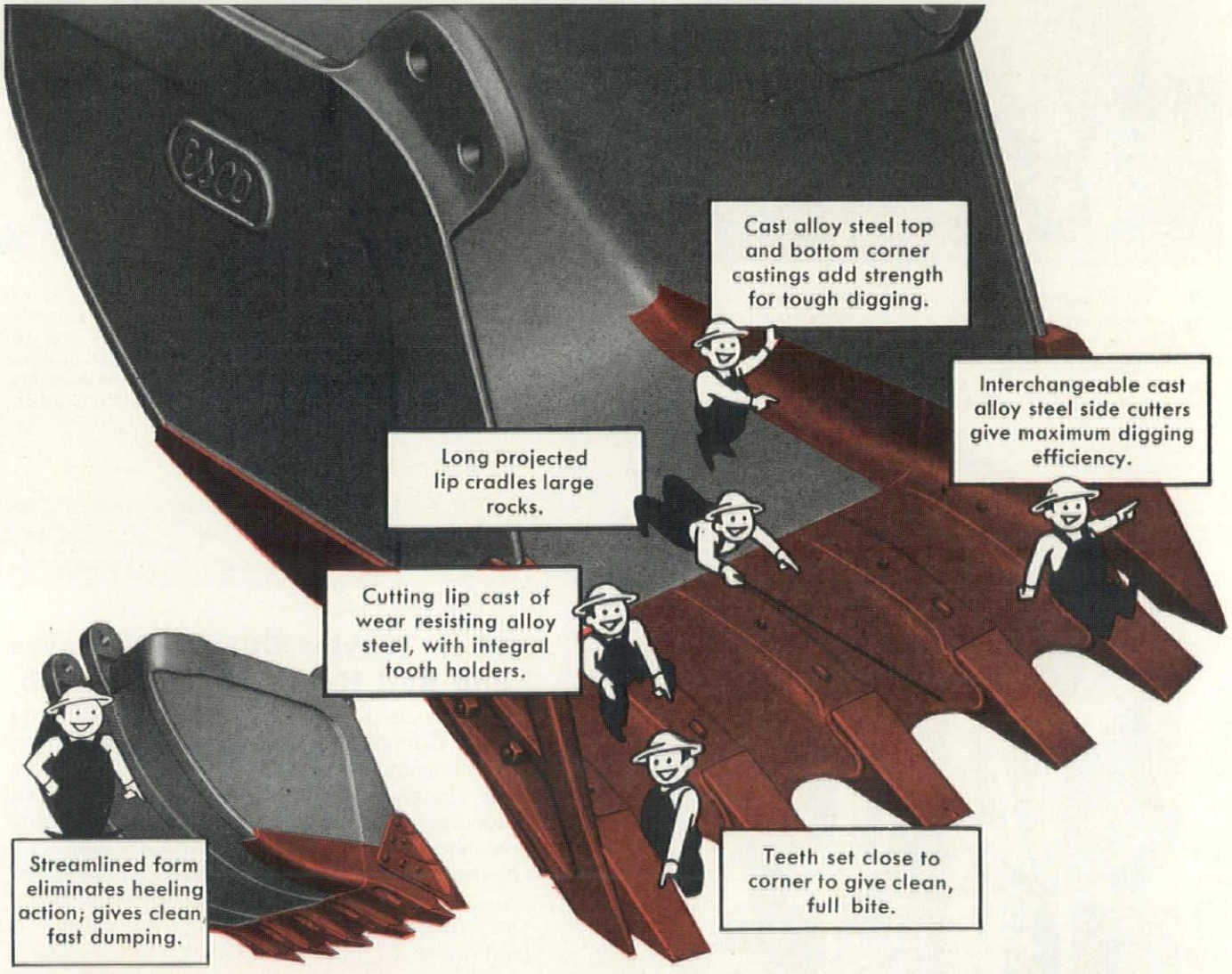
A "TRAYLOR" LEADS TO GREATER PROFITS

Designed for FAST DIGGING...*Built for* HARD WORK

Thoroughly tested on the proving ground and on the job, the pull shovel dipper shown here is the newest addition to the *ESCO* line of earth moving equipment.

Design is the result of thorough research, and engineering experience gained through making punishment-taking dragline and dipper buckets over a period of many years. Alloy steels used throughout the dipper are specified for maximum resistance to wear and shock.

Sizes range from 3/8 to 2½ yards. For additional information on the *ESCO* pull shovel dipper, see your nearest *ESCO* representative, or fill in and mail the coupon.



ESCO DIPPER AND DRAGLINE BUCKETS

ELECTRIC STEEL FOUNDRY

2163 N. W. 25th Avenue, Portland 10, OREGON

SALES OFFICES AND WAREHOUSES:

CHICAGO, ILL. — LOS ANGELES, CALIF.
EUGENE, OREGON — NEW YORK CITY, N. Y.
HONOLULU, T. H. — SAN FRANCISCO, CALIF.
HOUSTON, TEXAS — SEATTLE, WASH.
SPOKANE, WASH.

IN CANADA — *ESCO* LIMITED, VANCOUVER, B.C.

ELECTRIC STEEL FOUNDRY
2163 N.W. 25th Avenue, Portland 10, Oregon

Please send me your bulletin on the new ESCO Hoe Dippers.

Name_____

Address_____

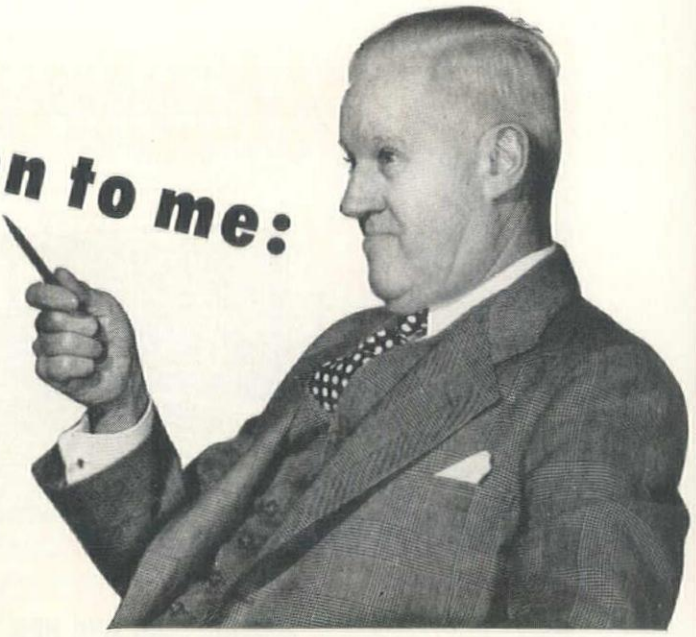
City_____

Zone_____ State_____

Make and Model of Machine_____

As a crane the Link-Belt Speeder is beautiful to operate . . . As a shovel it is a brute for production

listen to me:

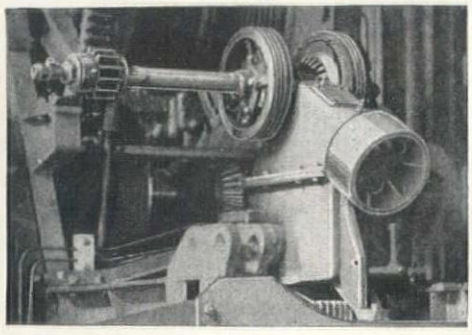


LINK-BELT SPEEDER

Don't take my word for it, — I only get reports from operators, like Fred Scanlan of Welso Construction Co., Chicago. Fred has been operating Shovel-Cranes for 35 years. His latest job is pouring concrete on two seven-story housing buildings. He is using a K-365 with 90′ boom, 20′ jib and 1½ yard bucket. But let him tell it: "This K-365 is the easiest machine I ever operated. The Independent Rapid Boom Hoist is the ticket for this type of work. And there's nothing like the K-365 for moving in close quarters. Handling concrete requires careful and close spotting: this is easy with Speed-o-Matic controls. And with all this I can reverse the machinery with a load." That's a kind testimonial, Fred, and we thank you. There are other advanced engineering features of the K-360 and K-365 Shovel-Cranes that make these machines outstanding in their class. Ask your Link-Belt Speeder distributor about them.

★

The Independent Rapid Boom Hoist



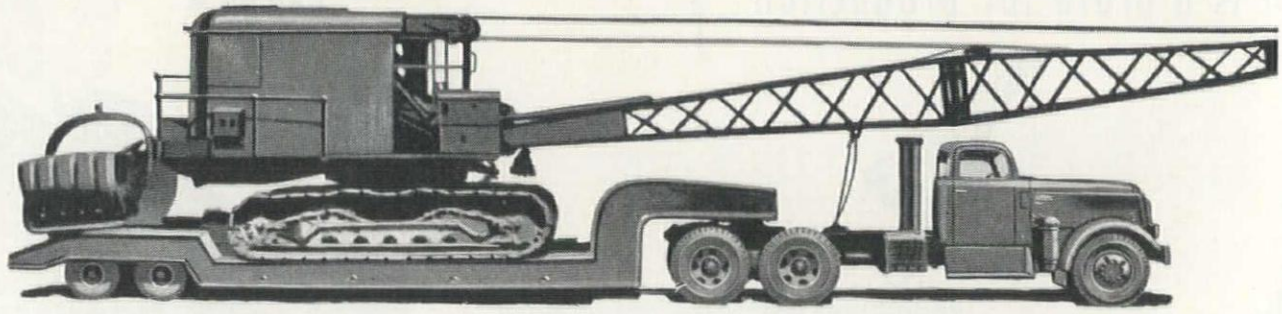
(Optional Equipment) This is a "Safety-type" independent friction clutch operated rapid boom hoist, power controlled both up and down. Worm gear is totally enclosed, running in oil, with automatic safety brake.

12,058

LINK-BELT SPEEDER

LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS IOWA

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



QUICK LIFT

—for loads up to 90,000 lbs. GCW

GMC 900 Series SIX-WHEELERS are Tops for Ferrying Heavy Cranes—Bulldozers—Shovels

FOR contractors using heavy machines on different sites — these GMC Series 900 GMC Diesels are made to order!

These six-wheeled giants can move just about anything anywhere. The 197-inch wheelbase tractor, with Gross Combination rating of 90,000 lbs., covers a tow-load factor of more than 72,000 lbs. Or use the 215-inch wheelbase for conventional truck service — you can handle body and pay load up to 37,000 lbs.

Eight Rear Tires for Traction and Action

The four dual driving rear wheels mean traction — assure full control of the load. With the "heavy end" riding on eight tires, concern over delays from tire failure vanishes. And the same eight tires let you run this equipment over soft ground or sand — no more off-the-road headaches.

For covering distance—these heavyweights really move. With standard transmission equipment, they carry maximum loads easily at 35 mph. For working on grades, their Diesel power, 5-speed main transmission and 3-speed auxiliary provide a flexibility that is a revelation.

Diesel Power—with 2-Cycle Efficiency

Engines in these trucks are those famous GM 2-cycle Diesels — the same power plants that are revolutionizing the commercial hauling field by speeding up schedules and slashing fuel costs.

It's *power on every downstroke* that pays off with the 2-cycle job — and packs such a wallop in such a

GMC

FROM ½ TO 20 TONS

compact engine. The trim lines of the GMC's engine result from the Unit Injectors that eliminate bulky high pressure fuel systems with oil pumps, manifolds and distributors.

GMC's Make Friends of Your Drivers

Drivers are all for GMC Diesels. GMC's have Synchro-Mesh transmission as standard equipment. Only GMC's have the re-circulating ball-bearing steering gear—for easiest handling.

If you have a heavy hauling handicap—make a date with your GMC dealer at once. Let him show you the right GMC truck for you—and why, when all cost figures are in, GMC's are the *lowest cost transportation* you can buy.

GMC Truck & Coach Division of General Motors

Your key GM *to greater hauling profits*

GM

GENERAL MOTORS

DIESEL TRUCKS

GMC—THE RIGHT TRUCK FOR EVERY JOB

Whatever you're hauling—marble slabs or name plates, concrete or conduits, you'll find *the best truck* for it in the GMC line—most complete line of trucks in the world, built by the largest exclusive maker of commercial vehicles.

Ranging from ½ to 20 tons — with gasoline or Diesel power — GMC trucks are all *real* trucks — the *most economical transportation* money can buy!

"TICKLISH JOB"

for hoe and crane operators

Close quarters, low hanging trees, pipes criss-crossing trench path . . . that made trenching a ticklish job for the hoe operator. And the crane operator's job was just as critical. Working in cramped space where boom couldn't be raised above cab top required exceptional control to place gas main sections under the small cross pipes.

But the job was done . . . and done *profitably and easily* with a MICHIGAN crawler and a MICHIGAN truck crane by William W. Adams, Inc., general contractors of Tenafly, New Jersey. That's why George Adams says . . .

> *"I like MICHIGAN . . . I wouldn't have bought three of them otherwise. They are very easy on maintenance and easy on the operators."*

Comments like these are typical from profit-wise contractors everywhere. Next time you need an excavator crane . . . investigate MICHIGAN and you'll agree it's *your best buy!* Write, wire or phone for full details.

MICHIGAN POWER SHOVEL COMPANY

430 Second Street, Benton Harbor, Michigan, U. S. A.

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, Calif.

●

THE SAWTOOTH CO.
715 Grove Street
Boise, Idaho

●

J. K. WHEELER MACHINERY CO.
171 W. S. Temple St.
Salt Lake City 1, Utah

●

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

●

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

●

ARIZONA EQUIPMENT SALES, INC.
733 N. 19th Avenue
Phoenix, Arizona

●

CONTRACTORS' EQUIP. & SUPPLY CO.
P. O. Box 45ú
Albuquerque, New Mexico
and
P. O. Box 2039, El Paso Texas

●

JAMES CASHMAN
107 N. Main Street
Las Vegas, Nevada

GREAT NEW ADVANTAGES IN TRUCK MIXERS

achieved with Chrysler Industrial Engines and Chrysler gýrol Fluid Drive

Reverse rotation of the drum without throwing damaging shocks and impacts into the transmission, engine and other parts of the machine!

No shear pins to replace! Smoother operation! Lower maintenance costs! Longer life! These are only a few of the advantages Chrysler Industrial Engines with gýrol Fluid Drive have brought to operation of truck mixers.

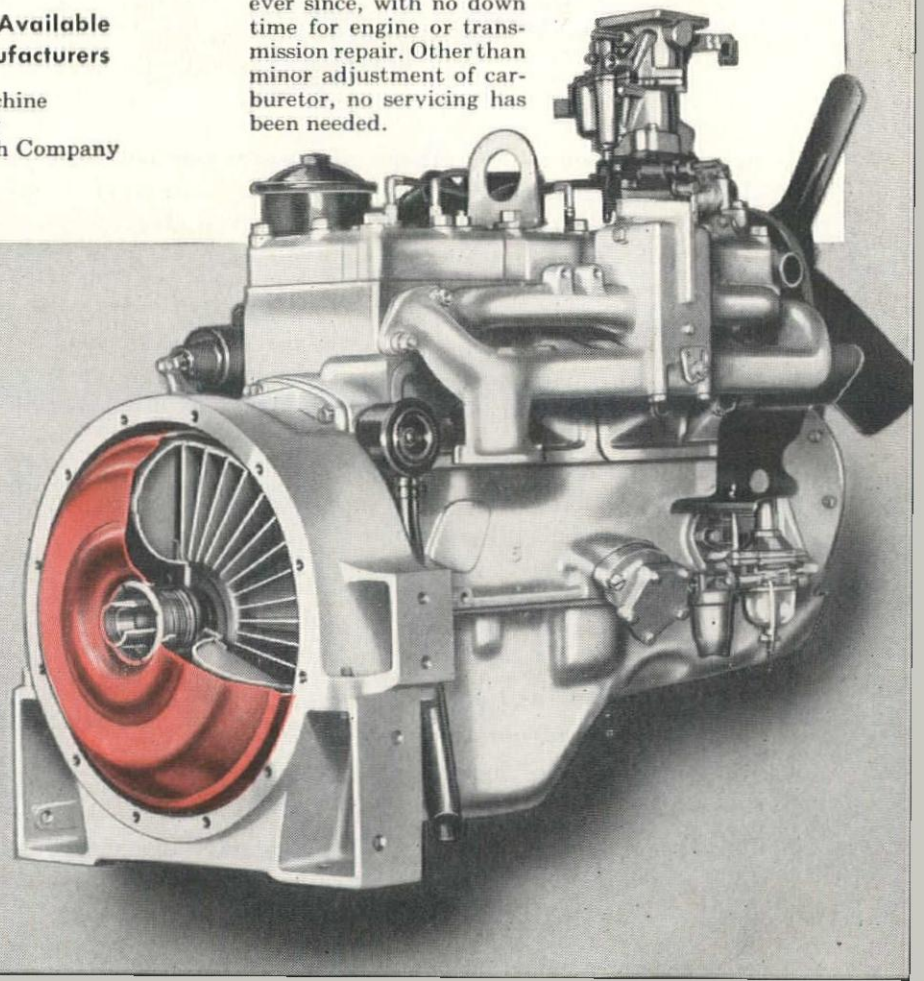
In addition, Chrysler Fluid Coupling prevents engine stalling, reduces clutch wear, eliminates jolts and gear rattle, simplifies starting from standstill with excessive load, gives gradual oil-smooth acceleration—opens a whole new field of improved operation for gasoline-powered equipment. See your Chrysler Industrial Engine Dealer or write us. ***Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan.***

Chrysler gýrol Fluid Drive Now Available For Truck Mixers From These Manufacturers

Blaw-Knox Division of Blaw-Knox Company
Chain Belt Company
Jaeger Machine Company
T. L. Smith Company

A Typical Experience

Five years ago, a Rex Moto-Mixer equipped with Chrysler Industrial Engine and gýrol Fluid Drive was placed in operation by the Tews Lime and Cement Company of Milwaukee. The unit has been operated continuously ever since, with no down time for engine or transmission repair. Other than minor adjustment of carburetor, no servicing has been needed.



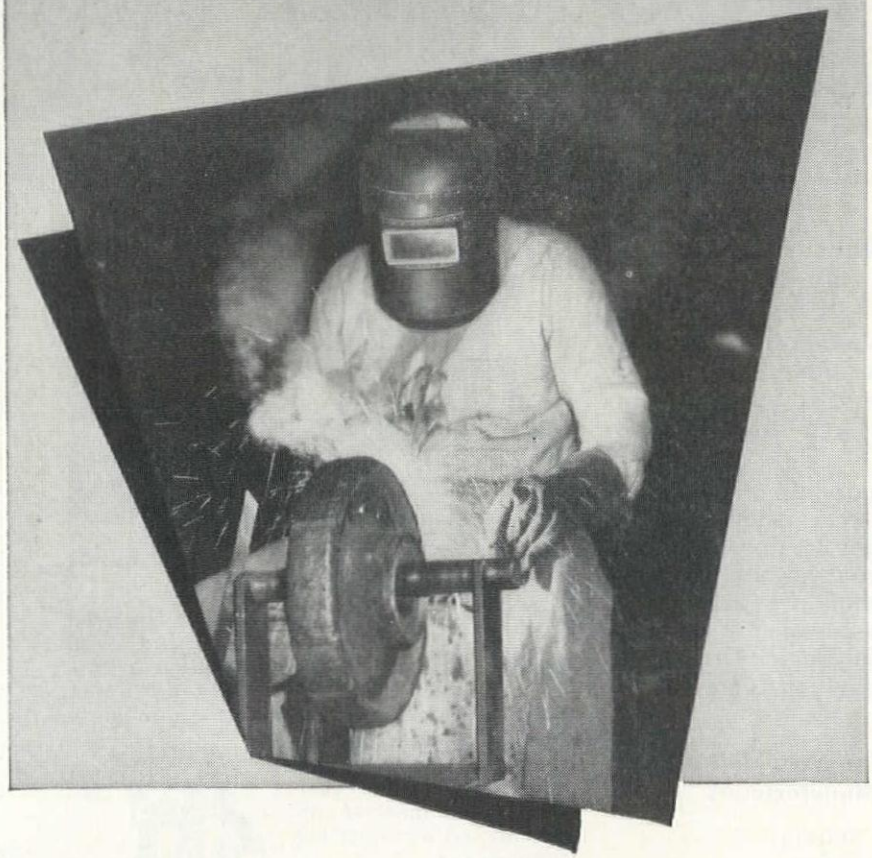
Chrysler gýrol Fluid Drive is built integral with Chrysler Industrial Engines. Its cost is only a few dollars more than the conventional flywheel which it replaces.

CHRYSLER

Industrial Engines and Power Units

HORSEPOWER WITH A PEDIGREE

extra service for your equipment when "WEAR-RESISTED" with AIRCO hardfacing alloys



Because of the hardness and other desirable characteristics of these alloys, they provide high resistance to all types of wear—abrasion . . . impact . . . heat . . . corrosion. One application often adds 2 to 25 times longer service life to *worn or new* parts . . . big dividends in savings of "down-time" and replacements.

There is an Airco alloy available for oxyacetylene flame or electric arc application to meet all types of wear conditions.

1. ***Severe abrasion and medium impact***
2. ***Shattering impact and abrasion***
3. ***Severe impact and abrasion***
4. ***Sliding abrasion and impact***
5. ***Extreme earth abrasion***
6. ***Corrosion and heat***

Constant research is developing new alloys to meet special wear problems as they occur.

If you have parts or tools subject to any type of wear, it will pay you to investigate the savings you can make in maintenance and replacement costs by using Airco Hardfacing Alloys.

For further information about Airco's complete line of "wear-resistant" alloys, write your nearest Airco office or Authorized Dealer for a free copy of the Hardfacing Alloys Catalog.

More news about AIRCO products

FOR SEVERE IMPACT AND RESISTANCE TO ABRASION
Airco No. 388 Electrode

A shielded arc electrode sufficiently high in alloy content to produce a deposit bearing approximately 9% chrome and 0.9% carbon. This alloy content results in a weld metal deposit which is essentially martensitic.

Operators will find that the exceptionally fine arc action of Airco No. 388 increases both the speed and quality of their work.

FOR RESISTANCE TO EXTREME EARTH ABRASION
Airco Tungtube Nos. 8, 10, 20, 30 and 40

These are fabricated rods of tungsten carbide particles encased in a steel sheath. The various Tungtube numbers indicate the screen size of the tungsten carbide particles contained within the tube. With its extreme hardness tungsten carbide ranks second only to the diamond in earth cutting efficiency. It is accepted as the standard means of cutting non-metallic substances; such as, coal, shale, and granite. It is recommended for core bits, fishtail bits, road plows, coal cutter knives, plow shares and similar equipment subjected to extreme earth abrasion.

CORROSION—ACID RESISTANT ALLOYS FOR WELDING HARDER GRADES OF ALUMINUM BRONZE
Airco Nos. 100, 116, 120, 125 and 130 Electrodes

For joining aluminum bronze or other metals and combinations of dissimilar metals—and for overlays on bearing surfaces, machine parts, dies, etc. The deposits made with these electrodes are corrosion and acid-resistant and will also retard wear from abrasion and impact.

AIRCO

AIR REDUCTION PACIFIC COMPANY
A Division of Air Reduction Company, Incorporated
SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE
Bakersfield • Fresno • Emeryville • Sacramento • Tacoma

Another Product Pioneered By Bitumuls

Laykold FIBRECOAT

The Mineral-Armored Asphalt

TWICE the life at HALF the price

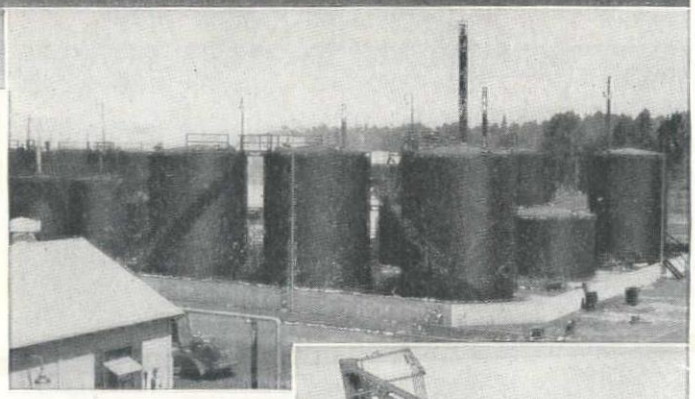
This is a roof in Alaska — not an air-field — one of the largest roofs in the world. Sprayed with FIBRECOAT — in record time and in adverse weather.

FIBRECOAT *Protects*—

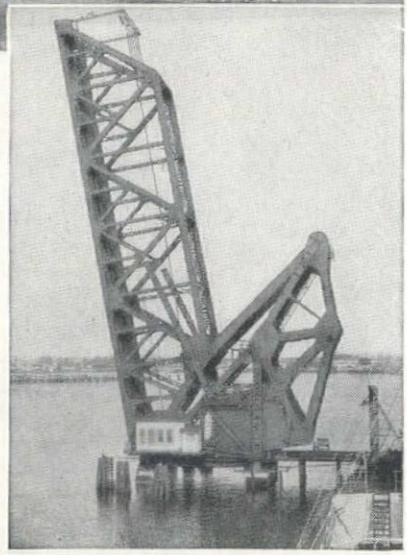
METAL—

ROOFS—

MASONRY



FIBRECOAT protects refinery tanks and insulation — endures over a wide range of temperature.



FIBRECOAT protects steel and masonry — outlasts red lead and oil — costs less.

ENDURES—over 1200 hours in Standard Weatherometer Tests, without breakdown. Passes Navy Salt Spray Cabinet Test.

SAFE—Spray or Brush COLD. Bonds to damp or dry surfaces. No fire hazard to job or workmen.

COLORS—Attractive and durable Green, Red or Black.

ACCEPTED—Over 6 million sq. ft. covered last year alone—on roofs, tanks, bridges, buildings, pipe, etc.

ECONOMY—Cost averages less than $1.00 per gallon. Sprays 5 to 10,000 sq. ft. per man per day.

A better coat with FIBRECOAT

In the West

STANCAL ASPHALT & BITUMULS COMPANY

200 BUSH STREET · SAN FRANCISCO 4, CALIF.

Los Angeles 14, Calif. • Oakland 1, Calif. • Portland 7, Ore. • Tucson, Ariz.

In the East

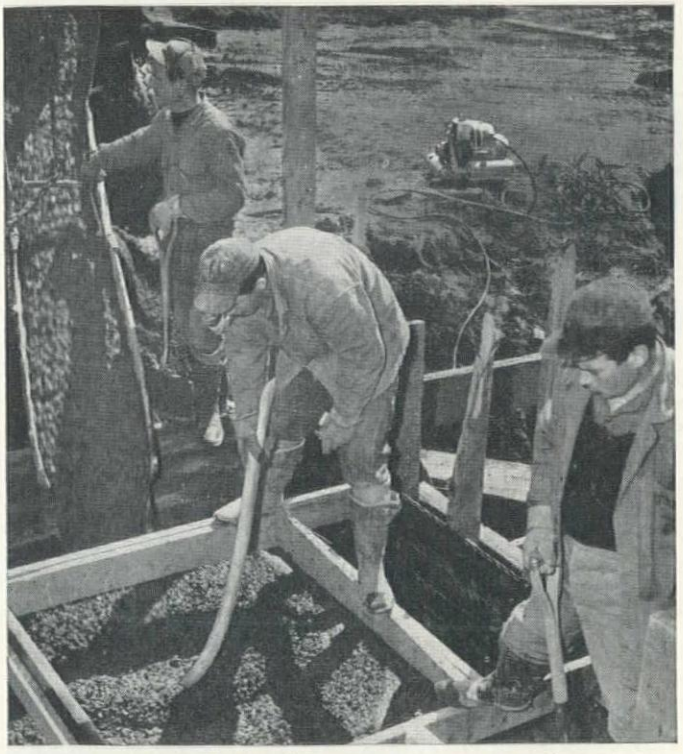
AMERICAN BITUMULS COMPANY

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.
E. Providence 14, R. I. • San Juan 23, P. R. • Mobile, Ala.

Get this folder— a short, pleasant story of dollars saved for YOU.

CP HICYCLE VIBRATOR works anywhere within 400 feet of Generator



A portable gasoline generator on ground powers CP Hicycle Vibrator on top of form.

CP Hicycle Vibrator places concrete as fast as it is delivered.

With the CP Hicycle Vibrator, the generator is placed in a convenient location, away from the actual pouring operation, and the one-man Vibrator can be used anywhere within a 400-foot radius.

The tough electric cable, in its neoprene hose handle, can be carried over forms or bent around corners without danger of injury. There is no troublesome flexible shaft; the motor and vibrating mechanism are in the head of the tool. An extension hose handle permits working 25 feet down in a form.

CP Hicycle Vibrators run at a constant speed of 10,000 v.p.m., the most suitable frequency for concrete placement, and will handle 30 to 40 cubic yards an hour of 2″ slump concrete.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

SAO PAULO (BRAZIL) OR ST. PAUL (MINNESOTA)

TRAXCAVATOR *Belongs* IN THE PROGRESS PICTURE!

As key equipment on a street-widening project in the heart of Sao Paulo, Brazil, this Model T4 TRAXCAVATOR speeds digging and loading of spoil earth into trucks — a scene that is repeated on thousands of jobs the world over, from Sao Paulo to St. Paul.

The nimble TRAXCAVATOR heaps its bucket, pivots, lifts and carries, and dumps its load within half-a-minute elapsed time. Such fast performance indicates how TRAXCAVATORS multiply manpower and horsepower efficiency.

Unit engineered to match the traction-harnessed horsepower of their "Caterpillar" Diesel Tractor teammates, TRAXCAVATORS have the bucket crowd, accuracy of control and operating thrift to make them "tops" in all types of excavating, earthmoving and material handling.

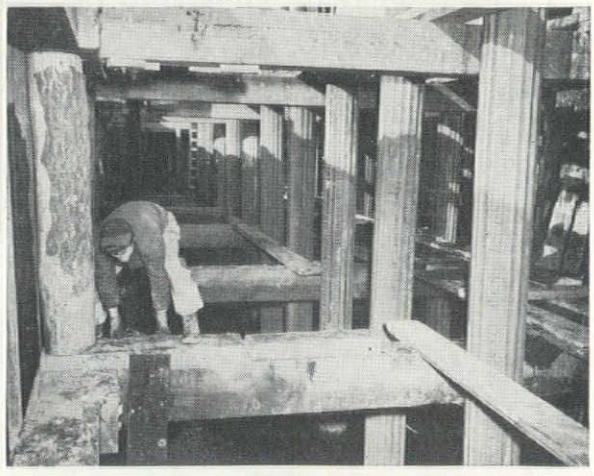
Multi-purpose utility, and variable speed mobility to work at a *creep* or a *sprint*, enable the TRAXCAVATOR to fit the functions of a fleet of limited-duty machines. The 5 TRAXCAVATOR models (1/2 to 4 cubic yards capacity) make this the only line with the choice of unit to fit jobs of all sizes and purposes.

See your TRACKSON-"Caterpillar" Dealer for detailed information on capacities, costs, and prices or write TRACKSON COMPANY, Dept. WC 90, Milwaukee 1, Wisconsin.

TRAXCAVATOR® *The Original Tractor Excavator*

Fast simplified driving of 70-foot Monotube Piles for pier under Boston side of Eliot Bridge.

No danger to this cofferdam



Note excellent alignment of Monotube piles. Extremely close tolerances alongside bracing and sheet piling made it imperative that there be no "walking" or lateral movement under hard driving.

PICTURED here is another difficult bridge-building job where Monotube Piles helped by greatly simplifying the problems of water work. The job is the Eliot Bridge, Cambridge, Massachusetts. It is to be a beautiful 3-span bridge, 418 feet in over-all length, 83 feet wide. It will have two 30-foot roadways, separated by a 4-foot median strip, with 8-foot sidewalks.

Following construction of the cofferdams, the 70-ft. Monotube Steel Piles were driven safely, swiftly and smoothly—78 for each pier. Neither the hazards of water, nor the blue clay—sand—gravel river bed, were problems for the Monotubes . . . as evidenced by easy, top-to-bottom inspection after driving.

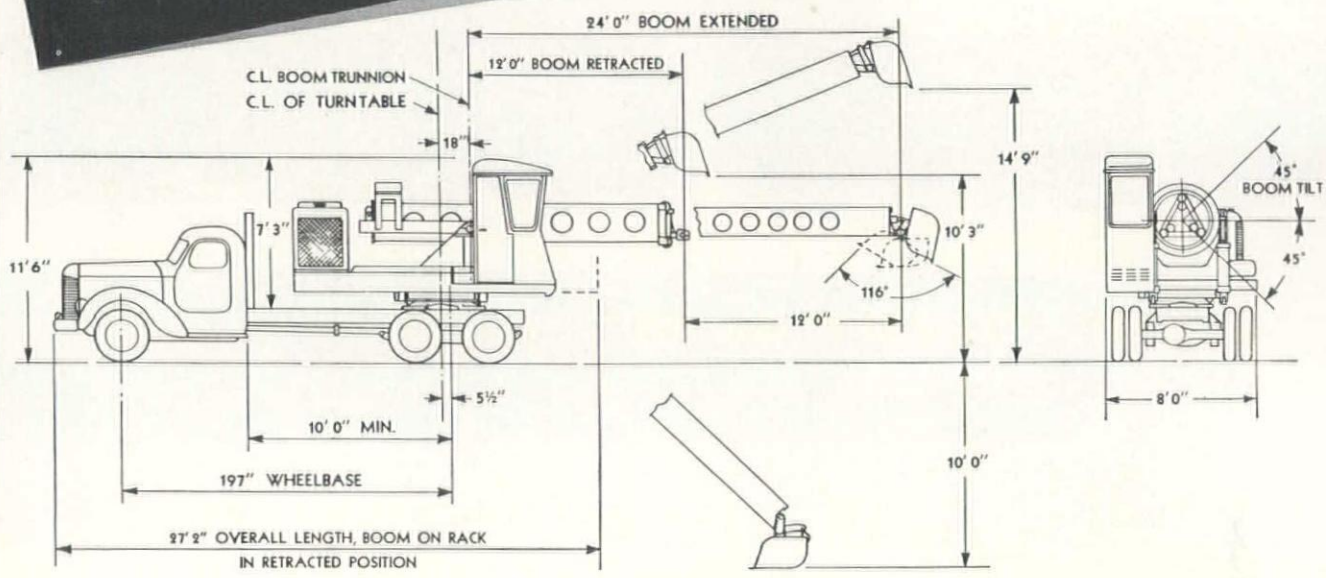
You can't afford to disturb the bracing or the alignment on a cofferdam as large as this. The *light,* sturdy Monotubes were safely placed in templates nailed to the cofferdam bracing. They were then driven to their high bearing loads without any fear of "walking" which might easily result in excessive deflection of the bracing, or even the cofferdam itself.

Monotube piles have extra advantages that can help reduce foundation costs while simplifying sound construction from start to finish. Monotubes are available in lengths, gauges, sizes and tapers to meet varying soil conditions. For complete information, write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL

Monotube Foundation Piles

We've given this diagram a name...



"SIMPLICITY"!

THIS IS THE ONE WORD that really describes the Multi-Purpose Gradall Construction Machine. The Gradall handles more types of construction work—more simply—than any similar machine on the market! Whether it's trenching, excavating, ditch digging, grading, or pavement removal, the Gradall handles the job simply and speedily.

One of the big reasons for this unusual simplicity of operation lies in the Gradall's *hydraulic design*. You get the full advantages of hydraulic power in the all-welded boom, rather than having it dissipated through mechanical transmission, as in ordinary construction machines.

But ask for a demonstration to see for yourself. You can arrange this with your Gradall distributor.

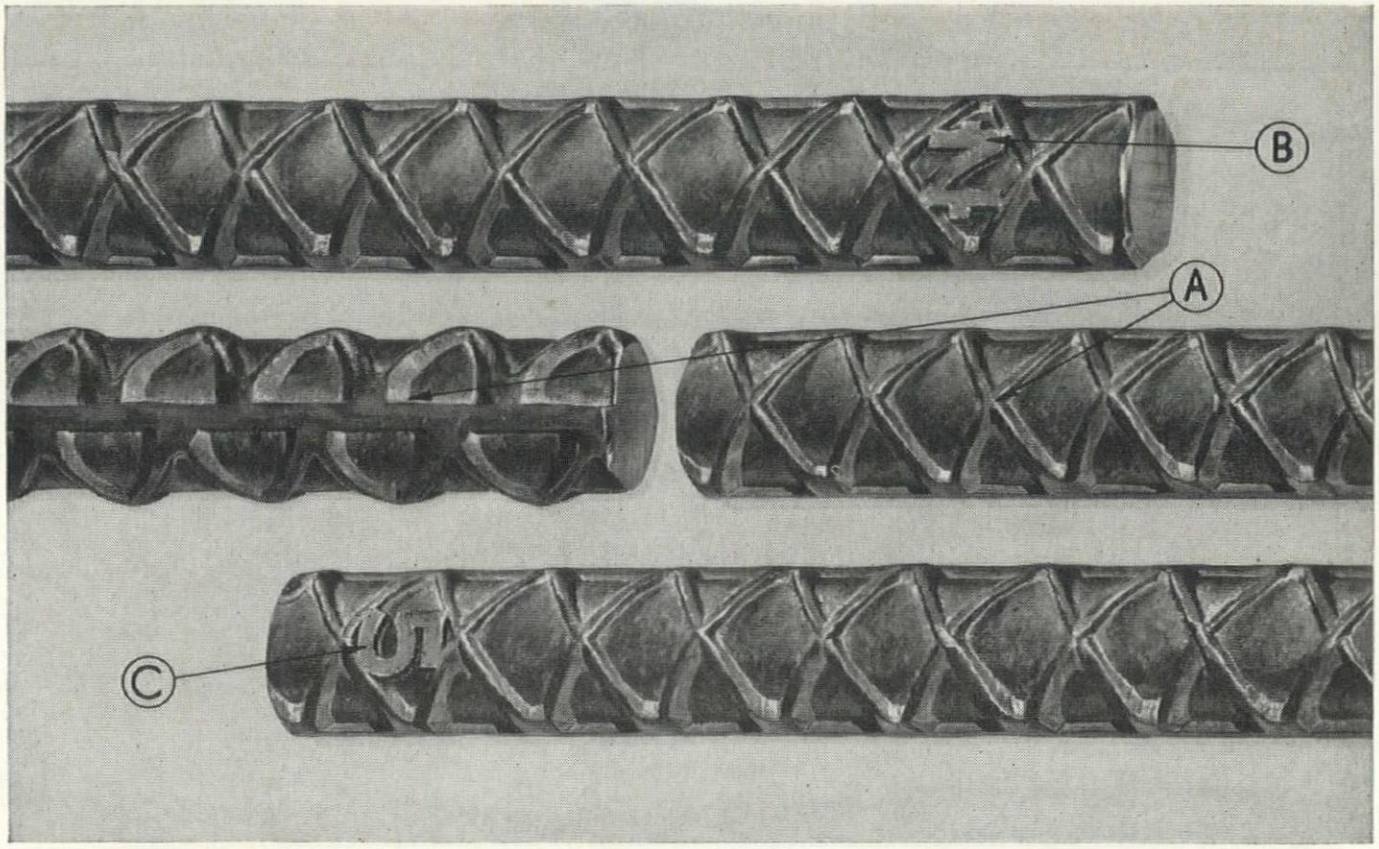
GRADALL
MULTI-PURPOSE
CONSTRUCTION MACHINE
with HYDRAULIC DESIGN

SALES AND SERVICE:

Columbia Equipment Company, Portland, Ore., Boise, Idaho, Seattle, Wash.
Bay Equipment Company.....Richmond, California
Brown-Bevis Equipment Company.....Los Angeles 58, California
N. C. Ribble Company.....Albuquerque, New Mexico
N. C. Ribble Machinery Company.....El Paso, Texas

Gradall®
DIVISION OF WARNER & SWASEY Cleveland

GRADALL—THE MULTI-PURPOSE CONSTRUCTION MACHINE



A reinforcing bar from Columbia that really bites and holds

And it bears the quality mark of the Concrete Reinforcing Steel Institute

When U·S·S DI-LOK re-bar sinks its teeth into a concreting job, you know the grip is there to stay. For DI-LOK'S special deformation design reduces cracking to a minimum and provides for maximum tensile pull. Lowers construction costs, too... by reducing the length of splices and usually eliminating the need for hooks. Columbia's re-bar is made from U·S·S Steel—and its new-billet steel meets ASTM A-15-39 specification for quality. Its pattern meets ASTM A-305-49 specification for deformations. On your next job discover a new standard of construction efficiency . . . specify U·S·S DI-LOK Reinforcing Bar.

A. Deep, rugged diamond-lock deformation gives positive grip without slippage. Builds maximum bond between steel and concrete.

B. The quality mark of the Concrete Reinforcing Steel Institute shows bars are rolled from new-billet steel to meet ASTM A-15-39 specification.

C. Size numbers on each bar make office, shop and field measurement easy...without time-taking measurements and possibility of error.

U·S·S DI-LOK re-bars available in these sizes

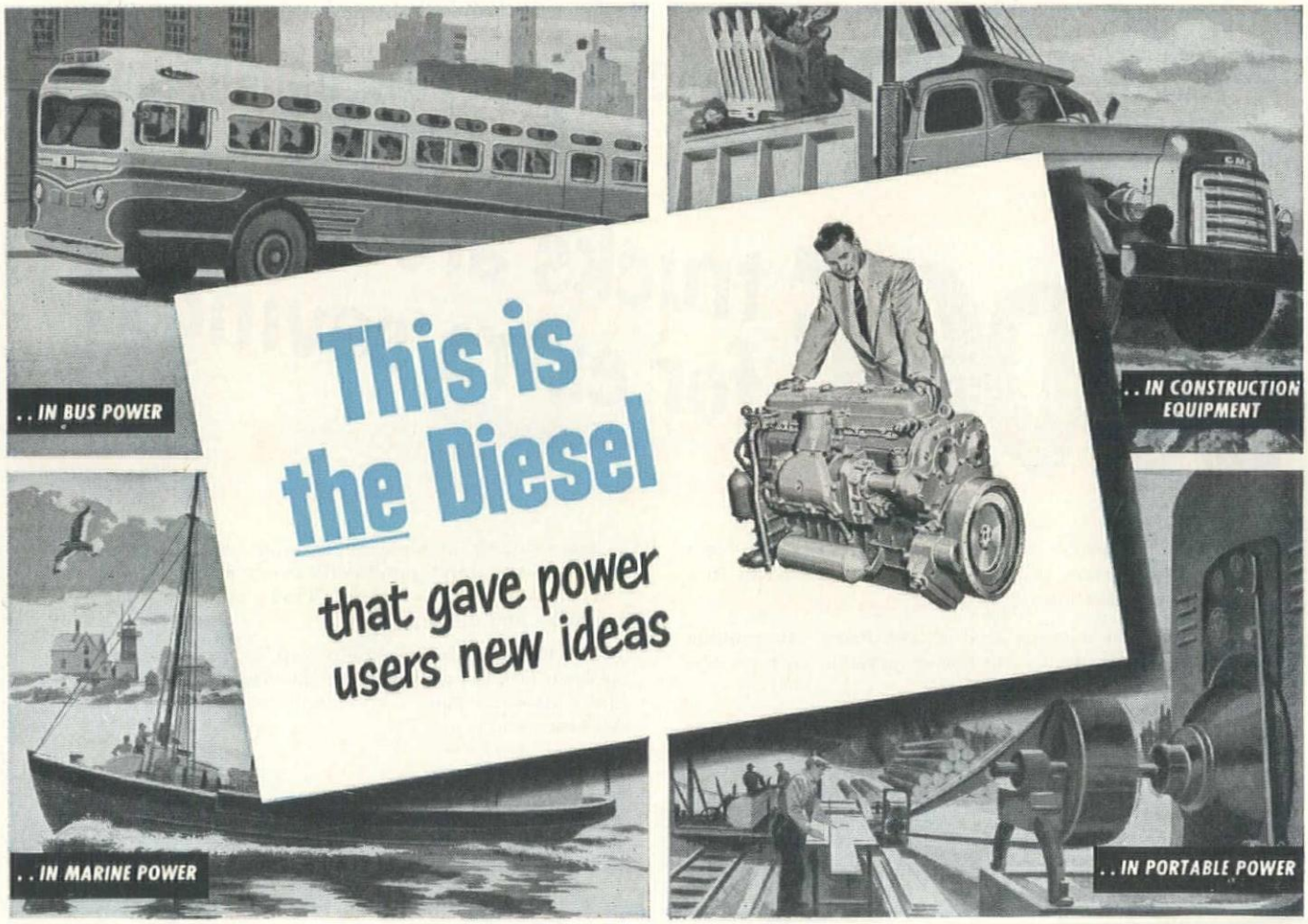
BAR NO.	3	4	5	6	7	8	9	10	11
SIZE (Rounds)	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1"	1-1/8"	1-1/4"
AREA (Sq. in.)	0.11	0.20	0.31	0.44	0.60	0.79	1.00	1.27	1.56
WEIGHT (Pounds per lineal ft.)	0.376	0.668	1.043	1.502	2.044	2.670	3.400	4.303	5.313

Specify U·S·S DI-LOK—the reinforcing bar that passes every test

U·S·S DI-LOK Reinforcing Bar

Columbia Steel Company • San Francisco • Los Angeles • Portland • Seattle • Salt Lake City

UNITED STATES STEEL



SHOW an engineer a better source of power and things start happening fast.

That's illustrated by events since General Motors first introduced the "71" Series of two-, three-, four- and six-cylinder Diesel engines, ranging from 50 to 200 horsepower—little brothers of the famed two-cycle GM Diesels that drive so many crack American passenger and freight trains.

Bus engineers went for the "71" at first sight. They liked its compactness, its fuel economy, its clean-burning operation. Now more than 20,000 city and inter-city buses are powered by GM "71" Diesel engines.

Army and Navy engineers approved its rugged strength and dependability. During the war they used 182,000 GM "71" Diesels to operate landing craft, tanks, tractors, bulldozers and other military vehicles.

So, too, have designers of all types of power-driven equipment turned to the GM "71" for low-cost efficient power. Today they are using it in heavy-duty trucks, tractors and earth movers, in work and pleasure boats, in cotton gins, lumber mills, oil rigs and for many other mobile, portable and stationary uses—*with remarkably successful results!*

That is because the GM "71" is a two-cycle engine that delivers power on every piston downstroke—in contrast to most Diesels that deliver power only on every second downstroke. This makes GM Series 71 Diesels more compact, lighter, faster-accelerating, smoother, cleaner-burning—*and twelve years' experience in applications totaling over 46,000,000 horsepower proves it!*

The GM "71" gives you Diesel brawn without the bulk. *It is Diesel power at its best.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES . . . Up TO 275 H. P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS . . . Up TO 800 H. P.

GENERAL MOTORS

Only GM Diesels provide all these advantages

Smaller size, less weight per horsepower • Two-cycle smoothness, power on every downstroke • Quick starting, on its own fuel • Unit injectors—no high-pressure fuel lines • Rapid acceleration • Cleaner burning • Better high-altitude performance • Easy accessibility

GM
GENERAL MOTORS
DIESEL POWER

"Your Key to Power Economy"

Here's a blueprint to LOW hauling costs!

DODGE trucks are "Job-Rated" for extra savings!

You can enjoy rock-bottom transportation costs and a brighter profit picture when you invest in a Dodge "*Job-Rated*" Truck.

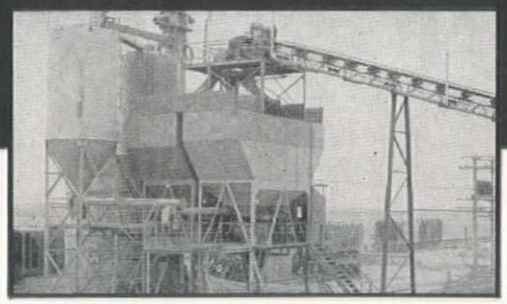
You'll get a truck that's "*Job-Rated*" to provide peak performance at lowest possible cost on the toughest of assignments.

Its engine will be "*Job-Rated*" to give you power to spare—with maximum gas and oil economy. Every chassis unit—practically every nut and bolt—will also be "*Job-Rated.*" That will cut your operating and upkeep costs.

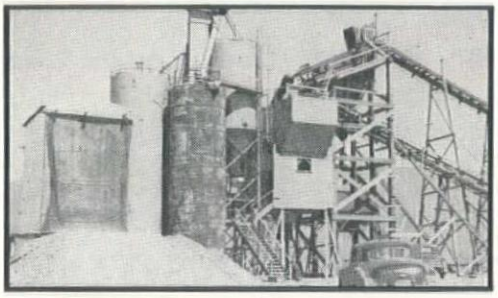
Your Dodge dealer can help you bridge the gap between profits and losses by showing you a truck that's sized to your job. It will be "*Job-Rated*"! See him soon.

With all their extra value **DODGE** "*Job-Rated*" **TRUCKS** *are priced with the lowest*

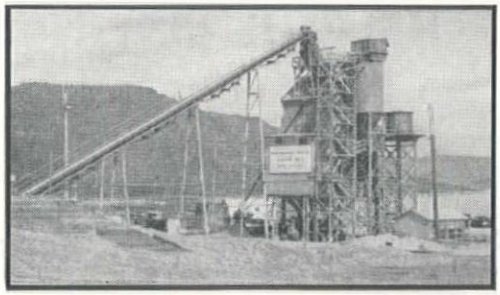
NOBLE BATCHING PLANTS CUT COSTS 4 WAYS for Columbia Basin Contractors



For Main Canal at Ephrata, Morrison-Knudsen batches with "twin" CA154 full automatic plants, two 2000 cu. ft. cement batching silos and a 2000-bbl. storage silo.



On East Low Canal, near Moses Lake, J. A. Tertling uses CA153 with aggregate screen at top of conveyor, a 500-bbl. cement batching silo and two 750-bbl. storage silos. This plant and the two at Ephrata have separate cement batchers.



At Grand Coulee Pumping Plant, Morrison-Knudsen batches 200,000 cu. yds. of concrete with NOBLE CA 354 full automatic plant and 500-bbl. cement batching silo.

Each of these NOBLE installations is different—yet each is "custom-built" from standard units.

More NOBLE batching plants are being used on the Columbia Basin project than any other make . . . and for 4 very good reasons.

1. *Batching Accuracy*—NOBLE'S exclusive photo-relay control of cement is automatic and unaffected by heat or humidity; you always get instant, accurate louvre-gate cut-off; easily batch to the strict specifications of the Bureau of Reclamation and U. S. Engineers.

2. *Bulk Cement Savings*—NOBLE storage silos enable you to receive and handle cement from storage to batcher through a single elevator. You save on equipment costs; and you buy cement at money-saving bulk prices. It's easy to add a NOBLE storage silo to your present set-up.

3. *Short Erection Time*—Noble plants are shop fitted before shipment. This, plus an all-welded center section with automatic batching controls and motor switches in place, enables a 4-man crew to erect a Noble CA154 plant in 3 or 4 days.

4. *Plant Engineered for You*—Like these and other Columbia Basin contractors, you get a plant designed and built to your exact needs with all the Noble cost-cutting advantages . . . often at stock-model prices. Standard units include aggregate bins from 80 to 1500 tons; cement silos from 500 cu. ft. to 7500 bbls.; weigh hoppers from 1 to 4 yds.

Let us help you. Wire, write or phone NOW. No obligation.

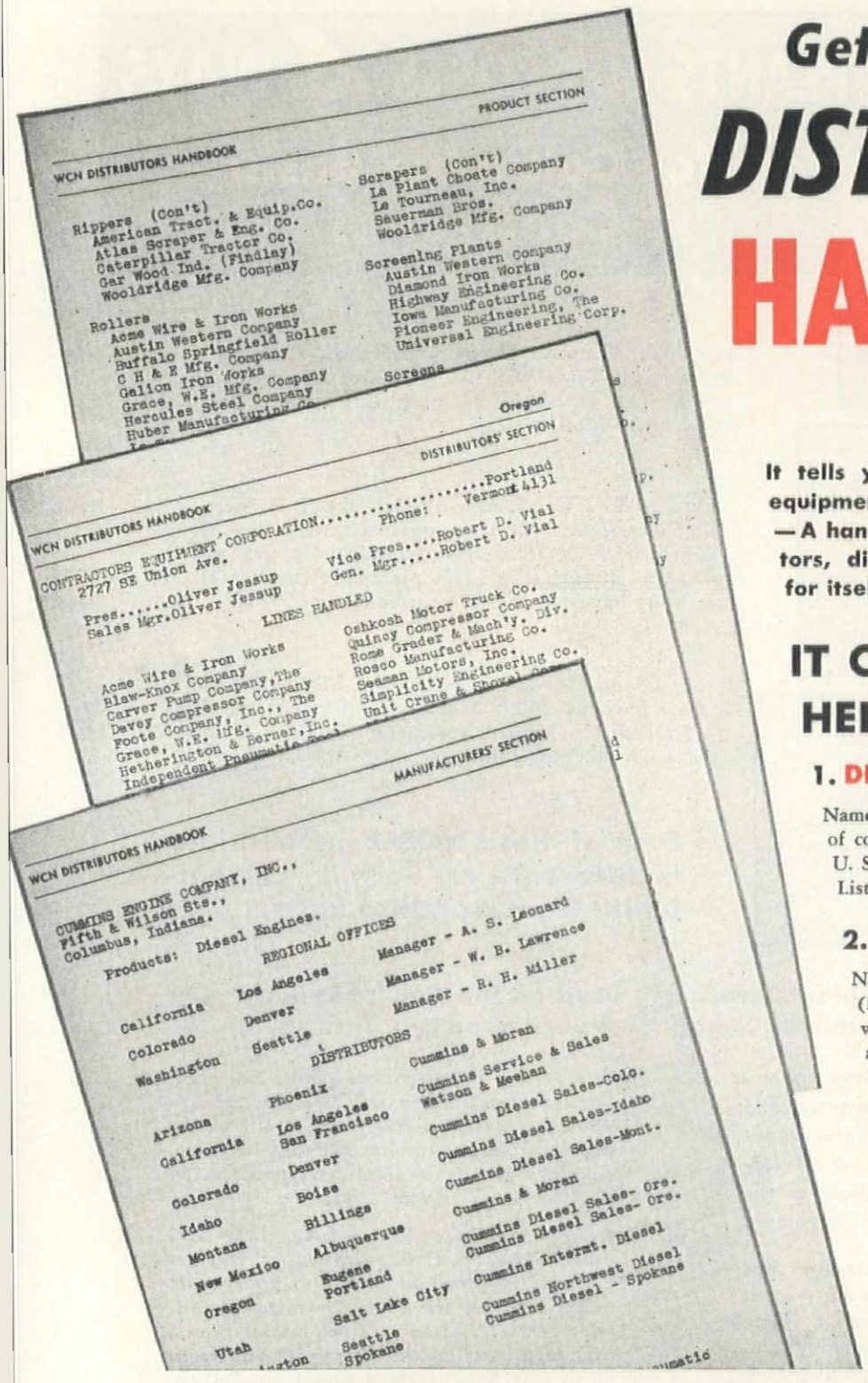
DESIGNERS AND BUILDERS OF
CEMENT AND AGGREGATE BATCHING PLANTS . . . BULK CEMENT PLANTS . . . AGGREGATE BINS AND CEMENT SILOS . . . STEEL FORMS FOR CONCRETE CONSTRUCTION JOBS . . TUNNEL AND DRILL JUMBOS CONVEYORS AND ELEVATORS . . WEIGH METERING DEVICES

NOBLE CO.

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

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

BORCHERT-INGERSOLL, INC., St. Paul 4, Minn., DAVIS, HANCOCK & KOSTER, INC., Dallas 15, Tex.; RAY L. HARRISON CO., INC., Albuquerque, New Mexico; INTERMOUNTAIN EQUIPMENT CO., Boise, Idaho; LOGGERS & CONTRACTORS MACHY. CO., Portland 14, Ore.; SIERRA MACHINERY CO., Reno, Nev.; STAR MACHINERY CO., Seattle 4, Wash.; TRI-STATE EQUIPMENT CO., Spokane 6, Wash. WESTERN CONTRACTORS SUPPLY CO., Chicago 12, Ill.



Get the new WC DISTRIBUTORS HANDBOOK

1950 EDITION

It tells you *Who* handles *What* construction equipment and *Where* in Western half of U. S. —A handy, time-saving reference for contractors, distributors, and manufacturers—Pays for itself in savings on wires and phone calls.

IT CONTAINS THESE HELPFUL LISTINGS . . .

1. DISTRIBUTORS

Names, addresses and phone numbers of distributors of construction equipment in the Western half of the U. S., the lines they handle, names of their branches. Listing is alphabetical by states.

2. MANUFACTURERS

Names of construction equipment manufacturers (listed alphabetically for entire U. S.), together with products, locations of their Western branches, and names of their Western distributors.

3. PRODUCTS

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

4¼" x 7½"
252 PAGES

$5.00
POSTPAID

THEY'RE GOING FAST!

Compiled and Published by

WESTERN CONSTRUCTION

Formerly Western Construction News

609 Mission Street, San Francisco 5, Calif., YUkon 2-4343

MAIL THIS COUPON TODAY!

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

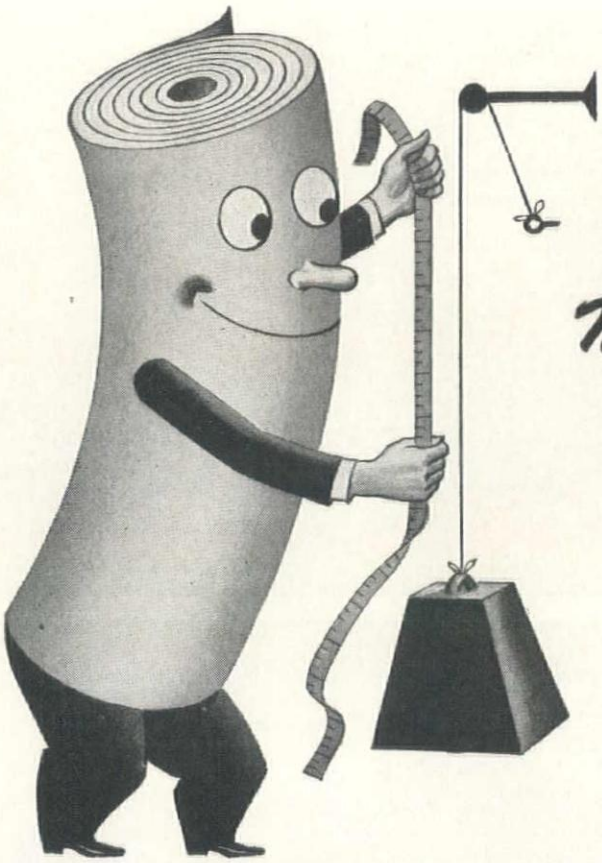
YES, I enclose $5 (add 15c if ordering from a California address). I want a copy of WC 1950 DISTRIBUTORS' HANDBOOK.

Name.....

Company.....

Address.....

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

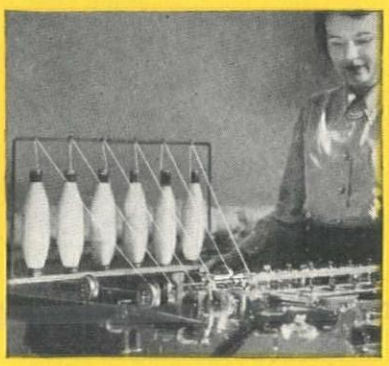


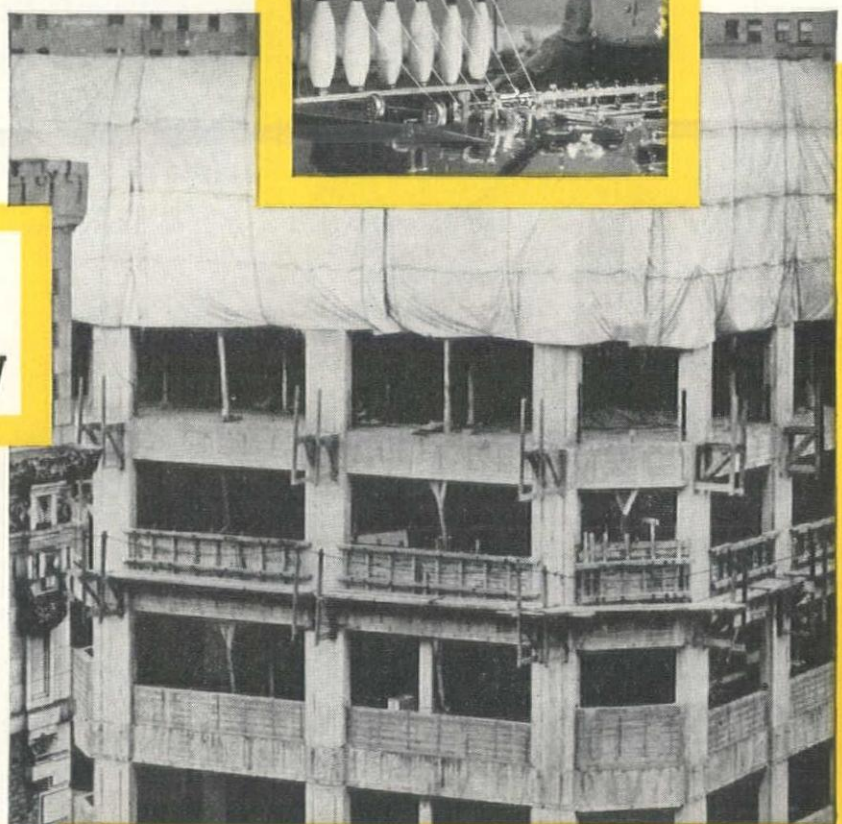
UNIFORMITY

Makes the Big Difference

In TARPAULINS

TESTING STRENGTH AND ELONGATION OF YARN WITH MOSCROP TESTER. This unit automatically tests 6 strands of yarn at one time. One of a series of comprehensive laboratory controls throughout production to assure fabric uniformity in all Mt. Vernon-Woodberry products.





Mt. VERNON — EXTRA

Gives You

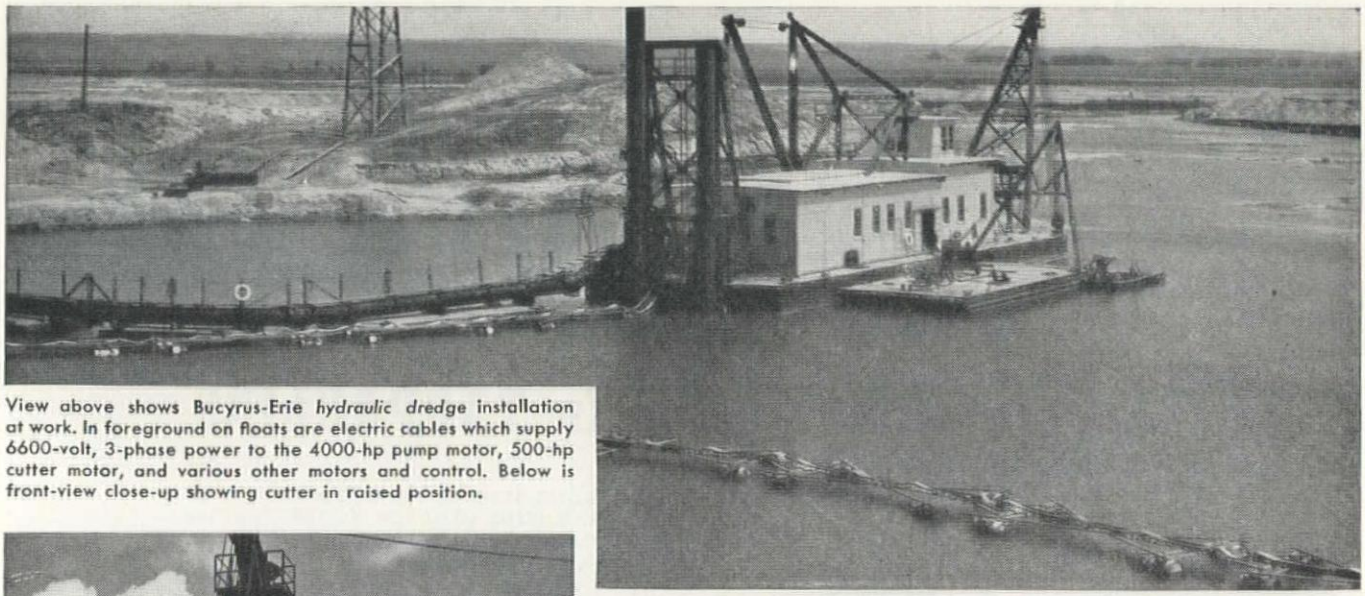
Greater Fabric Uniformity

The greater uniformity of Mt. Vernon Extra Duck assures you the two most important qualities you want in tarps — top protection and top wear. You'll find your repair and replacement costs reduced considerably.

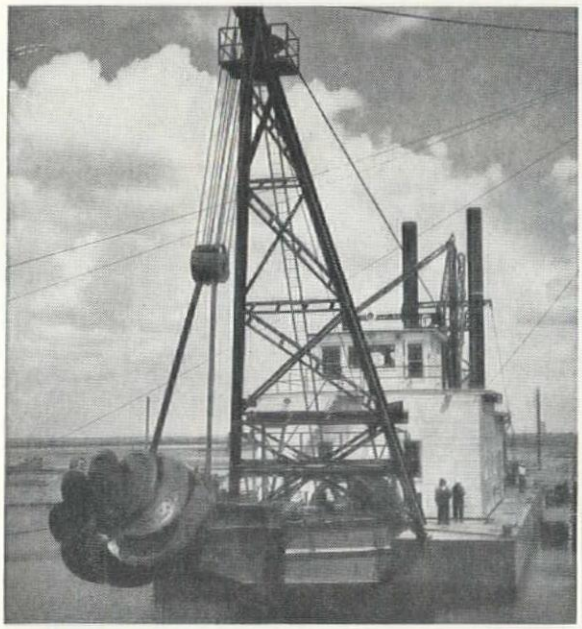
Mt. Vernon-Woodberry **TURNER HALSEY** COMPANY *Selling Agents* 40 WORTH ST. · NEW YORK *Mills*

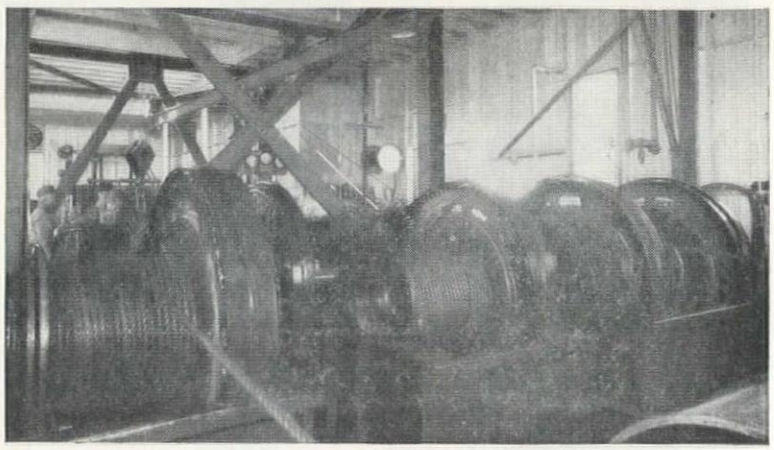
Branch Offices: Chicago • Atlanta • Baltimore • Boston • Los Angeles

Akron



View above shows Bucyrus-Erie *hydraulic dredge* installation at work. In foreground on floats are electric cables which supply 6600-volt, 3-phase power to the 4000-hp pump motor, 500-hp cutter motor, and various other motors and control. Below is front-view close-up showing cutter in raised position.





Inside, these hoist cable drums are driven by G-E motors. After ten years of rough duty, this fully electrified dredge continues to give top performance for its owners.

Vacuum-cleaning RIVERS . . . *Electrically*

This electrically driven hydraulic dredge is a pretty rugged looking "vacuum cleaner." But biting-into and sucking-up river bottoms is a rugged job—though it does require accurate control. That's why Bucyrus-Erie uses *electric drives* in most dredge installations.

Electrified construction equipment is being used more and more to handle difficult jobs—jobs that require smooth, completely dependable operation. With G-E power distribution systems supplying the voltage and G-E motors and control driving your equipment, you are assured of all the benefits of electrification plus G-E engineering assistance in application, installation, and service—wherever the job may be. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

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

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.

Electrified Construction
BETTER PRODUCT
LOWER COST

GENERAL ELECTRIC

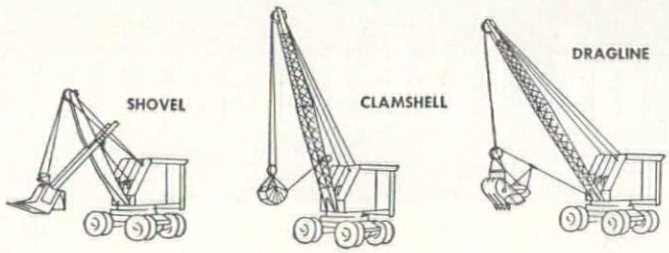
664-11

Announcing!

BAY CITY 25CW CRANEWAGON

- SELF-PROPELLED
- ONE-ENGINE DRIVE
- ONE-MAN OPERATED
- HYDRAULIC STEERING
- 8 RUBBER TIRES
- AIR BRAKES
- TWO AXLES

Now you can get BAY CITY performance and efficiency in this NEW 25 CW self-propelled, one-man operated, one-engine CraneWagon. Rated at 6½ ton capacity for use with ½ yard buckets, the 25 CW is fully convertible — packed with well-known, proven BAY CITY features that provide greater mobility. Travel speeds range from 1.8 to 9.9 M.P.H. with powerful traction on all 8 heavy-duty tires plus hydraulic steering. You will want to know more about this fast, easy operating, convertible CraneWagon which has just recently been added to the BAY CITY line. Write for Bulletin 25 CW-A. BAY CITY SHOVELS, INC., BAY CITY, MICHIGAN.



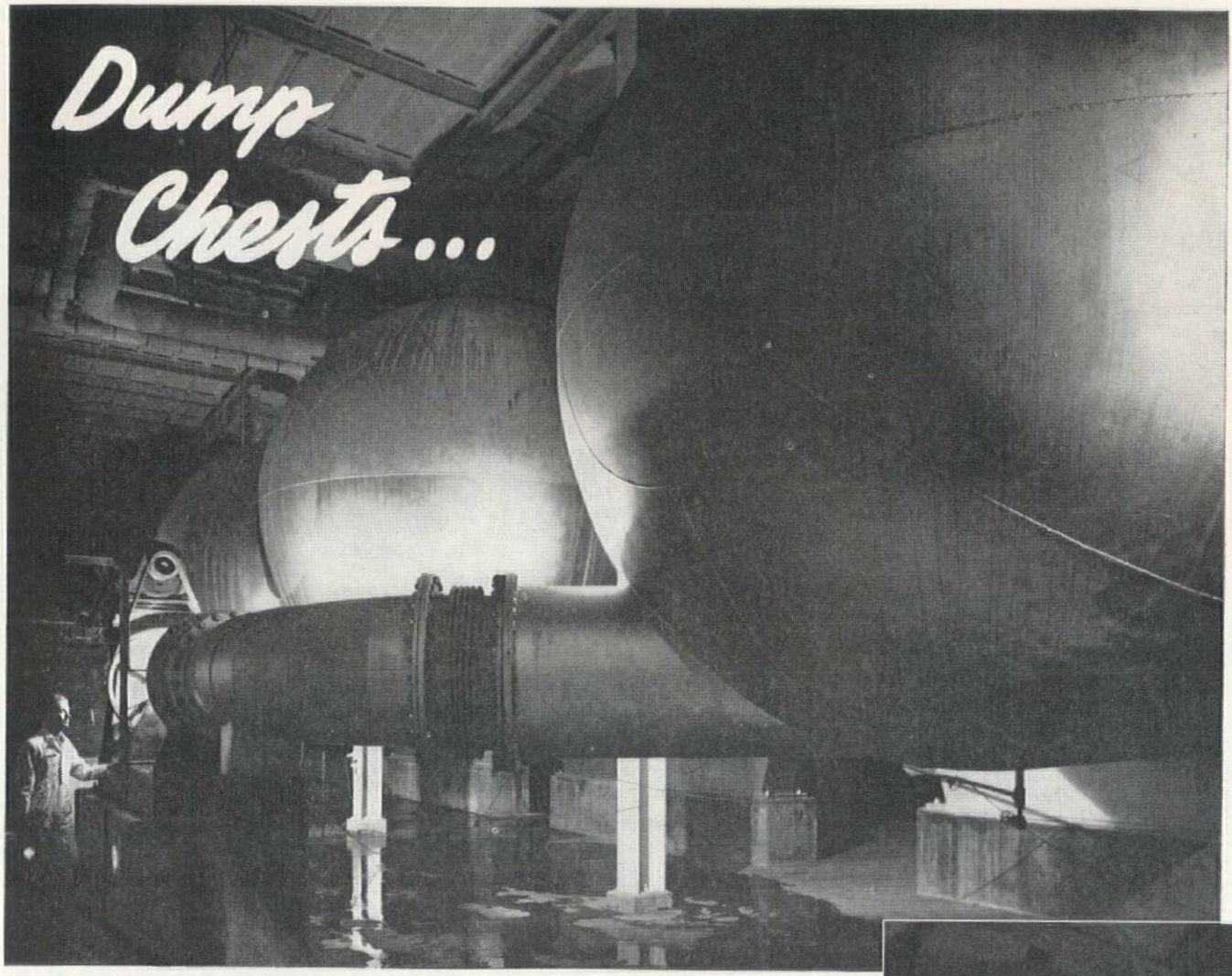
TRENCH HOE

MAGNET

BAY CITY

170

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS



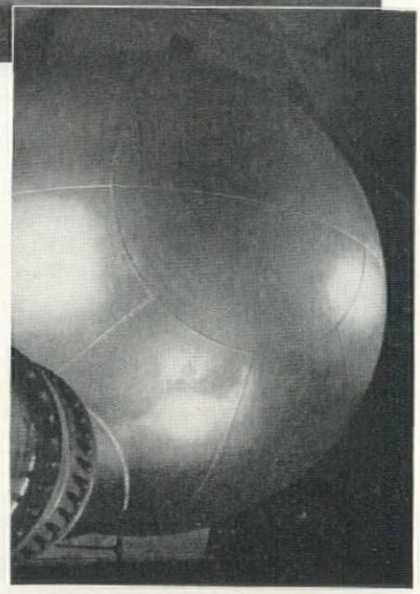
at a Washington pulp mill

The gracefully-curved modernistic structures shown in the above view are pulp dump chests at the Weyerhauser Timber Company's pulp mill at Longview, Washington. Sulphite waste liquor is used to wash pulp from the digesters into these dump chests.

The four 16-ft. diam. by 71-ft. chests were fabricated at our Chicago plant and erected at Longview by one of our experienced field crews. Each one is supported by two ring girders spaced 37 ft. apart. The base of one girder on each vessel is fixed, the other moves as the shell expands and contracts. Each chest has a 40-in. pipe connection in each end and one 8-in. and one 20-in. nozzle at the top. All of the chests have acid-resisting linings.

These dump chests are typical examples of the steel plate structures we fabricate and erect. Some of our other products include: flat-bottom welded steel reservoirs, oil storage tanks, and elevated water tanks. Write our nearest office for estimates the next time you need steel plate structures of any type.

Local Steel Plate Service for the West—Our plant at Salt Lake City, Utah, is now equipped to make the full line of Horton steel plate structures. It enables us to reduce to a minimum the length of haul and shipping time required to supply fabricated material for installation in the Rocky Mountain area, the Pacific Northwest, and on the Pacific Coast.



This view clearly illustrates the skilled workmanship required to shape heavy steel plates and the carefully-welded joints that are so important in building field-erected pressure vessels.

CHICAGO BRIDGE & IRON COMPANY

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

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA. *In Canada*—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

WESTERN CONSTRUCTION

September 1950 Vol. 25, No. 9

Korea Makes Everyone a Soothsayer

EVERYONE in the construction industry has suddenly become a soothsayer. Everyone is anxious to seem important—and helpful—in expressing an opinion as to what the present international developments will do to construction in the months ahead. Everyone has suggestions on what contractors and engineering organizations should do in the light of these crystal-ball predictions. Everyone ought to confine these predictions to the one word "Uncertainty," with an added sound suggestion as to the need for watching developments closely, and then *go back to work*. Somebody has to do something beside sit and watch the international barometer. The construction industry has work to do.

Developments which direct the course of construction for the next months and possibly years will be controlled by forces which are far beyond the horizon of normal civil engineering and contracting attention. The average individual will do himself and his organization more good by playing the game with such new rules as may develop, rather than by spending time worrying over the possible changes in the rules.

Obviously, there will be changes in emphasis and a reorienting of the service which the construction industry will render to the Nation during the present period of strain. But the same engineering groups will be designing in steel and concrete, and the same contracting organizations will be moving earth and driving piling. If they stay alert to trends and stay up to date on costs and procedures they will be ready for the eventualities of tomorrow and the next day.

Most of the new trends require no unusual amount of foresight. For example, the broad classification of construction work "essential for defense" will have an unrestricted future. By the same token, recreational projects, institutional or public type buildings, and ordinary water works and sewage improvements will fall under close scrutiny and probably go into a deferred classification. Highways fall into a mixed category. While the general programs for developing integrated highway systems will undoubtedly be subject to modification, there will be such emphasis on essential highway construction that the total volume of work may not be diminished to any appreciable extent—particularly here in the West. Construction of irrigation facilities may fall under a ban, but a corresponding acceleration of power producing facilities will provide at least an even offset. All indications point to a further and logical expansion of industrial activity in the West. Although housing will obviously be non-essential for the present period the added population will make the pressure even greater for the future. The general construction picture in the West remains good, even though different. Crystal gazing is not essential to keep it that way, but hard work is.

Specifications Are in Evolution

TIME WAS, when contractors gave little concern to specifications handed them by engineers, but confined themselves to the business of getting the work done as they were directed. Occasions would arise when contractors would suggest changes in the plans or requirements during the process of the work. These ideas would normally receive a cool reception on the part of the engineer, since the result would usually be to the obvious advantage of the contractor, and if not obvious the engineer sensed an ulterior motive to obtain a more subtle but similar objective.

Gradually the function of the Construction Engineer began to emerge on the larger projects to provide the link between the design office and the field work carried out by the contractor. These engineers noted and reported the design features which tended to slow construction progress and add man-hours to the work. Their observations and suggestions brought changes in both design and specifications with advantages to all.

Similarly, organized contractors under the leadership of the Associated General Contractors began to consider fundamental changes that might be made in engineering specifications to effect economies in construction time and costs. A mutual interest in the problem developed in the Bureau of Reclamation, and a series of conferences resulted between representatives of the AGC and the Bureau. Some of the tangible results of this joint effort are reviewed on page 65 of this issue. As an indication of current trends in specification writing this summary will be helpful to all engineers. It is an example of the results that may be secured from joint action of engineers and contractors in the interest of giving the public more and better construction.

Value of Unit Bid Figures

MOST SENSITIVE, as well as the most positive barometer of construction cost trends is a summary of unit bid figures. Prices of materials and labor rates are the raw materials for these figures, but the final answer on the cost of construction "in place," with all the significance of new field techniques and the impact of contractors' ingenuity is only reflected in the actual offers. This issue (page 110), and every issue, an extensive selection of current unit bids is presented, selected for both geographical spread and variety of type of construction. Not only is this service of importance to contractors in watching cost trends, but it represents the means for formulating engineers' estimates on the most current and useable base.

MAKING LITTLE ONES OUT OF BIG ONES

"61"

Designed for fast, economical production where extreme accuracy in grading to size is not required. Compact, lightweight and readily portable. Simple design and sturdy construction keep operating and maintenance costs at a minimum.

The AUSTIN-WESTERN LINE includes Jaw Crushers and Roll Crushers in a wide range of sizes; plus matching screens, elevators, conveyors and bins. Exclusive features increase output, assure constant operation and reduce maintenance costs. Skilled engineering characterizes each and every Austin-Western crushing, screening and washing plant, which is tailor-made to a particular production problem. We would welcome the opportunity to discuss yours.

AUSTIN-WESTERN COMPANY

Aurora, Illinois, U.S.A.

"201"

You'll like its READY PORTABILITY . . . CHOICE OF FEED . . . HIGH OUTPUT. The "201" is of a size and weight that can be transported over most highways without a special permit . . . may be had with either shovel-loading hopper, or swivel drive for separate feed conveyor . . . is capable of producing especially large amounts of ¾" and smaller product.

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*

First Field Test of a New Process for Rejuvenating Old Asphalt Pavement

Newly-developed softener mixed with windrow of pulverized material from old pavement—Resultant mixture re-layed on old base equivalent to a new SC 5 or 6 plant-mix surface

RESTORING rough, old asphaltic pavements to further years of usefulness has been the subject of an extensive field study carried out by the California Division of Highways on two lanes of a section of 4-lane U. S. 40 near Sacramento. The process of rejuvenation which was tested includes the following operations: (1) ripping up old pavement, (2) pulverizing, (3) mixing the pulverized material with a newly developed asphalt softener in a traveling road plant, and (4) re-laying the resultant mixture on the old base by road-mix methods. The liquid asphalt softener is a product developed by Shell Oil Co. during the last few years. It is an aromatic petroleum product in the gas-oil boiling range, and has a weight and viscosity close to diesel oil.

Prior to the State test, it had been tried for several years on pavements in California municipalities. These first applications were usually made by direct spraying on the old pavement to soften it in preparation for reworking and relaying by conventional roadmix methods. This method was not generally successful because of loss of softener through excessive run-off due to the low porosity of the traffic and weather hardened road surface. Another method consisting of applying the softener to the partially broken pavement prior to pulverization proved rather ineffectual due to loss of softener to the base. The key development introduced in the current test involved adding the softener to the windrowed mix after maximum mechanical breakage was effected.

Rigid control for first test

The current test was the first time the product and controlled field procedure have been tried on a major highway. Under the direction of the Division of Highways the field equipment was furnished on a rental basis by J. P. Breen, Sacramento contractor, so that the work could be carried out as an experiment with the expectation that modifications would be made in equipment and procedure.

Traffic was detoured onto the highway shoulder at the experiment site. A strip 22 ft. wide was cut and ripped from the existing asphaltic concrete pavement for a length of 2,700 ft. This slab had been laid down many years ago and subsequent re-topping had increased its thickness to 8 in. or more. Generally it was supported on a crushed rock base course. On one stretch, the asphalt pavement rested on a Portland cement concrete slab. In this case, the pavement was ripped and broken directly on this slab. On another stretch, the ancient pavement lay directly on a layer of fine sand. In this section the broken pavement from half of the roadway was bulldozed to the other side onto the existing roadway, where it was more easily pulverized against a hard surface. The sand base was cement-stabilized before the treated asphalt was re-laid.

The Sacramento field test was carried out under the most rigid conditions of control. It was the first major test of the method, and the location provided conditions of heavy traffic around workmen and equipment, unexpected conditions such as sand layers slowed progress, the asphaltic concrete pavement was far thicker than is to be expected normally, and different makes of equipment were tested at the site by the contractor to determine their capacities for this type of work.

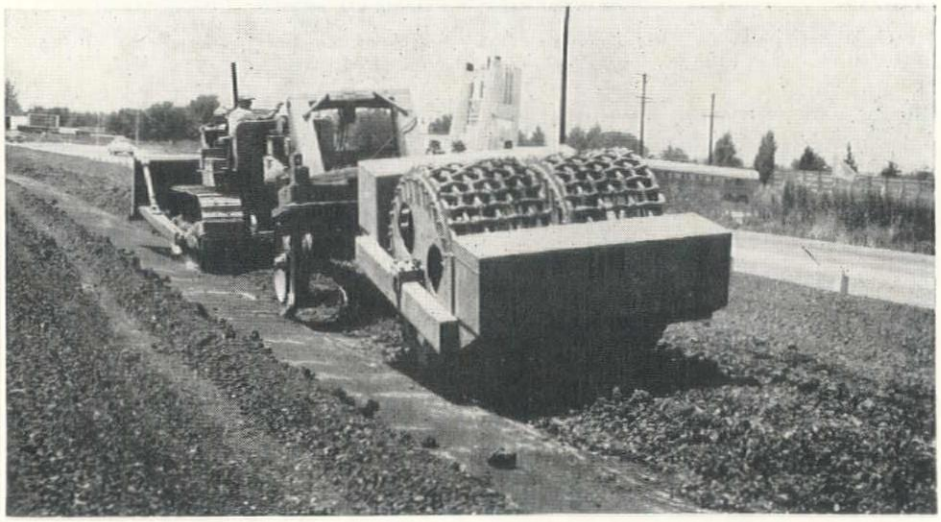
Steps in the operation

The 22-ft. wide test strip was first separated from existing pavement by drilling a line of 6-in. deep holes on 30-in. centers to guide the break. Later it was found that a scarifier with a single tooth could crease for this break-line at less cost. The next step was to rip up

FIRST STEP in the test was ripping up the old pavement, accomplished here by a LeTourneau K-30 ripper pulled by a Caterpillar D-8 tractor.

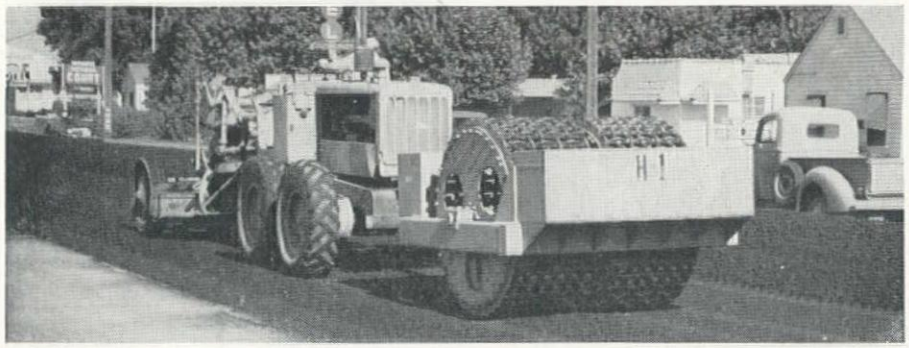
THE RIPPER left large chunks which were bulldozed to the side onto undisturbed pavement to be pulverized against the hard surface.

A HYSTER Grid Roller behind the ripper broke up the large chunks and then made several passes until the material was nearly reduced to original aggregate size.



FOLLOWING the Grid Roller, an Athey loader and impact breaker made one pass to reduce lumps to the size of original aggregate and deposit the material in a windrow.

A GARDNER road-mixer worked the windrow, mixing the aggregates and applying the asphalt softener. Between 6 and 8 passes were made with the road-mixer.



FURTHER passes with the Grid Roller over the newly-mixed material compacted the material in several courses to build the top surface up to its original thickness.

the existing pavement—in this case a hard job because some of the pieces broke out as big as the top of a desk. In the next step, the chunks of pavement were broken by a tractor and Hyster grid roller combination. The 14-ton grid roller acted as a primary breaker ahead of an Athey loader and impact breaker. The impact breaker made one pass, reducing the lumps to the size of the original aggregate (1½-in. minus) and then deposited the material in a windrow.

Next, a Gardner road-mixer worked the windrow, mixing the aggregates and applying the asphalt softener. Between 6 and 8 passes with the road-mixer were made. Two or three were with a fresh application of softener, and the rest were dry runs made exclusively for mixing.

The quantity of softener used is predetermined primarily on the basis of viscosity of the fluxed asphalt from consideration of the amount and condition of the old asphalt. The amount of softener may be adjusted on the job by small additions or reduced by aeration to meet varying conditions encountered on the job.

Once the softener was applied and mixed, the material was bladed in a 3-in. loose lift and rolled to 2-in. in much the same way roadmix material is handled. The mix tested at Sacramento bulked about one-third from 150 to 105 lb. per cu. ft. The grid roller was used for initial compaction, making four passes ahead of a Buffalo Tandem.

The finished product is an asphalt pavement that is the equivalent of a new SC 5 or 6 plant-mix surface. In most cases the softener cuts the oxidized and hardened asphalt back to an SC 5 or 6 material.

Prior to any field work on this type of rejuvenation program, extensive analysis of the old pavement is desirable to indicate whether or not additional asphalt or aggregate should be added during the process to improve the final mix. In some cases it is expected that from ½ to 1% of a 200-300 penetration asphalt should be added during the mixing process. On the Sacramento test the laboratory recommended the addition of a quantity of new aggregate in the No. 8 to 5/16-in. size. This material was blended into the windrows and thoroughly mixed. On the test location the reclaimed asphalt was sufficient to take care of the added aggregate.

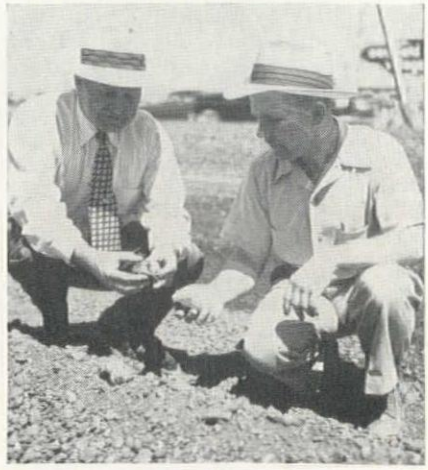
In general the process necessitates the redesign of the mix to compensate for any inherent lack of stability, either by added new asphalt or aggregate.

Since the recent job was primarily a test no attempt was made to develop speed of operations or measure output in terms of economy. As is characteristic of all road-mix type of operations, the work can be performed most economically on long stretches of roadway. Field requirements for the process include dry weather and a temperature of 60 deg.

The work was done under the supervision of District III, California Division of Highways. C. H. Whitmore is district engineer and R. I. Nicholson is district maintenance engineer. Robert Biggs was inspector on the job. Jack Breen, Sacramento, furnished the equipment under a service agreement.

The features of the field procedure have been made the subject of a patent application by The Reclaimix Process. This organization, under the direction of Charle Neville, manager, supervised the reclaiming operations on the test operations. The asphalt softener was supplied by the Shell Oil Co.

OBSERVING the job — Raymond Harsch, (left), Manager of the Asphalt Department of Shell Oil Co., and Ernest Zube, Associate Physical Testing Engineer, Div. of Highways.



Significant Changes in USBR Specs

Clarifying provisions which have caused misunderstandings and difficulties for contractors is the objective of Bureau of Reclamation work on specifications—Practical and precise definitions are aimed at providing bidders with information that can be analyzed easily and accurately

By
HYMAN BERGER
Engineer, Bureau of Reclamation, Denver, Colo.

THE CURRENT program of the Bureau of Reclamation embraces as much as Reclamation has accomplished from its beginning in 1902 to 1933, inclusive—the equivalent of 30 years' work in this single year. The scope and velocity of operations in carrying out this construction program has focused attention on all phases of work, and increasing emphasis has been particularly placed on the development of specifications and better contractual relations. The outstanding success and ability to get the job done by contractors engaged in Reclamation construction throughout the West has been paralleled by a progressive attitude in the Reclamation organization in recognizing the problems of the contracting fraternity and endeavoring, through a continuing critical review of specifications, to resolve a combination of economy, speed and quality into the construction of Reclamation projects.

In recent years, with the completion of many of the smaller projects, Reclamation efforts have been concentrated on the development of large multiple-purpose projects. Such projects constitute the major portion of the current $387,000,000 construction program. With the attendant responsibilities of executing the research, design and construction phases of these large-scale developments, it has been necessary to examine all aspects of Reclamation's specifications, procedures and requirements, particularly those connected with modern construction practice or those affected by the continual and progressive ideas of the construction industry in developing new techniques and new construction equipment.

Practical provisions result in lower bid prices . . .

The current objective in writing specifications for Reclamation work is directed toward clarification of those provisions which have occasioned misunderstandings and difficulties previously encountered in prosecution of the work, and toward elimination of expensive risks and unnecessary contingencies that contractors may be required to assume. These risks and contingencies are, of course, reflected in higher bid prices. Every effort is made to provide bidders with a definite, complete and factual set of specifications to bid on so that pertinent factors of the work involved can be analyzed properly, thus minimizing the inclusion of contingency costs in bid prices.

In addition to internal developments and improvement in specifications and contract procedures, Reclamation and a committee on specifications of the Associated General Contractors of America have participated in periodic meetings to encourage closer understanding in contractual relations and to discuss and resolve mutual contract and construction problems. A number of important modifications and changes in specifications procedures have been considered and worked out as a result of discussions and suggestions submitted by this cooperating committee. George H. Atkinson (President, Guy F. Atkinson Co., South San Francisco) is chairman of the AGC's Bureau of Reclamation Contact Committee.

For many years there has been a need in specifications writing for a more practical and precise manner of describing desired results for degree, quality, tolerance and appearance in workmanship. The customary phraseology, in practically all specifications submitted to the construction industry, generally states that the job shall be done in a workmanlike manner suitable for the purpose intended and as approved by the engineer or architect. Interpretation of such statements is almost entirely dependent upon personal opinion.

The need for a more concise description of workmanship standards has been even more pronounced during this post-war construction era. The philosophy of Lord Kelvin (1883) has often been expressed in the engineering world in connection with standards for materials and workmanship and is particularly apropos in discussion of tolerances for concrete construction. "When you can measure what you are speaking about and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager kind and unsatisfactory kind; it may be the beginning of knowledge but you have scarcely, in your thoughts, advanced to the stage of science, whatever the matter may be."

Establishing tolerances for concrete construction . . .

Adopting Lord Kelvin's philosophy as an approach to the problem of tolerances for concrete construction, study was made in an effort to establish appropriate standards for permissible variations from the dimensions shown on the drawings. Specifications now include a paragraph establishing tolerances for various features of concrete work and a paragraph stating allowable variations for specified types of formed and unformed concrete surface finishes. These provisions differentiate the local variations of surface finishes such as waviness, roughness, abrupt intrusions, or offsets (finish) from the general deviations (tolerances) as related to shape, dimensions, and departure from alignment or from the vertical or level. A general guide paragraph is adapted to the individual job and concrete tolerances are tabulated to cover the various divisions of work and individual structures. Tolerances are listed for the various features and dimensions of concrete canal lining, canal-type structures, power plants, dams and appurtenant works, and for placing of reinforcement steel.

The specifications require that the finished lines and surfaces be within the allowable limits as stated for both tolerances and the class of finish. Under the specifications, the contractor is responsible for setting and controlling the forms. However, the Bureau will check the formwork and advise the contractor in cases where the forms are faulty or have not been set correctly, and point out to the contractor, before concrete is placed, that the finished work will exceed the permissible limits as a result of such faulty formwork. If, for example, the forms, as set, are near the maximum permissible variation from the required alignment, the variation within the formwork caused by concrete placement may result in exceeding the allowable tolerance, and correction of the concrete surface would be costly, burdensome, and in many cases, unsatisfactory.

Symbols designate classes of concrete surface finish . . .

The various types of concrete surface finish are divided into classes in accordance with the quality required and the function performed by the surface finish. The classes of concrete surface finish required for each job are designated by symbols F1, F2, F3, etc., for formed surfaces, and by U1, U2, and U3 for unformed surfaces. The specifications describe the locations where each class of finish will be required and describe the minimum acceptable requirements for each class. Surface irregularities are divided into and defined as abrupt and

gradual. Abrupt irregularities are offsets caused by misplaced forms and are measured directly. Gradual irregularities are measured by the use of a straight edge or template and permissible variations from the template are specified for each class of finish. The length of template is 5 ft. for testing of formed surfaces and 10 ft. for testing of unformed surfaces.

The related specifications paragraphs covering formwork requirements and repair of concrete have been modified in accord with and for simultaneous use with the provisions for concrete tolerances and the surface finishes.

(1) Variation from the plumb:	
a. In the lines and surfaces of columns, piers, walls, and in arrises	In 10 feet ..... 1/4 inch In any story or 20 feet maximum ..... 3/8 inch In 40 feet or more ..... 3/4 inch
b. For exposed corner columns, control-joint grooves, and other conspicuous lines	In any bay or 20 feet maximum ..... 1/4 inch In 40 feet or more ..... 1/2 inch
(2) Variation from the level or from the grades indicated on the drawings:	
a. In floors, ceilings, beam soffits, and in arrises	In 10 feet ..... 1/4 inch In any bay or 20 feet maximum ..... 3/8 inch In 40 feet or more ..... 3/4 inch
b. For exposed lintels, sills, parapets, horizontal grooves, and other con-	In any bay or 20 feet maximum ..... 1/4 inch

TOLERANCES for various features of concrete work and a paragraph stating allowable variations for specified types of formed and unformed concrete surfaces are now included in Bureau of Reclamation specifications. Table above is a facsimile of the tolerances for reinforced concrete buildings as provided in specifications for the Keyhole Dam project in Wyoming.

Standard specifications for types of construction . . .

Contractors and engineers have at various times suggested that Reclamation publish standard specifications for appropriate types or divisions of construction. These suggestions have been made on the basis that once the contractors are familiar with standard requirements and procedures, the specific requirements for the individual job and any variance from standard or basic requirements can be readily identified. The standard specifications plan was introduced by issuance of standard specifications for construction of canal systems and later followed by issuance of standard specifications for construction of 69-, 115-, and 161-kv., woodpole, H-frame transmission lines.

A Special Provisions volume is issued for the individual job to cover such special and local requirements as wage rates, completion time, drawings, work not covered by the standard specifications, and detailed modifications to the standard specifications. It is planned to follow the standard specifications procedure for other appropriate phases of construction.

Provisions allowing bidder to furnish materials . . .

Reclamation specifications previously specified that construction materials were to be furnished by the Government. Specifications currently provide for the contractor to furnish the major portion of construction materials. In general, the Government is still furnishing items of large quantity and specially designed metalwork, machinery, and operating equipment. This practice has necessitated incorporation of material specifications in construction specifications, and has also necessitated solution of various problems affecting the inspection of contractor-furnished materials, and the shipment of such materials by Government bills of lading. Shipment of contractor-furnished materials is made on Government bills of lading in cases where the Government can effect substantial savings in freight charges on carload-lot shipments of construction materials.

Exhaustion of the funds provided by Congressional appropriations for certain projects pointed to the desirability of spelling out in precise language in the specifications the respective rights and obligations of the contracting parties under the provisions of the Reclamation laws. Accordingly, there are now incorporated in contracts extending beyond one fiscal year provisions which afford the contractor substantial protection. Each contractor is informed before submission of bids as to the amount of funds reserved for payment of earnings under the contract during the current fiscal year. When additional funds become available, written notice is given to the contractor of further amounts reserved. Should funds become exhausted before the completion of the contract, the contractor may, at his election, suspend the work pending availability of additional funds, or he may continue the work at his own risk in anticipation of additional funds being made available by the Congress. In the event Congress should fail to provide such funds during its regular session, the contract may be terminated at the option of the contractor.

Fixed costs distributed by subdividing work items . . .

Allocation or distribution of overhead, plant, and other fixed and intangible costs is one of the major problems confronting the bidder under a unit-price type of contract. In some instances bidders have found it difficult to confirm estimated quantities contained in bidding schedules. This raised the problem as to how to allocate these indirect costs among the unit prices bid. If the bidder spreads the charges of his indirect costs on a self-determined percentage (assume 85%) of the estimated quantities, any upward revision of these quantities, even if only to the extent of reaching the estimated quantities in the bid schedule, means that the contractor will receive a proportionately larger price than if he had distributed the indirect charges on a normal 100% basis. On the other hand, any downward revision of quantities from this 85% base may result in the contractor's failing to recover the total of his fixed costs.

The AGC-Reclamation Contact Committee proposed that Reclamation consider means of setting up provisions in the specifications for large jobs to afford contractors an opportunity to make a more equitable and proper distribution of fixed charges in their bids, regardless of variation in quantities from original bid estimates. Such a procedure should narrow the possibility of contractors' errors in bidding and eliminate excessive costs to the Government in cases of overrun.

Two methods of accomplishing this objective were proposed and studied. Under Method I, the bidding schedule would include a lump-sum item limited to a set amount or to a percentage of the total contract cost. Under the lump-sum item, the bidder could include all intangible and fixed costs for the job, and such items would include move-in and move-out costs, costs of special plant and equipment, and the costs of constructing and maintaining camp, maintenance shops and storage facilities.

Under Method II, several of the bid items for the principal components of the job would be subdivided into at least two portions each, with the intent that such division of work into ranges would permit bidders to include in the unit price bid for the work under the first range that part of the contractor's fixed costs properly allocable to the work under such item. The unit price bid for work under the second range would not include any part of the contractor's fixed costs.

Under this second method, the quantity stated in the first range would be practically assured, and the bid price for the quantity in the second range could then be sufficient to cover only the actual cost of performing the work. For example, if the estimated quantity for "excavation for dam" is 100,000 cu. yd., this item of work may be divided into the following two items in the bidding schedule: "Excavation for dam, first 50,000 cu. yd.," and "Excavation for dam, over 50,000 cu. yd."

After thorough consideration of the two proposed methods, the second method was adopted and first used in the specifications for Keyhole Dam for which contract was awarded on June 8. This procedure is being used in specifications for large jobs and for jobs where the quantities of the major payment items of work may be subject to large variations.

Another significant work and payment item that has been drawing attention is that of water control for diversion and

Item No.	Work or material	Quantity and price	Amount
13	Excavation in borrow areas and transportation to dam embankment, zone 1, first 300,000 cubic yards	300,000 cu. yds., at _____ _____ (words) _____ ($_____) per cu. yd.	$_____
14	Excavation in borrow areas and transportation to dam embankment, zone 1, over 300,000 cubic yards	870,000 cu. yds., at _____ _____ (words) _____ ($_____) per cu. yd.	_____

DISTRIBUTION of overhead, plant and other fixed costs has been a major problem confronting bidders. Bureau specifications for large jobs now subdivide major work units into at least two portions so that bidders can include fixed costs with the first range, which represents a practically assured quantity, while the second range then covers only the cost of actually performing the work. Facsimile above is from specifications for Keyhole Dam, where this method was first used by Bureau.

care of the river and unwatering foundations. Reclamation specifications have usually provided for lump-sum payment for such work. Suggestions were made that a method be determined to provide for payment based on a percentage of physical completion of the work involved for such water control, or on a percentage of completion of the dam. Since the payment provisions for the water control work did not provide for progress payments as the work was accomplished, contractors have expressed the opinion that such procedure encourages unbalanced bidding in connection with this item. In accordance with this suggestion, a new payment procedure for water control work was also inaugurated in the specifications for Keyhole Dam, which includes the following payment provision:

"**Payment**—Prior to beginning work on any diversion and care of the river and unwatering foundations, the contractor shall submit a water control plan showing his proposed method for diversion and unwatering. The water control plan shall be in such form as to allocate the total lump-sum price, for diversion and care of the river and unwatering foundation, to not more than 12 major items or divisions of work. Such major divisions of work shall be outlined and shall be identified by titles. For each division or item of work, the water control plan shall show the proportionate part of the total lump-sum price allocated thereto. The above allocation of the lump-sum price shall be subject to the approval of the contracting officer, and, when approved shall become a part of the contract. Monthly estimates for progress payments will include each major division or item of work which has been completed."

New provisions for overhaul, extra work and protests . . .

Recent developments in Reclamation specifications also include a series of progressive modifications and changes relative to many other contractual matters. New procedures have been formulated for payment of overhaul for canal work on a mile-yard basis with a 500-ft. free haul limit replacing the former station-yard haul and 200-ft. free haul. The paragraphs regarding extra work and contractor's protests have been modified to provide for an equitable and expeditious procedure in handling and processing contract adjustments. The "common" and "rock" classification of excavation has been eliminated on certain jobs. This method of classification has been replaced by classification of excavation on an area and zone basis, or on a basis adaptable to the local conditions, where the limits of excavation can be clearly defined by adequate exploration.

The passage of recent legislation enables Reclamation to assist school districts by direct Government payments. This eliminated the need for specifications requirements to have the contractor make financial arrangements with school districts on large and remote projects. Whenever feasible, jobs are divided into smaller schedules to give the smaller contractors an opportunity to bid. Provision is made in many specifications for final acceptance of work which has been completed, but which constitutes only a portion of a total contract, thus relieving the contractor of maintenance and responsibility for such completed and accepted portions.

A time-saving method which has proved to be of considerable help to bidders was recently adopted whereby duplicate bidding schedules are supplied to all bidders. The bidders can now retain a copy of the specifications for their records and submit their bids on the duplicate bidding schedule and accompanying forms.

Of considerable value to bidders is the recent revision in Reclamation's practice regarding public release of engineers' estimates for construction work. Prior to this revision engineers' estimates were always held in confidential status. Immediately after opening of all bids the estimates are now opened and publicly read. Also, printed copies of the abstracts of bids, which include an item breakdown of the engineers' estimates, are distributed free to all interested parties upon request.

Reclamation is continually striving to eliminate unreasonable risks contractors may be forced to assume in performance of the work. Specifications and contract procedures are constantly being improved in providing clear and complete drawings with adequate dimensions for all features of construction. Reclamation considers it a necessity to include clear statements on all factual preconstruction information and exploration data available. These data may include such information as right-of-way limits for the work, locations of borrow pits, dated underground water tables, hydrographs, locations of railroads and other facilities, availability of electric power, and such other information as is pertinent to the work and helpful to the bidder.

It is, of course, the mutual objective of Reclamation and its contractors to avoid misunderstanding and unnecessary difficulties to effect economical and efficient prosecution of contract work. Although progress has been made in improving and developing specifications procedures and contractual relations, Reclamation will continue to study new proposals, modify existing procedures, or initiate new procedures as may be required.

Pumps Being Assembled for Giant Grand Coulee Plant

ASSEMBLY of the first of the world's largest pumps has been started by the Bureau of Reclamation. The pump units, each approximating the height of a 6-story building, will lift Columbia River water from behind the Grand Coulee Dam 280 ft. up the west hills, to feed into the Grand Coulee equalizing reservoir.

The first two pump units will require approximately nine months to assemble. They are scheduled to be ready on May 1, 1951, to prime the equalizing reservoir in the Grand Coulee.

The first six pumps are supplied by the Pelton Water Wheel Co. of San Francisco and the Byron Jackson Co. of Los Angeles, under a contract for $1,062,975, let in the summer of 1946.

Each pump unit consists of a pump and a pump motor. The first two motors will be installed by General Electric Co. The first six motors, two by General Electric Co., and four by Westinghouse Electric Corp., are under contracts totaling $2,527,032.

The pumping plant is located inside a 600-ft. wing dam, at the west side of the Grand Coulee Dam. The basic structure and the inlet tubes were built with the dam. The interior works are being completed under a $13,348,000 contract held by Morrison-Knudsen Co., Inc., of Seattle and the Peter Kiewit Sons' Co., Inc., of Omaha, Neb.

The pumps will operate in pairs, and each pair will be supplied with power by one of the 150,000-hp. generating units in the west powerhouse. Any pair could supply easily the combined water needs of New York City and Chicago.

A complete description of the pumping plant construction was presented in *Western Construction*, July 1950, pg. 77.

Power Program for Southern Oregon Features—

Construction of Toketee Hydro-Plant

The plant includes an earth-fill dam with concrete spillway, a stilling basin of unique design, a 12-ft. diameter wood-stave pipe line, and 5,400 ft. of partially-lined tunnel through rock — Ultimate plan calls for eight plants on the Umpqua River

By
RAYMOND E. LAYTON*
Formerly Hydraulic Design Engineer, Pioneer Service and Engineering Corp., Chicago, Ill.

THE DESPERATE need for additional electrical energy in Southern Oregon and Northern California is being alleviated by the California Oregon Power Co. with the addition of approximately 145,000 kw. of hydro-power involving an estimated expenditure of $22,500,000. This power will be produced by the progressive development of a series of eight hydro plants on Oregon's North Umpqua River and its main tributaries. The development is planned to extend over the five year period from 1949 through 1953.

The Umpqua River is unique in that it lies entirely within Douglas County, Oregon. The accompanying location map shows the site of the North Umpqua Development to be approximately 25 mi. northwest of Diamond Lake, about 75 mi. due east from Roseburg, and 85 mi. north of Medford. The nearest rail head is at Yamsay, Ore., a distance of about 50 mi. from the project. Excellent highways exist out of Medford to Diamond Lake, but from Diamond Lake to the project, a distance of 27 mi., the road is a typical mountain route with much of the traffic consisting of huge logging trucks which are provided with extra wide "bunks" for carrying tremendous loads of logs, thus making the route hazardous for other types of traffic. To add to the difficulties the entire area is in a volcanic zone and clouds of pumice dust fill the air from every breath of wind or from moving vehicles and equipment. As one approaches the project on Highway 230 via Diamond Lake the elevation is about 5,000 ft. The elevation drops to about 2,500 ft. at the project site.

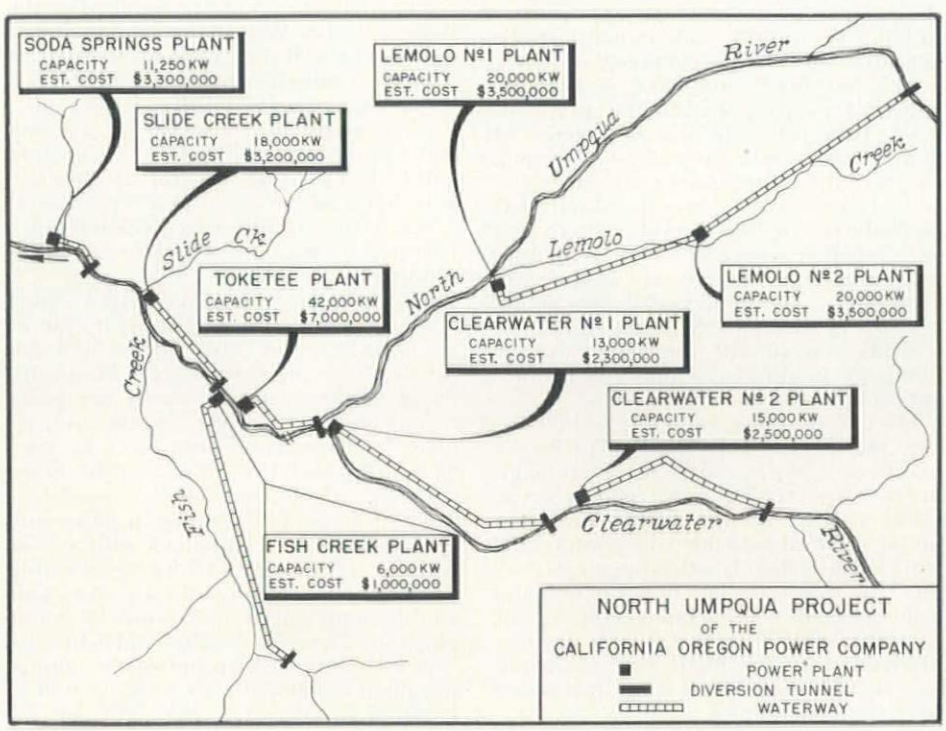
The first unit of the North Umpqua Development is the Toketee Plant, now under construction. The discussion of the principal features of this plant is the purpose of this article. Space does not permit a discussion of the other seven plants in the development, except for general remarks to assist in describing Toketee. The Toketee Plant is now about 90% complete. Construction began recently on the Slide Creek and Soda Springs Plants.

The Toketee site is in a timber-lined canyon about 1,500 ft. down from the canyon rim. The road leading down the side of the canyon to the site is a typical rough construction road with steep grades and numerous tortuous switchbacks. The North Umpqua River at the site is a roaring snow-fed mountain stream with a gradient having about a 210-ft. fall per mile. Toketee is estimated to cost about $7,000,000. The plant consists principally of a diversion dam and spillway; intake works; wood stave pipe line; rock tunnel, partially lined with concrete; steel penstock and surge tank; powerhouse and switchyard and transmission line.

Although the earth-fill diversion dam and concrete spillway are not complete, power has been generated since December 1949 by low-head diversion from the partially completed dam. The dam is expected to be completed by early fall of 1950.

In a discussion of this kind it is easy to lose sight of the real purpose of the project while becoming involved in the details of the component parts. It is necessary, then, at this point to indicate that the prime purpose of the Toketee Plant is to generate electrical energy in the amount of 48,000 kw. (64,000 hp.) at peak load with a normal capacity of 42,000 kw. (56,000 hp.). At present under low-head diversion the plant is producing about 40,000 kw. (54,000 hp.).

In the following discussion the construction described is to be taken as of June 1950, when the writer last visited the project, except as otherwise noted.



Diversion dam features

The diversion dam is located at the juncture of the North Umpqua and the Clearwater Rivers. Diversion is accomplished by an earth-fill dam across the North Umpqua and a concrete gravity ogee-type spillway and a trapezoidal gravity section across the Clearwater. The total length of the earth and concrete diversion dam is about 1,475 ft. The spillway and the non-overflow sections are on the south abutment with the earth-fill dam in the central portion of the diversion and on the north abutment. Flow from the Clearwater is diverted into the main pond by a small diversion channel immediately upstream from the dam. Normal flood waters are passed over the ogee-type spillway and around the dam by a spillway channel, which discharges below the downstream toe of the earth-fill dam.

The intake structure is located on the north abutment and consists of a reinforced concrete structure housing wheel gates, hoists, and bar screens. The intake is the upstream terminus of the power

*Now Senior Civil Engineer, East Bay Municipal Utility District, Oakland, Calif.

SITE of the diversion dam, looking downstream. Diversion flume intake is in exact center of picture. Spillway area is to left of this flume; earth-fill section is to right. Intake structure at far right is on right (north) abutment.

and sluice conduit. This conduit passes through the earth dam as a twin-barrel monolithic reinforced concrete structure terminating near the downstream toe of the earth dam. At this point the power conduit continues downstream in the form of a banded wood stave pipe. The sluice conduit terminates in a reinforced concrete stilling basin utilizing the hydraulic jump for energy dissipation.

Toketee is essentially a run-of-the-river plant; operating with a pondage capacity of about 1,500 acre-feet or enough storage to operate at full capacity for about 24 hours. The average stream flow is about 1,400 cfs. The maximum observed flood of record near the dam site is 8,000 cfs.

Volcanic materials at site

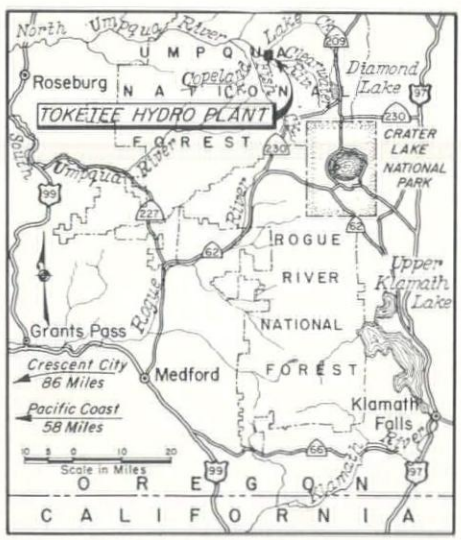
The dam site and the entire surrounding country has been the scene of violent volcanic activity in ages past. The native rock is essentially a vesicular basalt stratified with pumice, sand, and gravel layers. The river bottom at the dam site is filled with a matrix of pumice, sand, boulders, and gravel to a depth of as much as 100 ft. at the central portion of the earth dam. The north and south abutments are founded on rock reasonably close to the existing ground surface. One of the principal difficulties in constructing the earth dam has been in obtaining a reasonably good cut-off in the pervious foundation material.

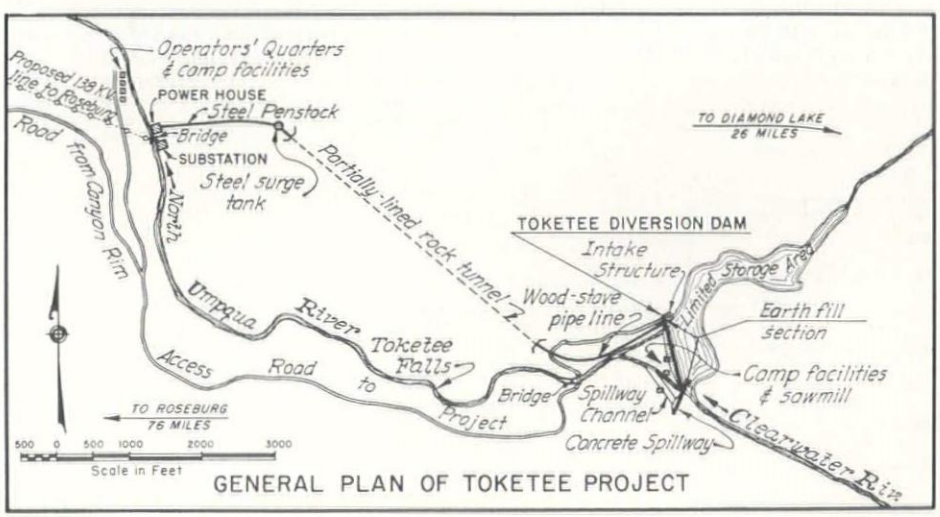
The earth-fill dam is approximately 1,000 ft. long and 55 ft. high at the maximum section. The dam contains about 225,000 cu. yd. of embankment material of which about 50,000 cu. yd. will be compacted clay core and 175,000 cu. yd. will be a graded pervious upstream and downstream structural fill.

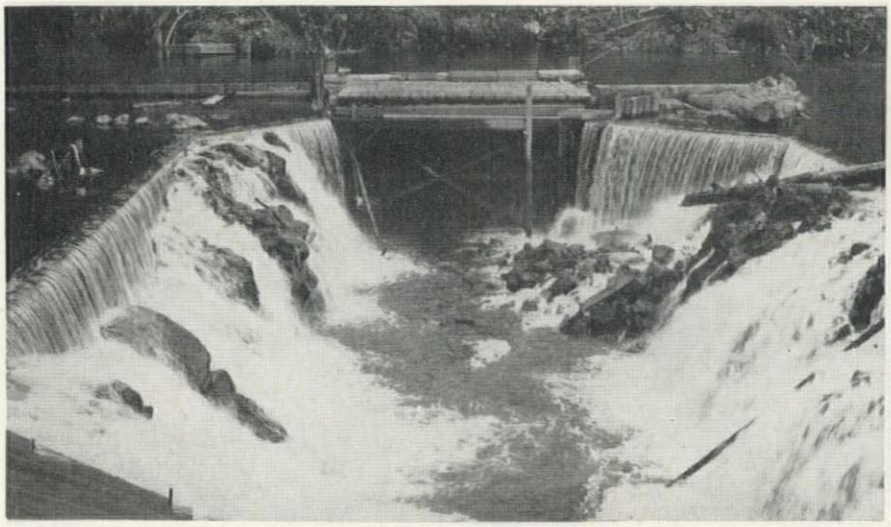
A sheet piling cut-off 220 ft. long has been provided in that portion of the river bed underlain with deep sand, gravel, and boulder deposits. The average pile penetration was about 35 ft. with a maximum penetration of 55 ft. In some instances the penetration was only 10 or 15 ft. A greater penetration was desired but due to the piling striking large boulders full pentration could not be obtained. A cut-off trench about 10 ft. deep was excavated along the axis of the dam in order to get through the initial layer of river deposit of heavy boulders and gravel before starting the sheet piling. The sheet piling used was a carnegie section M112 in 55-ft. lengths, 16 in. wide, ⅜-in. web at 30.7 lb. per foot. The piling was placed with a dragline and driven with a 7,000-lb. steam hammer. The piling was driven to refusal at about 200 blows per inch. A total of 7,500 sq. ft. of sheet piling was placed. The piling was embedded in a concrete cut-off wall at each abutment of the dam where the rock line approached the existing ground surface. The concrete cut-off wall is being placed on the north and south abutments. Upon completion approximately 950 ft. of concrete cut-off wall will have been placed, insuring an adequate water tight seal between the foundation rock and the clay core. The foundation under the cut-off wall is being grouted under pressure with holes at 10-ft. centers and about 20 ft. deep.

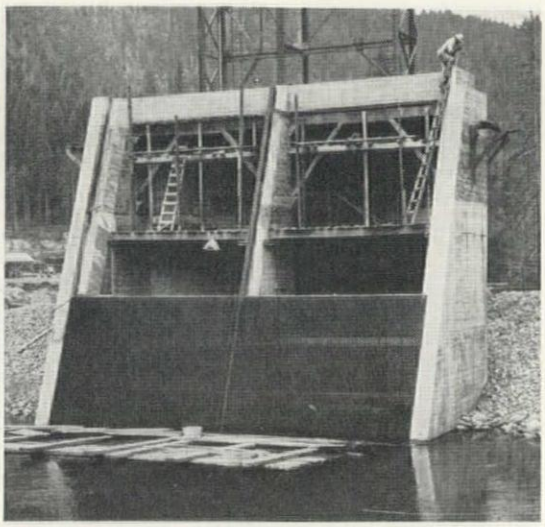
Special attention was given to compacting that portion of the fill beneath the power and sluice conduit, so as to minimize differential settlement of the conduit. At present work is under way in placing the embankment materials in the dam. Considerable difficulty has been experienced in placing the clay core. As soon as optimum moisture content is reached by a rather laborious drying process, it rains with the consequent repetition of the entire drying process before more fill can be placed.

All raw materials for the earth-fill dam and aggregate for the concrete structures are being mined from gravel bars about a mile upstream from the dam. An aggregate conditioning plant has









INTAKE to the timber diversion flume, left. Originally, rock-filled timber crib cofferdams diverted flow into the flume. Permanent intake structure, right, is of reinforced concrete, 52 ft. high, 30 ft. wide, housing wheel gates, hoists and bar screens.

been constructed to wash, screen, and crush the aggregate taken from the river deposits.

Clay for the impervious core of the earth-fill dam was obtained within ¼ mi. of the aggregate plant in the form of a clay meadow. The clay meadow had to be stripped of about 3 ft. of overburden and given continual working with discs to dry out the material to somewhere near the optimum moisture content before transporting it to the dam. In the clay drying operation a light tractor crosses the meadow, then pulls a disc across after it with a long cable attached to the tractor power control unit. The two pieces of equipment cannot cross the meadow together because of the soft ground conditions. A similar method of drying the clay in the core is used at the dam except that the disc is attached directly to the tractor. Compaction of the clay core is being carried to about 95 lb. per cu. ft. with sheepsfoot rollers.

At present the dam has been placed to elev. 2410 with the reservoir pool at elev. 2402. River diversion was accomplished by means of rock-filled timber crib cofferdams, placed so as to facilitate initial construction of the power and sluice conduit and the intake structure. Timber cribs were then placed upstream from the dam site with a timber flume through them for river diversion. Work then commenced on the cut-off trench, sheet piling and earth fill. The cribs have now been abandoned in lieu of the partially raised dam. However, river diversion is still being accomplished by the timber flume passing through the earth dam. As the dam is raised the flume will be removed and a small cofferdam will be placed around the present flume intake, and diversion will be accomplished by passing the entire river flow through the power and sluice conduit.

Spillway features

The main spillway is an ogee-type overflow section 325 ft. long with a 20-ft. log sluice included in this length on the north end of the spillway. The log sluice is controlled by a 20-ft. by 4-ft. high taintor gate. The main spillway has a free crest without gates or flash boards. The crest of the main spillway is at elev. 2430. Immediately south and adjacent to the main spillway is the trapezoidal non-overflow section 150 ft. long across the Clearwater River. The above sections are both concrete gravity structures with contraction joints spaced 30 feet apart. The foundation of the spillway and non-overflow section will be keyed and grouted in a manner similar to that used for the concrete cut-off wall. On the north end of the spillway it has been necessary to provide a retaining wall to hold the earth dam fill and to act as the north spillway training wall.

SPECIAL DESIGN of hydraulic stilling basin is based on studies made at University of Minnesota (see discussion on next page). Basin length is reduced so that roller formed by hydraulic jump originates in the basin and deposits material against the end.

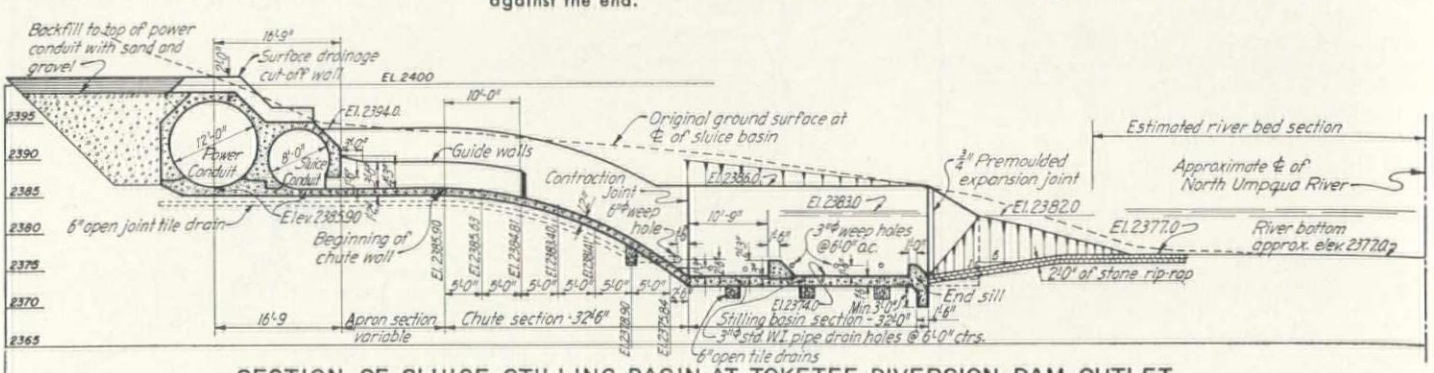
The maximum pool level has been set at elev. 2435 with the crest of the dam at elev. 2438. With the pool at elev. 2435 the main spillway will pass a flood of about 14,000 cfs. As a factor of safety against overtopping by an unprecedented super-flood, the crest of the non-overflow section has been set low at elev. 2435. With a pool level at elev. 2438 the combined discharge of the main spillway and the non-overflow section will be approximately 30,000 cfs.

At present excavation is under way in the main spillway area. The spillway channel excavation, however, will not be undertaken until work has been entirely completed on all other phases of the diversion dam. A portion of the construction plant including the sawmill are now located in the spillway channel area. The spillway channel will be excavated to sound rock except on the north wall. Here it may be necessary to construct a partially compacted earth embankment to form the north side of the channel. This side of the channel will be lined with an 8-in. thick concrete slab keyed to the channel bottom.

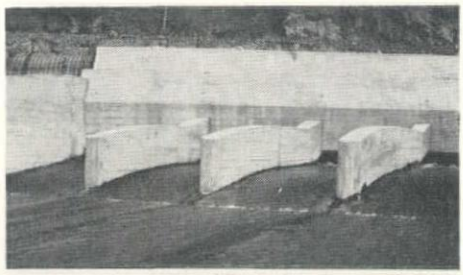
Intake works

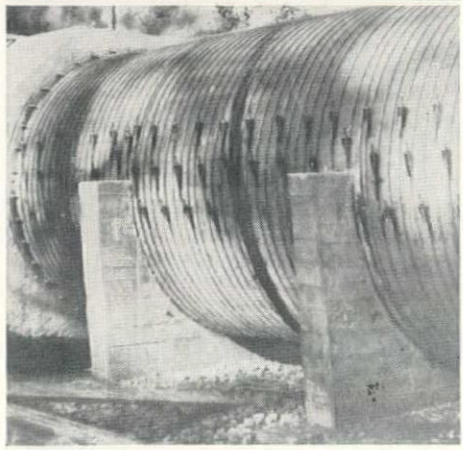
The intake works includes the intake structure, power and sluice conduit and the stilling basin, all located near the north abutment of the dam.

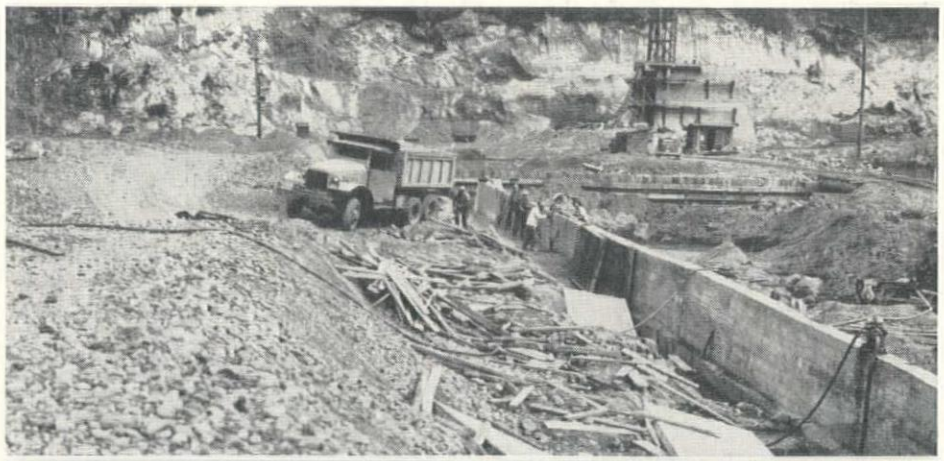
The intake is a reinforced concrete structure about 52 ft. high by 30 ft. wide with a sloping removable bar screen on the upstream face. The bar screen is made up of flat steel bars with a clear opening between bars of 1½ in. The



SECTION OF SLUICE STILLING BASIN AT TOKETEE DIVERSION DAM OUTLET







TOP LEFT—Stilling basin, with timber floor as temporary apron (see drawing opposite page).

BOTTOM LEFT—Close-up view of concrete cradles supporting the 12-ft. wood stave pipe. Cradles are spaced on 10-ft. centers along tangents and 8-ft. centers on curves.

TOP RIGHT—Sheet piling cut-off wall in earth dam is embedded in concrete cut-off wall at both abutments. View is of north abutment, with intake structure in background.

BOTTOM RIGHT—Looking downstream along the wood stave pipe line. Toe of the dam and stilling basin are in foreground.

screen is made up in panels and mounted in metal guides to facilitate removal for maintenance or replacement. Stop-log grooves have been provided downstream of the screen so that the head gates serving the power and sluice conduits can be unwatered for inspection and maintenance. The head gates are the wheel type with fixed hoists mounted on a structural steel frame about 20 ft. above the intake deck. The hoisting gear is an outdoor installation. At present the gates are being operated temporarily by a block and tackle arrangement pending the arrival of the permanent hoisting gear. The gates will be provided with automatic controls so that they can be operated by remote control from the powerhouse.

An air vent immediately downstream from the gates insures against collapse of the conduits by the formation of a partial vacuum during gate closure. The intake structure and the power and sluice conduit are not rigidly attached. A construction joint is provided at the juncture of the two structures. The joint is sealed with a rubber water stop.

Power and sluice conduit

The conduits served by the intake are an 8-ft. diameter sluice and a 12-ft. diameter power conduit. The principal uses of the sluice are as follows. The sluice maintains a base flow in the river in case of a complete power shut-down combined with minimum reservoir pool conditions. The sluice will provide base flow in the river between the dam and the powerhouse at all times. The sluice will provide relief for the spillway in the amount of 1,500 cfs. with the reservoir pool at elev. 2435. The sluice will be used to aid in clearing accumulated debris from the intake structure.

The power and sluice conduit is a 287-ft. long reinforced concrete, twin barrelled pipe. In passing through the earth dam the conduit is under a maximum height of fill of about 40 ft. A portion of the conduit is placed on the compacted material in the cut-off trench and the remainder of the conduit is on undisturbed material. In order to accommodate some settlement the conduit was provided with contraction joints at 50-ft. intervals. The joints were sealed with rubber water stops. The conduit was constructed by first placing the invert section up to the construction joint. Some difficulty was experienced in placing the arches because of the large quantity of reinforcement involved. The design of this conduit was a particularly laborious and difficult task because of the unsymmetrical cross-section and the degree of indeterminancy. The stress analysis was accomplished by moment distribution with a rather extensive list of loading assumptions. In general shear rather than moment was the controlling factor in sizing the structure.

The hydraulic sizing of the power conduit was based on an economic study from which was evolved an economic velocity of 14 ft. per sec., and a diameter of 12 ft. The sluice was sized on the basis of providing 1,500 cfs. downstream as a maximum. Positive pressure in the sluice was maintained by throttling the downstream end of the pipe just before the flow enters the stilling basin. Positive pressure will not be maintained for all flows, but for the larger quantities where higher velocities maintain, it is important that negative pressures do not develop. It is not uncommon for such structures to literally "pound themselves to pieces" under severe cavitation conditions.

Special design for stilling basin

As the flow from the sluice leaves the throttling orifice it enters the hydraulic stilling basin. The stilling basin does not have a conventional design. The design is based on extensive model studies conducted at the St. Anthony Falls Hydraulic Laboratory of the University of Minnesota. Here was developed a type of stilling basin that is much shorter than the conventional design requiring a length of 5 to 6 times the height of the jump. The St. Anthony Falls design requires a basin length of about 3 to 4 times the height of jump. Conclusive evidence was brought out at St. Anthony Falls that the length need only be long enough so that the roller formed by the hydraulic jump will originate in the basin and tend to deposit material against the end of the basin. The place-

ment and design of the splitters and chute blocks is critical in that they cause the jump to form in the basin. At present the stilling basin has only been constructed as far as the end of the guide walls with a timber floor being used as a temporary apron. Limited flows have been passed through the sluice and into the basin for the purpose of sluicing-out downstream of the timber floor so as to aid in excavating for the remainder of the basin.

Wood stave pipe line

The power conduit leaves the concrete power and sluice conduit at the downstream toe of the dam in the form of a banded wood stave pipe. The wood stave pipe line is 1,645 ft. long with a great part of its alignment in curves. The pipe is supported on concrete cradles spaced at 10-ft. centers on the tangents and at 8-ft. centers on the curves. The supports are cast in place on the tangents but on the curves only the inside portion of the cradle and the foundation are cast in place. After the pipe has been erected the remaining half of the cradle is placed on the outside of the curve in the form of a pre-cast unit grouted in place. The pipe is designed to operate under 45- and 50-ft. heads.

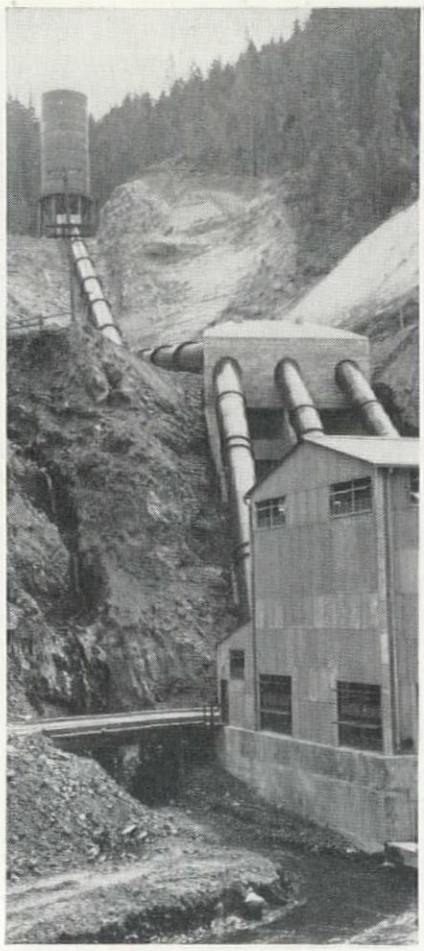
Land slides during the winter months of 1949 and 1950 endangered the pipe line. About half the length of the pipe line had to be "benched-out" of the side of a hill with steep side-slope cuts. Several thousand yards of material had to be removed to stabilize the hill side to prevent further slides from damaging the pipe line. Fortunately serious damage was avoided by "back-breaking" efforts of the construction crew to beat the slide. The slope adjacent to the pipe is composed of a pumice deposit with stratas of clay interspersed throughout the mass. After heavy rains the pumice deposit became so heavily loaded with water that the entire mass began to slide on the well lubricated clay strata. Further stabilization may have to be undertaken this winter.

Rock tunnel

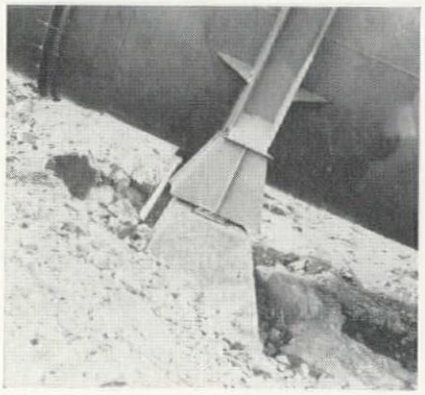
The wood stave pipe terminates in a 12-ft. diameter rock tunnel 5,400 ft. long. The pipe is joined to the concrete power and sluice conduit upstream and to the concrete tunnel portal downstream by a steel adapter and expansion joint. The tunnel is lined with concrete for a distance of 1,200 ft. upstream and 300 ft. on the downstream end. The remainder of the tunnel is unlined and in sound rock. Some spalling of surface rock occurs where the rock has been loosened by the drilling and blasting while driving the tunnel. A debris trap has been installed near the downstream tunnel portal to collect the spalling rock and any debris that may find its way through the intake screen.

The tunnel was started and completed in 1948 and has the distinction of being the first major construction undertaken on the Toketee Project. No unusual conditions were encountered in driving the tunnel except indirectly as influenced by the penstock location.

The tunnel terminates in a steel penstock. Initial plans called for the penstock and tunnel alignment to follow a different route. The tunnel had been "holed-out" on the original alignment when excavation for a construction road in the surge tank area indicated that the entire slope along the penstock was sliding. Subsequent subsurface exploration revealed that sound rock was so far below the surface that a penstock location was not feasible at this site. This slide was an unstable pumice deposit, as encountered on the wood stave pipe line. In the light of this latter development a new penstock location was determined after further subsurface exploration of several alternate sites was undertaken. The new location required the excavation, through pumice and gravel deposits, of from 20 to as much as 50 ft. to sound rock.



STEEL PENSTOCK, 1,220 ft. long, splits into three conduits, each supplying a 21,500-hp. turbine in the structure steel powerhouse.



PENSTOCK is supported over its entire length by ring girders set on rockers which transmit load to concrete footings.

Penstock

The new alignment necessitated abandoning about 500 ft. of the tunnel on the old alignment and the additional construction of some 300 ft. of new tunnel. As the penstock leaves the tunnel it is a 12-ft. diameter steel pipe with a shell 7/16 in. thick. At a distance of 242 ft. from the tunnel portal a restricted orifice surge tank is mounted over the pipe. The surge tank is 40 ft. in diameter by 130 ft. high with a restricted orifice of 6 ft., 5⅜ in. diameter. After leaving the surge tank the penstock plunges over the side of the canyon wall and reduces in diameter gradually to 11 ft. immediately above the penstock manifold where it splits into three 6 ft., 4 in. diameter conduits supplying the turbines immediately below. The penstock has a maximum thickness of one inch.

The penstock is supported by ring girders over its entire length of 1,220 ft. with a spacing of 60 ft. on centers. The ring girders are set on rockers which transmit the load from the pipe into the concrete footing but allow the pipe to move freely under expanding and contracting conditions. The penstock is provided with expansion joints immediately downstream from the tunnel portal and immediately downstream from each anchor.

The penstock is entirely of welded construction with most of the joints being double butt welded. The joints were radiographed in so far as was practicable. The penstock manifold was stress relieved.

In placing the heavy steel pipe sections on the steep slopes an interesting device was used. A 25-ton hoist was mounted on the anchor just downstream from the surge tank with a cable payed-out to a timber sled. The sled was guided and supported down the slope by timber tracks. The pipe was set on the sled in such a position that the entire assembly was about 6 in. below grade. Final adjustment to grade was made by raising the pipe with hydraulic jacks.

The penstock pipe sections were shipped from Portland by truck. The pipe was supported by a steel beam along the axis of the pipe with spiders to transmit the weight of the pipe to the beam. The beam was supported by the truck power unit on the forward end and by a special dolly on the trailing end. Some difficulty was experienced in negotiating the road from Diamond Lake to the job but the pipe came through in excellent condition.

The penstock manifold is located about 150 ft. upstream from the powerhouse. Each of the three 6 ft., 4 in. diameter branches of the manifold supplies a 21,500-hp. turbine. Immediately upstream from the juncture of the penstock and the turbine scroll case, a 2½-ft. by-pass pipe takes off to make connection with the synchronous by-pass valve. These valves are set on very carefully calculated closure times, so that

on load-off conditions water hammer is held to a practical minimum. On full load off conditions the synchronous bypasses cannot completely eliminate water hammer but they reduce it to a marked degree with an accompanying saving by reducing the amount of steel in the penstock.

Powerhouse

The powerhouse is approximately 100 ft. long by 60 ft. wide with a mass concrete substructure and a structural steel superstructure. The steel frame is covered with a corrugated asbestos sheathing presenting a very utilitarian appearance. The house superstructure supports a 50-ton bridge crane for installation and servicing of the units. The house has one story above the generator floor with all of the operating gear and controls mounted on the generator floor. The switchyard is located about 100 ft. up the river from the powerhouse and in full view from the generator floor. Electrical energy is delivered to the transmission line at 132,000 volts. The transmission line is about 75 mi. long following the Umpqua River downstream to serve Roseburg and several smaller towns in the area.

The powerhouse was constructed by building a concrete cofferdam around the house area. All work was done in the dry, except for a very minor amount of seepage that was easily handled by pumping. The house is founded on sound basalt rock with the deepest part of the structure about 20 ft. below normal stream bed. The concrete cofferdam was left in place after construction to act as a tailwater weir to maintain proper tailwater elevations at low river flows and to prevent scour around the draft tubes.

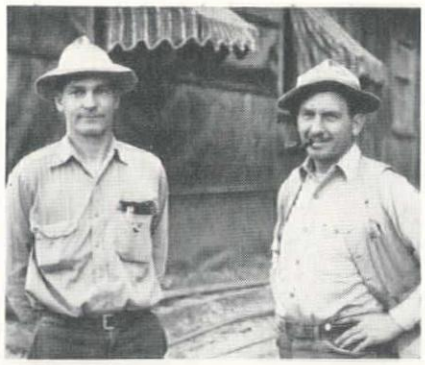
Under full load conditions the tailrace appeared to be excessively turbulent, which would lead the observer to believe that an excessive amount of energy was being wasted in get-away. However, on further investigation it was found that this is a normal condition for a high-head plant. In general about one per cent of the head is allowed as velocity head for get-away. In this case the get-away velocity amounts to about 16 ft. per sec.

Relocation of the penstock and the powerhouse resulted in a loss of head of about 20 ft. for the Toketee Plant. However, this head was not lost to the system because it will be regained by the Slide Creek Plant.

The turbines, generators, and transformers were off-loaded from railroad cars at Yamsay, Ore., and transported to the job by truck and "low-boy" trailer combinations. Again, as in the case of the penstock pipe and in spite of difficult road conditions, the equipment arrived on the job in excellent condition.

The constructors

The California Oregon Power Company is maintaining its own construction crew of some 350 men on the Toketee Project and the other projects now under way in the North Umpqua Development. A major part of the construction is being undertaken by Company forces. However, several of the



P. G. HUMPHREYS, left, is resident engineer in charge of construction. C. W. PATTON is resident engineer on the diversion dam.

major parts of the Toketee Project were let out to general contractors as follows:

The wood stave pipe line was contracted to the Santa Fe Tank and Tower Co. of Los Angeles, Calif.

The penstock and surge tank were fabricated and erected by the American Pipe and Construction Co. of Los Angeles, Calif.

The tunnel was driven by L. E. Dixon Co. of Los Angeles, Calif.

The generators were furnished by the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., and the turbines were furnished by the S. Morgan Smith Co., York, Pa.

The sheet piling cut-off was driven by Morrison-Knudsen Co., Inc., Boise, Idaho.

A job "village"

In view of the fact that the job is so far away from a town, village or any settlement it has been necessary to establish a completely independent construction village on the job. The headquarters camp is located near Toketee Powerhouse with smaller camps located at strategic points over the development. There are camps located at the tunnel portal, diversion dam, gravel plant and others at the Slide Creek and Soda Springs Plants.

The main camp has all the necessary facilities to maintain a village of approximately 1,000 people; namely, commissary store, gas station, barracks, mess halls, dwelling units for families, trailer camps, a grade school, etc., etc. One realizes that the North Umpqua construction camp must be practically self-contained when informed that the main highway to Diamond Lake is snowbound until late May or the first part of June and closed to all traffic. There is a road open down the Umpqua River to Roseburg but it is a rough twisting mountain road that is very difficult to negotiate and to keep open in the winter. The Company has to maintain this road during the winter months in order to get supplies and equipment to the job.

Rainfall is relatively heavy along the Umpqua water shed, which makes for difficult construction conditions during the winter months. Along with the abundance of rainfall the Umpqua basin is blessed with an abundance of merchantable timber. Major logging operations have to be undertaken to clear the dam sites, reservoir sites, pipe line and transmission line rights of way, etc. The Company has taken advantage of this by-product of construction and set up a sawmill near the Toketee diversion dam to furnish all of the lumber for the construction operation.

It was the writer's impression that the entire North Umpqua Project is being prosecuted with the utmost speed, energy and economy.

Personnel

All phases of the design and construction of the North Umpqua Development and the Toketee Hydro-Electric Plant in particular are under the general direction of John C. Boyle, Vice-President-General Manager and Chief Engineer of the California Oregon Power Company with main offices in Medford, Oregon. P. G. Humphreys is Resident Engineer in charge of the construction for the Company. The plans and specifications were prepared by Pioneer Service and Engineering Corp., Chicago, Ill., under the direction of Stephen Wehner, Chief Hydraulic Engineer.

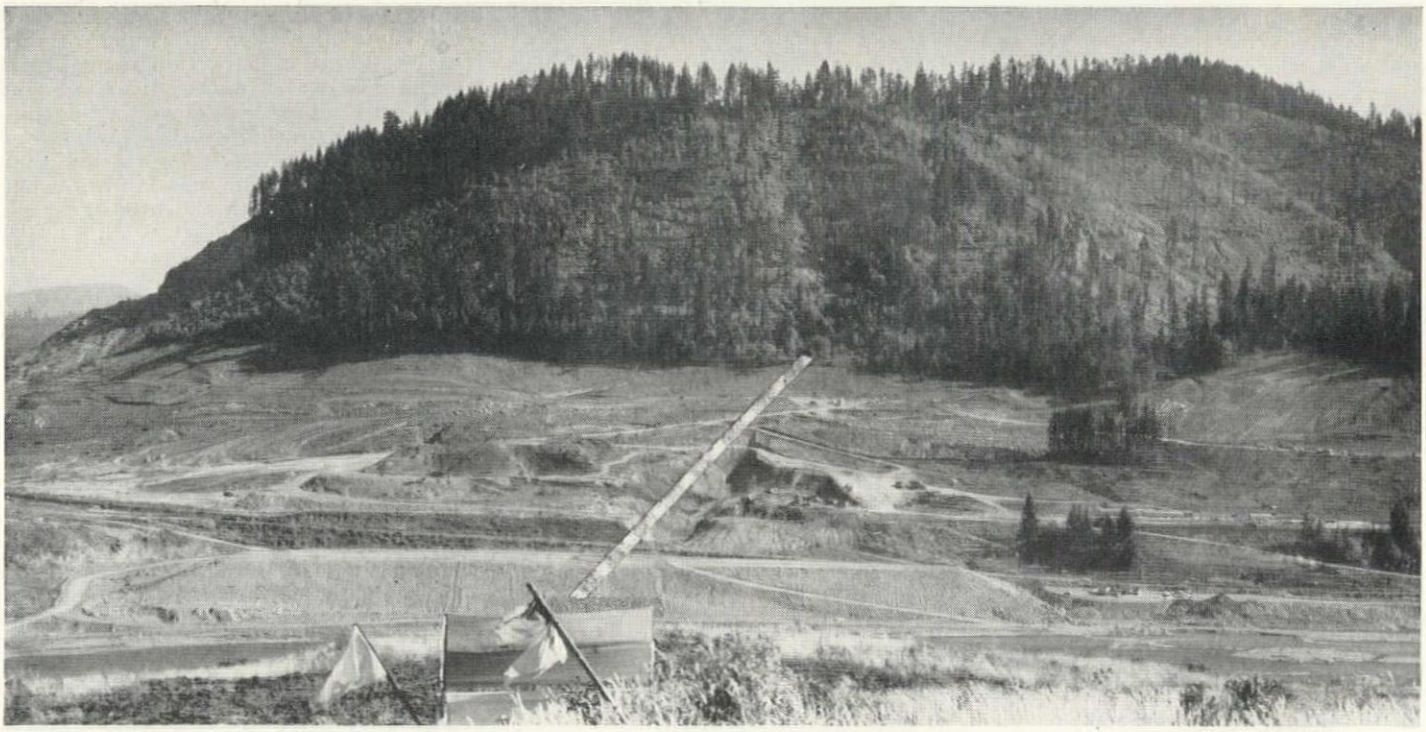
Hathaway Nominated as 1951 ASCE President

GAIL A. HATHAWAY, Special Assistant to the Chief of Engineers, Department of the Army, Washington, D. C., has been nominated as 1951 President of the American Society of Civil Engineers. Confirmation of his nomination by letter ballot of the membership is scheduled for later in the year.

An internationally-known specialist in the field of water resource development, Hathaway has filled many important war and postwar assignments for the government. From November 1944 to March 1945, he acted as Special Adviser to the Chief Engineer, European Theater of Operations, in connection with the organization and operation of the Rhine River Flood Prediction Service, which furnished important data to the Allied Armies prior to their crossing of the river. For his work on this mission he received a Presidential Citation and the Bronze Star Medal. He has also been a member of the Inter-Departmental Committee of the United Nations Scientific Conference on Natural Resources, and he is the present chairman of the United States Committee of the International Commission on Large Dams World Power Conference.

A graduate of Oregon State College and veteran of World War I, Mr. Hathaway began his career with the Corps of Engineers in 1928. He was stationed at Kansas City, Mo., for nine years, serving as hydraulic engineer with the Kansas City District and, later, the Missouri River Division Office.

Called to Washington in 1937 to serve in the Engineering Division of the Office of the Chief of Engineers, Hathaway was made Special Assistant to the Chief of Engineers in 1945. In this capacity he serves as technical adviser to the Chief of Engineers on policy and engineering matters related to the civil works and military programs of the Corps of Engineers.



Nearly Inaccessible Quarry and Steep Terrain Govern—

Plant Layout at Lookout Point Dam

Preliminary studies by contractor determine layout of facilities for efficient and coordinated production of 800,000 cu. yd. of mass concrete and 6,000,000 cu. yd. of random gravel fill

PLANT LAYOUT on steep terrain at Lookout Point Dam has been tentatively planned by Morrison-Kiewit-Macco, Lowell, Ore., holder of the $18,696,031 general contract by the Portland District, Corps of Engineers. The joint venture firm, composed of Morrison-Knudsen Co., Inc., Boise, Idaho, Peter Kiewit Sons' Co., Omaha, Neb., and Macco Corp., Clearwater, Calif., was awarded the contract May 15, 1950, and construction has started on access roads and warehouse facilities at the damsite.

The multiple-purpose Lookout Point Dam is on the Middle Fork of the Willamette River, and is a general flood control structure of the Willamette River Basin Project. Several locations were under consideration by the Corps of Engineers, and the one chosen is called the Meridian damsite, 23 mi. southeast of Eugene, Ore. The earth-rock-concrete structure will consist of about 1,000,000 cu. yd. of clay and silt impervious core, an 8-ft. thick filter zone of 1-in. minus rock, almost 6,000,000 cu. yd. of uncompacted random gravel embankment, and about 800,000 cu. yd. of mass and structural concrete in the spillway and appurtenant structures. Reservoir clearing and relocation of the Cascade Route of the Southern Pacific Railroad and State Hwy. 58 is under contract to various firms (see accompanying box), and is about half completed. Completion of the M-K-M contract is scheduled for 1954.

Aggregate to travel 3,600 ft.

Of first consideration in the entire plant layout is Eagle Rock quarry. Location of the quarry requires the path of primary crushers and screens, conveyors, and surge piles through which the aggregate travels to be 3,600 ft. long, with a drop of 1,280 ft. from quarry ledge to peddling tracks.

Controlling factor in the aggregate primary processing is the nearly inaccessible quarry site, the only nearby site of suitable concrete aggregate being on the left side of the canyon. Preliminary studies by the contractor determined that rock will be wagon-drilled and shot in conservative 16 to 24-ft. benches. Quarry rock will be hauled down a 15% grade road for 1,350 ft. to the 42-in. gyratory primary crusher in 20-cu. yd. end-dump Euclid trucks. Leaving the primary crusher, 7-in. minus rock will be conveyed down a 26% slope on a rubber belt to a 20,000-ton surge pile located on an existing cleared area. The surge pile, originally scheduled for 100,000 tons, was reduced in size due to unstable earth conditions on the mountain side. A second 26% slope conveyor, 1,300 ft. long, at a right angle to the first, carries the material from a recovery tunnel to a second 20,000-ton surge pile 200 ft. away from the secondary screening plant.

The two surge piles are estimated to have enough storage in transit to supply the screening plant with 400 tons per hour. Surge storage was split only because it was feared that the mountainside would not support the larger surge pile. The haul road between quarry and primary crusher will be established as a matter of necessity, because there is no space available for the primary plant on the 6-ac. mountain cap site. The quarry road has been laid out with no switchbacks, and will handle two-way traffic for its entire distance. Haul roads on the more gentle slopes prevalent at the remainder of the damsite will have grades between 6% and 12%.

Also on the left side of the canyon are the highway and railroad relocations. The aggregate conveyor crosses the relocation lines about 200 ft. upstream from a highway-railroad grade separation, and a small problem here was the method of crossing the relocations with the 26% slope of the conveyor. Cooperation from the proper agencies will allow the contractor to build a timber conveyor overpass, shielded and with standard clearances, at the highway. At the

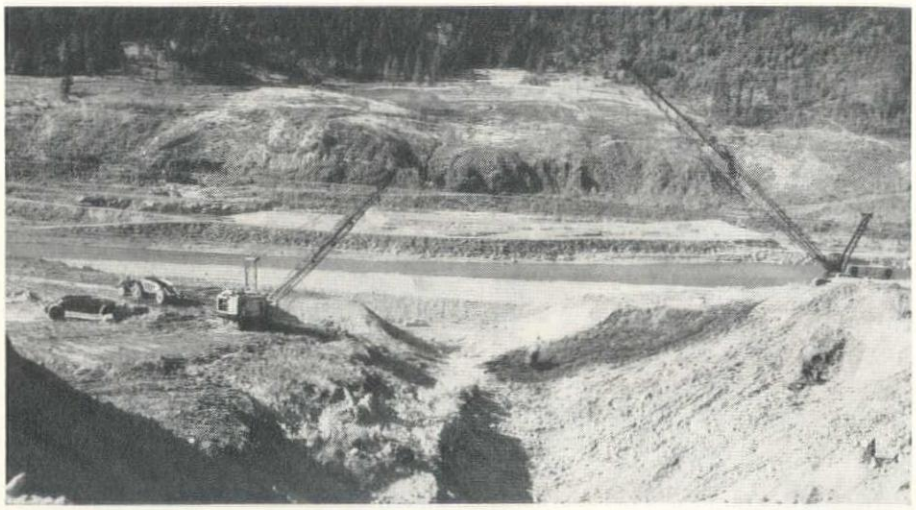
PICTURED ABOVE—

LOOKING ALONG the dam's main axis (roughly indicated by bar in center of picture). Core trench is partially excavated in center. Rock embankment paralleling river was completed under separate contract. Eagle Rock quarry is on mountainside, left.

railroad grade, 100 ft. downhill, the contractor is planning to install a concrete tunnel below the fill to carry the conveyor.

Eagle Rock quarry is composed of three materials. The outer shell of the ridge is basalt. The main ridge core is a diabase, and the rest of the core is a combination of the two, classed as a porphyritic diabase.

The secondary screening plant will use conventional equipment. It will have six stockpiles for aggregates over a 635-ft. long timber ring and concrete recovery tunnel, and a surge pile, crusher, and return circuit for reprocessing of the ¾-in. minus material. Since the contractor elected to batch two sands rather than combine the material, the design calls for a return rodmill circuit for additional flexibility and control at the sand end of the plant.



DRAGLINES excavating core trench—at left, a 2½-cu. yd. Marion; at right, a 3-cu. yd. Speedcrane. Cranes turn 180 deg. each cycle to load bottom-dump Euclids.

Field problems peculiar to site

Comments brought up during a recent meeting of the staffs of the resident engineer and contractor, during which the preliminary plant layout described above was given tentative approval by the engineer, indicate the many field problems peculiar to the Meridian site. Flexible and complete control of aggregates, particularly No. 4 to No. 16 material, was the first subject discussed. Although a slightly high amount of No. 4 to No. 8 material in relation to No. 8 to No. 16 may be expected, the screens will be set up to waste either size as required, or return either one through a rod mill to make No. 16 minus, in addition to combining both materials in the No. 4 minus to No. 16 plus stockpile. With the use of this layout, sand (No. 16 minus) will bypass the screens and rodmill crusher and be conveyed straight to the sand stockpile, and its control, mentioned above, will be by either wasting, combining or reprocessing the two larger sizes. The logic behind this layout is based on the opinion that it is doubtful if the No. 16 material itself will be improved by processing it through the mill. It is expected that half of the No. 16 minus sand will be non-processed.

Rather than place stockpile bunkers directly beneath the screens, the contractor has set stockpiles and recovery tunnel on a parallel line 150 ft. away to take advantage of more economical construction on adequate flat ground at the plant site. The general comment on the planned 66-ft. headroom for the third screening tower was, "You are never wrong on too much headroom." Since the end product of a rock plant is almost never perfect at the start of operations, sufficient headroom has been kept to install a No. 30 plus-No. 16 minus vibratory screen, in the event it is necessary to discard No. 16 minus and save No. 30 minus. This circuit will be able to recirculate the No. 16 minus material, if laboratory screening tests at a later date indicate the new screen will have to be added. The plant has been laid out with two equipment stations above the lower surge pile. This has been done so the operator faces the screens, crushers, and the three conveyor belts leading to the secondary plant.

Batching and cooling aggregates

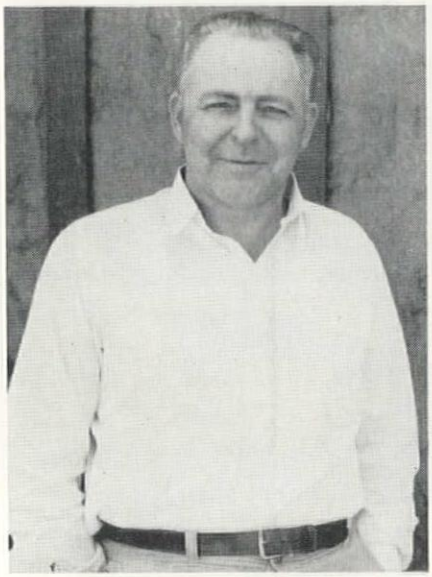
The batching and mixing of concrete will be in a C. S. Johnson plant using two 4-cu. yd. Koehring tilting mixers. It is similar but smaller than the 4-mixer plant now being used at Detroit Dam, having 500 rather than 750 cu. yd. of overhead storage. There will be individual mix controls, six materials hoppers, and a batch totalizer to give 12-mix selection. The plant will be supplied cement by bucket elevator, instead of an air system, from bulk cement trucks shuttling between the plant and the railroad spur across the river.

York cooling equipment, similar to that used at Philpott Dam, will be used in a system to blast refrigerated air through the coarse aggregate hoppers in a manner similar to that used at Harlan County Dam. The insulated cooling plant will treat 150 cu. yd. per hour for 20 continuous hours. Water will be at 32 deg. F., and no sand or cement cooling is planned. The system is reversible, and can blast hot air through the aggregate during the winter if necessary. Ad-

Status of Major Contract Work at Lookout Point Dam

RAILROAD AND HIGHWAY RELOCATION

Description	Amount of Bid	% Completion	Contractor	Contractor's Supt.
"E" Jasper Section	$ 267,470	100	Strong & Macdonald, Inc., and Miller & Strong	
"D" Rattlesnake Section	1,126,045	100	K. L. Goulter & Co.	
Lost Creek Section	2,037,962	100	McNutt Bros.	
"F" Noisy Creek Section	983,620	85	K. L. Goulter & Co.	Stan Goulter
"G" Minnow Creek Sec.	837,295	50	Utah Construction Co.	Cecil Welton
"H" Rolling Riffle Sec.	1,178,057	40	Utah Construction Co.	Cecil Welton
"J" Goodman Bluff Sec.	2,071,095	30	Leonard-Slate-Hall Co.	E. E. Anderson
"K" Crale Creek Section	2,846,611	10	Guy F. Atkinson Co.	C. V. Thompson (Asst.Proj.Mgr.)
"L" Shoofly Section	348,500	8	McNutt Bros.	Arnold Lindland
Tracklaying, ballast	672,760	12	Utah Construction Co.	Cecil Welton
Lower River Bridge and superstructure, etc.	431,842	10	American Bridge Co.	Wayne Lynn (Proj. Mgr.)
Highway Overpass Substructure	84,863	1	General Construction Co.	G. A. Baty
"R" Upper River Bridge Substructure	204,005	1	F. W. Case Co.	D. Persson (Proj. Mgr.)
DAM				
Core Trench Excavation	120,711	100	Morrison-Knudsen Co., Inc.	
Cofferdam, spillway excavation and small part of earth dam	775,591	100	Lytle-Amis	
Main Dam	18,696,031	0.1	Morrison-Kiewit-Macco	L. E. Steelman (Proj. Mgr.)
Clearing Minnow Creek area in reservoir	97,512	80	C. O. Lindstrom	H. E. Lindstrom



ROBERT E. LEE, resident engineer at Lookout Point for the Corps of Engineers.

ditional cooling will be provided as required by adding ice to the batch.

The shuttle car operation will be similar to that used at Garrison Dam, and will be a one-man, one-car and one-train operation from the batcher to the two-compartment 8-cu. yd. air-operated buckets on the highline.

Cableway and lighting

The 16-ton capacity cableway, made by Construction Improvements, Ltd., with towers supplied by Consolidated Western Steel Corp., will have a travel-lift similar to that at Detroit Dam, where the carriage can travel and hoist simultaneously. The tail tower will operate on a 2,600-ft. radius from the 396-ft. high guyed head tower, with telephone control from either end. A warning bell circuit will be in parallel with the lights and control system, a safety measure now in use at Hungry Horse Dam.

Specifications call for a minimum of 3 ft.-candles illumination over all work areas. The contractor plans to light all conveyors and to use light towers over the main structure instead of suspending a light cable. First estimates call for seventy-five 500-watt units on an 80-ft. tower for the right abutment, over the mass concrete, and 34 to 40 units beamed down the center of the embankment from the left side of the canyon. The canyon is too wide for light suspension, it was decided. To avoid troublesome shadows, the contractor intends to keep light units 50 ft. or more above the top of work at all times. Additional lighting plans include portable lights on each of the block forms, of small wattage to eliminate numerous shadows. It was suggested that a battery of 24 flood lights be installed on the cableway tail tower for safety whenever the tower travels. The contractor stated that in his experience this has proved satisfactory, and the workmen notice no "eerie" moving shadow effects.

The contractor expressed a preference to begin concrete operations early in 1951, rather than to begin this fall and perhaps shut down the entire operation during winter. It was pointed out here that the mass concrete spillway and random gravel fill operations are tied in closely on all production schedules.

A geologic fault is known to cross the damsite, but its extent and nature will not be precisely known until foundation excavation is begun. Two alternatives were mentioned as possible treatment. The resident engineer may decide to place a concrete mat and grout underneath, or perhaps place grout pipe and then grout through the fill as was done at Dorena Dam.

Water supply

Water for the entire project is pumped directly from sumps in the gravel bed of the river. On the right abutment, 65,000 gal. of chlorinated storage will be provided for domestic water and concrete curing. The interesting comment was made that concrete cured with chlorinated water is not subject to normal curing stains. On the left abutment, 125,000-gal. storage will be provided for the secondary aggregate plant, concrete mixing, and embankment placing if needed. The river water has been tested and approved for allowable potassium content. Wash water from the aggregate plant will pass through sedimentation ponds before being discharged downstream.

Another matter discussed before the assembled staffs is the contractor's procedure with installation of the penstock gates. No conclusion was made as to whether the gate liners should be placed and grouted, and the gates installed fast so as not to disrupt the concrete pouring schedule, or whether the gates should be lowered through the machinery shafts and tunnels at a later date. The 34 tons of penstock gates will be advertised for bids this fall.

Paragraph SC-36 in the specifications is peculiar to Lookout Point Dam, and this is the first time such a paragraph has been used by the Portland District, Corps of Engineers, since before World War II. It states that the contractor must hold safety meetings for a minimum of 15 minutes bi-weekly for all supervisory personnel including foremen. The key personnel then point out to workmen the safety hazards and potential dangers as they occur during the course of the work. Although most contractors voluntarily exceed the specifications in this paragraph, SC-36 has been included in Portland District specifications since early 1950.

In addition to submitting plans of procedure and plant layout to the resident engineer, contractors on the entire project are required to submit in advance of construction an outline of their accident and fire prevention programs, (P. SC-38).

The contractor has the option of using either predominantly clay or silt material for the impervious core section, and at present is planning on using clay as far as possible.

Railroad relocation was begun in May, 1947. The damsite selected involves the relocation of 23 mi. of railroad, 13 mi. of state highways, and 16 mi. of secondary roads.

Personnel

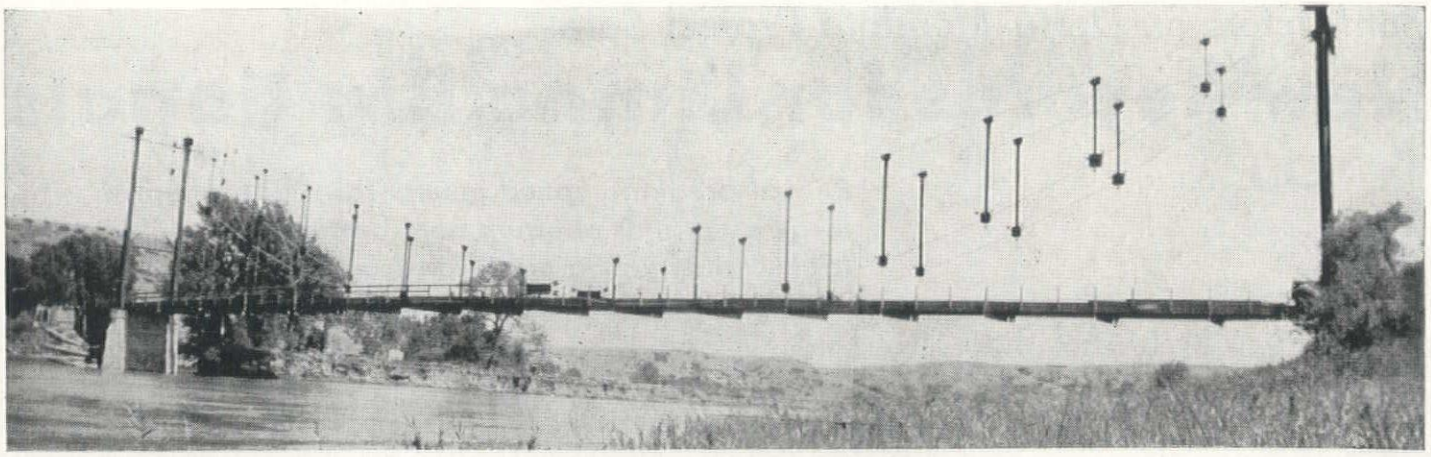
Work on Lookout Point Dam is under the direction of Col. Donald S. Burns, District Engineer of the Portland District. Robert E. Lee is Resident Engineer, and Tom Waring is Assistant Resident Engineer. Robert M. Snyder is Office Engineer. Engineers in charge of various features of field work include Vincent Kemp, relocation; Fred Drager, earthwork; Tom Kelly, concrete work.

Lou E. Steelman is Project Manager for Morrison-Kiewit-Macco, and Harold Maxwell is Assistant Project Manager. Charles Harris is Project Engineer, and Don M. Drugan is Office Manager. Superintendents include: John Erickson, carpenter; Jim Rutherford, "Swede" Contrell and Jack Lloyd, excavation; Floyd Mercer, electrical, and Leonard Kinyon, master mechanic.

Adequate Western Highways by 1969?

HIGHWAY SYSTEMS of the Western States will fail to meet the demand of 1950's traffic for an average of nearly 19 years, according to a survey made by the American Road Builders' Association. During the present year, the survey indicates that about $200,000,000 is being spent on new highway construction under state supervision. At the present rate of expenditure, and if no additional deficiencies appear in the interim, it would be 1969 before the West's highway system would be adequate to its needs of 1950. Motor vehicle registrations increasing at an approximate rate of 9% per year (U. S.) make the problem of providing adequate highways an even greater one. A state-by-state breakdown of the ARBA estimates is shown in the following table.

State	1950 Program	Deficiencies	Years to Overcome Present Deficiencies
Arizona	$ 10,000,000	$ 150,096,000	15.0
California	72,392,000	1,415,000,000	19.5
Colorado	17,000,000	284,051,000	16.7
Idaho	12,000,000	229,750,000	19.1
Montana	16,000,000	498,705,000	31.2
Nevada	5,800,000	86,264,000	14.9
New Mexico	12,500,000	157,427,000	12.6
Oregon	20,556,000	270,000,000	13.1
Utah	7,000,000	213,128,000	30.4
Washington	17,000,000	300,000,000	17.6
Wyoming	9,000,000	137,360,000	15.3
Total	$199,248,000	$3,741,781,000	Avg. 18.7



Suspension Bridge of a Novel Design Across Montana River

By THOMAS W. HURDLE
R. T. Hurdle & Sons, Consulting Engineers
Billings, Montana

A BRIDGE of novel design, a braced chain-type suspension structure with a 250-ft. span, was completed July 1950 in Liberty County, Montana. The bridge crosses the Marias River about 20 mi. southwest of Chester and replaces a combination steel and timber bridge built in 1914 by C. E. Peppard. This original bridge served with some alterations until it was destroyed by ice in March 1947. The original bridge consisted of two 145-ft. spans on concrete end piers and a center pier consisting of two concrete filled steel tubes connected by a steel plate. An ice jam took out the center pier.

In September 1947, Liberty County retained R. T. Hurdle & Sons, Consulting Engineers of Billings, Mont., to estimate the cost of rebuilding the bridge which was at that time not very badly damaged although it was resting on the bank of the river about ½ mi. downstream from its former site.

Available funds limit design

The Hurdle firm estimated a cost of $53,520 to re-erect the bridge and the county initiated proceedings to vote bonds for this amount. However, before this procedure could be completed another ice jam moved the bridge an additional mile downstream and practically demolished it. The problem then presented itself of designing another bridge which could be built with the available funds and which would carry the H-10 loading for which the original bridge was designed.

After exploring the possibilities of several other types of construction, the engineers concluded that the brace chain type would best satisfy the conditions. This bridge was designed as three-hinged, with a span of 290 ft., towers 51 ft. high, a roadway 16 ft. wide and a 16-in. thick laminated timber deck.

Materials and stresses

The upper chord cables are of 2-in. diam., the lower chord cables are of 2¼-in. diam., the back stays are two 2-in. cables on each tower leg, and the suspenders are ⅞-in. cable. The tower legs are 14 WF95 with angle wind bracing; the cable stiffener consists of double-angle struts and cable diagonals. The floor beams are 15 I 42.9, and the deck is built of 4-in. x 16-in. timbers laid on edge and spiked with 12-in. x ¼-in. spikes on 3-ft. centers. The back stay anchors are reinforced concrete blocks 32 ft. long, 6 ft. thick and 10 ft. deep on 16 creosoted timber piles 25 ft. long, projecting 6 ft. into the concrete. The bridge was constructed on the existing piers which were found, upon investigation, to be adequate to support the loads.

Maximum stresses for H-10 loading were computed by the method of "Reaction Locus Lines" and no stiffening effect of the floor was considered in the design. However, the floor very definitely does have a stiffening effect, and such effect tends to dampen vibration and no doubt adds to the factor of safety. The lateral wind load is carried by transverse bending stress in the deck, and no appreciable lateral deflections have been noted under winds up to 50 mph.

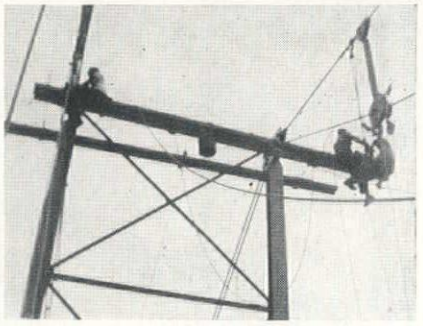
Construction

The bridge was erected by Liberty County's own forces under the supervision of R. T. Hurdle & Sons. The erection was accomplished without the use of any falsework. Equipment used on the job consisted of a power shovel (backhoe), concrete mixer, 2-drum hoist (1-ton), winch truck, compressor, and welding and burning equipment.

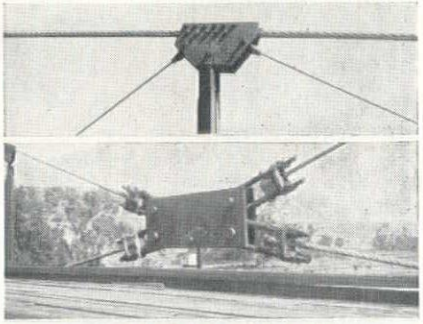
The largest crew employed at any time was eight men. Thomas W. Hurdle was in charge of design and Willard C. Hurdle was in charge of construction.

Cable for the bridge was furnished by Pacific Wire Rope Co. of Los Angeles. Structural steel was furnished by Great Falls Iron Works, Great Falls, Mont. Timber was furnished by Loraine Valley Lumber Co., Cottage Grove, Ore.

The engineers feel that this project owes its completion to a large extent to the cooperation they received from the County Commissioners of Liberty County—Charles O. Johns (chairman), J. A. Broadhurst and Nelson G. Bingham.



PLACING stiffening struts from scaffolding.



CLOSE-UPS of upper chord connection, top, and center connection, bottom.

THE CONSTRUCTION CREW. Standing, left to right—Willard C. Hurdle, construction engineer; Paul Aspervig, Jerry Ward, Lee Ludwig and J. E. Barlow. Kneeling—Alfred Hanson and Thomas W. Hurdle, author of the accompanying description.

Contractors on Delta-Mendota Project Set—

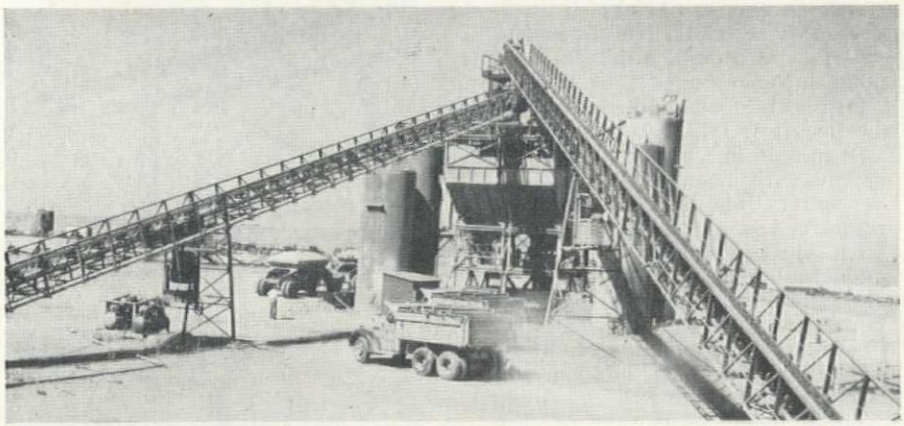
New Records for Lining Big Canals

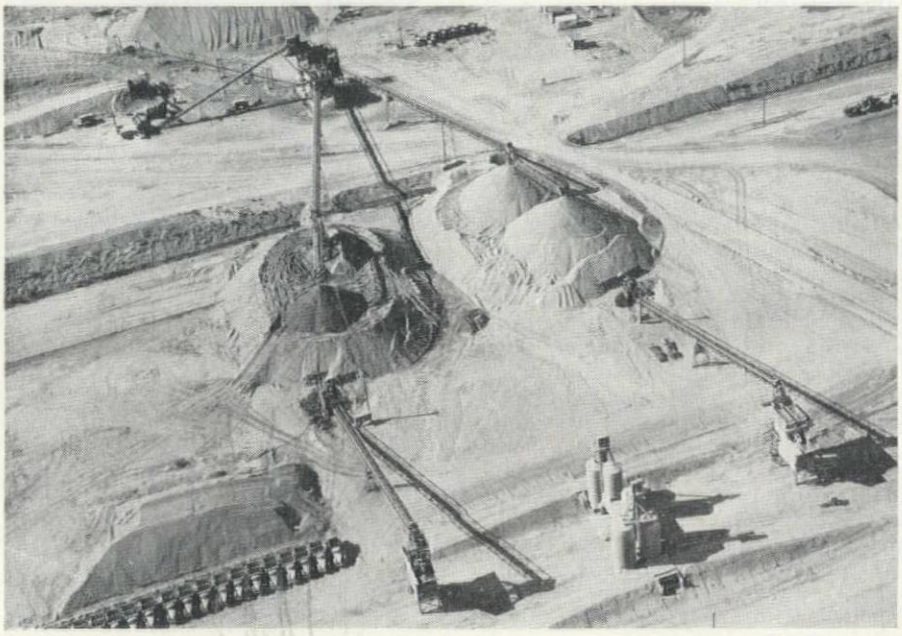
Record-breaking speed results from operation of large quantities of equipment on tight schedules, high-capacity aggregate and batch plants, and the know-how from years of field experience

OPERATING on the fastest schedules ever achieved for canal work on the California Central Valley Project, contractors operating on this Bureau of Reclamation job are breaking all records on the $70,000,000 Delta-Mendota Canal. The two firms with the largest amount of work now under way—(1) Morrison-Knudsen Co., Inc., Boise, Idaho, and M. H. Hasler Construction Co., Santa Ana, joint venturers, and (2) Western Contracting Corp., Sioux City, Iowa—are each averaging more than one mile per week on the main canal. This record-breaking speed is made possible by (1) improvements in equipment resulting from years of field experience, (2) adequate deposits of good aggregates and high-capacity crushing and screening plants, and (3) experienced contractor personnel using large quantities of equipment on tight operating schedules.

Relation of the Delta-Mendota Canal to the general CVP is outlined at the bottom of the next page. Like the Friant-Kern Canal (*Western Construction*, March 1950, p. 72 and April 1948, p. 81) the Delta-Mendota is being built with the use of giant trimmers and slipforms, which travel on rails behind the excavating draglines. These units trim the rough excavation to grade, and provide a subgrade for the 4-in. unreinforced concrete lining.

The dragline-trimmer-slipform method now used almost exclusively on large canal construction is a masterpiece of assembly line technique. New production records are set only if the machines are kept traveling at constant speed. One of the main causes for slow-down time is the large number of appurtenant structures that must be built in connection with the canal. These structures include state and county highway bridges, drainage inlets, turnouts, siphons and overhead conduits for existing irrigation systems. In addition, utilities and petroleum products pipelines must be severed and reconnected. Unless these obstructions can be passed by the trimmer and slipform they must be hauled out of the canal, moved ahead, and put back on the rails. In order to eliminate the highest number of slow-downs possible, Bureau engineers have designed structure foundations and abutments so that many can be built ahead of trimming and slipform operations. In the case of bridges, footing excavation and steel and concrete placing are done between dragline excavation and trimming work. Where ground-water is encountered longitudinal drainage trenches are constructed in the subgrade before the trimmer arrives. Finger drains, shallow grooves extending about halfway up the side slopes, are filled with gravel and topped with mortar to the subgrade. All concrete for drainage inlets and turnouts is poured before the arrival of the trimmer.





BOTH CONTRACTORS on current operations have high-capacity aggregate and batch plants. Above, the Morrison-Knudsen & Hasler plant. Sand and rock conveyors in foreground lead to batch plant, where all materials are obtained at one stop of the trucks. Stockpiles are in back of photographer. Below, air view of Western Contracting Corp. plant. Batch trucks make three stops—for rock, cement and sand, in that order.

Daily speed of the trimmer-slipform combination is directly proportional to the freedom from interfering appurtenant concrete work. As an aid in achieving top efficiency, Bureau engineers have made changes in the design of footings, so that they can be poured and capped before the lining is placed. In addition to revising the design of small structures to permit early construction, certain changes have been made in the large transition sections of canal, on either side of siphons and wasteways.

The trend is toward circular curves in the headwall sections, rather than the parabolic curves used on the Friant-Kern Canal design. The advantages of simple curves are faster construction and lower form costs. Loss in head, the only disadvantage, is slight and is offset by the resulting lower bids in structural concrete.

Fast aggregate production

A major problem of the contractors is processing enough aggregate to keep the fast-moving slipforms supplied with concrete. M-K & Hasler is placing an average of about 1,750 cu. yd. of concrete lining per 8-hr. day. The lining on this contract required 1.308 cu. yd. per lin. ft. of canal, resulting in 1,350 ft. of daily

progress. The overrun (concrete lining placed below the 4-in. pay-line) is averaging only about 1½%. Western Contracting Corp. is averaging about 1,600 cu. yd. of concrete lining per 8-hr. day. On this contract, the lining requires 1.375 cu. yd. per lin. ft., yielding a daily progress of 1,150 ft. The average lining overrun on this contract is about 2%. Both overrun percentages are low and extremely efficient figures. The entire Delta-Mendota Canal is being lined at the rate of ½-mi. per day.

Both contractors have high-capacity aggregate plants operating at full speed. Western Contracting Corp. designed its own layout, and during the past two years has averaged 242 tons per hr., with peak production as high as 350 tons per hr. The plant is 4 years old, and at present is operating on a 10-hr. shift. The Conveyor Co. of Los Angeles designed the M-K & Hasler plant, which was erected in March, 1950 and has ob-

KEEPING FAST-MOVING slip-forms supplied with concrete is the major problem of both contractors. Above, trucks feed two Koehring Twinbatch mixers which deliver concrete to the Western Contracting slip-form. The firm is averaging about 1,600 cu. yd. of concrete lining per 8-hr. day. Morrison-Knudsen & Hasler is placing about 1,750 cu. yd. per 8-hr. day. The entire Delta-Mendota Canal is being lined at the rate of ½ mi. per day.

Details and Progress of the Delta-Mendota Project

A MAJOR UNIT in the Central Valley project, the Delta-Mendota canal will convey Sacramento River water from the delta region southerly along the west side of the San Joaquin Valley, a distance of about 120 mi., to the vicinity of Mendota. This delivery of Sacramento River water to the lower (northern) section of the San Joaquin Valley provides a supply for existing irrigated lands with rights to adequate water. In turn, this delivery permits diversions of San Joaquin River water into the Friant-Kern canal to supplement existing supplies in areas of deficiency. This exchange arrangement and the delivery of water south into the San Joaquin Valley is one of the key features of the Central Valley plan. In fact, completion of the Delta-Mendota canal is necessary for full use of the storage behind Friant dam and other features in the southern end of the San Joaquin Valley.

Initial capacity of the Delta-Mendota canal is 4,600 sec. ft. Original engineering plans called for a series of low-lift pumping plants to advance this water to the south up the San Joaquin Valley. Subsequently this plan was modified to provide a single lift of about 200 ft. at the intake near Tracy. The intake is located on Old River, which is one of the meandering branches of the San Joaquin River in the delta. The Cross Delta canal, now under construction, will provide a means by which Sacramento River water will find its way into the intake for the pumping plant.

The plant will contain six units of 767 sec.-ft. capacity, each powered by a 22,500-h.p. electric motor. These pumps discharge into 120-in. steel pipes and these converge by pairs into three 15-ft. diameter concrete pipes to deliver water to the initial point of the canal proper. Dimensions of the initial section of canal provide a 48-ft. bottom width, water depth of 16.5 ft., side slopes of 1½:1 and a velocity of 3.7 ft. per sec.

Construction work on the canal has been active since 1946 and has involved a group of major contracts which provide for excavation, placing of a 4-in. unreinforced concrete lining, and numerous structures. The lining operations repre-

sent the most interesting construction feature and most of the contractors have carried out this work with mammoth trimming and lining machines spanning the canal and operating on rails set to final line and grade. In general, this equipment has been similar to that used on other large canals, including work still in progress on the Friant-Kern and current operations on the Columbia River basin.

The present article reviews some of the construction program and procedures as these operations near conclusion of the Delta-Mendota canal.

Selected unit bids on major features of the Delta-Mendota canal have appeared in *Western Construction* as follows:

Initial canal section....Aug. 1946 p. 122
11 mi. of canal.....Dec. 1946 p. 121
Tracy pumping plant..Aug. 1947 p. 126
9 mi. of canal.....July 1948 p. 112
20 mi. of canal.....Oct. 1949 p. 128

The record size concrete pipe used as part of the delivery system between the pumping plant and the canal was described in *Western Construction*, Dec. 1949, pg. 67.

Major Contracts on the Delta-Mendota Canal

Length or Structure	Contractor	Amount of Bid
Pumping Plant and Intake Canal (Initial contract only)	Stolte, Inc., United Concrete Pipe Corp. Duncanson-Harrelson and Ralph A. Bell	$ 5,888,695.00
9 mi.	Morrison-Knudson Co., Inc., and M. H. Hasler	3,025,181.10
13 mi.	Morrison-Knudson Co., Inc., and M. H. Hasler	4,418,811.00
13 mi. and Westly Wasteway	H. H. Everist, Sr.	3,530,067.50
15 mi.	H. H. Everist, Sr.	3,679,102.10
16 mi.	Western Contracting Corp.	4,165,764.00
20 mi.	Morrison-Knudsen Co., Inc., and M. H. Hasler	4,273,872.50
8 mi.	Morrison-Knudsen Co., Inc., and M. H. Hasler	2,173,888.50
17 mi. and Firebaugh Wasteway	United Concrete Pipe Co., and Vinnell	3,067,484.00
Newman Wasteway	A. Teichert & Son	427,139.00
Newman Wasteway	United Concrete Pipe Co., and Vinnell	1,031,790.00
San Luis Wasteway	Western Contracting Corp.	1,192,515.40
	Total	$36,874,310.10

tained peak hourly production of 400 tons per hr.

Principal difference in the flow of aggregate through the two plants is the arrangement of the surge pile arrangement and control of coarse aggregate. In the Western plant, rock passing the 7/16-in. screen is drawn off to a spoil pile whenever necessary to adjust grading of material in the stockpile. All sizes leaving the crushing and screening process are carried on one stockpile conveyor, thoroughly intermixed, to twin surge piles. The rock is drawn from the bottom of the stockpile through a tunnel conveyor to the batcher. Before entering the batcher, it is regraded on a triple deck vibrator screen and deposited in separate hoppers. Since the control of each aggregate size occurs during crushing and screening, before entering the surge pile, small adjustments are made from time to time in the hoppers above the batcher. This usually consists of drawing a truck load of excess material from the 7/16-in. minus hopper as needed to maintain the hoppers at the same level.

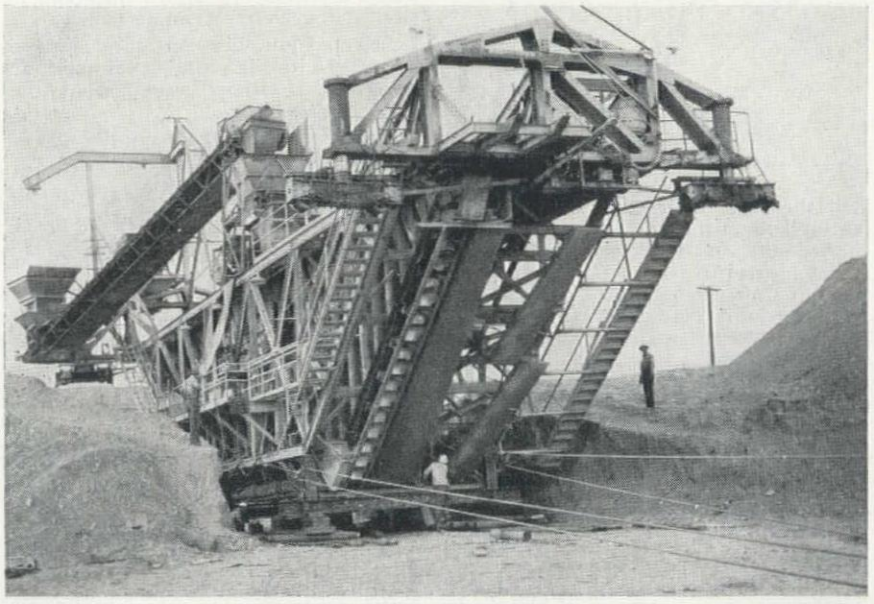
In the M-K & Hasler plant, the rock is separated immediately after crushing and screening, and stockpiled in three separate sizes. A common tunnel conveyor beneath the piles supplies the batcher. Whereas adjustment control in the Western plant is made in the hoppers in the batcher, control at the M-K & Hasler plant is made here by drawing off the three aggregate sizes on the tunnel conveyor through slide gate openings.

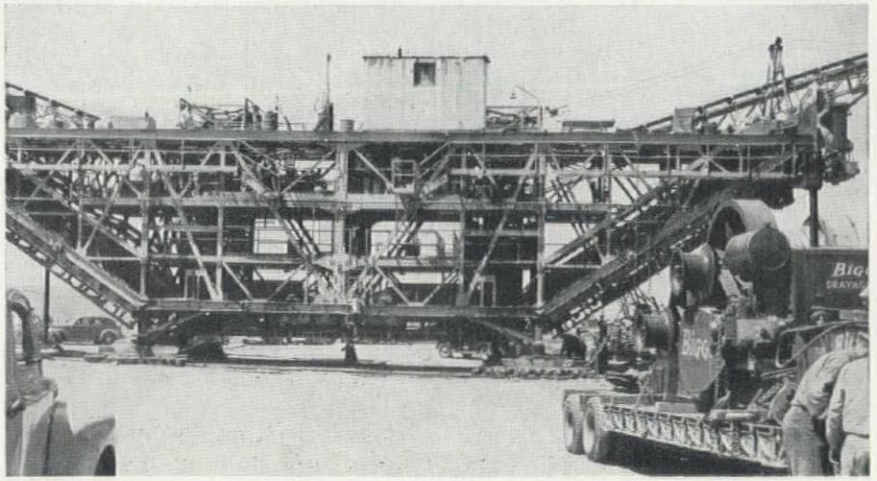
Aggregate used in the concrete lining must be particularly well graded, for the

The Latest Methods for Moving Canal-Lining Jumbos

HANDLING METHODS for moving large canal-lining machines around obstructions have been improved within the last few years. One of the latest moves was recently made for Western Contracting Corp. by Bigge Drayage Co. of Oakland on the Delta-Mendota Canal project. This move, which included some record-weight units, occupied only five days (10 shifts) and illustrates some of the advances made since this idea was first tried.

When these large units, designed to provide for efficient trimming and concrete forming operations on large irrigation canals, were first developed it was general practice to dismantle them whenever an obstruction was encountered. These breaks in continuous lining operations might include highways, essential pipelines, sections to be left unlined and some design features of the canal itself. The units were taken apart, moved around the obstruction and reassembled in a new position. This operation usually involved about 25 days and a fairly large crew of skilled labor. Naturally, the economics of using these large special pieces of construction equipment was based on keeping them in operation with a minimum number of down days.





According to accepted construction history, the original suggestion for moving these units without dismantling was made to Arizona-Nevada Constructors on a Friant-Kern Canal contract by a representative of the Bigge Drayage Co. The suggestion was taken rather lightly at first, but resulted in an offer to undertake the move.

On this first move the unit was stripped of accessories to reduce weight to about 100 tons and to improve the balance of the machine. The question of stress-reversal in some of the structural members had to be considered because the units are designed to hang suspended from wheels along the outer edges, while during the move the weight would be supported under the lower chord. However, by using care in placing supports, this problem was solved.

From this beginning, subsequent moves have been made with less and less stripping of accessories until units are now handled weighing well over 200 tons. On these heavy units rollers are used for the move, while some of the lighter frames are handled on low-bed trailers.

Sequence of operations includes the following: raising with hydraulic jacks to introduce steel beams, and hardwood rollers. The unit is then swung 90 deg. in the canal and headed up a ramp left during the excavation. The pull up the ramp is made by winch installed at the top of the bank. Normally, this winch is mounted on a low-bed trailer for mobility. The machine is then pulled forward on rollers around the obstruction and the process of lowering it down an earth ramp to the new location is reversed.

For those units handled on trailers the general process is the same, but the process of lowering into the new location is carried out after a complete turn, with the units following a truck for steerage because the multiple support does not permit steering the unit in reverse.

Two typical views of Bigge Drayage Co. handling the Western Contracting Corp. liner in a recent Delta-Mendota move are shown.

reason that workability is an all-important quality in the slipform method of placement. To increase workability in the mix, the percentage of ¼-in. pea gravel is kept low and the fines in the sand relatively high.

Concrete specifications are the same on all contracts for main canal work.

Native pit material for the Western plant is dug with a 3-yd. dragline and hauled ½ mi. to the processing plant at the rate of about one load per minute. Waste at the plant averages 20%: 7% is oversize at 4 in., and 13% consists of excessive ¼-in. pea gravel. In the event of different capacity requirements or a change in the natural grading of the pit, the vibrating screen under the intake apron feeder can be changed to reject to the spoil pile 3 or 5-in. rock, instead of the 4-in. discard now used. The 12,000-ton sand and rock surge piles are elongated, so that each resembles overlapping 6,000-ton twin piles. A horizontal conveyor delivers aggregate on alternating days to each pile, so that the material surrounding the tunnel conveyor is not excessively moist. However, additional water is sprayed on the rock as it enters the batcher for silt control.

In addition to high capacity for its size, the plant (see illustration) was designed to be portable and flexible. Each steel bent has hinge joints with pins, and the plant superintendent estimates that the plant could be dismantled in two days and be ready for moving.

The sand classifier is a dual twin-rake type, designed by the contractor. Cement is batched from a 2,200-bbl. bulk cement system. Plant personnel, including all operations at the gravel pit totals 14 men.

The plant being used by Morrison-Knudsen & Hasler was designed by the Conveyor Co., Los Angeles. Pit material is excavated by a 2½-cu. yd. shovel, and hauled by a 20-cu. yd. bottom dump Euclid trailer, with side boards. Material passes a 9-in. grizzly, made of railroad rails, and enters the plant on a 36-in. felt feeder. Oversize rock is negligible.

A special feature of the plant is the return circuit at the second screening stage which can take No. 4 minus material, convey it through a crusher, and return it to the line. Coarse aggregate is stored in three piles: 1,600 tons of No. 4 to ⅜-in.; 3,200 tons of ⅜ to ¾-in.; and 6,000 tons of ¾ to 1½-in. Sand is conveyed from the screens to a sand classifying and dewatering wheel, thence to a swivel conveyor and the 800-ton crescent-shaped pile. A ball mill is used to increase the fines in the sand.

End product of both aggregate plants is dry-batched concrete mix in 1½-cu. yd. units. The batchers of both plants are of twin capacity, with three hoppers each. At the Western Contracting Corp. plant, batch trucks receive the 2-batch loads of rock, cement, and sand, in that order, from dual weight hoppers. At the Morrison-Knudsen & Hasler plant, all materials are obtained at one stop of the trucks. Cement for both contracts is hauled by trailer from the San Andreas plant of the Calaveras Cement Co., over 125 mi. The present dry-batch haul of the Western contract is 12 mi., and will reach a maximum of 20 mi. The maximum haul on the M-K & Hasler contract was 18 mi., and at that time 40 batch trucks were being used.

RUBBER-TIRED RIG was especially built for Morrison-Knudsen & Hasler to place gravel in drainage trenches. Dump trucks feed hopper at left and gravel is delivered by conveyor.

Both contractors are running three shifts on excavation and a 10-hr. shift on aggregate production, and two shifts of 8 hr. on trimming. M-K & Hasler is running one shift of 8½ hr. on lining; Western is running one 8-hr. shift on lining.

M-K & Hasler is using a Link Radio Corp. 2-way radio system, with master units in the Los Banos office and at the warehouse, and 11 mobile units in the field. Communication limit is 7 to 8 mi. between cars, and 20 mi. from main stations to car.

Both contractors, at their present rate of speed, will complete their contracts in January, 1951.

Western Contracting Corp. has erected a portable dry batch plant near the head of the San Luis wasteway for the 8,000 cu. yd. of structural concrete needed on this contract and the south end of the firm's main canal contracts.

Over 2,000,000 cu. yd. per month is being excavated for the canal and wasteways by the various contractors at the present time, which includes that excavated by United-Vinnell Co. on the last contract.

Morrison-Knudsen & Hasler Equipment on Delta-Mendota Canal

Excavation:

One 9W Bucyrus-Erie Monighan walking dragline, 850-hp. diesel, with 165-ft. boom and 15-cu. yd. Esco bucket.
Two Northwest 95 draglines, crawler, with 3-cu. yd. light weight Hendrix buckets.

Trimming and lining:

Conveyco, rock and screening plant, Conveyor Co., Los Angeles (Traylor plate feeder, Traylor crusher, Symons crusher, Marcy ball mill).
Two Conveyco bulk cement batch plants.
Two Conveyco aggregate batch plants.
One canal trimmer, Guntert and Zimmerman.
One canal slipform, Guntert and Zimmerman.
One canal gravel conveyor, by Conveyco.
One 34E Koehring dual drum paver.
One 34E Rex dual drum paver.
Twenty-three KB-8 International batch trucks.
Eighteen batch trucks rented as needed.
One Link Radio Corp. communications system; two office units (office and warehouse) and twelve field units on cars and pickups.
One Northwest 80 shovel, 2½-cu. yd. bucket.
Three 20-cu. yd. Euclid trailer units, with side boards.
Ten Caterpillar D-8 tractors.
One ¾-yd. Marion dragline.
One Northwest Model 6 dragline.
Two Lorain truck cranes.

Western Contracting Corp. Equipment on Delta-Mendota Canal

Excavation:

Two 7200 Marion diesel-electric walking draglines, 120-ft. booms, and 8½-yd. Hendrix buckets.
Two 111 Marion crawler draglines with 5 cu. yd. Hendrix buckets and 90-ft. booms.

Trimming and lining:

Aggregate screening and washing plant (contractor's design) using Cedar Rapids and Symons equipment, Conveyor Co. conveyors.
One 51B Marion dragline and five Koehring Dumptors in pit to feed plant.
Two aggregate batch plants, contractor's design.
Two cement batch plants, Johnson.
One canal trimmer, contractor's design.
One slipform, contractor's design.
Two 34E Koehring dual drum pavers "Twin-batch."
Twenty-five KB-7 International batch trucks.
Seventy-five miscellaneous batch trucks, rented as needed.

Structures:

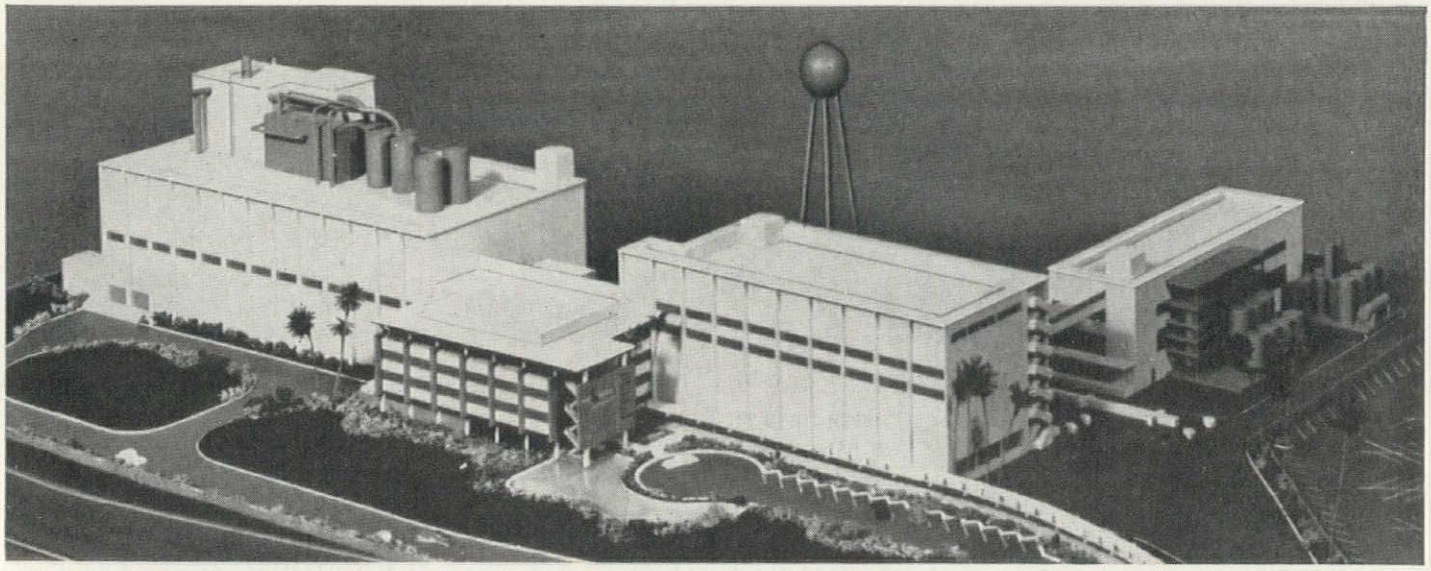
Three 34E dual drum Koehring pavers, each with 60-ft. belt conveyor.
Two 605 Koehring draglines.
Two Bucyrus-Erie Hydrocranes.
Two Hough loaders.
One 22B Bucyrus-Erie truck crane.

Organization

Work on the Delta-Mendota Canal is being carried out by the Bureau of Reclamation under the direction of Oscar G. Boden, Construction Engineer. Oliver H. Folsom is Resident Engineer, and A. I. Greenlaw, Dee Wren, J. J. Welsh and E. O. Baird are Chief Inspectors.

The Morrison-Knudsen Co., Inc., & M. H. Hasler Construction Co. staff is headed by W. J. Darkenwald, Project Manager. George Renauld is General Superintendent, and Arthur Gray is Project Engineer. Superintendents include: Jim Ricker, lining; Mel Stoddard, grading; Dallas Mathews, Master Mechanic; Ed White, aggregate plant; Frank Partian, structures; L. W. Andrews, truck foreman; and Glen Van Landingham, in charge of the B-E Monighan walking dragline. John Gorman is in charge of drainage. Frank King is office manager. MacDonald, Young & Nelson, of San Francisco, is subcontractor on the structures for M-K & Hasler, and Red Cameron is their superintendent.

Project Manager for Western Contracting Corp. is Robert K. Ames. R. H. Heitman is District Engineer. Superintendents include: M. K. Young, structures; C. F. Hynes, aggregate plant; Herb Alexander, mechanical; Wes. Rogers, lining; James Briggs, grading.



Series of Steel Frame and Concrete Slab Buildings for—

Lever Brothers Plant in Los Angeles

Form work totals 1,250,000 sq. ft. for multi-million dollar industrial plant — Fluted concrete exterior finish poses form design problem—Belled concrete piers used for foundation

CONSTRUCTION of the multi-million dollar industrial plant for Lever Brothers Company in Los Angeles is more than half completed by the Bechtel Corporation, Industrial Division, Los Angeles. Located on a 30-acre site east of the city center on the Santa Ana Freeway, the plant is the first West Coast installation by Lever Brothers Company. Bechtel Corporation, acting as general contractor, has complete development responsibility, and is in charge of both process and structural design. The series of steel frame and concrete slab buildings will provide 415,000 sq. ft. of usable floor space for the manufacture of both soap and edible products, with provision for additional future warehouse area of 185,000 sq. ft. The entire plant is scheduled to be in operation by July, 1951.

Belled pier foundations

Earthmoving crews began work in November 1949 when 60,000 cu. yd. fill was placed on the site and compacted to 90% density. Thorough compaction was done to provide for future expansion anywhere on the triangular site. A compressible layer of soft clay lies near the surface in this area, and heavy bearing power must come from a 10-to-20-ft. layer of sand 12 ft. below this layer.

Using a conventional foundation treatment, the contractor drilled holes to make belled concrete piers, an economical way to escape settlement due to compressible clay. The piers vary from 2 to 4 ft. in diam. The bottom of the shaft was belled out by drilling with an expander, and in many cases was hand trimmed by workmen lowered to the bottom. Because the soil is quite stable in its dry state, no forms were needed. No reinforcing steel mat was used, since the concrete bell bottom, at 30 deg. from vertical, is designed to take shear and not tensile stress. Design pressure of the bell on the sand layer is 12,000 psf. Most pours of the piers were accomplished using elephant trunks.

As construction of the buildings and installation of industrial equipment continues, the contractor and subcontractor crews number as many as 600 men. Concrete work totals 31,000 cu. yd., all classes, and is either 2,500 or 3,000 psi. strength. The three front structures of the plant—buildings to house soap finishing and packaging, center office building, and edible oil operations—are primarily of concrete slab construction.

Exterior wall forms

Exterior walls, 8 in. thick, feature the concreting operations. On the front walls, pilasters limit the width of form panels to 16 ft. The forms are 2 x 4's faced with ⅝-in. plywood, fitted between pilasters, and raised from floor to floor by hand winch. Each outside form has two winches, slung over light 4 x 6-in. portable timber framework. After each pour, the form is raised by the hand winches, cleaned and oiled, and readied for the next pour.

At the building ends, where 90 and 120-ft. long walls are uninterrupted by protruding pilasters, the same form-and-pour cycle is followed. Hand winches on light frames are used on 15-ft. centers along the 90- and 120-ft. long forms. The extra-long forms are heavily waled for stiffness, and in addition have metal brackets between wales and studs on which the scaffolding rests. Thus, the forms serve as scaffolding for unloosening the bolts and cat heads, and both forms and scaffolding move together. Walkway boards are directly supported on stamped metal brackets bolted to the walers. The forms overlap the previous pour by a few inches only.

An attractive architectural feature of the facades of the three front buildings is the fluted concrete finish. The detail is provided by attaching vertical strips of tapered wood, 1½ in. deep on 6-in. centers, to the plywood form face. The field problem that was a temporary puzzle here was concerned with the method of attaching the strips of wood to the form face. The tapered wood, clear pine, was procured from the mill in its finished trapezoidal cross-section. The contractor at first glued and tacked the strips in place to the face of the form with finish nails. Then the form was turned over and the strips were nailed from the backside of the form. This method was discontinued, however, when it was found that the strips would not remain on the forms when the forms were stripped. During fabrication, the forms were coated with a sealer, however the glue did not stick satisfactorily to the surface. Adding to the original problems, concrete sometimes seeped in between plywood and tapered strip, entrapping the strip during final set.

As a solution to the problem of fasten-

PICTURED ABOVE—

AN ARCHITECTURAL MODEL of the plant. Large building at left is for soap operations, smaller building at front center contains offices, and the two other buildings are for edible products and edible oil operations.

ing the tapered strips, the contractor experimented with a caulking gun. The strips were toted into line with finish nails and the abutting margin was filled with gray lead sealer. Cement-coated nails, 40 per flute, were then driven in from the back of the form on 18-in. centers. In addition, 1½-in. No. 10 wood screws were driven in from the back at all form joints, and when needed, ¼-in. bolts were used. Although heavily tapered for exit from the wall face, the strips were at first given a rip cut down the center of the back side in order to make them flexible to allow for concrete shrinkage. This was discontinued both because of the resulting weakness and because concrete seeped into the back of the strips. It was found that once the strip was securely attached to the plywood, nothing other than caulked sealer had to be applied to the form.

Form yard

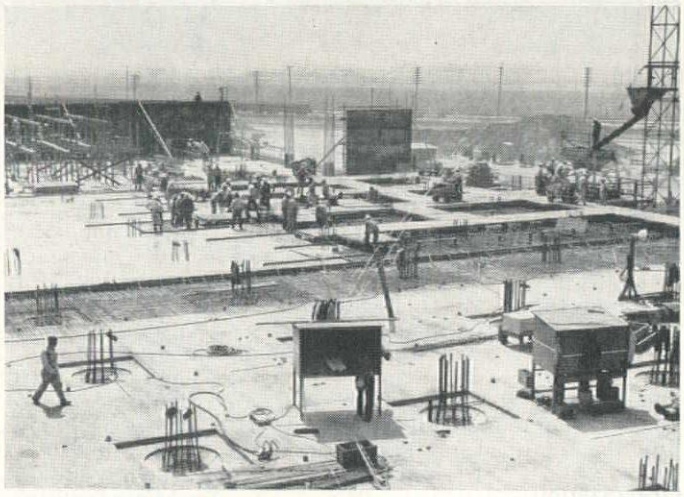
The form yard, located at one end of the site away from the structures, originally had two saws, each with 40 ft. of roller conveyor on the framing tables. Later, another saw and conveyor were added, using rollers from the original conveyors, in order to maintain form production. Forms, both flat and fluted, are cleaned by hand with a 1-ft. wide wire bristle brush. The concrete surfaces are dressed by hand pointing, grinding, and sacking, in the conventional manner, from a painter's scaffold. Formwork totals 1,250,000 sq. ft. Interior walls are conventional metal lath and plaster. Concrete interior columns are of round capital, drop head design, and were poured in steel forms. The bottom 6 ft. of interior columns exposed to truck traffic within the structure, have been encased in a ⅛-in. steel sheet for protection against spalling. The flat slab floors are 8½ in. thick, poured with a fleet of 8 to 13-cu. ft. power buggies, and in the operating area are surfaced with a ¾-in. mortar topping. Concrete slabs on grade are 5 in. thick. About 5,000 cu. yd. of transit mix concrete for wall, column, and slab sections is poured per month. One lift is made every 12 working days on buildings under construction.

In the rear of the new plant, adjacent to the railroad spurs, are the edible and soapery tank farms. Tanks in these two units are of welded steel, resting on grade, and are supported by a 3-in. mat of asphaltic concrete.

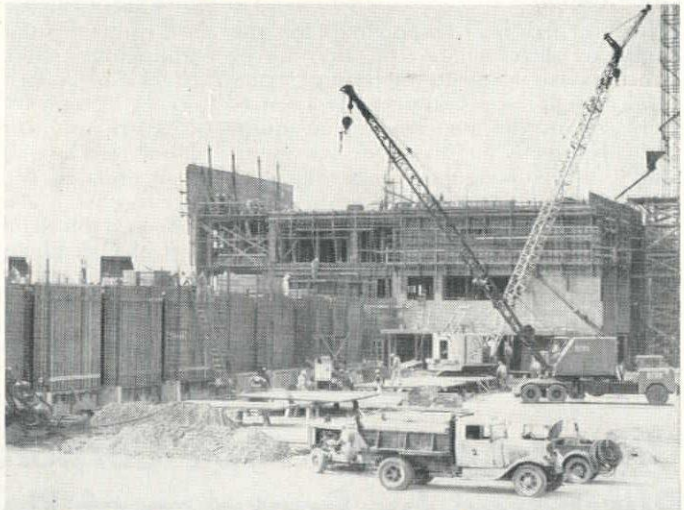
Both the soap and edible products processing buildings are steel frame structures, housing heavy vessels three stories in height. The equipment in some cases hangs three floors. The front three buildings are adjacent to each other but are separated by a 3-in. seismic separation for lateral isolation. Due to the variety of construction types employed in the new plant, three different factors were used in the design to withstand lateral forces. These factors are: for vessels, .33g; vessel supports, .20g; processing areas, .13g.

Lever Brothers Company is a nationally known firm manufacturing 8 brands of soaps and detergents, as well as food shortening, margarine, salad

BELLED concrete piers provide an economical foundation for the buildings. The piers penetrate a 12-ft. layer of compressible clay to rest on stable sand.

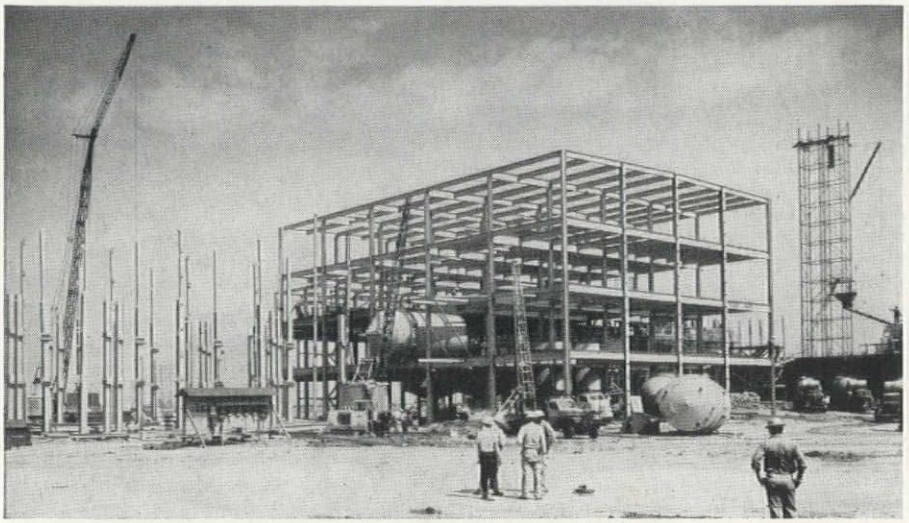


FLAT SLAB concrete floors, 8½ in. thick, were placed using a fleet of 13-cu. ft. Whiteman power buggies. Round concrete interior columns were placed using steel forms.



EXTRA-LONG one-piece wall form (far end of building) is raised by hand winches on boom and light frame. Metal brackets carry scaffolding which moves with the form.

STEEL FRAME construction supports heavy vessels necessary for manufacturing operations. The steel columns are set on the belled concrete foundation piers.



SETTLING TANKS for the soap process building are shown being installed before completion of the steel frame. Both the soap and edible products processing buildings house heavy vessels three stories in height. Tanks in other buildings rest on grade.

dressing, mayonnaise, sandwich spreads, and several types of refined glycerine. The new Los Angeles plant was planned by and is under the general direction of Lever executives W. H. Burkhart, vice-president in charge of manufacturing; G. G. Grant, Western operations manager; C. W. Deane, manager, general engineering; R. J. Leaver, manager, construction engineering; and A. H. Lawrence, project engineer.

Organization

Bechtel Corp. is responsible for the complete development of the Lever Brothers Co. project, including structural and process design, and procurement and installation of industrial equipment. Jerome K. Doolan, vice-president, and J. W. Komes, general manager of the Industrial Division, are in direct charge for Bechtel Corporation, and Earl E. Nichols is general superintendent. Other key men on the job are: Construction—J. B. Becich, mechanical superintendent; Rex Dunn, building superintendent; Fred S. Paul, superintendent of electrical and subcontract work; Jack W. Chamberlain, piping superintendent, and Basil C. Licklider, office manager. Engineering—Leonard G. Rummel, project engineer; Frank H. Scott, process engineer, and Richard F. Grambow, supervising engineer. Purchasing—Lyle J. Blowers, purchasing agent. Estimating—Russel D. Koons. Paul E. Jeffers, Los Angeles, is consulting structural engineer. The architectural firm of Wurdeman and Becket, Los Angeles, acted in a consulting capacity on exterior design.

Principal subcontractors include the following: Bethlehem Pacific Coast Steel Corp., structural and reinforcing steel; Western Concrete & Equipment Co., ready-mix concrete; American Hoist & Derrick Co., hoisting towers; Consolidated Western Steel Corp., storage tanks; Casey & Case Foundation Co., caisson drilling; Ets-Hokin & Galvin, electrical work; Mathews Construction Co., grading; C. C. Moore & Co., boilers; P. & J. Artukovich, Inc., sewer and drain; Paul Vukich Construction Co., outfall sewer and storm drain, and Hal Greenwood, railroad spurs.

United Concrete Pipe Corporation Purchased by Pontusco of Delaware

THE PURCHASE of United Concrete Pipe Corporation of Baldwin Park, Calif. by Pontusco Corporation of Burlington, N. J., has been announced by H. Lloyd Nelson, president of Pontusco. United Concrete Pipe Corporation is an old established manufacturer of concrete pipe which was originally founded in 1918 as the United Concrete Pipe Company and in 1929 became United Concrete Pipe Corporation. United manufactures vertically poured reinforced concrete pressure pipe either with a steel cylinder, a cage of reinforcing steel or both. They also centrifugally cast pressure pipe either with a steel cylinder or cage reinforcement. In addition, concrete pipe is cast without reinforcement for very low pressure service.

United has its main office, a large permanent plant for the manufacture of concrete pressure pipe and extensive shop facilities for the manufacture of heavy specialized pipe making and handling equipment at Baldwin Park. Other pressure pipe plants of a permanent nature are located at Stockton, Calif., and Pleasant Grove, Utah. United also operates seven plants in California for the manufacture of low pressure concrete pipe for sewer, drain and irrigation service.

Pipe is made in a wide range of diameters from 4 to 180 in. The smaller pipe is more generally used for sewer service and the larger sizes for water lines, sewers and irrigation purposes. Recently United completed the manufacture of 9,000 ft. of 180-in. diameter reinforced concrete pipe for the Bureau of Reclamation's Central Valley project at Tracy, Calif.

Pontusco Corporation is a Delaware Corporation with offices presently located at Burlington, N. J., and New York, N. Y. It is jointly owned by the United States Pipe and Foundry Company and by Compagnie de Pont-a-Mousson of Nancy, France. It was formed in 1946 for the purpose of manufacturing concrete pipe and associated products in North America, Central America and some countries in South America.

It is expected that United Concrete Pipe Corporation will continue expanding its plants into other states so that prices can be quoted by Pontusco anywhere in the United States. According to Nelson, "Most of the concrete pressure water pipe manufactured is in sizes larger than those normally available in cast iron pipe, so that this purchase of United enables Pontusco to expand its service to the entire water supply industry as well as other major utility industries and to agriculture."

California Contractor Asks Permit for Power Project

THE FEDERAL Power Commission has received an application filed by G. L. Carrico, general contractor of San Francisco, Calif., for a preliminary permit for a hydroelectric project in Mendocino and Trinity Counties, Calif. The proposed development would include four dams and three powerhouses having a proposed installed capacity of 27,500 kw. The applicant proposes to sell the power to be generated at the project to Pacific Gas and Electric Co.

Dam No. 1 would be located on the Middle Fork of Eel River with a 4-mi. tunnel and a penstock leading to a powerhouse on Hulls Creek, a tributary of the North Fork of Eel River. A main storage dam (No. 2) would be constructed on Hulls Creek, creating a reservoir with a capacity of about 250,000 ac. ft. and an area of about 1,200 ac. Water would be diverted from this reservoir into Short Creek, a tributary of the Middle Fork of Eel River, through a penstock leading to powerhouse No. 2. Dam No. 3 is to be located on Short Creek with a powerhouse and penstock, and Dam No. 4 would be situated on the same stream below the powerhouse. The latter dam would be constructed primarily to provide water for irrigation and also would serve as a regulating dam.

A $20,000,000 POWER project at Eklutna Lake near Anchorage, Alaska, is scheduled to start next spring. President Truman signed an authorization bill for the project last month. Construction will be under the supervision of the Bureau of Reclamation.

The project will provide power for the entire Anchorage area, including smaller towns as well as the Alaska Railroad and the Army's base at Fort Richardson.

Short Cuts for Power at Kortes Dam

Generation of power begins with only one block of dam "topped out"—Temporary shelters erected over powerhouse facilities—Penstock extended through wall of powerhouse to carry river flow during concreting of diversion tunnel

By
JOHN P. OTTESEN
Field Engineer, Bureau of Reclamation, Kortes Dam, Wyoming

THE FIRST generator of the Kortes Unit of the Missouri Basin Project went on the line June 30, 1950, for commercial long-time generation of power. This is only the headline, for the full story comes in knowing that, although power is now being generated, only one block of the dam has been "topped out," the switchyard has not been started, the spillway is not ready for use and there is no roof on the powerhouse.

Kortes Dam and Power Plant is being built by Morrison-Knudsen Co., Inc., of Boise, Idaho, under a $4,688,000 contract for the Bureau of Reclamation on the North Platte River about 65 mi. southwest of Casper, Wyoming. The dam is a straight gravity-type concrete structure rising 240 ft. above the river bed with a crest length of 440 ft. The uncontrolled spillway crest at the right end of the dam discharges into an inclined transition and horizontal tunnel section with a finished diameter of 30 ft. and a capacity of 50,000 cfs. The powerhouse, located across channel and adjoining the dam, will house three 12,000-kva. vertical shaft generators. Construction on the dam and power plant, the first unit of the Missouri River Basin Project to be placed under contract, was started in May 1946.

An article describing the construction features of the job and enumerating some of the difficulties which delayed the job beyond the original completion date of February 1949 appeared in *Western Construction*, March 1949, pg. 55. But when that article was written the "Big Blizzard" of January and February 1949 was not foreseen. This not only shut down such work as could be performed during the winter but heavy accumulations of snow and ice delayed considerably the resumption of concreting operations in the spring. Then again in June of 1949 the high run-off in the North Platte River filled Seminoe Reservoir, 2 mi. above Kortes Dam, and forced the spilling of 13,500 cfs. As the Kortes diversion tunnel had a capacity of only 5,000 cfs., the dam and powerhouse substructure was completely inundated for nine days.

Change and extra work orders

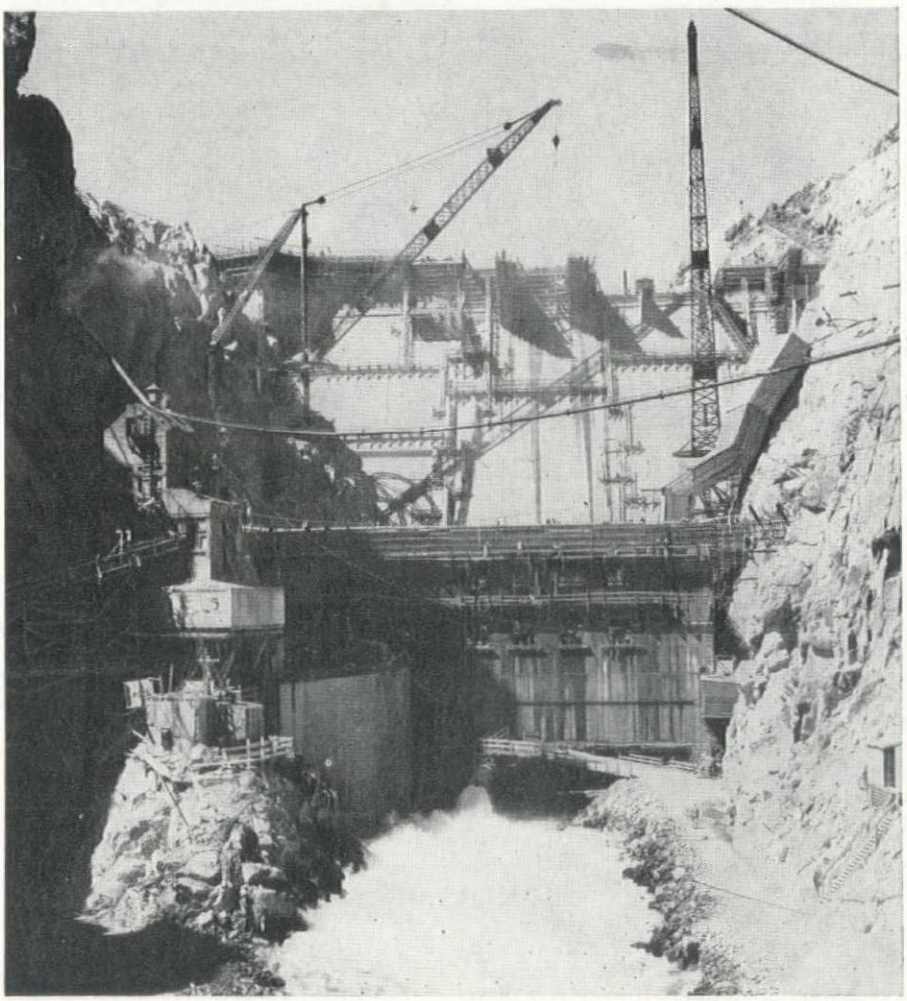
With the original completion date for the dam and powerhouse set for February 1949, it was planned to install the turbines and generators and make the electrical hook-ups and installations during the following year, either by a separate contract or with government forces. This plan would have resulted in the delivery of power to the system in time to meet the irrigation pumping load of June and July in 1950. But even before the flood of 1949 it was apparent that the prime contract would not be completed until the fall of 1950 and that installation of the turbines and generators would have to be performed simultaneously with the construction of the powerhouse if power commitments were to be met. The nature of the work involved, the remoteness of the location, the inaccessibility of the job and the lack of working areas in the narrow canyon precluded bringing another contractor in to the job. So all installation and hook-up was done by the prime contractor under orders for change and extra work orders to the original contract.

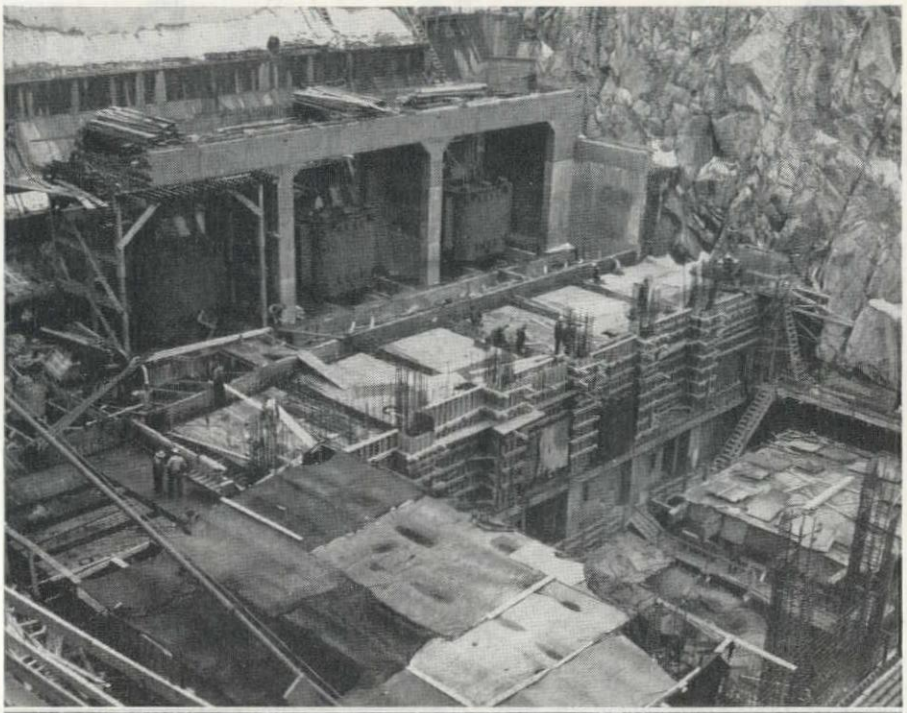
Short cut schemes

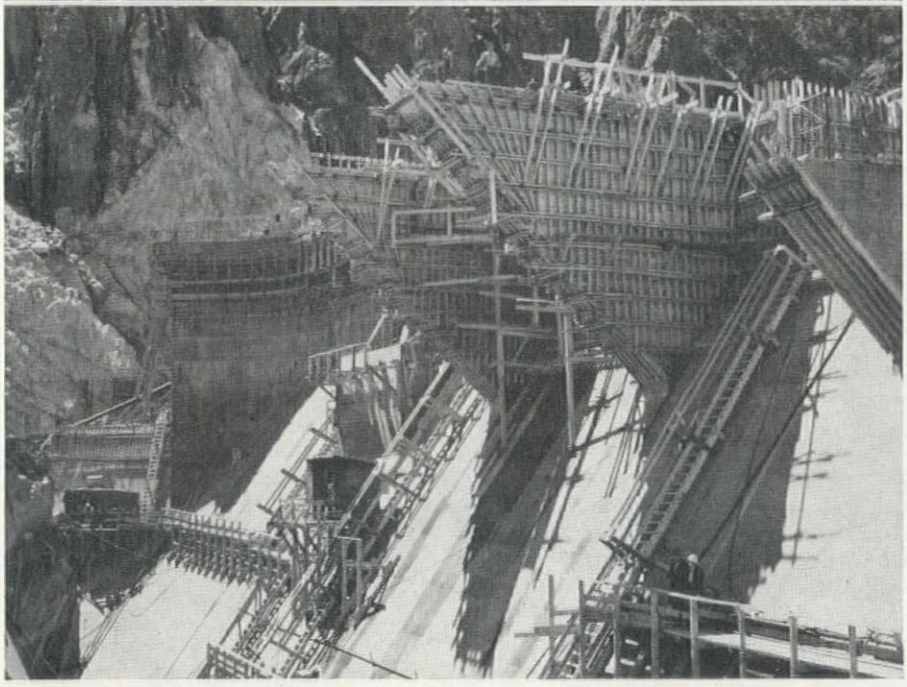
The first problem to be solved was what to do with the normal flow of the river while the spillway tunnel was being lined, as the original diversion had been made with the tunnel unlined. The original plan was to plug the diversion and spillway tunnel as soon as the dam was high enough, permitting the water to spill through the three penstocks, discharge into the powerhouse substructure and flow on out through the draft tubes into the tailrace. But if this plan had been followed it would have been impossible to install turbines in the flooded powerhouse.

Studies showed that if the dam was completed to elev. 6105, sixty-four feet

FIRST GENERATOR went on the line the day this picture was taken—June 30, 1950—with only one block of the dam completed (at left). Formwork on downstream wall of powerhouse is set for final lift. "Chute" protecting temporary tap lines can be seen up canyon wall at right.







WINTER concreting operations in the powerhouse, top. Canvas covering in the foreground protects the machine shop floor. Power transformers in the background are in their final position under protective structure. BOTTOM—View of formwork for the switchyard brackets. Completed Block 6 of dam is in background, and spillway is beyond Block 6.

below the roadway elevation, one penstock extended through the downstream wall of the powerhouse could carry the normal discharge of 2,500 cfs. from Seminoe Powerplant. While this would permit the installation of only two of the three units before the spillway was completed, no alternative was available, so the scheme was adopted. The concrete placing program during the summer of 1949 was concentrated on the dam, but not until November 10 were the six blocks of the dam levelled off at the minimum elevation.

By February 5, 1950, all preparations for the diversion through the penstock were completed and, with the river flow shut off at Seminoe Dam, a wooden bulkhead was erected in the gate structure of the diversion tunnel. To complete the seal a concrete "cork" was then poured over the entire gate structure. Releases from Seminoe were resumed early on February 6, and as only 2,000 acre-feet of storage are required below the penstock intakes, water began flowing through the single penstock extension at 10:00 a. m., and the diversion was successfully accomplished. Pouring of the permanent plug and lining of the spillway tunnel was started immediately.

Installation of the embedded portions of the turbines presented no particular problem. The heaviest piece to be installed, the 13-ton speedring, could be handled by one of the stiff-leg derricks. No protection from the weather was necessary except to keep the second-stage concrete embedding the scroll-case from freezing during winter concreting. Installation of the embedded portion of the first turbine was started in October 1949, and concrete placing to the top of the pit liner was completed in January 1950. Placing of second-stage concrete to the generator floor of the first unit was completed March 15.

Machinery installation

Installation of the generator, governor and other machinery could not proceed without suitable shelter. As the roof would not be on the powerhouse until fall, a temporary shelter had to be erected to provide protection from snow, rain and dirt but which would still permit construction to proceed on the powerhouse walls and roof. A timber structure with corrugated metal siding was erected on the generator floor about 2 ft. inside the walls. A heavy timber roof provided protection from anything that might be dropped from the cranes and roofing paper and tar sealed out the moisture. A 20-ft. square hatch provided ample access for placing the largest piece, the generator stator. A tar seal on the generator floor excluded all seepage at the bottom.

Without the overhead powerhouse crane available there were three particularly difficult lifts—the generator rotor and shaft, the generator stator, and the power transformer. The stiff-leg derricks each had a rated capacity of 25 tons and each of these lifts was nearly double that in weight. Consequently the only solution was to use both derricks with an equalizer block. The lift was further complicated by the fact that both derricks had to be at extreme low boom to reach the access road. The first lift was the three power transformers. With the oil removed and replaced by nitrogen the transformers weighed 45 tons each. When these had been set in place it was apparent that the derricks could handle the rest of the lifts and the only question remaining was whether enough control could be exercised for precise positioning of the heavy load. This question was answered affirmatively when the stator for the first unit was set on the sole plates.

Temporary switchyard and tap lines

With generator installation progressing satisfactorily under the temporary housing, the time came to work on the problem of providing a temporary switchyard and some means of getting the power out of the powerhouse to the first tap-line tower. In the original design the switchyard had been located on top of the powerhouse with the transformers outside and against the back wall of the powerhouse. Soon after the beginning of construction it was realized that in these positions both the switchyard and the transformers would be vulnerable to falling rock in the precipitous canyon. The transformers were then moved back against the downstream face of the dam and housed in a protective

concrete structure while the switchyard was moved to a platform to be built extending downstream from the roadway on top of the dam. By spring of this year the transformers were in place in the transformer structure but there was no switchyard and consequently no connection to the tap line for the transmission of power.

Another temporary wooden structure was built, extending out from the transformer structure and covering the transformer transfer deck. This structure was built of heavy timbers to protect disconnect switches, lightning arrestors and high-voltage busses. The temporary transmission line was run up the nearly vertical left abutment and suspended by strain insulators in wooden frames anchored to the rock. These frames were timbered over to provide a protective chute. The permanent tap line was brought down from the top of the canyon on two steel towers and dead-ended to the stabilizer wall which will be the base for the No. 1 tap-line tower. This tower will not be erected until the permanent switchyard is completed. The connection between the permanent and temporary lines was made at this point.

All activities were carefully timed and integrated so that when the generator dry-out and high potential tests were completed, the temporary switchyard and tap line were ready, control and distribution boards were wired and tested, low-voltage circuit breakers were hooked-up and all other equipment was ready and waiting. On June 30 the Missouri River Basin Inter-Agency Committee headed by Chairman W. G. Sloan inspected the project. With appropriate ceremonies, Mr. Sloan and G. T. Mickelson, Governor of South Dakota, officially put Kortes "on the line."

Meanwhile work on the dam, powerplant and spillway continues. The second unit is now going into operation. Then the penstock extension can be removed and the third unit installed. The end of this construction season should see all the major features completed with only painting, floor topping and other minor work left in the powerhouse. The channel will have to be cleaned, the access road up the left side of the river removed, and the contractor's plant dismantled and moved out. But the major problems have been solved. Kortes is "on the line" and doing its share to relieve the power shortage in its area.

Organization

Design and construction of Kortes Dam and Power Plant is under the direction of Leslie N. McClellan, Chief Engineer of the Bureau of Reclamation. Charles S. Rippon is Construction Engineer and the author is Field Engineer. The Kortes Unit is a feature of the North Platte River District, for which I. J. Mathews is District Manager, and Region 7 of the Bureau, with A. A. Batson as Regional Director. B. "Woody" Williams is Project Manager for Morrison-Knudsen Co., Inc., George "Pete" Piedmont is general superintendent, and R. G. Foster is in charge of electrical installation.

Reservoir Evaporation Data Is Goal Of Research at Ideal "Saucer" Lake

NEW RESEARCH into a comparatively little known but important phase of water resources development—evaporation from reservoirs—has been undertaken by the Department of the Interior with the cooperation of several other governmental agencies. Studies have been started on Lake Hefner, near Oklahoma City, which are expected to provide more exact data concerning an old hydrologic mystery—the amount of water lost by reservoirs through evaporation to the atmosphere.

In building reservoirs the objective is to balance water storage capacity until maximum conservation with minimum evaporation loss is obtained. But one difficulty originates from the fact that no one knows just how much moisture the atmosphere demands from a given expanse of water under different climatic conditions.

The survey to determine this loss rate on a scientific basis was requested by Commissioner Michael W. Straus of the Bureau of Reclamation, which has the primary responsibility for development of water resources in the Western States. The scientific investigations are proceeding under the direction of the U. S. Geological Survey with the assistance of the U. S. Navy and Weather Bureau.

Means of determining evaporation

At present there are four means of determining evaporation. In the first method, known as the "water budget," evaporation is determined by measuring inflow, outflow, and changes in storage. This method is not generally practicable because the evaporation is often small compared to errors in measuring the inflow and outflow, and because seepage and bank storage are uncertain and changing factors.

The second method utilizes "evaporation pans." Considerable work has been done by various investigators on the relation between evaporation from a pan of a certain type and evaporation from a lake or reservoir. This method is in use at present, but has been widely criticized because the "pan coefficients," determined experimentally for various pans, apply only for the conditions under which they were determined.

The third and fourth methods result from recent developments in oceanographic and meteorologic theory and have not been adequately tested in practice. The third method is known as the "energy budget," and is based upon a determination of the energy available for evaporation. In the fourth method, derived from modern "mass-transfer theory," certain factors affecting the transport of water vapor are measured and the evaporation calculated therefrom. The Oklahoma City studies will explore these last two methods, using the water-budget method as a control.

As an example of the importance of the study, the annual evaporation loss from Lake Mead, which was created when Hoover Dam was constructed, has been estimated at more than 800,000 ac. ft., or about 25,000,000,000,000 (25 trillion) gallons.

At present it is not practical to devise means of preventing evaporation from reservoirs, but these figures do drive home the need for precise knowledge of evaporation rates. The rate of evaporation may determine the location and capacity of proposed structures and would be of value also in setting up operating schedules to provide optimum utilization of water.

Search for the ideal conditions

How to obtain such facts posed a difficult problem. To conduct the studies initially at Lake Mead, which is the largest artificial reservoir in point of storage in the world, was out of the question because there were too many variables that could not be controlled.

What was needed as a scientific control was a reservoir like a saucer, several miles in diameter, with a bottom that doesn't leak; where literally every drop of water in it could be accurately measured, together with the amount going in and drawn out. The difference between inflow and outflow, allowing for any change in the amount of water in the saucer, would be the quantity lost to the atmosphere.

The Geological Survey and the Bureau of Reclamation canvassed their field offices in search of such a lake. After considering more than 100 throughout the West, Oklahoma City's Lake Hefner was found to come about as close to providing a natural outdoor laboratory as could be expected.

The ideal "saucer" lake

Lake Hefner is a saucer approximately 2½ mi. in diameter, scooped out at the very headwaters of a drainage basin. Through a dike or dam almost 4 mi. long, very little water is lost and even this can be accurately measured. The bottom, of compacted red clay, is nearly impervious to water leakage.

Last winter, Bureau of Reclamation engineers calibrated the venturi meter at the filtration plant that measures the amount of water drawn from the lake to supply Oklahoma City. This meter is considered accurate to within one per cent.

Rain gages have been set up at 23 points on and around the lake to measure the amount of rainfall. Multiplying this figure by the total lake surface will give the amount of water added directly through precipitation. As a further check on the drainage basin, weirs and recording gages have been installed near the mouths of the two inlet streams. Because there are almost no trees on the reservoir rim, losses by transpiration can be practically disregarded.

In Lake Mead and other large reservoirs it will not be possible to determine

Concluded on page 123

Aluminum Dump Truck Bodies Tested

A. Teichert & Son firm increases payloads 1,600 lb. per unit (as compared to steel bodies) for routine and on-the-road hauling—Greater payloads more than offset increase in body costs

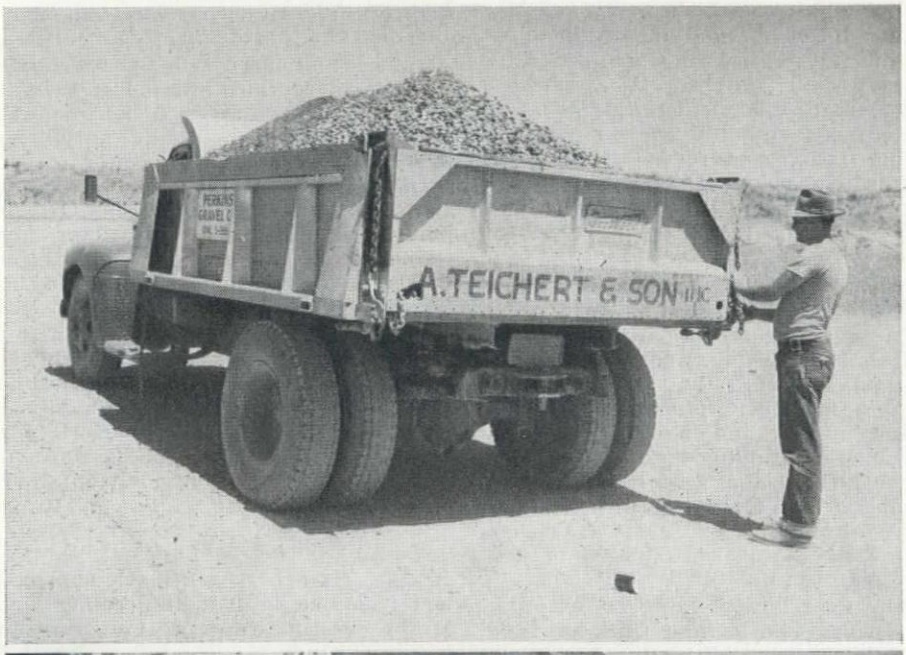
ALUMINUM dump truck bodies are now being used by a Western contractor for routine hauling and on-the-road service. The most noteworthy advantage of the lightweight bodies, the fact that greater payloads are possible, more than offsets the increase in body costs. Five trucks, owned by A. Teichert & Son, Inc., Sacramento, Calif., and equipped with the new lightweight dump bodies, are in service in the Sacramento and Stockton city areas.

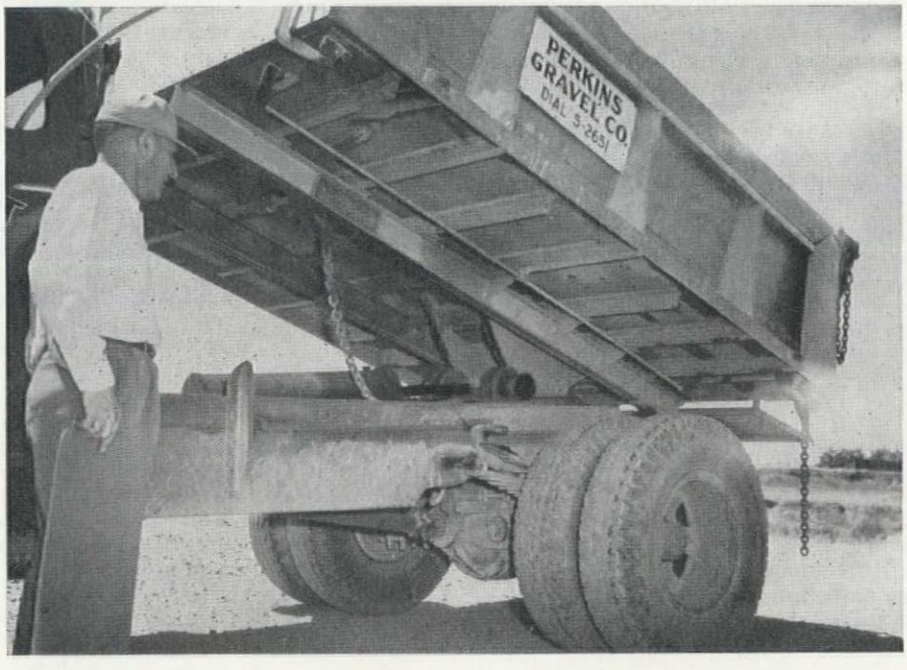
Statistics taken during the first three months of operation reveal a gain of approximately 1,600 lb. on each payload over that which would be obtained with a conventional steel body. Tare weight of the trucks is 9,000 lb. A gross vehicle weight of 23,000 lb. yields 14,000 lb. payload, distributed 2,400 lb. on front axle (about 20% of payload) and 11,600 lb. on rear axle. Using this load and distribution, gross axle weight is 6,300 lb. front and 16,700 lb. rear. Operators report that the trucks handle and steer smoothly under this front-axle load.

On a test load of crusher-run base rock at the contractor's Stockton yard, a 9,240-lb. truck, empty, was loaded to a gross vehicle weight of 25,840 lb., yielding a payload of 16,600 lb. The scales showed 6,380 lb. on the front axle, and 19,460 lb. rear, a 1,400-lb. overload. Under these conditions, the truck handled smoothly, according to operators. Test loadings at the Perkins yard were carried to a front-axle loading as great as 8,000 lb. gross before steering control suffered.

Although aluminum is considerably softer than steel, the truck bodies have withstood abrasion from ordinary materials, according to the contractor. The aluminum will not withstand heavy impact, such as would result from derrick stone dropped from a bucket, but ordinary city delivery of crushed stone, screenings, hot mix and cutbacks only serves to keep the aluminum bed shiny. There is no noticeable wear from the load sliding during dumping, and as long as there is no appreciable impact, the trucks have withstood heavy loadings from clamshell and shovel buckets.

LOADED TRUCK with aluminum dump body, top, carries payload of 20,400 lb., with gross vehicle weight of 30,000 lb. At bottom W. C. Petersen, master mechanic for A. Teichert & Son, inspects heavy hoist and subframe assembly used on all Teichert dump trucks. Two long sills are 4-in. steel I-beams; cross members and remainder of body are aluminum.



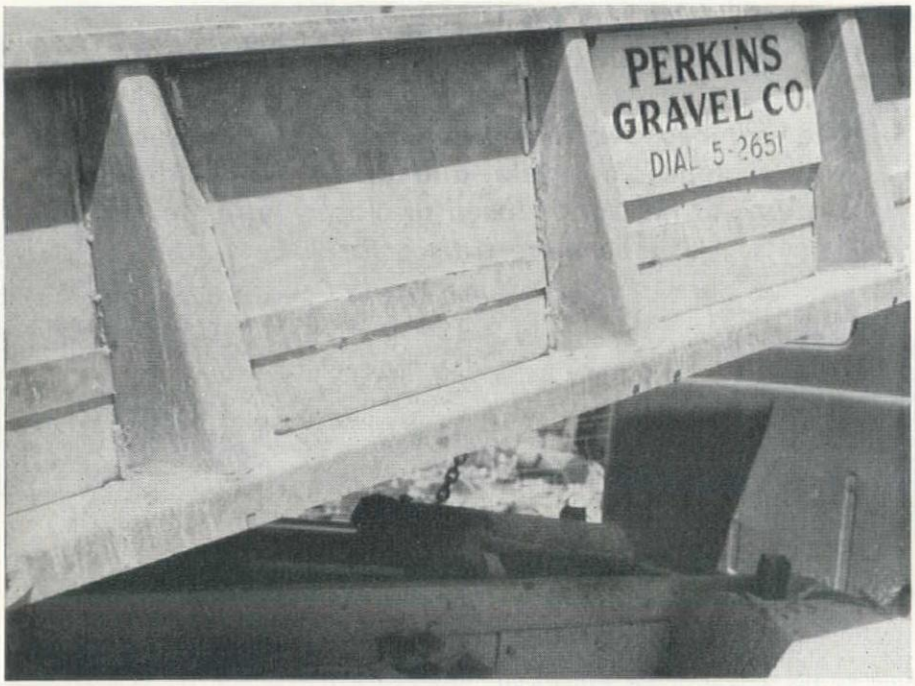


Best on production basis

According to W. C. Petersen, master mechanic for A. Teichert & Son, Inc., the lightweight bodies are shown to best advantage when on a strict production basis, where the repetition of the 1,600-lb. extra payloads mounts up to sizeable profits. This is usually a city delivery haul, probably of small and medium sized aggregate. Since a contractor buys a truck to meet the heaviest needs he expects to have, and since the aluminum body as it is now designed will not withstand heavy impact, aluminum without a "wear plate" is no more efficient than is steel for an all-purpose dump body. Under these conditions, the aluminum bodies are of limited use to contractors whose operations are large enough to divide their truck fleets for both on-the-road and off-the-road service. The aluminum body is not recommended for the varied use it can expect for the smaller sized jobs, according to Petersen.

The first trucks have been equipped with Gar Wood F4CA dump hoists and sub-frame assembly, a fairly heavy model specified by the contractor. The master mechanic also uses over-powered hoists on steel truck bodies as a matter of practice. As proof of the benefits of this practice, ample hoisting power is always available, regardless of the grade upon which the truck is backed. The contractor has used Ford F-8 chassis on all units.

Four of the aluminum bodies are designed after the Gar Wood Model W-12 steel body, with certain structural parts



AN ALL-WELDED aluminum body is also being tested by the Teichert firm. Its performance is being compared to the four riveted models as to length of service and initial cost.

boosted to meet stress requirements. Rolled aluminum sheets 3/16 in. thick are used for the body floor, and ⅛-in. material is used for the body sides and remainder of rolled parts. The pilot model manufactured by the Richmond Division of Gar Wood Industries, Inc., weighed 1,000 lb., and increased the payload by 1,340 lb.; succeeding models weigh about 800 lb., increasing the payload by almost 1,600 lb. Model W-12 is a 5-cu. yd. struck body. The addition of side boards makes the body effectively of 6 cu. yd. capacity. Side boards are designed for shovel protection during loading, an important item with aluminum bodies. An end strip 2 in. wide, of oak, is fastened with three bolts to the tailgate for shovel protection. The bodies are 10 ft. long and 6 ft. wide.

Records are also being kept on an all-welded aluminum body. This welded body is an experimental model, and is being compared on a trial basis to the other four riveted bodies as to length of service and initial cost. All parts of the body are aluminum, with the exception of two 5-in. standard I-beam main sills, all hinge hardware and a cab protector of sheet steel. One model was equipped with cast aluminum tailgate brackets, but it was found that in this instance the extra cost was not justified by the weight saved (about 25 lb.)

Aluminum dump truck bodies were first manufactured by Gar Wood in 1928. Those units were similar to the present aluminum Model W-12, but used a heavier gauge aluminum section, since the metal at that time did not have its present day quality. The alloy now in use is 61ST6. The aluminum was provided by Kaiser Industries and the Aluminum Company of America.

Rules Set Governing Loans From California Water Pollution Fund

THE CALIFORNIA State Water Pollution Board, at a recent meeting in San Francisco, adopted rules and regulations and approved application for forms for the administration of the State's 1949 Pollution Control Act. The Act provides for loans to municipalities and districts for the construction of sewerage and storm drainage facilities. It also created the State Water Pollution Control Fund and appropriated $1,000,000 to set this revolving fund in operation.

Loans made under this Act bear a 2% interest rate. Annual repayment installments may be spread over a maximum period of 30 to 40 years. The State Board, with the approval of the Director of Finance, may defer any one or more of the repayment installments if conditions warrant. Money loaned under the provisions of the Act must be secured by bonds of the borrowing municipality or district.

The rules and regulations of the State Board require that all applications for loans shall be on forms supplied by the State Water Pollution Control Board, which forms may be obtained from the executive officer of any of the regional water pollution control boards. All applications must be submitted to the regional water pollution control board of the region in which the proposed construction is to take place. The regional board forwards the application to the State Board. No application for loan under this Act will be considered by the State Board until it has first been reviewed by the appropriate regional board; and the State Board will make no loan under this Act for a project concerning which a regional board has made an adverse recommendation in writing to the State Board.

In determining loan priority, account will be taken of the following three criteria: (1) Degree of pollution, (2) Number of people adversely affected, and (3) Degree of financial hardship.

Highest priority will be given to those projects which combine in the greatest degree the relief of serious degrees of water pollution, the correction of those instances of pollution which adversely affect the largest number of people, and the providing of financial assistance where it is most sorely needed.

Applications for loans under this Act must include the following: (a) A description of the proposed facilities; (b) A statement of facts showing the necessity of the proposed facilities and showing that funds are not available for financing such facilities and that the sale of revenue or general obligation bonds through private financial institutions is impossible or would impose an unreasonable burden on the municipality or district; and (c) A proposed plan for repaying the loan.

Printed copies of the application forms, instruction sheets, rules and regulations, and other pertinent data may be obtained from the executive officers of the regional boards listed below. September 1, 1950 was scheduled as the first loan date. Other loan dates will be published by the State Board at the earliest possible opportunity, subject to amendment from time to time.

Regional control boards are as follows:

North Coastal Regional Water Pollution Control Board (No. 1):
Wm. G. Shackleton,
707 South State St., Ukiah.

San Francisco Bay Regional Water Pollution Control Board (No. 2):
John B. Harrison,
364 Fourteenth St., Oakland.

Central Coastal Regional Water Pollution Control Board (No. 3):
Paul R. Bonderson,
Bank of America Bldg., San Luis Obispo.

Los Angeles Regional Water Pollution Control Board (No. 4):
Linne C. Larson,
Spring-Arcade Bldg., 541 South Spring St., Los Angeles.

Central Valley Regional Water Pollution Control Board (No. 5):
Joseph S. Gorlinski,
608 Thirteenth St., Sacramento.

Lahontan Regional Water Pollution Control Board (No. 6):
John T. Leggett,
310 North Main St., Bishop.

Colorado River Basin Regional Water Pollution Control Board (No. 7):
Terrence H. Donovan,
45-450 Towne Ave., Indio.

Santa Ana Regional Water Pollution Control Board (No. 8):
Paul G. Brown,
325 North Broadway, Santa Ana.

San Diego Regional Water Pollution Control Board (No. 9):
Harold E. Miller,
Box 1808 Aeronautical Sciences Bldg., 3380 W. Harbor Drive, San Diego.

What Type Concrete Pipe Irrigation

The writer suspects that the commonly used open-type system is obsolete, and that well-designed systems of the semi-closed or closed types might be more satisfactory

By
ARTHUR F. PILLSBURY
Associate Professor of Irrigation, University of California, Los Angeles, Calif.

IRRIGATION WATER can be distributed in concrete pipe systems of the open, closed, or semi-closed types. The systems used strictly for irrigation today are of the open type. Because of operating difficulties encountered and other features, the writer has long suspected that the open system, where grades are steep enough to create real distinction between the types, may be obsolete, and that well-designed systems of the semi-closed or possibly the closed type might be more satisfactory. In the hope of stimulating thought on this matter, this article has been prepared.

Flow requirements

Farmers would like to obtain water on demand, but during the peak irrigation season this would require such a high rate of delivery as to be uneconomical. Therefore, it is usual and satisfactory to have delivery on a modified rotation basis. Under such a system a farmer is guaranteed delivery at periodic intervals, but also can obtain delivery a day or two after request if the load on the system permits. Small continuous deliveries result in uneconomic and inefficient irrigation and commonly contribute to drainage problems, so are not generally desired by farmers. The end result desired is that farmers receive adequate flows at reasonable intervals, and yet the mains and main laterals can be kept near peak flow during seasons of maximum need.

Delivery should be at a constant rate, except that the farmer should be able to decrease the flow, in some cases, as the irrigation progresses. Rate of delivery, therefore, needs to be relatively independent of pressure fluctuations in the pipe lines. Also, it is desirable that farmers be able to shut off the flow on short notice before the pre-determined completion of delivery.

Characteristics of open systems

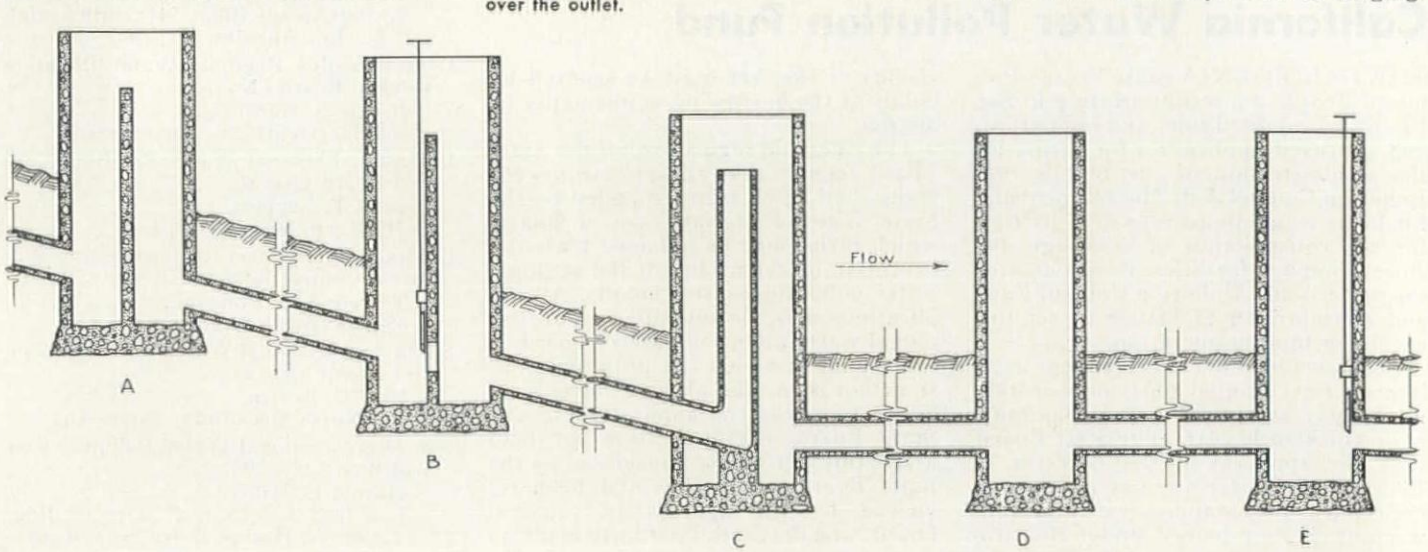
An open system is one in which pressure is kept within low limits (usually, but not necessarily, between 6 and 20 feet of water) by the installation of vertical open-top stands at periodic intervals as shown in Fig. I. Pressure is limited by the height of the baffle wall in the overflow stand, and by the height of the stand itself with the simple stand. The overflow stand serves to regulate delivery pressure upstream. The need for the stand increases with grade.

In operation, when changes in delivery are to be made, flow is adjusted at the uppermost portion of the system, and then followed downstream, adjustments being made at each station along the line. At the downstream end of each branch, any excess flow is wasted, at least until steps can be retraced and further adjustments made along the line. This procedure is similar to that used for canal systems but is more complex because there is less pondage and farmers are apt to expect more accurate deliveries. For these reasons, provision for wastage may be more important with open-type pipe systems than with canals, although much wastage will certainly not be allowed to occur for very long periods. To prevent pressures within a farmer's system from affecting delivery, and hence the flow in the lateral, delivery and metering are usually affected at an overflow structure. Weirs and miner's inch boxes are older types of such structures.

Such a system (overflow stands as per types A or C in Fig. 1) has many apparent advantages. Deliveries should not appreciably affect pressures in the distribution system, nor should deliveries be subject to fluctuation from pressures in the distribution system, at least where grades are such that an overflow stand can be located immediately downstream from each delivery. There is no dependence upon mechanical devices, and there is no water hammer problem. Unfortunately, there are other difficulties in such a system. Some of these difficulties involve the entrainment of air in the overpour portion of the overflow stands. The result may be a surging in the system, the solution of which generally involves the placing of a gate valve in the baffle of each overflow stand (B of Fig. I). Such gate valves solve the difficulties, but partially or wholly negate the regulating effect of the overflow stands because change in delivery at any point will affect deliveries, to a greater or lesser extent, all up and down the system.

The principal advantage then of the overflow stand with gate valve (B of Fig. I) over a simple stand with gate valve (E of Fig. I) is that any overflow returns to the line and is neither immediately wasted nor does it flood an area around the stand. This is an exaggeration, however, since often a small flow, sufficient for regulation, can be allowed to spill over the baffle without causing surges, and since air entrainment does not always lead to surging.

FIGURE 1—Portions of an open system. "A" and "B" are overflow stands, "B" having a gate in the baffle wall; "C" is an overflow stand consisting of a riser pipe within the larger stand; "D" and "E" are simple stands, "E" having a gate over the outlet.



Distribution Systems?

The mechanism of surges and possible remedies are discussed later in the article.

The closed system

A closed system is one in which the full flow is always available at every delivery gate as soon as opened, as with the usual domestic water system. In fact, such systems as do exist are for combined domestic, industrial, fire protection and irrigation service. Overloading a system is usually prevented by enforcing a rotation system for irrigation, or serving on demand with the restriction that service be delayed until previous conflicting demands have been satisfied. In the San Fernando Valley, for instance, when they have approved a demand for water, the City of Los Angeles removes a plug from the delivery stub and inserts a line meter, and the meter is removed as soon as the demand is satisfied. Because of relatively high pressures, and because the number and location of deliveries made at one time is carefully planned, delivery rates are at least sufficiently close so as to prevent any appreciable farmer dissatisfaction with the service. However, some pressure and discharge fluctuations are inevitable and if the pressure were low, these might be of considerable magnitude. In most circumstances, with careful supervision, adequate delivery uniformity should be attainable. Float valves, or float valves in overpour structures, could be utilized to provide uniform delivery pressure, or rate, where needed. This, however, prevents the farmer from taking advantage of all the pressure available upstream from the delivery (such pressure would usually only be needed for sprinkler irrigation or for boosting water up hill).

Chief disadvantages of a closed system are that more steel is required in the pipe because of higher pressures, and precautions must be taken to prevent water hammer. Also, it would not be feasible to use plain (non-reinforced) concrete pipe, although the present tendency in district systems is to use reinforced pipe anyway except in the smaller sizes. (The writer does not believe this tendency entirely justified unless, at the same time, advantage is taken of the reinforcing to move away from the open type design. The tendency results from the ripping of plain pipe because of wetting expansion and also from joint leakage with thermal contraction. Both can be minimized, if not altogether prevented, by modifications in laying procedure which add little to the cost.) Some saving can result from the smaller sizes of pipe that the greater pressures make feasible, but more expensive valves will be needed.

The writer knows of no large irrigation system, strictly for irrigation, of the closed type. Some rough estimates for one area did not indicate great difference in costs over an open system, but more detailed estimates of more areas will be needed before the true picture is known. Certainly, operating efficiency of a closed system, the convenience to farmers during off-peak demand, the fire protection features, and waste prevention make it an attractive method.

The semi-closed system

The semi-closed system combines features of both the open and closed systems by substituting float valves in stands for the overflow stands (Fig. 2). Pressures are kept within the same range as for the open systems; so use of plain pipe is not excluded and present systems can be changed over. Pressure at each delivery is not significantly affected by any change elsewhere in the system, within the limits of design capacity. Any change is immediately and automatically adjusted all the way upstream to the open source. There is no waste at the lower end, and no provision needs to be made for waste.

Each float valve regulates the pressure downstream, whereas overflow stands regulate the pressure upstream. Overflow stands allow the full flow to pass, whereas float valves let pass only the amount required, as fixed by the level of the water in the stand. At full flow the valves are wide open, giving minimum loss of head. No air can be entrained. Operation of such a system could be extremely simple, except for regulation of flow in the canal, if such be the source for the system.

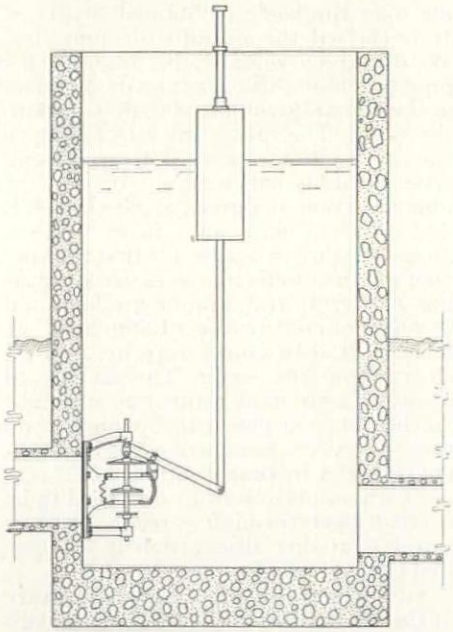
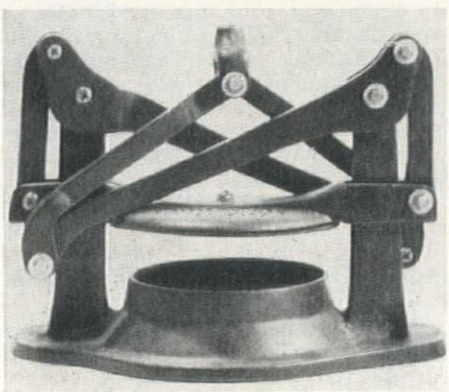


FIGURE 2—A float valve stand as used on semi-closed irrigation pipe systems.

FIGURE 3—One type of float valve used on semi-closed farm distribution systems. The base is mortared into a riser pipe within the stand. The float is not shown.



The writer knows of no such system in existence on a district basis. There are many systems, however, in use on farms. One of the earliest float valves for farm concrete pipe systems consisted of a gasketed ring set in a riser pipe, with a horizontal disc above actuated by the float above through jack knife levers (Fig. 3). This type always worked well, and passed trash easily, but required a float large enough to overcome the entire upstream pressure on the disc. Others tried diaphragm valves, actuated by the upstream water pressure. Singly, these worked fine—the flow changing from 0 to full with less than a ¼-in. change in water level. In series, however, there was severe hunting. Efforts to dampen response did not cure the hunting. Next, a sleeve valve was tried, but trouble was experienced with sticking. A balanced valve, similar to the ones in Fig. 2, but turned on its side, was next tried, and found quite satisfactory. This latter type, and the one shown in Fig. 3, are in common use today.

The balanced type of valve shown in Fig. 2 appears to be the one now in commercial production that is of a size most suitable for district distribution systems. This type has been used for many years in water treatment plants, and with reservoir outlets to provide constant flow. There is apparently no valid patent on it. The price is high, but with quantity production should drop considerably.

Areas of the discs are so proportioned that difference between upstream and downstream pressure makes essentially no difference in the force required to open or close the valve. Therefore, the size of the float is only that necessary to overcome friction in the valve. The shape of the float of the models now in production is wrong for a semi-closed system. That float is shallow and of large diameter to accomplish the change from full open to closed with little change in water surface elevation. Actually, as demonstrated with the farm systems, fluctuation in water surface elevation of 6 in. to 12 in. is desirable to insure smooth operation and to eliminate all tendency towards hunting in series systems. This head variation normally affects discharge of deliveries less than 5%, and would not even be noticed by farmers. The valve is not designed for complete shut-off, but the leakage when closed is small and should not cause trouble if a few gate valves are provided through the system. Good tests on the various size valves for friction loss when full open do not appear to have been made. This information should be obtained before widespread use of the valves is planned. For some installations, larger size valves than now made might

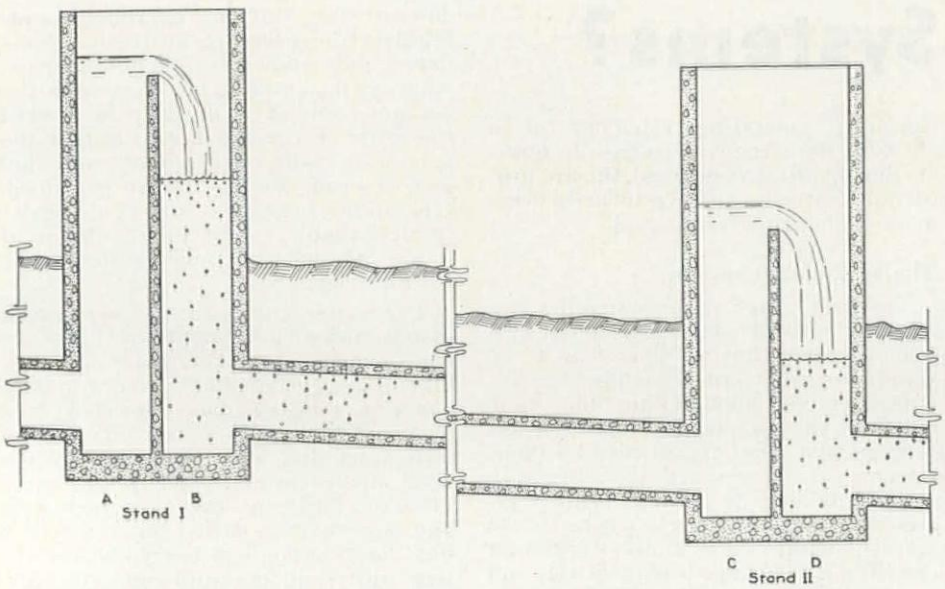


FIGURE 4—Elevation of a portion of an open system illustrating how surges are created.

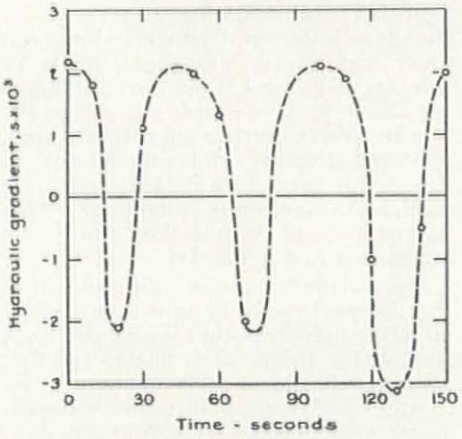


FIGURE 5—Hydraulic gradient plotted against time for reach of pipe between overflow stands where surge was being created. Plus gradient is in normal direction of flow; minus, reverse direction.

be required. Principal objection to semi-closed systems appears to be the danger of localized flooding around stands should something go wrong with a float valve.

In the long run, there is no reason to believe semi-closed systems would be any more expensive—and possibly would be less expensive—than the open type. One advantage is that on deliveries line meters and valves could be substituted for overflow structures where desired, without impairing the efficiency of the system. Provision could be made for the farmer to shut off or cut down the flow by himself whenever desired, provided there is some canal or reservoir storage upstream, and this would be appreciated. There is no possibility of air entrainment in the system.

Surges in open systems

As previously mentioned surges in open systems have been so common that the customary practice is to place gate valves in the baffles of most such installations (B of Fig. 1). The writer has observed conditions under which surge did and did not occur in a system recently constructed. The following are his interpretations of these observations:

1. Air is entrained in the water flowing over the baffle of Stand I of Fig. 4. It is carried thence into the pipe line. With a given velocity the grade of the pipe line is too flat for the air to collect at the top of the pipe and to flow back to the stand. Therefore, any air coming to the top is re-entrained, and carried on.[1] After possibly half a minute or less, the upper portion of a given reach (Fig. 4, B and adjacent pipe line) is so much a mixed flow of air and water that the specific gravity is effectively lowered, causing a reversal of hydraulic gradient and flow from Stand II toward Stand I. (The level in B then comes way up, and air clears from the water. The level in B drops and gradient returns to normal.) In the different places this phenomenon was observed a complete cycle of gradients ranged in time from 50 to 75 seconds. In no place was air observed to be carried clear through a reach between stands, but this observation is too limited to be conclusive.

To get better evidence on the nature of the fluctuation of the hydraulic gradient the writer selected a 1,418-ft. reach of pipe between stands where the difference in elevation of the baffle lips was 2.8 ft. Flow was 6.9 cfs. in the 36-in. pipe. Pressure at B (Fig. 4) was determined by dropping a limp rubber bag attached to a long length of tubing down to the bottom of the stand. The tubing was run up over the top of the stand, down to some distance below ground surface, and up again. Thus it formed a manometer to measure the pressure adjacent to the pipe entrance. Since the bag was limp, expansion of it would cause no stretching of the rubber, and it floated in a small wire cage. Pressure at C was determined simply by observing the water surface since there were no evidences of air. Simultaneous readings of pressure were made at B and C for about 3 cycles. The results are shown in Fig. 5.

2. Vents somewhat downstream from the stand (as downstream from B, Fig. 4) appeared to have no significant effect.

3. At many stands air appears to blow back rather continuously, and no surge trouble is experienced. So far as observed, this appeared related to the grade of the pipe—where the grade was steep enough the air moved back along the crown of the pipe, and there was no surging. Whether or not the air would move upstream should depend upon pipe roughness, grade and water velocity.[1]

4. As far as observed, the amount of air carried into a pipe appeared to be inversely related to the depth of the water above the pipe (in B of Fig. 4) and the downward velocity (which in turn is related to the cross-sectional area of the downstream portion of the stand). With these observations in mind, the following are suggestions that should minimize the difficulty:

a. Steepen the initial reaches of pipe downstream from a stand as much as possible (possibly for 50 to 100 ft. to the extent that any air entrained can blow back upstream. Grades necessary to permit air to flow back are being investigated.

b. Make the downstream portion of the overflow stands of larger cross-sectional area (Stand C of Fig 1 illustrates a way this is sometimes done in farm systems).

c. Increase the depth of water in the downstream portions of the stands at all ranges of flow.

5. In some cases surge seems to gradually build up from stand to stand. In other cases complete stoppage of flow occurs during each cycle so that there is nothing further to build up except to impose one cycle above another.

6. There appears to be more trouble at low flows than at high flows. Question can be raised whether or not there will be trouble at peak flows, assuming peak flow can be attained despite the surging, but all systems through a good part of the season are run at less than capacity.

Conclusions

As regards surging it is probable that with more information the difficulty can be minimized in future design even if operation is made more complex thereby. However, model studies will not provide a solution since it is impractical to compare the surface roughness of a model pipe with that of the prototype, and movement of the air depends upon that roughness.[1] The best studies can be made on existing systems.

Granted that surge difficulties can be minimized in open systems of future design, the writer still believes other systems should be tried. The closed and semi-closed systems have so much to offer farmers and district operators, that it seems illogical to proceed with the installation of many miles of open system without giving them a fair trial. Granted that no district system of the semi-closed type is known to exist. The thing to do is to construct one lateral off of a canal of this type, and see what the cost is, and see what the efficiency of operation is.

[1]Roberson, J. A. Study of the breakage and reduction of flow in concrete irrigation pipe. Bul. 204. Washington State Institute of Technology, Pullman, Wash., 1949.

Construction Design Chart

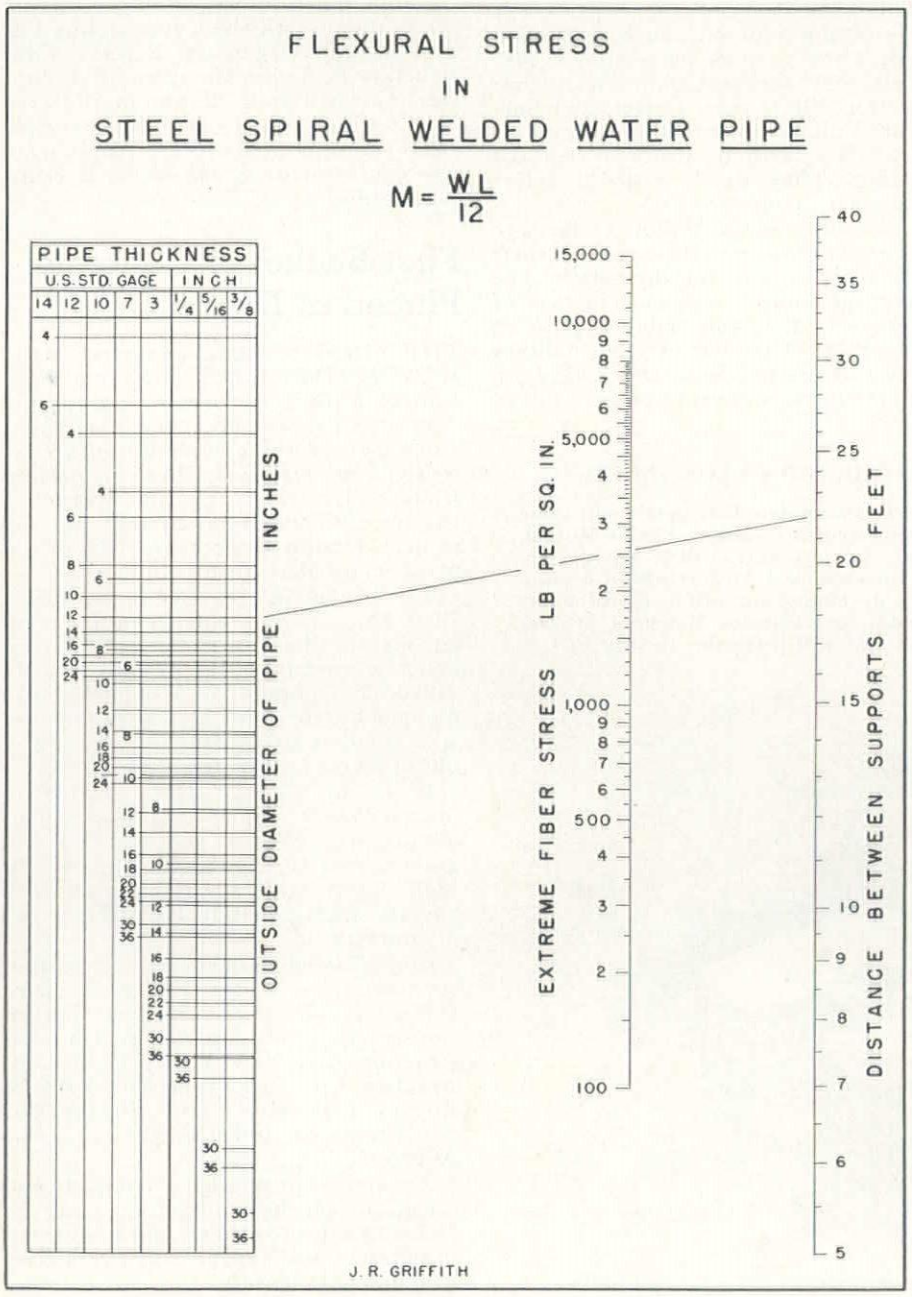
CXXIII . . . Flexural Stress in Steel Spiral Welded Water Pipe

By
JAMES R. GRIFFITH
Dean of Engineering
Portland, Ore.
University of Portland

WATER PIPE above ground may be supported in various ways such as concrete saddles, hangers, or ring girders on rollers. A careful study of the resulting stress concentrations should be made, whichever method is to be used.

Hoop tension is developed in the pipe shell due to the internal hydrostatic pressure from static head and water hammer. The reaction at the support produces localized bending stresses tending to push the shell inward. Then finally there are the flexural stresses caused by the normal beam action as a result of the pipe being supported at intervals. The individual stresses caused by these various loadings are not directly additive for total stress.

The accompanying chart has been prepared to give close approximations of the flexural stress alone resulting from the beam action. The loading includes both the dead-load of the pipe as well as the water contents. The assumption has been made that the pipe is continuous over many equally spaced supports. Steel spiral welded pipe is conveniently specified by outside diameter and thickness. Since the sectional area and the resulting water contents varies with the thickness of pipe for any diameter, the various pipe sizes have been listed under the headings of the commercially available thicknesses.



The Handbook of Welded Steel Pipe[1] contains a table, No. 61, of Maximum Safe Spans for Welded Steel Pipe on Saddles. This table, as an example, gives an allowable span of 22 ft. for a 12-in., 12-gage pipe without reinforcement at the supports. On the accompanying chart I have drawn a solution line for these same conditions. A maximum unit stress of 2,550 p.s.i. will be noted on the chart, resulting from the tendency of the pipe to bend at and between the supports. In order to illustrate the comparative accuracy of the chart, we have the following:

Table 67,[1] under 12-in., 12-gage pipe, gives

Weight of bare pipe = 13.62 lb. per ft.
Sectional area = 0.758 cu. ft.
Section modulus, $S = 11.5$ in.^{3}
Weight of water contents = 0.758×62.4
= 47.30
Weight of bare pipe = 13.62
Total weight of pipe and contents = 60.92 lb. per ft.

Then

$$M = \frac{WL}{12} = \frac{(60.92 \times 22) \times 22 \times 12}{12}$$

= 29,476 in. lb.

$$\text{Max. unit stress, } f = \frac{M}{S} = \frac{29{,}476}{11.5} = 2{,}563 \text{ p.s.i.}$$

This stress is a reasonable check on the value of $f = 2{,}550$ p.s.i. obtained from the chart, but again I remind you that this is only a portion of the total unit stress.

There are several graduations on the chart for which no pipe size has been given due to lack of space. Under 12-gage pipe between 16 and 20-in. diameters the graduation is for 18-in. pipe. The unlabeled graduation, under the same gage, between the 20 and 24-in. diameters is for a 22-in. pipe. Likewise, under 10-gage metal the unlabeled graduation between 20 and 24-in. diameters is for 22-in. pipe.

[1] Armco Drainage & Metal Products, Inc.

Listing Available of Films Featuring Building Products

A 24-PAGE bibliography of construction films available from building product manufacturers has been prepared by the Producers' Council. Organizations may obtain single copies by writing the Council's national office at 815 Fifteenth St., Washington 5, D. C.

The list includes 67 films prepared by 27 companies and covers a wide range of products and building techniques. Most of the films are 16-mm. sound movies, many of them in color.

The bibliography gives the titles, a summary of the subject matter, running time, type of film, and the addresses from which the films may be requested. All of the films are available without charge to responsible groups.

NEWS OF WESTERN CONSTRUCTION

SEPTEMBER 1950

Seabee Ratings Offered Skilled Construction Men

SKILLED construction men over the age of 25 can still enlist in the Naval Reserve as Seabees and receive petty officer ratings equal to their civilian experience, the Navy has announced.

By joining the Seabee Volunteer Reserve, older men in the construction trades not only will retain their rating when and if they are called to active duty, but they also will have reasonable assurance that they will be assigned to Naval Construction Battalions for high speed building and defense of overseas bases.

The same opportunity to join this standby Reserve no longer is available to men in the 19 to 25 age group because they have become subject to induction under the Selective Service Extension Act of 1950.

Approximately 70,000 additional experienced construction men are wanted in the Seabee Volunteer Reserve. This is considered the minimum number needed for a nucleus to develop the construction speed that would be required of the Seabees in case of full scale war.

The seven Seabee ratings open cover some 60 different civilian construction skills. These ratings are: Builder, Mechanic, Steelworker, Utilities Man, Construction Electrician, Driver, and Surveyor. Volunteers will be placed on inactive duty, with no drills or required meetings. They may be called to active duty when required.

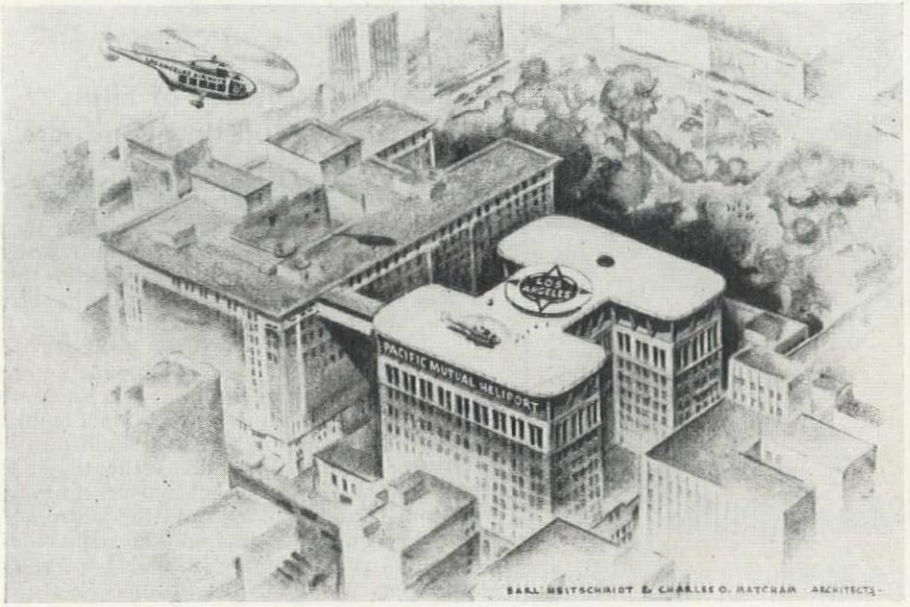
Enlistment in the Volunteer Reserve is limited to men who have reached their 26th birthday but not their 45th. The upper age limit is extended in case of veterans to the same number of years beyond age 44 as their previous military service. If this previous service has been with the naval service, volunteers will be accepted up to age 50½ years, plus the number of years of naval service.

Depending on the kind and amount of civilian experience, skilled construction men can expect to be rated at some point in the scale between Chief Petty Officer, with minimum active duty base pay of $198.45 per month, to Third Class Petty Officer, with a minimum of $117.60. Additional pay is given for dependents and for years of previous service.

Those desiring to volunteer should get in touch with the Commanding Officer of any Organized Reserve Construction Battalion Company or Volunteer Construction Battalion Reserve Unit. These are located in principal cities throughout the West. Application also can be made at any Naval Recruiting Station.

ROOF-TOP "HELI-PORT" WILL BE CONSTRUCTED IN LOS ANGELES

A CENTRALLY-LOCATED passenger terminal to accommodate helicopters will soon be constructed in the downtown Los Angeles area on top of the 12-story Pacific Mutual Life Insurance Building at Sixth St. and Grand Ave. Air passengers will be able to step into a waiting helicopter and be at Los Angeles International Airport within 6 min. New 'copters seating 12 to 20 people are now being developed and will be used for the commute service. Architects are Earl Heitschmidt and Charles Matcham of Los Angeles. Pacific Mutual is financing the project and will lease the facility to Los Angeles Airways, Inc.



First Bucket of Concrete Placed at Detroit Dam

THE FIRST bucket of concrete for the $70,000,000 Detroit Dam power and flood control project in Oregon was placed August 5th (see front cover). The milestone marked the completion of an extensive concreting plant by Consolidated Builders, Inc., the corporation which has the $28,230,509 general contract for the project. Design and construction of the plant required about fifteen months.

The bucket in the cover picture is a Blaw-Knox twin-compartment 8-cu. yd. air-operated bucket. Concrete is shown being poured in a slot of rock, locally called "The Gut." The first bucket was dumped by Governor McKay of Oregon, who stood at air controls on a gangway out of picture at the left.

Work on Detroit Dam started in March 1949. Completion date is scheduled for July 1953. It will be a concrete gravity structure 1,580 ft. long, 462 ft. high, 335 ft. wide at the base, and will contain approximately 1,450,000 cu. yd. of concrete.

Consolidated Builders is a corporation sponsored by Kaiser Engineers, Inc., Oakland, Calif., and including General Construction Co., Seattle; Walsh Construction Co., New York; Utah Construction Co., San Francisco; Bates & Rogers, Chicago; Pacific Bridge Co., San Francisco, and The Shea Co., Los Angeles.

An article providing a complete description of the concreting plant at Detroit Dam and other major features of the project will appear in *Western Construction* next month.

Surveys Reveal That Lake Mead Has A Life of 275 Years Despite Silting

PRELIMINARY RESULTS of surveys reveal that Hoover Dam on the Colorado River has a useful life of at least 275 years regardless of river-carried silt deposits. This information on silt was obtained primarily from investigations for the Bureau of Reclamation by the U. S. Geological Survey, with the aid of the Navy Department, on Lake Mead. (*Western Construction*, May 1948, pg. 106.) For the past two years, these agencies have been probing the bottom of the lake, using various wartime Navy techniques developed to locate submarines and sunken ships and to chart the ocean floor.

Preliminary results of the investigations show that silt has been deposited in the reservoir at an annual rate of 105,500 ac. ft. since water storage was started in 1935. The actual measurement, after 15 years operation, establishes deposits approximately as the Bureau of Reclamation calculated before it built the dam.

At the present rate, it would take until the year 2225 for Lake Mead to fill up with silt. The compaction of sediment into a smaller area as tons of new silt pile up on it over the years will extend this date to the year 2380, according to the estimate of Geological Survey technicians. Lake Mead now has an actual storage capacity of 29,827,000 ac. ft., compared with an original capacity in 1935 of 31,142,000 ac. ft. About 95% of the total deposition of sediment has been contributed by the Colorado River and is in the main lake.

Even at the head of the reservoir, the silt deposits are not serious. Core samples showed that the sediment is packing down much more tightly than was originally anticipated, thus taking less of the usable storage space for a greater tonnage. Coarse gravel and sand are settling rapidly, while the lighter silt is carried farther into the body of the reservoir before it settles.

A summary of the investigation is now in preparation and will be published in booklet form within the next few months.

252-Ft. Plate Girder Span for Bridge at Salem, Oregon

CONTAINING one of the longest plate girder spans in the West, 252 ft., the Marion St. Bridge, Salem, Ore., has been started under an initial contract let by the Oregon State Highway Department. The 3-span continuous deck structure will cross the Willamette River on the Salem-Dallas highway, and will have a 26-ft. clear roadway and a 5-ft. cantilevered sidewalk.

The three center spans, 210, 252, and 210 ft. long, are of particular interest since they will be built of 120-in. deep by ½-in. thick plate girders. Each girder has four 8 x 8 x ¾-in. flange angles, and will have ¾-in. cover plates as needed, up to a maximum of three. The deck will be of concrete slab, supported at panel points by transverse steel trusses, and finished with a 1½-in. wearing course of asphaltic concrete.

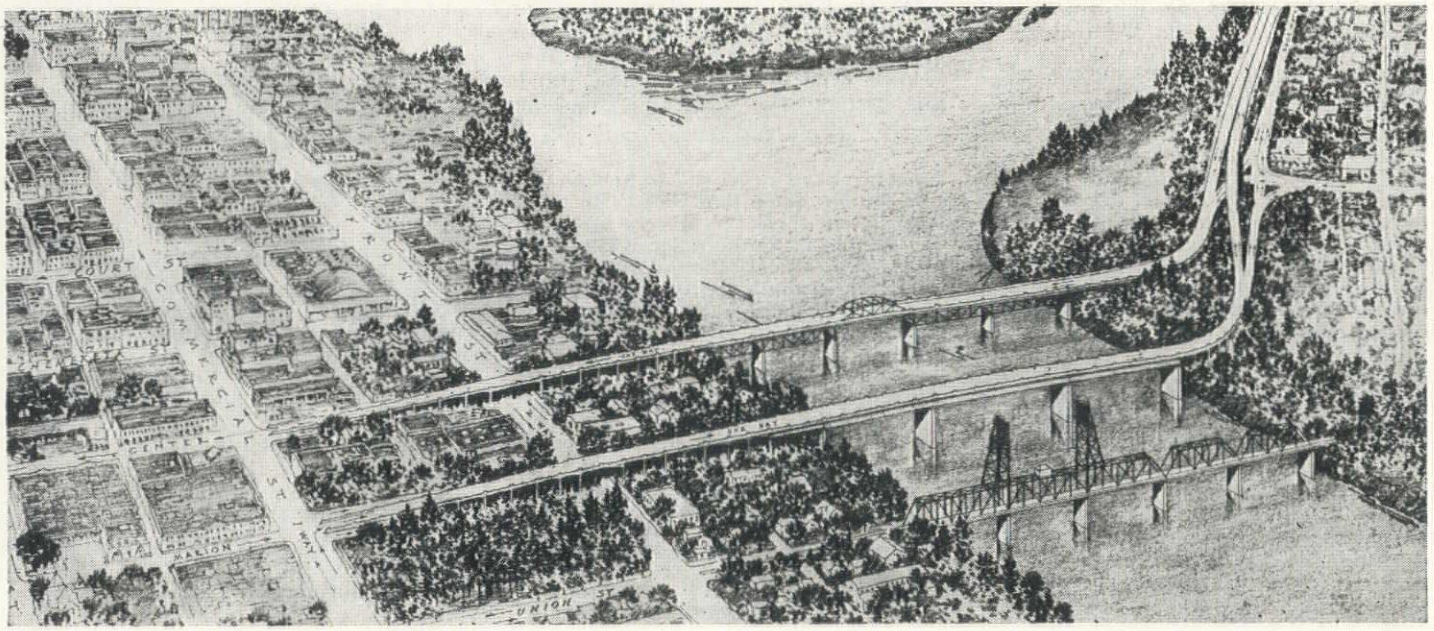
The plate girder type of bridge construction was chosen for economy, appearance and low maintenance cost. Factors that entered into the design are a critical approach grade of 6.39% made necessary on the Salem approach, and river clearance of the superstructure, since the Willamette is a navigable stream.

A special feature made necessary by the 720-ft. long Salem approach is a radiant heating de-icer system, electrically heated and controlled. Sections of welded wire fabric will be secured to the top of the concrete slab, and the asphaltic concrete will be placed and rolled directly on top. Each section of the fabric will receive power from a longitudinal buss bar which will be powered automatically in event of a temperature drop which would bring on ice conditions. During extremely cold weather, an automatic circuit concentrates the power directly under the four wheel lanes to give maximum de-icer effect.

Final designs of the Marion St. Bridge have been recently completed, and the structure will be built under three separate contracts. The first, now underway, is for $246,570 to the Lee Hoffman Construction Co., Portland, for five of the structure's largest center piers. The second, not yet advertised, will be for structural steel. The third will be for the all-concrete approaches and concrete decking over the steel spans.

The concrete approaches have spans varying from 45 to 65 ft. On the plate girder, the maximum length between splices is 74 ft. The bridge has a design loading of H-20-S16-44, and will use 3,500 psi. concrete, except 3,300 psi. mix in the piers. The design strength of concrete was raised by the Bridge Department in recent years, when it was found that standard mixes were consistently better than 3,000 psi. The girders are designed with a lightweight section using 27,000 psi. loading, prevalent after the war in much public work. The web section is stiffened with longitudinal angles, and cross-braced at deck panel points with the transverse truss work supporting the slab deck.

G. S. Paxson is Bridge Engineer for the Oregon State Highway Commission.



THE 3-SPAN structure is midway between two existing bridges. Artist's conception shows traffic flow on bridges, approaches.

Permanente Cement Company Begins Expansion of Plants

PERMANENTE Cement Company has announced an expansion program which will augment its distribution facilities and provide an additional 5,600,000 sacks of cement a year for Western construction. The entire expansion program is expected to cost in the neighborhood of $3,500,000.

The Permanente Cement plant—located in the San Francisco Bay Area near San Jose—will be increased 25% in capacity. The expanded plant will produce 28,000,000 sacks of cement a year or 7,000,000 bbl.

The program includes enlargement of facilities in Seattle, thereby carrying out expansion of Permanente Cement Company's established system of distribution plants which serve widespread markets from Northern California to the Pacific Northwest, Canada, Alaska and Hawaii. The expansions are scheduled for completion in six months.

BPR Will Determine Highway Projects Needed for Defense

ACTION has been taken by the Bureau of Public Roads in accordance with the President's request that Federal agencies re-examine their programs as a result of increased defense measures. The Bureau has asked the cooperation of State highway departments in making the re-examination. Immediate objective of the study is to identify projects which directly contribute to defense.

PERSONALLY SPEAKING

Harold A. Linke, who recently resigned as State Engineer of Utah, has joined with **Win Templeton** of Salt Lake City in incorporation of the firm of Templeton and Linke, Consulting Engineers, with offices in the Dooly Building, Salt Lake City, Utah.

* * *

Ridgeway M. Gillis has been named acting deputy state highway engineer of the California Division of Highways, replacing **Fred J. Drumm,** who retired recently. From 1938 to 1947, Gillis was state construction engineer, and when the Division was reorganized in 1948 he was named assistant state highway engineer in charge of operations.

* * *

Philip W. Knights, civil engineer, announces the opening of professional consulting engineering offices at 318-320 Spreckels Building, San Diego, Calif. He is an associate engineer with Kistner, Curtis & Wright, Architects and Engineers of Los Angeles. Knights specializes in water works, sewerage and hydraulics, as well as structures, industrial plants and industrial buildings.

* * *

Harry R. McBirney retired July 31 after nearly a quarter-century in charge of canal designing for the Bureau of Reclamation. He joined the Bureau in 1909 at Boise, Idaho. In 1920, he was transferred to the Chief Engineer's Denver offices. In 1927, he was named to direct work including major and minor canals, diversion dams and bridges. He was appointed head of the canal engineering division when the Bureau was reorganized in 1946. **A. B. Reeves** has been named acting head of the canal engineering division in the Bureau's Branch of Design and Construction.

* * *

Hugh Odor, construction engineer for the Bureau of Reclamation at Coulee Dam in Washington, has received an appointment as civil engineer in design and construction at the Bureau's office in Washington, D. C. **Fred Powell** replaces Odor. Powell has worked on various projects both for the Bureau and for the Corps of Engineers, and has previous experience at Coulee Dam.

* * *

L. D. Jurs, vice president of Tidewater Associated Oil Co., has retired after 39 years of service with the firm. He started as a draftsman in the engineering department in 1911. In 1912 he was appointed Chief Engineer and it was following this time that many important projects were carried out in the company's expansion program. He will continue to reside in Oakland, Calif.

* * *

D. P. Krynine, civil engineer, announces that he will be practicing consulting engineering in California in the field of applied soil mechanics, foundations, earth structures and allied subjects. He is temporarily located at 364 Flood Bldg., 870 Market St., San Francisco. Krynine taught soil mechanics and foundation engineering at Yale University from 1929 to 1948. He has done consulting work in soils and foundations for a number of agencies. He is the author of a book on soil mechanics and several published papers and discussions. For the past two years, he taught soil mechanics at the University of California, Berkeley.

* * *

A. B. Milhollin, formerly assistant engineer to C. E. Stockman, consulting engineer of Baker, Oregon, is now bridge designer for the Idaho State Highway Department at Boise.

* * *

Donald B. Slawson, formerly assistant head of the flood control section of the Corps of Engineers, Portland District, has been transferred to the Alaska District of the Engineers as head of the highway and airfields section.

* * *

Paul A. Oliver, formerly field engineer for the Bureau of Reclamation on the All-American Canal Coachella Division, California, is now resident engineer for the Bureau at the Office of River Control at Needles, Calif.

* * *

Charles E. Shumate, district engineer for the Colorado State Highway Department at Pueblo, has been named administrative engineer of the department, reporting only to State Highway Engineer Mark U. Watrous. He will direct most of his initial efforts toward effecting a closer coordination of work between the field and office.

Oliver T. Reedy retires Sept. 16 as administrative assistant to the chief engineer after 29 years of service with the department.

* * *

Recent retirements of administrative personnel within the organization of the California Division of Highways include the following: **R. E. "Ernie" Ward,** Associate Highway Engineer, District II at Redding, retired recently after 38 years of service. **S. V. Cortelyou,** Chief Engineer of Los Angeles Division, Dis-

THE ANNUAL CONVENTION of California's Structural Engineers will be held October 12, 13 and 14 at Hotel del Coronado across the bay from San Diego. Meeting recently to discuss convention plans were, left to right—*Walter T. Norris*, banquet committee; *Robert J. Short*, finance committee; *Donald F. Shugart*, social committee; *Harold P. King*, state director; *William T. Wright*, technical committee; *Leonard W. Ross*, general chairman; *Harry W. Bolin*, president of the State Association, and *Alex Silverstein*, attendance and registration committee. The technical program will feature outstanding authorities in various fields.

trict VII, retired recently. **E. Q. Sullivan,** Chief Engineer of District VIII with headquarters in San Bernardino, has retired and will set up consulting office in San Bernardino at 107 East Highland Ave. **Ira G. Thomas,** Assistant Engineer in the Department of City and Cooperative Projects with headquarters at Sacramento, has retired.

* * *

Chris Juhl, maintenance foreman for the Nevada State Highway Department at Beatty for the past 10 years, retired recently.

* * *

Roy M. Butcher, electrical contractor of San Jose, Calif., is the elected chairman of the California Contractors' State License Board. He succeeds **Joseph A. McNeil,** general contractor of Los Angeles. Butcher is an original member of the board, having served continuously since 1935, when the board was set up.

* * *

Floyd M. Jensen, formerly construction engineer for the Bureau of Reclamation on the Cannonball Unit of the Missouri Basin Project at Elgin, N. Dak., has been named district field engineer for the Bureau at Cody, Wyoming.

* * *

Harmer E. Davis, director of the Institute of Transportation and Traffic Engineering at the University of California, has been named chairman of the Highway Research Board's Committee on Highway Organization and Administration. Broad purpose of this Committee is to study the organization and management of highway activities on all government levels with respect to organizational forms, efficiency, extent of jurisdiction, and specific functions. The present Committee will devote its attention particularly to road-department organization at county and city-government levels.

* * *

R. J. Lecky, secretary of the Building and Construction Industries Exchange of British Columbia, has retired. He was secretary of the Exchange since it was organized in 1928. **Harold Cole,** who joined the Exchange in 1945 as associate secretary, has been appointed secretary of the organization.

* * *

Henry A. Ross has been named city engineer of Petaluma, Calif. He replaces **Kenneth Godso,** resigned.

* * *

L. D. Woodward, city engineer of Riverton, Wyo., for the past 14 years, has resigned to enter into private practice.

* * *

W. H. Clagett, Jr., assistant to supervising engineer A. F. Darland at Coulee Dam in Washington, left July 17 to join the chief engineer's office of the Bureau of Reclamation at Denver, Colo. With the Bureau at Coulee Dam since 1936, he has been in the concrete control section and in charge of electrical installations. In his work at Denver, Clagett is now in charge of the substation and switchyard design unit. He becomes responsible for the design of structures up to voltages of 230,000 which will be installed by the Bureau at its various power developments.

* * *

Daren G. Thiel, until recently with the Design Section of the Bureau of Reclamation at Boise, Idaho, is now working with the Design Section of the Bureau at Hungry Horse Dam in Montana.

* * *

Dr. Lloyd N. Robinson, associate engineer with the Puget Sound Power & Light Co., has been elected president of the Washington Society of Professional Engineers for 1950-51.

* * *

Herman R. Horn and **Harold E. Egeberg** have been assigned to the branch of project planning for the Bureau of Reclamation's region 6 with headquarters at Billings, Mont. Egeberg, with 25 years of experience at various engineering posts throughout the West, was most recently with the Corps of Engineers at Walla Walla, Wash. Horn comes from the Corps of Engineers office at Omaha. Horn will serve with the programs and reports division; Egeberg with the engineering estimates and surveys division.

* * *

Daley E. Nyberg is now field engineer for the American Bridge Co. on construction of the Agate Pass Bridge at Seabold, Wash.

* * *

Quentin W. Holmes is now construction engineer for the San Francisco District, Corps of Engineers, on construction of the Veterans Administration Hospital at Salt Lake City, Utah.

* * *

Eugene L. McCoy is now concrete inspector for the Bureau of Reclamation at Hungry Horse Dam in Montana.

* * *

Randolph R. Johnson is now a highway engineer trainee with the U. S. Bureau of Public Roads and is currently working on construction of a highway near Deborgia, Mont.

OBITUARIES . . .

Harry Boyer, 79, Pacific Northwest building contractor, died August 9. He built the Sorrento Hotel in Seattle, the Thurston County, Wash., court house, several buildings on the state capitol grounds at Olympia, Wash., and Paine Field in Snohomish County, Wash.

* * *

Morley Alfred Rear, 71, retired California building contractor, died July 24 in Los Angeles.

* * *

M. O. Packard, Jr., president of the Packard Contracting Co., Phoenix, Ariz., died August 4 in Los Angeles. He served for many years as a member of the board of directors of the Arizona chapter, Associated General Contractors of America.

* * *

Raphael E. Parker, 75, construction engineer of Los Angeles, died August 4.

* * *

John Christopher Staser, 74, a veteran Washington State Highway Department civil engineer, died August 7. He was chief engineer for the new Tacoma Narrows Bridge before his retirement in 1949.

* * *

Marion Mills Mulchahey, Compton, Calif., died recently. He was excavation superintendent for Morrison-Knudsen Co.

* * *

Thomas W. Bulpin, 81, retired civil engineer, died July 30 in Alhambra, Calif.

* * *

George E. Solnar, Jr., 36, manager of the Clay Brick and Tile Manufacturers Association, San Francisco, died last month. During the war he was Director of Stanford University Engineering, Science and Management War Training Program.

* * *

Arthur F. Edwards, 70, president of the American Marble Co., died August 4 after a long illness. He was director of the San Francisco Builders Exchange for 25 years and the Exchange's secretary for 10 years.

* * *

Wallace Stewart, 61, president of the W. Stewart Construction Co., Ltd., died in General Hospital at Vancouver, B. C., recently.

* * *

John Habel, 35, of Stockett, Mont., was killed when a tractor he was driving plunged through a bridge near Chinook July 18. He was an employee of O'Neil & Lewis Construction Co.

* * *

Thomas Maxwell, 69, director of the Golden Gate Bridge and Highway District and former Napa County, Calif., supervisor, died July 29.

* * *

Matthew Davis White, 48, Salt Lake City building contractor, was killed in a motorcycle accident July 23.

* * *

George A. Tilton, Jr., assistant construction engineer with the California Division of Highways, died July 31 in Sacramento.

* * *

Charles E. Mead, 79, building contractor, died July 23 in Los Angeles.

* * *

Richard C. Boyer, 67, civil engineer for the city of Beverly Hills, died August 7.

SUPERVISING THE JOBS

Robert Smith is job superintendent for Eaton & Smith, San Francisco, removing streetcar tracks on a 48-block stretch of Lincoln Way in San Francisco, a $340,711 project. **Loren Roller** is concrete foreman; **John Hanley** is subgrade foreman; **Earl Lawrence,** sewer and drainage foreman; and **John M. O'Connor,** job accountant.

* * *

George Easterbrook is job superintendent for the joint venture firm of Boen-Sealand Constructors, Seattle, for constructing a $1,530,400 housing project at Eilson Air Force Base, Anchorage, Alaska. **P. D. Koon** and **R. D. Egge** are job engineers.

* * *

On the $178,728 construction of Gila Valley canal desilting basin near Yuma, Ariz., **J. E. "Jock" Broton** is the job superintendent and **W. E. "Bill" Daniels** is excavation foreman for Macco Corp., Paramount, Calif.

* * *

Lynn Johnson is the job superintendent on a $187,483 construction project for 10.6 mi. of highway in Toole County, west and east of Kevin, Mont., for Nilson-Smith Construction Co., Great Falls.

* * *

Supervising Macco Corp.'s $432,990 construction of steel towers to carry transmission lines across the Sacramento and San Joaquin Rivers in California are: **Giles C. Parker,** project manager; **Ware Boyd,** job superintendent; and **Andy Micek,** pile foreman. Contract was let by the Bureau of Reclamation for the Central Valley Project.

* * *

Paul Swanson is the project manager and **Howard Graves** is the office manager for Morrison-Knudsen Co., Inc., on the $2,000,844 construction of grouting and spillway extensions for Seattle's Diablo Dam on Skagit River, Wash.

* * *

Peter Kiewit Sons' Co. has appointed the following men to supervisory capacities on the $2,572,544 construction of the first stage of Chief Joseph Dam, Douglas County, Wash.: **Harvey Washburn,** job superintendent; **Bob Betcher,** excavation superintendent; **Hank Armstrong,** master mechanic; **Lew Griggs,** superintendent of drilling and shooting; **Chub Foster,** job engineer; and **Harry Eckstein,** job office manager.

* * *

Samuel O. Upton, Alhambra, who recently went into business for himself, is supervising construction of a $100,000 school building at Lancaster, Calif. **Andy Wilson** is superintendent for the Upton firm on a $60,000 school building at El Monte, while **Sam Upton, Jr.,** is superintendent on the Montebello Gardens School construction, all in California.

* * *

Ted Mosher is superintendent and **Slim Bloomfield** is assistant superintendent for Hensler Construction Corp., Glendale, Calif., for widening and surfacing 5.5 mi. of highway between Newport Beach and Laguna Beach in Orange County, a $34,505 contract.

* * *

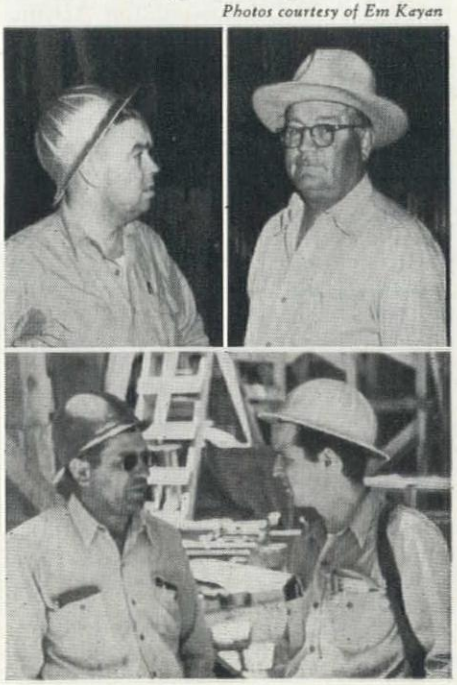
L. M. Anderson is project manager for the joint-venture firm of A. L. Murphy and Nathan A. Moore, Los Angeles, for construction of the $457,760 Fort Sumner Diversion Dam, Fort Sumner Project, N. M., a Bureau of Reclamation contract.

* * *

R. J. Stoddard is general superintendent and **Ralph Birchard** is assistant superintendent for Hoagland-Findlay Engineering Co., Long Beach, Calif., on the construction of rearing ponds and piping for the Oakridge salmon hatchery at Lookout Point Dam, Ore., a $243,000 contract let by the Corps of Engineers.

THE MEN of Morrison-Knudsen Co., Inc., who have brought Kortes Dam near to completion despite some tough breaks (see article on page 85 of this issue) are shown below. Top left—*Robert G. Foster*, power plant erection superintendent. Top right—*B. "Woody" Williams*, project manager. Bottom left—*George "Pete" Piedmont*, general superintendent. Bottom right—*F. C. Eberhardt*, project engineer.

Photos courtesy of Em Kayan



Johnnie Iben is the general superintendent and **Page Thiers** the assistant superintendent for Packard Contracting Co. on the $215,000 state highway construction project between St. Johns and Sanders, Ariz.

* * *

Supervising construction of two bridges on Paso Robles Creek and 4.1 mi. of highway near Atascadero, Calif., for the M. J. B. Construction Co., Stockton, are **John Bevanda,** project manager, and **Nick Bulum,** superintendent.

* * *

Superintendent on a $350,000 construction job at Santa Monica Civic Center is **C. T. King,** working for Curlett Construction Co., Long Beach, Calif.

* * *

L. A. Runkle is the project manager and **E. E. Anderson** is the general superintendent for Leonard-Slate-Hall Co. on the $2,056,368 railroad and highway relocation at Lookout Point Dam, Ore., for the Corps of Engineers.

* * *

Bert Norris is general superintendent and **Bill Cole** is assistant superintendent for Peter Kiewit Sons' Co. on the $854,000 highway construction project between Barkley Springs and Algoma in Oregon.

* * *

J. E. Jones and **A. L. Hurley,** contractors, are project manager and superintendent, respectively, for constructing a portion of roadway near the south entrance to Yellowstone National Park for the Bureau of Public Roads.

* * *

Fred S. Peterson has been transferred from the Soap Lake Siphon project by Winston Bros., Azusa, Calif., to the position of project manager of the Carter Lake Reservoir project, near Berthoud, Colo., a $2,389,350 project.

* * *

J. J. Dooling, contractor, Denver, Colo., is superintendent on the $375,000 grading and base course surfacing of 8.3 mi. in Teton County, Wyo., on the Moran-Yellowstone Approach, a Bureau of Public Roads project.

* * *

W. J. Darkenwald is project manager and **T. H. Rutherford** is general superintendent for Morrison-Knudsen Co., Inc., for constructing a $865,965 earthfill dam at Farmington, Calif., for the Corps of Engineers. **Jim Cannon** is job engineer; **Roy W. Fellows** is master mechanic; and **John Alexander** is night master mechanic.

* * *

William "Bill" Woodall is job superintendent for Macco Corp., Paramount, Calif., on the basic construction of Lucky Peak Dam, a $3,494,965 project on the Boise River, Idaho.

* * *

John Christman is superintendent on the $1,113,214 Jemez Canyon Dam and reservoir outlet works construction in New Mexico. Others working for Mor-

Fills a gondola in 21 minutes
(including switching)

BUILDS ITS OWN RAMP

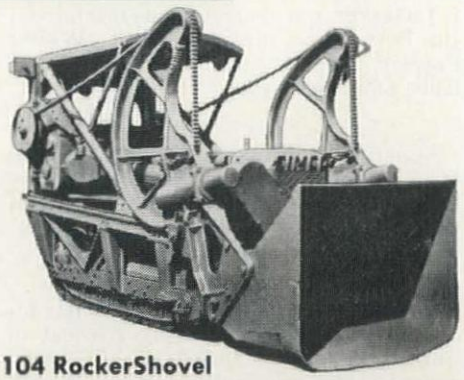
LOADS THE CAR

SWITCHES CARS

The versatile Eimco 104 replaces several other pieces of equipment wherever it is used. The job illustrated above retired a boom type shovel, a bulldozer and a small switcher when the 104 was installed. The speed, power and dependability of the 104 bring new low costs into the field of material handling. Loading the 60 ton gondola with sand in 21 minutes including switching time is only one of its accomplishments.

This new, universal loading machine can do the job better than heavier, slower and many times more expensive equipment.

Write for details on the 104.



Eimco 104 RockerShovel

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

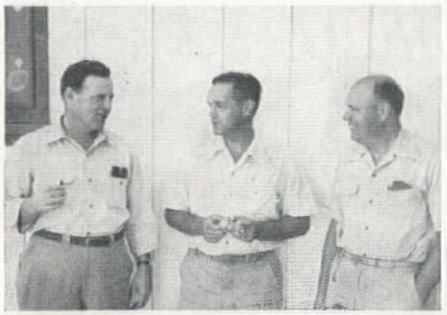
EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U. S. A.

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, 315 MAPLE STREET

AFFILIATED COMPANIES: SOCIETE EIMCO, PARIS, FRANCE
EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

You Cant Beat an Eimco!



KEY PERSONNEL on current Delta-Mendota canal construction (see article on page 78 of this issue). At top, left to right—*R. K. "Bob" Ames*, project manager for Western Contracting Corp.; *O. H. Folsom*, resident engineer for the Bureau of Reclamation; *R. H. Heitman*, district engineer for Western; *Arthur Gray*, project engineer for Morrison-Knudsen & Hasler; *W. J. Darkenwald*, project manager for MK&H, and *M. H. Hasler*, contractor. At left: *M. K. Young*, superintendent of structures, and *C. F. "Pick" Hynes*, rock plant superintendent, for Western Contracting Corp.

rison-Knudsen Co., Inc., on the Rio Grande Flood Control Project are **T. W. Marshall,** office manager, and **William Burns,** job engineer.

* * *

Frank H. Dunn is job superintendent for Dodge Construction Co., Inc., Fallon, Nev., on a $147,781 highway construction project between Garden Pass and Alpha, Nevada.

* * *

S. C. Harlan is job superintendent and **Mahlon C. Shipley** is engineer for Howard P. Foley Co. of Salt Lake City on the firm's $242,652 contract for structural and electrical work on Tucson substation, Davis Dam Project, Ariz.

* * *

Keith C. Wasson is job superintendent for Peter Kiewit Sons' Co. on its $3,333,156 contract for constructing earthwork, concrete lining, and structures of the Friant-Kern Canal in California. **J. W. "Major" Lowe, Jr.,** is project manager; **W. W. White,** structure superintendent; **I. J. Garver,** excavation superintendent; **Jim Bett,** lining superintendent; **Walter Powers,** master mechanic; and **A. L. Ellis,** office manager.

* * *

Supervising the $131,300 construction of a concrete bridge and road portion on U. S. Hwy. 40 in Utah is **N. G. Wheelwright** for the Wheelwright Construction Co., Ogden.

* * *

Supervising the $1,931,343 construction of Ping Yuen Housing Project in Chinatown, San Francisco, for Theodore G. Meyer, contractor, is **R. W. Brown.**

* * *

F. A. Bleeker is job superintendent for Guy H. James Construction Co., Oklahoma City, on the $2,280,717 contract for Stage 1 of Oahe Dam. Supervising the $1,000,000 subcontract for 3,155,000 cu. yd. of excavation for joint-venturers Archie Campbell and William Collins & Sons, Fargo, N. D., are **Kenneth J. Collins,** general superintendent, and **John P. Beck,** project superintendent.

* * *

Jack Sutalo is job superintendent and **P. L. Philippe** is office manager for P. & J. Artukovich, Inc., Los Angeles, on the $891,613 joint outfall "I" trunk sewer, Units 2 to 4 at Long Beach, Calif.

* * *

Giles Parker is project manager for Macco Corp., Paramount, Calif., on the $242,593 bridge construction at Gage Ave. and Tweedie Lane, Los Angeles County, Calif. **Art Armstrong** is job superintendent and **Leonard Marshall** is job engineer.

* * *

Constructing 1⅔ mi. of highway over a new alignment in Greenlee County near Rose Peak, Ariz., for Packard Contracting Co., Phoenix, is **Page Thiers** as job superintendent. **John Ritner** is office manager. **Herman W. Kuntz** is in charge of purchasing on the $189,931 job.

* * *

Walter Jarvis is job superintendent for M. M. Sundt Construction Co. on construction of the $289,859 outfall sewer and treatment plant at Nogales, Ariz. **Bob Sundt** is office manager and **Nate Nicoll** is grade foreman.

* * *

C. A. Emerson is job superintendent and **J. R. Phillips** is structure engineer for Blanchard Bros. Construction Co. of Denver for road construction on State Hwy. 185, near Wellington, Colo., a $194,170 project.

* * *

Kovick Bros. Construction Co., Inc., Fresno, awarded a $209,831 contract for construction of additions to the Fresno sanitary sewer system, has appointed **Mike Batrich** as superintendent for the job. Other key men are: **Les Hunt,** master mechanic; **A. H. Balavac,** structure superintendent; **M. L. MacDonald,** office manager, and **Tom Butler,** excavation foreman.

* * *

Paul Carney is general superintendent on construction of the Grand Canyon-Olds Trail in Arizona, for Pioneer Contracting Co. **Albert Carney** is assistant superintendent and **John Feeney** is office engineer on the $350,000 project.

* * *

John Andrews is superintendent and **Ben Johnson** erection superintendent for Vernon Bros., Boise, and C. L. Electric Co., Pocatello, Idaho, a joint venture for the installation of turbines and generators at Anderson Ranch Dam, Idaho.

* * *

Harry Dursten is project manager and **Paul Pond** is superintendent for J. Terteling & Sons, now completing the spillways at the Anderson Ranch Dam, Idaho. **Robert Morris** is the office manager.

* * *

H. E. Williams is project manager for T. L. James & Co., Inc., Ruston, La., on the $1,600,000 Fort Worth, Tex., International Airport project, consisting of concrete paving of runways and incidental work.

* * *

Completing the Hollywood Parkway construction project for N. M. Ball Sons, Berkeley, Calif., are: **Ted Orcutt,** superintendent; **W. C. "Slim" Wentworth,** concrete foreman; and **Floyd Davis,** master mechanic.

* * *

Dean Skinner is project manager and **J. C. McMillan** is superintendent for the joint-venture firm of T. C. Cage and Dean Skinner, constructing a section of state highway at Austin, Tex. **James Brown** is assistant superintendent.

* * *

L. B. McDaniel is superintendent and **R. H. McKinley** is assistant superintendent for Brooks and Gardner, constructing the $145,644 water filtration plant at Waco, Tex.

* * *

C. E. Pehl is project engineer and **K. O. Taylor** is general superintendent for Bechtel Corp. on the construction of a power house on the San Joaquin River near North Fork, Calif., for the Southern California Edison Co.

* * *

George Archibald is project manager and **George Jones** is general superintendent for Guy F. Atkinson Co., constructing the $1,879,722 Leroy Anderson Dam on the Coyote River near Madrone, Calif. Contract for the rock and earthfill dam was let by Santa Clara Water Conservation District.

* * *

Del E. Webb Construction Co. has transferred these supervisors to Culver City, Calif., to direct a $2,000,000 expansion program at Hughes Aircraft Co.

plant: **J. E. Salmon,** job superintendent; **J. J. Fahey,** job chief of operations; and **R. E. Sinclair,** job office manager. These men were transferred from Beverly Hills where they recently completed the W. and J. Sloane store building.

* * *

C. A. Emerson is general superintendent for Blanchard Bros. Construction Co. on the construction of a new road, part of State Hwy. 185 near Wellington, Colo. **Ted Emerson** is assistant superintendent and **George Parsons** is master mechanic on the $200,000 project.

* * *

R. G. McGillivray is superintending construction of twin arch bridges and approaches on the Denver Valley Highway, Colo., a $427,000 job contracted by Peter Seerie, Inc.

* * *

J. C. Hubbard is superintendent for Etlin E. Peterson Construction Co., Casper, Wyo., on the building of a $300,000 steel and concrete bridge over the North Platte River at Torrington, Wyo.

* * *

H. P. Graham is superintendent for Brown Construction Co., Pueblo, Colo., on construction of 26 mi. of U. S. Hwy. 85 between Cheyenne and Torrington. Others working on the $600,000 road job are **J. I. Firkins,** as master mechanic, and **Bill Murphy,** as office manager.

* * *

Harry Scheideman is superintendent for JKS Construction Co., subcontractors for gravel surfacing and hauling on State Hwy. 185 near Wellington, Colo.

* * *

John Trollman, Jr., is superintendent on the construction of a $182,686 school building at San Carlos, Calif., for Cannon Construction Co.

* * *

James D. Fogg is project manager and **Robert G. Davidson** is general superintendent for Utah Construction Co. on the $10,301,653 Bonny Dam near Hale, Colo. **J. F. McCreight** is project engineer on the Bureau of Reclamation project.

* * *

C. A. Byrne is superintendent for H. C. Jones, contractor of Albuquerque, N. M., on the construction of the $118,000 access road to Jemez damsite, N. M.

* * *

Earl Shannon is general superintendent and **Joe Brock** and **Cliff Earsley** are assistant superintendents for Henry Thygesen & Co., Albuquerque, on the $192,000 highway reconditioning project between Gallup and Albuquerque, N. M.

* * *

W. F. Chambers is general foreman on the construction of a high school in Lomita Park, Calif.

* * *

Starting the construction of a 500-bed V. A. hospital in St. Louis, Mo., for Del E. Webb Construction Co., Los Angeles, are: **Neil Drinkward,** job superintend-

ent; **F. W. Danielson,** job engineer; and **W. A. Warriner,** job office manager.

* * *

Henry Vondekuhlen is superintendent for Pozzo Construction Co., Los Angeles, on the addition to St. John's Hospital, Santa Monica, now nearing completion.

* * *

Harry Arenburg is superintendent for W. P. Neil Construction Co., contractor for the Standard Steel Spring Co. Building in Los Angeles.

* * *

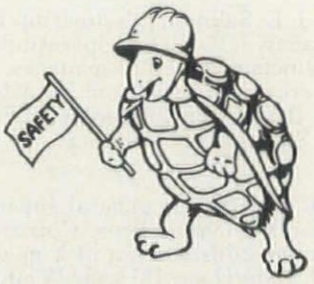
Directing construction of a $120,000 highway project between Gallup and Whitewater, N. M., for Henry Thygesen & Co., are **Paul Cross,** project manager, and **Grover Meadows,** general superintendent.

* * *

Jack Hurley is superintendent and **Paul Matus** is assistant superintendent for Granite Construction Co. on the construction of the San Jose Water Works Assn. earthfill dam in California. **Paul Eller** is construction engineer.

* * *

Tom Oglesby is superintendent for Griffith Co., Los Angeles, for constructing 2.8 mi. of the Santa Ana Freeway near Anaheim, Calif., a $310,000 project. **A. Twifort** is master mechanic and **G. Weir** is office manager.



200-Lb. Rock Helps Qualify New Member For the "Turtle Club"

LATEST MEMBER of the "Turtle Club" is David J. Jones, Inspector for the Bureau of Reclamation on the Riverton, Wyoming, tunnel project. Jones can thank a hard hat for nothing more than a pratfall when a 200-lb. rock hit him on the head. So Jones has been sent a certificate, a decal for his new hard hat (the old one was fractured), and a Turtle Club lapel pin.

This exclusive club (announced on page 89 of the July 1950 *Western Construction*) is open for membership only to those whose lives have been saved by wearing a hard hat. Application for membership may be obtained by writing Editor, *Western Construction,* 609 Mission St., San Francisco 5, Calif.

NEW BOOKS . . .

EFFECTS OF ATOMIC WEAPONS—Prepared for and in cooperation with the U. S. Department of Defense and the U. S. Atomic Energy Commission, under the direction of the Los Alamos Scientific Laboratory. Published by the U. S. Government Printing Office, Washington, D. C. 456 pages, paper-bound, 6 x 9. Price $1.25.

This handbook is a technical summary of the results that can be expected from the detonation of atomic weapons. It tells the degree to which building types will be destroyed by an atomic explosion and which types of construction can withstand a blast, in proportion to the distance ratio of the explosion. Described are the effects on personnel and means for their protection, in addition to methods for decontamination. Some of the chapters give a description of an atomic explosion, characteristics of the shock, physical damage, and effects of radiation.

* * *

PLANNING AND DESIGN OF AIRPORTS—By Robert Horonjeff and John Hugh Jones. Published by the University of California Press, Berkeley 4, Calif. (University of California Syllabus No. 316.) 64 pages, 33 illustrations, paper-bound, 8 x 11. Price $1.50.

The manual explains the principles pertaining to the planning and design of airports, as well as related problems and standards of design. Chapter headings are—site selection, airport design stand-

ards, layout of airports, pavement design, airfield drainage and airport marking and lighting. Criteria for establishing the necessary size and location of an airport are tabulated and discussed. The authors list specific design standards for runways and give the principal dimensions of the more popular light planes and the commonly used aircraft.

* * *

HIGHWAY DESIGN AND CONSTRUCTION—By Arthur G. Bruce and John Clarkeson. Published by the International Textbook Co., Scranton, Pa. 740 pages, 6 x 9. Price $7.25.

In the third edition of this popular book on the location, design and construction of highways, special emphasis has been placed on the following features: preliminary studies, including planning surveys; highway classification; driver behavior; sight distance; preliminary location studies; origin and destination studies; traffic studies; intersection study and treatment; highway capacity, and speed characteristics.

* * *

MUNICIPAL AND RURAL SANITATION—By Victor M. Ehlers and Ernest W. Steel. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 550 pages, 6 x 9. Price $6.50.

This is the fourth edition of a book dealing with the fundamentals of general sanitation. Basic information is given concerning the diseases which preventive sanitation eliminates, and a brief description of the field of public health is included. Sewage disposal and water supply are discussed from the point of view of operating problems, which leads to a discussion of subsequent solutions.

* * *

PHOTOELASTICITY, PRINCIPLES AND METHODS—By H. T. Jessop and F. C. Harris. Published by Dover Publications, Inc., 1780 Broadway, New York 19, N. Y. 184 pages, 6 x 9. Price $3.50.

This book is for the practical engineer who wants to apply the methods developed in photoelasticity but does not have the time to read lengthy theoretical texts. Described in the book are methods that can be applied immediately to specific problems of experimental stress analysis. The work offers researchers and engineers an opportunity to learn the latest, time-saving methods of checking calculations in two-dimentional design problems. In addition, it describes the relatively new techniques by which stresses in three dimensions can be checked.

THE FISCAL year 1949 saw the Columbia River federal power system become the second largest producer of power in the United States, second only to the Tennessee Valley Authority system, according to the annual report of the Bonneville Power Administration.

Contracts . . .

A Summary of Bids and Awards For Major Projects in the West

Arizona

$148,558—**Arizona Sand & Rock Co.,** Box 596, Phoenix—Contract for construction of 2½ mi. of the Black Canyon highway between Rock Springs and Prescott.

$279,568—**Dale F. Payne,** 2345 W. Thomas Road, Phoenix—Contract for constructing a portion of the highway between Wickenburg and Kingman.

$333,480—**Phoenix-Tempe Stone Co.,** Box 1670, Phoenix—Low bid for grading and draining 7.3 mi. of new road from Topock to Yucca, Mohave County.

$202,553—**Trans-Electric Co.,** 108 E. Oak St., Louisville, Ky.—Low bid for constructing parts 1, 2, and 3 of the 34.5-kv. transmission lines, Davis Dam Project; by Bureau of Reclamation.

$240,000—**J. H. Welsh & Son,** 805 S. Central Ave., Phoenix—Contract for building outside water, sewer, and irrigation lines for a housing development at Williams Air Force Base.

California

$338,238—**P. & J. Artukovich,** 13305 S. San Pedro St., Los Angeles—Contract for construction of Units No. 5 and No. 6 of the trunk sewers, Santa Clara County; for Santa Clara County Sanitation District 4.

$397,539—**Guy F. Atkinson Co.,** Box 593, South San Francisco—Low bid for constructing a reinforced concrete slab bridge on concrete pile bents, and grading and paving 3.7 mi. of state highway north of Madera, Madera County.

$347,468—**Guy F. Atkinson Co.,** Box 259, Long Beach—Contract for preliminary work on the new Anaheim St. bridge with cloverleaf approaches, on Pico Freeway, Los Angeles County; by Port of Long Beach.

$500,000—**Bechtel Corp.,** 220 Montgomery St., San Francisco—Contract for constructing a new plant in Santa Clara County; for Pacific Electric Manufacturing Corp.

$1,664,115—**Bressi & Bevanda Constructors, Inc.,** Box 439, North Hollywood—Contract for channel improvement along the Tujunga Wash from Los Angeles River to Hansen Dam, and from Van Owen St. to Beachy Ave., Los Angeles County; by Corps of Engineers.

$5,000,000 approx.—**Capital Co.,** 1 Powell St., San Francisco—Contract for construction of a 12-story bank and office building on the northeast corner of Wilshire Blvd. and Vermont Ave., Los Angeles; for the Bank of America.

$2,906,239—**Dinwiddie Construction Co.,** 210 Crocker Bldg., San Francisco—Low bid for constructing a 5-story wing of reinforced concrete and structural steel to Children's Hospital; remodeling of existing building, and installation of boiler plant and generating plant, San Francisco.

$217,743—**Dix-Syl Construction Co., Inc.,** 2114 Second St., Bakersfield—Low bid for constructing a reinforced concrete and structural bridge, grading and surfacing 1.9 mi. with imported base material, and bituminous surface treatment, in Kern County, between Isabella Dam site and Route 57.

$1,925,000—**L. E. Dixon Co.,** 409 S. California St., San Gabriel—Contract for the erection of new buildings at San Fernando High School, Los Angeles County; by Los Angeles Board of Education.

$598,946 on Schedule I or $449,137 on Schedule II—**Fred J. Early, Stolte, Inc.,** and **Duncanson-Harrelson,** 8451 San Leandro St., Oakland—Joint-venture low bid for construction of three sludge digestion tanks and one digestion control building in Alameda County, on the southerly boundary of the East Bay sewage treatment site, Oakland; by East Bay Municipal Utility District.

$823,334—**Fredericksen & Kasler,** 212 13th St., Sacramento—Low bid for grading and surfacing with plantmix surfacing on untreated rock base about 7.1 mi. of state highway near the Los Angeles-Ventura County line.

$819,127—**Fredrickson & Watson Construction Co.,** 873 81st Ave., Oakland—Low bid for 1.1 mi. of grading and paving with cement-treated base and plantmix surfacing, building grade separation structures, grading and paving of connecting roads at

Broadway Terrace and Temescal Park Roadway, Alameda County.

$226,035—**Harms Bros.,** 5261 Stockton Blvd., Sacramento—Single bid received for grading and surfacing 3.6 mi. with imported surfacing material on imported base material, bituminous surface treatment, and application of seal coat, all on a portion of state highway between Silver Lake and Alpine County line, Amador County.

$5,449,300—**Johnson, Drake & Piper, Inc.,** 1736 Franklin St., Oakland—Contract for constructing a group of buildings at the California Vocational Institution near Tracy; by California State Division of Architecture.

$346,940—**Kirst & Sons,** 836 W. Atlanta, Altadena—Low bid for grading and surfacing 3.3 mi. with plantmix surfacing on untreated rock base, applying seal coat to state highway between Tequepis Canyon and Santa Ynez River bridge, Santa Barbara County.

$4,500,000—**Likins, Foster & Associates,** Huntington Park—Contract for building a 500-unit housing development, to include playgrounds, streets, sidewalks, landscaping, and community center, located at Fort Ord; by Sixth Army Headquarters and carried out under the provisions of Wherry Housing Bill.

$608,569—**Lord & Bishop,** Box 812, Sacramento—Contract for constructing substructure for a bridge and portion of the north embankment, on the American River near Elvas, Sacramento County.

$367,478—**Frank B. Marks, Jr.,** Box 668, Newman—Low bid for widening 5.9 mi. of highway, including plantmix surface treatment to cement-treated base and plantmix surfacing on portions of existing pavement, between Palo Alto and Sunnyvale, Santa Clara County.

$171,631—**Fred McKinley,** Paramount—Low bid for grading and installation of corrugated metal pipes on 4 mi. of state highway between Willitts and Fort Bragg, Mendocino County.

$1,500,000 approx.—**Pacific Pipe Line & Engineers, Ltd.,** 225 Bush St., San Francisco—Contract for installation of 24 mi. of 20-in. pipe, to include grading, trenching, hauling, and welding, from Hollister to Moss Landing, Monterey and San Benito Counties; by Pacific Gas & Electric Co.

$459,630—**Alex Robertson Co.,** 14433 S. Paramount Blvd., Paramount—Contract for building a 7-mi. water pipe line to connect El Toro Marine Base with the Metropolitan Water District System; by 11th Naval District.

$3,000,000 approx.—**Ford J. Twaits, T-S Construction Engineers, Inc., Morrison-Knudsen Co.,** 449 S. Beaudry St., Los Angeles—Joint-venture contract awarded for construction of a 100-bed wing to the Good Samaritan Hospital, Los Angeles; by the Bishop of the Episcopal Diocese of Los Angeles.

Utah Construction Co., 1 Montgomery St., San Francisco—Construction has started on a 550-ft. covered wharf on the south side of Santa Fe Channel, Richmond; for Santa Fe Railway.

$11,000,000—**Utah Construction Co.,** 1 Montgomery St., San Francisco—Contract for construction of a rock-fill dam and 1,094 ft. of a 14,000-ft. water tunnel at the head of Mokelumne River; for Bear River development of Pacific Gas & Electric Co.

Colorado

$1,000,000 approx.—**Mead & Mount Construction Co.,** Denver—Contract for constructing the American Legion Memorial Building in Denver; for Leyden-Chiles-Wickershak Post No. 1, American Legion.

Idaho

Central Pre-Mix Concrete Co., Spokane, Wash.—Will furnish all concrete for the Atomic Energy Commission's reactor testing station at Arco.

$1,214,222—**L. T. Johnson Construction Co.,** Ogden, Utah—Low bid for surfacing 18.4 mi. of the Twin Buttes Highway in Bonneville County.

$1,247,000—**F. H. McGraw & Co.,** Hartford, Conn.—Low bid for construction of building for assembling and testing naval reactor; for Westinghouse Electric Corp. and Atomic Energy Commission.

$937,794—**Pickett & Nelson,** Box 755, Idaho Falls—Low bid for constructing 19.2 mi. of the Twin Buttes Highway between Idaho Falls and the AEC reactor testing station at Arco.

$310,904—**Westinghouse Electric Corp.,** Salt Lake City, Utah—Contract for furnishing the Idaho Operations Office, Atomic Energy Commission, with 11 electric power transformers for use at the reactor testing station at Arco.

Montana

$284,497—**A & W Construction Co.,** and **Walling Construction Co.,** Box 228, Glasgow—Joint-venture contract for grading, gravel, drainage, and bituminous surface treatment on 16.9 mi. of state highway between Grass Range and Jordan, Fergus and Petroleum Counties.

$257,505—**Roy L. Bair & Co.,** W. 1220 Ide Ave., Spokane, Wash.—Contract for construction of an underpass and .2 mi. of paving between Malta and Vandalia and Grass Range and Malta, Phillips County.

$1,852,893—**Carson Construction Co., Inc.,** Box 1153, Helena—Contract for general construction of an addition to the Montana State Tuberculosis Sanitarium, construction of a power plant, employees' dormitory, and apartment building, all at Galen.

$199,544—**Heald & Christler,** Cody, Wyo.—Contract for grading, gravel surfacing, bituminous surface treatment, and construction of drainage structures on 4.8 mi. of the Red Lodge-Belfry highway in Carbon County.

$188,251—**McLaughlin, Inc.,** 327 Fort Bldg., Great Falls—Low bid for a 40-block north side paving project in Glasgow to include: a 1½-in. gravel cushion course topped by 2 in. of hot plantmix asphaltic mixture; by the city of Glasgow.

$288,076—**S. T. Olson Co.,** P. O. Box 249, Billings—Low bid for construction of a 313-mi. electrical distribution line, using butt-treated lodge pine poles, for serving consumers in Sheridan, Daniels, and Roosevelt Counties; by Sheridan County Electric Cooperative.

$11,564,347—**Western Contracting Corp.** and **Massman Construction Co.,** 400 Benson Bldg., Sioux City, Ia.—Joint-venture low bid for construction of Tiber dam and dike, south of Tiber on the Marias River; by Bureau of Reclamation.

Nebraska

$432,694—**R. N. Campsey Construction Co.,** 2520 Leyden St., Denver, Colo.—Low bid for building a 115-kv. transmission line from Sidney to Ogallala; by Bureau of Reclamation.

New Mexico

$537,491—**Allison & Haney, Contractors,** 1412 N. Broadway, Albuquerque—Contract for resurfacing 9.5 mi. of U. S. Hwy. 66 at San Jon.

$226,333—**Armstrong & Armstrong,** Box 873, Roswell—Contract for grading, draining, and surfacing 8 mi. of roadway between Fort Sumner and Dunlap in De Baca County.

$167,140—**Armstrong & Armstrong,** Box 873, Roswell—Contract for 9.5 mi. of highway construction and bridge on the road between Dexter and Hagerman in Chavez County.

$183,454—**Fulton & Hamilton Construction Co.,** Roswell—Contract for grading and paving 1.1 mi. of U. S. Highway 85 near Las Vegas in San Miguel County.

$248,987—**Floyd Haake,** 1201 Sierra Vista, Santa Fe—Contract for constructing 5.3 mi. of highway between Farmington and Shiprock.

$394,231—**Neely Bros.,** Clovis—Low bid for furnishing and installing 259 mi. of distribution lines and 83 mi. of transmission lines from the Cuba-La Jara area to San Ysidro in Jemez Valley; by Jemez Mountain Electric Cooperative.

$177,286—**Skousen-Hise Construction Co.,** 201 Springer Bldg., Albuquerque—Contract for grading and draining 13.7 mi. of state highway between Ramah and El Morro in McKinley and Valencia Counties.

$577,451—**Wylie Bros.,** 1009 No. 3rd St., Albuquerque—Contract for paving 172 blocks with hot-mix asphalt in Hobbs, Lea County.

North Dakota

$752,500—**Orlando Construction Co.,** Coleman, Wis.—Low bid for furnishing material and constructing 115-kv. transmission lines, Schedules 1, 2, and 3, Garrison-Voltaire, Devils Lake-Lakota, and Jamestown-Valley City on the Missouri River Basin Project; by Bureau of Reclamation.

Oregon

$388,159—**Roy L. Houck & Son,** Salem—Low bid for grading and paving on the Oregon Coast Highway between Chrome Plant and Cedar Point, Coos County.

$994,500—**Pacific Construction Co.,** 1510 21st Ave. S., Seattle, Wash.—Low bid for construction of a 19-classroom high school at Baker; by School District No. 5, Baker County.

$236,871—**Roy L. Houck & Son,** Salem—Low bid for grading and paving city streets in Salem, Marion County.

$236,893—**Parker-Schram Co.,** Builders Exchange Bldg., Portland—Low bid for grading and paving on a section of state highway between Ontario and Nyssa in Malheur County.

$407,050—**Parker-Schram Co.,** Builders Exchange Bldg., Portland—Low bid for construction of a 36-in. water main to supplement the water supply in northeast section of Portland.

$178,542—**A. H. Saxton & Sons,** Rt. 2, Corvallis—Low bid for grading and paving a portion of state highway near Scio in Linn County.

Utah

$219,858—**W. W. Clyde & Co.,** Springville—Low bid for constructing 19.4 mi. of gravel surfaced road between Vernon and St. John in Tooele County.

$391,000—**W. W. Clyde & Co.,** Springville—Low bid for grading, draining, and surfacing 5.3 mi. of the National Parks approach road to Zion-Bryce Canyon, Kane County; by Bureau of Public Roads.

$1,200,000 estimate—**Utah Construction Co.,** 719 First Security Bank Bldg., Ogden—Contract for construction of a cobalt refinery at Garfield; by Howe Sound Co.

Washington

$1,000,000 approx.—**Bechtel Corp.,** 220 Bush St., San Francisco, Calif.—Contract for constructing an asphalt refinery at Edmonds, north of Seattle; for Union Oil Co.

$449,577—**Brazier Construction Co.,** 309 Pontius, No., Seattle—Contract for constructing the control building and switchyard at Bothell substation, Seattle; by Seattle Board of Public Works.

$344,050—**Curtis Gravel Co.,** Box 106, Spokane—Low bid for manufacturing, stockpiling, and placing crushed gravel and crushed rock on a 35-mi. section of Spokane, Portland & Seattle Railway relocation in connection with McNary Dam reservoir; by Corps of Engineers.

$421,711—**Collins Concrete & Steel Pipe Co.,** 3841 No. Columbia Blvd., Portland, Ore.—Low bid for construction of a lateral system, to include: 36.5 mi. unlined laterals and sub-laterals; 4.6 mi. asphaltic membrane lined laterals; another 4.6 mi. pre-cast concrete pipe; and related concrete structures, all known as Irrigation Blocks 70 and 701, northeast of Ephrata; by Bureau of Reclamation.

$1,792,519—**MacDonald Building Co.,** 1517 S. Tacoma Way, Tacoma—Contract for constructing Mountain View Sanitarium, including combined general, mechanical, and electrical contracts.

$751,661—**Seattle Contracting Co.,** 101 Nickerson St., Seattle—Contract for a paving project on 37th Ave. N.E., Seattle; by Seattle Board of Public Works.

Alaska

$717,391—**S. Birch & Sons, J. C. Boespflug Construction Co.,** 208 Central Bldg., Seattle, Wash.—Joint-venture low bid for grading and paving of streets at Elmendorf Air Force Base near Anchorage; by Corps of Engineers.

$2,392,000—**Morrison-Knudsen Co., Inc.,** and **Peter Kiewit Sons' Co.,** 603 Hoge Bldg., Seattle, Wash.—Low bid for construction of outside utilities at Fort Richardson near Anchorage.

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

T. J. JEANNERET is manager of the new district office of *Harnischfeger Corporation* of Milwaukee which was opened in Denver, Colo., on June 1. The office, located in the Central Bank Building, will cover Colorado, Wyoming, Utah, New Mexico, Arizona and the southeastern section of Idaho. Assisting Jeanneret in serving P&H distributors and customers in this area will be a staff of P&H factory-trained men. The company manufactures excavators, soil stabilizers, welding equipment, overhead cranes and electric hoists.

☆ ☆ ☆

TREDWELL

TIMOTHY H. TREDWELL, JR., was recently transferred from the general sales office of the *Chicago Bridge & Iron Co.* in Chicago to its Los Angeles sales office located in the General Petroleum Bldg. Tredwell has been associated with Chicago Bridge & Iron Co. since 1943 except for a two-year period when he was on active duty in the U. S. Navy. In his new position he will assist DEAN E. STEPHAN, manager, and LUCIAN J. HARRIS, contracting engineer.

☆ ☆ ☆

The *Andrews Machinery of Washington, Inc.*, Seattle, has established a branch office in Tacoma located at 2120 South Tacoma Way. S. L. POSSEHL has been appointed branch office manager and is now active in serving contractors in the Tacoma area as well as other districts of southwest Washington. The Andrews Company is offering sales and rental services as distributors of *Chicago Pneumatic Tool Co.* compressors and air tools; *Construction Machinery Co.* concrete handling equipment, hoists, pumps, batching plants, etc.; *Master Vibrator Co.* concrete vibrating equipment and Turn-A-Trowels; and various other lines of construction equipment.

☆ ☆ ☆

Two new men have been added to the sales force of *The Four Wheel Drive Pacific Co.* GEORGE H. HAND, formerly associated with the *Ralph M. Parsons Co.*, Los Angeles, is covering the Southern California territory from Los Angeles to Bakersfield. BRENT P. BAILEY, formerly with the *Metropolitan Supply Co.*, Los Angeles, has the territory comprised of the southern portion of Los Angeles County and all of Orange County. Both men are selling Four Wheel Drive trucks, Byers cranes, Schield bantam cranes, shovels and backhoes, Tucker Sno Cats and Lull Traveloader for Four Wheel Drive Pacific Co. This company has recently taken on the distributorship of the Lull Traveloader, a combination fork-lift truck and motor truck.

☆ ☆ ☆

ROBERT B. GEORGE has been appointed office manager of the *Phoenix Division of Western Machinery Co.*, Phoenix, Ariz. He was formerly assistant equipment manager of *Edward R. Bacon Co.* in San Francisco, and previous to that had been office manager of Western Machinery's San Francisco office.

☆ ☆ ☆

HAL HOLTZ, advertising manager of *Cleaver Brooks Co.*, Milwaukee, Wis., was a recent visitor to the West Coast to attend the NIAA convention at Los Angeles.

☆ ☆ ☆

Caterpillar Tractor Co., San Leandro, Calif., through B. L. HAGGLUND, Western Sales Division manager, has announced numerous changes involving company district representatives. E. A. TIARKS, former district representative out of Salt Lake City, Utah, is transferred to Seattle, Wash., and will serve the following Caterpillar distributors: *Crater Lake Machinery Co.*, Klamath Falls, Ore.; *Interstate Tractor & Equipment Co.*, Portland, Ore.; *Western Tractor & Equipment Co.*, Seattle, Wash.; *Finning Tractor & Equipment Co.*, Vancouver, B. C., and *Northern Commercial Co.*, Seattle, the company's Alaska dealer. H. A. MANUEL, former district representative in the Northwest territory, has been transferred to Fresno, Calif., to serve *Hudd & Quinn, Inc.*, Fresno; *James Cashman Co.*, Las Vegas, Nev.; *The Cousins Tractor Co.*, Hanford, Calif.; *Halton Tractor Co.*, Merced, Calif.; *Holt Bros.*, Stockton, Calif.; *Treanor Equipment Co.*, Visalia, Calif., and *Valley Tractor & Equipment Co.*, Modesto, Calif.

A. T. AGERN has been promoted from engine representative to district representative, with headquarters in Pendleton, Ore., to serve *Braden Tractor & Equipment Co.*, Walla Walla, Wash.; *Bunting Tractor Co., Inc.*, Boise, Ida.; *Empire Machinery Co.*, Pendleton, Ore., and *Inland Machinery Co.*, La Grande, Ore. C. K. HEDGES has been appointed district representative at Salt Lake City, Utah, serving *Pioneer Machinery Co.*, Idaho Falls, Ida.; *Robison Machinery Co.*, Salt Lake City, and *Sanford Tractor & Equipment Co.*, Reno, Nev. R. M. RICHARDS, Portland, has been promoted from agricultural representative to assistant district representative, assisting Tiarks.

☆ ☆ ☆

P. L. Crooks & Co., Portland, Ore., was recently appointed distributor for *A. Leschen & Sons Rope Co.*, St. Louis, Mo.

☆ ☆ ☆

JOE FRANK, service engineer of *Wisconsin Motors Corp.*, Milwaukee, recently made a tour of the company's distributors in California.

☆ ☆ ☆

WALKER

Koehring Company, Milwaukee, Wis., heavy-duty construction equipment manufacturer, recently appointed C. BYRON WALKER district sales representative for the Northwest territory. Walker joins the Koehring organization after 14 years' association with the Pacific Car & Foundry Co. In his new position, he will be in contact with distributors of Koehring Company equipment and the products of three subsidiary companies, *Kwik-Mix Co.*, *The C. S. Johnson Co.*, and *The Parsons Company*. The territory to be covered by Walker includes the states of Washington, Oregon, Idaho, Montana, Wyoming, as well as portions of Canada.

☆ ☆ ☆

CHARLES STOECKLY of *General Electric Co.'s* apparatus department in San Francisco has been appointed manager of sales for the company's San Jose, Calif., Motor Division, it was announced recently by D. E. MOORHEAD, manager. He replaces DEAN FOWLER who becomes manager of sales for the company's Control Division in Schenectady, N. Y. Since 1944, Stoeckly has been motor specialist for G.E.'s Pacific Sales District with headquarters in San Francisco, and is well known in Western engineering circles for his many contributions in the fields of motor application engineering and technical education. Fowler has been with G.E. since 1923. In 1941 he returned to the West when he became Pacific District motor specialist and general office representative of the Motor Division at Oakland. In 1948 he was appointed manager of sales for the Small and Medium Motor Divisions in Oakland, and later when the motor manufacturing plant was completed, moved to San Jose.

☆ ☆ ☆

Construction of a new $300,000 addition to present warehouse facilities at its Los Angeles tire and tube manufacturing plant is under way, it was recently announced by *The B. F. Goodrich Co.* According to L. R. KELTNER, manager of the Goodrich Los Angeles plant, the new warehouse space will be a 1-story structure designed to "most effectively utilize available ground area and offer excellent opportunity for later expansion." L. T. GREINER, Pacific Coast manager of the replacement

tire division, reports that the new space will speed up the filling of orders and is "being constructed now to better serve the expanded tire market which has developed on the West Coast." Los Angeles is the distribution point for tires and tubes over the eleven Western States. A master warehouse in Portland, Ore., serves as an auxiliary unit for quick service to dealers throughout the Pacific Northwest.

☆ ☆ ☆

Bay Cities Equipment, Inc., Oakland, Calif., was recently appointed Northern California distributor for *Quick Way Truck Shovel Co.* of Denver, Colo.

☆ ☆ ☆

GEORGE MCINTOSH recently joined the sales staff of *Bay Cities Equipment, Inc.*, Oakland, Calif. He was formerly part owner of the firm *McIntosh & Bodenhamer Equipment Co.* of Oakland.

☆ ☆ ☆

JOHN A. BEYNON, president of *Brown-Bevis Equipment Co.*, Southern California distributor of many nationally-known lines of construction machinery, announces two recent personnel additions. WILTON M. AIKIN has joined the firm as sales promotion and advertising manager. JOHN A. CLOES has been appointed supervisor of purchasing, parts and service. Headquarters of the company is in Los Angeles.

☆ ☆ ☆

FISCHER

Austin-Western Co. of Aurora, Ill., made announcement recently of the appointment of RAYMOND F. FISCHER as district sales manager for the territory covered by *Columbia Equipment Co.* in the states of Washington, Oregon and Idaho, and *Western Construction Equipment Co.* in Montana and Wyoming. Fischer has been associated with various equipment manufacturers since 1934 and brings to his new appointment a sound background of experience in the sales and service fields. His headquarters are in Portland.

☆ ☆ ☆

B. R. SHEETS, Engineering Division, *Gardner-Denver Co.*, was a recent visitor to the West Coast. He visited Gardner-Denver distributors, as well as many G-D equipment users in the area.

☆ ☆ ☆

R. M. "STEVE" STEVENS has joined the sales staff of *Inland Equipment Corp.*, Stockton, Calif. He was recently discharged from the U. S. Marine Corps, where he spent seven years in the heavy engineering department.

☆ ☆ ☆

The Instrument Laboratory, Inc., of Seattle, distributor in Washington and Oregon for the *Electric Plants and Engines Division, Kohler Co.*, has appointed *Western Tractor & Equipment Co.* as a

Continued on page 110

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

Continued from page 109

dealer for the full line of Kohler plants and engines. According to E. L. FROST, sales manager for Instrument Laboratory, Western Tractor is in an excellent position to sell and service Kohler equipment to contractors and rural users from stocks in Seattle, Chehalis, Tacoma and Everett. The Kohler line will supplement Western's exclusive dealership in Caterpillar equipment.

☆ ☆ ☆

Sales of Koehring, Parsons and Kwik-Mix construction equipment in Northern California and Nevada will be handled from the *Koehring Company* West Coast Division office in Stockton, Calif., it was announced by Koehring officials. LEO J. LAMLEY, formerly Koehring district representative for the West Coast area, will be in charge of sales for all products manufactured by Koehring and the two subsidiary companies. Lamley is a veteran of the Koehring organization, having joined the company in 1937. In 1944 he was named West Coast district sales representative. The Northern California-Nevada territory was formerly served by *Bay Cities Equipment Co.* and *Moore Equipment Co.* The remaining southern territories of California will continue to be covered by the *San Joaquin Tractor Co.*, Bakersfield, and *Harron, Rickard & McCone Co.* of Los Angeles. HAROLD BUCKLER, district representative in the 11 Western States for *C. S. Johnson Co.*, another Koehring subsidiary, will make his headquarters at Koehring's new West Coast Division office at Stockton.

☆ ☆ ☆

Wetzel Equipment Agency, Salt Lake City, Utah, has been appointed an accredited distributor of *Republic Rubber Division, Lee Rubber & Tire Corp.*, Youngstown, Ohio, it has been announced by G. L. SMITH, Republic's sales manager. As a Republic distributor, Wetzel will carry a representative stock of Republic industrial rubber products.

☆ ☆ ☆

Diesel Power Co., General Motors diesel distributor of Oklahoma City and Tulsa, announces the appointment of FRED WINN, JR., as sales representative operating out of the Tulsa office. For the past three years he has been in the employ of a large petroleum equipment supplier.

☆ ☆ ☆

Establishment of an 11-states region to expedite future requirements of Western industries for ball and roller bearings was recently announced by *SKF Industries, Inc.* R. R. ZISETTE, general sales manager at Philadelphia, said the new region, with headquarters in San Francisco, includes territory now serviced by district offices in that city, Los Angeles and Portland and by

Continued on page 112

UNIT BID SUMMARY

Water Supply . . .

Roofed Concrete Reservoir with 1,500,000-Gal. Capacity

Idaho—Nez Perce County—Bureau of Reclamation. Henly Construction Co., Boise, Idaho, with a bid of $63,708, was low before the Bureau of Reclamation for construction of Clearwater Reservoir of the Lewiston Orchards Project, Idaho. It will be 140-ft. 10-in. by 140 ft. 10-in. in plan, will have a capacity of 1,500,000 gal. and will be of reinforced-concrete construction, with reinforced-concrete roof having interior reinforced-concrete column supports.

Water will be delivered to the reservoir through a 14-in. diameter asbestos-cement pipe influent line which will connect with an existing water pipe line at a point approximately 350 ft. distant. Unit bids were as follows:

(1) Henly Constructiion Co.	$ 63,708	(5) Midland Constructors, Inc.	$ 97,353
(2) John Klug & Co.	72,080	(6) C. B. Lauch Construction Co.	108,355
(3) Hansen & Parr Construction Co.	80,588	(7) Engineer's estimate	83,748
(4) Clifton & Applegate	84,373		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
11,000 cu. yd. excavation	2.50	.46	.75	.60	1.15	2.50	.70
500 sta. cu. yd. overhaul	.05	.10	.10	.20	.25	.03	.05
890 cu. yd. constructing embankment	.30	.40	.50	.75	1.00	3.50	.50
1,645 cu. yd. backfill	.30	.20	.50	.40	.50	1.00	.40
755 cu. yd. compacting backfill	1.00	2.00	1.00	.75	3.50	1.50	1.50
100 cu. yd. furn. and plac. screened grav. rd.	2.00	5.00	5.50	6.00	6.75	3.00	5.00
517 lin. ft. furn. and constr. sand and gravel drains with 4-in. diam. drain tile	2.20	1.25	1.20	2.70	3.50	2.00	2.00
1,215 lin. ft. furn. and constr. sand and gravel drains without drain tile	2.00	.60	1.00	.90	1.00	.70	1.40
56 lin. ft. furn. and laying 6-in. diam. sewer pipe with cemented joints	1.00	1.50	1.20	1.10	2.50	3.50	1.75
835 cu. yd. concrete in structs.	20.00	44.50	52.00	59.60	60.00	60.00	55.00
1,254 bbl. furn. and handling cement	5.00	5.50	5.00	4.95	5.25	6.00	5.50
100,000 lb. placing reinforcement bars	.04	.065	.05	.0475	.055	.035	.06
Lump sum, furn. and install. metal pipe, fittings and valves	$1,200	$11,000	$11,750	$10,499	$12,500	$9,734	$9,000
Lump sum, furn. and install. miscl. metalwork	$2,000	750.00	750.00	776.00	$1,200	929.00	$1,000
40 lin. ft. laying 14-in. diam. asbestos-cem. pipe	1.00	1.75	2.00	1.75	2.00	1.35	2.00
35 lin. ft. laying 8-in. diam. asbestos-cem. pipe	1.00	1.20	1.25	1.25	2.00	.78	1.50
Lump sum, furn. and install. elect. system for interconnecting circuits betw. filter house and reservoir	600.00	400.00	500.00	539.00	350.00	700.00	$1,500

Sewerage . . .

Sewage Lift Plant and Pumping Plant on Columbia River

Washington—Benton County—Corps of Engineers. Fred J. Early, Jr. Co., Inc., San Francisco, with a bid of $237,555, was low before the Corps of Engineers for construction of a sewage lift plant at Levee 2-B and a pumping plant at Levee 2-C, including all equipment, piping, drainage and outlet structures and levee closures, on the Columbia River at Richland, Wash. Unit bids were as follows:

	Alt. 1 (Excl. Items 15aa and 17ba)	Alt. 2 (Excl. Items No. 15a and 17b)
(1) Fred J. Early, Jr. Co., Inc.	$237,555	$238,755
(2) Packard Pipe & Pump Co.	258,970	259,970
(3) John Klug & Co.	277,164	277,264
(4) M. P. Butler	281,905	283,105
(5) Engineer's estimate	277,570	277,309

PART A—SEWAGE LIFT PLANT 2-B

		(1)	(2)	(3)	(4)	(5)
(1a)	Lump sum, construct sewage lift Plant 2-B	$70,675	$76,800	$81,673	$79,000	$92,606
(2a)	Lump sum, furn. and install discharge piping	$8,030	$7,500	$7,950	$11,550	$10,711
(3a)	Lump sum, const. outlet struct. and retaining wall	$4,070	$5,500	$4,546	$4,550	$3,808
(4a)	Lump sum, const. plant service substation	900.00	$2,200	$1,700	$1,730	$1,213
(5a)	.25 acre clearing	200.00	400.00	300.00	400.00	169.14
(6a)	2 acre stripping foundation and borrow areas	200.00	200.00	100.00	450.00	145.45
(7a)	.5 acre preparation of foundation	80.00	200.00	100.00	100.00	35.71
(8a)	360 cu. yd. excav. for piping	3.50	3.50	5.00	3.00	2.22
(9a)	7,400 cu. yd. embankment, Zone I	.54	.50	.70	.80	.52
(10a)	2,200 cu. yd. embankment, Zone II	.42	.35	.90	1.00	.50
(11a)	1,200 cu. yd. embankment, Zone III	.48	.40	.90	1.20	.64
(12a)	20 M. gal. sprinkling	4.80	4.00	10.00	7.00	2.82
(13a)	30 hr. additional compaction	11.00	9.00	12.50	15.00	8.88
(14a)	.25 acre mulching	300.00	250.00	300.00	240.00	141.18
(15a)	900 cu. yd. Class "A" dumped-stone revetment	5.10	4.25	4.75	6.00	4.46
(16a)	140 cu. yd. hand-placed stone	24.00	20.00	15.00	9.00	14.26
(17a)	100 lin. ft. remove and relo. exist. 8-in. cast iron pipe	9.30	4.00	8.00	10.00	3.41
(18a)	80 lin. ft. furn. and install 8-in. cast iron pipe	12.00	4.50	10.20	8.00	5.87
(19a)	100 lin. ft. furn. and install 27 by 43-in. arch culvert	24.00	23.00	26.00	34.00	16.33
(20a)	100 cu. yd. overdepth excav. and select backfill	8.00	6.00	5.00	7.00	7.76
(21a)	1 job construct access ramp	540.00	800.00	500.00	400.00	201.52

PART B—PUMPING PLANT 2-C

(1b)	Lump sum, const. Pumping Plant 2-C	$92,916	$109,000	$109,754	$106,100	$109,368
(2b)	Lump sum, furn. and install discharge piping	$9,540	$8,660	$9,202	$12,750	$13,050
(3b)	Lump sum, const. outlet struct.	$2,710	$5,200	$3,911	$3,450	$2,813
(4b)	Lump sum, const. plant service substation	$2,120	$2,200	$1,700	$1,900	$1,083
(5b)	Lump sum, modify culvert drainage struct.	830.00	$1,000	735.50	$1,140	830.03
(6b)	.25 acre clearing	140.00	400.00	300.00	400.00	169.14
(7b)	2 acre stripping foundation and borrow areas	150.00	200.00	100.00	450.00	145.45
(8b)	.5 acre preparation of foundation	80.00	40.00	100.00	100.00	35.71
(9b)	600 cu. yd. excav. for piping	4.00	3.00	5.00	1.20	2.22
(10b)	9,000 cu. yd. embankment, Zone I	.45	.38	.70	.70	.54
(11b)	2,300 cu. yd. embankment, Zone II	.55	.45	.90	.90	.59
(12b)	3,100 cu. yd. embankment, Zone III	.54	.45	.90	1.10	.82

(Continued on next page)

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

Continued from page 110

the Denver branch office, and is comprised of the states of Washington, Oregon, California, Idaho, Utah, Wyoming, Montana, Colorado, Arizona, New Mexico, western Nebraska and the city of El Paso, Tex. J. C. BOWMAN, district manager at San Francisco since 1936, has been appointed regional manager.

☆ ☆ ☆

Coast Equipment Co., San Francisco construction, industrial and mining machinery dealers, has announced the appointment of R. F. "RAY" GOODMAN to its Bay Area field staff. Goodman has been associated with the Northern California construction industry for many years and is well known to contractors in the area.

☆ ☆ ☆

The Spokane branch of *Electric Steel Foundry Co.* of Portland, Ore., which has been located at S. 121 Monroe St. since 1943, has moved to a new office and warehouse building at N. 1327 Washington St., which was completed last June. E. V. WICKEY, who has been manager of this branch since its beginning, has turned over the reins of the managership to N. J. VANELLI, who will carry on as active head of the sales district, while Wickey, thus relieved of executive pressures, will continue to call upon his many friends in the mining, logging and construction fields in a more leisurely way. Vanelli has been with the company for eleven years and since October, 1948, has been covering the Inland Empire territory out of the Spokane branch.

☆ ☆ ☆

A unique plan for achieving a more efficient service system in the 85 *Fruehauf Trailer Co.* branches throughout the United States, has been announced by FRANK MARSCHALL, general service manager. The company has picked 25 of its top service men and has established them into a mobile force directly responsible to the home office in Los Angeles. Each man will cover an area up to five states in some cases and will act as a trouble shooter wherever special service problems arise.

☆ ☆ ☆

Recent announcements of appointments made by ROBERT P. MCCULLOCH, president of *McCulloch Motors* of Los Angeles, included that of LEWIS S. PECK as company personnel manager, and JEAN ST. HENRI and KENNETH MULKEY to posts as factory sales representatives. All three appointments are effective immediately.

☆ ☆ ☆

Daley Electric Co., Phoenix, Ariz., has been named a dealer for *Allis-Chalmers* motors and controls and a certified service shop for the company's motors, controls and transformers in Arizona and in 13 counties in New Mexico. J. R. HORTON

Continued on page 114

(13b)	7,600	cu. yd. embankment, Zone IV	.45	.375	.50	.70	.56
(14b)	10	M. gal. sprinkling	4.80	4.00	10.00	7.00	2.82
(15b)	20	hr. additional compaction	11.00	9.00	12.50	15.00	8.88
(16b)	.25	acre mulching	300.00	250.00	300.00	240.00	141.18
(17b)	600	cu. yd. Class "A" dumped-stone revetment	6.90	5.75	4.75	6.00	4.59
(18b)	110	lin. ft. 15-in. diam. bell and spigot conc. pipe	6.50	2.50	4.00	6.00	2.08
(19b)	185	lin. ft. 24-in. diam. bell and spigot conc. pipe	10.00	3.50	7.00	11.00	3.34
(20b)	265	lin. ft. 60-in. diam. tongue and groove conc. pipe	12.00	22.50	36.00	30.00	22.15
(21b)	1	ea. 60-in. diam. "T" with 24-in. take-off	150.00	150.00	200.00	200.00	151.19
(22b)	1	ea. 24-in. catch basin	75.00	65.00	50.00	150.00	91.57
(23b)	100	cu. yd. overdepth excav. and select backfill	8.00	7.50	3.00	7.00	7.76

Concrete or Vitrified Clay Pipe for District Sewer System

California—Sonoma County—District. N. P. Van Valkenburgh Co., Sacramento, with a bid of $314,412, was low before the South Park County Sanitation District at Santa Rosa, Calif., for constructing a sanitary sewer system, using concrete pipe. Unit bids were as follows:

	Using Concrete Pipe	Using Vitrified Clay
(1) N. P. Van Valkenburgh Co.	$314,412	$347,048
(2) Barrett & Hilp	374,233	409,375
(3) A. E. Downer	385,458	—
(4) McGuire & Hester	428,810	451,673
(5) Robert M. Rapp	434,929	471,438
(6) Engineer's estimate	390,958	427,091

			(1)	(2)	(3)	(4)	(5)	(6)
(1)	55,133	lin. ft. 6-in. concrete pipe	1.20	1.44	1.47	1.95	1.66	1.50
(1a)	55,133	lin. ft. 6-in. vitrified clay pipe	1.30	1.52	—	2.00	1.78	1.60
(2)	18,521	lin. ft. 8-in. concrete pipe	1.30	1.60	1.68	2.00	2.10	1.70
(2a)	18,521	lin. ft. 8-in. vitrified clay pipe	1.44	1.76	—	2.10	2.25	1.80
(3)	11,196	lin. ft. 10-in. concrete pipe	1.40	2.05	1.92	2.00	3.26	2.20
(3a)	11,196	lin. ft. 10-in. vitrified clay pipe	1.70	2.41	—	2.20	3.61	2.70
(4)	7,813	lin. ft. 12-in. concrete pipe	2.21	2.72	2.10	2.93	3.29	3.00
(4a)	7,813	lin. ft. 12-in. vitrified clay pipe	2.63	3.21	—	3.23	3.73	3.30
(5)	8,112	lin. ft. 15-in. concrete pipe	2.68	3.08	3.00	3.25	3.69	3.20
(5a)	8,112	lin. ft. 15-in. vitrified clay pipe	3.45	4.08	—	3.75	4.55	4.00
(6)	3,036	lin. ft. 18-in. concrete pipe	3.68	4.83	4.02	4.40	4.67	4.50
(6a)	3,036	lin. ft. 18-in. vitrified clay pipe	4.53	5.95	—	5.10	5.62	5.50
(7)	2,580	lin. ft. 24-in. concrete pipe	5.00	6.85	5.40	5.85	5.65	6.00
(7a)	2,580	lin. ft. 24-in. vitrified clay pipe	6.78	8.00	—	7.35	7.55	7.50
(8)	1,810	lin. ft. 27-in. concrete pipe	6.11	6.82	7.08	7.20	7.68	6.50
(8a)	1,810	lin. ft. 27-in. vitrified clay pipe	8.58	9.82	—	9.20	10.44	9.50
(9)	1,905	lin. ft. 4-in. steel pipe	.90	.82	1.20	1.25	1.26	1.25
(10)	8,133	lin. ft. 6-in. steel pipe	1.25	1.13	1.44	1.29	1.56	1.40
(11)	3,875	lin. ft. 8-in. steel pipe	1.50	1.99	1.74	1.80	2.16	2.00
(12)	70	lin. ft. 12-in. steel pipe	3.10	3.43	3.00	4.20	3.76	3.00
(13)	255	lin. ft. 36-in. manholes	100.00	93.20	162.00	130.00	155.00	150.00
(14)	28	cleanouts	25.00	22.92	24.00	17.00	27.50	25.00
(15)	3	railroad crossings	$2,760	963.00	500.00	975.00	850.00	500.00
(16)	2	highway crossings	$2,640	713.00	800.00	860.00	$1,580	500.00
(17)	1	pump station No. 10, complete	$8,580	$10,566	$7,800	$8,465	$7,730	$7,500
(18)	1	pump station No. 11, complete	$3,492	$4,984	$3,500	$3,950	$3,029	$3,500
(19)	1	pump station No. 12, complete	$12,360	$14,493	$13,000	$11,850	$10,450	$15,000
(20)	1	pump station No. 13, complete	$22,560	$25,600	$22,000	$21,440	$18,332	$22,500
(21)	1	siphon under SR creek	$4,500	$6,000	$6,000	$7,900	$4,000	$3,750
(22)	5	creek crossings	600.00	55.00	200.00	340.00	325.00	200.00
(23)	1,000	house laterals	24.00	31.95	40.00	45.00	39.50	35.00
(24)	73	48-in. manholes	120.00	137.60	175.00	170.00	210.00	170.00

Irrigation . . .

Buried Asphaltic Membrane Lining, Pre-Cast Concrete Pipe Lines, Structures and Earthwork for Columbia Basin Laterals

Washington—Grant County—Bureau of Reclamation. J. A. Terteling and Sons, Inc., Boise, Idaho, with a bid of $512,247, was low before the Bureau of Reclamation for building an 18-mi. lateral and sub-lateral system designed to bring water to approximately 10,000 ac. north and east of Moses Lake. The principal components of the work include the following:

(a) Excavation and other earthwork for approximately 18.1 mi. of earth section for laterals, sub-laterals, and wasteways. Bottom widths of the lateral sections vary from 2 to 12 ft., and side slopes are 1¼ to 1.

(b) Excavation and other earthwork and application of asphaltic-membrane lining for approximately 11 mi. of asphalt-lined lateral sections. The membrane lining will be covered with earth material.

(c) Earthwork and construction of approximately 2.8 mi. of precast-concrete pipe lines with pipe diameters varying from 12 to 54 in., inclusive. The types of concrete pipe required will be irrigation pipe, reinforced culvert pipe, and reinforced-concrete pressure pipe specifically designed for 25-, 50-, and 75-ft. internal hydrostatic pressures. These specifications permit the use of optional types of concrete pipe joints.

(d) Earthwork and construction of structures along the open laterals and pipe lines, including concrete structures such as: division boxes, checks, drops, weirs, siphons, chutes, road crossing, railroad crossings, pipe inlets, a parshall flume, various types of turnouts, blow-off structure, relift pumping-plant structures, and timber bridges.

(e) Furnishing and installing a steel siphon, a steel pipe crossing, deflection meters, slide gates, flap gates, a throttling valve, gate valve, pipe drain and air valve units, and miscellaneous metalwork.

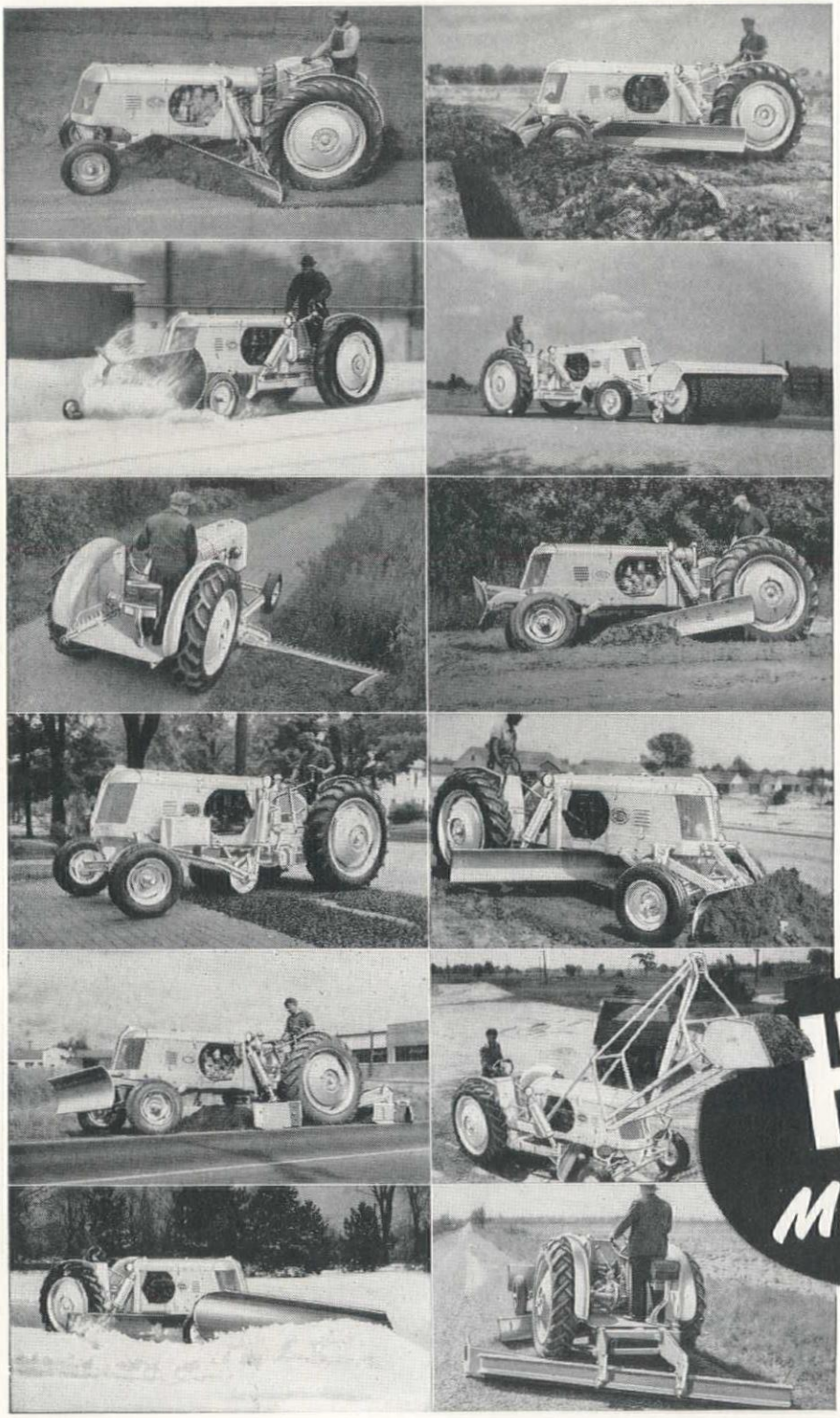
(f) Complete installation of pumping-plant equipment, including pumping units with controls, discharge piping, bypass piping, valves, and trash-racks; and the installation of air valves for pipe lines.

Unit bids were as follows:

(1)	J. A. Terteling and Sons, Inc.	$512,247	
(2)	Tom McCorkle Construction Co. & Intermountain Plumbing Co.	519,065	
(3)	Collins Concrete and Steel Pipe Co.	522,026	
(4)	T.C.M. Co. & Minnis and Shilling	$530,290	
(5)	Marshall, Haas and Royce	545,327	
(6)	Engineer's estimate	489,883	

		(1)	(2)	(3)	(4)	(5)	(6)
12,100	cu. yd. excav., com., and backfill of pipe trenches	.68	.43	.35	.635	.50	.50
100	cu. yd. excav., rock, and backfill of pipe trenches	2.54	1.50	5.00	5.00	5.00	3.00
4,400	cu. yd. compacting backfill in pipe trenches	.95	2.00	1.25	2.00	3.00	1.50
230,000	cu. yd. excav., com., for laterals	.17	.19	.22	.21	.16	.18
1,000	cu. yd. excav., rock, for laterals	2.55	1.00	1.00	3.00	2.00	2.50
150,000	cu. yd. excavation from borrow	.24	.19	.35	.22	.20	.20
10,000	mi. cu. yd. overhaul	.31	.30	.30	.30	.50	.25
59,000	cu. yd. compacting embankments	.125	.12	.10	.20	.30	.25
231,000	sq. yd. dragging and rolling subgrade under membrane lining	.05	.07	.055	.07	.07	.07
600	M. gal. sprinkling of subgrade	4.45	4.00	5.00	3.00	5.00	5.00
1,200	ton furn. and applying asph. for membrane lining	67.20	65.00	60.00	55.00	60.00	60.00
127,000	cu. yd. placing earth cover for membrane lining	.19	.23	.275	.33	.30	.25
11,500	cu. yd. excav., common, for structs.	.76	.70	1.00	.90	.80	.70

(Continued on next page)



MORE FOR YOUR MONEY

Weighs 6000 pounds with liquid in tires

Big 42½ H.P. engine

One-third the cost of a big grader

Hydraulic Controls

9 MAINTENANCE MACHINES IN 1

1. GRADER
2. HIGHWAY MOWER
3. BERM LEVELER
4. ROAD PLANER
5. BULLDOZER
6. LIFT-LOADER
7. ONE-WAY BROOM
8. PATCH ROLLER
9. SNOW PLOW

HUBER MAINTAINER

THE HUBER MFG. CO.
Marion, Ohio

See your nearest HUBER Distributor for Maintainers, Rollers and other Road Machinery.

Lee & Thatro Equipment Co.	Los Angeles 21, Calif.
Jenkins & Albright	Reno, Nevada
Contractors' Equipment & Supply Co.	Albuquerque, N. M.
Feenaughty Machinery Co.	Portland 14, Oregon
Feenaughty Machinery Co.	Boise, Idaho
Feenaughty Machinery Co.	Spokane 2, Washington
Feenaughty Machinery Co.	Seattle 4, Washington
Casson Hale Corporation	Hayward, Calif.
Foulger Equipment Co., Inc.	Salt Lake City 8, Utah
The Colorado Builders' Supply Co.	Denver 9, Colorado
The Colorado Builders' Supply Co.	Casper, Wyoming
Montana Powder & Equip. Co.	Helena, Billings, Montana

NEWS of DISTRIBUTORS AND FACTORY BRANCHES

Continued from page 112

and LEO DALEY are co-owners of the company, which was organized in 1934. New Mexico counties covered by the firm for Allis-Chalmers are Grant, Sierra, Socorro, Hidalgo, Luna, Dona Ana, Catron, Valencia, Bernalillo, Torrance, Santa Fe, Sandoval and McKinley.

☆ ☆ ☆

Two recent appointments in the general sales departments have been announced by PHILIP HILL, general sales manager for the *Hyster Company*, Portland, Ore., manufacturer of industrial trucks and auxiliary tractor tools. HAROLD R. LUCAS, JR., is now an assistant to the general sales manager following 12 years' experience in merchandising for Fred Meyer, Inc. In charge of demonstrations for the Hyster grid roller, an earth compaction and black-top salvage tool designed for use with track-type or rubber-tired tractors or with motor graders, is HENRY BENIT, assistant to RICHARD STIEGELE. For 14 years previously Benit was employed by the Gardner-Byrne Construction Co. of California.

☆ ☆ ☆

Anticipating the opening of its new plant in Ukiah, Calif., this fall, *Masonite Corporation* has announced the expansion of its Western Sales Division and the appointment of one of its top executives, GEORGE M. SYVERSEN, as director of Western sales. Eight states are in the Western Sales Division. Customers in California, Oregon, Washington, Idaho, Utah, Nevada, Arizona and New Mexico, after the new plant gets into operation, will receive shipments from Ukiah. Their orders will be processed by the division sales office in San Francisco. According to the announcement made by WALTER G. STROMQUIST, vice president and director of sales, Syversen will be assisted by C. H. SMITH and JACKSON EDWARDS. The position vacated by Syversen has been filled by his assistant, J. B. PALMER.

NEWS of MANUFACTURERS

Marvel Equipment Co. of Chicago recently announced its retirement from the construction equipment business, and has turned over the manufacture and sales of Marvel asphalt kettles, junior distributors, pouring pots, etc., as well as other Marvel equipment to the *Tri-Line Company* of Racine, Wis., which has a skilled force of mechanics and a well equipped plant to manufacture such equipment. O. E. QUINTON, president of Marvel Equipment Co. since the company was established in 1939, is retiring from active business because of

Continued on page 116

100 cu. yd. excav., rock, for structs.	3.80	2.00	3.00	5.00	5.00	4.00
9,300 cu. yd. backfill about structs.	.25	.20	.40	.30	.50	.40
7,300 cu. yd. compacting backfill about structs.	1.90	2.50	1.25	1.60	3.00	2.00
20 sq. yd. 8-in. dry-rock paving	4.45	4.00	10.00	5.00	10.00	4.00
80 sq. yd. 12-in. dry-rock paving	5.00	5.00	8.00	5.00	10.00	5.00
670 cu. yd. riprap	1.58	7.00	5.85	5.00	6.00	4.00
1,250 cu. yd. concrete in structs.	69.75	59.00	71.00	69.50	65.00	65.00
30 cu. yd. plain concrete	25.35	40.00	25.00	40.00	40.00	40.00
1,800 bbl. furnishing and handling cement	5.68	5.30	5.00	5.00	5.00	5.00
103,000 lb. furn. and placing reinf. bars	.1075	.11	.12	.11	.12	.10
34.5 M.b.m. furn. and erecting untr. timber in structs.	204.00	225.00	225.00	225.00	200.00	220.00
6.8 M.b.m. furn. and erecting tr. timber in structs.	245.00	275.00	300.00	275.00	300.00	270.00
90 lin. ft. placing rubber water stop in joints	1.25	.50	1.00	2.00	1.00	1.50
90 sq. ft. furn. and placing elastic filler matl. in joints	1.50	1.50	.65	3.00	2.00	2.00
620 lin. ft. furn. and installing 8-in. diam. std. conc. irrigation pipe for measuring wells	.75	.90	1.00	.80	1.30	1.00
50 lin. ft. furn. and lay. 15-in. diam. std. conc. irrigation pipe	1.75	3.00	2.20	1.60	2.00	1.60
50 lin. ft. furn. and lay. 18-in. diam. std. conc. irrigation pipe	2.45	3.60	2.38	2.20	2.80	2.10
860 lin. ft. furn. and lay. 12-in. diam. std. str. conc. culvert pipe	1.95	2.10	1.75	1.75	2.00	2.25
1,350 lin. ft. furn. and lay. 15-in. diam. std. str. conc. culvert pipe	2.70	2.75	2.40	2.40	2.50	2.75
930 lin. ft. furn. and lay. 18-in. diam. std. str. conc. culvert pipe	3.10	3.10	2.80	2.75	3.00	3.25
460 lin. ft. furn. and lay. 21-in. diam. std. str. conc. culvert pipe	4.10	4.00	3.60	3.80	4.75	3.90
1,100 lin. ft. furn. and lay. 24-in. diam. std. str. conc. culvert pipe	6.20	5.60	5.30	5.40	5.50	4.60
430 lin. ft. furn. and lay. 30-in. diam. std. str. conc. culvert pipe	8.55	7.50	7.25	7.45	7.75	6.10
530 lin. ft. furn. and lay. 36-in. diam. std. str. conc. culvert pipe	11.35	9.85	9.30	9.65	10.00	7.90
290 lin. ft. furn. and lay. 39-in. diam. std. str. conc. culvert pipe	12.45	10.50	10.25	10.40	12.00	9.00
80 lin. ft. furn. and lay. 42-in. diam. std. str. conc culvert pipe	18.95	12.75	12.50	12.00	14.00	10.20
400 lin. ft. furn. and lay. 48-in. diam. std. str. conc. culvert pipe	19.35	15.70	15.30	15.00	17.00	12.35
130 lin. ft. furn. and lay. 54-in. diam. std. str. conc. culvert pipe	22.25	19.10	18.10	18.10	20.00	14.65
140 lin. ft. furn. and jacking 24-in. diam. extra-str. conc. culvert pipe under railroad	6.45	45.00	5.55	14.50	30.00	38.00
1,670 lin. ft. furn. and laying 12-in. diam. 25-ft. head concrete pressure pipe	1.90	2.20	1.70	2.16	2.00	1.80
2,150 lin. ft. furn. and laying 15-in. diam. 25-ft. head concrete pressure pipe	2.65	2.90	2.35	2.92	3.00	2.35
2,700 lin. ft. furn. and laying 18-in. diam. 25-ft. head concrete pressure pipe	3.00	3.65	2.70	3.40	3.25	3.00
1,750 lin. ft. furn. and laying 21-in. diam. 25-ft. head concrete pressure pipe	3.95	4.55	3.50	4.30	4.00	3.50
1,100 lin. ft. furn. and laying 24-in. diam. 25-ft. head concrete pressure pipe	6.10	6.05	5.20	6.15	5.00	4.10
382 lin. ft. furn. and laying 12-in. diam. 50-ft. head concrete pressure pipe	2.70	3.10	2.35	2.85	3.00	2.20
2,400 lin. ft. furn. and laying 15-in. diam. 50-ft. head concrete pressure pipe	3.85	4.10	3.25	3.85	3.50	2.80
1,040 lin. ft. furn. and laying 18-in. diam. 50-ft. head concrete pressure pipe	4.20	4.30	3.65	4.35	4.00	3.35
472 lin. ft. furn. and laying 21-in. diam. 50-ft. head concrete pressure pipe	5.30	5.20	4.55	5.35	4.50	4.00
125 lin. ft. furn. and laying 54-in. diam. 50-ft. head concrete pressure pipe	24.30	22.80	19.70	21.75	22.00	13.00
1,500 lin. ft. furn. and laying 15-in. diam. 75-ft. head concrete pressure pipe	4.85	4.75	4.55	4.65	4.00	3.25
3 tapers furn. and laying concrete pipe tapers	19.65	75.00	30.00	60.00	50.00	50.00
3 tees fabricating tees in reinforced conc. pipe	65.95	50.00	30.00	50.00	50.00	50.00
14 lin. ft. furn. and laying 18-in. diam. corr. met. pipe	3.45	4.50	2.95	3.00	5.00	3.50
3 units furn. and installing air valve units	171.25	200.00	60.00	120.00	150.00	100.00
10 units furn. and installing pipe drain units	168.70	150.00	112.00	125.00	150.00	100.00
1 unit furn. and installing blow-off unit	95.75	100.00	110.00	100.00	100.00	80.00
1 valve furn. and installing 8-in. gate valve for throttling	172.50	150.00	100.00	175.00	100.00	200.00
Lump sum, furn. and installing 54-in. diam. steel pipe siphon and 15-in. diam. steel pipe crossing	$7,155	$9,400	$8,200	$10,200	$9,000	$5,500
2 units furn. and installing deflection meters	589.80	300.00	125.00	300.00	100.00	300.00
4,950 lb. furn. and installing adjustable weirs	.58	.50	.60	.50	.60	.50
15,100 lb. furn. and installing slide gates	.50	.48	.40	.45	.60	.50
1,320 lb. furn. and installing flap gates	.88	.75	.50	.70	.70	.50
25,000 lb. furn. and installing miscl. metalwork	.50	.55	.40	.40	.50	.40
10,000 lb. installing pump-discharge connection pipe	.19	.20	.20	.10	.25	.15
900 lb. installing metal pipe, fittings, and valves less than 6-in. in diam.	.25	.40	.20	.12	.50	.20
9,100 lb. installing metal pipe, fittings, and valves 6 in. and larger in diam.	.19	.30	.06	.10	.25	.15
5,200 lb. installing trashracks	.19	.20	.10	.20	.25	.10
20,400 lb. installing pumping units, including control equipment	.19	.20	.15	.20	.25	.12

Bridge and Grade Separation . . .

Concrete Slab Bridge on Concrete Pile Bents

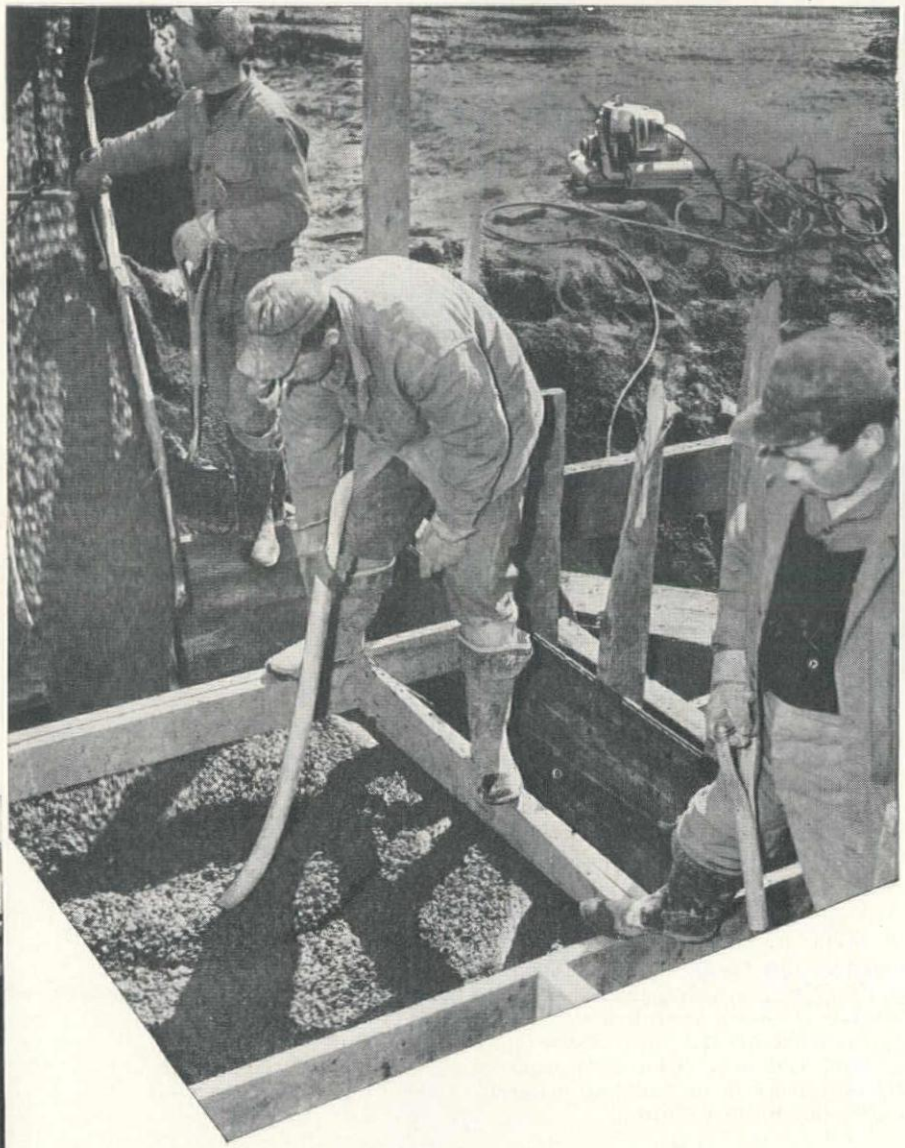
California—Kings County—State. William E. Thomas Construction Co., Sacramento, Calif., with a bid of $33,722, was low before the California Division of Highways for construction of a reinforced concrete slab bridge supported on concrete pile bents across Kings River, about 16 mi. northwest of Hanford. Unit bids were as follows:

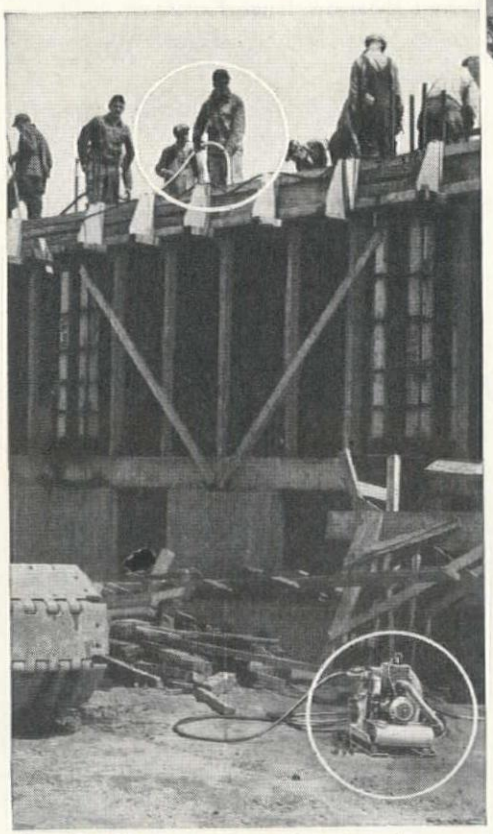
(1) Wm. E. Thomas Construction Co. $33,722
(2) E. G. Perham 34,755
(3) C. B. Tuttle Co. 37,074
(4) Gordon C. Weems 37,345
(5) Volpa Brothers $39,251
(6) E. H. Peterson & Son 41,835
(7) Barton Construction Co. 41,921

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump sum, removing existing bridge	$2,500	$2,450	$2,000	$5,500	$1,050	$3,500	$5,050
326 cu. yd. Cl. "A" P.C.C.	38.00	42.00	45.00	40.00	45.50	48.00	47.66
4,630 lb. misc. steel	.20	.26	.30	.30	1.20	.25	.2853
2,120 lin. ft. furn. concrete piling	3.55	3.00	3.00	3.20	3.45	4.00	3.34

(Continued on next page)

One man can use this VIBRATOR anywhere





Homelite Generator on ground powers vibrators on top of forms.

One man with a CP-Homelite unit, placing concrete as fast as it is delivered, does the work of an ordinary three man crew. Place the Homelite Generator in any convenient location—out of the way of the actual pouring operation—and use the CP-Homelite Electric Vibrator anywhere in a radius of 400 feet.

There's no flexible shaft to give trouble. You can bend the tough electric cable—in its neoprene hose handle—around corners or over forms without injuring it. And the extension hose handle permits working 25 feet down in a form. CP-Homelite Hicycle Vibrators run at a constant speed of 10,000 v.p.m., the most suitable frequency for concrete placement and will handle 30 to 40 cubic yards an hour of 2" slump concrete.

Your Homelite Generator will operate two vibrators and will also power other Hicycle tools, standard Universal Electric tools, and floodlights. Write for full information.

Carryable
Pumps • Generators •
Blowers • Chain Saws
• Paving Breakers

PERFORMANCE · DEPENDABILITY · SERVICE

HOMELITE
CORPORATION

1309 RIVERDALE AVENUE • PORT CHESTER, NEW YORK

NEWS of MANUFACTURERS

Continued from page 114

ill health, and in doing so has made the arrangements outlined to give all Marvel dealers, both new, as well as those who have handled this equipment for the past ten years, a direct factory connection from which they will receive the best possible service.

☆ ☆ ☆

FRIZZELL

RICHARD H. FRIZZELL was appointed sales manager of the structural products department of the *Wickwire Spencer Steel Div. of The Colorado Fuel & Iron Corp.*, it was announced recently by H. C. ALLINGTON, general manager of sales, at the executive offices in New York City. Frizzell succeeds to the position of G. L. CRAWFORD, who will devote his full efforts to that of sales manager of the Division's Buffalo sales district. Both men will continue to headquarter at the offices of the Division in Buffalo.

☆ ☆ ☆

RUSSELL R. GALLOWAY has been appointed by *The Paraffine Companies, Inc.*, San Francisco, as sales manager, Building Materials Division, according to a recent announcement by H. J. LILLESTON, vice president. Galloway brings 28 years of solid experience in the building materials industry into his new position.

☆ ☆ ☆

Manufacture of the Gradall, multi-purpose earthmover, is being transferred from the Cleveland plant of *The Warner & Swasey Co.* to a plant being leased by the company in New Philadelphia, Ohio. A separate Gradall Division plant will permit more economical production of the machine, and will simplify the planned doubling of 1951 production schedules. Initially, about 125 men will be employed in the new plant under the direction of FRED W. BLAISDELL, production manager. Sales headquarters, in charge of S. F. BEATTY, Gradall Division sales manager, will remain at Cleveland.

☆ ☆ ☆

The *Peerless Pump Division of Food Machinery & Chemical Corp.* in a recent announcement from Los Angeles reported the completion of a new pump testing laboratory at its Indianapolis Works, Indianapolis, Ind. The installation involves a consideration of over a quarter million dollars and establishes a completely new set of standards in pump testing procedures in this field of product manufacture. Peerless Pump Division, one of ten manufacturing divisions of Food Machinery &

Continued on page 118

58,000 lb. bar reinf. steel	.085	.0825	.08	.08	.09	.10	.0975
53 ea. driving piles	70.00	83.00	110.00	80.00	69.00	95.00	104.16
433 lin. ft. corr. metal bridge railing	4.00	4.25	5.00	4.00	3.63	5.00	4.01
2 ea. clearance markers	5.00	12.50	10.00	10.00	25.00	25.00	10.36

Highway and Street . . .

Crushed Stone Surfacing and Asphaltic Concrete Pavement

Washington—Grant County—State. Tom McCorkle Construction Co., Boise, Idaho, with a bid of $180,710, was low before the Washington Department of Highways for constructing 15.6 mi. of asphaltic concrete pavement on the highway between Odair and Basin City in Grant County. Unit bids were as follows:

(1) Tom McCorkle Construction Co. $180,710
(2) McAtee and Heath 193,612
(3) Peter Kiewit Sons' Co. 202,702
(4) Parker-Schram Co. $206,146
(5) Western Asphalt Co. 215,570
(6) J. D. Shotwell Co. 222,884

	(1)	(2)	(3)	(4)	(5)	(6)
828.2 stas. (100-ft) finishing roadway	2.75	3.00	8.00	2.00	6.00	4.50
1,580 M. gal. water in place	2.00	2.00	2.50	2.50	3.00	3.00
18,120 ton cr. stone surf. top course from stkpl.	.80	.83	.75	.75	1.25	1.00
TYPE I-1 ASPHALTIC CONCRETE PAVEMENT						
18,695 ton Class C wearing course in place	4.30	4.70	4.90	5.10	4.90	5.25
18,695 ton Class L leveling course in place	4.30	4.55	4.65	4.90	4.90	5.25

Bituminous Seal Coat and Covering

Utah—Iron County—State. Nelson-Birtcher Construction Co., Salt Lake City, with a bid of $32,412, was low before the Utah State Road Commission for 30.6 mi. of highway construction between New Castle and Nevada state line in Iron County, a bituminous material seal coat to be applied. Unit bids were as follows:

(1) Nelson-Birtcher Construction Co. $32,412
(2) Germer, Abbott & Waldron 36,862
(3) W. W. Clyde & Co. 40,150
(4) Deal Mendenhall Construction Co., Inc. $42,105
(5) Engineer's estimate 29,570

	(1)	(2)	(3)	(4)	(5)
111,000 gal. bituminous material, Type RC-4	.1375	.1375	.15	.155	.12
5,600 ton cover material	2.75	3.50	3.75	4.00	2.50
1,000 ton cover material (place in stockpile)	1.75	2.00	2.50	2.50	2.25

Gravel Surfacing on Select Borrow Base Course

Montana—Fallon County—State. Northwestern Engineering Co., with a bid of $60,974, was low before the Montana State Highway Commission for 13.3 mi. of gravel surfacing on select borrow base course between Webster and Baker in Fallon County. Unit bids were as follows:

(1) Northwestern Engineering Co. $60,974
(2) Stanley H. Arkwright, Inc. 69,007
(3) Lou Richardson 69,459
(4) R. J. Sundling Construction Co. $69,939
(5) Summit Construction Co. 79,400
(6) Billings Construction Co. 79,908

	(1)	(2)	(3)	(4)	(5)	(6)
44,129 ton Type B top, ¾-in. grd.	.74	.88	.91	.93	1.05	.97
35,568 ton sel. borrow base course	.62	.70	.62	.64	.73	.79
1,550 cu. yd. binder	.01	.01	.25	.01	.30	.10
3,100 mi. yd. overhaul on binder	.01	.01	.12	.01	.15	.10
500 hr. blading work	8.00	7.00	8.50	8.00	8.00	12.50
100 hr. scraper work	14.00	8.00	13.00	12.00	15.00	13.50
2 ea. conc. project markers	40.00	25.00	20.00	20.00	25.00	25.00
1,000 ton Type B stkp. grv. ¾-in. grd.	.74	.88	.90	.85	.62	.89

Waterway Improvement . . .

Cast-in-Place or Precast Concrete Deck for Wharf and Concrete Piles or Concrete-Jacketed Timber Piles

California—City and County of San Francisco. Ben C. Gerwick, Inc., San Francisco, was awarded a $1,050,000 contract for construction of a wharf connecting Piers 30 and 32 in San Francisco, using cast-in-place concrete deck and concrete piles throughout, as specified in Proposition No. 2 of the specifications. Bids were received under three alternate propositions:

Proposition No. 1—Lump sum bid. Cast-in-place concrete deck, concrete jacketed timber piles between bents 1 and 62, inclusive. Concrete piles in bents 63 to 68, inclusive.

Proposition No. 2—Lump sum bid. Cast-in-place concrete deck and concrete piles throughout.

Proposition No. 3—Lump sum bid. Precast concrete deck with concrete jacketed timber piles and concrete piles as in Proposition No. 1.

Bids were as follows:

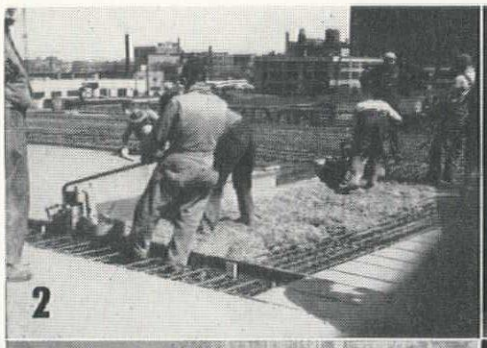
	Proposition 1	Proposition 2	Proposition 3
Clinton Construction Co.	$1,058,500	$1,265,500	$1,221,000
Duncanson-Harrelson Co.	1,030,000	1,210,000	1,043,000
Ben C. Gerwick, Inc.	972,117	1,050,000	.....
Healy Tibbitts Construction Co. & Barrett & Hilp	.....	.....	1,079,000
M & K Corp. & Stolte, Inc.	1,110,000	.....	.....
MacDonald, Young & Nelson, Inc. & Raymond Concrete Pile Co.	1,197,678	.....	.....
Pacific Bridge Co.	.....	.....	1,217,000

Pile, Timber and Stone Dike on the Columbia River

Oregon—Sand Island—Corps of Engineers. General Construction Co., Portland, Ore., with a bid of $77,410, was low before the Corps of Engineers for construction of about 1,800 lin. ft. of pile, timber, and stone dike at the westerly end of Sand Island, Columbia River, Ore. Unit bids were as follows:

(1) General Construction Co. $77,410
(2) Portland Tug & Barge Co. 82,952
(3) Engineer's estimate 75,871

	(1)	(2)	(3)
26,000 lin. ft. piling, in place	1.18	1.22	1.10
55 M.f.b.m. lumber, in place	230.00	160.00	177.00
24,000 lb. hardware, in place	.22	.25	.25
7,200 cu. yd. stone, in place	4.00	5.06	4.38



JACKSON VIBRATORS
THE BEST FOR ALL CONSTRUCTION

1 **MASS CONCRETE VIBRATOR:** This machine has a tremendously impressive record on world dam construction — wherever true mass concrete is placed.

2 **ELECTRIC VIBRATORY SCREED** with Jackson Portable Power Plant: A great producer on MUNICIPAL PAVING, BRIDGE DECKS, HIGHWAY WIDENING and PATCHING. Strikes off to all crowns, undercuts at curb or sideform, works right up to and around manholes and other obstructions. Inexpensive.

3 **HEAVY DUTY GENERAL PURPOSE VIBRATOR:** For small dams, large sections or any job permitting entrance of a 4" diameter vibrator head.

4 **SIDE FORM VIBRATOR:** Works equally well mounted ahead of finisher screed or in rear of spreader. Controlled by finisher operator. Saves better part of two men's labor. Will not penetrate through concrete to subgrade.

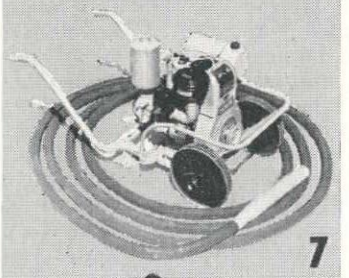
5 **VIBRATORY SOIL COMPACTOR:** Can be used to tremendous advantage in quickly obtaining specified densities in granular soils adjacent to structures, bridges, culverts, trenches, factory floors, earth fill dam construction and many other places. Propels itself.

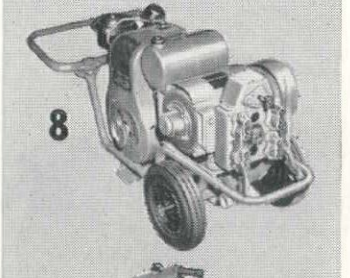
6 **FLEXIBLE-SHAFT, ELECTRIC VIBRATOR:** 2½ HP motor. Operates from light socket, 115 volt, single phase AC or DC, with any length of shaft up to 28'. 8,000 to 10,000 VPM.

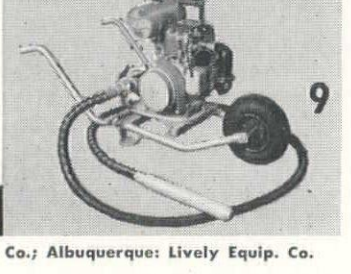
7 **HYDRAULIC VIBRATOR WITH 50 FT. REACH:** Powerful (7 HP), dependable and efficient. Reaches hard-to-get-at places with minimum moves of power unit.

8 **PORTABLE POWER PLANTS:** Three models. 1.25, 2.5, 5 KVA capacities. Generate both single phase and 3-phase 110 volt, 60 cycle AC and are equipped with permanent magnet generators requiring no adjustment or maintenance. For operating all types of vibrators, contractor's tools and lights.

9 **ENGINE-DRIVEN FLEXIBLE-SHAFT VIBRATOR:** The finest in its class, for both thin and thick sections. Ample power (4.7 HP).







AND MANY OTHER VIBRATORS for every type of concrete placement. FOR SALE OR RENT at Jackson distributors. Write for free copy of our handy "POCKET GUIDE." Describes complete line.

ELECTRIC TAMPER & EQUIPMENT CO. • LUDINGTON, MICH.

San Francisco: Edward R. Bacon Co.; Cheyenne: Wilson Equip. & Supply Co.; Phoenix and Denver: Western Machy. Co.; Albuquerque: Lively Equip. Co.

NEWS of MANUFACTURERS

Continued from page 116

Chemical Corp. of San Jose, Calif., has its headquarters in Los Angeles, headed by G. F. TWIST as general manager. G. D. SICKERT is works manager at Indianapolis.

☆ ☆ ☆

A new vermiculite-processing plant has recently been opened in Los Angeles by the *California Zonolite Co.*, it was recently announced by C. H. WENDEL, president. The company is exclusive processing distributor in California, Nevada and Arizona for Zonolite Company, leading miner and processor of Vermiculite, a mica-like mineral used in construction as plaster and concrete aggregate and as insulating fill. The Los Angeles plant will act as an addition to the plant in operation at Sacramento.

☆ ☆ ☆

ROLF

CARL R. ROLF has been appointed assistant secretary and sales manager of *Pioneer Engineering Works*, Minneapolis, Minn., according to K. E. BRUNSDALE, vice president in charge of sales. The company builds heavy equipment for quarries, gravel producers, mines, cement mills and asphalt paving contractors. Other new officers recently announced by the Board of Directors, following acquisition of the stock of Pioneer by Poor and Company, Chicago, are: Re-elected, LEWIS W. YERK, president and general manager, and MELVIN OVESTRUD, vice president and works manager; elected vice president in charge of sales, K. E. BRUNSDALE; treasurer, O. J. ELLERTSON. Chicago officers of the company announced by the board are: FRED POOR, chairman; EUGENE C. BAUER, vice chairman; P. W. MOORE, JR., secretary; and R. W. SERGEANT, assistant secretary and comptroller.

☆ ☆ ☆

Morris Coupling & Clamp Co., Ellwood City, Pa., announces the election of the following new officers: C. F. MARONEY, president, and R. W. MCGREW, secretary. The company manufactures patented Morris pipe couplings for permanently joining either plain or threaded pipe or a combination of the two, as well as pipe repair clamps.

☆ ☆ ☆

Jahn Trailer Division of Pressed Steel Car Co., Inc., formerly known as C. R. Jahn Co., has moved sales and executive offices from Savanna, Ill., to 6 North Michigan Ave., Chicago. Manufacturing operations of the company will be transferred to the Mount Vernon, Ill., plant of Pressed Steel Car Co. Established in 1932 as the

Continued on page 120

Dam . . .

Installing Radial Gates and Hollow-Jet Valves at Enders Dam

Nebraska—Chase County—Bureau of Reclamation. Claussen-Olson-Benner, Inc., Holdrege, Neb., with a bid of $138,032, was low before the Bureau of Reclamation for installing radial gates and hollow-jet valves and concrete and earthwork for completion of Enders Dam, Frenchman-Cambridge Division, Nebraska-Missouri River Basin Project. Unit bids were as follows:

(1) Claussen-Olson-Benner, Inc. $138,032
(2) Foster-Smetana Co. 168,933
(3) Diamond Engineering Co. 175,750
(4) Wunderlich Contracting Co. $194,067
(5) Stebbins-Frost Construction Co. 217,256
(6) Engineer's estimate 101,241

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, protective works, care of river during const., and unwatering	$2,500	$6,000	$21,000	$2,500	$1,750	$2,500
13,500 cu. yd. placing uncompacted fill in channel upstream from trashrack struct.	.60	1.00	.35	.80	.52	.25
45 cu. yd. concrete in outlet-works closure plug	80.00	55.00	45.00	60.00	120.00	50.00
179 cu. yd. concrete in spillway-gate counterweights	55.00	75.00	55.00	60.00	73.00	65.00
30 cu. yd. concrete in blockouts	100.00	275.00	125.00	150.00	365.00	80.00
25 cu. yd. miscellaneous concrete	100.00	225.00	80.00	80.00	245.00	60.00
Lump sum, concrete repairs	$4,000	$4,500	$3,500	$2,500	$6,000	$3,000
130 sq. ft. placing joint filler	1.00	1.00	1.00	1.00	1.60	1.00
7,940 lb. placing reinf. bars in radial-gate counterwgts.	.10	.10	.05	.10	.06	.08
3,000 lb. furn. and placing reinf. bars in outlet-works closure plug	.20	.25	.15	.20	.17	.14
325 lb. furn. and handling cement	6.00	8.00	6.00	5.00	7.30	5.50
80,000 lb. installing hollow-jet valves	.06	.10	.04	.10	.08	.05
76 lb. completion of the high-pressure gate installation in outlet-works	10.00	7.00	2.50	1.00	6.40	.70
973,650 lb. installing radial-gates	.075	.09	.10	.13	.136	.06
Lump sum, sandblasting and painting radial-gate No. 1	$5,000	$2,000	$4,500	$1,000	$5,000	900.00
Lump sum, sandblasting and painting radial-gate No. 6	$5,000	$3,000	$6,000	$3,500	$5,000	900.00
50 lb. installing track rails	10.00	7.00	1.00	1.00	10.00	.20
365 lb. installing ice-prevention air system	1.00	2.00	1.00	2.00	1.25	1.00
24 lb. installing fan and louver in battery house	10.00	6.00	2.00	2.00	1.60	.50
650 lin. ft. installing electrical metal conduits	2.50	3.00	2.00	2.00	4.00	1.00
1,300 lb. installing electrical conductors	1.50	2.00	3.30	2.00	3.00	1.00
3,500 lb. installing electrical apparatus	1.00	.50	2.00	2.00	1.00	1.00
Lump sum, installing storage battery	$2,500	500.00	570.00	$2,500	980.00	800.00
2,000 cu. yd. removing existing protective earth blanket from spillway	1.00	1.00	.65	1.00	1.25	.40

Earthfill Cachuma Dam, Outlet Works and Concrete-Lined Tunnel

California—Los Angeles County—Bureau of Reclamation. Mittry Brothers Construction Co., West Los Angeles, was low before the Bureau of Reclamation for construction of Cachuma Dam, Cachuma Project, approximately 19 air-line mi. northwest of Santa Barbara. Principal features included are an earth-fill dam across the Santa Ynez River, a spillway on the left abutment, and a tunnel outlet works through the left abutment. The dam embankment will be approximately 2,975 ft. long at the crest and will have a maximum height of approximately 275 ft. above the lowest foundation.

The central or impervious portion, Zone 1 of the dam embankment, will consist of selected clay, sand, and gravel moistened and rolled to 6-in. layers. The upstream and downstream slopes of Zone 1 will be protected and stabilized by Zone 2 material consisting of selected sand, gravel, and cobbles compacted to 12-in. layers by crawler-type tractor.

Zone 2 on the downstream slope will contain Zone 3 consisting of selected Monterey formation material from excavations for spillway, rolled to 6-in. layers. The upstream slope of the dam embankment above the berm at elevation 600 will be protected by 3 ft. of riprap. A cut-off trench with 150-ft. maximum bottom width will be excavated to a suitable foundation for the full length of the dam embankment and foundation material will be grouted along the center line of the trench through a grout cap.

The outlet works will consist of an inlet channel, intake structure with diversion intake and transition section; a concrete-lined 7-ft. diameter horseshoe tunnel with a semicircular arch roof with transition section and upstream venturi tube; concrete gate chamber with a 2-ft. 9-in. by 2-ft. 9-in. high pressure slide gate; a concrete-lined 7-ft. diameter horseshoe tunnel with a semicircular arch roof containing a 38-in. inside diameter steel outlet pipe between the gate chamber and control house, etc.

The spillway will consist of an approach channel; concrete gate structure with four 50-ft. by 30-ft. radial gates, hoist deck, and roadway bridge; concrete chute and stilling pool; and discharge channel. Hilton Creek, a tributary stream to the Santa Ynez River at the dam site, will be diverted from its present channel to a new channel constructed of waste material from excavation for the dam and appurtenant works.

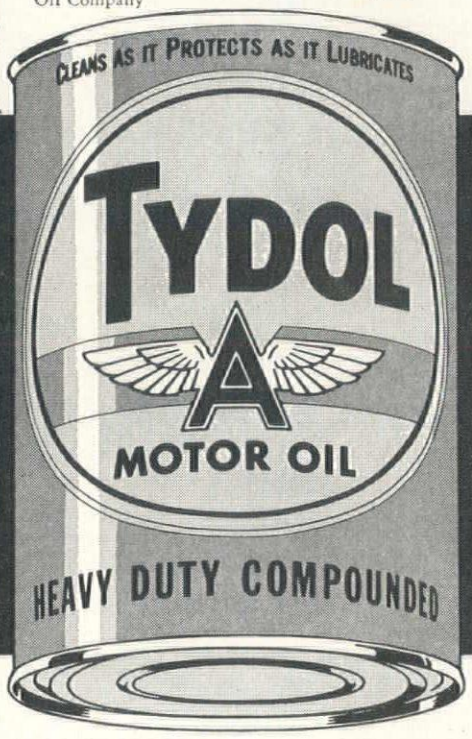
Unit bids were submitted as follows:

(1) Mittry Brothers Construction Co. $6,722,520
(2) Wunderlich Contracting Co. 7,062,484
(3) Peter Kiewit Sons' Co., Macco Corp., and Morrison-Knudsen Co., Inc. 7,183,000
(4) The Utah Construction Co., and Bates and Rogers Construction Corp. 7,273,578
(5) Stolte, Inc., T. E. Connolly, Inc., and Parish Bros. 7,281,662
— United Concrete Pipe Corp., B. J. Ukropina, T. P. Polich, Steve Krell, Vinnell Co., Inc., and Ralph A. Bell 7,366,739
— Winston Bros. Co., and Al Johnson Construction Co. 7,384,607
— A-H-M-O Co., composed of Adler Construction Co., Halvorson Construction Co., Mason Construction, and Osberg Construction Corp. 7,477,284
— Guy F. Atkinson Co. 7,627,570
— Grafe-Callahan Construction Co. 7,697,594
— Arundel Corp., and I. E. Dixon Co. 9,781,615
(6) Engineer's estimate 6,818,270

	(1)	(2)	(3)	(4)	(5)	(6)
Lump sum, diversion and care of river during const. and unwatering foundations	225,000	135,000	75,000	92,000	93,000	120,000
280,000 cu. yd. excav., Class 1, in open cut for spillway outlet works, and Hilton Creek diversion, first 280,000 cu. yd.	.38	.50	.45	.33	.48	.35
280,000 cu. yd. excav., Class 1, in open cut for spillway, outlet works, and Hilton Creek diversion, over 280,000 cu. yd.	.36	.25	.35	.25	28	.28
425,000 cu. yd. excav., Class 2, in open cut for spillway, outlet works, and Hilton Creek diversion, first 425,000 cu. yd.	.42	1.00	.57	.52	.75	.60
425,000 cu. yd. excav. Class 2, in open cut for spillway, outlet works, and Hilton Creek diversion, over 425,000 cu. yd.	.36	.35	.47	.44	.44	.55
418,000 cu. yd. excav., Class 1, in open cut for spillway, separation and transportation to dam embankment, first 418,000 cu. yd.	.50	.60	.68	.59	.71	.48
418,000 cu. yd. excav., Class 1, in open cut for spillway, separation and transportation to dam embankment, over 418,000 cu. yd.	.46	.30	.58	.46	.42	.42
3,475 cu. yd. excav. for grout cap and spillway cut-off trenches	15.00	4.20	5.80	3.20	4 52	15.00
3,800 cu. yd. excav. for outlet works tunnel	40.00	33.00	20.00	21.50	48.00	28.00

(Continued on next page)

SAFEGUARD YOUR ENGINE



CLEANS as it PROTECTS as it LUBRICATES

Three great new Tydol Heavy Duty Compounded Motor Oils solve every lubrication problem of gasoline, diesel or butane – automotive or stationary engines!

New Tydol HD, HD S-1, HD S-2 solve every problem of modern lubrication for automotive and stationary engines using gasoline, butane or diesel fuels. Tydol Heavy Duty Motor Oils are made of high quality, high VI paraffinic base oil compounded with the new types of "additives." Tydol cleans as it protects as it lubricates.

TYDOL HD

Especially recommended for high speed diesel, gasoline, butane fueled engines in automobiles, buses, trucks, tractors, stationary units under normal Heavy Duty conditions. SAE grades 10, 20, 30, 40, 50. Sold in drums and cans.

TYDOL HD S-1

Has higher detergency level than Tydol HD. For operation under cold start and stop conditions and under unusually severe continued overloaded conditions in all types of engines. SAE grades 20, 30, 40. Sold in drums.

TYDOL HD S-2

Has highest detergency level of the Tydol Heavy Duty series. For high performance and supercharged diesel engines using all kinds of diesel fuels under the most extreme conditions. Available in SAE grade 30. Sold in drums.

Call your Associated Representative for expert help on any lubrication problem.

CHECK THESE TYDOL SAFEGUARDS

- ✓ Easier starting—heat resistant—stable in service.
- ✓ Contains anti-foam agent and assures positive lubrication. Low oil consumption.
- ✓ Prevents sludge and varnish deposits and clogging of oil ducts and passages.
- ✓ Freedom from ring sticking—less piston ring and cylinder wear.
- ✓ Insures free acting valve stems. Provides cleaner filter elements.
- ✓ Non-corrosive to alloy bearings and other engine parts.
- ✓ *Cleans* as it *protects* as it *lubricates.*

TIDE WATER ASSOCIATED OIL COMPANY

NEWS of MANUFACTURERS

Continued from page 118

C. R. Jahn Co., the Jahn organization has been making heavy duty low bed trailers and special trailers for oil fields, public utility service and many other fields where special trailer design is needed.

☆ ☆ ☆

KENNETH R. BEARDSLEE, formerly Carboloy vice president and marketing manager, has been named president of *Carboloy Company, Inc.*, Detroit, Mich., to succeed the late WALTER G. ROBBINS, according to recent announcement by ROY W. JOHNSON, vice president and general manager. At the same time EUGENE F. WAMBOLD, formerly vice president in charge of manufacturing, was named to the newly created post of executive vice president in charge of manufacturing, engineering, employee and community relations, and purchasing. Both men have also been named to the Carboloy board of directors.

☆ ☆ ☆

Food Machinery & Chemical Corp., San Jose, Calif., recently announced that GERALD F. TWIST was elected a vice president of the corporation. He is manager of *FMC's Peerless Pump Division*, with major plants located at Los Angeles and Indianapolis. Twist first became associated with Food Machinery in 1930. Later, he joined the Atlas Imperial Diesel Engine Co. of Oakland, subsequently becoming executive vice president and a director of that organization. In 1947, he rejoined FMC and took charge of the newly acquired subsidiary, the Stokes & Smith Co. of Philadelphia. Two years later he was made manager of the Peerless Pump Division, with headquarters at Los Angeles.

TWIST

☆ ☆ ☆

Anticipating that the needs of national defense will require large amounts of steel entitled to priority in production, *Columbia Steel Co.* in San Francisco announced the leasing from the Government of steel-making facilities of the wartime steel foundry at Pittsburg, Calif., having a capacity of approximately 60,000 tons of ingots yearly.

☆ ☆ ☆

WILLIAM WALLACE MEIN, JR., vice president of *Calaveras Cement Co.*, has been appointed to membership on the Natural Resources Committee of the United States Chamber of Commerce. This committee advises the Board of Directors of the Chamber on matters affecting extractive mineral industries, and is charged with developing and recommending policies in that field. Mein performs a similar

Continued on page 121

105,000 lb. furn. and placing perm. structl.-steel tunnel supports steel tunnel-liner plates, and steel lagging	.23	.24	.14	.157	.115	.17
255,000 cu. yd. excav. for fndtn. of dam embank. above elev. 570	.50	.50	.50	.30	.70	.30
70,000 cu. yd. excav. for fndtn. of dam embank. above elev. 570, separation and transptn. to dam embankment	.60	.60	.56	.45	.58	.50
135,000 cu. yd. excav. for fndtn. of dam embank. below elev. 570, first 135,000 cu. yd.	.50	2.00	.30	.31	1.35	.45
135,000 cu. yd. excav. for fndtn. of dam embank. below elev. 570, over 135,000 cu. yd.	.55	.35	.62	.26	1.00	.38
400,000 cu. yd. excav. stripping borrow areas	.25	.25	.25	.26	.23	.20
1,700,000 cu. yd. excav. in borrow area 1 and reserve bor. area, separation and transptn. to dam and embank., first 1,700,000 cu. yd.	.44	.60	.55	.54	.60	.43
1,700,000 cu. yd. excav. in borrow area 1 and reserve bor. area separation and transptn. to dam embank., over 1,700,000 yd.	.42	.30	.44	.46	.35	.38
500,000 cu. yd. excav. in borrow area 2 and transptn. to dam embank., first 500,000 cu. yd.	.40	.40	.45	.28	.41	.30
500,000 cu. yd. excav. in borrow area 2 and transptn. to dam embank., over 500,000 cu. yd.	.36	.25	.35	.24	.24	.25
10,500 cu. yd. dumped riprap	2.50	2.50	2.30	2.55	1.35	3.25
83,000 cu. yd. backfill	.40	.25	.57	.80	.20	.30
1,500,000 cu. yd. earth fill in dam embank., zone 1, first 1,500,000 cu. yd.	.08	.12	.18	.145	.15	.12
1,500,000 cu. yd. earth fill in dam embank. zone 1, over 1,500,000 cu. yd.	.08	.10	.16	.115	.09	.11
15,300 cu. yd. special compaction of earthfill in embank.	1.10	2.50	2.00	5.10	2.40	2.50
1,400 000 cu. yd. sand, gravel, and cobble fill in dam embank., zone 2, first 1,400,000 cu. yd.	.08	.10	.12	.10	.12	.10
1,400 000 cu. yd. sand, gravel, and cobble fill in dam embank., zone 2, over 1,400,000 cu. yd.	.04	.06	.11	.09	.07	.09
700,000 cu. yd. Monterey formation fill in dam embank., zone 3	.10	.12	.16	.15	.09	.20
125,000 cu. yd. riprap on upstream slope of dam embank.	2.50	2.50	2.30	2.35	1.35	3.00
1,800 lin. ft. furn. 10-in. diam. sewer pipe and const. embank. to toe drains with uncem. jts.	2.00	2.00	2.30	2.50	2.00	2.50
1,100 lin. ft. furn. 12-in. diam. sewer pipe and const. embank. toe drains with uncem. jts.	4.00	2.00	2.65	2.90	2.12	3.00
10,000 lin. ft. furn 4-in. diam. sewer pipe and const. drains with uncem. jts.	2.75	1.60	1.85	2.40	1.65	2.20
4,000 lin. ft. furn 6-in. diam. sewer pipe and const. drains with uncem. jts.	2.00	1.30	1.50	1.90	1.42	1.80
4,900 lin. ft. furn. 8-in. diam. sewer pipe and const. drains with uncem. jts.	2.75	1.60	1.65	2.40	1.65	2.20
540 lin. ft. furn. 12-in. diam. sewer pipe and const. drains with uncem. jts.	4.00	2.50	3.50	4.05	2.40	3.00
820 lin. ft. furn. and laying 4-in. diam. sewer pipe with cemented joints.	1.50	2.00	1.50	1.50	1.30	1.40
50 lin. ft. furn. and laying 8-in. diam. sewer pipe with cemented jts.	3.10	2.00	2.50	2.40	1.80	1.80
400 lin. ft. furn. and laying 10-in. diam. sewer pipe with cemented jts.	3.50	2.50	3.00	3.00	1.90	2.10
230 lin. ft. furn. and laying 12-in. diam. sewer pipe with cemented jts.	4.00	3.00	4.00	3.85	2.50	2.60
280 lin. ft. furn. and laying 15-in. diam. sewer pipe with cemented jts.	4.50	3.00	6.00	5.85	3.00	3.50
200 cu. yd. continuous gravel drains back of spillway walls	7.00	6.00	6.50	14.25	4.00	8.00
40 lin. ft. furn. and laying 14-ga., 24-in. diam. corrugated-metal pipe	4.00	10.00	6.00	6.50	4.00	5.00
20,400 lin. ft. drilling grout holes in stage betw. depths of 0 ft. and 35 ft.	.80	1.75	1.40	1.65	2.00	1.80
8,000 lin. ft. drilling grout holes in stage betw. depths of 35 ft. and 60 ft.	2.00	1.85	1.40	1.65	2.50	2.00
12,000 lin. ft. drilling grout holes in stage betw. depths of 60 ft. and 110 ft.	2.10	2.00	1.40	1.65	2.50	2.20
4,000 lin. ft. drilling grout holes in stage betw. depths of 110 ft. and 160 ft.	2.50	2.10	1.68	1.65	2.50	2.40
11,500 lb. furn. and placing std. black pipe and fittings for foundation grouting	.80	.35	.55	.43	.40	.60
250 lb. furn. and installing std. zinc-coated pipe and fittings and special grout outlets	1.50	1.50	.50	.59	.70	1.00
23,650 cu. ft. pressure grouting	1.50	1.00	1.40	1.28	2.00	1.80
35,750 cu. ft. pressure grouting with packers	2.10	1.10	1.68	1.36	2.10	2.20
32,650 lin. ft. drilling holes for anchor bars and grouting bars in place	.80	1.00	1.56	.59	1.00	1.50
3,853,000 lb. furn. and placing reinf. bars	.085	.075	.07	.0825	.08	.09
1,250 cu. yd. concrete in grout cap	16.00	20.00	18.50	21.15	23.80	20.00
1,700 cu. yd. concrete in tunnel lining	45.00	35 00	37.50	42 [illegible]	5 [illegible]	[illegible]
90 cu. yd. concrete in gate chamber	90.00	50.00	51.00	48.58	75.00	60.00
140 cu. yd. conc. in intake struct. below elev. 570	60.00	60.00	11.00	35.45	25 00	25.00
110 cu. yd. conc. in intake struct. above elev. 570	70.00	70.00	52.00	63.40	74.00	70.00
380 cu. yd. conc. in control-house substruct.	60.00	30.00	19.00	42.60	36.00	35 00
145 cu. yd. conc. in control-house superstruct.	70.00	50.00	67.00	85.95	73.00	85.00
80 cu. yd. conc. in outlet works, second stage	80.00	35.00	69.00	39.60	40.00	45.00
7,600 cu. yd. conc. in spillway-gate struct.	35.00	35.00	31.00	31.90	50.00	36.00
14,200 cu. yd. conc. in spillway floors, first 14,200 cu. yd.	20.00	20.00	16.00	24.75	16.00	18.00
14,200 cu. yd. conc. in spillway floors over 14,200 cu. yd.	18.00	16.00	17.00	24.75	14.00	16.00
14,800 cu. yd. conc. in spillway walls	28.00	35.00	31.00	44.70	34.00	35.00
100 cu. yd. conc. in paved gutters	30.00	35.00	50.00	40.95	40 00	50.00
1,130 cu. yd. conc. in parapet and curb	28.00	30.00	57.00	80.00	37.00	65.00
210 sq. ft. furn. and placing resilient-type jt filler	2.00	2.00	1.20	2.75	1.20	2.00
210 sq. ft. furn. and placing bitum.-type joint filler	1.50	2.00	1.20	1.35	1.50	1.50
140 lin. ft. placing rubber water stops	2.00	2.00	2.30	3.00	2 50	1.50
120 lin. ft. furn. and placing metal seals, type N-1	2.50	3.00	2.00	1.80	1.50	1.75
2,500 lin. ft. furn. and placing metal seals, type Z	2.00	3.00	2.30	2.00	1.50	2.00
1,187,000 lb. installing radial gates	.07	.06	.06	.09	.05	.05
110,000 lb. installing radial-gate hoists	.10	.05	.07	.09	.05	.06
24,500 lb. installing high-press gates and conduit lining	.25	.05	.15	.056	.15	.12
2,400 lb. installing control apparatus and piping for high-presure gate	.50	1.00	.57	.054	.80	.40
3,500 lb. installing slide gate and hoist	.35	.40	.14	.843	.25	.20
75,000 lb. installing outlet pipe	.12	.10	.16	.054	.12	.10
7,150 lb. installing metal pipe, fittings, and valves less than 6 in. in diam.	.60	.46	.24	.45	.70	.30
1,600 lb. installing metal pipes, fittings, and valves 6 in. and larger in diam.	.60	.30	.12	.41	.40	.25
13,900 lb. installing trashrack metalwork	.30	.10	.07	.075	.05	.10
16 200 lb. installing hatch covers, floor plates, and gratings	.50	.20	.12	.16	.10	.10

(Continued on next page)

NEWS of MANUFACTURERS

Continued from page 120

function as a member of the National Minerals Advisory Council, which gives policy guidance to Secretary of the Interior Oscar L. Chapman.

☆ ☆ ☆

ROBERT F. ORTH, manager of the *Johns-Manville Corporation's* transite asbestos-cement pipe department, was elected president of the *Water & Sewage Works Manufacturers' Association* at a recent meeting of the association in Philadelphia. He takes office Jan. 1, 1951. Other officers elected were: vice president, E. M. JONES, vice president and general manager of *Simplex Valve & Meter Co.*, Philadelphia; treasurer, E. J. BUTTENHEIM, New York City; acting secretary-manager, DOROTHY E. DIMMERS, New York City.

☆ ☆ ☆

J. C. GORMAN, president of *Gorman-Rupp Co.*, Mansfield, Ohio, recently announced the establishment of a new department within the company specializing in the development of small centrifugal pumps. At the same time, the appointment of EDWARD M. SMITH as hydraulic engineer and HORACE M. MONTGOMERY as project engineer for the new department was announced. Smith was formerly chief engineer and Montgomery was new products engineer of the Pump Division of Barnes Manufacturing Co.

☆ ☆ ☆

JOHN E. GOBLE, president of *National Tube Co.*, Pittsburgh, Pa., subsidiary of United States Steel, has announced the election of WILLIAM F. MCCONNOR as executive vice president of the company. At the same time, Goble announced the election of H. J. WALLACE as vice president in charge of sales, succeeding McConnor in that position.

☆ ☆ ☆

It was recently announced that ROBERT A. COSTA has joined the staff of *Kaiser Gypsum, Division of Kaiser Industries, Inc.*, Oakland, Calif. He becomes administrative assistant to the general sales manager. Formerly, he was administrative assistant to the chief engineer of Arabian American Oil Co. in San Francisco, and prior to that he served nearly five years with various branches of the U. S. Navy as ship's executive officer and intelligence officer.

☆ ☆ ☆

WILLIAM J. MILLETT, assistant to the vice president in charge of manufacturing, has been appointed works manager of Holyoke Works, according to an announcement by L. C. RICKETTS, vice president in charge of manufacturing, *Worthington Pump & Machinery Corp.*, Harrison, N. J. He replaces E. M. DETWILER, who has resigned. Veteran of the corporation for 37 years, Millett advanced through various capacities to the post which he has just left to become Holyoke works manager.

1,400 lb. installing ladders, stairways, and platforms	.35	.50	.29	.27	.30	.20
5,300 lb. installing embedded frames	.30	.50	.29	.08	.15	.15
1,300 lb. installing hoist and runway beam	.25	.20	.12	.043	.20	.20
4,500 lb. installing ventilating system	.50	.25	.23	.26	.25	.35
2,000 lin. ft. erecting wire fence	1.00	1.00	1.15	2.15	.70	1.00
25,850 lb. installing pipe handrails	.20	.10	.28	.47	.26	.18
9,200 lb. installing miscel. metalwork	1.00	.10	.28	.27	.50	.25
91 sq. ft. furn. and installing metal doors	15.00	5.00	16.00	4.30	5.00	8.00
88 sq. ft. furn. and installing metal-sash windows	5.00	5.00	5.00	4.30	4.00	5.00
30 sq. ft. furn. and installing metal louvers	6.00	5.00	8.00	4.30	6.00	6.00
230 sq. ft. furn. and installing steel partition	5.00	5.00	2.30	4.30	3.00	4.00
510 sq. ft. furn. and placing roofing	2.00	1.00	.60	1.10	1.00	.80
4,100 cu. yd. selected gravel surfacing	3.50	.60	1.00	4.70	4.00	2.00
1,800 lin. ft. furn. and erecting beam-type guardrail	3.00	3.00	2.90	3.05	5.00	2.50
2,530 lin. ft. furn. and install. elect. metal conduit 1 in. and less in diam.	2.50	1.00	1.60	1.20	1.20	1.50
650 lin. ft. furn. and install. elect. metal conduit 1¼ and 1½ in. in diam.	3.00	1.00	2.20	1.60	1.50	2.00
615 lb. furn. and installing ground wire	4.00	5.00	2.20	1.70	2.00	2.00
945 lb. installing elect. conductors	3.00	1.00	1.20	.55	1.00	1.00
3,000 lb. installing elect. apparatus	1.50	.50	.70	.55	1.00	.75
600 lin. ft. drilling 1½-in. min. diam. holes for piezometer apparatus	3.00	2.00	2.50	3.05	1.25	3.00
40 lin. ft. drilling 4-in. min. diam. holes for settlement apparatus	12.00	5.00	5.50	12.30	4.00	5.00
1,500 cu. yd. trenches for test apparatus	8.00	4.00	4.50	4.05	3.00	6.00
108,000 lin. ft. installing piezometer tubing in dam emb.	.10	.10	.17	.093	.10	.12
4,750 lb. installing settlement apparatus in dam	2.00	1.00	.60	.083	1.00	.70
Lump sum, installing test apparatus in terminal wall	$1,500	$1,000	$2,343	$1,025	$1,000	600.00
65 points installing surf. settlement points on dam	12.00	10.00	5.00	2.25	7.00	10.00

Miscellaneous . . .

Earthwork and Structures for San Luis Wasteway and Holding Reservoir Dike, Reservoir Outlet and Timber and Concrete Bridges

California—Merced County—Bureau of Reclamation. Western Contracting Corp., Newman, Calif., with a bid of $1,192,515, was low before the Bureau of Reclamation for constructing Schedule Nos. 1 and 2 of the San Luis Wasteway and holding reservoir dike, Delta-Mendota Canal, Central Valley Project, Calif. Schedule No. 1 involves excavation and earthwork for approximately 6 mi. of the San Luis Wasteway; earthwork and construction for two concrete drops with canal crossings, three timber bridges, one concrete and steel bridge, one concrete drop with highway crossing, one concrete drop with railroad and road crossing, and one drainage inlet. Schedule No. 2 includes excavation and earthwork for approximately 5.8 mi. of San Luis Wasteway and for reservoir dike; earthwork and construction for reservoir outlet structure. Unit bids were as follows:

	Schedule 1	Schedule 2
(1) Western Contracting Corp.	$ 987,794	$204,721
(2) United Concrete Pipe Corp. & Vinnell Co., Inc.	* 1,039,540	* 154,538
(3) Haas and Rothschild	1,111,374	237,775
(4) Peter Kiewit Sons' Co.	1,129,820	220,833
(5) Morrison-Knudsen Co. & M. H. Hasler Construction Co.	1,133,430	222,593
(6) Engineer's estimate	1,008,665	192,116

*Item 33, Schedule No. 2 included in bids and bids considered incomplete.

SCHEDULE 1

	(1)	(2)	(3)	(4)	(5)	(6)
2,025,000 cu. yd. excavation for wasteway	.104	.105	.15	.13	.12	.12
50,000 sta. cu. yd. overhaul	.02	.01	.05	.02	.02	.015
10,000 cu. yd. compacting embankments	.90	.20	.50	.20	.50	.25
9,000 cu. yd. excavation for drainage channels	.25	.30	.25	.20	.35	.30
90,000 cu. yd. excavation for structures	.70	1.00	.70	.60	.75	.60
50,000 cu. yd. backfill	.50	.30	.30	.60	.60	.40
35,000 cu. yd. compacting backfill	3.00	2.00	3.00	3.00	3.00	2.00
6,500 sq. yd. dry-rock paving	4.90	7.00	5.00	5.00	7.00	6.00
1,100 cu. yd. grav. or rk. bedding under dry-rk. paving	4.30	5.00	5.00	10.00	6.00	6.00
3,800 cu. yd. gravel subbase under structs.	4.30	5.00	5.00	5.00	6.00	5.00
8,125 cu. yd. concrete in structs.	40.00	45.00	41.00	50.00	48.00	42.00
240 cu. yd. concrete in canal lining	22.00	30.00	50.00	20.00	40.00	30.00
12,500 bbl. furn. and handling cement	3.20	4.00	4.00	3.00	3.40	3.50
376,000 lb. placing reinf. bars	.04	.04	.05	.04	.035	.04
1,015,000 lb. furn. and placing reinf. bars	.08	.08	.09	.10	.085	.085
760 sq. ft. furn. and placing elastic filler matl. in jts.	1.70	1.50	2.00	1.50	2.50	2.00
85 M.b.m. furn. and erecting timber in structs.	220.00	250.00	220.00	175.00	240.00	225.00
920 lin. ft. manufacturing and driving conc. piles	7.30	7.00	7.00	3.00	7.00	8.00
850 lin. ft. furn. and lay. 18-in. diam. std. str. conc. culvert pipe	4.30	4.00	5.50	4.00	4.50	5.00
300 lin. ft. furn. and lay. 24-in. diam. corr.-met. pipe	5.00	5.00	5.00	6.00	5.75	6.00
7.5 per mi. furn. and erect. right-of-way fence	$1,000	$1,200	$1,000	$1,100	$1,110	$1,000
29 gates furn. and install. 16-ft. met. fence gates	50.00	60.00	50.00	50.00	50.00	50.00
700 cu. yd. furn. and placing untreated rock base	3.70	5.00	3.50	5.00	5.50	6.00
250 cu. yd. furn. and placing plant-mixed surf.	16.80	8.00	16.00	10.00	20.00	18.00
65,000 lb. erecting structural steel	.06	.06	.05	.05	.10	.06
200 lb. installing gates and gate hoists	.11	.40	.25	.15	.25	.20
8,200 lb. erecting metal guard railing	.11	.40	.07	.25	.30	.20
700 lb. furn. and installing miscl. metalwork	.11	.60	.70	.25	.60	.45

SCHEDULE 2

	(1)	(2)	(3)	(4)	(5)	(6)
850,000 cu. yd. excavation for wasteway	.14	.105	.16	.13	.15	.13
2,000 cu. yd. excav. for drainage canal	.25	.40	.40	.20	.40	.30
60,000 sta. cu. yd. overhaul	.02	.01	.05	.02	.02	.015
190,000 cu. yd. construction of reservoir dike	.38	.12	.40	.30	.40	.35
190,000 cu. yd. compacting embankments (deleted)	—	.14	—	.20	—	—
100 cu. yd. excavation for structs.	.70	3.00	3.00	.60	2.00	1.00
380 cu. yd. backfill	.50	.60	1.00	.60	.75	.70
160 cu. yd. compacting backfill	3.00	2.00	4.00	3.00	4.00	3.00
100 sq. yd. dry-rock paving	4.90	7.00	10.00	5.00	8.00	6.00
18 cu. yd. gravel or rock bedding under dry-rk. pav.	4.30	5.00	10.00	10.00	6.00	6.00
90 cu. yd. concrete in structures	40.00	50.00	111.00	50.00	75.00	50.00
11,000 lb. furn. and placing reinf. bars	.08	.09	.15	.10	.10	.10
135 bbl. furn. and handling cement	3.20	4.00	5.00	3.00	3.40	3.50
5.1 mi. furn. and erecting right-of-way fence	$1,000	$1,200	$1,200	$1,100	$1,110	$1,000
3 gates furn. and installing 16-ft. metal fence gates	50.00	60.00	60.00	50.00	50.00	50.00
2,800 lb. installing gates and gate hoists	.11	.10	.20	.15	.25	.20
400 lb. furn. and installing miscl. metalwork	.11	.60	.75	.25	.60	.45

Evaporation Studies

. . . Continued from page 87

evaporation by the water-budget method. Hence the aim of these studies is to develop an improved method or methods for determination, and, if possible, the prediction from weather data, of water losses by evaporation using mass-transfer and energy-budget theory.

Thus one attack is to strike an "energy balance" or to determine the "heat budget" of Lake Hefner. An accurate account will be kept of all radiation from the sun in the course of a year, against which will be charged reflected radiation and heat absorbed by the water. The rest must be what is used up in evaporation processes.

Another attack will consist of evaluating a series of equations concerned with the physical removal of water to the atmosphere. Evaporation follows definite physical laws and is affected by such things as air and water temperature, amount of moisture already in the air, wind velocity, height of waves kicked up, as well as by the amount of solar energy that falls directly on the lake surface. All these factors can and will be measured and will enter into the final computations.

Here again, as in the recent Lake Mead siltation studies, the Navy Bureau of Ships, and the Navy Electronics Laboratory (NEL) were called upon for help. The Lake Mead "Navy" has been moved to Oklahoma. It included one Naval Lieutenant and two Chief Petty Officers, and such technical equipment as boats, anemometers, rain gages, and towers.

As its part of the program, Weather Bureau technicians have installed several types of evaporation pans, complete with anemometers, and water and air thermometers, as well as 20 rain gages and other meteorological equipment. They are also making the daily climatological summary from the Oklahoma City Weather Station immediately available for use in connection with the study. They will study these data in relation to corresponding observations on the lake and compare their evaporation figures with the water budget, to devise more reliable and sounder methods of using pan evaporation data.

Navy Electronics Laboratory researchers under Dr. Dana Russell have assumed responsibility for the meteorological observations, the thermal survey, and for analysis of the data therefrom.

General responsibility for the studies at Lake Hefner rests with Director William E. Wrather of the Geological Survey. Cost involved is approximately $90,000. Carl G. Paulsen, Chief Hydraulic Engineer, will represent the Director in the overall operation. Collaborating with him will be the Chiefs of the Geologic and Topographic Divisions. George B. Cummings, Electronics Engineer in the Sonar Systems Branch of the Bureau of Ships, will represent the Chief of that Bureau and Morgan D. Dubrow, Hydrology Liaison for the Bureau of Reclamation will represent that agency.

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.

★★★

901

Dewatering System

Manufacturer: Pacific Pumping Co., Oakland, Calif.

Equipment: System for dewatering excavations, using centrifugal pump.

Features claimed: A centrifugal pump, a tank, and a pipe which supplies water at high pressure to a series of ejectors from which sand points are located where needed, comprise the dewatering unit. The water discharged from the ejectors supplies a tank connected to the pump suction, the excess water being disposed of either by gravity, or, if location of pump makes this impossible, by use of a booster pump. Advantages are: (1) a considerable saving in first cost due to use of a centrifugal pump instead of higher priced vacuum equipment; (2) the centrifugal pump can be located at any convenient point on the job site; (3) the header pipe, once placed in position, need never be moved during the progress of the job; (4) the multiple sand points with ejectors can be used at almost any depth below ground and at a considerable distance from the pump.

902

Loaders for Tractor Mowers

Manufacturer: Lull Manufacturing Co., Minneapolis, Minn.

Equipment: Two Shoveloader models designed for installation on tractors equipped with mowers.

Features claimed: Shoveloader Model 3-AM is built exclusively for the Case VAI tractor; Model 4-AM is built for the Minneapolis-Moline RTI tractor. They are designed so that either Shoveloader or mower operates independently of the other and neither needs to be removed from the tractor when the other is being used. The Model 3-AM has 1800-lb. lifting capacity, a 7½-ft. dumping clearance and can be equipped with several alternate loader attachments in addition to the standard ⅜-cu. yd. material bucket. Vital statistics for the 4-AM are 2500-lb. lighting capacity, 8½-ft. clearance.

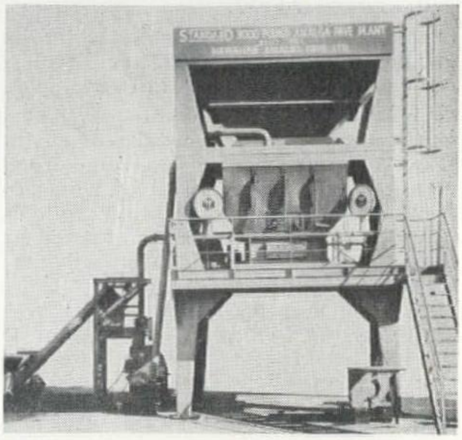
903

Cold Mix Plant

Manufacturer: Standard Steel Corp., Los Angeles, Calif.

Equipment: Mixing plant designed for Amalga-Pave process, eliminating dryer, hot storage tanks, boiler, and dust collector.

Features claimed: This equipment includes a special mixing unit with overhead



storage bins, an aggregate weigh hopper, a flux oil weigh hopper, and a batch type of pugmill. A special unit for automatically powdering the asphalt just prior to its being added to the mix has been developed particularly for the Amalga-Pave plant.

This is necessary since it is impractical to store powdered asphalt in advance of mixing. The plant is available in six sizes, ranging from 1,000 to 6,000 lb. capacity per batch.

904

Self-propelled Scraper

Manufacturer: Wooldridge Manufacturing Co., Sunnyvale, Calif.

Equipment: Model TC-S142 Terra Cobra with more powerful engine and larger low-pressure tires.

Features claimed: Substantially increased speed, gradeability, traction, flotation, and load-carrying capacity are attributed to the

Model TC-S142 Terra Cobra self-propelled scraper as a result of its 225-hp. engine and 24:00 x 25 24-ply low-pressure tires. Other innovations include formed steel construction for increased ruggedness, 65-in. apron opening and curved ejector designed for faster discharge of sticky materials, and increased ground clearance.

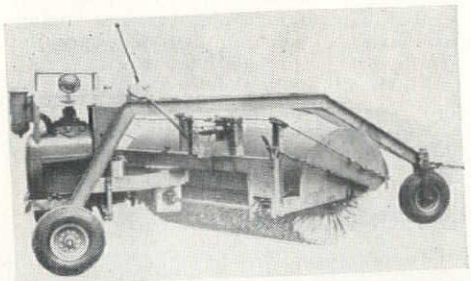
905

Engine-Driven Sweeper on Trailer

Manufacturer: Little Giant Products, Inc., Peoria, Ill.

Equipment: Sweeper, powered by 15-hp. air-cooled engine, for cleaning sub-surface of roads, snow removal.

Features claimed: The sweeper is built for one-man operation towed behind a car,



truck, or tractor. Use of oversized parts makes for unusually rugged construction with little or no maintenance required. Brush is available in 6-, 7-, 8-, or 9-ft. lengths, with a 32-in. diameter. The three-wheel trailer and sweeper is built for municipal, airport, and road construction use.

906

GM Diesel

Manufacturer: Detroit Diesel Engine Division, General Motors Corp., Detroit, Mich.

Equipment: A compact, light weight diesel, built to meet the higher power requirements of large earth-moving vehicles.

Features claimed: The 110 diesel has a horsepower rating of 275 at 1800 r.p.m., attained with a b.m.e.p. of 92 lb. per sq. in. Blower scavenging, with a new and highly efficient gear-driven centrifugal blower furnishes considerably more air for the cylinders than is needed for combustion. Location of the blower at the rear of the engine, above the flywheel, not only offers the best

possible connection to the main gear train, but also contributes to compactness. The blower impeller is an aluminum alloy forging 9 in. in diameter and is of the open type with radial vanes. A spiral air inlet helps maintain its high efficiency.

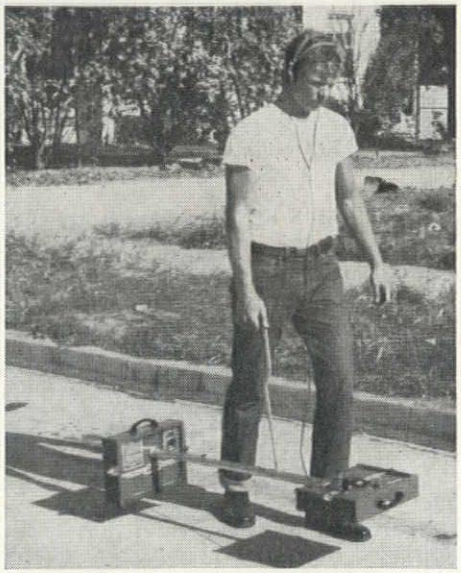
907

Pipe and Cable Detector

Manufacturer: Detectron Co., North Hollywood, Calif.

Equipment: Model 505, recently completed pipe and cable detector, first to employ metal cases instead of the wooden ones in use many years.

Features claimed: The instrument can be used to determine the exact location of a pipe or cable. The pipe can be traced any



desired distance and its depth can be closely estimated. Operation of model 505 is simple and can be done by a single untrained workman. Other features include increased power, improved operating handle, plastic finished panels with simplified instructions. Upkeep cost is negligible due to the protection offered by the metal case and the use of long life, standard portable radio type batteries. Lifetime guarantee.

908

Tungsten Carbide Electrode

Manufacturer: Mir-O-Col Alloy Co., Los Angeles.

Equipment: Electrode for use with AC or DC machines.

Features claimed: The coating covering a core wire is impregnated with tungsten carbide particles of various mesh size for a smooth deposit of 60% tungsten and 40% carbide using low amperage.

909

Mobile Field Phone

Manufacturer: General Electric Co., San Francisco.

Equipment: A 10-watt mobile radio transmitter receiver, type ES-12-A, designed for adjacent channel operation in urban and metropolitan areas and wide use in the construction industry.

Features claimed: Designed to improve performance in the crowded radio frequency spectrum at the lowest possible price, the single unit contains transmitter, receiver, and power supply in one cabinet. Features include triple-tuned transformers for extra high selectivity, high peak audio

output of 2 watts, adjustable IF gain control, and built-in low pass filter that reduces interference to other services. Weight is 32 lb.

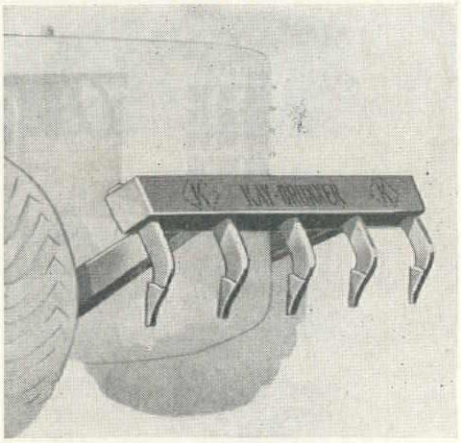
910

Hydraulic Scarifier

Manufacturer: Kay-Brunner Steel Products, Inc., Los Angeles.

Equipment: Package unit consisting of scarifier, rams, control valve and all fittings, for use on Hough Payloaders.

Features claimed: Utilizing the existing hydraulic system on the Payloader, the scarifier assures the operator of full utiliza-



tion of bucket capacity as he can scarify his own material, and thus obtain maximum loading. Ripper bar, which clears Payloader hitch when raised, has five adjustable shanks with H & L removable teeth. Specifications include: ripping width, center to center of outside teeth, 70 in.; penetration, 8 in.; raised height, 21 in.; teeth spacing, 17½ in.; teeth shanks, 1½ in. x 3 in. x 18 in.; weight of complete unit, 1,100 lbs.

911

Hydraulic Tractor-Loader

Manufacturer: Maine Steel Inc., South Windham, Me.

Equipment: Machine that can dig at either end but dumps always in front.

Features claimed: Combining in one machine the features of an overhead and a conventional front end loader, the Strait Line Hydraulic Loader allows the operator to

select the digging end to fit the job, so that he can do any type of loading without turning the tractor. It is for use only on the Oliver 77 industrial wheel tractors. On a level surface the Strait Line can lift a load of 4,100 lbs. to a height of 8 ft. in front and can swing 2,900 lbs. over the top from rear to front. Rear digging has the following important advantage: the load adds weight to the rear wheels, increasing traction, and reducing weight on the front wheels, thus making steering almost effortless. A special push-tilt bucket will penetrate a bank far more easily than will a con-

ventional bucket. The bucket has long loading lips with sides sloping up to the bucket proper at an angle of about 30 deg. A rear end tilt action lifts the cutting edge of the bucket 20 in. and thrusts it further into the bank after the tractor has penetrated to its limit and stopped.

912

Arc-Welding Electrode

Manufacturer: General Electric Co., Schenectady, N. Y.

Equipment: Electrode designed for high-quality welding of low-alloy, high-tensile steels, such as pipe lines, in all positions.

Features claimed: The W-52 (AWS Class E7010) arc-welding electrode, a reverse polarity d-c rod, is available in 5/32-in. and $\frac{3}{16}$-in. diameters for field trial. This carbon-molybdenum electrode can be widely applied in the welding of high-pressure piping and of castings where high tensile strength and resistance to creep at high pressures and temperatures are desired.

913

Plastic Pipe

Manufacturer: Carter Products Corp., Cleveland.

Equipment: Pipe with higher burst pressure and increased resistance to suction collapse.

Features claimed: Carlton EX plastic pipe is a heavy-duty pipe that is flexible, light in weight, and is completely resistant to rot, rust, and electrolytic corrosion. It is recommended for handling liquids intended for human consumption as well as for conveying industrial processing solutions, wastes, and highly corrosive gases and vapors. The pipe also can be used for air ducts, exhaust systems, and electrical conduit (both exposed and concrete encased). In addition, it is suitable for use with suction pumps to transmit sludge and to expel acid waters from mines.

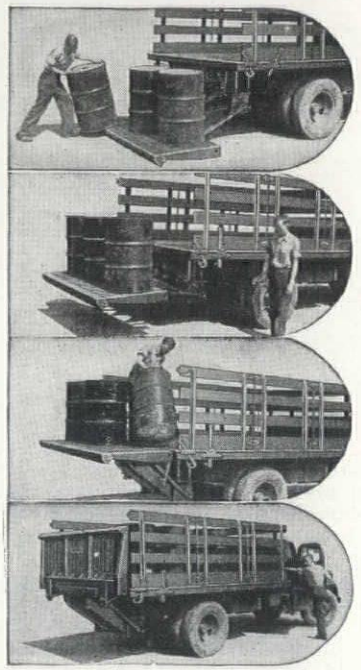
914

Hydraulic Lift End Gate

Manufacturer: The Perfection Steel Body Co., Galion, Ohio.

Equipment: A combination gate for trucks hauling heavy or bulky cargo which can be installed on any model and is operated from the truck power take-off.

Features claimed: One man can quickly load or unload heavy cargo. Both lifting



and closing of the gate are accomplished hydraulically. Most important feature of the unit is the use of only one hydraulic cylinder for all operations, i.e., lowering, raising, and closing of the gate. Other features include: capacity of 3,000 lb.; gate rides perfectly level and may be stopped at any point; no side obstructions; convenient operating controls, and a ramp attachment for loading from hand trucks at ground level.

915

Solvent for Bituminous Paint

Manufacturer: Speco, Inc., Cleveland, O.

Equipment: Solvent and thinner for bituminous base paints and synthetic enamels.

Features claimed: Speco Solvent is a blend of aromatic, hydrocarbon solvents, reputed to mix more easily and more thoroughly than most solvents. It can also be effectively employed for removing bituminous base paints from surfaces before repainting.

916

Blasting Galvanometer

Manufacturer: Atlas Powder Co., Wilmington, Del.

Equipment: Galvanometer which gives accurate resistance readings in ohms even when its activating cell is not at full strength.

Features claimed: The new unit gives extra safety and control in testing blasting circuits before firing. The instrument is calibrated on an accuracy of less than ½ ohm, making possible the checking of small

resistances such as a single blasting cap. In addition, the new unit may be used as an ammeter in the detection of stray currents, a function especially useful in underground blasting work. Can be adjusted for continued accurate readings.

917

Single Pass Type Crusher

Manufacturer: Pioneer Engineering Works, Inc., Minneapolis, Minn.

Equipment: Portable crushing plant mounted on 2-axle chassis.

Features claimed: The No. 6 plant has a mechanical (reciprocating plant) feeder, 2 ft. x 3 ft. two-bearing vibrating screen,

and may be equipped with a 1016, 1020, or 1024 roller bearing jaw crusher. A gathering conveyor which blends the material from the screen and crusher is built into the plant and can be used to load trucks, or to deliver to bin or stock pile. V-belts drive the crusher and screen. Other drives are high-speed steel roller chain.

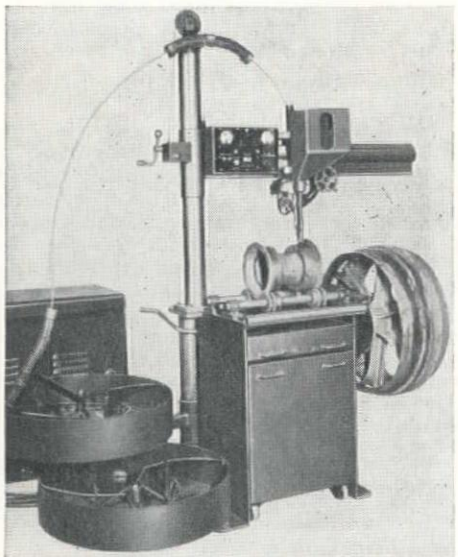
918

Automatic Welding Machine

Manufacturer: Leader Welding and Mfg. Co., Berkeley, Calif.

Equipment: Completely unitized automatic welding machine especially designed for production welding and hard-facing.

Features claimed: Known as the Leader, the machine incorporates a 500-amp. AC welder, automatic welding head, and posi-



tioner for both horizontal and angular mounting of the work. The AC power supply contains two windings, one heavy duty from 100 to 500-amp., the other a separate stinger winding of 120-amp. capacity for tackwelding. The simply-designed automatic head handles all sizes and types of automatic wires and has provisions for manual step-over control for spacing weld

beads as well as horizontal travel along its supporting arm. If submerged arc operation is required, flux is supplied from an attached hopper. The positioner is unique in design. Its horizontal unit incorporates two V-rollers on each of two shafts which support round objects such as tractor rollers, and the front rollers are driven by the shafts while the rear rollers are free to slide, providing a spacing adjustment. By adapting a track-mounted table to slide over the rollers, flat work is easily accommodated. The angle positioner rotates through 120 deg. of arc and is equipped with a face-plate drilled and tapped for various fixtures. Both horizontal and angle positioners are motor-driven through a variable speed drive, eliminating all compromises in speed selection. Twin reels, mounted low, swivel on the post and permit quick exchanges of two different welding wires.

919

Ditchers with Hydraulic Control

Manufacturer: E. V. Briscoe & Son, Kerman, Calif.

Equipment: Ditcher with hydraulic control enabling operator to bank ditcher on its longitudinal axis like an airplane, thus keeping cutting level of machine on the same plane.

Features claimed: Machine not only digs the irrigation ditch but prepares it for concrete lining, water, wooden forms, or reinforcing wire. An arched, steerable tongue makes it possible for the ditcher to get into and out of formed ditches and around obstructions with ease. Because it has its own front wheels and is not dependent upon the tractor for front-end support, the ditcher may be pulled by tractors on one or both banks, by use of a cable linkage. This feature is useful when vegetable growth or water in the ditch makes it impossible to operate the pulling tractors directly ahead of the machine; in such a case the tractors may be on either bank, some distance to the side of the actual cut. Speed of construction depends on speed of the tractor.

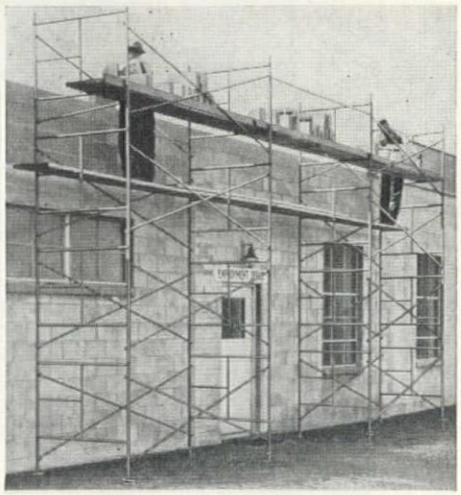
920

Light-Duty Steel Scaffolding

Manufacturer: Safway Steel Products, Inc., Milwaukee, Wis.

Equipment: Scaffolding with basic end frame members 4 by 4 ft. which can be assembled in towers as high as 40 ft.

Features claimed: The Safway "4 by 4" scaffolding is the firm's contribution of a low-priced steel scaffolding for light-duty



construction and maintenance work at a cost where it could replace wood-pole and crossbar scaffolding. On the ground, legs rest on simple base plates or screw jacks. To increase scaffold height, additional end frames are installed by simply slipping the tubular legs over integral coupling pins on the top of the next lower frame. Cross braces and guard rails are attached by means of quick-operating wing nuts on studs. Working platforms can be located at 16-in. intervals.

921

152-h.p. Diesel Engine

Manufacturer: Buda Co., Harvey, Ill.

Equipment: Heavy-duty truck diesel suitable for operation in all kinds of trucks and tractors carrying gross loads up to 52,000 lb.

Features claimed: Model 6-DTS-468 is a supercharged diesel engine developing 152 hp. and a maximum torque of 370-lb. ft. at 1600 rpm. It is a 6-cylinder model, full diesel, solid injection type. Features of this new Buda unit are greater torque and horsepower packed into a compact, comparatively lightweight plant. Overall length of the unit is about 48 in. Without electrical equipment and air compressor it weighs 1,418 lb.

922

Welding Cable

Manufacturer: Lincoln Electric Co., Cleveland, Ohio.

Equipment: New type of cable for both electrode and ground.

Features claimed: Linconductor Cable is unique in that the outer cover is neoprene with a paper separator of 2½-mil thickness between the outer cover and the copper stranding. This makes for long cable life

and maximum flexibility with freedom from cable kinking and copper oxidation. The features combine to produce a low cost cable with performance equal to premium rubber covered cable.

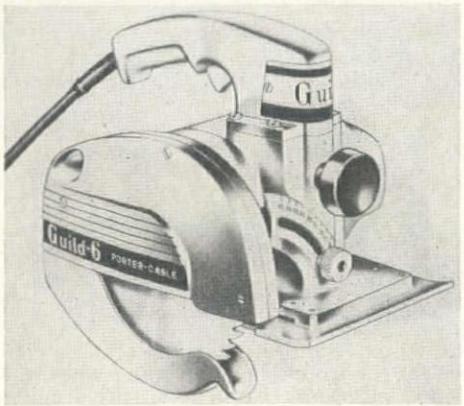
923

Saws for Close Control

Manufacturer: Porter-Cable Machine Co., Syracuse, N. Y.

Equipment: Saws with instant depth control and built-in calibrated angle-adjustment which permits accurate bevel cutting.

Features claimed: The Guild saws, Models A-6 and A-8, are equipped with pre-



cision-cut helical gear drive which delivers maximum power for accurate production sawing. Model A-6 cuts full 2 in. at 90 deg. and Model A-8 cuts 2⅞ in. at 90 deg. Blade is on the right side so that the saw rests safely on the main piece. The saws also have a safe spring-loaded swing guard and a comfort grip handle on top for balanced operation.

924

Metal Post Straightener

Manufacturer: H. K. Porter, Inc., Somerville, Mass.

Equipment: Unit with hydraulic jack for straightening parking meter posts, metal fence or sign posts.

Features claimed: The 10,000-lb. capacity direct-action jack has a full swiveling

handle for pumping at the most convenient angle and a new lever-operated valve for quick, easy control.

925

Concrete Core Drills

Manufacturer: Tilden Tool Mfg. Co., Pasadena, Calif.

Equipment: Drill bits of new "centerless" design to penetrate concrete at high speeds with less pressure.

Features claimed: The new line of drill bits is designed to supplement the firm's "Konkrete Kore" drills and is furnished in

sizes from $\frac{3}{16}$ to $\frac{7}{16}$ in. Because there is no center point to act as a pivot and retard cutting, the drills penetrate with 80% less pressure than required for ordinary drills of the same diameters. The bits can be used with ordinary drills of the same diameters. The bits can be used with ordinary electric drills at speeds of from 500 to 1200 r.p.m.

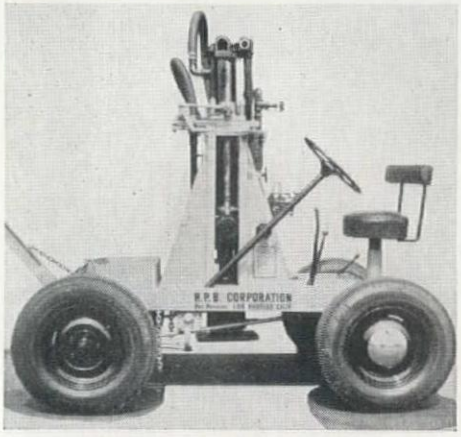
926

Pavement Breaker

Manufacturer: R.P.B. Corp., Los Angeles, Calif.

Equipment: Breaker with automatic control.

Features claimed: Mighty Midget Model B eliminates almost all upsurge of the



piston against the top head and 95% of the over-reach on the bottom head of its pavement breaker. A heavier head gives a more effective blow. It is equipped with a conventional automobile rear end, driving on both wheels, which makes it a simple matter to keep the machine on the line while in action. A longer or shorter stroke can be effected by regulating the amount of air needed by the piston which actuates the valve.

927

Extra-Strength Dragline Chain

Manufacturer: Baer Steel Products, Inc., Auburn, Wash.

Equipment: Chain for power shovel and dragline use made to withstand 150,000 psi. tensile.

Features claimed: The chain is cast of Fibraloy steel which was originally developed to absorb the battering required of earth-moving bucket castings. Extra strength allows longer wear within the working capacity of the chain and permits the use of 10% lighter sections when new. Extra toughness at high hardness levels provides the chain with superior shock resistance, especially at sub-zero temperatures, and with high abrasion resistance. Since Fibraloy resists plastic deformation, the metal does not thin out when overloaded.

928

Job Phone Booths

Manufacturer: Burgess-Manning Co., Libertyville, Ill.

Equipment: New type of telephone booth designed particularly for use on construction jobs.

Features claimed: The "Acousti-Booth" is a doorless and sound-proofed booth that traps high and low frequency noises and permits conversation without raising the voice, even in the noisiest spots. It is particularly adaptable to noisy spots where space is at a premium, such as on construction jobs and in field offices. In two models, full length and waist high.

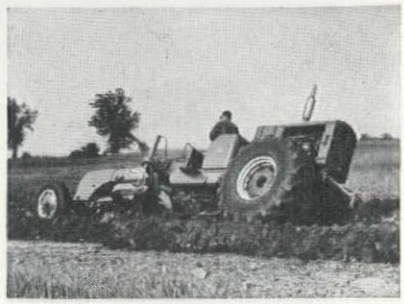
929

Engine-over-Axle Power Grader

Manufacturer: Meili-Blumberg Corp., New Holstein, Wis.

Equipment: Grader with extra-large, low-pressure tires for better flotation, traction, and maximum performance.

Features claimed: The 501 grader has a frame weight of 130 lb. per foot. Extra



heavy axles afford greater clearance, 19½ in. for the front axle, with wider wheel-to-wheel clearance. Front axle with leaning wheels is of unusually heavy construction. The 501 can handle the toughest of grading jobs, such as 1 to 1 sloping, cutting and cleaning ditches, building, widening, shaping and maintaining roads.

930

Combination Dozer Moldboards

Manufacturer: Pacific Car and Foundry Co., Renton, Wash.

Equipment: Dual-purpose dozer and clearing blade for specialized land clearing and dirt moving.

Features claimed: Without the use of heavy gear, clearing blade teeth can be removed from this Carco land-clearing blade

and replaced by a lower blade section, complete with cutting edge and corner bits, for all types of dozer work. This combination blade feature eliminates the need for two blades. The blades feature cast Fibraloy teeth with replaceable tips, ideally suited to withstand the shock loads encountered in land clearing. Tooth depth is varied by tipping the blade.

931

Wrought Iron Sling Chain

Manufacturer: Cleveland Chain & Mfg. Co., Cleveland, Ohio.

Equipment: Sterling wrought iron sling chain, suitable for the most hazardous types of lifting.

Features claimed: The sling chains are reputed to withstand more kinking, bend-

ing, distortion, and greater overload than other types of chain. Under heavy overloads, they will stretch up to 30% before fracture. This elongation can be readily seen, providing visual safeguard against sudden, unexpected breaks. The chain is hand-forged from domestic double-refined hand-puddled iron or Swedish charcoal Lancashire wrought iron, whichever is preferred by the user. Sling chains are furnished with rings and slip hooks unless otherwise specified.

932

Silicone Insulated A-C Welder

Manufacturer: General Electric Co., Schenectady, N. Y.

Equipment: Portable, silicone-insulated a-c. welder, series 6WK20H.

Features claimed: A high margin of safety and operating dependability is provided by this insulation, since it is unaffected by

high temperatures and is water repellent. Compact construction, 12x17 in. by 23 in. high, permits use of underbench and balcony space not available to larger welding units. The welder averages about ½ lb. per amp. maximum output, and has a current range of 30 to 250 amp. One man can readily lift it and put it in an automobile trunk for transporting. Coils of the welder are impregnated with Class H insulation, involving asbestos, glass, and mica, and impregnated by the synthetic high temperature resisting silicone resins.

933

Hauling Trucks

Manufacturer: Mack Trucks, Inc., New York.

Equipment: Trucks ranging in size from 17,000 lbs. (g.v.w.) for medium duty hauling, to 40,000 lbs. (g.c.w.) in the tractor semi-trailer model for heavy-duty highway work.

Features claimed: Mack's Golden Anniversary Model A trucks have a new engine to power them, the Magnadyne. Models include: the A-20, 17,000 lbs. (g.v.w.), designed for medium capacity short hauls and delivery work; the A-30, 21,000 lbs. (g.v.w.), designed for medium heavy-duty hauling and medium-heavy construction work; the A-40, ranging in size from 24,000 lbs. (g.v.w.) to 40,000 lbs. (g.c.w.), designed for heavy-duty, long-haulage work. The A-40 includes a dumper chassis, a six-wheel

chassis, a highway chassis, and a tractor. The A-40 is well-fitted for transit-cement mixing, construction work requiring heavy payloads, and tractor-trailer work.

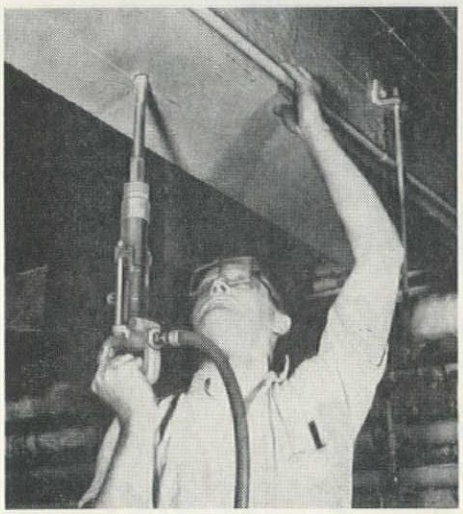
934

Powerful Hammer Drill

Manufacturer: Chicago Pneumatic Tool Co., New York.

Equipment: Self-rotated, air-powered drill for one-handed operation.

Features claimed: The well-balanced CP-9 Handril, weighing only 7½ lb., is



easy to operate on overhead work or where footing is precarious. Steel rotating principle is the same as that used in heavy-duty, self-rotating rock drills. An Ajax chuck permits rapid change of drill steels and non-rotating chisels. For changing it is merely necessary to slip back the chuck sleeve, withdraw steel, insert new steel, and release chuck. A large-capacity built-in oiler provides lubrication. Exhaust is right- or left-handed so that blower hose may be used where necessary.

935

Fiber Glass Joint for Highways

Manufacturer: Keystone Asphalt Products Co., Chicago, Ill.

Equipment: A new non-extruding expansion joint material developed to meet the required demands of a pre-formed joint filler for concrete as described by A.A.S.H.O. designation M-59-42.

Features claimed: Available in thicknesses of ½, ¾, and 1-in., the product is lighter in weight, will not decompose or rot, and absorbs less than one-half the volume of water permitted by specifications. The material is a combination of inorganic glass fibers and asphalt, and has been tested under conditions of extreme temperatures for 70% thickness recovery.

936

Portable Electric Saw

Manufacturer: Independent Pneumatic Tool Co., Aurora, Ill.

Equipment: Low priced 6-in. Thor portable electric saw with exclusive features of higher priced models previously released in the Silver Line.

Features claimed: The new model has long shaft transverse motor mounting, for more power and life; no power-wasting worm or bevel gears; die cast aluminum housings with steel inserts for bearings and threads; built-in blower for dust removal from guide line; smooth operating automatic ball bearing blade-guard with rubber snubber; complete ball bearing construction using larger bearings than in any saws of this type.

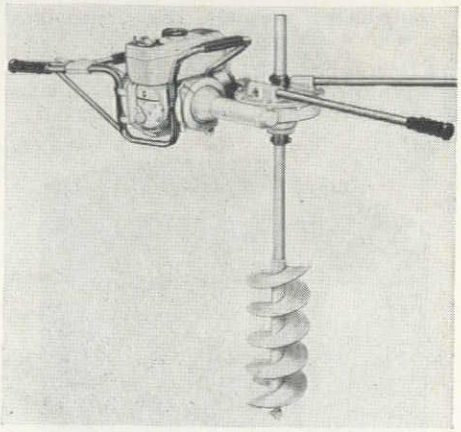
937

Post-hole Digger

Manufacturer: McCulloch Motors Corp., Los Angeles.

Equipment: 5 hp. gasoline-powered digger for high-speed drilling in any type earth or clay, easily convertible to saw.

Features claimed: The portable earth drill can be converted into a saw merely by



detaching the drill assembly and attaching a chain saw assembly. Weight of the two-man Earth Drill complete with 6-in. auger is only 79 lb. A full-swivel coupling at the engine permits the auger to drill at any de-

sired angle, and makes it possible to reverse the rotation of the auger if desired. A centrifugal clutch automatically disengages the auger at idling speeds.

938

Streamlined Shoveloaders

Manufacturer: Lull Manufacturing Co., Minneapolis, Minn.

Equipment: Models featuring faster raising, lowering and dumping.

Features claimed: Operating visibility on the Shoveloader is improved, because the hydraulic supply tank now forms the upper part of the radiator shield, which places it

directly above the hydraulic pump. A removable ventilating section in the center of the radiator shield permits easy servicing of all front-end parts, allows a free flow of air for radiator cooling and prevents the engine from overheating. Bucket control cylinders have been re-designed and relocated for faster bucket control and better forward vision. Buckets have been improved with a longer lower lip to dig easier, dig faster, and fill more completely, even out of loose windrowed material.

939

Mine Air Compressor

Manufacturer: Davey Compressor Co., Kent, Ohio.

Equipment: Extremely low overall height compressor in sizes rated 105, 160, 210, and 315 cfm., at 100 psi. pressure, each available in either self-propelled or towable trailer design.

Features claimed: Outstanding quality of the new compressors is the low overall height (32 in. for model 105, 33 in. for 160 and 210, and 37 in. for 315). Standard compressors are equipped with pneumatic tires and automotive steering. Special axle and front end design permits 30 deg. turns. Flanged steel wheels are offered as optional equipment. All compressor working parts are totally enclosed in a metal housing which is provided with efficient side-panel air filters.

940

Hauling Unit

Manufacturer: R. G. LeTourneau, Inc., Peoria, Ill.

Equipment: Rear dump hauling unit, designed for loading by shovel, dragline, or backhoe.

Features claimed: The E-9 Tournarocker dumps material behind its rear tires by raising the rocker body with a cable and sheave arrangement which is actuated by a Tournatorque electric motor. This arrangement enables the Tournarocker to dump over the edge of fills. The machine has a 9-ton or 10-cu. yd. heaped capacity. Its big 11-ft. by 7-ft. top opening and low body—only 7 ft. high for rear loading—permits easy spotting and loading. The load is carried down between the wheels, giving a low center of gravity for greater stability. Able to turn around in a 14-ft., 5-in. radius, the unit can operate in narrow cuts or side-hill jobs.

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.

★★★★★★★★★★★★★★★★★★★★★★★★★★★★

941

MASONRY ANCHORING DEVICES—**U. S. Expansion Bolt Co.**, York, Pa., has published complete descriptions and illustrations of its line of masonry anchoring devices and tools in a colorful 20-page pamphlet. The pamphlet provides all information about lag screw expansion shields, machine bolt expansion shields, machine screw anchors, wood screw anchors, nail anchors, wire rope clips, wire rope thimbles, toggle bolts, turnbuckles, bent wire eye bolts, one-hole pipe clamps, carbide tipped drills, star drills, and cold chisels.

942

PROBLEMS OF CONCRETE AND MASONRY CONSTRUCTION — "15 Steps to Better Concrete Construction," a 12-page illustrated booklet published by **Sika Chemical Corp.**, Passaic, N. J., is written specifically for architects and consulting and construction engineers. It lists detailed information and specifications on Sika compounds engineered to answer specific problems of concrete and masonry construction and describes the use of Plastiment Retarding Densifier for rendering structures resistant to water, cracking and absorption. The booklet discusses 14 additional materials of construction engineered for coating, sealing, hardening, and repair work on concrete and masonry.

943

PORTABLE ELECTRIC TOOLS—**Portable Electric Tools, Inc.**, Chicago, has issued a 16-page pocket-size catalog illustrating and describing its complete line of Hi-Power and Zephyr models of portable electric drills, hand saws, paint sprayers, paint brush cleaners, and drill kits. Complete specifications are given, including information on attachments and accessories that can be used with ¼-in. electric drills for sanding, grinding, polishing, and buffing.

944

AUTOMATIC SPEED CONTROLS—**Link-Belt Co.**, Chicago, in an 8-page illustrated booklet, outlines the four basic control systems for the P.I.V. Variable Speed Drive—namely, electronic, hydraulic, pneumatic, and mechanical. The automatic controls have many uses, such as the following: (1) To keep separate machines in accurate synchronization, often over a wide range of operating speeds; (2) Driving beams, feed rolls, take-up, and pay-off reels at everchanging, infinitely variable speeds in order to keep tension constant in drawing, coating, impregnating, extruding and laminating materials of many sizes and kinds; (3) In the precise timing and accurate maintenance of operating cycles of differing lengths over varying periods without interruption; (4) To hold the temperature, velocity, pressure, levels, and flow to narrow limits despite variations in operating conditions.

945

CONCRETE MIXERS—Worthington-Ransome Blue Brute Concrete mixers, Models 11-S and 16-S, are described in a bulletin published by **Worthington Pump and Machinery Corp.**, Dunellen, N. J. Uses of the models are described as follows: 2-wheel 11-S mixer, for use where the contractor is cramped for space at the job site; 4-wheel 11-S mixer, for use on curb, gutter and building type jobs; 4-wheel 16-S mixer, for use on curbs, gutters, and construction jobs such as bridges and culverts.

946

STUD WELDING IN CONSTRUCTION—Eleven different construction applications of stud welding are illustrated in a 4-page folder issued by the **Nelson Stud Welding Division** of **Morton Gregory Corp.**, Lorain, O. Uses shown include installation of roofing, siding, windows, and decorative panels; insulation, electrical equipment, and various types of reinforcing for concrete and gunite applications.

947

STABILIZING SOFT SOIL—A method for quickly stabilizing soft marshy ground on which a road, airport or earth dam is to be built, is described in a folder released by **McKiernan-Terry Corp.**, N. Y. The method of draining water from the soil to be treated is fully described, together with an explanation of the equipment used. Among the illustrations are diagrams showing the action of the Sand-Drain method and many photographs of Sand-Drain rigs in operation, including the Mc-

Kiernan-Terry pile hammers, compression loads, and specially designed skips which are used on Sand-Drain projects. According to the bulletin, the method is 20-80% cheaper than other ground stabilization methods in which the depths range from 10 to 100 ft. or more; this method speeds up settlement of underlying silt to a point of firmness in a year or two as compared to expected natural settlement periods of perhaps 50 years.

948

CARBIDE BITS—A picture story presented in a 20-pg. book by **Rock Bit Sales & Service Co.** shows how to successfully recondition tungsten-carbide bits. In addition the book contains many helpful operating suggestions for drillers on how to obtain the maximum speed and footage out of carbide bits, as well as a complete catalog covering Rok-Bits.

949

TANK TRAILERS—**Fruehauf Trailer Co.** has published a tank trailer catalog which is profusely illustrated, and gives specifications of all standard tank trailers plus information on equipment for specialized liquid hauling jobs. Illustrations in the catalog show step-by-step construction of these units in the Fruehauf plants.

950

CRUSHING ROLLS—A 40-pg. booklet on Traylor Crushing Rolls has been published by **Traylor Engineering and Manufacturing Co.,** Allentown, Pa. Cutaway views of each of the three different types of Traylor Rolls clearly illustrate the exclusive features that account for their extreme operating economy. For example, Traylor's automatic lateral adjustment mechanism, used to minimize annular corrugation and flanging of roll tires on type A and AA rolls, is fully described and illustrated. Of special interest to anyone considering the purchase of rolls is a chapter that shows how to determine the proper size roll required to do a given job with the greatest economy and efficiency.

951

CRAWLER TRACTOR—A two-color, 24-pg. catalog describing the features of the new International TD-14A crawler tractor has been published by **International Harvester Co.,** Chicago. The catalog contains photographs and sectional views.

952

SPEED REDUCERS—**The Falk Corp.,** Milwaukee, announces the release of two bulletins illustrating and describing the new Falk Concentric Shaft Speed Reducer and Right Angle Shaft All-Steel Speed Reducer. These speed reducers are designed for a wide variety of power transmission requirements and are adaptable to electric motor drives, belt drives, gas engine drives, chain drives. They are suitable for use as a speed increaser or reducer. The bulletins provide information on service factors, dimensions, rating tables, and method of selection.

953

CONCRETE BUCKETS — "Placing Concrete on Big Jobs" is the theme of a catalog published by **Gar-Bro Manufacturing Co.** of Los Angeles. Twenty different models ranging in capacity from 1/3 to 8 cu. yds. are described in the publication. Complete dimensions, specifications, and data on the Gar-Bro line of concrete buckets are given. A two-compartment concrete bucket with individually air-operated gates having a total capacity of 8 cu. yd. is shown in action. Illustrated and de-

scribed are: the double clamshell gate design; self-closing spring operated gates; discharge by remote control; and center discharge for accurate placing. Two attachments, the accordion-type collection hopper and the suspended steel sub-hopper with elephant trunk are shown.

954

CRAWLER-MOUNTED TRENCHER—A 12-pg. catalog describing the **Parsons Co.** Model 310 Trenchliner and illustrating its extra large work capacity features is now available. More than 50 photographs in the two-color bulletin describe the high capacity production features incorporated in the 310 Trenchliner, which is claimed by the manufacturer to be the largest full crawler-mounted trencher available. The trencher's shiftable digging boom provides off-set digging for close quarter operation. Its power shift conveyor moves completely through the machine in less than one minute for controlled discharge. The trencher also features an automatic safety clutch to protect machinery from shock loads, and a unit-constructed main frame and oscillating three-point suspension for even weight distribution and uniform ground pressure.

955

ROCK LOADING MACHINE—**The Eimco Corp.**, Salt Lake City, has published a folder in full color, showing the Model 104 RockerShovel in action, performing its versatile operations of bulldozing, carrying, and loading. The RockerShovel features a single control lever for bucket operation and an automatic power cut-off at discharge to return the bucket. The bucket control is so responsive that the operator can control the bucket so that it comes up slowly to dribble the load into small trucks or he can bring the load up fast to throw the load back into long, big trucks.

956

GRADALL EARTHMOVERS — An illustrated catalog has been published by **The Warner & Swasey Co.**, Cleveland, covering the recently introduced Gradall earthmovers. The bulletin describes the new machine's operation, lists specifications, and pictures the Gradall at work on a variety of jobs.

957

IMPROVED TWIN AND TRIPLE ROLL CRUSHERS—Covering its line of redesigned and improved twin and triple roll crushers is a 16-pg. bulletin published by **Pioneer Engineering Works**, Minneapolis, Minn. The bulletin describes and illustrates application of the roll crusher in the gravel, rock, ag-lime and mining industries, and contains tables and information to enable selection of the proper type and size of crusher for the job. Dimension and foundation data are included, and a special chart shows the percentage of each size of stone for various settings of the crusher. The center spread consists of a full cutaway showing how the crushers are built and pointing out features claimed by the manufacturer.

958

PORTABLE BITUMINOUS PLANT—A bulletin on its Model 101 bituminous plant, with a rated capacity of 110 to 135 tons an hour, has been issued by **Pioneer Engineering Works**, Minneapolis, Minn. The bulletin illustrates, by means of a

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.

three-pg. cutaway in two colors, how the material flows through the plant in the continuous process. Model 101 is distinguished by having only three main units, on pneumatic tires, to move. Mixer, transfer elevator, gradation screen, and bin are on one chassis. The drier is on the second chassis, with the dust collector on the third.

959

MINE COMPRESSORS—A technical data bulletin and catalog sheet descriptive of its line of mine air compressors has been released by the **Davey Compressor Co.**, Kent, O. The bulletin lists complete specifications of 105, 160, 210 and 315-c.f.m. two-stage units. It also summarizes and illustrates outstanding mechanical features which include permanent peak efficiency valves, oil pressure safety switch and built-in unloader system. Because of their low overall height, the mine units can operate right next to the job in many locations inaccessible to ordinary mine compressors. They are especially well adapted for roof-bolting.

960

PIPE LINE CONSTRUCTION MOVIE—Interested groups may book showings of the 16-mm. film, "As the Crow Flies," being distributed by **Gardner-Denver Co.** The pictures shows all phases of pipe line construction including trenching, rock drilling, blasting, welding, doping, wrapping, laying, and backfilling. The 21-min. movie includes a demonstration of a new rock drilling technique used on the Green Brier-Oak Ridge, Tenn., pipe line.

961

REPUBLIC SUPPLY CATALOG—**Republic Supply Co. of California** is distributing its new 1950 catalog, designed to afford users with ease and accuracy in obtaining information and product selection, together with current price listings. Piping, tools, rubber, wire rope, industrial supplies, and machinery are the commodities to be found in the catalog. In addition, it contains: useful engineering data; complete references on pipe, valve, and fitting dimensions and specifications; charts indicating the best couplings recommended for various types of hoses; specially designed charts for determining selection of valves for specific conditions; as well as charts to facilitate convenient selection of correct lubricants for use in Nordstrom valves.

962

PIPE FITTINGS—**The Kennedy Valve Mfg. Co.**, Elmira, N. Y., has published a catalog which describes its complete line of cast iron, malleable, and bronze fittings. The catalog also includes the recent additions of cast-iron screwed, flanged, sprinkler, and extra-heavy malleable fittings to the Kennedy line.

963

DIESEL TRACTOR—A three-color broadside features **Caterpillar Tractor Co.'s** Diesel DW10 Tractor. The DW10 features a short wheelbase for short turning radius, constant mesh transmission for fast shifting, high operating speeds to fit any job, and a hydraulic steering booster for operator ease. The broadside lists specifications and features a large cutaway view, keyed to the features of the machine.

964

METAL LATH AND PLASTER—Depicting the use of "Metal Lath and Plaster for Beauty, Strength, Economy, Permanence" in both residential and commercial construction, an interesting, 16-pg. educational booklet has just been issued by the **Metal Lath Manufacturers Association**, Cleveland. The booklet concisely describes various types of metal lath and metal plastering accessories available for both home building and commercial construction.

965

107-HP. DIESEL CRAWLER—A two-color catalog containing pictures, sectional views, and diagrams fully illustrating features of the TD-18A crawler tractor has been made available by **International Harvester Co.**

966

WELDING SUPPLIES—A directory of welding supplies has been published by **Lincoln Electric Co.**, Cleveland. The catalog lists several types of electrode holders, protective shields, welding cables, and electrodes, in addition to other welding tools for maintenance and working aids.

967

LAMINATED PANEL CURTAIN WALL—An illustrated 12-pg. booklet, giving complete details of a new laminated panel designed to provide efficient, permanent curtain walls or interior partitions, has been published by **Kaylo Division of Owens-Illinois Glass Co.** Kaylo Laminated Panels are a "sandwich" product 2 in. thick with faces of cement-asbestos board and an inorganic core of insulation. The panels, available with wood veneer and metal facings, have better insulating value than 16 in. of concrete, according to the manufacturer.

968

DYE PENETRANT INSPECTION METHOD — **Dy-Chek Co.**, division of Northrop Aircraft, Inc., Hawthorne, Calif., describes in its new circular the dye penetrant method of inspection for every kind of metal, using Dy-Chek. Dy-Chek is claimed to be a revolutionary chemical process used for manufacturing inspection, receiving inspection, and preventive maintenance.

INDEX TO ADVERTISERS
★ IN THIS ISSUE ★