WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

LISHED MONTHLY
UME XXIV, No. 9

SEPTEMBER 15 • 1949

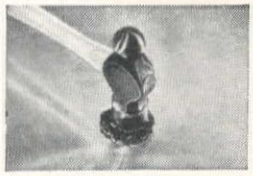
35 CENTS A COPY
$4.00 PER YEAR

A "HAIRPIN" places a pipe section in its framework of reinforcing steel on the $7,614,000 Soap Lake Siphon of the Columbia Basin Project. Prime contractors are Winston-Utah.

Bureau of Reclamation Photo.

STOP LOOK LESSEN

maintenance costs



HIT IT! *Marfak* won't splatter like ordinary grease — proof that heavy loads and rough roads won't hammer it out of spring shackles, tie rods and other chassis parts . . . that *Marfak* gives safer, longer-lasting protection with fewer applications.

TEXACO MARFAK assures longer life for all chassis parts

Texaco Marfak is the longer-lasting chassis lubricant that *stays on the job.* Heavy loads and rough service won't squeeze or jar it out of bearings. *Texaco Marfak* seals against abrasive dirt, keeps rust-forming moisture off metal. Parts last longer, maintenance costs less.

In wheel bearings, use *Texaco Marfak Heavy Duty.* It provides fluid lubrication inside the bearing, but retains its original consistency at the edges . . . sealing itself in, sealing out dirt and moisture. Protects against rust, too. No seasonal change is required.

For crawler track mechanisms, use *Texaco Track Roll Lubricant.* It assures longer life for all parts, and lower maintenance costs.

Let a Texaco Lubrication Engineer explain the Texaco Simplified Lubrication Plan, and show you how it can reduce costs all around. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

MORE THAN 300 MILLION POUNDS OF MARFAK HAVE BEEN SOLD!

TEXACO

TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

SO — YOU WANT IT ON RUBBER?

You want a machine that will get around fast — a chassis that will stand crane loads and crane conditions — good looking—protection for craneman and driver — a machine you can be proud to put your name on!

But, you want the crane practical — easy to operate — easy to care for. The Northwest "Feather-Touch" Clutch Control and Simplicity of Design brings you that! You'd like to be rid of that jerky swing action that is present in so many truck cranes and is so hard on the carrier — the Northwest Uniform Pressure Swing Clutches take care of that.

You'd like to be able to have a live boom, quiet operation, easy visibility, longer cable life, easy convertibility to truck-shovel, -dragline, and -pullshovel — the Independent High Speed Boom Hoist, the Helical Gear Drive, modern cab design, the cushion clutch, ball or roller bearing on all high-speed shafts and other Northwest features. The Northwest Truck Crane gives you all this and more. It's the smoothest, fastest truck crane on the market—a unit you can rely on in the heart of the job.

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135 South LaSalle Street
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only the best for the heart of the job
MAKE YOUR KEY MACHINE A REAL ROCK SHOVEL
PROFIT

MONEY-MAKER

ILLUSTRATED above is one of three T4 TRAXCAVATORS working on a new four-lane highway at San Pedro, California. These TRAXCAVATORS dug and loaded 21,000 yards of earth in six days . . . over 1,100 yards per TRAXCAVATOR per day!

This profit-making TRAXCAVATOR performance is being repeated on hundreds of jobs all over the country. TRAXCAVATORS are unequaled for digging and loading — for handling bulk materials — and for doing numerous other important construction and road-building tasks.

Get complete information about TRAXCAVATORS from your TRACKSON-Caterpillar dealer, or write direct to TRACKSON COMPANY, Dept. WC99, Milwaukee 1, Wisconsin.

TRAXCAVATOR

REG. U. S. PAT. OFF.

The Original Tractor Excavator

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Volume 24 **SEPTEMBER 15 • 1949** Number 9

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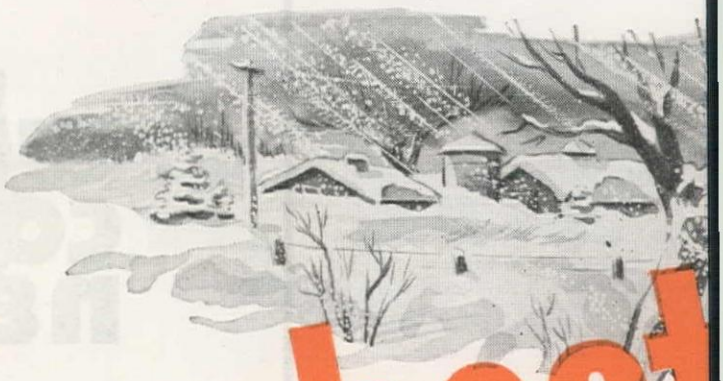
Covering Construction in the Western Half of the United States

BE READY FOR THE WORST WEATHER



with the best

CHOOSE THE SNOW PLOW 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
W-Speed Patrol	31.5	Gasoline

(Wings available for AD and BD models . . . scarifiers for all models, except W-Speed Patrol, for removing ice. Blade plow also built for W-Speed Patrol . . . and snow bucket for Model D.)

A-C CRAWLER TRACTORS with Baker "V" Plows and Wings

MODEL	DRAWBAR HP.	ENGINE
HD-10	86.63	2-Cycle Diesel
HD-7	60.10	2-Cycle Diesel
HD-5B	40.26	2-Cycle Diesel

(Also: Tracto-Shovel "V" plow and Snow Loader Bucket for HD-5G)

A-C WHEEL TRACTOR with Baker "V" or Blade Plow

MODEL	DRAWBAR HP.	ENGINE
IB	13.5	Gasoline

FOR OPENING HIGHWAYS . . .

. . . it's heavy-duty, diesel-powered Allis-Chalmers Motor Graders and Crawler Tractors with Baker snow plows. A right size to fit your conditions—but not one-job machines. Each model handles light or heavy plowing efficiently and economically. Provide instant starting and operation on diesel fuel! Exclusive tubular frame on A-C Motor Graders absorbs the shocks and strains that come from bucking heavy drifts. Tandem chain drive and proper weight distribution gives you the traction to keep moving through toughest going.

Also available—Baker snow plow for the new, low-cost Allis-Chalmers Model D Motor Grader with exclusive tandem drive. Gasoline powered, for light to average work . . . a money-saver on many jobs.

equipment

You can depend on A-C's to handle toughest snow removal at lowest cost— all through the winter

FOR LOADING OR PLOWING SNOW . . .

. . . it's the Allis-Chalmers HD-5 2-Cycle Diesel Tractor with a Tracto-Shovel light materials bucket or V-plow—both are interchangeable. Ideal for cleaning up streets, alleys, gasoline stations, parking lots . . . working around buildings, industrial plants, cemeteries, many other places. This same outfit, with other interchangeable attachments—dirt and rock buckets, bulldozer blades—handles all types of excavating and leveling . . . earns an income for contractors the year around . . . stretches city and highway budgets.

FOR CLEARING WALKS, DRIVEWAYS, PARKING AREAS . . .

. . . it's the Allis-Chalmers Model IB Industrial Wheel Tractor with broom or snow plow—"V" or blade type. Has mounting frame for quickly attaching or removing auxiliary equipment. Compact, fast, low center of gravity, short-turning radius, gasoline powered. Handles all kinds of jobs all year, at big savings.

ALL-AROUND PLOW

You can plow the toughest as well as the lightest drifts with this 17,000 lb., Allis-Chalmers HD-5 Tractor and V-plow attachment for the Tracto-Shovel. Has hydraulic tilt to break through any going. Crawlers work where rubber-tired equipment can't penetrate.

SEE YOUR ALLIS-CHALMERS DEALER

ARIZONA
Phoenix—Neil B. McGinnis

NORTHERN CALIFORNIA
Oakland—Buran Equipment Co.
Modesto—J. M. Equipment Co.
Fresno—Food Machy. & Chemical Corp.
Paso Robles—E. C. Livingston Co.
Sacramento—Moore Equipment Co., Inc.
Stockton—Moore Equipment Co., Inc.
Mountain View—Redwine Tractor Co.
Visalia—Tulare County Tractor Co.

SOUTHERN CALIFORNIA
Bakersfield—San Joaquin Tractor Company
Los Angeles—Shaw Sales & Service Co.

IDAHO
Boise—Olson Manufacturing Co.
Idaho Falls—Southern Idaho Equip. Co.

MONTANA
Missoula—Mountain Tractor Co.
Sidney—Northland Machinery Co.
Billings—Seitz Machinery Co., Inc.

NEVADA
Reno—Moore Equipment Co., Inc.
Elko—C. W. Paul Hardware & Machy.

OREGON
The Dalles—Mid-Columbia Supply & Equipment Co.
Eugene—Farm & Industrial Equip. Co.
La Grande—Oregon Tractor Co.
Medford—Tractor Sales & Service, Inc.
Redmond—Tri-County Equip. Co., Inc.
Klamath Falls—West Hitchcock Corp.
Portland—Wood Tractor Co.

UTAH
Salt Lake City—Cate Equip. Co., Inc.

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Walla Walla—Northern Harris
Spokane—Fred M. Viles & Co., Inc.
Yakima—Wikstrom Motors, Inc.

WYOMING
Casper—Studer Tractor & Equip. Co.

WHY "CATERPILLAR"

do more work at lower

Take a good look at your present scraper equipment. Sure, the machines are holding together. They're moving earth. But *can you afford* to keep them on the job, when competitors are using "Caterpillar" Scrapers—moving more yardage, faster, at lower costs?

On these pages are a few of the reasons why the "Caterpillar" Scraper is out ahead in profitable operation. Let your "Caterpillar" dealer show you other superior features. Then talk to him about trading in your old "pans" on the new machines he can supply.

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

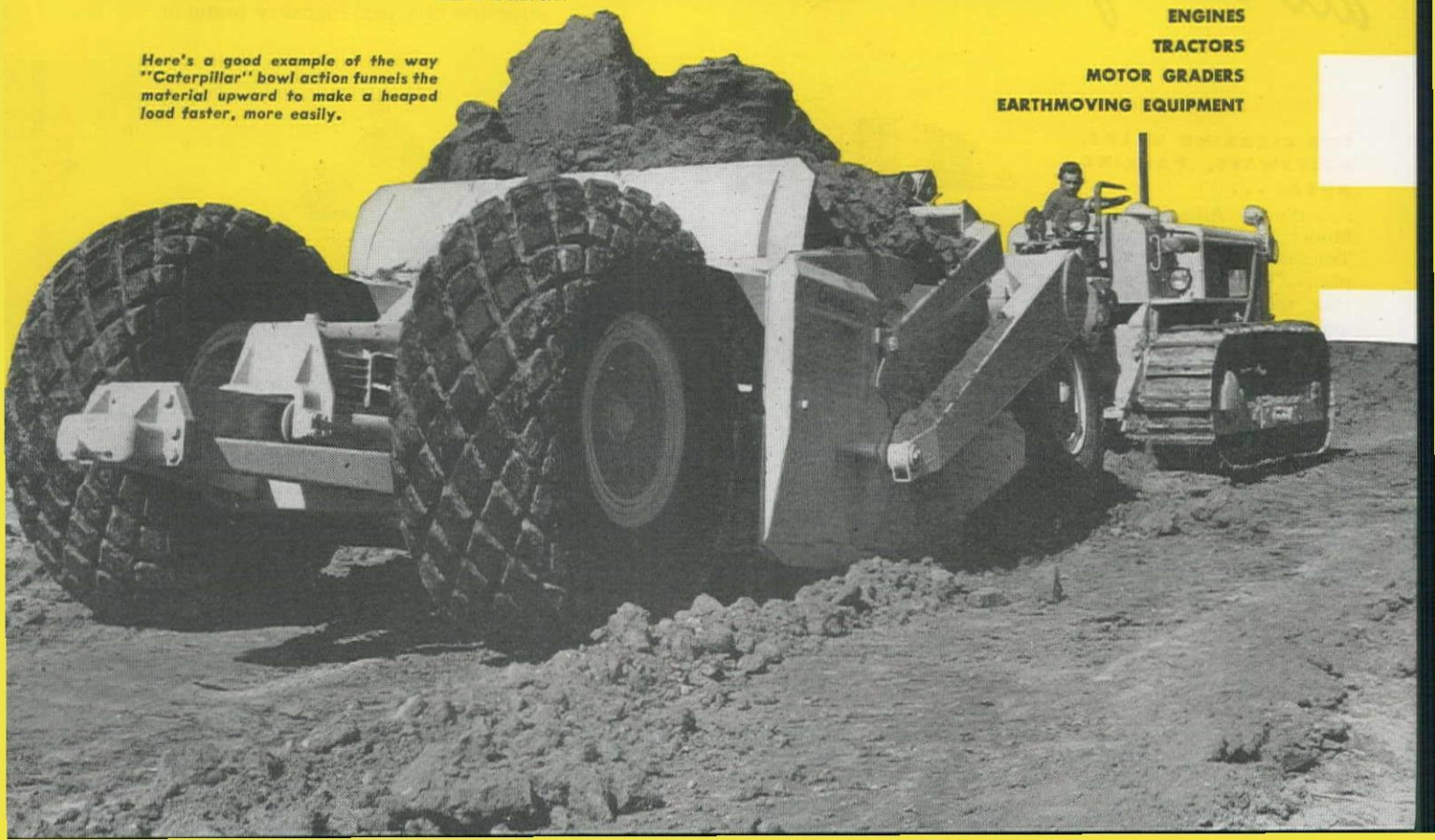
"Caterpillar" design, with positive ejection and high apron lift, gives you fast, clean dumping and smooth spreading on the fill.

CATERPILLAR DIESEL

REG. U. S. PAT. OFF.

ENGINES
TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

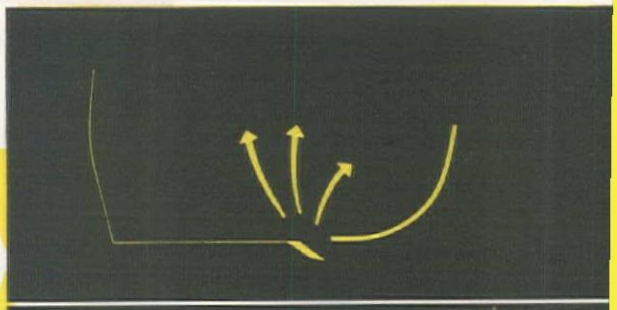
Here's a good example of the way "Caterpillar" bowl action funnels the material upward to make a heaped load faster, more easily.



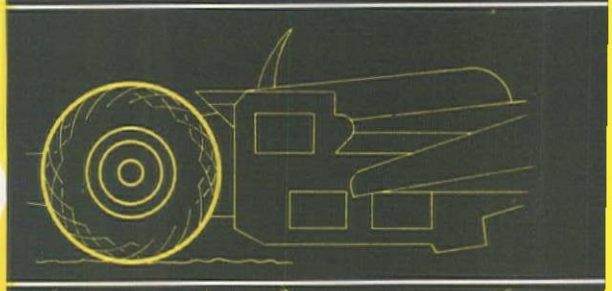
SCRAPERS

costs per yard

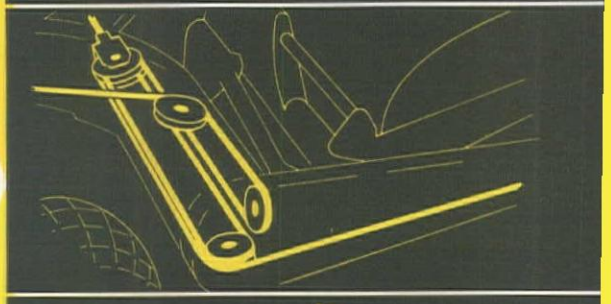
The "Caterpillar" Scraper blade is designed for *slicing* action in the cut. It digs faster, with less drawbar pull. And the apron is so designed that it won't clog the loading chute. It allows the material to *funnel* up from the blade without excessive packing.



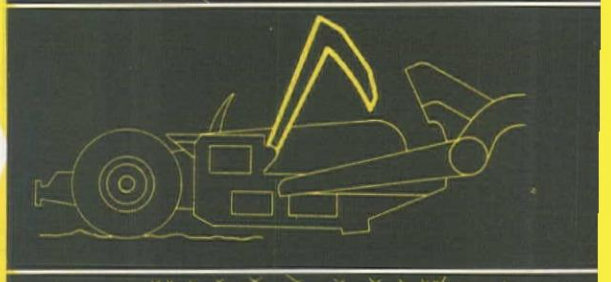
Bigger tires on the "Caterpillar" Scraper give low rolling resistance on the haul. That means higher travel speeds and more trips per day. Big tires also allow very low tire pressures for greater flotation in soft earth. You can operate in working conditions that would bog down the average scraper.



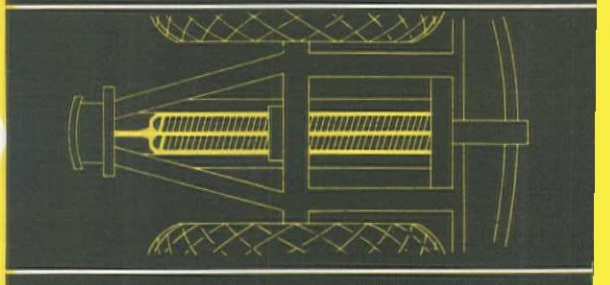
On the fill, the "Caterpillar" Cable Control system takes over to eject the material in smooth layers. Concealed sheaves and cable keep out abrasive material and result in longer cable life. Yet all cables can be replaced by a man standing on the ground. Sheaves are accurately aligned, heat-treated and machined, so that cable doesn't chafe or wear.



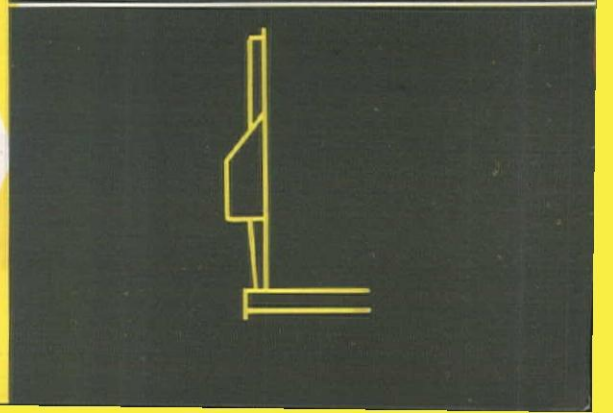
The apron lifts high, with no interference overhead. It is pivoted on the outside and well back on the bowl for ample load clearance when spreading material.



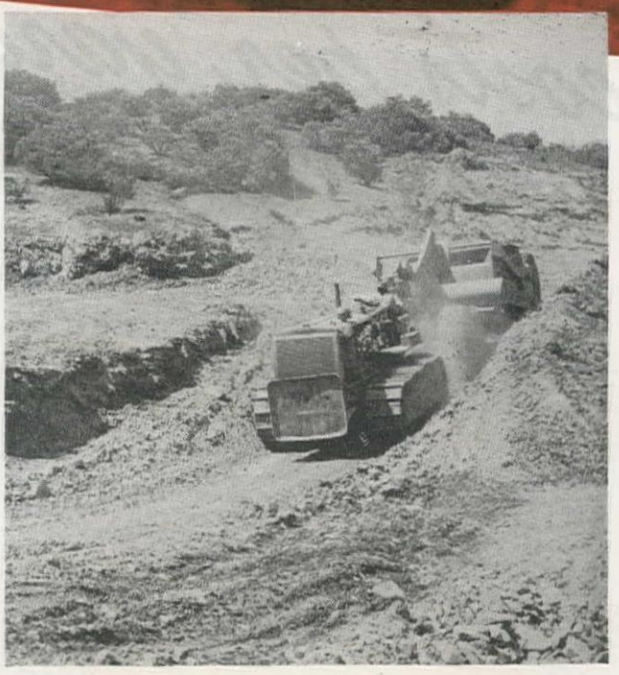
Four long flexible springs are hooked directly to the ejector plate to give a simple but dependable return action after a load is spread. Springs and ejector sheave systems are both well shielded from abrasive earth.



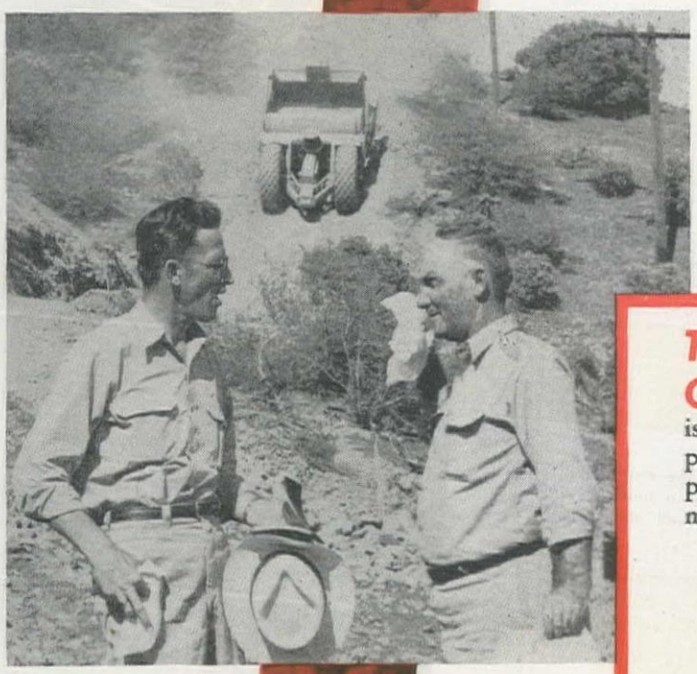
"Caterpillar" Scrapers are built to true "Caterpillar" quality standards. Box section double bottom and box section side walls, made from special high-tensile steels, are among the reasons why these units have exceptionally long work life.



"BEST LUCK



It's an up and down job all the way as big cats and Terra Cobras labor over decomposed earth. 15 cats, 5 tractors and scrapers, 3 Terra Cobras and a variety of shovels, grading and leveling equipment, trucks and cars are on the job.



Ralph Aberg, G. P. representative, comments on the weather in no uncertain terms to W. C. Smith, Heintz Co. job superintendent.

with G. P. Products

on a job that's no picnic"

says W. C. Smith

The R. A. Heintz Construction Company is rerouting eight miles of railroad around a lake to be formed by the new Keswick Dam northwest of Redding, California. W. C. Smith, superintendent, describes the job as "no picnic." It's up and down all the way with fills up to 80 feet deep. Equipment working in decomposed earth and in temperatures of 100° takes a beating. "We've had better luck on this job using G. P. fuels and lubricants 100% than we ever had previously with others. It's not only product performance but top service that has me sold."

The contract for the job gives Heintz 265 days in which to excavate and fill 995,000 cubic yards of rock and dirt. Earthmoving equipment of all kinds have been hard at it for 5 months. The variety of equipment and the tough operating conditions offer convincing proof of the high performance qualities of all products used. For example, Mobilgrease Track Roller (used on all tracked equipment) seals grease in and dust out. Mobilube gear oils high chemical stability results in longer gear life, requires less frequent draining. Delvac 700 keeps crankcases clean, leaves minimum deposits, decreases wear.

GENERAL PETROLEUM CORPORATION

Serving the West since the start of the Century

No Twist— No Stress— No Strain

with

Mack Six-Wheelers

• That's because only Mack six-wheelers have the advantage of Mack's famed Balanced Bogie. Here's an outstanding development that means unmatched flexibility . . . mastery of the toughest terrain without stress or strain.

The exceptional flexibility of the Mack Balanced Bogie insures equal traction, even tire loading and uniform braking on all four wheels. Exclusive Mack Power Divider assures traction at all times, regardless of terrain.

Simplicity and rugged strength are typified in the functional construction of the Balanced Bogie. Maintenance requirements are reduced to a minimum. Outside of the brake system only four points on the assembly require lubrication. No place in the suspension ever needs adjustment.

For detailed information on how this and other Mack features can cut costs and increase profits on your particular job, see your nearest Mack branch or dealer.

IT'S PART OF THE LANGUAGE

Built Like a

Mack

Truck

Mack-International Motor Truck Corp.—Los Angeles • Sacramento San Francisco • Seattle • Portland • Salt Lake City • Factory branches and dealers in all principal cities for service and parts.

Euclid Service - YOUR KEY TO LOWER COSTS!

Engineered and built for heavy off-the-highway hauling, "Eucs" are first choice for open pit mining and quarry operations, and for construction and industrial work. Proved on hundreds of the toughest jobs, Euclid low cost performance is backed by a world wide distributor organization with competent personnel and stocks of genuine Euclid parts.

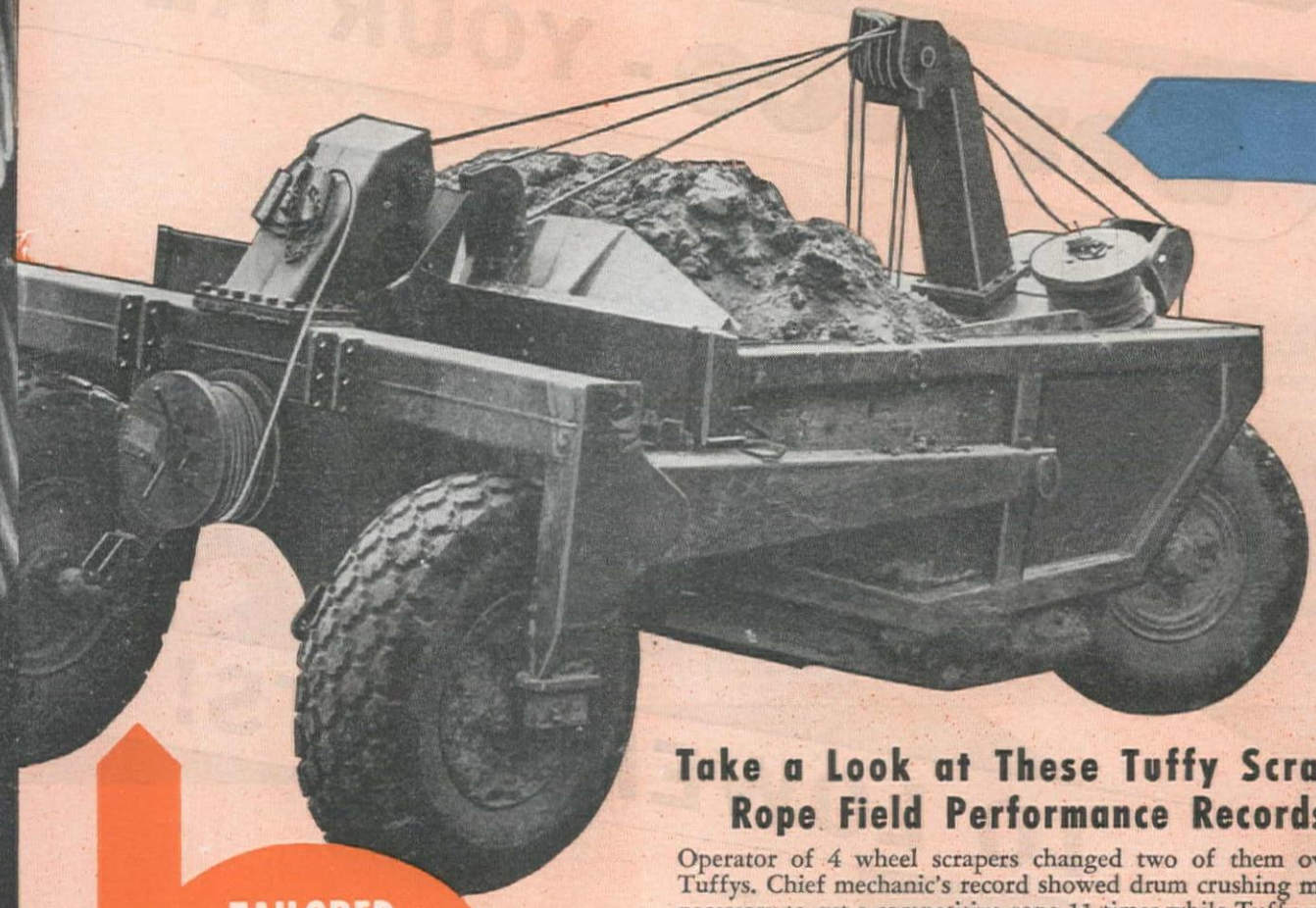
Euclid owners know they can depend on prompt and efficient service whenever needed to keep down-time and maintenance costs at a minimum. Your Euclid distributor will be glad to show you how dependable performance and fast on-the-job service can help to lower your hauling costs and keep your work moving on schedule.

First in field performance—first in service . . . these are Euclid plus values that add up to customer satisfaction.

The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

EUCLIDS *Move the Earth*

When You Order Ropes for Scrapers



TAILORED TO STAY WITH ANY WHEELED SCRAPER LONGER IN TOUGH GOING

Take a Look at These Tuffy Scraper Rope Field Performance Records

Operator of 4 wheel scrapers changed two of them over to Tuffys. Chief mechanic's record showed drum crushing made it necessary to cut a competitive rope 11 times while Tuffy needed to be cut only 4 times. Tuffy gave 33⅓% more service and became standard equipment on all rigs.

Tuffy Scraper Ropes are proving to be really 'Tuffy' up in this part of the country (Nebraska). They wear out instead of breaking up. Ship two more 300 ft. reels of Tuffy.

On April 1st, 1948, I placed two rolls of Union Rope on our scraper No. 3, and at the same time placed two rolls of another make of rope on scraper No. 1. Both worked about the same number of hours and performed about the same amount of work during the past working season. Scraper No. 1 had to be rewired whereas scraper No. 3 has about ⅔ roll of the new type (Tuffy) rope still on it.

UNION WIRE ROPE CORP

union Wire Rope

Specify Tuffy Trade Mark Scraper Rope

DESIGNED TO PICK UP AND LAY DOWN MORE LOADS OF "PAY DIRT"

Harnessing the power of a traction unit to the mechanical operation of a towed wheel scraper subjects wire rope to varied and severe abuses. For more than ten years, Union Wire Rope Engineers have made exhaustive field studies leading to the design of the new Tuffy rope construction for wheel scrapers tough enough to stand up longer under:

- **Greater drum crushing abuse.**
- **Sharper bends over smaller sheaves.**
- **Angle pulls through swivel mounted sheaves.**
- **Crawling on flanges of guide rolls and edges of sheave housing.**
- **Multiplied impact shock of load on slack lines.**

Changeovers to Tuffy Scraper Rope by operators of all makes of wheel scrapers have steadily mounted. Use on one scraper leads to changing over the whole fleet. This, and the regularity of repeat orders, is strong testimony of the extra yardage handling ability of Tuffy Scraper Rope.

For Longer Runs and Lower Cost Mount Tuffy Reels on Your Scrapers

Tuffy scraper rope is wound on special built reels with countersunk bolt ends. This eliminates hazards to the safety of operators. Reels are readily mounted on reel carriers. They hold up to 600 ft. of ½-inch, 500 ft. of 9/16-inch, with the Tuffy rope wrapped in waterproofing. No complicated specifications are necessary. In ordering from your Union Wire Rope distributor, simply say—

Tuffy Scraper Rope

_____ Reels _____ Feet
How Many Length

_____ inch in diameter

That is all it takes to bring you new scraper rope yardage records. Tuffy is Union-formed (pre-formed). It has the flexibility to withstand more bending over small sheaves, yet the stiffness to resist looping and kinking when slack; and on the crown of each strand, less length of wire is exposed to be torn or crushed out of shape. Specify Tuffy by the full reel—save re-threading time.

UNION WIRE ROPE CORPORATION

2146 Manchester Ave. Kansas City, Mo.

☐ Send New Folder on Tuffy Scraper Rope.

For Tuffy Scraper Rope—See Your Union Wire Rope Distributor (Listed in Yellow Section of Your Phone Directory) and/or send this coupon.

Firm Name_____

Address_____

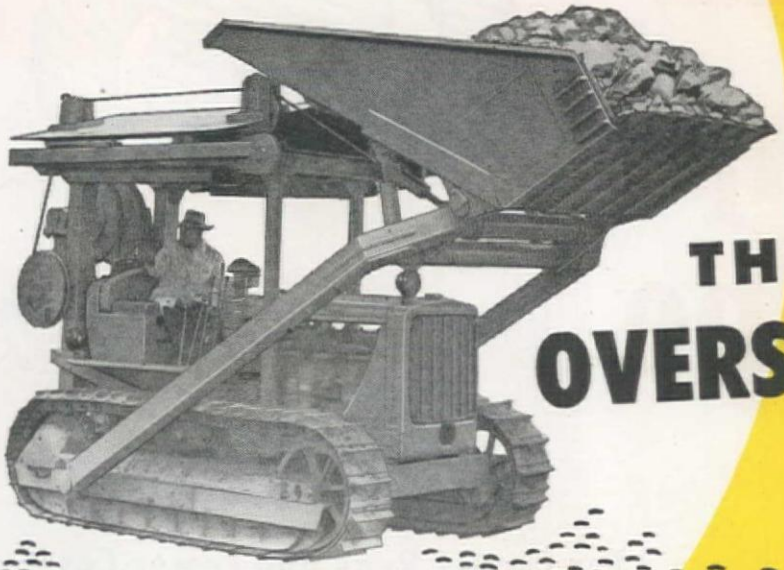
City_____ Zone_____

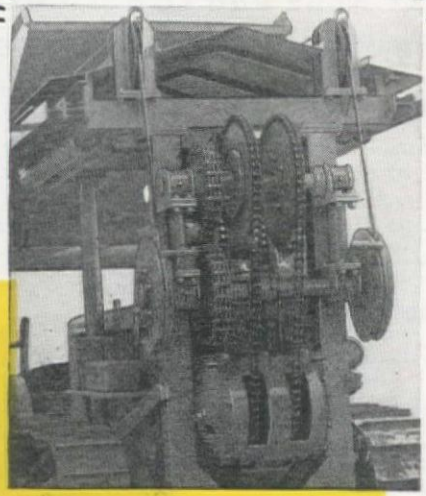
State_____

Cut Deep INTO LOADING COSTS

with

THE AUSTIN OVERSHOT LOADER!





Powerful, MECHANICAL drive. Multi-web chain wraps on two hubs, creating a variable speed — maximum power at the digging position, changing to speed as bucket is raised.

In one straight-line operation, this high-production low-cost loader digs, cleans, hauls, and dumps MORE BITES PER MINUTE than equipment of equal bucket capacity. Yes . . . 3 to 5 completed passes per minute for the 1½ and 2½ cubic yard (rated capacity) models!

No side swings. Brings big-capacity loading into tunnels, excavations and other tight spots where formerly only low-capacity, less efficient equipment could move.

MECHANICALLY OPERATED. Designed and built "dozer strong" by practical contractors who know the service demands. Take the punishment of toughest boulder and slab mucking with minimum maintenance and down time.

- **One man operation, one lever control.**
- **Operates on any late model crawler-type tractor.**
- **Special attachments install in a few minutes. Include dozer blade; special buckets for snow, coal, beets, etc.; forks for timber.**
- **Three models, for 1½, 2½ and 4 cu. yd. buckets.**

"LONG JOHN" AUSTIN—*holder of many world records for tunnel driving*—knows *what you want in loader speed, rugged stamina, versatility, and efficiency. The loader which bears his name will cut deep into loading costs—help you, too, bust records!*

WRITE FOR SPECIFICATIONS AND COMPLETE DETAILS

JOHN AUSTIN, INC.

LONGMONT, COLORADO

you earn MORE

with P&H

TRUCK CRANES

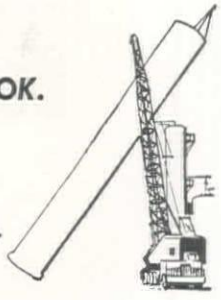
1 FAST TO THE JOB!

Travel one or one hundred miles, swiftly, safely, economically. Its travel engine built for this job, provides more than two times the power required for hoisting.

2 FAST ON THE JOB!

Here, the upper engine, ruggedly *built* for sustained hard service, takes over. It's the right power that's geared right for selective line pulls and line speeds — it's fast on all types of jobs.

3 MORE ON THE HOOK.



Not just a claim, but proved by operators on all kinds of jobs — size for size no P&H Truck Crane has ever been outlifted. This means handling a wider range of jobs with the ability also to tackle those unusual assignments.

Note These P&H Added Values

- Hydraulic control — a new peak in operating ease and safety.
- Greater stability — with exclusive torsion bar-mounted front axle and lower center of gravity.
- Independent planetary boom hoist — raises or lowers crane boom smoothly and safely, with or without load.
- Planetary load lowering — permits "inching" of loads accurately.
- All-welded construction—greater strength.

P&H REMOTE CONTROL — with this unit you can control all functions (even the horn!) by electric push-buttons — from the operator's position inside the crane cab.

More and more busy operators are buying P&H Truck Cranes, (wholly built by P&H, trucks included) because of their unique earning power. Get the full story. Write for literature now.

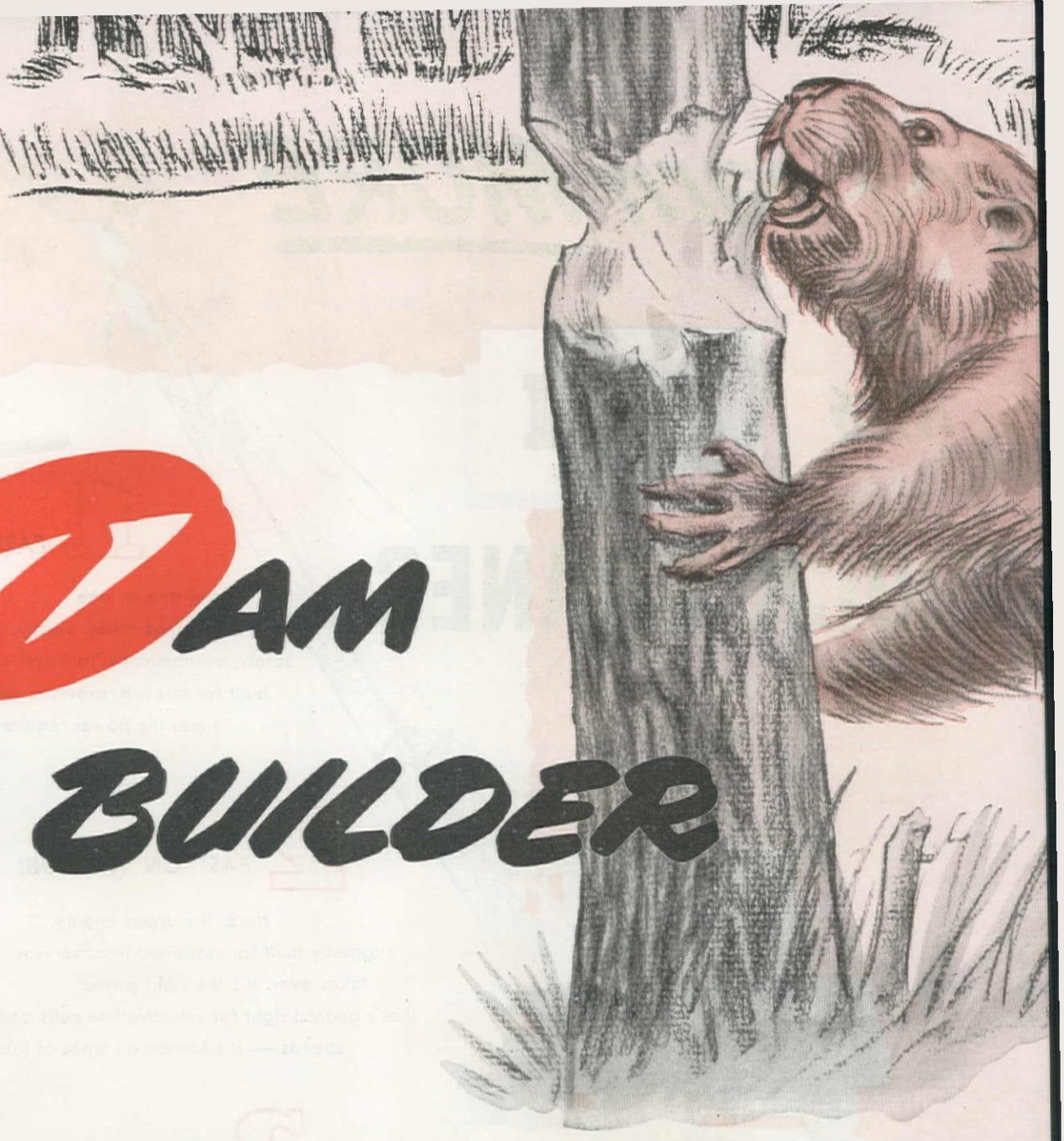
P&H TRUCK CRANES
4490 W. National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

SIZE FOR SIZE NO P&H TRUCK CRANE HAS EVER BEEN OUTLIFTED

HARNISCHFEGER CORPORATION: SAN FRANCISCO, Calif., 82 Beale Street
Warehouses Service Stations: SEATTLE, LOS ANGELES, SAN FRANCISCO
PORTLAND 14, Oregon, Loggers & Contractors Machinery Co., 240 S.E. Clay St.; **WILLOWS, Calif.,** Willows Motor Sales Co.; **BAKERSFIELD, Calif.,** Kern Tractor & Equipment Co., 24th & N. 99 Highway, P. O. Box 1695; **NAPA, Calif.,** Berglund Tractor & Equipment Co., 1016 Soscol Ave.; **SALT LAKE CITY, Utah,** Western Machinery Co., 748 West 8th, South; **BOISE, Idaho,** Olson Manufacturing Co., 2223 Fairview Ave.; **EL CENTRO, Calif.,** Faure Tractor & Equipment Co., 1414 Main St.; **SEATTLE, Wash.,** Bow Lake Equipment Co., 16826 Pacific Highway; **FRESNO, Calif.,** Allied Equipment Co., 1824 Santa Clara St.; **SAN DIEGO, Calif.,** Southern Equipment & Supply Co., 2025 South Harbor Drive; **SPOKANE 8, Wash.,** F. M. Viles & Co., Inc., East 124 Trent Ave.; **RENO, Nevada,** Jenkins and McCloud 1131 West Fourth St.; **SEATTLE 4, Washington,** Glenn Carrington & Co., 91 Columbia St.; **LOS ANGELES, Calif.,** Lee & Thatro Equipment Co., Inc., 820 S. Santa Fe Ave.; **SACRAMENTO, Calif.,** Sacramento Valley Tractor Co., Broadway at 19th St.

EXCAVATORS • OVERHEAD CRANES • ARC WELDERS and ELECTRODES • SOIL STABILIZER • CRAWLER and TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PREASSEMBLED HOMES



DAM BUILDER

Matchless ability to hang on to a load and put dirt where you want it *fast*—that's the kind of performance you get from International Diesel Crawlers on any earthmoving job. *Built to outperform,* to dig in and do, with diesel power that *exceeds* today's exacting requirements!

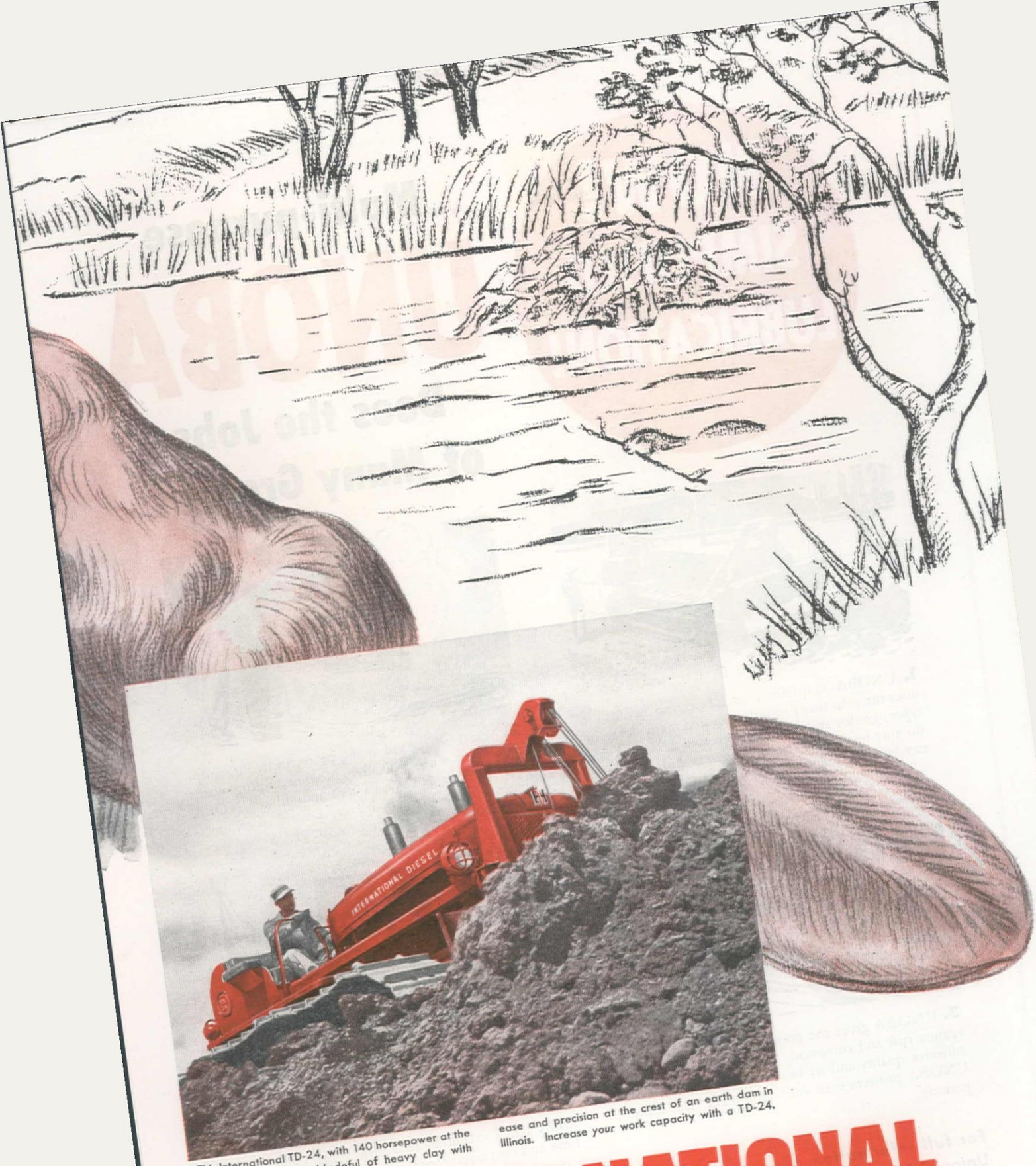
Quick to get to work; with in-built, all-weather starting—and quick to do the work; with 8 speeds ahead, 8 in reverse and finger-tip speed and steering control—International TD-24 turns in record after record of unbeatable work performance.

On dams for soil conservation as well as the great flood-control and hydro-power earthworks, this modern, diesel crawler is the tractor to use for all your tough jobs. Contact your International Industrial Power Distributor for TD-24's now.

INTERNATIONAL HARVESTER COMPANY
CHICAGO

Standardize on Power that Pays

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS



This International TD-24, with 140 horsepower at the drawbar, delivers a bladeful of heavy clay with ease and precision at the crest of an earth dam in Illinois. Increase your work capacity with a TD-24.

INTERNATIONAL HARVESTER

INTERNATIONAL
INDUSTRIAL POWER

NOW! SIMPLIFIED LUBRICATION!

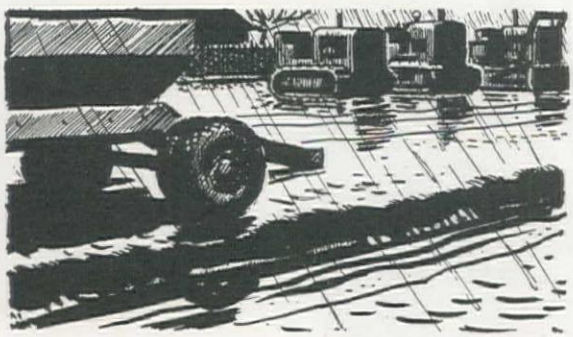
Multi-purpose

UNOBA

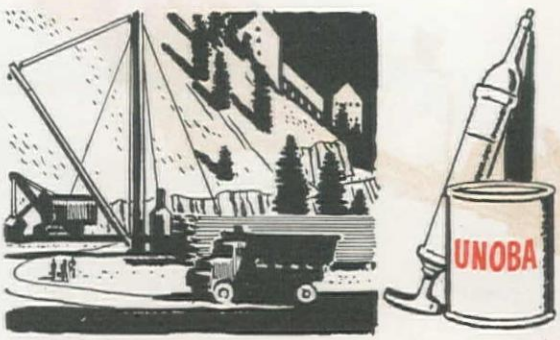
Does the Jobs of Many Greases

1. UNOBA simplifies your lubrication because it does the jobs that formerly required many different types, grades and brands of greases. UNOBA can do this because it resists *both* heat and water and can be used under almost all operating conditions.

2. You'll be amazed at the protection your equipment gets with UNOBA. Neither boiling water nor dry heat can cut its tenacious film. UNOBA maintains its smooth, buttery texture at temperatures from below freezing to 300° F.!



3. UNOBA gives the greatest possible defense against rust and corrosion. Because of its unusual adhesive quality and its heat and water resistance, UNOBA protects even idle equipment over long periods.



4. UNOBA reduces costs, saves you time! With UNOBA you need use only one gun and one container in most cases. Thus this multi-purpose grease holds stock inventory to a minimum, saves you time and cuts equipment costs.

For full information phone your local Union Oil Representative or write Sales Department, Union Oil Company, Los Angeles 14, California.

76 UNOBA

UNION OIL COMPANY OF CALIFORNIA

Barber-Greene

UTILITY Bituminous Mixing Plant

EASIER TO ERECT!

SOME OF MANY REVOLUTIONARY FEATURES!

- *True portability* in every unit
  Faster erection without cranes or heavy equipment
- *No cribbing* necessary
- *Adaptability* to widest variety of jobs and mixes
- *Built-in* Gradation Control
- *Built-in* Elevators on Dryer and Mixer
- *High Discharge Dryer*—eliminates hot elevator pit
- *Two, three or four-bin* aggregate gradation

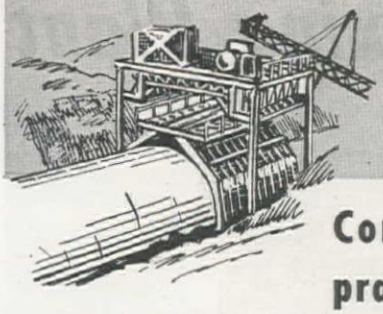
This new Barber-Greene Bituminous Mixing Plant was developed to meet specifically the need for a more completely portable, easier-to-erect plant with a capacity in the 60-ton per hour range. Here is a plant that makes the most of manpower — that minimizes the time required for setting up or dismantling — yet retains all the basic B-G advantages of accurate volumetric measurement and proportioning of aggregate and bitumen. The Utility Plant is all this and more, for it can be adapted to produce a constant flow of all types of mixes including the highest types. Each of its basic units incorporates new improvements in design to achieve the maximum in portability, simplicity in erection and operation.

Before bidding on any bituminous job, get full information on this new, advanced design Utility Plant.

FOR SALE BY:

BROWN-BEVIS EQUIPMENT CO., Los Angeles 11, 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.

HOW TO WIN CONTRACTS AND MAKE PROFITS ON CONCRETE JOBS



Consult Noble's Steel Forms Division, staffed by practical experts and engineers... let them help you

No matter what type of concrete construction you're figuring... **Siphons • Bridges • Walls • Conduits • Tunnels • Gravity and multiple arch dams...** you get practical help on estimating, designing, custom-building and installing steel forms. Actual field experience, plus our engineering "know how," enables us to solve your steel forms problems in ways that save you time, money, headaches.

YOU BENEFIT FROM "KNOW HOW" GAINED ON THESE BIG JOBS

The helpful experience we bring to your job was gained by 20 to 30 years work in designing, building, installing and trouble-shooting steel forms on these and other like concrete jobs—

Los Angeles Aqueduct	**Shasta Dam**
Friant-Kern Canal Siphons	**Bozeman RR Tunnel No. 2**
Moffat Water Tunnel	**Coachella Valley Canals**
New York Aqueduct	**Bartlett Dam**

Noble telescoping horseshoe tunnel form built for the Second Mokelumne Project. Contractor, Utah Construction Co.

COMPLETE SERVICE FOR YOU

Take advantage NOW of this Noble "know how." Noble engineers will gladly help you estimate, design, build and install steel forms for your concrete jobs. No obligation. Wire, phone or write Wm. H. (Bill) Schutte, Steel Forms Division, Box 39 W.

Noble hydraulically-controlled jumbo telescoping round tunnel forms built for Big Thompson Project. Contractor, Tunnel Constructors.

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

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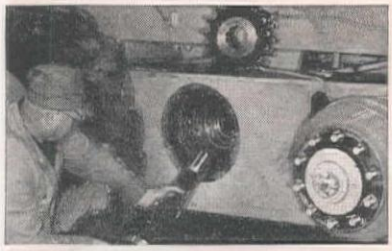
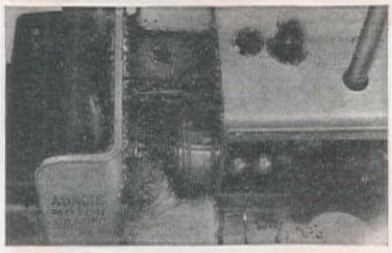
Adams Motor Graders

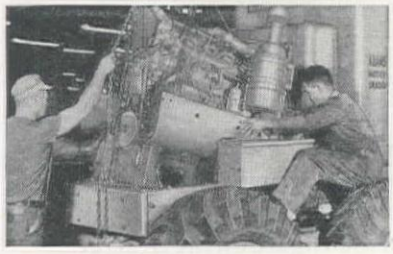


REAR AXLE REPLACED BY 1 MAN IN FROM 2 TO 4 HOURS



CLUTCH OVERHAUL REQUIRES 1 MAN 4 HOURS OR LESS

TRANSMISSION REMOVED BY 2 MEN IN 2½ HOURS OR LESS



ENGINE REMOVED BY 2 MEN IN 3 HOURS OR LESS

DESIGNED BETTER FOR FAST SERVICING

Fewer hours in the shop—more hours on the job . . . that's what the fast, easy-servicing features of Adams Motor Graders mean to owners. Note in the accompanying photographs how usually difficult major repairs are accomplished in minimum time, with minimum effort.

BUILT STRONGER FOR TOUGH WORK

On the job, owners quickly discover that Adams Motor Graders have abundant power, strength and stamina—plenty of everything it takes for handling roughest, toughest work . . . for punching shale out of hillsides—making heavy ditch and bank cuts—scarifying hard surface material—bucking through deep snow drifts, etc.

Let your near-by dealer show you how Adams Motor Graders save you time and money—*on the job and in the shop.*

See Your Local ADAMS Dealer

J. D. ADAMS MFG. CO.
Western Factory Branch
San Francisco, California
Adams Distributors at: Oakland, Los Angeles, Sacramento, Redding, Riverside, San Jose, Fresno, Stockton, Salinas, Santa Rosa, Modesto, Visalia, Merced, Bakersfield, Santa Maria and San Diego, Calif.

THE O. S. STAPLEY CO.
Phoenix, Arizona

McKELVY MACHINERY CO.
Denver, Colorado

INTERMOUNTAIN EQUIPMENT CO.
Boise and Pocatello, Idaho
Spokane, Washington

INDUSTRIAL EQUIPMENT CO.
Billings and Missoula, Montana

NORMONT EQUIPMENT CO.
Great Falls, Montana

NEVADA EQUIPMENT SERVICE
Reno, Nevada

CLARK COUNTY WHOLESALE MERCANTILE CO. INC.
Las Vegas, Nevada

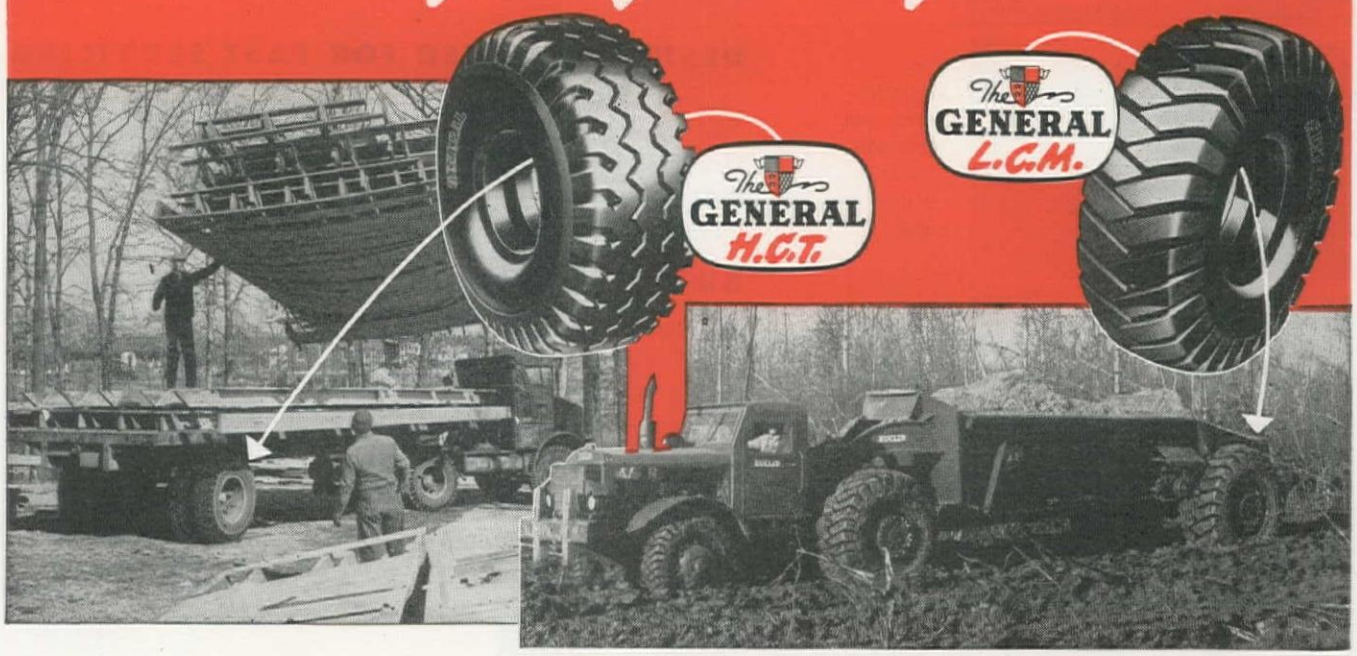
J. D. COGGINS CO.
Albuquerque, New Mexico

HOWARD-COOPER CORPORATION
Portland, Ore., Seattle, Wash.

THE LANG CO. INC.
Salt Lake City, Utah

GLENN CARRINGTON & CO.
Fairbanks, Alaska

GENERALS ARE DOING AMAZING JOBS *Every Day... Everywhere!*



The *General H. C. T.* Truck Tire is designed with a deep, zig-zag tread that disperses loads over more of the stronger carcass. Tremendous rubber lugs form wide, sturdy reinforced shoulders. Through off-the-highway sand, gravel and mud, out and over-the-road the *General H. C. T.* delivers the load faster, safer, at lower cost. More rubber, more strength for more original miles — more dependable recap miles.

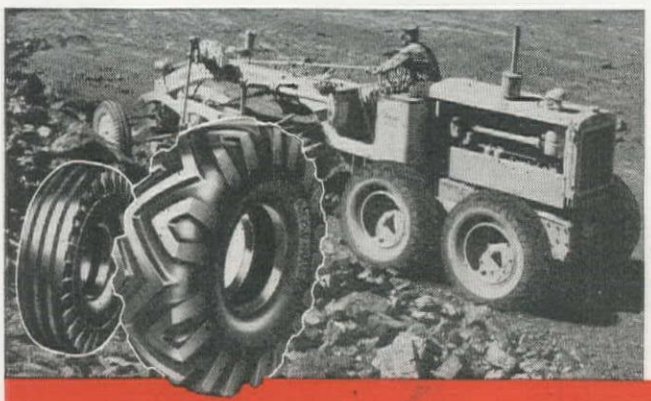
★

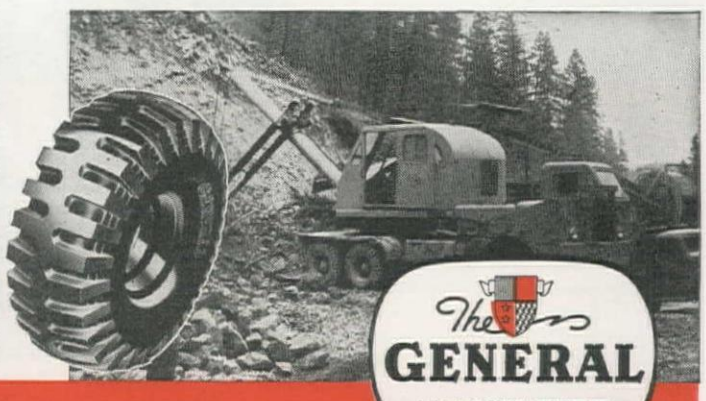
The General Tractor Grader Tire is built with thick, angled lugs of rubber that develop extra drive-wheel traction forward and backward. The deep-ribbed General Ribbed Grader for front or trailing wheels steer easier, last longer.

It is easier to figure any job anywhere on Top-Quality Generals and come up with more profit per load. If the job calls for 80% off-the-highway and 20% over-the-road then figure on the *General L. C. M.* Massive lugs of rubber angle over wide, sturdy shoulders for more flotation in soft going . . . more traction on any surface. And on-the-highway the *General L. C. M.* rolls smoother, steers easier, lasts longer, rides safer — rain or shine.

★

For extra drive-wheel power and traction in soft ground, sand and gravel, use the deep-ribbed General Non-Directional Cleated with the self-cleaning tread that digs deep, goes straight.





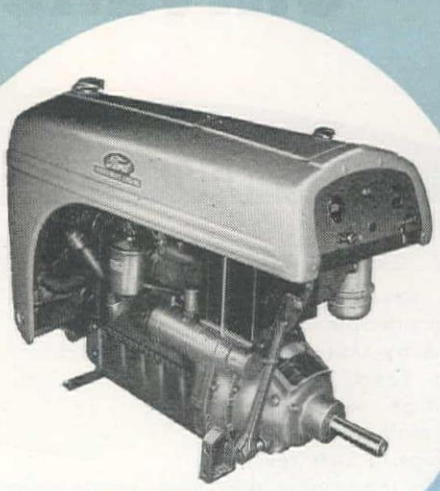
THE GENERAL TIRE & RUBBER CO., AKRON, OHIO

You're Right 3 Ways with FORD POWER!

1 **RIGHT POWER** for your job . . . your choice of five great models in the Ford Industrial Engine line.

2 **RIGHT FEATURES**—all the latest advancements of Ford's progressive engineering are yours in Ford Industrial Engines.

3 **RIGHT SERVICE**—world-wide facilities of Ford Dealers keep Ford power always on the job, save you time and money.



Ford 120 Four Cylinder Industrial Engine Power Unit (120 cu. in. displacement)

Vacuum sweeping principle is used in the "Leaf and Litter Collecting Unit," manufactured by the Good Roads Machinery Corp. of Minerva, Ohio, to remove debris from along street curbs and around drain openings. A Ford 120 four cylinder Industrial Engine Power Unit provides the power for suction blower, shredder and hydraulic body dumping mechanism. Leaf compartment holds 14 cubic yards, is equipped with filters to eliminate dust.

For power, pick Ford! There's a model *just right* for your application in the great Ford Industrial Engine "Power-Family"—a "four" with 120 cu. in. displacement . . . two "sixes"—226 cu. in. and 254 cu. in. displacement . . . two "V-eights"—239 cu. in. and 337 cu. in. Each one completely new, the *right* power for you—for farm implements, construction, standby units, material handling, pumping, many other important uses. Write today for complete specifications.

INDUSTRIAL ENGINE SALES DEPARTMENT

FORD MOTOR COMPANY

Dearborn, Michigan

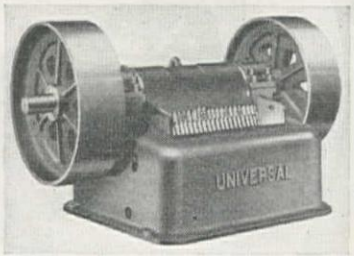
YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

IN STATIONARY AND PORTABLE CRUSHING PLANTS

UNIVERSAL BASIC UNITS MEAN MYPH AT LCPY

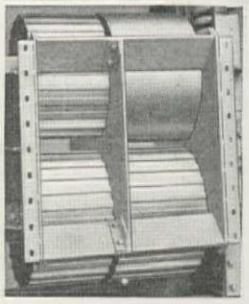
MORE YARDS PER HOUR AT LESS COST PER YARD

UNIVERSAL JAW CRUSHERS



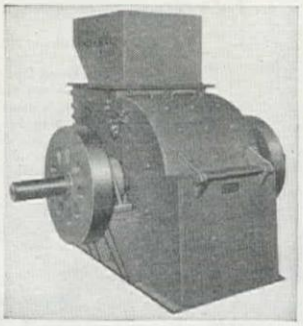
With overhead eccentric principle originated by Universal. Force feed, force discharge. 4 types with plain or roller bearings. Tough reversible manganese steel jaws, simple adjustment for product size. A size and capacity to meet every need. Series "SL" Streamline illustrated. Bulletin 100B.

UNIVERSAL TWINDUAL ROLLS



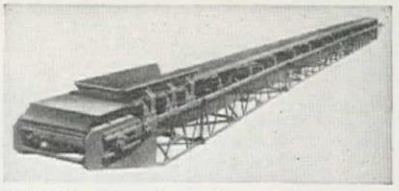
Exclusive with Universal 293-Q Portable Quarry Plant, the Twin Dual Master Gravel Plants, and TwinDual Secondary Plants. Two stages of secondary reduction with one crusher. Permits up to 100% wider primary discharge opening. Amazing capacities and lower maintenance cost. Bulletins 31AA, 682A and U30S.

UNIVERSAL HAMMERMILLS



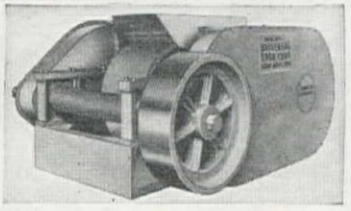
For profitable production of aglime and road rock up to 1½ inch. Roller bearing, welded steel plate construction. Manganese steel hammers and liners. Made in 4 sizes with capacities up to 100 tons per hour. Ask for bulletin 55B.

UNIVERSAL CONVEYORS

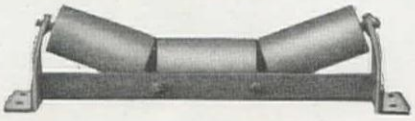


Sectional lattice or channel types. Rigid construction, easy to move—easy to set up. Anti-friction bearings throughout. Troughing rolls and return idlers are equipped with sealed-for-life bearings. Self-cleaning pulleys are provided where needed to protect belts. Available in multiples of 4′ lengths in 18, 24, 30, and 36 inch belt widths. Portable type has hydraulic hoist truck. Ask for Bulletin 46-7A.

UNIVERSAL DOUBLE ROLL SECONDARY CRUSHERS



Star gear final drive. Roller bearings, manganese steel roll shells. These crushers feature simplicity of design, greater capacity, double safety against tramp material, easy adjustment for product size, and strength for the toughest jobs. Built in sizes to meet every secondary crushing requirement. Bulletin 6B.



UNIVERSAL TROUGHING ROLLS

Made of heavy seamless steel tubing with end sections rolled in place. Self-aligning shaft locked in position. Mounted on a combination welded and pressed steel base and brackets. Anti-friction sealed-for-life bearings. A complete line of conveyor parts for new construction or repairs. Details in Bulletin 46-7A.

Other Basic Units available include: GYRATING AND REVOLVING SCREENS, ROTOVATOR, SCRUBBERS, SAND SCREWS, LOG WASHERS, STEEL BINS, AND APRON FEEDERS

UNIVERSAL ENGINEERING CORPORATION

323 8th ST. N. W. • CEDAR RAPIDS, IOWA

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J. K. Wheeler Machinery Co. ..... **Salt Lake City 1, Utah**

Move more yardage today with the Scraper of tomorrow!

WOOLDRIDGE Model TC-142

14.2 cu. yds. struck, 17.5 cu. yds. heaped

BETTER!

Even faster loading is achieved by instant penetration of new 3-piece cutting edge. WIDER 65-inch apron opening and new curved ejector allow faster complete discharge of load. The rugged new TC-142 is built to "take" the heavier stresses imposed by today's more powerful tractors. Modern formed steel construction minimizes welding, increases structural strength. Higher yoke and ground clearance make maneuvering easy.

PROVED!

Proved Wooldridge advantages have been maintained. Original boiling bowl loading permits heaping volumes to surge freely into bowl. Pivot-tilt forced ejection dumps load faster with less cable strain. Rear-draft fulcrum leverage insures positive blade penetration. Cable is easily accessible, simply reeved over minimum of sheaves, all located away from load.

PROFITS!

Job-proved, clean-lined, this IS the scraper of tomorrow—for greater production—for minimum operating cost—for highest profits TODAY! Contact your dealer or write for Bulletin TC-202 now for details. Other Wooldridge Scrapers from 7.5 to 27.5 cu. yd. heaped capacities.

TERRA COBRA high-speed self-propelled earthmovers.
14.0 cu. yds. struck.
17.5 heaped.

RIPPERS

BULLDOZERS

POWER CONTROL UNITS

WOOLDRIDGE MANUFACTURING CO.
Sunnyvale, California, U. S. A.

WOOLDRIDGE EARTH MOVING EQUIPMENT

PROVED AND APPROVED FOR EVERY TYPE OF EARTH-MOVING JOB

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

HEATING AND VENTILATING EQUIPMENT


Air Conditioning Equipment


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Ventilating Fans

Stokers

POWER DISTRIBUTION EQUIPMENT

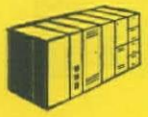

Unit Substations


Power Centers


Bus Duct


Control Centers

Panelboards


Ignitron Unit Substations


Dry Type Transformers


AB-1 Circuit Breakers


Mechanical Drive Turbines


Load Centers


Meters and Instruments


Safety Switches


Power Transformers


Capacitors

LIGHTING EQUIPMENT


Office Lighting Equipment


Vapor-tight and Dust-tight Luminaires


High Bay Luminaires


Industrial Lighting Equipment


Silvered Bowl Diffusers


Lamps

CONSTRUCTION AND BUILDING EQUIPMENT


Welding Equipment


Floodlighting


Freight Elevators


Motors and Controls

Water Coolers

Passenger Elevators

*Reg. U. S. Trademark

ONE SOURCE ONE RESPONSIBILITY for *Everything* electrical

For commercial construction projects, your entire electrical needs can be supplied by Westinghouse. This fact will benefit you, no matter what part you play in the project.

Architects and engineers: We can help you develop the most efficient ways to distribute, control and utilize electric power. Our engineering specialists have broad experience covering all types of applications.

Contractors and builders: Simplify your buying procedures by ordering all electrical equipment and supplies from Westinghouse. Our organization is geared to give you prompt delivery for integrated installation.

Owners and operators: You get top performance from your electrical equipment because we co-ordinate the design and manufacture of related apparatus. And our nationwide chains of Renewal Parts Warehouses and Manufacturing and Repair Plants provide unmatched maintenance service.

When you have CONSTRUCTION AHEAD . . . whether commercial, residential or industrial . . . call your nearest Westinghouse District Office or Distributor for full information. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-94793

Practical, Easy-to-Use Buying Data

This 362-page book contains detailed information on Westinghouse products for the construction industry. It was designed to meet the requirements outlined by Architects and Engineers themselves.

Industry-wide distribution has already been made. If you do not already have your copy, ask your nearest Westinghouse District Office to send you B-2161-D.

Westinghouse

Prolong Equipment Life with VICTOR'S NEW Hard-Surfacing Rods

Complete line, designed for use on cutting, drilling, crushing equipment in the construction, mining, logging, oil and metal-working industries

CAST ALLOY WELDING ROD—*VICTORITE*—for both acetylene and electric (AC and DC) application. Recommended for plowshares, cultivators and farm tools subject to earth abrasion.

CAST NON-FERROUS ALLOY ROD—*VICTOR HS1*. Contains cobalt, chromium and tungsten. Designed for acetylene and AC or DC, reverse polarity. Recommended for saw teeth, carbon scrapers, wire guides, and other tools requiring resistance to corrosion, heat and abrasion.

FOR HARDNESS AND WEAR RESISTANCE AT RED HEAT use *VICTOR HS6*. Similar to **VICTOR HS1**, but more ductile. Use it for exhaust valves; blanking, forming and trimming dies; cams, hot punches, and parts subject to corrosion, abrasion, heat, and impact.

WHERE SEVERE ABRASION IS ENCOUNTERED, use *VICTORTUBE*. Contains tungsten carbides of varying screen sizes in steel tube. Designed for either acetylene or electric application, and recommended for scarifier teeth; dredge cutter blades, posthole augers, oil field tools and equipment, and other like tools.

FOR THIN CUTTING EDGES such as coal cutter bits, brick augers, pug-mill knives and similar tools, use **VICTOR TUNGSMOOTH.** Similar to **VICTORTUBE,** but tungsten carbide particles are of varying fine meshes incorporated with a flux allowing smooth and thin deposits. For acetylene application.

FOR EQUIPMENT SUBJECT TO BOTH ABRASION AND SEVERE IMPACT, VICTORALLOY is recommended. Fabricated rod of mixed alloys contained in mild steel tube. Use on tractor rollers, dredge pump impellers, bucket lips and teeth, rock crushers, steel mill wobblers, etc.

Distributors write NOW for attractive deal on Victor Hard-surfacing Rods.

VICTORTUBE "SPECIAL" — Bare rod for oxy-acetylene application, 37½% tungsten carbide, 30 mesh and under.

See for yourself how these NEW, HARD-SURFACING RODS by VICTOR prolong the cutting and drilling life of equipment. Try them NOW. Get your supply from your VICTOR dealer today.

VICTOR SUPER-TITAN BLASTING NOZZLES
for sandblasting, foundry and heat treating, glass and monument decorating, building cleaning, railway and shipyard maintenance and cleaning. Sizes and types for every need.

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Welding and cutting equipment

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.

You're ready for anything when you put this Timken rock drilling team to work.

With a supply of Timken standard steel bits and Timken carbide insert bits on hand, plus a suitable number of shouldered and threaded steels, you're ready to meet — and beat — any rock condition that may crop up.

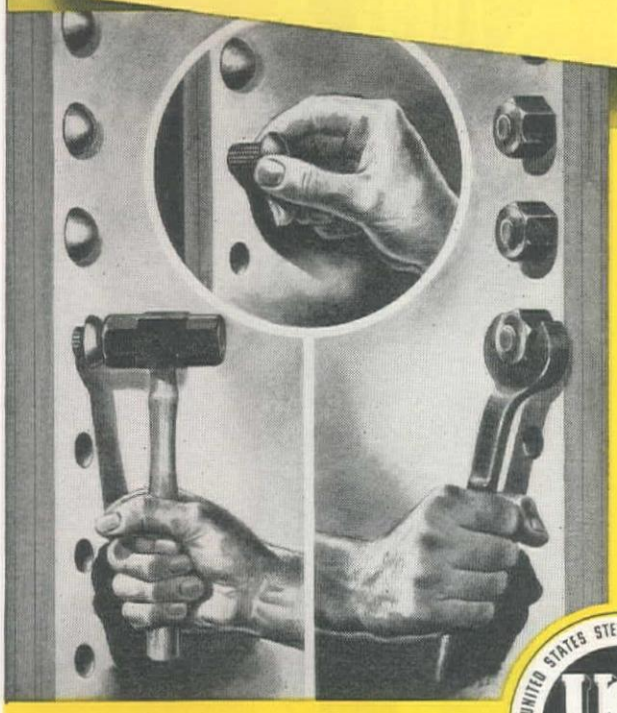
You don't have to carry two kinds of steels; Timken standard steel bits and Timken carbide insert bits are interchangeable on the same Timken thread — the threaded union proved by 17 years use wherever rock and ore are drilled.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

Write for specific information covering your requirements.

THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO
Cable Address "TIMROSCO"

Erect your Structural Steel . . . with a man a maul and a wrench!



Dardelet "Rivet Bolts" make it possible for you to do just that. And that includes all kinds of building jobs—from the smallest to the largest. These self-locking "Rivet Bolts" are unexcelled for holding steel members together—regardless of the severity of the work they must do. Stronger, faster to handle than rivets, their superiority has been proved in construction as well as in the repair of all kinds of machinery and equipment.

For complete information, and a sample Dardelet "Rivet Bolt," simply fill in and return the coupon.

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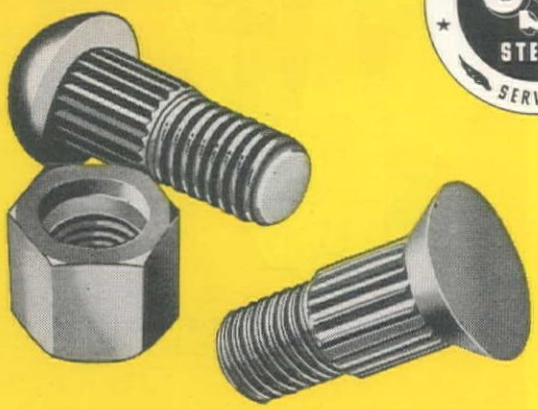

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208 S. La Salle St., Chicago 4, Ill.
Without obligation on my part, please send me a sample Dardelet "Rivet Bolt" and literature on its use.

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UNITED STATES STEEL

These Vital Parts fit *ALL* GM "71" DIESELS

Every GM Series 71 Diesel engine, whether a two-cylinder or one of a Quad 6, *has the same bore and stroke.* This means that practically all moving parts are exactly the same for any size Series 71 engine from 43 to 520 continuous B.H.P.

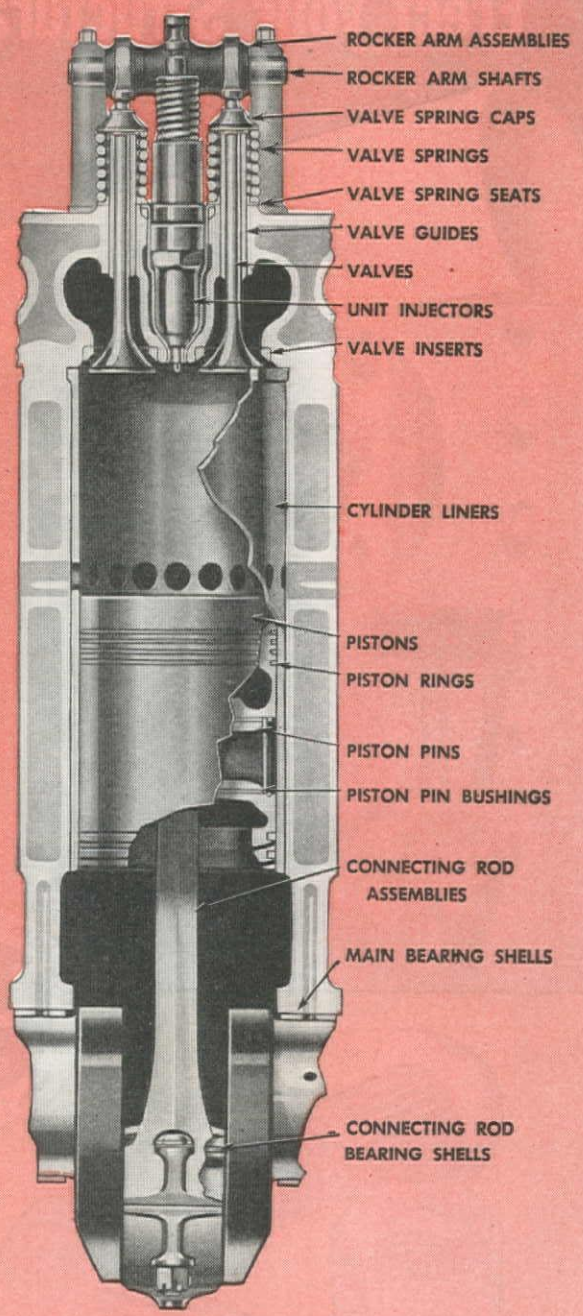
For example, all of the GM Diesel parts shown here, plus dozens more, are completely interchangeable, regardless of the number of cylinders, horsepower, age or usage of the engine.

To large contractors, oil drillers, truck or boat fleet operators, this unique feature of GM Diesel design means lower parts inventories and less time out for maintenance.

To the individual owner, it brings a no less important benefit. A *single* inventory of basic parts on the distributor's shelves increases the availability to owners of the *right* part when it is needed.

Maximum parts interchangeability is just one of the many *plus* values that go with your purchase of General Motors Diesel engines—a good reason why it pays to *standardize* on GM Series 71 Diesels.

For topmost satisfaction and reliability, always buy genuine "Factory-Engineered" GM Diesel parts from your authorized distributor or dealer.



CUTAWAY OF CYLINDER FROM GM SERIES 71 DIESEL

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES...*Up to 200 H.P.* **DETROIT 28, MICHIGAN** MULTIPLE UNITS...*Up to 800 H.P.*

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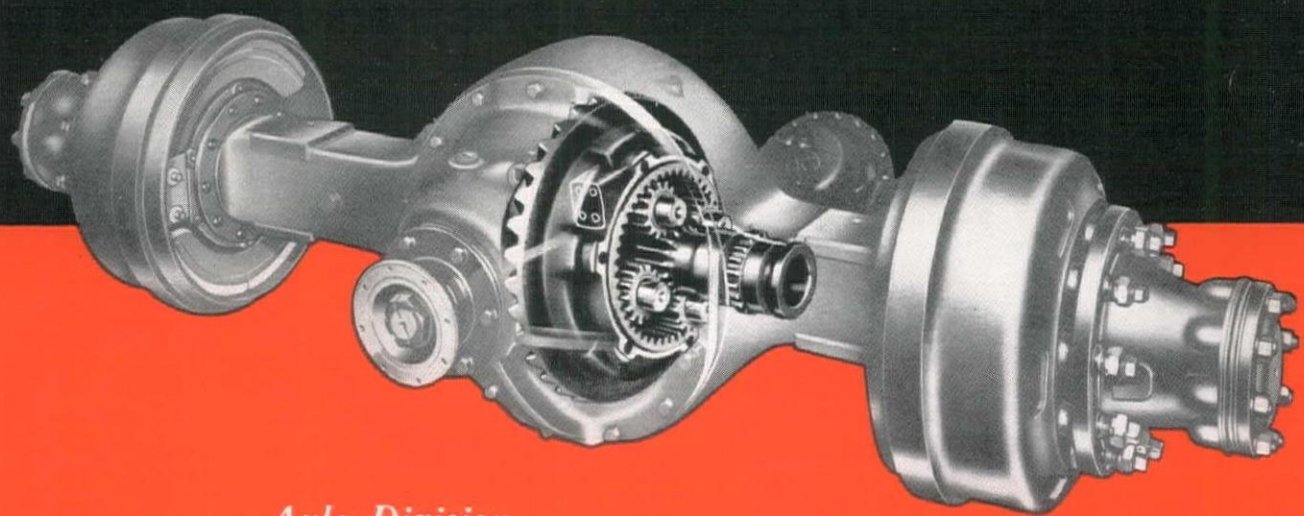
Money-Saving Planetary Gearing is Available only on

EATON
2-Speed Truck
AXLES

Eaton's exclusive planetary gearing distributes gear-tooth load, reduces stress and wear on gears and bearings, adds thousands of miles to axle life, holds maintenance costs to a minimum. Slower planetary gear movement makes for easy shifting and silent operation. Available for most trucks of the 1 ½-ton class and larger, Eaton 2-Speed Axles give extra pulling power combined with high speed; save time, fuel, oil, and engine wear. *They more than pay for themselves.* Ask for a road demonstration . . see the Eaton advantages for yourself.

More Than a Million Eaton 2-Speed Axles in Trucks Today



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PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • 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

TRAILMOBILE LOW-BED

Kept Busy by California Road Builders

Building logging roads in Humboldt County, California, home of the giant Redwoods, is the principal business of the Mercer-Fraser Company of Eureka. They operate a fleet of 25 trucks, and among their equipment is the TRAILMOBILE sixteen tire low bed trailer shown in the illustration above. This unit is kept continually on the move, hauling tractors, bulldozers and power shovels from one road building job to another. Mercer-Fraser are old hands at building logging roads and the lumber companies and loggers in the Redwood belt keep them very busy. The TRAILMOBILE shown is designed to take care of their heaviest hauling requirements, which includes lugging a 51-ton power shovel. If your operations are scattered over widely separated areas, a TRAILMOBILE low bed trailer is not only a necessity, but will prove a highly profitable investment in helping you to get more "machine hours" out of your equipment.

TRAILMOBILES for the logging, construction, petroleum and similar heavy industries are available in a wide range of designs for hauling all types of equipment and supplies. There are converter dollies for the logger; roller beds and flatbeds for the lumber hauler; low beds for the machinery and equipment haulers suitable for loads of 100 tons and over; flatbeds for those hauling steel and other building materials; hopper dumps for hauling bulk cement and aggregates. You can count on it—there is a TRAILMOBILE that will just fit your bill.

THE TRAILMOBILE COMPANY
BERKELEY, CALIFORNIA

TRAILMOBILE

)S ANGELES · VENTURA · SAN LUIS OBISPO · BERKELEY · SACRAMENTO · SANTA ROSA · FRESNO · SAN JOSE · BAKERSFIELD
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WICKWIRE ROPE

A PRODUCT OF CF&I

Ask any user . . . you'll find them everywhere

In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISSCOLAY® *Pre*formed. It lasts longer — is easier to cut, splice and install. It's kink-resistant and safer to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant — Palmer, Mass.

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LOGGING

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SPECIAL PURPOSE CEMENTS

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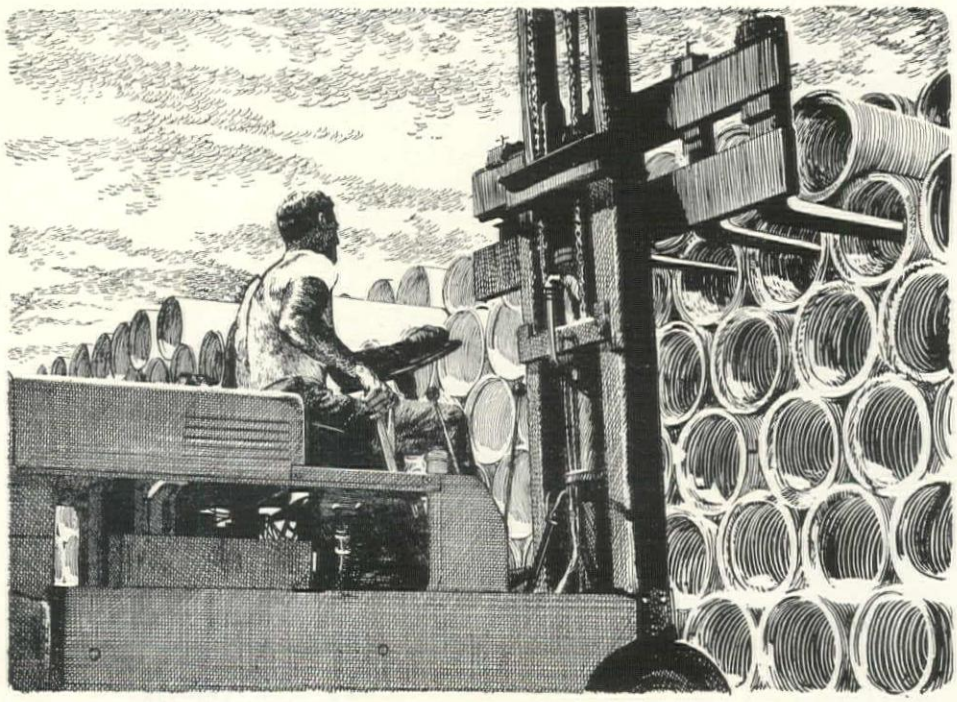
PIPE CEMENT



STANDARD PORTLAND

MODIFIED PORTLAND

HIGH EARLY

LOW HEAT

SULPHATE RESISTANT

PRONTO

PORTLAND POZZOLAN

BRICK MIX

PLASTIC CEMENT

OIL WELL CEMENT

PERMANENTE PRONTO CEMENT ALLOWS QUICKER STOCKPILING

Concrete pipe manufacturers require a cement which will produce a plastic, workable concrete—yet will set up rapidly—resistant to breakage and deformation shortly after fabrication.

PERMANENTE PRONTO CEMENT is a modified high-early strength cement, ground finer than standard cement—and will produce a plastic concrete which sets rapidly. When units leave the molding machine, they are rigid enough to be moved immediately to the curing area. The molding parts can be moved much earlier and returned to fabricating operations.

Concrete pipe made with PERMANENTE PRONTO CEMENT can be stockpiled for permanent curing several days earlier—greatly increasing the production of your forming units and reducing manufacturing costs.

Permanente Pronto Cement Is Sold at the Same Price as Standard Portland Cement in Northern California and Western Nevada.

PERMANENTE CEMENT COMPANY

On the job - On time

PERMANENTE CEMENT COMPANY

PERMANENTE, SANTA CLARA, DIAMOND, YOSEMITE AND KAISER BRANDS OF PORTLAND CEMENT AND PERMANENTE LIME PRODUCTS

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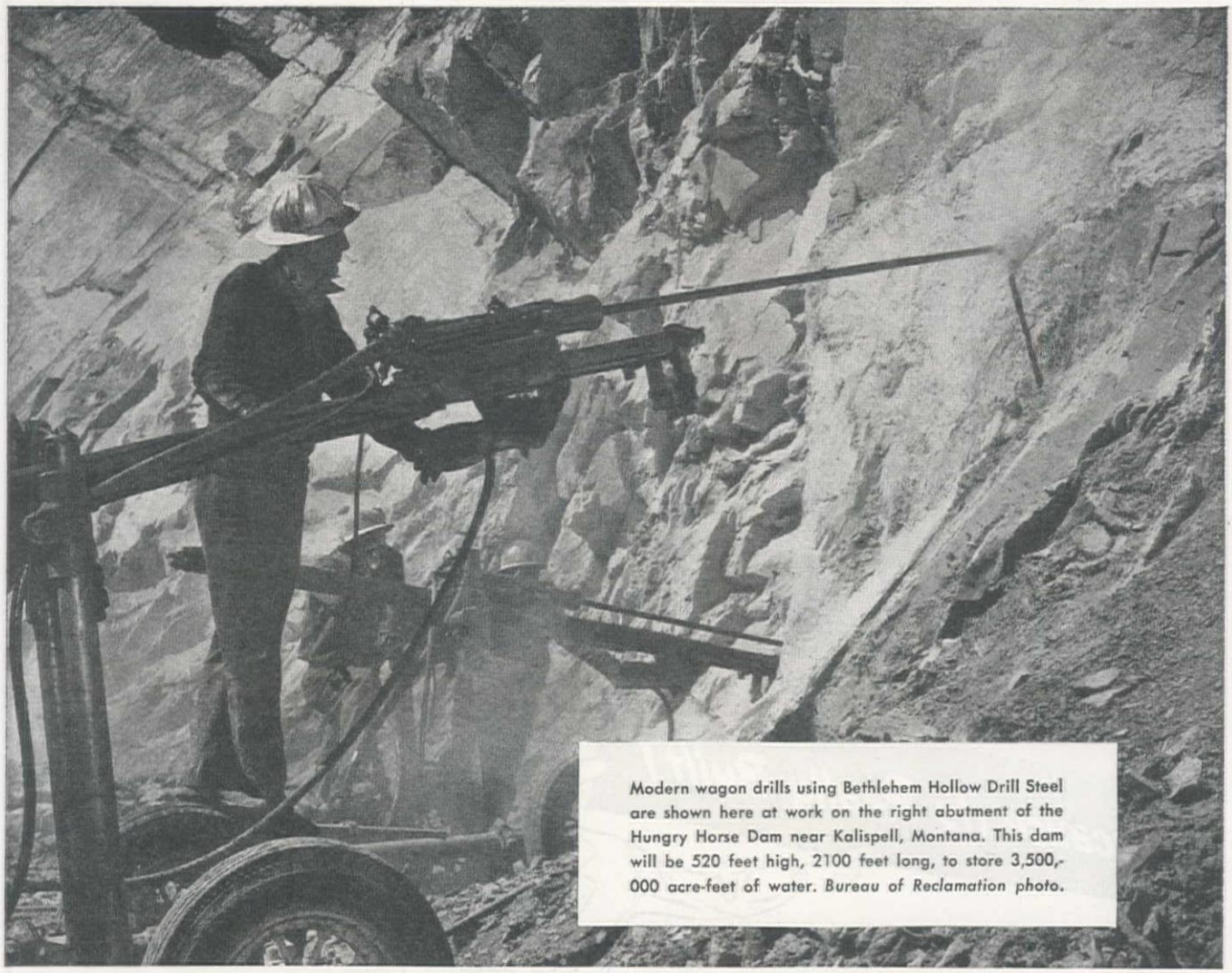


Modern wagon drills using Bethlehem Hollow Drill Steel are shown here at work on the right abutment of the Hungry Horse Dam near Kalispell, Montana. This dam will be 520 feet high, 2100 feet long, to store 3,500,000 acre-feet of water. *Bureau of Reclamation photo.*

Drilling the Way for the Hungry Horse

More than 1,000,000 cu yds of rock is being drilled, blasted and excavated to make way for the gigantic Hungry Horse Dam. The fourth largest of all concrete dams, Hungry Horse will impound the Flathead River in northwestern Montana for irrigation and power-generation purposes.

Bethlehem Hollow Drill Steel used with modern drilling equipment is helping General-Shea-Morrison, the prime contractors, stay up to schedule on this job despite the difficulties brought on by one of the worst winters in the history of the West.

Used on practically all of the Bureau of Reclamation projects, Bethlehem Hollow has a reputation among veteran hard-rock men everywhere as a tough, thoroughly-dependable drill steel.

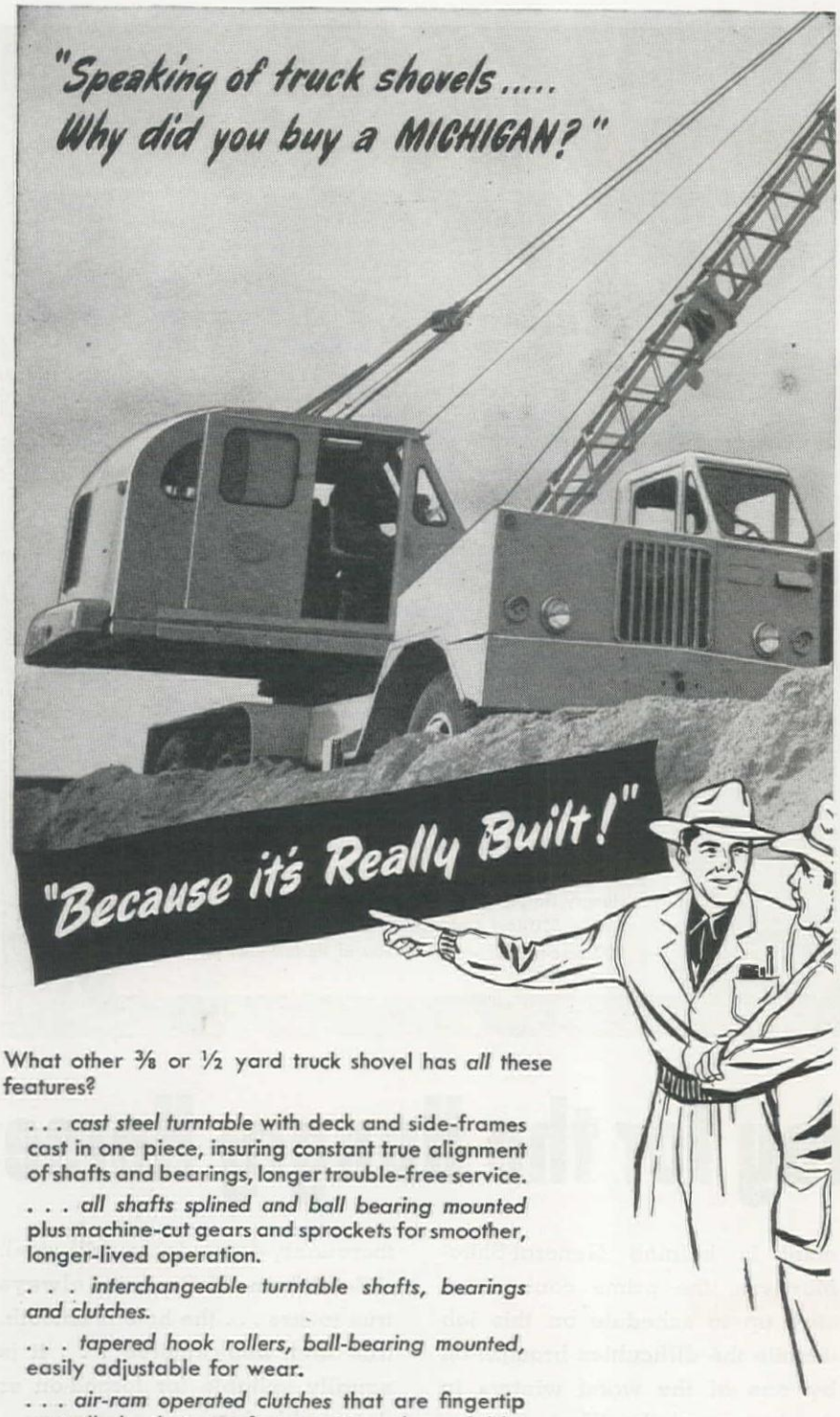
Bethlehem Hollow is always true to size . . . the hole is smooth, true and well-centered . . . it is equally suitable for forged-on or detachable bits.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: San Francisco, Los Angeles, Portland, Seattle, Honolulu

BETHLEHEM STEEL

BETHLEHEM PACIFIC



What other ⅜ or ½ yard truck shovel has *all* these features?

. . . *cast steel turntable* with deck and side-frames cast in one piece, insuring constant true alignment of shafts and bearings, longer trouble-free service.

. . . *all shafts splined and ball bearing mounted* plus machine-cut gears and sprockets for smoother, longer-lived operation.

. . . *interchangeable turntable shafts, bearings and clutches.*

. . . *tapered hook rollers, ball-bearing mounted,* easily adjustable for wear.

. . . *air-ram operated clutches* that are fingertip controlled—that are fast, positive, dependable.

From wheels to boom-point you get *more* fast-production, cost-cutting features in a MICHIGAN. That's why I selected MICHIGAN . . . and it's why I say *you'll get the most for your money in a MICHIGAN!"*

Write for your copy of Bulletin 100, "On the Job with MICHIGAN," showing MICHIGAN Truck Shovels on jobs like yours.

DID YOU KNOW
you can buy
a brand new
MICHIGAN
TRUCK CRANE
complete with chassis
for as little as $10,250
F.O.B. factory?

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

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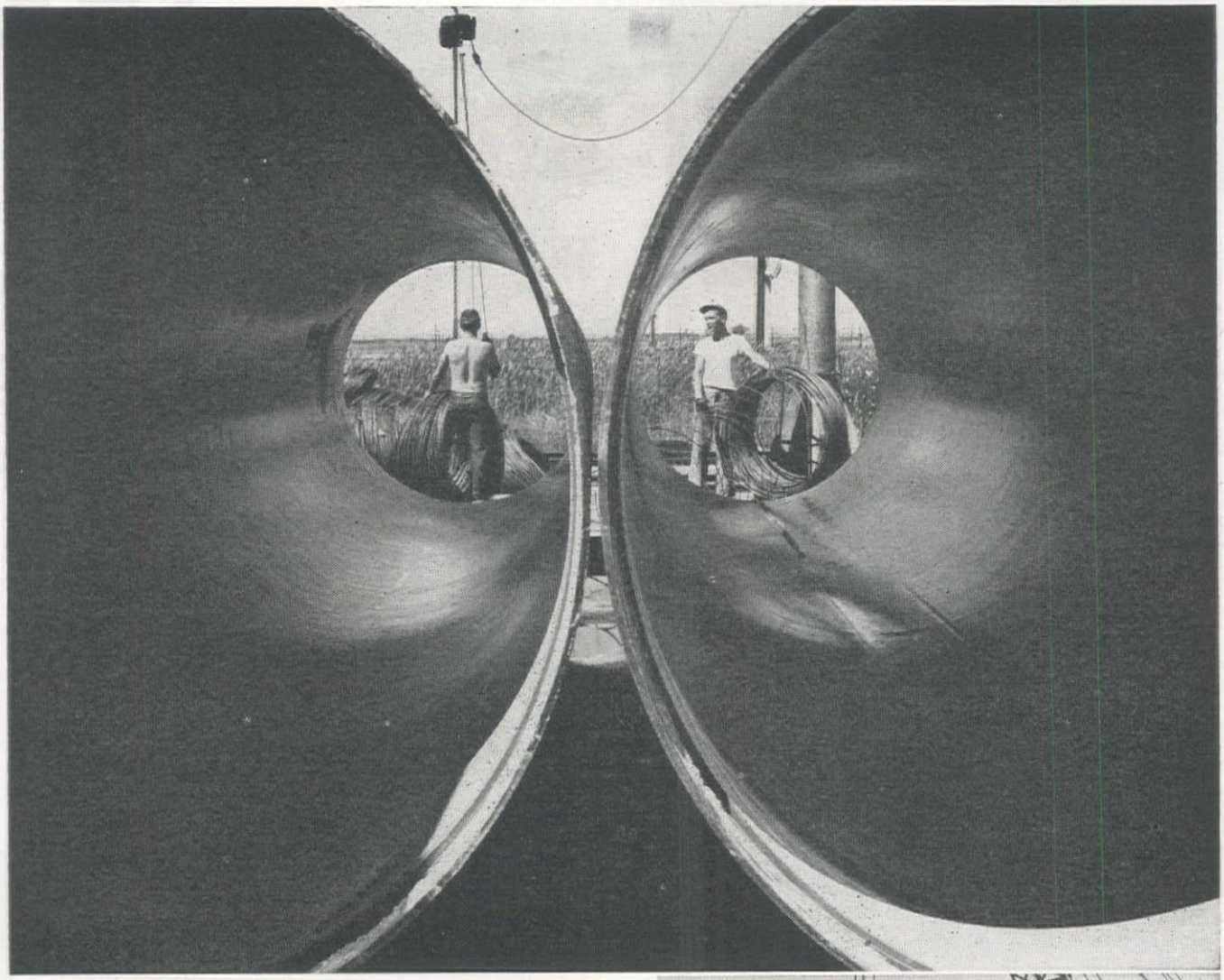


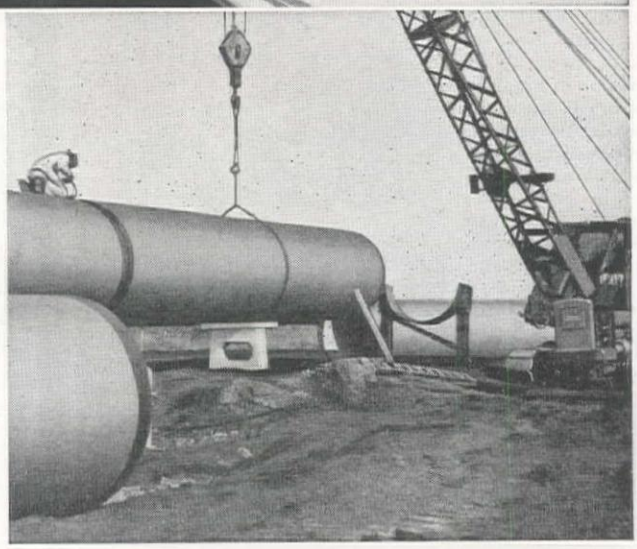
Giant steel pipe—of ½" U·S·S Steel plate mortar lined, wire wrapped and mortar coated—forms an 81-mile long artery pouring water from the Pardee Reservoir on the Mokelumne River to the eastern border of San Francisco Bay. Here you see it after the ½" cement mortar lining has been applied by centrifugal force. In the background, workmen are preparing to wrap the pipe with ¼" steel rod to bond the outer cement coating in place.

Steel is building the West

for today—for the future

If it's a job demanding strength and speed, it's a job for steel. And versatile steel is filling the bill in countless jobs, large and small, in the West today. Columbia combines its own modern facilities with others in the Industrial Family that Serves the Nation...facilities which have expanded to meet our nation's postwar needs. Just the right steel for your job is now ready for delivery. Get in touch with your nearest Columbia Steel Company office.

Only STEEL can give you all 7 of these structural advantages: Extra toughness and shock resistance—Incombustibility—High strength-weight ratio—Highest modulus of elasticity—Versatility of application—Great durability—Ultimate economy.

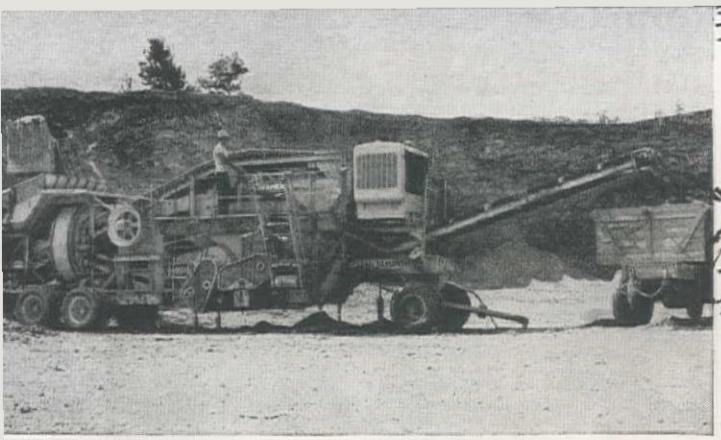


On the site, the 30′ sections are lowered into place and joined by arc welding. Each section weighs some 7½ tons, is large enough for a man to walk through. The second Mokelumne project is now completed... delivering 50 millions of gallons daily. Ultimate capacity: 118 million.

Columbia Steel Company

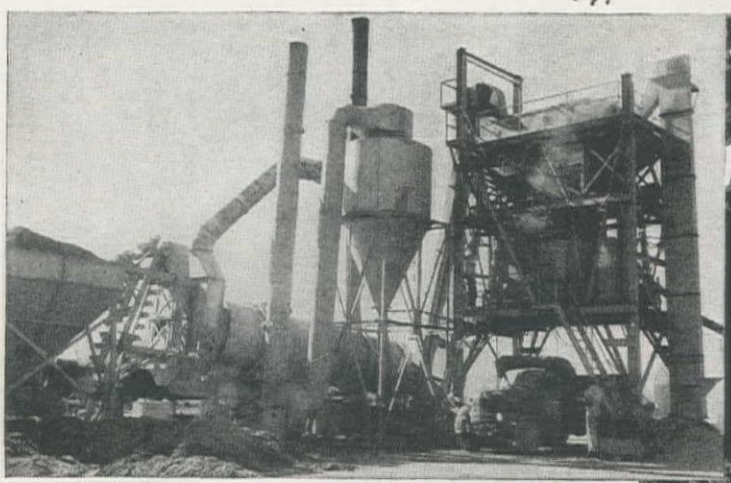
San Francisco Los Angeles Portland Seattle Salt Lake City

UNITED STATES STEEL



JUNIOR TANDEM
A combination of quality features that mean big capacity, low operating costs, minimum maintenance. Operators report production of 110 tons per hour, crushing to ⅝", with 75% crushing. Rugged, quality construction cuts downtime, reduces maintenance costs. Greater flexibility permits profitable operation in all kinds of rock and gravel conditions.

THE



MODEL "E" BITUMINOUS MIXING PLANT
This batch type plant combines all the high capacity, efficiency and accurate batching of the largest stationary plants, with the easy portability of the smaller plants. Cedarapids quality construction from the ground up assures high tonnages accurately mixed at the lowest possible cost.

MODEL "FA"
The most portable batch type bituminous mixer in the Cedarapids line. The "FA" can be set up for operation in a matter of hours. Centralized controls insure fast, easy, one-man operation. Balanced coordination of every part produces up to 350 tons per day of accurately weighed and uniformly mixed aggregates and bitumen. Quality-built for long-term service at lowest cost.

HAMMERMILL SECONDARY
Roadstone or agricultural limestone, or a percentage of both, can be produced in one operation. The heavy-duty Cedarapids Hammermill produces finer and more uniform material, and more tons per hour, than other types of Hammermill equipment. Such quality performance gives you a peak-efficiency machine for a wide variety of reduction jobs.

Cedarapids

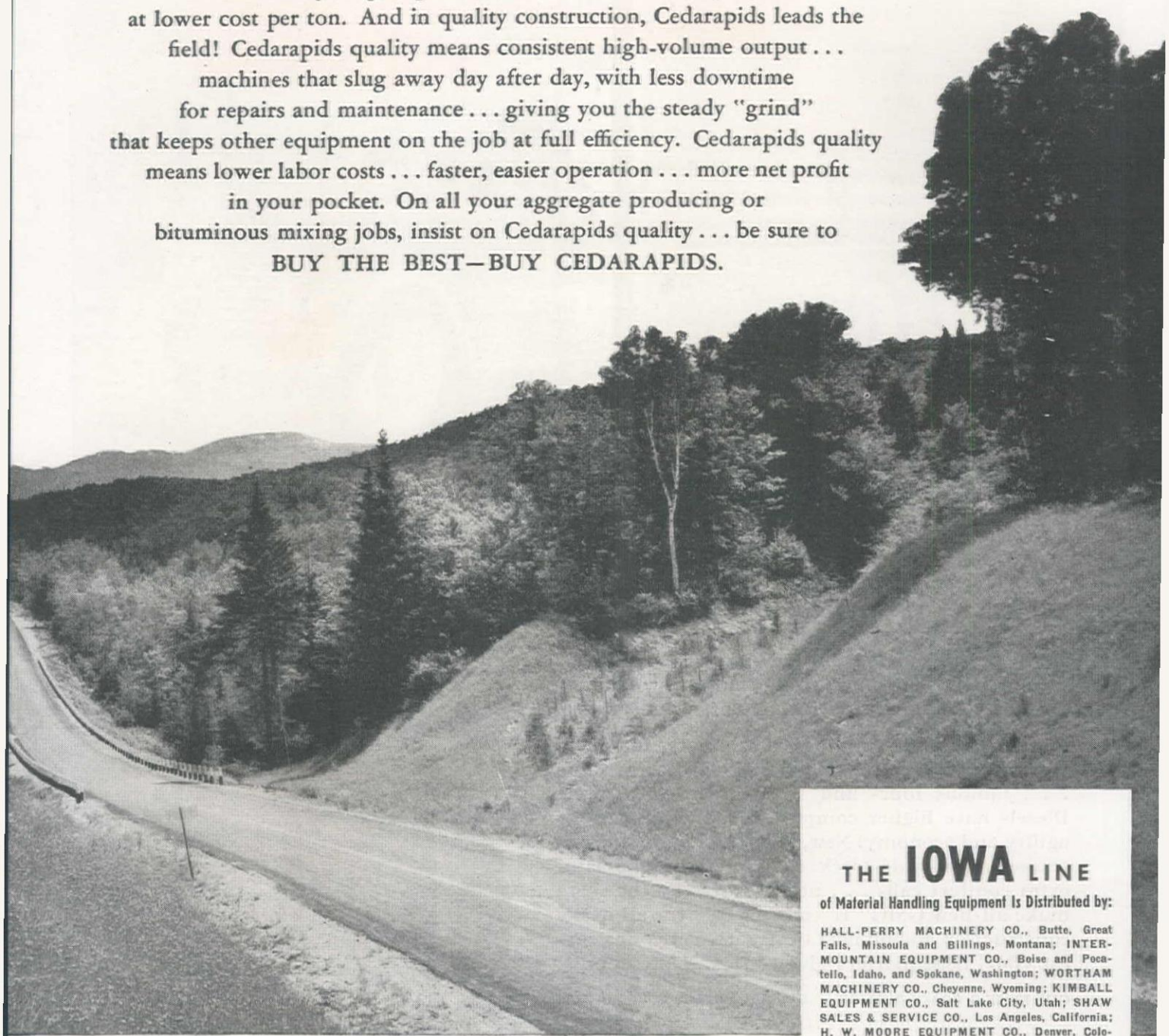
Built by IOWA

● For roads, airports, dams, quarry operations . . . *any* rock crushing or bituminous mixing job . . . there is a size and type of Cedarapids equipment to meet every requirement for output, specifications and costs. On small operations or large projects, you'll get more trouble-free production at lower costs when you depend on Cedarapids quality equipment. For full information on the complete Cedarapids line, see your Cedarapids distributor, or write for literature.

OLD RIDGE ROAD—

"She ain't what she used to be..."

She's a *better* road today, and built at lower cost . . . because modern aggregate producing and bituminous mixing equipment is QUALITY-BUILT to meet today's rigid specifications with more tons per hour at lower cost per ton. And in quality construction, Cedarapids leads the field! Cedarapids quality means consistent high-volume output . . . machines that slug away day after day, with less downtime for repairs and maintenance . . . giving you the steady "grind" that keeps other equipment on the job at full efficiency. Cedarapids quality means lower labor costs . . . faster, easier operation . . . more net profit in your pocket. On all your aggregate producing or bituminous mixing jobs, insist on Cedarapids quality . . . be sure to BUY THE BEST—BUY CEDARAPIDS.



THE IOWA LINE

of Material Handling Equipment Is Distributed by:

HALL-PERRY MACHINERY CO., Butte, Great Falls, Missoula and Billings, Montana; INTER-MOUNTAIN EQUIPMENT CO., Boise and Pocatello, Idaho, and Spokane, Washington; WORTHAM MACHINERY CO., Cheyenne, Wyoming; KIMBALL EQUIPMENT CO., Salt Lake City, Utah; SHAW SALES & SERVICE CO., Los Angeles, California; H. W. MOORE EQUIPMENT CO., Denver, Colorado; EDWARD F. HALE CO., Hayward, California; ARIZONA CEDAR RAPIDS CO., Phoenix, Arizona; R. L. HARRISON CO., INC., Albuquerque, New Mexico; SIERRA MACHINERY CO., Reno, Nevada; HOWARD-COOPER CORP., Seattle, Wash.; Portland, Eugene and Central Point, Oregon.

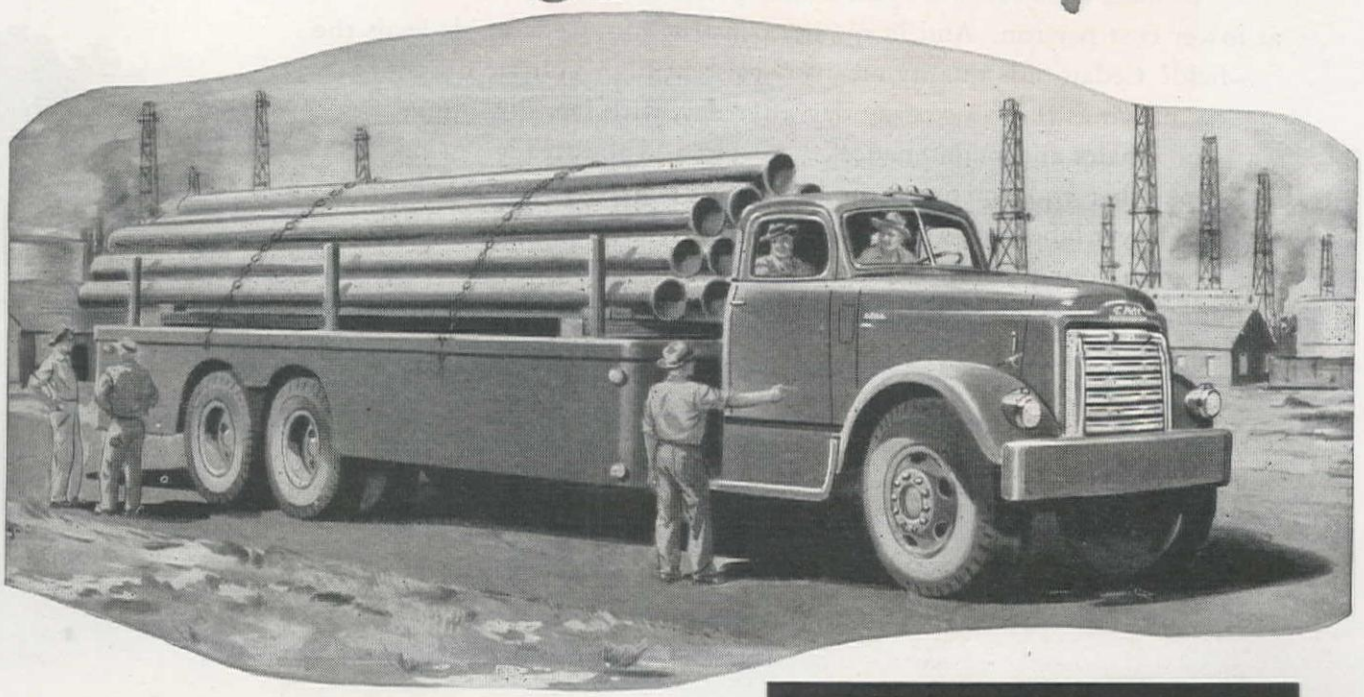
See Your Cedarapids Distributor For Full Details

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

All-New and...

Just as Rugged as They Look



There's a new look in heavy duty trucks . . . all-new "H" line GMCs. These great new trucks, in weight ratings from 19,000 to more than 90,000 pounds, pace the entire heavy duty field in styling that adds to the prestige of your business. And they pace the field in design and engineering that give you better performance, lower operating costs, longer life.

Four new gasoline engines offer greatly increased power, in addition to traditional GMC extra value . . . famous four- and six-cylinder GM 2-cycle Diesels have higher compression for even greater agility and economy. New, stiffer, straight side rail frames, new wide-track axles, new broad-beam, extra comfort cabs . . . new features by the score make all-new GMC "H" models best for all heavy construction and oil field transport. Let your nearest GMC headquarters give you complete details.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

GMC

GASOLINE • DIESEL

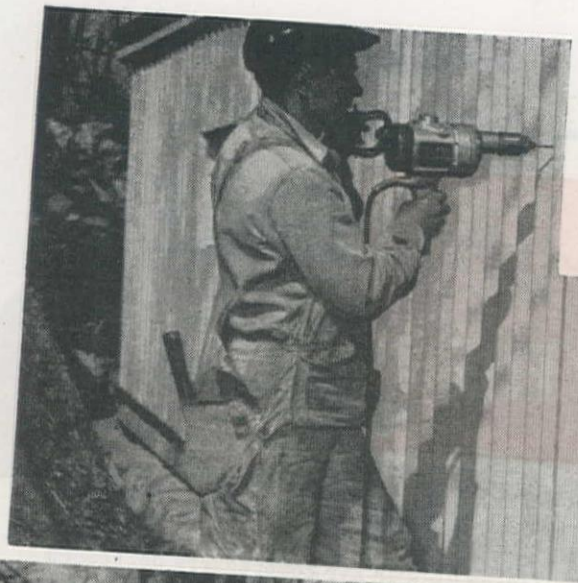
TRUCKS

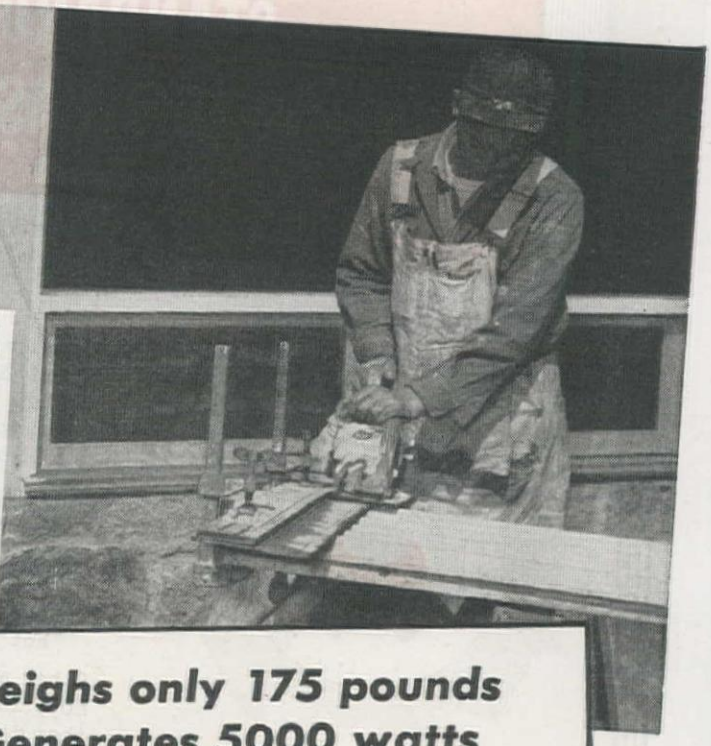
THE INDUSTRY'S ONLY

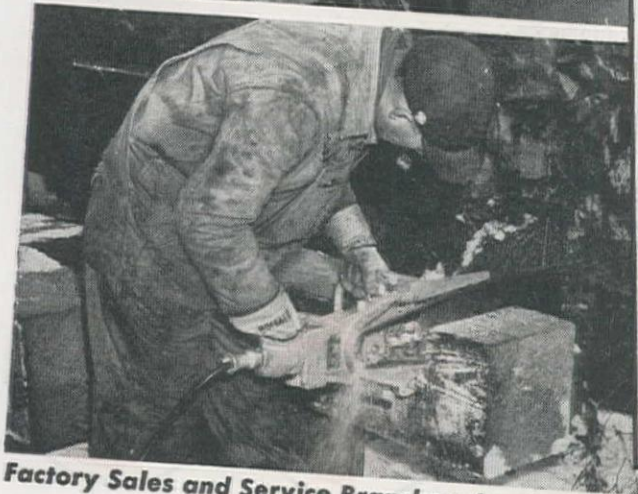
BUMPER-BUILT FRONT END

Typical of GMC "H" line ruggedness are angle-braced, frame-mounted radiator grilles with top and sides of spring steel bumper stock, heavy gauge fenders, wide, thick bumpers . . . for complete front end protection, axle to emblem.

Carryable Power for Electric Tools







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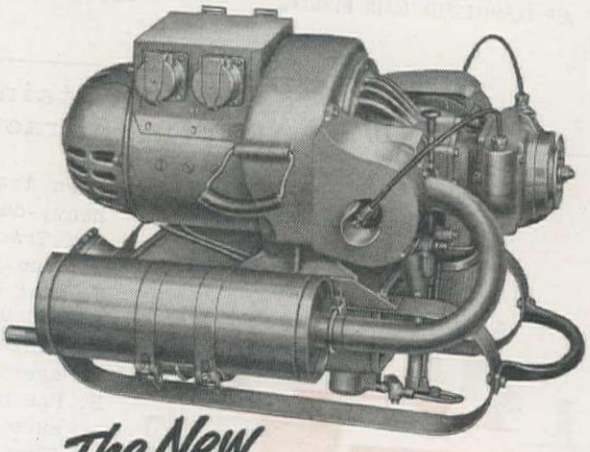

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Carryable **DUAL-PURPOSE GENERATOR**
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For operating both high-cycle and standard universal 110 volt tools. Write for complete information.

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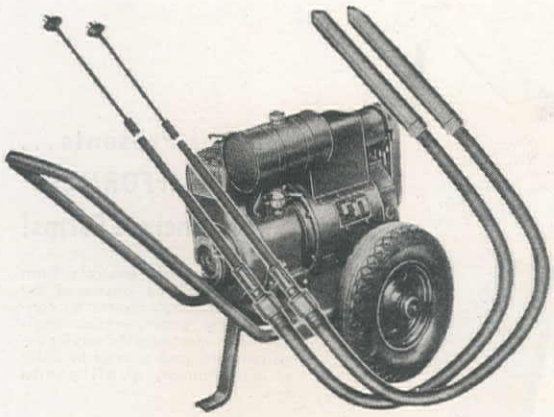

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Built for one-man operation, the CP-220 Vibrator is designed for concretes of 2″ slump and over; walls, footings, columns, floor and roof slabs; precast piles and similar products.

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Every requirement for mass or reinforced concrete is met by seven different models of CP Vibrators – pneumatic and electric – including the new CP-5190 High Frequency Vibrator for low-slump concrete specified on current dam projects.

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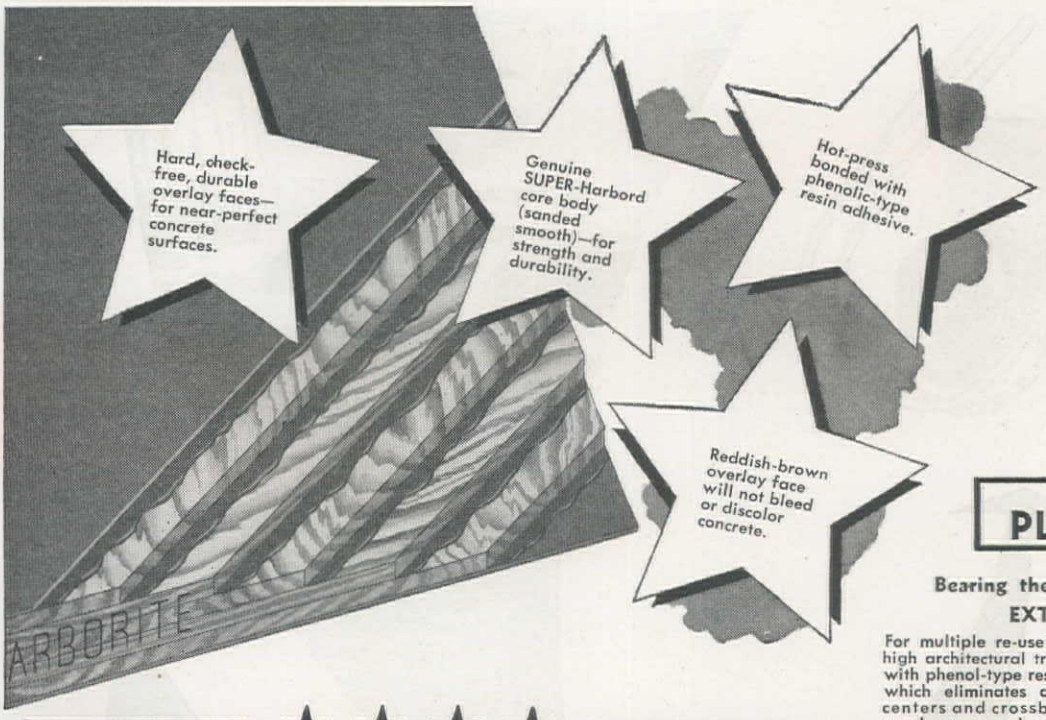

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You'll find basic concrete form panel problems answered by Harbor Plywood's quartet of concrete form panels — each engineered to meet specific service requirements, and starred in order of performance, quality and price.

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HARBOR **Harborite**

Trade Mark Registered. Patents 2,150,697—2,150,698—2,150,841 and 2,343,740

The Superior Multiple Re-Use Concrete Form Panel

Four "Star Features" Make Harborite the Leading Form Panel!

Only Harbor's exclusive method of hot-press bonding of phenolic-type resin-impregnated overlays to a core of genuine SUPER-Harbord give you the four advantages you seek most in concrete form panels.

1 Hard, check-free overlay surfaces give you better concrete surfaces, free from blemishes, quickly and easily finished.

2 The quality of Harborite's overlay facing is without equal, because Harbor manufactures its own overlay . . . assuring you of tougher, abrasion-resistant panels for longer, more efficient use.

3 The "tooth" of the overlay surface is specially designed to hold oil, sealers or lacquers, and the overlay's absorptive liner effect helps reduce pit voids to a minimum.

4 Harborite will *not* bleed or discolor the concrete. Its distinctive reddish-brown color is permanent. No added finishing problems with Harborite!

Harborite sizes: Widths — 36" up to 48"; Lengths — 96" up to 144"; Thicknesses — ¼" to 1-3/16". Thickness tolerance — 1/64". Edge-sealing and mill-oiling optional.

Specify "HARBORITE" . . . the concrete form panel for better concrete surfaces . . . for form panels that can be used again and again until literally worn away!

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Bearing the industry grade-mark:

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Harbord PLYCRETE has the same AA (Sound) veneer faces as SUPER-Harbord Plycrete, but is bonded with 10-cycle moisture-resistant glues instead of the waterproof adhesives used in the Exterior-type panels. A superior form panel, sanded smooth on both faces. Will withstand many re-uses, but can not, of course, be expected to deliver the service established by Harborite or SUPER-Harbord Plycrete. Ideal for average jobs where limited re-use will write off the cost. Factory edge-sealing and oiling optional.

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Bearing the industry grade-mark:

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The standard DFPA PlyForm panel, manufactured to Harbor Plywood Corporation's strict quality standards. Bonded with highly water-resistant 10-cycle glues (not waterproof), it will withstand a reasonable number of re-uses. Both faces are BB (solid) veneer, with surfaces free from open defects, but admitting neatly made plugs, tight splits, and slightly rough grain, sanded smooth. Factory edge-sealing and oiling optional.

Like any other quality product, most satisfactory results are gained by using approved procedures. For full data on Harborite use, write requesting instructions.

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LaPLANT-CHOATE MOTOR SCRAPERS
cut earthmoving costs on MORE and MORE jobs!

11

11 LPC MOTOR SCRAPERS on Cherry Creek Dam! Moving millions of yards on schedule calls for fast, steady operation with capacity payloads. LPC Motor Scrapers haul heaped capacity loads of 17.5 yards every trip! The big 225 H.P. Diesel gives the unit authority on the haul road, the fill and in the pit. It's a powerhouse of production!

11

11 LPC MOTOR SCRAPERS on the Rio-Sao Paulo Highway in Brazil! "Maxima rapidez e economia" says the user . . . in any language, it's a fleet of cost savers. 17.5 heaped yards each trip . . . speeds up to 19.3 mph for more trips per hour. BIG production with minimum maintenance means a pocketful of pesos.

3

3 LPC MOTOR SCRAPERS on Ohio Highway 3 near Wilmington. Big 24:00 x 29 tires carry the biggest loads with ease, have surplus traction and flotation, and with less tire wear! Easier loading, faster spreading, positive forced ejection . . . further assurance of more yards moved at lower cost with LPC scrapers.

Whether you need one, two, four or a big fleet of units for *your* job—take a tip from the contractors who handle the big new jobs. They are paring down earthmoving costs with LPC equipment, and bidding successfully on job after job.

Start building *your* Motor Scraper fleet now! With a fleet of LPC units you can handle the biggest jobs, finish them faster and at lower cost. LPC scrapers consistently give you bigger payloads per trip and more trips per hour, stay on the job shift after shift, day after day. You know what that means in terms of competition and your own bid price!

Whatever type of scraper you need, for moving millions of yards or a few thousand, it will pay you to see your LPC distributor for a demonstration of real scraper performance.

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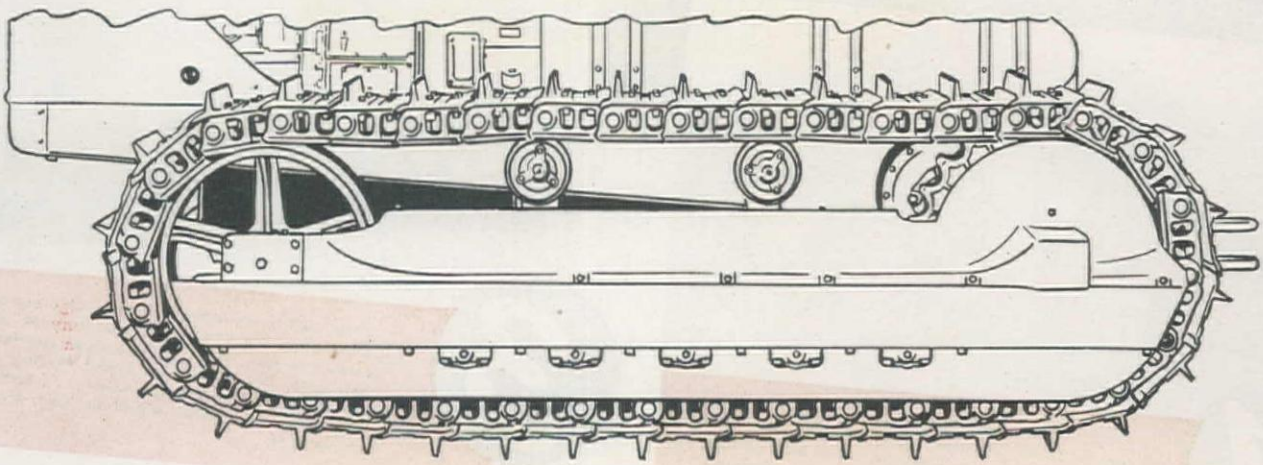

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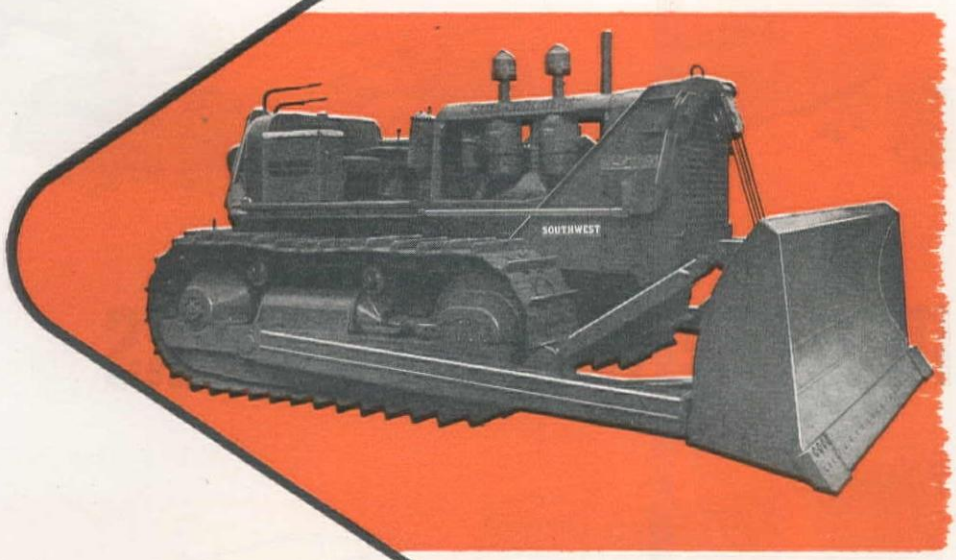
TIDE WATER ASSOCIATED OIL COMPANY

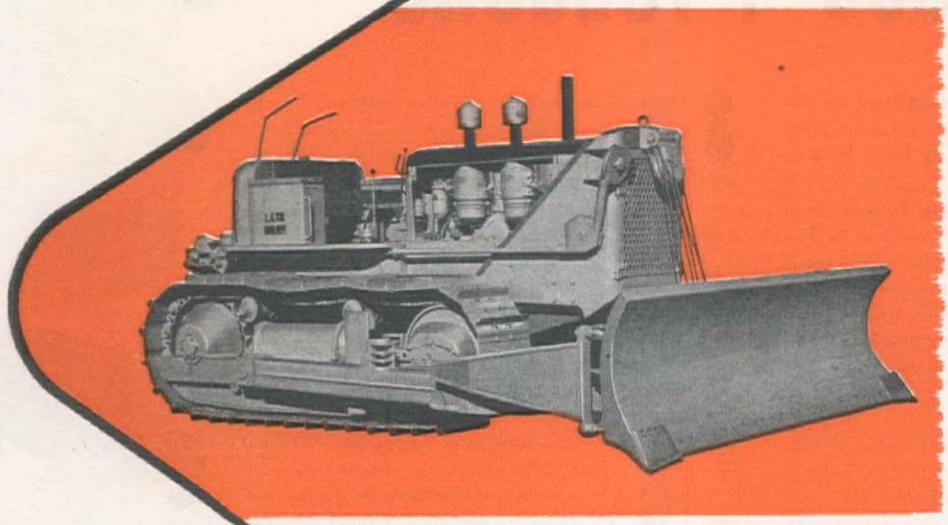
SOUTHWEST



The new bulldozer and trailbuilder equipment developed by SOUTHWEST for use with Allis-Chalmers HD-19 tractors have proved exceptionally efficient and reliable in all types of operations. These are rugged, dependable units that provide outstanding economy and long service life.

Type "AFB" Bulldozers and Type "AFT" Trailbuilders for use with Allis-Chalmers Tractors.

"QUARRY-TYPE"
BULLDOZERS AND TRAILBUILDERS NOW AVAILABLE FOR ALLIS-CHALMERS HD-19 TRACTORS



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Overhead "A" frame structures entirely eliminated.

New, rugged radiator guard type mounting.

Furnished for either rear or front mounted control units.

Bulldozers can be furnished with either adjustable arms or with side arms welded to blade.

WRITE FOR BULLETIN CM23

CONSTRUCTION MACHINERY DIVISION

Southwest Welding & Manufacturing Co.

ALHAMBRA, CALIFORNIA

Choose from America's

most complete line of trucks

for these 4 reasons

1 **International Trucks are specialized** for the job. International builds America's most complete line of trucks. It offers 22 basic models, 1,000 truck combinations ranging in gross vehicle weights from 4,400 to 90,000 pounds. It also offers 13 truck engines (gasoline, diesel, butane) as well as specialized units and parts, to satisfy individual hauling requirements. An International sales engineer who knows your business in terms of trucks helps you analyze your own hauling needs and select the right International Trucks to meet them.

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4 **International Trucks are backed** by America's largest exclusive truck service organization. 4,700 Dealers and 170 Company-owned Branches offer complete International Truck service wherever you drive a truck. Precision-engineered replacement parts, factory-rebuilt exchange units, and factory-trained mechanics are as close as your telephone. For the right truck to solve your hauling problems, see your nearest International Dealer or Branch.

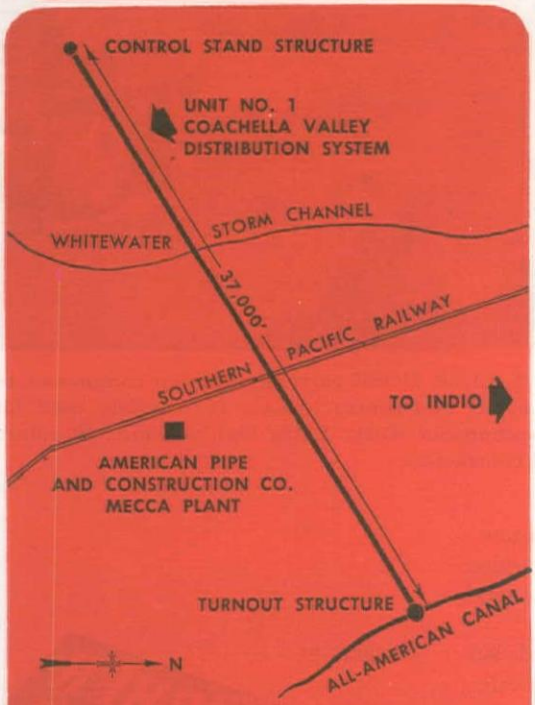
International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

INTERNATIONAL INTERNATIONAL **TRUCKS**

INTERNATIONAL HARVESTER COMPANY • CHICAGO

LOCK JOINT CONCRETE CYLINDER PIPE

Sizes 36" to 144" for heads of 100' and greater



This Company has recently completed the manufacture and installation of 37,000 feet of 78" and 84" Lock Joint Reinforced Concrete Pressure Pipe for Unit 1 of the Coachella Valley Distribution System, a U. S. Bureau of Reclamation Project.

Permanence and sustained high performance of Lock Joint Concrete Cylinder Pipe help reduce the cost of delivered water.

Performance in this important water supply line is the result of multiple requirements: (1) great strength, both for resistance to designed operating pressures and for great earth loadings – all with an ample factor of safety; (2) flexible, yet positively watertight joints; (3) resistance to corrosion and tuberculation which assure maximum and sustained hydraulic capacity.

This superior design of pressure pipe combines the physical properties of steel with the structural and protective properties of concrete to meet the most exacting job requirements, and the Lock Joint Rubber Gasket Joint provides ease of installation, flexibility and trouble-free service under all normal operating conditions.

These factors, plus reasonable first cost and freedom from maintenance, mean immediate and long-term savings in the cost of delivered water. Lock Joint Reinforced Concrete Pressure Pipe and its superior qualities of design are *"there to stay"—permanently.*

American
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Concrete Pipe for Main Water Supply Lines, Storm and Sanitary Sewers, Subaqueous Pipe Lines

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Quality pipe line products manufactured and installed by American include: Lock Joint Concrete Cylinder Pipe, American Concrete Cylinder Pipe, Prestressed Lock Joint Concrete Cylinder Pipe, Centrifugal Concrete Pressure Pipe.

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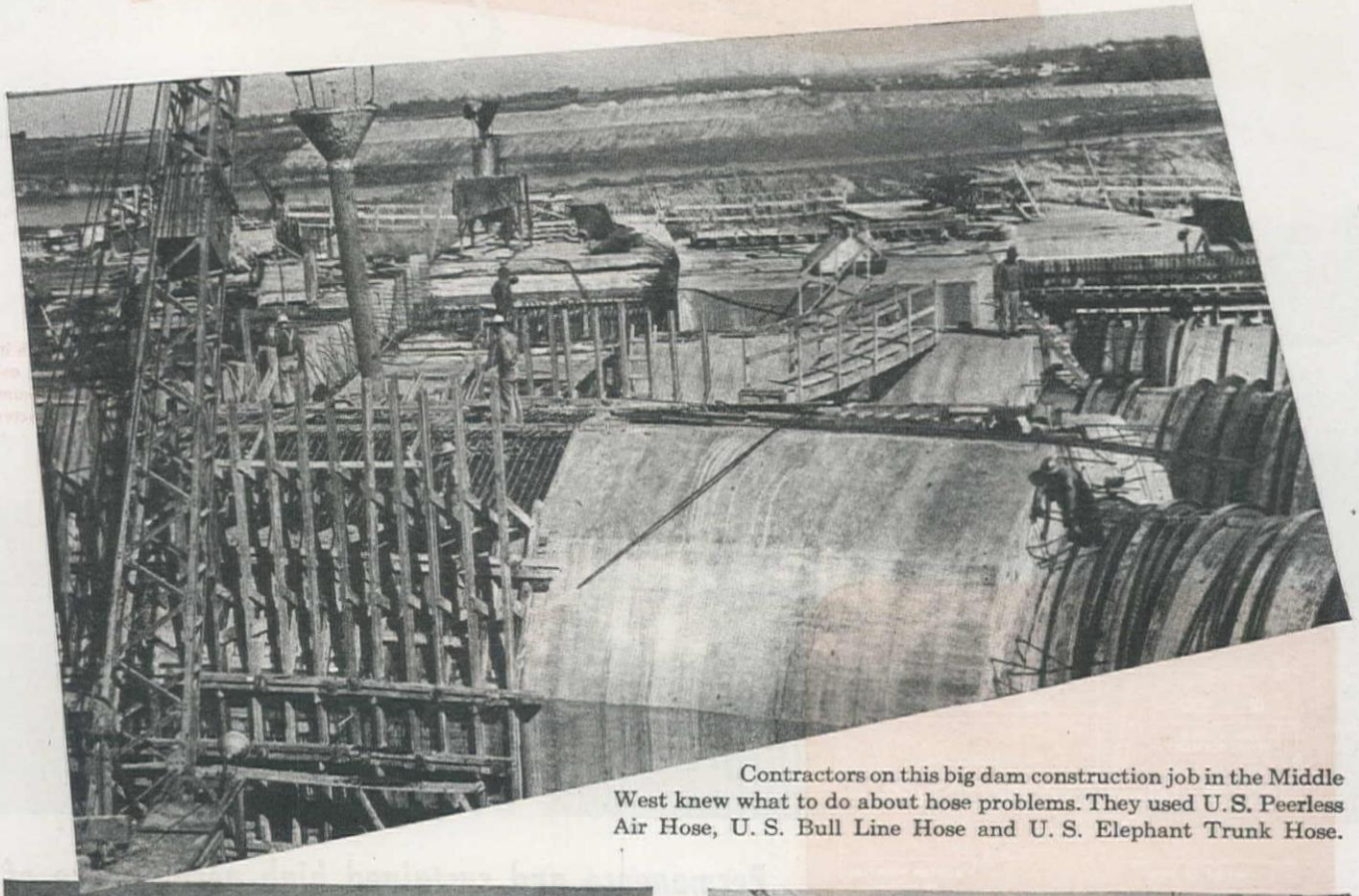
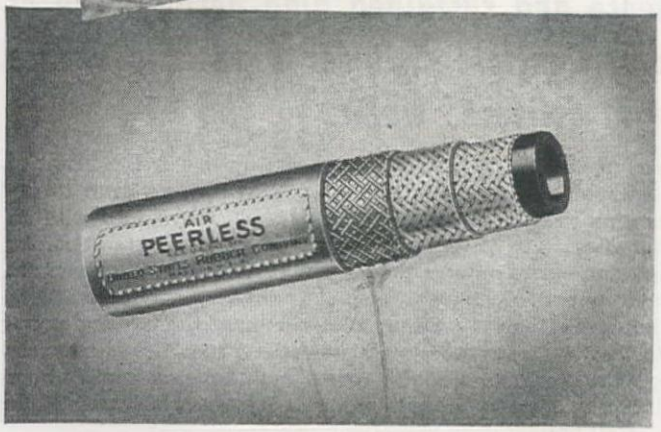
For rough, tough work—it's "U. S." Hose!



Contractors on this big dam construction job in the Middle West knew what to do about hose problems. They used U. S. Peerless Air Hose, U. S. Bull Line Hose and U. S. Elephant Trunk Hose.



U. S. PEERLESS AIR HOSE has oil-proof synthetic rubber lining, and a tough, flexible, brown rubber cover with a resilient surface workmen like to handle. Tube is specially compounded to take both hot and cold oil without swelling or flaking.

U. S. BULL LINE HOSE carrying air from compressor to manifold in air tool contract work. It is widely used for portable compressor work. Extra high pressure. Standard for tunnel contractors.

U. S. ELEPHANT TRUNK HOSE—wherever considerable quantities of concrete are poured, U. S. Elephant Trunk Hose provides an ideal method for dropping it speedily and efficiently into the proper spot.

Since the hose is flexible, it can easily be maneuvered and led into inaccessible places where concrete could not be dropped directly.

For more information about

U. S. ENGINEERED RUBBER PRODUCTS FOR THE CONTRACTOR

Hose • Belting • Gate Seals and Water Stops • Hydron

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PRODUCTS OF

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SAVE TIME  CUT COSTS 

MOVE MORE DIRT 

With Fast, Maneuverable Bucyrus-Erie 4-Wheel Scrapers!

CUTS go down fast and dirt really moves when Bucyrus-Erie 4-wheel scrapers go to work, because Bucyrus-Erie scrapers save time on every trip . . . dig and haul fast, turn quickly, deliver greater output every shift. The result is outstanding economy of operation for low-cost earth-moving.

Low overall height, low center of gravity, carefully designed load placement and wide-spread rear wheels give these scrapers exceptional stability for working steep slopes, for speedy moves from cut to fill. Big low-pressure tires provide large ground-contact area for superior flotation in soft footing. Double-disc drum-type wheels mounted on tapered, sealed anti-friction bearings mean low rolling resistance, and the streamlined goose-neck leaves ample front wheel clearance for short turns.

Add to these features the big, compact yardages produced by Bucyrus-Erie's exclusive double-curve cutting edge and the fast, clean dumping action of the exclusive two-part hinged apron and it's easy to see why Bucyrus-Erie scrapers are tops for economical output!

Capacities from 4 to 22 cu. yd.

SOUTH MILWAUKEE BUCYRUS ERIE WISCONSIN

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See Your INTERNATIONAL Industrial Tractor Distributor

The Mail Bag...

Mexican Cement

Editor, Western Construction News

Commenting on Mr. Federico Barona's article, "Advances in Cement Technology in Mexico," in the August 15 issue of *Western Construction News*. We have followed closely the developments and experiences in Mexico in cementing materials and are well acquainted with Mr. Barona and his work. He has visited the Bureau of Reclamation on a number of occasions and we have exchanged correspondence at length over the past several years. I have admired the progressive attitude of the Mexican engineers in putting new ideas into practice. In some respects, namely in the use of pozzolanic materials, it must be admitted they are ahead of United States engineers.

The article under consideration shows that the Mexican Federal Reclamation Agency is very progressive and is designing and building its structures with much the same techniques used by the Bureau of Reclamation. The rules which Mr. Barona cites for the production of good cement are all sound and I approve of them. Of course, there was much more improvement to be made in Mexican cements during the last 20 years than required during the same period in this country. For instance, he says that prior to 1926 Mexican cements contained as high as 3 per cent free lime. I doubt that our cements were ever as poorly burned. One of his rules is to burn thoroughly, keeping the free lime below 1.5 per cent. I doubt that cements in this country would easily pass the autoclave soundness tests if they contained that much free lime. The Mexican cements are also coarser ground than the American product.

That Mr. Barona was requiring limits of sodium and potassium oxide as early as 1936 in cement for Angostura Dam is much to his credit. He could not, at that time, however, have been aware of alkali-aggregate reaction as this discovery was not made until 1940. I had previously inquired of Mr. Barona what prompted him to apply this limit and his answer was that the provision was inserted to avoid bids on Japanese cement which he had found to contain over 2 per cent alkalies. Also, he was probably influenced by the specifications of the New York Board of Water Supply, which for some time have included restrictions on water soluble alkalies.

Mr. Barona's statements concerning pozzolan and portland-pozzolan cements are interesting to me as I have long been an advocate of that type of cement for use in dams as well as in general construction. I was not aware until reading the article that portland-pozzolan cement is being used in the Morelos Dam on the Lower Colorado River. You will recall that we are presently using a pozzolanic addition in the concrete for Davis Dam higher up on the Colorado River. Our pozzolan is a calcined shale supplied by the California Portland Cement Company, Colton, California. Primarily, the decision to use pozzolan in Davis Dam was prompted to help combat probable expansion of the concrete due to alkali-aggregate reaction.

Mr. Barona states that the concrete lining in the Lerma Tunnel is being cast in one operation, that is, the invert and arch together. This is a remarkably good feat if they can accomplish it effectively. However, I have my doubts. Nevertheless he is on the right track in using an air-entraining agent to improve the workability of this concrete. If the monolithic placing scheme is successful it will undoubtedly be due in no small measure to the use of air-entrained concrete.

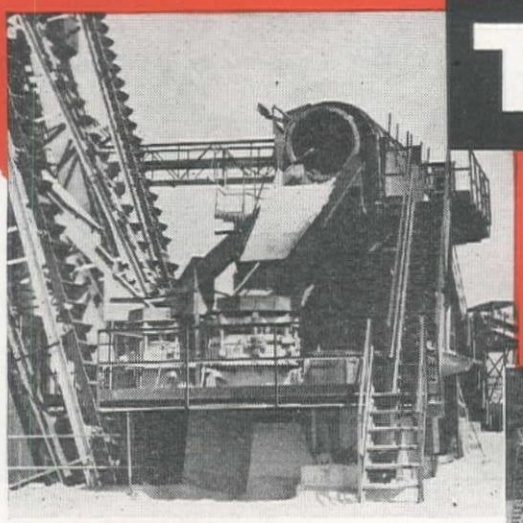
On page 64 under (5) there is undoubtedly a typographical error and the 6 per cent stated should be 0.6 per cent. (This was a typographical error.—Ed.)

At the bottom of page 64 and continuing at the top of page 65, Mr. Barona suggests a method of obtaining pozzolan by hydrating quartz. This would certainly be a good trick if someone could accomplish it. However, quartz is about one of our most obdurate materials and I doubt that it will ever lend itself to any easy processing.

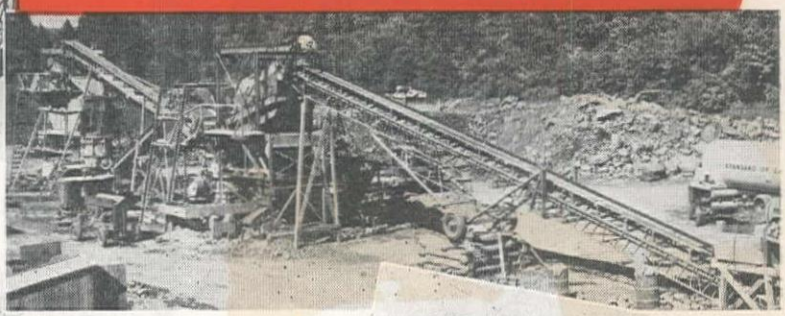
In spite of the above critical comments, Mr. Barona's article is a very

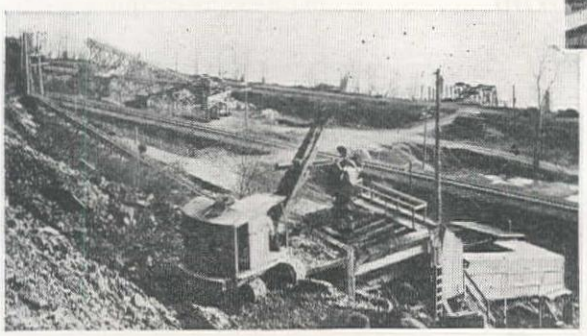
Continued on page 58

WESTERN OPERATORS use TELSMITH Gyrasphere CRUSHERS



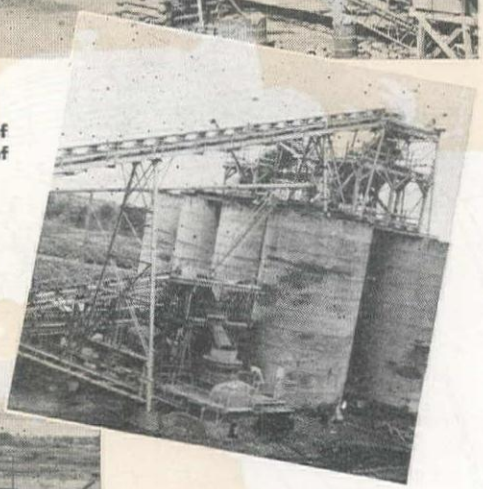
CALIFORNIA
Arrow Rock Co., Roscoe. Two 36" Gyraspheres handle final reduction.



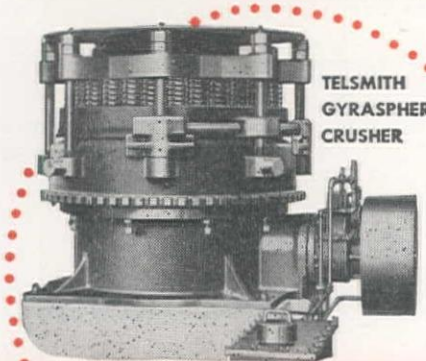


OREGON
Plant at Oregon City of Warren Northwest, Inc., of Portland, Oregon.

WASHINGTON
Crushing-washing plant, Howard Smith, Vancouver.



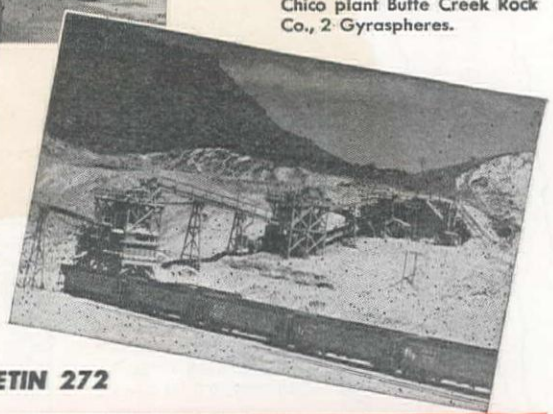
CALIFORNIA
Chico plant Butte Creek Rock Co., 2 Gyraspheres.



TELSMITH GYRASPHERE CRUSHER

MONTANA
Plant of Helena Sand & Gravel Co., Helena.

NEW MEXICO
Sharpe & Fellows Contracting Co. of Los Angeles, quarry plant near Albuquerque.



SEND FOR BULLETIN 272

SMITH ENGINEERING WORKS, 4010 N. HOLTON STREET, MILWAUKEE 12, WISCONSIN

Mines Engineering & Equipment Co.
369 Pine St., San Francisco 4, Calif.

Garlinghouse Bros.
2416 E. 16th St., Los Angeles 21, Calif.

Lee Redman Equipment Co.
Phoenix, Arizona

Acme Machinery Co.
Salt Lake City 1, Utah

Clyde Equipment Co.
Portland 9, Ore. Seattle 4, Wash.

General Machinery Co.
Spokane 1, Wash.

The Sawtooth Co.
Boise, Idaho

Gordon Russell, Ltd.
Vancouver, B.C.

The Mailbag . . .

. . . Continued from page 56

good one, reflecting the progressive attitude and good engineering practice of the Mexican Reclamation Agency.

R. F. BLANKS, Chief
Research and Geology Division
U. S. Bureau of Reclamation

Denver, Colo.

* * *

Silent Craft

Editor, Western Construction News

I have been a subscriber to *Western Construction News* for over a year now, and read it thoroughly. The July 15 issue has brought my gripes to a head. I am a millwright by trade, a subdivision of the carpenters, and we do all the machine erection now being done through Building Trades, and there are several thousand of us here on the West Coast alone.

We do some very precision work as well as some of the rougher work. For instance, we do the erection of turbines and generators, steel mills, rotary kilns, etc., and have the responsibility of getting it into satisfactory operation.

Never in any of your issues have I noticed an account of our even being on the job, and in the July 15 issue you make note of one job on which I myself was millwright foreman . . . and our craft wasn't even mentioned.

I am now employed as millwright foreman at the hot strip mill addition being constructed by Kaiser Engineers at Fontana, Calif. There are several other foremen on the job as well for Kaiser and for the subcontractors, and we want to know why we are a silent craft that no reader ever hears about.

I hope to see in the future some mention of our work in *Western Construction News*.

ROBERT B. SIMS
Millwright Foreman
Kaiser Engineers

Fontana, Calif.

* * *

Cooperation Works Both Ways —For Self Preservation

Editor, Western Construction News

I have read with interest your editorial in the August 15 issue, "Cooperation Works Both Ways." Quite naturally, I am gratified to learn that you have found P. G. and E. cooperative. It is a long-standing policy of the company to make available for publication such information and data regarding its service and its construction projects as may be of public interest.

I think, too, that you may be assured of our management's appreciation of your efforts in the common battle against governmental encroachment in the electric power field and for preservation of the private enterprise system. That is a cause to which all business must contribute, for self preservation if for no other reason.

ROBERT R. GROS, Manager
Publicity and Advertising Dept.
Pacific Gas & Electric Co.

San Francisco

* * *

Letters Like This Are A Daily Occurrence

Editor, Western Construction News

I think *Western Construction News* is well worth the price. Please send my future copies to this address . . .

A. C. LEE
Carpenter Foreman
Ashbach-Steenberg Co.

Exeter, Calif.

* * *

Service

Editor, Western Construction News

I have enjoyed your magazine; your service has been excellent. If and when I return to the West, I shall be delighted to renew my subscription.

E. P. H. WILLETT
Project Engineer
Alabama State Highway Dept.

Fairhope, Alabama

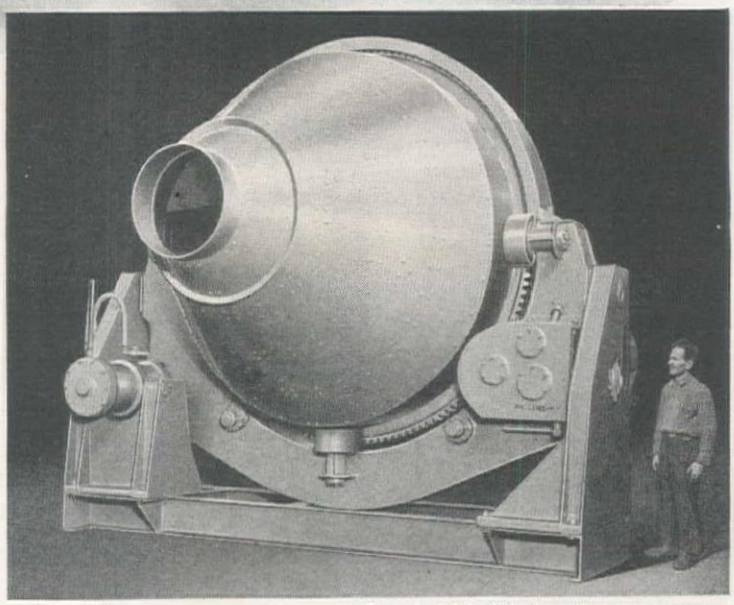
Yes Sir! We Really $ave with these TWO PROFIT MAKERS

You can make more money mixing concrete in a Smith 6 yard Tilter and delivering the concrete in Smith-Mobile Agitators . . . a profit-making combination for big concrete projects and Ready-Mix plants.

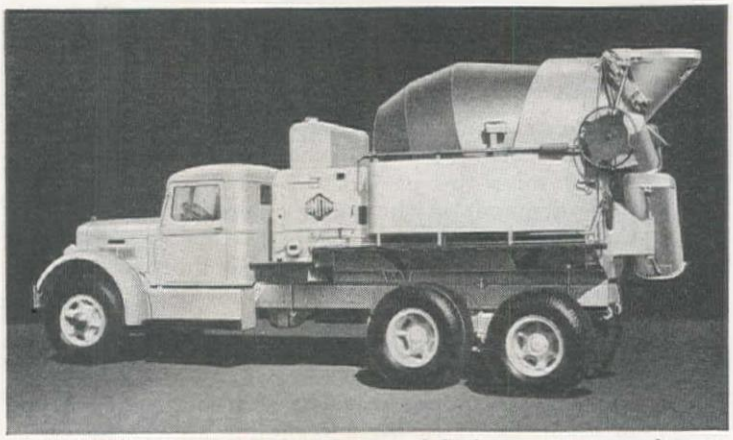
The initial cost of a Smith 6 yard Tilter is not much more than a 4 yard mixer, but it will give you 50% greater output with practically the same labor, power and overhead cost. It steps up your plant capacity, gets agitators out of the yard in a hurry, reduces the cost per yard of concrete to rock bottom.

Smith Tilters mix any type of concrete at any slump and discharge it with absolutely no segregation. Six sizes available — 1, 2, 3, 4, 5, or 6 cu. yds. per batch.

Smith-Mobiles are designed to deliver the maximum payload per pound of mixer. No deadweight. Built of the toughest wear resistant materials. Four sizes available — 2, 3, 4½ and 5½ yards as truck mixer — 3, 4¼, 6⅛ and 7⅜ yards as agitator.



New Smith 6 yard Tilter.. Compact. Low height. Fits into the same space formerly used by a 4 yard Mixer. One batch fills a 6⅛ yard agitator.



Smith-Mobile 6⅛ yard Agitator. Loads and discharges at top speed, even dry, low slump concrete. Takes entire batch of a Smith 6 yard Tilter.

GET THESE NEW CATALOGS

Just off the press. Bulletin No. 244 describes the new Smith 6 yard Tilter. Catalog No. 239 describes Smith-Mobile Truck Mixers and Agitators. Write for your copies.

The T. L. SMITH COMPANY

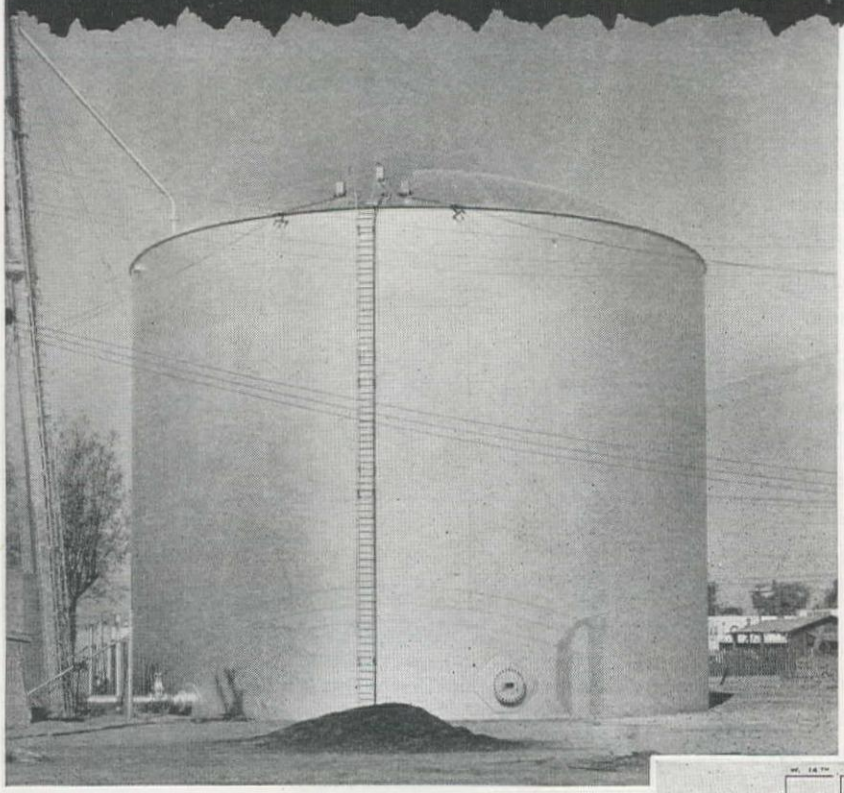
2871 N. 32nd STREET • MILWAUKEE 10, WIS., U. S. A.

SMITH MIXERS

FOR BIG CONCRETE PROJECTS AND READY-MIX PLANTS

A 5631-1P

How a 500,000-gallon HORTON Steel Reservoir solved Casa Grande's water demand problem — at a saving of $20,000!

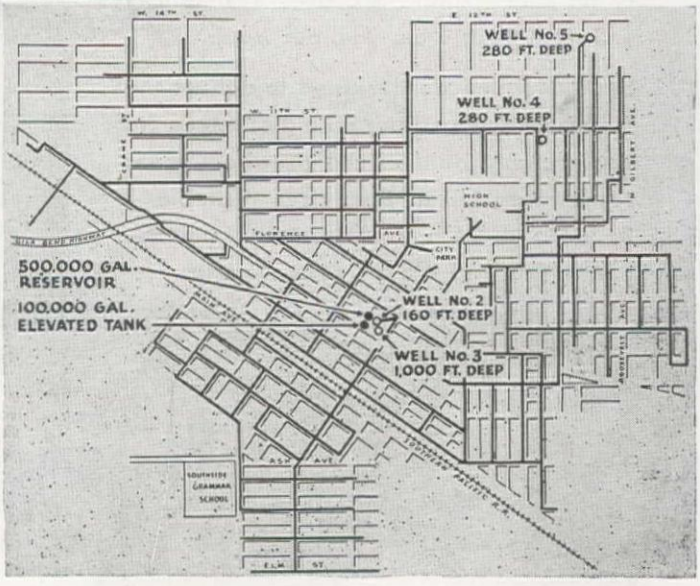


The 500,000-gal. Horton welded steel reservoir shown at the left solved a serious water service problem at Casa Grande, Arizona. Before it was installed, the system depended entirely upon two wells and a 100,000-gal. elevated tank. But the wells did not have sufficient capacity to handle peak loads and the elevated tank was emptied rapidly unless water was pumped from a third well nearby. It had the disadvantage of producing very hard water. This reservoir installation solved the problem by meeting peak demand at Casa Grande without using the hard water well or incurring the expense of drilling a new one.

The Arizona Edison Company found that a Horton ground-level reservoir would solve the problem of meeting peak demands in the water system of Casa Grande—at a saving of $20,000. This saving is the difference between the cost of the reservoir and the cost of drilling a new well and laying 1¼ miles of transmission mains.

Casa Grande's Horton reservoir is a 500,000-gal. welded steel tank, 48 ft. 6 in. in diam. by 37 ft. high. Its joints are water tight, and its smooth surfaces are easily painted.

Horton reservoirs are built in a wide range of standard capacities up to 10,000,000 gals. Ask our nearest office for estimating figures.



Map of Casa Grande, Arizona, showing location of wells, storage tanks, and distribution mains.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2183 Healey Building
Birmingham 1.....1598 North Fiftieth Street
Boston 10.....201 Devonshire Street
Chicago 4.....McCormick Building
Cleveland 15.....Guildhall Building
Detroit 26.....Lafayette Building
Houston 2.....National Standard Building
Havana.....402 Abreu Building
Los Angeles 14..1544 General Petroleum Building
New York 6.....165 Broadway Building
Philadelphia 3.....1700 Walnut Street Building
Salt Lake City 1..1555 First Security Bank Building
San Francisco 11....1213—22 Battery St. Building
Seattle 1.....1355 Henry 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 NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
September 15, 1949 Vol. 24, No. 9

When the County Owns the Machines—

WE HAVE OFTEN editorialized about the desirability of doing county road work (or any other construction) by contract, rather than by force account, or day labor. In that connection, we're much interested in a recent appellate court decision in California, of which "more later"!

Called to our attention recently, though, and with the facts documented by pictures, is the case of a Colorado county which is apparently actually going into the contracting business, using county equipment to pave private roads, driveways, service station yards and similar areas, or through some system of rentals or sales agreements permitting small contractors to use county asphalt plants, trucks, and other equipment to perform private work.

We presume there must be a shade of legality about the operation, for surely no county Board of Supervisors would lay itself open to recall or impeachment by misuse of publicly-owned machinery. But it is unquestionably against public interest.

We recognize of course that there are situations in which the public is best served by the performance of street and other construction work by its own tax-paid agencies. Small maintenance operations, test or experimental sections, jobs in remote locations, emergency work, etc., might well be too expensive, or too slow, were it necessary to write specifications and advertise for bids. Even though submittting them for contract might be more economical, it is granted that other considerations might make this undesirable.

For such work, then, it is surely permissible that the county or city or other agency own its own construction equipment and directly employ needed operating personnel. But try as we may, we can conceive of no circumstance other than one of life-and-death emergency, in which such publicly-owned machines and tax-paid personnel might properly be employed to improve private property or for private gain. These machines and these men are not cheap, and the taxpayer has made a considerable investment. To expend that investment for the benefit of one individual or one firm is clearly a violation of public trust, even though the officials responsible presumably have legal protection.

Colorado ought to take immediate steps to make such a practice illegal, and so should any other state in which it is presently possible for public officials either to direct public equipment to private benefit; to make such equipment available to others for private use; or to employ it as a contractor, in competition with private citizens, even if certain profits should accrue to the public treasury.

The $3,000 Limit

"MORE LATER," we said above in reference to the recent California Appellate Court decision on force account construction of county roads. It was a rather peculiar decision in that it established by court precedent what California contractors have been seeking for years through legislation.

The initial lower court case was instituted in Plumas County, Calif., and raised the question of whether a county road commissioner who is not a registered civil engineer could legally direct construction of certain county roads. When finally appealed, the unanimous decision was that registration is not required, but that $3,000 is the maximum cost which a county may spend for force account construction on any one road project.

We're very pleased that it has happened this way. We certainly have no intention of criticising the court, for we're sure they arrived at their decision after deep and careful study of all the existing statutes.

We do suggest, however, the need of legislation to modify their findings for clarification of future projects. In the first place, we believe the commissioner, since his duties include planning and supervision of civil engineering construction, **should** be a registered civil engineer. And secondly, though we are gratified that a construction limit was set, we feel it is too low, and suggest that $10,000 be considered as a suitable substitute, since at current prices $3,000 will scarcely permit maintenance equipment to be moved out of the shop. We further suggest that uniform, approved accounting practice be specified for use by the counties in evaluating future projects, in order that the established limit may not be circumvented by irregular pricing methods.

This Is the West!!!

THESE EDITORIALS are being written in an airplane, high over the plains and mountains of southern Montana. But a few moments ago, the plane was winging over colorful Wyoming, and only a couple of hours since, was passing over Colorado's beautiful Platte Valley farming area. It's all glorious to see, and the engineer yearns to get his teeth into some of the great development projects which seem, from the air at least, so obvious.

But one great fact is so plain that it fairly shouts for recognition. Large areas of irrigated land are beautifully green and heavily productive of fine crops. Other great tracts (and these predominate) are desolate and brown, equally fertile in many cases, but without the water needed for plant life. And conditions exactly similar to this have been observed on other flights over Arizona, California, Oregon, Utah, North Dakota, Texas, and all the other Western States. In all of them rocky mountains jut out of the landscape, and "badlands" render some areas virtually useless. These conditions prevail **all over the West,** and **nowhere in the East.**

Great dams, thousands of miles of canals, aqueducts hundreds of miles long, water tunnels up to 70,000 ft. in length, and men who are giants to plan and build and operate them —these show the character of the West.

The East is not the same; it has a softer, more seasoned and more nearly static character. Water is always close at hand or falls regularly from the sky.

Western problems are different; Western needs are different; Western solutions are different; Western construction is different; Western vision and Western men are different.

It's high time Congress took cognizance of these differences. Let Congressmen take an air tour of the nation, and compare the land of the Eastern half with that of the West; let them mingle on the ground as citizens to compare the bright-eyed pioneers of the West with the weary factory worker in the East; let them compare the growing population, the expanding industry and the unlimited opportunities of the West with the declining economy of the East.

Surely then they will see that our future as a nation will reflect the future of the West; they will insist that seats of importance in the Cabinet and other administrative posts of prominence are awarded to Westerners; that Western projects and needs receive due consideration in appropriations and national planning. No longer will such totalitarian and typically European solutions as the Valley Authority be proposed, and no longer will essential and self-supporting projects be hamstrung for lack of vision and lack of funds.

Break Tha

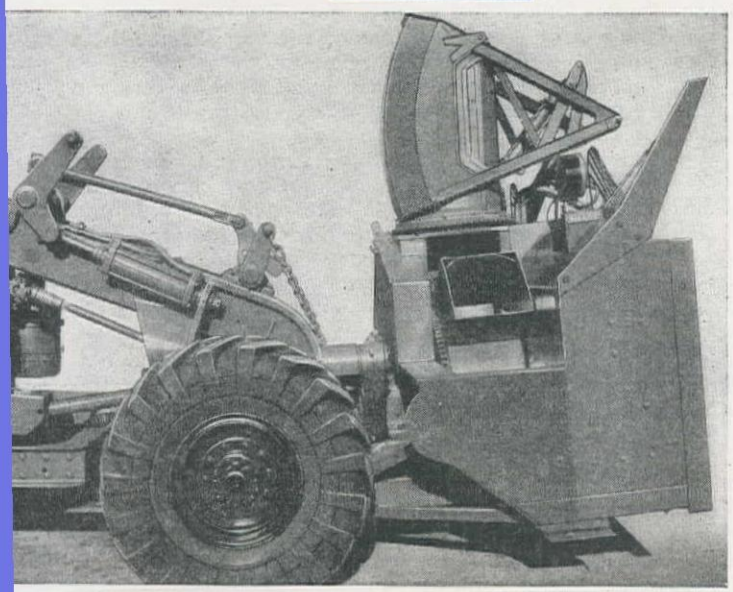
with this POWERHOUSE Combination

Austin-Western
SICARD

Engine, radiator, clutch and batteries for the Snow Master are mounted beneath the arch of the grader frame, and can be quickly and easily removed as a unit.

AUSTIN-WESTERN

All-Wheel Drive and Steer Power Grader with SICARD Snow Master Rotary Snow Plow



Close-up of Sicard Snow Master in raised position, with blower housing revolved for casting to the right. The Sicard unit can be quickly removed from the front end of the grader.

Wherever there's a tough problem—freeing country roads from a smothering blanket of snow, loading trucks to capacity in crowded business districts, or cleaning streets right to the curb in closely built residential areas—this outfit has what it takes. Sicard Snow Master, with its powerful blower and exclusive patented "wrist action" chute for precision casting, backed by the power and drive of the Austin-Western Power Grader, with its exclusive All-Wheel Drive for maximum traction and *front end* control, and exclusive All-Wheel Steer for maximum maneuverability and *rear end* control.

This is no *single season, single purpose* unit! The grader that drives the Sicard is the same Austin-Western machine that dominates the *grader* field 365 days a year on every type of work. Thus, there is no closed season for the outfit. Spring, summer and fall it's the last word in graders . . . when winter rolls around, it is ready in a few hours for the job of snow removal.

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

BLOCKADE!

Cutting through heavy, icy drifts in the Colorado "Rockies."

Power and steering control at all four wheels holds the grader steadily to its work in widening.

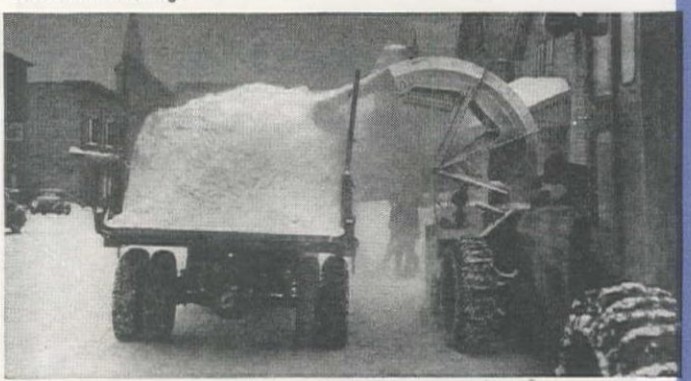
EXCLUSIVE FEATURES
Set New Performance Standards

The powerful rotary augers of the Sicard grind up compacted snow and ice, whirling it toward the throat of the blower. The exclusive, saw-tooth cutting table, separating the two sets of augers, prevents the snow cut by the upper augers from falling and choking the lower series. There's no bottleneck at the front end of the Sicard . . . each auger does its share of the work. Ice cutters can be quickly attached to the augers, when exceptionally difficult conditions are encountered.

The blower of the Snow Master has a casting range of up to 150 feet on either side, *plus* the exclusive, patented "wrist action" casting chute which is completely controllable.

All-Wheel Drive provides the *front end* control which has been found so important on truck-mounted rotary plows. All-Wheel Steer provides—for the first time on any rotary—the short turning radius which is always advantageous, and the *rear end* control which is the only thing that will successfully resist the side draft that is always present when widening out.

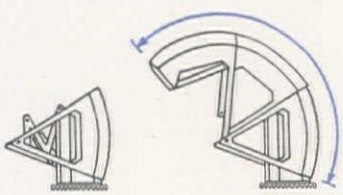
Austin-Western and Snow Master—this is the combination to break the clutch of winter—to keep city streets and country highways clear for the rolling wheels of commerce.



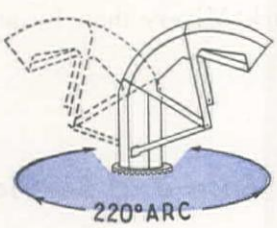
Complete directional control, with "wrist action" chute, makes it easy to load trucks from any angle.

The rotatable, telescopic chute puts the snow precisely where it's wanted. No broken windows . . . no clogged driveways.

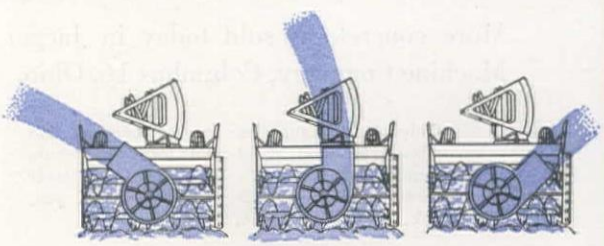
EFFORTLESS HYDRAULIC POWER MAKES ALL ADJUSTMENTS . . . INSTANTLY



Controls telescopic chute for long or short range casting.



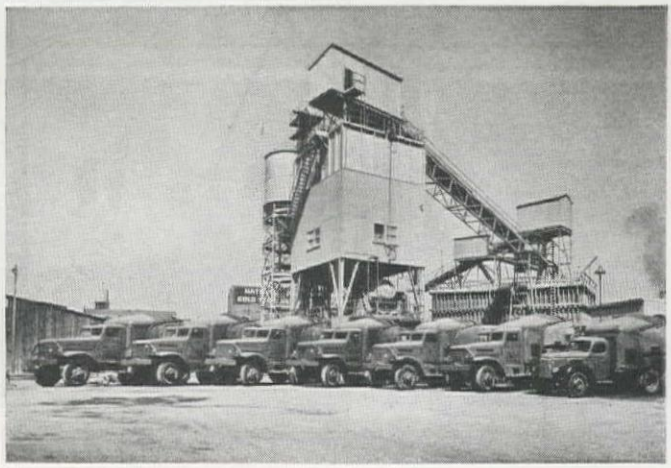
Rotates chute in 220° arc for casting or loading to either side.



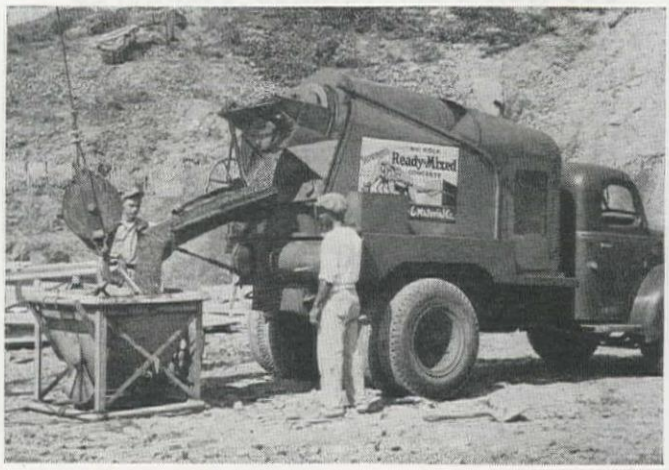
Rotates blower housing for direct casting to either side, or through chute.

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

Jaeger dual-mixed specification concrete



is highest quality, accepted on all jobs,



yet often costs less in place in the forms

Because it is positively dual-mixed, accurately controlled for slump and delivered without segregation over any kind of haul, concrete mixed to specification in Jaeger Truck Mixers is known and accepted by architects and engineers *on every type of work.*

The contractor also enjoys a cost-saving advantage. Concrete delivered by Jaeger Truck Mixers is definitely more workable, is poured faster under perfect control and on the dependable schedules maintained by Jaeger-equipped plants which are the pace-setters of the industry.

More concrete is sold today in Jaeger Truck Mixers than by any other method. The Jaeger Machine Company, Columbus 16, Ohio.

Only Jaeger supplies top or end loading mixers to meet plant and local aggregate requirements, in all standard Truck Mixer Bureau ratings — 2 - 3 to 5½ - 7⅜ cu. yds. Ask for Catalog TM-8.

Sold and Serviced by

EDWARD R. BACON CO., San Francisco 10
SMITH BOOTH USHER CO., Los Angeles 54
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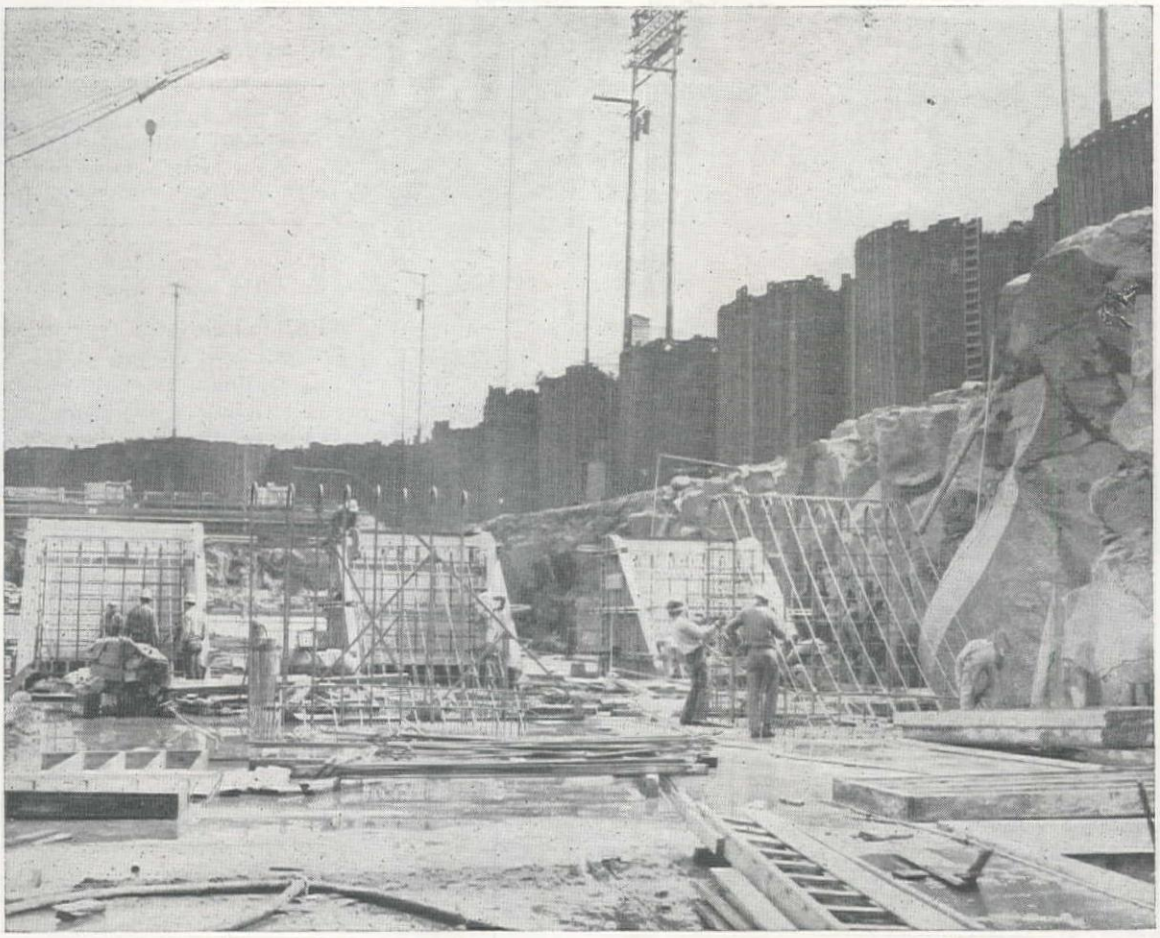
NELSON EQUIPMENT CO., Portland 14
ANDREWS EQUIPMENT SERVICE, Spokane 9
WESTERN MACHINERY CO., Salt Lake City 13 & Denver 2
CENTRAL MACHINERY CO., Great Falls & Havre
TRACTOR & EQUIPMENT CO., Sidney & Miles City
WORTHAM MACHINERY CO., Cheyenne & Billings
J. D. COGGINS & CO., Albuquerque
MILES CITY EQUIPMENT CO., Miles City
SCHRIVER MACHINERY CO., Phoenix
IDAHO MACHINERY CO., Boise

WESTERN CONSTRUCTION NEWS
SEPTEMBER 15 • 1949



WORK on the Washington shore half of the dam is on a 24-hour schedule within the cofferdam of circular steel cells.

Large Scale Construction at McNary

Within a cofferdam enclosing 40 acres, Atkinson-Ostrander-Jones have streamlined operations for placing the concrete of McNary Dam's long spillway and record-sized navigation lock

McNARY DAM, third major structure on the main stem of the Columbia River, is under construction near Umatilla, Ore., 292 mi. above the river's mouth. First known as Umatilla Dam, it has been renamed in honor of the late Senator Chas. L. McNary, long-time Senator from Oregon.

It is a multi-purpose project, providing for navigation and power, with incidental irrigation and recreation benefits. The two completed dams in the development plan are Bonneville, about 150 mi. downstream, and Grand Coulee, approximately 300 mi. upstream from McNary.

The work is performed under the direction and supervision of the Corps of Engineers, Walla Walla District. Actual production of electrical energy from the first two units is scheduled to begin Dec. 1, 1953. Additional installations will follow with one unit about every four months until the capacity of 14 units is reached. Estimated total cost is $227,028,000.

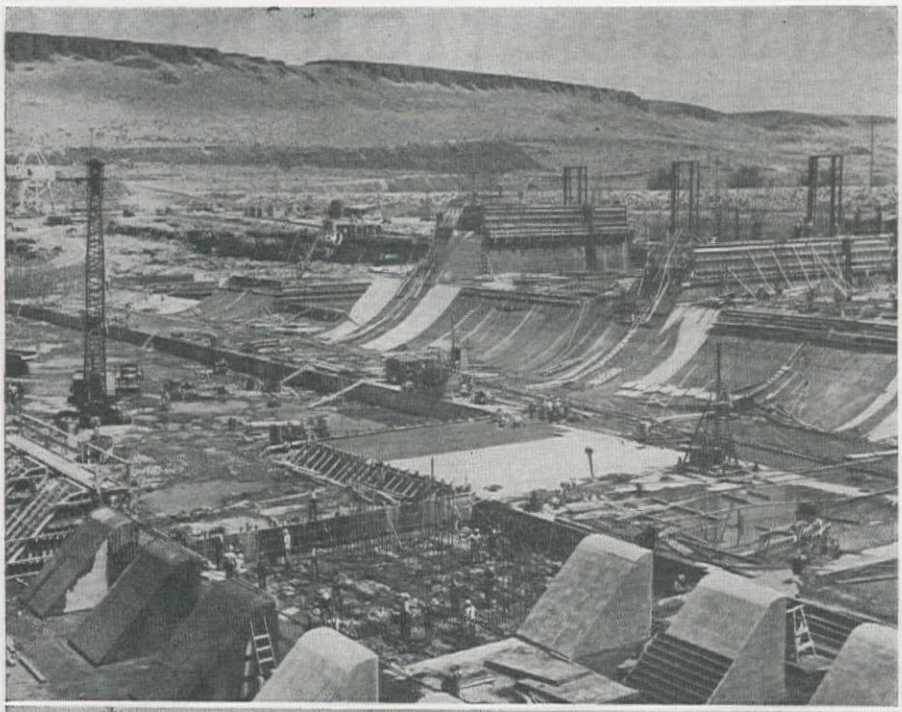
A mile and a half from shore to shore

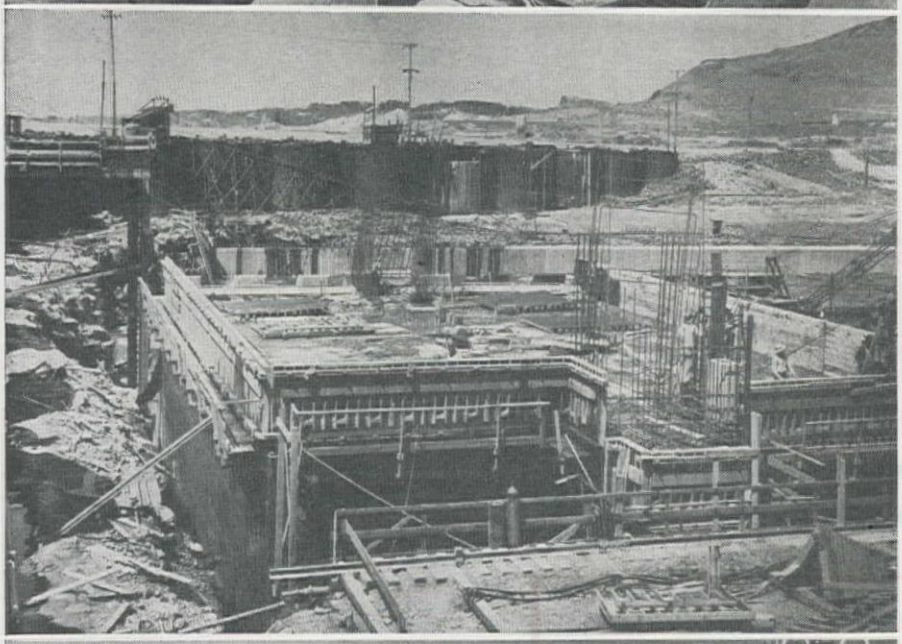
The dam will be concrete gravity type, with earth dam abutments tied to bedrock on both the Washington and Oregon shores. Maximum height will be 158 feet from foundation to deck and the over-all length, assuming that the dam begins where the crest intersects the ground surface, will be 7,365 ft. The spillway section will be 1,310 ft. long and the spillway discharges will be controlled by 22 vertical lift gates of 50-ft. span each. It will have a discharge capacity of 1,430,000 cu. ft. per sec. at normal pool elevation of 340 ft. above mean sea level.

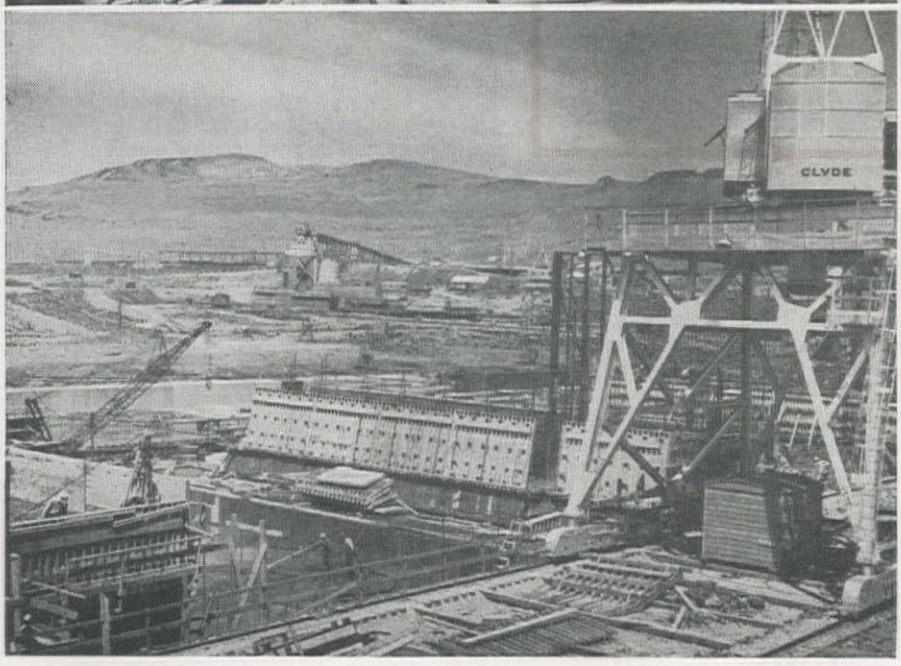
The powerhouse section will have an over-all length of 1,422 ft. There will be a concrete non-overflow section 93 ft. long between the powerhouse and the spillway, and another non-overflow section 263 ft. long between the spillway and the navigation lock.

Highest single-lift navigation lock in the world

The navigation lock, located on the north or Washington shore, is a portion of the work now under construction along with 13½ bays of the 22-bay spillway dam by Atkinson-Ostrander-Jones, a joint venture, on a $21,751,456 contract. The lock will be 86 ft. wide, 675 ft. long and will have a maximum lift of 92 ft., making it the highest single-lift lock in the world. It will have a minimum draft of 12 ft. over the lower sill. Maximum time for filling the lock will be 17 minutes and time for emptying the







lock will be 15 minutes. The upstream gate will be 23 ft. in height and the downstream gate 106 ft. Water will be pumped into the lock through a concrete manifold conduit with a whole series of ports along the floor of the lock, so as to reduce turbulence and current. Likewise, when dropping the water surface in the

TOE of the ogee spillway, spillway apron and baffle blocks, right to left. Floor of the spillway bucket is being poured directly on the solid rock river bed of the Columbia.

lock, another series of ports will withdraw the water into a similar manifold.

Fish to have latest type accommodations

The non-overflow section between the navigation lock and the spillway dam will include fishways and fish lock. Because of the importance of the annual upstream migration of salmon and other fish to spawning areas in upper tributaries of the Columbia river, the fishways at McNary Dam will be among the finest that engineering talent can devise. The Washington shore fishways will consist of a ladder 30 ft. wide with separate pools every 20 ft., each pool one foot higher. The ladder will be 2,200 ft. long. The fish lock will be 30 by 20 ft., with a lift of 118 ft.

There will also be a fish collecting system across the downstream face of the powerhouse with water so regulated that fish will be attracted to a ladder located

SPILLWAY monolith construction viewed from the end of the spillway trestle. The cofferdam passes to the left, just out of picture.

on the Oregon shore, where passage to the pool above will be by the same easy stages as on the Washington side.

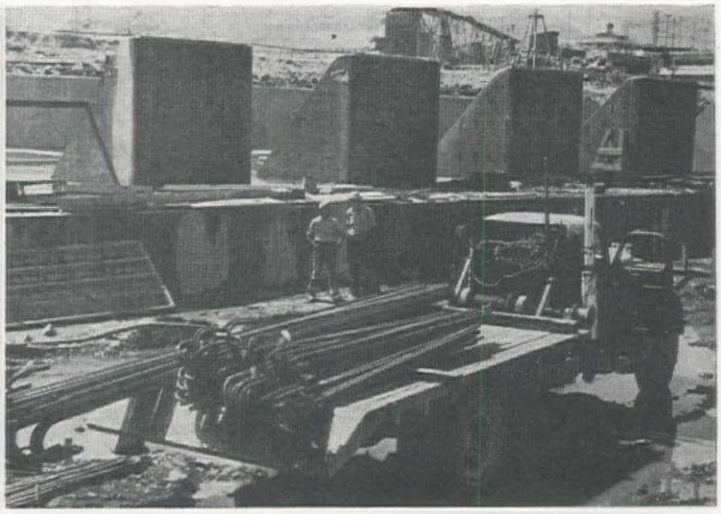
World's biggest generators

The powerhouse section will be on the south, or Oregon side of the river. It will have a deck elevation of 361 ft., and maximum height of 170 ft. from draft tube foundation to intake deck. It is designed for 14 generating units of 70,000 kw. each, or a total of 980,000 kw. Generators for the first four units are now being designed by General Electric Co., and reputedly will be the largest physically in the world. Kaplan turbines, 280 in. in diameter, having a rated capacity of 111,300 hp. with runner

FORMWORK for the main dam buttresses, foreground. The gantry crane rides a track just upstream from the spillway face to handle heavy loads.

speed of 85.7 rpm., will turn the generators.

When completed, McNary dam will create a pool extending 59.2 mi. upstream to the vicinity of Pasco, Wash., and will provide for 67 mi. of slackwater navigation in the Columbia and Snake rivers. At normal pool elevation the storage capacity will be 173,000 ac. ft.



HOOKED DOWELS of heavy steel, projecting at left, are grouted into drill holes 5 ft. deep in the solid river bed to secure a mat of reinforcing steel one foot beneath the finished floor of the spillway bucket. At right, a load of the dowels arrives ready to be placed in the spillway apron.

and will cover 37,900 ac. This pool will make necessary the relocation of 83 mi. of railroad and 24 mi. of state highways, and require the revision of 22 mi. of power transmission lines and 24 mi. of telephone and telegraph lines. Approximately 27 mi. of levees will have to be constructed to protect some low areas.

The flow of the river at the dam site has varied from a minimum of 30,000 sec. ft. to a maximum of 1,190,000 sec. ft. The minimum dependable flow at the dam is 66,200 sec. ft.

Circular steel shells for cofferdams

Because of the size of the river and its unusual high minimum flow, the problem of cofferdams is of tremendous importance. The type employed is a circular cell steel sheet piling cofferdam with earth filled wings. The upstream wing is built first, followed by the downstream wing. Then, simultaneously, the cells are erected. Steel piling is driven into the river bed and the completed cells are filled with sand and gravel, with water added for greater density. Each cell is then topped with a layer of large stones. With the cells in place the enclosure is unwatered with pumps.

The contract for construction of the Washington cofferdam, behind which the lock and spillway construction is proceeding, was awarded to Guy F. Atkinson for $1,096,510. The piling was placed by pile-drivers working from an earth and rock fill, the temporary continuation of the two earthfill wings to form a complete enclosure. The cells are 38 ft. in diameter, except for one central tie cell, which has a diameter of 56 ft. The piles varied from 26 to 44 ft. in length. They were not really driven, but were placed from a previously determined template made from a survey of the river bottom, and were merely topped lightly so as to seat firmly on the rock. After the sheet piling had been placed, the working embankment was used as the filler material inside the cells, being transferred by clamshells retreating toward the wing fills. About 40 ac. is enclosed by the cofferdam.

After dewatering inside the cofferdam, the foundation for the first 13½ bays of the spillway was cleaned, little actual excavation being required. Also, excavation for the navigation lock, preliminary work on which had furnished material for the cofferdam wing walls and working platform, was continued to final grade. Total excavation within the enclosure was approximately 410,000 cu. yd., mostly rock.

Cement arrives by ship and barge

Concrete work started on the dam on February 9 and has proceeded continuously since. For mass concrete, in which cobbles up to 6 in. in diameter are used, a 1:4:12.5 mix is used. A 28-day strength of 2,000 lb. is developed by this concrete. Medium strength concrete, with aggregate up to 3 in. in diameter, employs a mix of 1:3.8:9, and surface concrete is made with a 1:2.3:5 mix. In all mixes Protex is added in sufficient quantity to produce a 4.5% air entrainment.

On wearing surfaces, such as the floor of the spillway bucket and the faces of the surge baffles, the vacuum process is used to secure a hard surface, and in some other cases absorptive form lining is used for the same purpose.

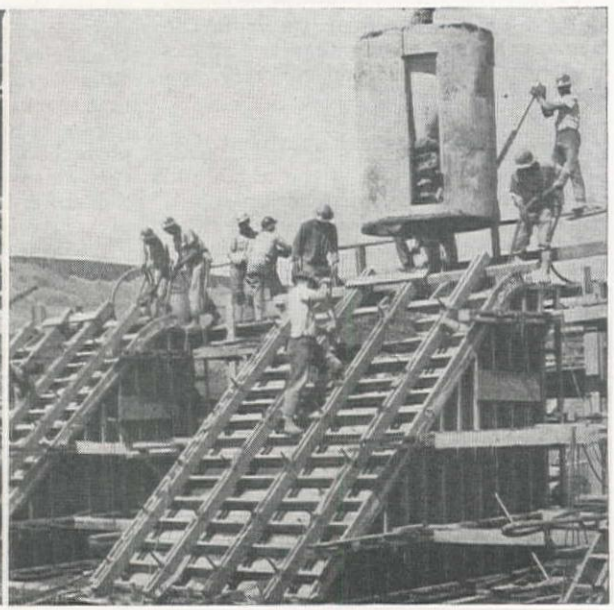
Cement for the construction at McNary is purchased from the Permanente Cement Co. from its mill near San Jose, Calif. It is transported by Kaiser-owned ships to Portland, where it is transferred to barges and moved up the river to the damsite. A Fuller-Kinyon cement pump at the river's edge there lifts the cement into silos.

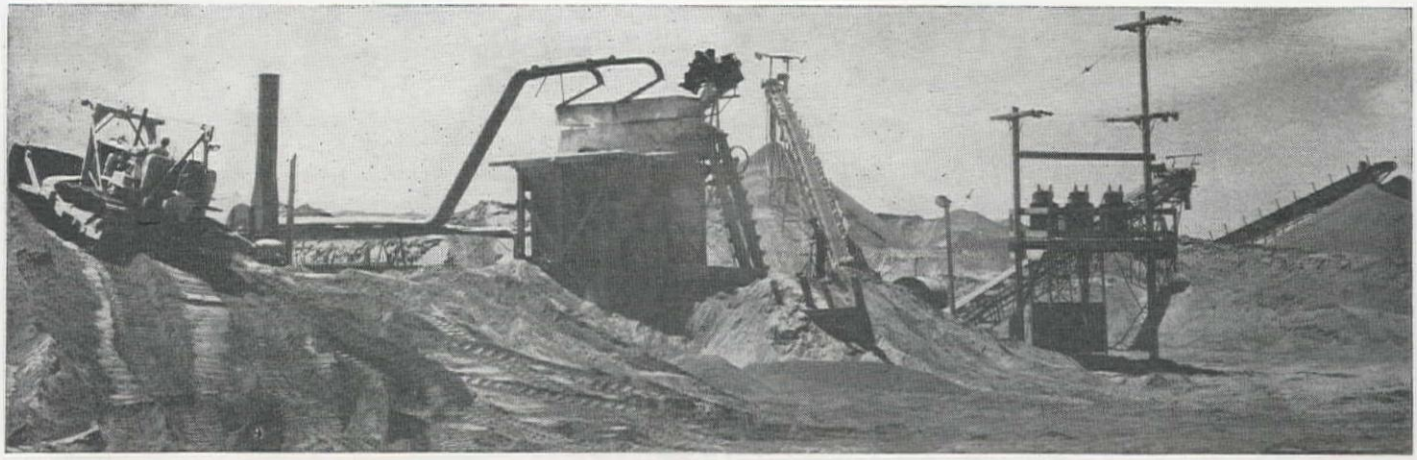
Aggregate is furnished under a separate contract by J. G. Shotwell of Tacoma, Wash., who secures it on Berian Island, about 4 mi. upstream from the dam and trucks it to the batching area. Sand is mostly manufactured at the same pit, but to secure the proper proportion of fines, some blow sand is trucked in and added to the sand stockpile.

Concrete poured in three shifts

Concrete is batched in four 4-cu. yd. Noble batchers and mixed in four 4-cu. yd. Koehring machines. It is discharged from the mixer into 4-cu. yd. buckets and moved near to the point of placement on flat cars pulled by Diesel engines. Mobile cranes, in most cases, then

A WAGON DRILL prepares foundation for the spillway apron, left. At right, a 4-cu. yd. bucket drops concrete into forms for one of the series of spillway baffle blocks.





AGGREGATE is trucked 4 mi. to the dam site from this crushing plant under a separate contract to J. G. Shotwell of Tacoma, Wash. To secure the proper proportion of fines, some blow sand is trucked in and added to the sand stockpile.

lift the buckets to the required spot. A ground-wire telephone system keeps the batch plant informed as to concrete requirements.

Concrete is poured during three shifts daily, with production at the present time in the vicinity of 3,000 cu. yd. per day. To date, about 250,000 cu. yd. have been poured. All concrete is water cured. About 450 to 500 lb. of ice, manufactured in a tube ice machine, is used in each batch for cooling purposes. No cooling tubes are used within the structure.

Hooked dowels join foundation and spillway

The floor of the spillway bucket is poured directly on the rock foundation. Almost no excavation was necessary other than cleaning, for the river bed has been scoured to solid rock by the stream through the centuries. Hooked dowels of heavy steel, however, are grouted into drill holes 5 ft. deep in the foundation rock, and a mat of 1-in. reinforcing steel is firmly secured to these dowels 1 ft. beneath the finished surface of the concrete.

At the lower edge of the spillway bucket is an end sill and a series of concrete baffle blocks in two rows, the blocks staggered in position in the rows. Steel in these is also secured to the foundation rock by dowels through the underlying slab.

A Clyde traveling whirley crane moves along a track just upstream from the face of the spillway gate piers and is used in placing steel and concrete, and in other operations.

Metal slip forms on earth abutment

The earth abutment at the north end of the dam is under construction simultaneously. An impervious core 20 ft. in width at the top, with 1 on 5 side slopes, forms the central portion of the embankment. On the slopes of this impervious zone, filter blankets of sand and gravel 3 ft. thick are laid. These are followed by a 4-ft. layer of spalls (6 in. minus material) and outside this, heavy rock fill. All material is placed in 9-in. layers uncompacted.

The placement of the sand and gravel filter blanket is a delicate operation, when confined to a 3-ft. layer lying alongside a 1-on-5 slope. In order to achieve the desired result, and maintain the thickness accurately, the contractor is using a series of metal slip forms to accurately demark the layers.

The material within these narrow zones is vibrated with a small Jackson vibrator-tamper operated by gas engine and oscillating a 3-ft. tamper shoe. The spalls and larger rock are compacted with conventional equipment.

At the shoreward end of the abutment fill, a special stop-log structure has been constructed to permit passage of two tracks of the S. P. & S. Ry. through the dam. The grade of the railroad is approximately 6 in. below the crest of the dam, and in cases of heavy flood which would fill the reservoir to its maximum surface, stop logs will be inserted over the rails, and traffic stopped. It is anticipated, however, that this situation will occur less than once in ten years. The temporary inconvenience to the railroad was accepted as preferable to the considerable relocation which would be necessary to maintain the roadbed on the maximum 0.2% grade, which is the S. P. & S. standard.

Diversion of Columbia will be difficult

The present contract includes completion of the ship lock and fish ladder on the Washington side and erection of the spillway ogee to an elevation of 250 (final elevation of the ogee will be 291). Bids were received last month on the first work on the Oregon shore, including a "junior" cofferdam around the powerhouse foundation area, and eventual closure of the river by continuing the cofferdam to a junction with that presently in place on the north shore. The same contractor group was low, with a bid of $15,835,539, and have been awarded the contract.

A particularly difficult operation in this new contract will be the final closure and diversion of the river through the navigation lock, because an underwater channel 80 ft. deep must be cut off by the contractors. The government proposal is to dump very heavy rock or pre-cast concrete blocks from barges into this channel until the depth to the top of this pervious fill is about 40 ft. Then, upon this base the sheet steel piling will be set, and filled with earth and rock. With the main flow then diverted through the navigation lock, impervious silt would be forced into the interstices of the channel-filling rock. It is not necessary, according to the contract, for the contractor to follow this method of closure if some other system equally effective is devised and approved by the Corps of Engineers.

One of the first construction activities at McNary damsite was construction of a large community for government and contractor employees. The town of McNary was built on the bluff above the Oregon end of the dam, and is a complete community with water, sewers, paved streets, shopping center, etc. Transportation across the river to the scene of operations on the Washington shore is furnished by two small ferries, one operated by the government, one by the contractors.

McNary Dam builders

Construction of McNary Lock and Dam is under the direction of Col. William Whipple, Walla Walla District Engineer for the Corps of Engineers. In the Walla Walla office, J. E. Reeves is chief of the engineering division; Louis E. Rydell is chief of planning, and E. C. Franzen is chief of design. At the damsite, the Engineers are represented by Col. Wm. J. Ellison, Jr., resident engineer; A. G. Davis, chief of engineering, McNary division; W. B. Watson, chief of construction; and C. C. Morgan, in charge of lock and dam construction.

For the contractors, R. J. Jenks is project manager, and William Rieves is general superintendent. Al Chaussee was project manager on the cofferdam erection.

Dredge Speeded on Reserve Fleet Basin at Cathlamet Bay

AN ELECTRIC DREDGE has been put to work on a 24-hr. basis by General Construction Co. of Portland, Ore., for digging of the new $2,500,000 Maritime Commission reserve fleet basin in Cathlamet Bay near Astoria, Ore. The port commission put a steam dredge to work two months ago on the project. The commission and General each have a contract to dredge part of the basin. Completion of the job is scheduled for mid-1950.

Progress Curves Can Cut Job Costs

Plotting construction production as a function of time, an efficiency expert develops a flexible graphic method for predicting job progress and obtaining efficiency and economy

By
ISMAIL ISMEN
Engineer
International
Engineering Co., Inc.
San Francisco, Calif.

A BALANCED and justifiable progress schedule on construction speeds up the production, offers an economy and establishes the basis for a high quality of engineering job. The control of the production is of utmost importance in a contract. This control is composed of the following steps.

1. Preliminary time schedule for each item separately.

2. Determination of the percentage in accomplishment of different items at the end of uniform intervals (such as days, weeks or months) by comparison to the total amount to be done.

3. Secondary changes, modifications and adjustment if necessary applied on each item in order to satisfy and correlate the development of different phases within the construction period.

These first three steps will be called horizontal control.

4. Preliminary combination of work items at given intervals by using their unit prices as respective weight.

5. Determination of the percentage in accomplishment of the job at a given time, by comparison to the total cost of the contract.

6. Secondary changes, modifications and adjustments, at given intervals, satisfying and correlating further changes during different phases of the construction period.

The last three steps will be called vertical control.

7. Comparison of the production proposed under horizontal and vertical controls with a certain production curve (whose properties will be analyzed further in this paper) where the entire job is considered as a whole. Here, the production at the end of different periods will be expressed as the percentage of the total cost of the job.

8. By using the previous data proposing a forecast of the production (within the limits of a certain approximation) to predict the development of future phases in the development of the project.

The last two steps will be called diagonal control.

Figure 1 shows a portion of a typical time schedule for a construction project.

Plotting the cumulative values

In an engineering job the efficiency of the production can be studied by plotting the cumulative value of the production as a function of the time. This cumulative value is the quantitative expression of the building material such as feet, pounds, cubic yards, corresponding to each item of the job, or can also be expressed in monetary unit by the combination of all work items with their respective unit prices. Sometimes the cumulative value is plotted as the total number of office and field employees and workers.

In the first case the curve gives the variation of each item taken as independent units; in the second case the curve in question shows the overall picture of the job; in the third case the curve represents the labor force of the contract.

The approximation required for each efficiency curve depends on the character of the job. The successive points of the curve can be plotted each day, each week or each month correspondingly, the practice determining the required intervals.

Conditions and limitations

The use and analysis of a production curve is generally simple, but is subject to several conditions and limitations.

In the following analysis it is assumed that a reliable and accurate result can be obtained if the job in question satisfies the following conditions.

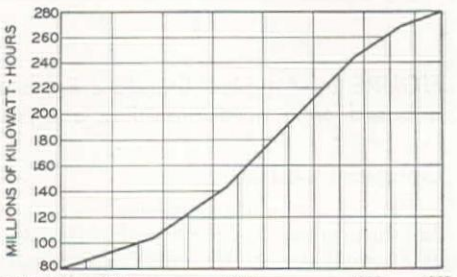
(a) A uniformity should be the dominant feature for the work items separately or for the total job. A horizontal control should always be maintained.

(b) A coordination should exist between different work items. A vertical control should always be maintained.

(c) A balance should exist between different periods of the job. A diagonal control should always be maintained.

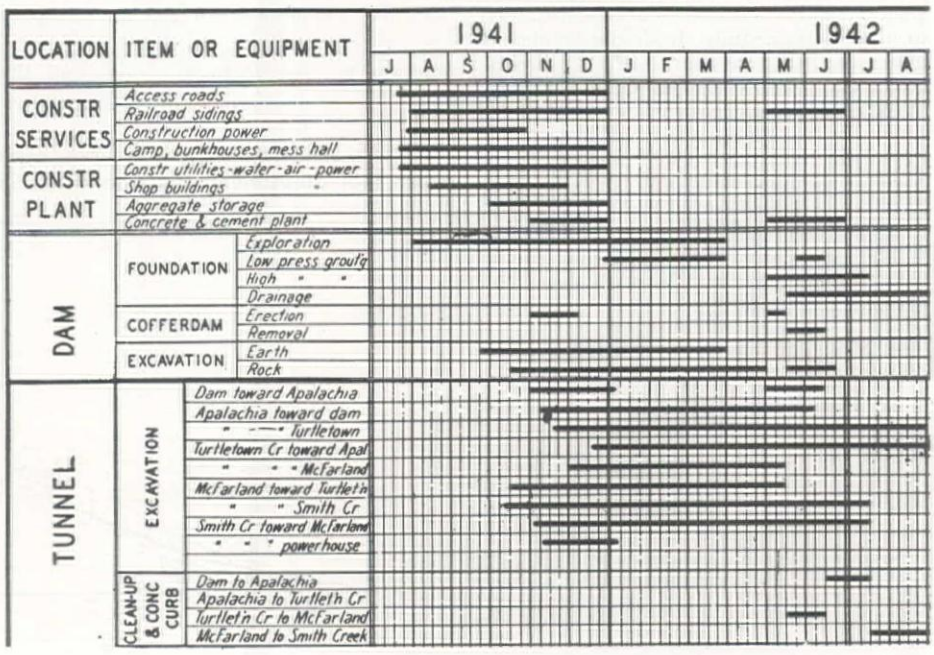
(d) If due to some factors (such as winter months, financial conditions, etc.) a certain delay is necessary between different construction phases, each phase should be analyzed separately and independently, instead of being correlated.

(e) This time analysis is to be applied to jobs which take at least two or three weeks or maybe a month. This is in general the case of usual construction jobs.



AN EXAMPLE of the production-time elongated S-curve. The installation of a power plant was accomplished in 1948; annual power consumption was then 80-million kwh. It is expected to reach 280-million kwh. in 1963, and the curve shows the predicted rate of growth until then. Referral to the curve during the 15-year period will show whether the predictions were justifiable.

FIGURE 1—Typical time schedule from which values can be determined for the author's proposed Standard Production Curve. *(Apalachia Project drawing courtesy TVA)*



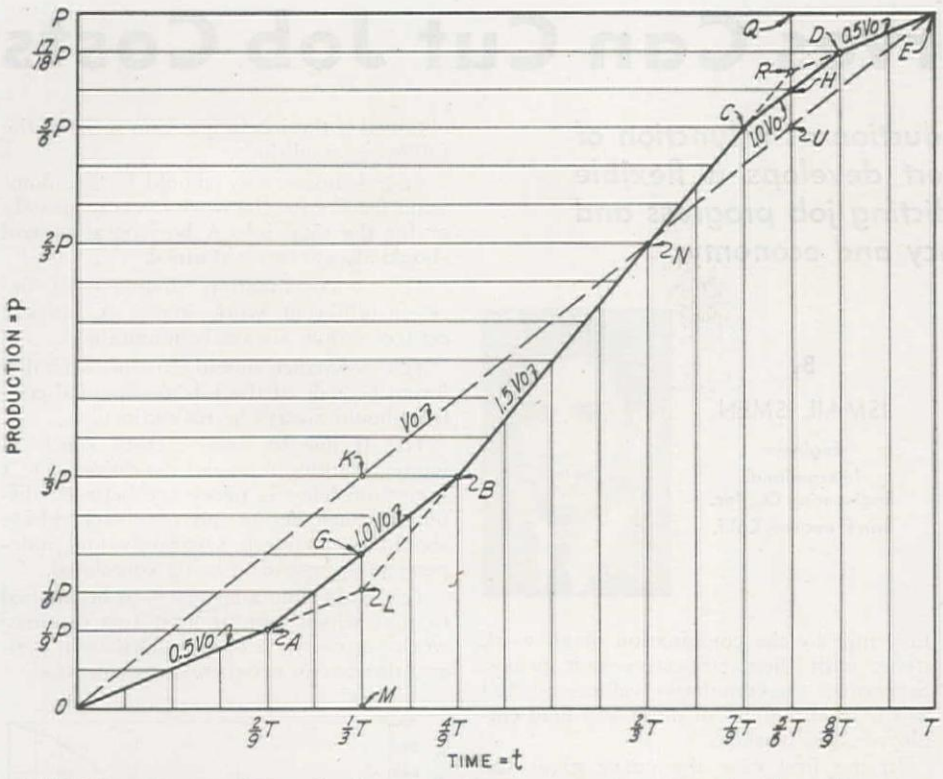


FIGURE 2—A typical Standard Production Curve, explained in detail on this page, is based on a production-time analysis revised from conditions of an actual job.

Elongated S-curve

The practice and experience has shown that the production-time curve has the form of an elongated S, the curve being characterized by a very small initial slope along a portion called *incipient period*, then a rapidly increasing slope giving way to a nearly constant slope along a portion called *development period*, and finally a rapidly decreasing slope along a portion called *saturation period*.

The growth of population, production statistics for iron and steel, the variation of production in construction, etc., are represented with elongated S-curves.

The relative proportions of the periods and the corresponding speed of production are different in each particular case. Here a simple and schematic S-curve is proposed to make a time study. It should be clearly understood that this curve is not a unique and an absolute one. Based on a variety of different production curves on field jobs, several forms and shapes and proportions have been tried and tested and finally an S-curve composed of only straight lines has been proposed for a simple production-time analysis.

The limitations and restrictions in the use of the curve have already been explained above.

The Standard Production Curve, construction and properties

To distinguish from any S-curve, the proposed curve will be called Standard Production Curve (Fig. 2). Take a rectangular coordinate system where the abscissa represent the time t and the ordinate the production p.

Suppose that a production P is accomplished in a time T, the ratio $v_o = \frac{P}{T}$ represents the average speed of production between the time $t = 0$ and $t = T$. The slope of the line OE corresponds to this average speed. Between $t = 0$ and $t = \frac{T}{3}$ draw the line OL with a slope $v_1 = 0.5\,v_o$ (L can be easily determined by taking $KL = LM$); similarly take RE with a slope $v_1 = 0.5\,v_o$ between $t = \frac{5T}{6}$ and $t = T$ (R can be easily determined by taking $QR = RU$). Join LR; the S-curve or S-line $OLRE$ is the first assumption for the efficiency curve. From the geometrical properties of this broken line it can be seen that the point L corresponds to a production $p = \frac{P}{6}$, R to $p = \frac{11P}{12}$ and the speed of production between L and R on the line LR is $v_2 = 1.5\,v_o$.

The portion OL of the S-line can be termed as incipient period; LR as development period; RE as saturation period.

A sharp transition from a speed $v_1 = 0.5\,v_o$ to a speed $v_2 = 1.5\,v_o$ is seen to be impossible. One can expect to have for a certain time a production speed with an intermediary value such as $v_3 = 1.0\,v_o$. This speed is nothing else but the average speed of production.

Now take a point A corresponding to a time $t = \frac{2}{3}\left(\frac{T}{3}\right) = \frac{2T}{9}$ or a production $p = \frac{P}{9}$. Draw a parallel from A to OE. This line intersects LR at B. Similarly, take D at the $\frac{2}{3}$ of ER, draw a parallel from D to OE, and this line intersects LR at C.

On the line LR the point N corresponds to a time $t = \frac{2T}{3}$ and a production $p = \frac{2P}{3}$.

The broken line $OABCDE$ is the proposed standard production curve.

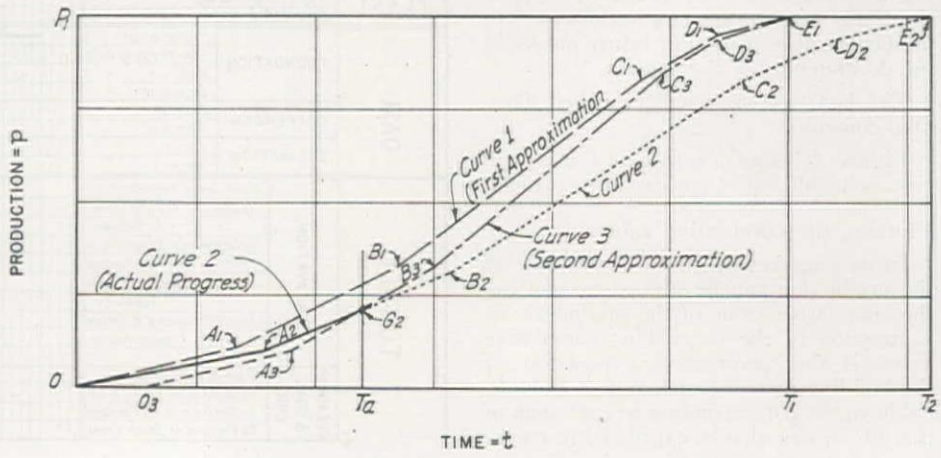
Use of the Standard Production Curve and example

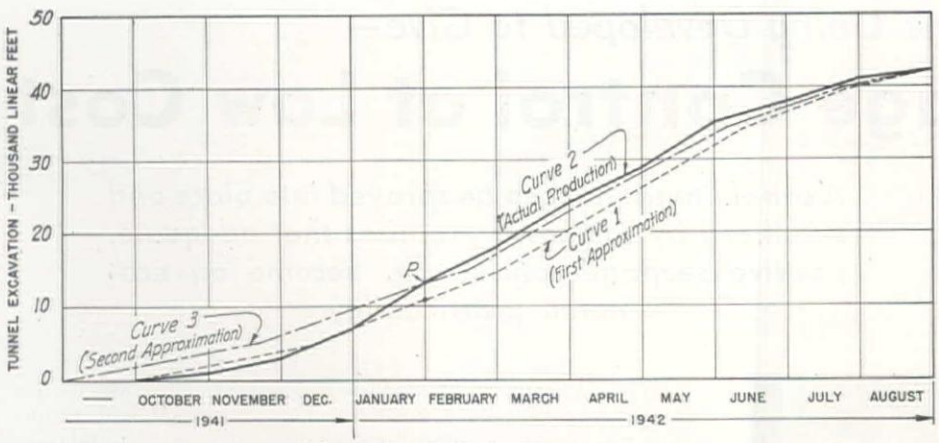
Curve 1 ($OA_1\,B_1\,C_1\,D_1\,E_1$) of Fig. 3 corresponds to a production P_1 to be accomplished in a time T_1. This is the proposed curve for the first approximation. From $t = 0$ to $t = T_a$ the actual progress shown by Curve 2 will be compared with the proposed one and the following analysis will be made at $t = T_a$. Here there are three possibilities:

(a) Curve 2 follows Curve 1 very closely.
(b) Curve 2 is below Curve 1.
(c) Curve 2 is above Curve 1.

In the first case our assumption gives satisfactory results. The problem will be to keep Curve 2 following Curve 1 by controlling different phases of the construction at regular intervals; a deviation (especially on the negative side) more than say 5 to 10 per cent will be a warning for the adjustment by increasing the factors affecting the production.

FIGURE 3—Another typical curve, explained in the text, shows how the graph can warn that adjustments must be made in some factor that is affecting construction.





PROGRESS CURVE determined from the Apalachia Tunnel time schedule (page 69). Curve 1 is the proposed standard curve for the first approximation, Curve 3 has been drawn in such a way as to pass by the actual point P for the second approximation and Curve 2 is the actual production. The maximum error between values given by Curves 2 and 3 is less than 5% from February, 1942, to the end of the job in August.

In the second case the actual progress is below the proposed one. The actual production line $OA_2\ G_2$ can be considered as a portion of a standard curve such as $OA_2\ B_2\ C_2\ D_2\ E_2$, but the time of accomplishment of the job is T_2 instead of T_1.

In some contracts the allowable time can be extended; in some no extension can be taken into consideration. Now the problem is as follows:

The actual production up to $t = T_a$ being represented by the portion $OA_2\ G_2$, what efficiency curve should be proposed to accomplish the job at the time T_1, or at a given time between T_1 and T_2? Here the time T_1 will be considered as the proposed limit. It would be necessary to speed up the production by using more labor, material, equipment, etc. in such a way as to be able to follow a new standard production curve $G_2\ B_3\ C_3\ D_3\ E_1$ after T_a. The broken line $G_2\ B_3\ C_3\ D_3\ E_1$ is a part of a standard production curve $O_3\ A_3\ B_3\ C_3\ D_3\ E_1$, referred to as Curve 3. The two points G_2 and E_1 are sufficient to determine the Curve 3.

The next step will be to adjust the efficiency of the production in order to follow Curve 3 during the remaining two-thirds of the contract time.

In the third case, the actual progress curve is above the proposed one. If it is not inconvenient to finish the job ahead of schedule, the force of the contract will be maintained to follow a standard production curve admitting the initial slope of the actual curve as the slope of the incipient period. The time required for the accomplishment will be determined by tracing the standard production curve. In this way, this case is a reverse of the preceding one. The diagram of Fig. 3 can be used by changing Curve 1 to Curve 2 and vice versa.

Loans Approved for Many Western Rural Electrification Projects

FUNDS HAVE BEEN advanced as loans to Western electric cooperatives and other approved construction agencies by the Rural Electrification Administration in recent weeks with which to advance electrification projects in rural areas. These funds are to be repaid from operation of the facilities but are advanced by the agency to expedite early construction. By states, in the West, they include:

Arizona

To Sulphur Springs Valley Electric Coop., Willcox, $20,000, to finance farmstead wiring and purchase of electric appliances; to the same coop., $235,000, for generating plant and facilities including a 1,150-kw. generator; and to Mohave Electric Coop., Inc., Kingman, $240,000, for 71 mi. of line, acquisition of the Peach Springs Light & Power Co., and headquarters facilities.

California

To Surprise Valley Electrification Corp., Alturas, $68,000, for completion of previously approved construction work.

Colorado

To San Isabel Electric Assn., Pueblo, $540,000, for 42.5 mi. of transmission line, 13.5 mi. of distribution line and other system improvements; to Intermountain Rural Electric Assn., Littleton, $25,000, for completion of headquarters facilities; to Mountain View Electric Assn., Limon, $192,000, for 91 mi. of distribution line, a 2-way radio system and headquarters facilities; to Morgan County Rural Electric Assn., Fort Morgan, $96,000, for 7 mi. of tie line, 2-way radio, a warehouse, and system improvements; to Union Rural Electric Assn., Brighton, $57,000, for 15 mi. of line; and to Empire Electric Assn., Cortez, $340,000, for 153 mi. of line and system improvements.

Kansas

To Northwest Kansas Electric Coop. Assn., Bird City, $200,000, for 46 mi. of distribution line, headquarters facilities and system improvements; to the same association, $895,000, for 615 mi. of line, 21 mi. of tie line and 2-way radio; to Victory Electric Coop. Assn., Dodge City, $496,000, for 358 mi. of distribution line, 15 mi. of tie line and 2-way radio; to Lane-Scott Electric Coop., Dighton, $560,000, for 369 mi. of distribution line; and to Wheatland Electric Coop., Leoti, $5,400,000, for acquisition and rehabilitation of generating facilities from the Inland Utilities Co., addition of two 2,300-kw. fuel generating units at Scott City, construction of 118 mi. of 69-kv. transmission line and 891 mi. of distribution line, and installation of 4 new substations.

Montana

To Lower Yellowstone Rural Electric Assn., Sidney, $120,000, for 20 mi. of distribution line and headquarters facilities; to Sheridan County Electric Coop., Westby, $630,000, for 426 mi. of distribution line; to Marias River Electric Coop., Shelby, $100,000, for 40 mi. of line and improvements to the generating plant; to Beartooth Electric Coop., Inc., Red Lodge, $130,000, for 66 mi. of distribution line, 10 mi. of tie line and other system improvements; and to Tongue River Electric Coop., Inc., Terry, $126,000, for 85 mi. of line and system improvements.

Nebraska

To South-Central Membership Assn., Nelson, $463,000, for 235 mi. of line and other construction; to Loup River Public Power District, Columbus, $8,412,000, for a 60,000-kw. steam generating plant at Bellevue, 317 mi. of 115-kv. transmission line, 23 mi. of 69-kv. transmission line, and new substation and switching facilities; to Howard-Greeley Rural Public Power District, St. Paul, $55,000, for 18 mi. of distribution line; to North Central Nebraska Rural Public Power District, Creighton, $650,000, for 363 mi. of distribution line and system improvements; to Twin Valleys Electric Membership Assn., Cambridge, $1,769,000, for 11.5 mi. of transmission line, 910.5 mi. of distribution line and headquarters facilities; to Niobrara Electric Membership Assn., Hay Springs, $558,000, for 379 mi. of distribution line; to Panhandle Rural Electric Membership Assn., Alliance, $800,000, for 11 mi. of 34.5-kv. transmission line, 545 mi. of distribution line and system improvements.

New Mexico

To Roosevelt County Electric Coop., Portales, $430,000, for 107 mi. of distribution line, 61 mi. tie line and warehouse facilities; to Lea County Electric Coop., Lovington, $824,000 in addition to a previous loan of $401,000, for construction of a 5,800-kw. fuel generating plant at Lovington; to Kit Carson Electric Coop., Taos, $765,000, for two 522-kw. generating units and 149 mi. of distribution line; to the same coop., $15,000 for farmstead wiring and purchase of electrical appliances; to Central New Mexico Electric Coop., Corona, $560,000, for a 375-kw. generating unit, 32 mi. of 33-kv. transmission line, 55 mi. of distribu-

Concluded on page 98

Buried Asphalt Membrane Lining Developed to Give—

Canal Seepage Control at Low Cost

A canal lining that can be sprayed into place and stabilized by soil cover promises that adequate, positive seepage control will become an economic practicability

By

J. R. BENSON

Bituminous Engineer
Bureau of Reclamation
Denver, Colo.

THE CONTROL of water seepage through permeable earthern structures in canals and reservoirs has been a major engineering problem in all but a few irrigation and water storage undertakings. Many means have been employed for control of such water losses varying from conventional linings of Portland cement, asphaltic, and pneumatically applied concretes and grouts to less conventional linings of compacted earth, clay, or bentonite blankets, or by induced or natural silting. All of these methods vary in first cost, effectiveness, required maintenance, and longevity.

In general, the cost of adequate, positive seepage control has been beyond economic practicability for a large number of our water systems and all the evils of seepage and water loss—the construction of oversized storage and transmission facilities, the waterlogging and alkalyzing of valuable arable land, and the necessity of extensive drainage systems (sometimes exceeding in scope the original transmission system) — have been tolerated because the cost of correction exceeded the cost of drainage.

Much time and research effort have been put forth in an endeavor to find an economical solution to this problem. Of the many methods brought forth as a result of these investigations and one that appears to hold particular promise as an extremely low-cost, highly efficient, yet durable lining is buried asphalt membrane.

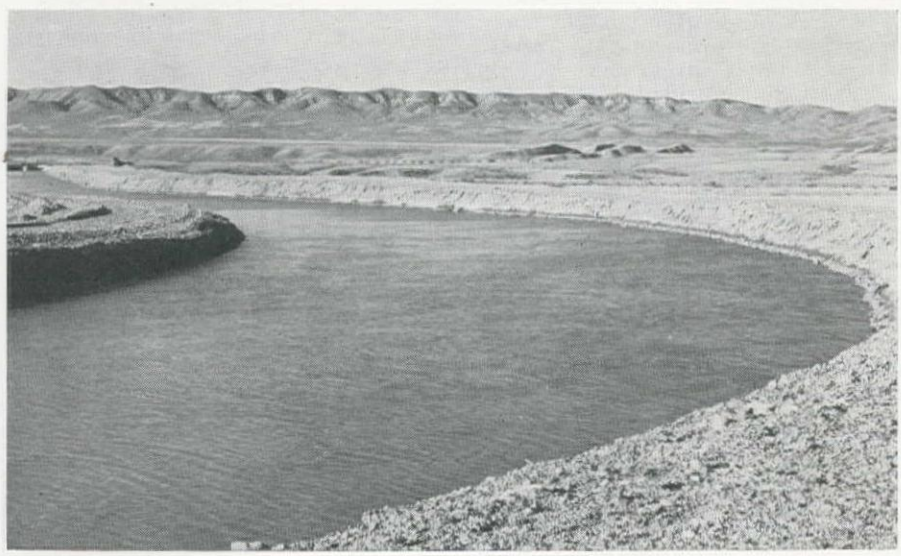
This lining, as recently developed by the Bureau of Reclamation in its research program for lower cost linings, consists essentially of thick membranes of special pure asphalt, protected by coverings of earth or gravel. In the new type of lining, advantage is taken of the established fact that in the great majority of irrigation systems, earthen surfaces are generally adequate and satisfactory for canals, laterals, and reservoirs, except for control of seepage. By control of the latter, through use of the new lining, all of the advantages and economies of the earth construction may be retained. In ordinary installations, the cost of the new type of lining is very low.

Advantages retained, disadvantages eliminated

The possibilities of asphaltic materials for use in linings and seepage control have long been recognized. Primarily, the advantages of asphalt are its universal availability, low cost, extreme versatility in available physical forms, and the fact that it is undoubtedly one of the most logical engineering materials available for large-scale waterproofing construction.

Previous construction and research indicated that the use of pure asphalt in membrane form constituted a most effective construction from the standpoint of seepage control and cost, but its use in this form, if fully exposed, had serious disadvantages in subgrade foundation requirements, weathering and aging due to exposure to actinic solar radiation and heat, erosion from turbulent water, and damage from livestock. To a large degree, correction of these disadvantages was proven possible in prime-membrane type asphaltic linings in which deep subgrade treatments and filled asphalt membranes were used, but the cost of such construction remained unduly high. To retain the advantages of a membrane lining, while eliminating or minimizing its disadvantages, the new type of lining was developed.

HEART MOUNTAIN Canal in Wyoming after 3 months' operation with a buried membrane lining. Complete over-excavation before placing the membrane removed all weed growths.



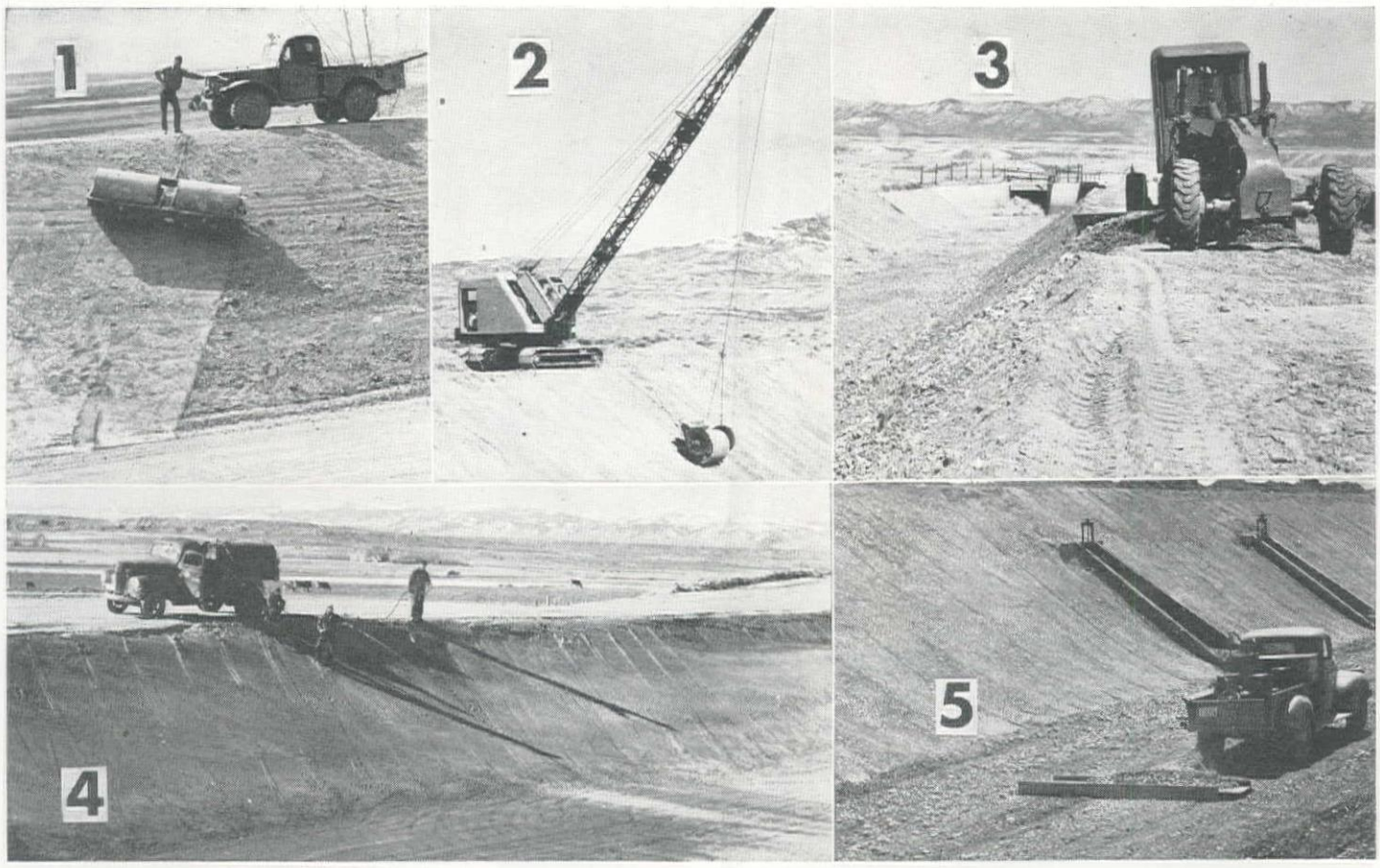
Membrane tough as a rug

The basic construction procedures for buried membrane lining are simple. To allow for the thickness of the cover over the membrane, the canal, lateral, or reservoir are first over-excavated to a depth corresponding to the depth of cover required. This is usually not less than one foot, but may be as much as 24 in. if a high degree of protection is required.

The excavated material is usually placed where it will be available for convenient replacement over the membrane. A completely impervious membrane is most easily obtained over a smooth subgrade prepared by dragging and rolling operations using steel beams and flat-faced steel rollers. A high density in the prepared subgrade is not considered mandatory, since the membrane is sufficiently flexible and plastic to withstand normal subgrade movements due to settlement, without injury.

The membrane is applied by spraying special asphalt cements, liquefied by temperatures of from 350 to 400 deg. F., directly on the subgrade. The indicated minimum application is 1.25 gal. per sq. yd., while up to 1.75 gal. may be applied if the surface is rough, or if high heads or unusual conditions must be tolerated. The membranes so formed are approximately from 3/16 to 3/8 in. thick. These membranes are tough, which is frequently attested to by picking up a corner of a membrane and shaking it like a rug.

After the membrane is completed, cover material is applied, usually by dragline casting. In ordinary operations this cover material is not compacted but becomes stabilized by the "seasoning" actions occurring during the operation of the canal or reservoir. Over the soil cover, gravel blankets of from 4 to 12-in.



TECHNIQUES in preparing the membrane's subgrade. 1. Rolling side slopes using an articulated roller and truck equipped with power take-off winch. Smooth effect on the silty-type soil is evident. 2. Rolling using a small dragline and a flat-faced roller. A smooth surface reduces required asphalt quantities by as much as 50 per cent. 3. Blading cover over the edge for finishing operations on side slopes after applying the membrane. This operation produces a neat surface requiring no further work. 4. Sprinkling dry, dusty subgrade before applying asphalt. The dampening prevents holidays which occur when asphalt is applied to a dusty surface, and also helps to chill the asphalt more rapidly. 5. A 20-in. I-beam is used as a drag over gravelly soil. High density in the prepared subgrade is not considered mandatory for flexible membrane.

thickness may be placed for erosion protection, if required.

By utilization of these simple construction procedures, the employment of asphalt in an exceedingly efficient form and with equipment needs limited to a dragline, an asphalt distributor, and miscellaneous small equipment, a most effective, durable, and low-cost control of seepage is obtained.

Soil cover important in design

Simplicity in basic construction procedures does not infer that attention to certain design factors is not required. The type of soil available for cover, the depth of cover, the stability of the cover soil in a loose, saturated condition on steep side slopes, erosion conditions, and the quantity and type of asphalt required are matters of great importance if maximum efficiency and durability are to be obtained.

Adequate protection of asphalt membrane, through use of a soil cover is undoubtedly the most important design factor, and presents the greatest problem of attainment. The soil cover must resist sloughing, erosion, and wave action, and if livestock traffic is expected, displacement under the weight of cattle, horses, sheep, or other animals. The cover must furthermore be of a character and of sufficient depth to prevent action of actinic solar radiation on the membrane. When available, well-graded sands and gravels make the best cover material, but low-stability silts and fine sands may be used if proper precautions are taken. These precautions include the use of flat slopes and if required, gravel blankets over the soil cover.

In all existing buried membrane lining construction, the soil cover has not been compacted by rolling, but has been placed loose, stability being reached through the seasoning operation of the canal or lateral. A slow rise of water level and avoidance of rapid drawdown are essential components of this seasoning operation. By these means, the cost of compacting the cover soil is avoided, although in some cases the additional stability obtained by compaction of the cover may be advisable.

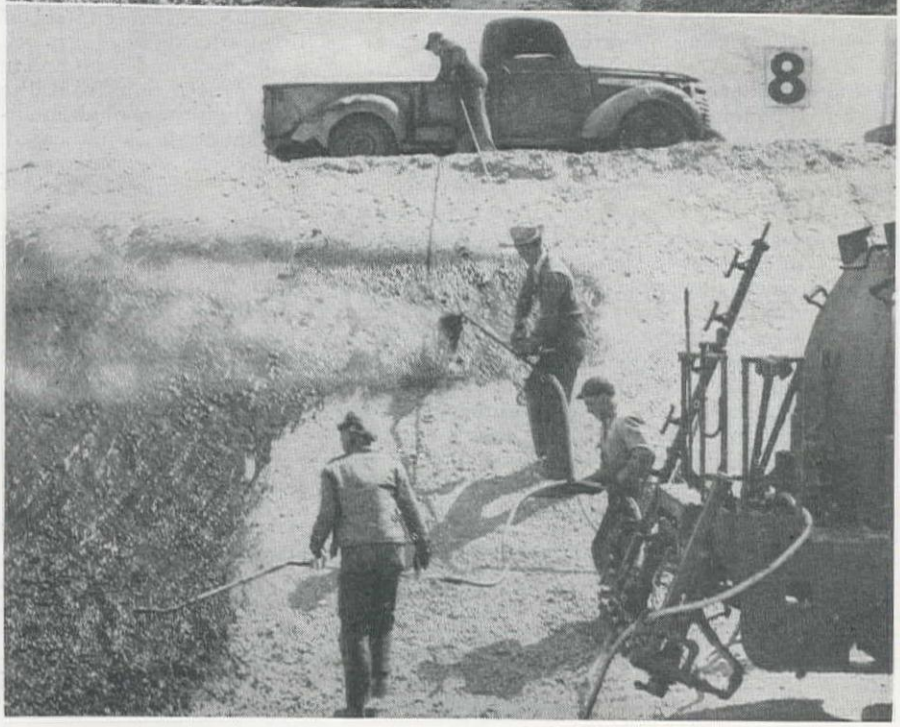
The steepness of side slopes and the depth of cover will vary with soil and service conditions. Experience indicates slope steepness greater than 1¼:1 for uncompacted cover should be avoided, while slopes as flat as 2:1 to 3:1 may be preferred where unstable soils exist and gravel blankets are impractical. At the present time, a minimum one-foot depth of cover is being specified, with maximum depths of approximately 24 in.

Under investigation is the possible use of dense, granular blankets of less than 12-in. thickness. Such covers, if proven feasible, would combine the protective features of both soil and gravel blanket covers. In some areas, the behavior of the soil cover under severe winter conditions must be considered in design. The drainage characteristics of the soil cover may be especially important in such cases.

Weed problems can be negligible

Buried membrane construction in new canals and laterals poses no particular problems of control of weed growth beneath the membrane. The control of seepage tends to retard weed growth into the subgrade area and a complete absence of root penetration from the wet cover soil through the asphalt membrane into dry subgrade is indicated. Grass growths in cover material are encouraged as a stabilizing and erosion-prevention measure.

The treatment of weed- and willow-infested surfaces in old canals is advisable. When such surfaces are overexcavated as in normal construction, nearly all such plants are removed in the process so that further weed removal may not be necessary. However, in many instances where membrane lining is constructed in old canals, the existing surfaces may frequently be used without excavation, and in these cases, the cattails, tules, willows, and other deep-rooted infestations should be grubbed and the soil sterilized, preferably with a borax-chlorate mixture applied in closely spaced holes in the infested area (chlorate alone tends to leach out rapidly while borax acts slowly—a combination of the two gives both rapid and long-lasting action).



If weed removal and sterilization before placing the membrane is thorough, the growth of weeds through the membrane should be negligible during its entire service life. While the growth of individual plants through the membrane affects seepage losses only to an infinitesimally small degree, the accumulative effect over a number of years could possibly seriously reduce the efficiency of the membrane.

Resisting water, soil and animals

The asphalt membrane must be thick and tough to be impermeable, to resist the pressure of water, soil, and animals, and yet permit plastic movements with earth settlement without rupturing. Impermeability is obtained by the use of from 1.25 to 1.75 gal. per sq. yd. of asphalt, producing membranes with thicknesses of from 3/16 to 3/8 in. The application is varied with the character of the surface, rough surfaces or surfaces which are very soft or unstable requiring the heavier applications.

The asphalt is applied at from 350 to 400 deg. F. by hand sprays. This method is preferable to mechanical spraying since localized areas may be given special attention, and because satisfactory membranes over rough surfaces have not yet been obtainable except by dextrous manipulation of hand sprays. By use of as many as three hand sprays, each having three nozzles, it has been possible to apply over 10,000 gal. of asphalt in less than 8 hours. The prog-

The asphalt is applied essentially in one operation, the rapid chilling of the high softening point asphalt used permitting heavy applications and rapid buildup of membrane thickness even on relatively steep slopes. Handling of the very hot, high softening point asphalt requires skill and organization of work to prevent freezing of hose lines and sprays. Spray bars are not shut off for more than one to two minutes at a time, and all pipes, pump lines, and bars must be flushed with distillate immediately after cessation of asphalt pumping.

Special asphaltic materials of high softening point are required for membrane construction. The most satisfactory materials have been found to be air- and catalytically-blown asphalt cements of 50-60 penetration, 140 to 200 deg. F. softening point. These materials are sufficiently plastic at all normal temperatures so that the danger of rupture from earth movements is minimized yet they are tough enough to resist puncture during covering operations and exces-

TECHNIQUES FOR applying the membrane. 6. Hand sprays with 3 nozzles apply catalytically-blown asphalt at a rate of 1.29 gal. per sq. yd. Asphalt was shipped 150 mi. in tank cars, retorted to 400-deg. F., and trucked 30 mi. to the canal. 7. A single-nozzle spray being used to apply 50-60 penetration semi-blown asphalt at a rate of one gal. per sq. yd. from a pull-type distributor. Asphalt was trucked from the refinery 8 mi. to this canal. 8. Two flexible metallic hoses, each fitted with a single-nozzle hand spray, apply 50-60 penetration catalytically-blown asphalt at 400-deg. F. at a rate of 1.34 gal. per sq yd. The asphalt is all applied in one pass. Rundown on slopes was negligible due to rapid chilling of the high-softening point asphalt.

sive cold flow due to high hydraulic heads. The catalytically blown asphalt, produced by blowing certain petroleum stocks in the presence of a catalyst, is indicated to be especially suitable for this purpose. The specifications for the two materials are given in Table 1 below.

Construction costs low

Approximately 80,000 sq. yd. of buried asphalt membrane lining, involving six installations, have been constructed by the Bureau to date. Of these, five were full-scale operations in which all earthwork and subgrade preparation was performed by Bureau Operation and Maintenance personnel and equipment while the furnishing and application of asphalt were performed by contract. On the latter projects the costs, which included all equipment and personnel costs of Bureau forces, as well as contract costs, varied from $0.30 to $0.56 a square yard with an average of $0.43 a square yard.

A recent Wyoming project consisting of approximately 50,000 sq. yd. of buried membrane lining, to be placed in an operating 94-ft. wetted perimeter canal, has been placed under contract at a cost of approximately $1.25 a square yard. This cost was considerably higher than normal due to the specification of a very thick membrane (3⅜ in.), a 12-in. thick selected soil cover obtained from a pit 3 mi. distant, a 4-in. thick gravel blanket obtained from a source 8 mi. distant, and perhaps most affecting a high cost, operations in a wet canal during generally adverse late fall and winter weather. It will not be possible to operate any equipment in the canal, all operations except the actual asphalt application being conducted from the bank, with dragging and rolling performed with the aid of cables fastened to draglines or tractors. However, even under these severely adverse conditions, the cost of the buried asphalt membrane lining in this particular installation is still a very economic method of seepage control.

Weather, water, and buried membrane construction

One of the greatest obstacles usually encountered in the rehabilitation and control of seepage in operating irrigation systems has been the necessity of working during winter or late fall and early spring months, with canals and laterals frequently extremely wet or mucky, preventing use of equipment directly in the waterways. By fortunate circumstance, buried asphalt membrane lining lends itself well to construction under these adverse conditions. Even in canals of large size, it is usually possible to conduct all construction operations with the mechanized equipment on the banks and berms, instead of in the canal. In most cases, the prime requirement of stability in the canal is a surface sufficiently stable to permit walking on during the application of the asphalt.

Cold weather is not unfavorable to buried membrane construction since heavy membranes can more easily be built up due to the more rapid chilling of the asphalt as it is applied to the cold subgrade surfaces. In one instance, membrane asphalt was applied to a surface covered with a light skiff of snow. While much foaming occurred, the resultant membrane did not appear to have been adversely affected so far as watertightness was concerned. While such procedures are not recommended, the limits of workability with respect to moisture and weather are indicated.

Maintenance recommendations

The maintenance required of a buried membrane lining is of necessity similar to that required of an earth-lined canal of similar characteristics. An important maintenance item during the early stages of use of a new membrane lining employing loose cast cover, particularly those without gravel cover, is the repair of localized areas where some sloughing may occur before stability of the soil cover is obtained. Areas subject to such sloughing should be repaired by addition of soil to reestablish adequate cover. Where erosion conditions become apparent after beginning operations, such areas should be repaired and the necessary erosion protection, using gravel, rock, or riprap, should be provided.

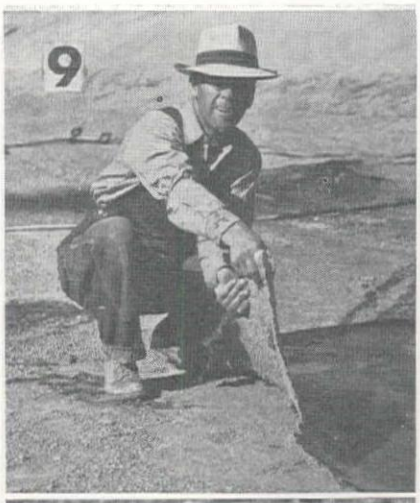
As a protection to the membrane in canals where dragline-cleaning operations are seasonally necessary, the use of a layer of sand or gravel directly over the membrane, with a soil cover superimposed, is being considered. Deeper than normal soil covers are also recommended where cleaning operations must frequently be performed.

Potential uses manifold

The use of buried asphalt membrane lining constructions for control of seepage in canals and laterals is rapidly becoming established, with an impressive mileage of such lining sheduled for construction during the next 12 months. The lining is also being put to numerous applications for seepage control including such diverse uses as lily ponds, golf course water hazards, dike leakage control, and the lining of earthen municipal water supply reservoirs. For the latter use, the bland character of the asphaltic material, as well as low cost of construction, makes this type of construction particularly suitable.

Indicated for large potential use is the construction of buried membrane linings for small farm ponds and dams, and swimming pools. In the latter use particularly, the low cost and efficiency of the buried membrane lining, placed on flat slopes and covered with a foot or more of beach-providing sand, may well go a long way toward creating recreational facilities in areas where existing conditions and the costs of other types of construction have previously prohibited such facilities.

To further make available membrane linings for general use and to reduce the hazards and equipment needed for applying high temperature asphalt, several manufacturers have in the development stage, prefabricated linings of pure asphalt, or asphalt and reinforcing materials which, in roll form, will make possible rapid, convenient construction at low cost. Some of these membranes are being designed for use without earth cover while others will require protections in the same manner as the sprayed membranes. The ease of construction, high efficiency, and low cost of asphaltic membrane linings will undoubtedly result in increasingly greater, and more diverse, usage of this form of seepage control.



THE MEMBRANE is tough enough to be picked up like a rug (9), yet is plastic enough to deform with soil movements without rupturing. Section cut from a membrane (10) is approximately ¼ in. thick, which is average.

Table 1

	Air blown	Catalytically blown
1. Flash point (C.O.C.) min. ° F.	347°	425°
2. Penetration, 77° F.	50 to 60	50 to 60
3. Penetration, 32° F. min.	—	30
4. Penetration, 115° F. max.	—	120
5. Softening point, ° F.	140 to 160	175 to 200
6. Ductility, 77° min.	5 cm.	3.5 cm.
7. Loss on heating, 325°, 5 hrs. max.	1.0%	1.0%
a. Pen. of residue, % of original, min.	60.0%	60.0%
8. Solubility in CCl_4, min.	97.0%	97.0%

Compact Division of Rivers Approved by State Engineers

Western State Engineers, at annual get-together in North Dakota, praise river compact system and denounce Valley Authorities

"COMMISSIONS composed of men of good will can arrive at practically what a competent court would decide, and arrive at the solution sooner and at less expense."

This statement by Mark Kulp, Idaho's State Reclamation Engineer, might well have been the keynote of the 22nd Annual Meeting of the Association of Western State Engineers at Bismarck, N. Dak., Aug. 22 to 25. The subject assigned by President J. J. Walsh of North Dakota to the State Engineers for coverage in their annual reports was "The Importance of International and Interstate River Compacts to My State." Each engineer cited the number and effective operation of such water agreements affecting his state, and all but Oklahoma indicated that they felt this method of settling long-time disputes for all time was by far the most suitable and satisfactory. Mr. Kulp's statement, above, however, seemed to epitomize the virtually unanimous sentiment.

Oklahoma disagrees

Oklahoma, in a report prepared by Clarence Burch, Director of the State's Department of Planning and Resources, and read by Ivan Husky, felt that the negotiation of compacts might tie the participants down to conditions which seemed good at the time of ratification, but which after some years were less appropriate or even positively detrimental. They preferred an over-all basin study of each river by a federal agency, with recommendations to the states involved, for consideration by the citizens of the states, in order that an over-all and long-term view of the needs and opportunities may be had.

Colorado, with an interest in seven interstate compacts, and New Mexico, signatory of six, led the states in compact participation, but each named several streams on which the compact type of arbitration was desirable, and would be prosecuted as soon as possible.

One or two international compacts are in existence with Canada on small streams, but in other cases relations have been harmonious. The engineers delicately evaded reference to the Mexican Water Treaty by which an excessive share of Colorado River water was assigned to the southern republic. Incidentally, it was brought out that agreements with foreign countries are not really compacts, since they are negotiated by the State Department, through the international boundary commissions, with little or no reference to the states and state engineers.

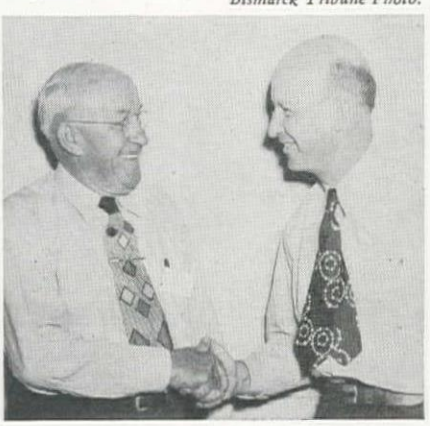
Special addresses

Special speakers included Harry E. Polk, president of the National Reclamation Association; J. K. Brandeberry of the U. S. Forest Service; Gladwin E. Young of the Department of Agriculture; Dean H. L. Walster of North Dakota Agricultural College; Carl G. Paulsen, chief of the Water Resources Branch of the Geological Survey; Kenneth Markwell, Assistant Commissioner and Kenneth Vernon, Regional Director, both of the Bureau of Reclamation; Col. J. S. Seybold, Garrison District Engineer, and Brig. Gen. S. D. Sturgis, Jr., Missouri River Division Engineer, both of the Corps of Engineers.

Vernon and Col. Seybold gave interesting presentations of the actual construction now under way on features of the great Missouri Basin Project by the Bureau of Reclamation and Corps of Engineers, respectively. As features of the convention, conducted tours were arranged to Heart Butte Dam, a Bureau project, and to Garrison Dam, the huge Army Engineer structure on the Missouri River. Vernon chided the State Engineers somewhat, saying that they sometimes become so interested in single projects that they lose sight of overall basin development plans.

President Polk of the National Reclamation Association spoke on four C's held in common in the irrigation states. These are cooperation, construction, conservation, and capitalism. He made particular reference to the development of small projects, and suggested that if the Bureau of Reclamation was so large and cumbersome that it was unable to handle this type of operation, some other agency of government be assigned the task. Under the fourth C—capitalism—Polk stated that he considers Valley Authorities definitely socialistic, and a contradiction of all the principles that have made America strong, and that have developed the rugged West. In support, he quoted Sec. Julius Krug's remark at the recent Congressional hearings on a Columbia Valley Authority. When Krug was asked if he favored having the people affected in the valley vote on the matter, he replied, "No, the people wouldn't have the intelligence to decide."

J. J. WALSH, North Dakota State Engineer and past president, congratulates new president JOHN H. BLISS, New Mexico State Engineer. *Bismarck Tribune Photo.*



Bureau, Corps programs

Markwell gave a quick summary of the anticipated Bureau of Reclamation program for 1949-50, and expressed extreme satisfaction that some limitations on the Bureau which had been imposed by a previous Congress had been removed in the present bill. The Engineers group had been instrumental in imposing some of the limitations in the hope of improving the service of the Bureau. He indicated displeasure because the limitation on the Bureau performance of construction by force account probably would not be lifted. Some of those in attendance were heard to remark that the Bureau had experienced no difficulty in spending over $300,000,000 during the past year, in spite of so-called limitations.

Gen. Sturgis, in a friendly address to the annual banquet, outlined the development of the Corps of Engineers' program for the Missouri Valley, its coordination with that of the Bureau of Reclamation, and the construction accomplishments to date, as well as the future program. He stressed the benefits to accrue to North Dakota and the other states in the way of flood control, irrigation, electric power, and below Sioux City, navigation.

The trip to Garrison Dam, personally conducted by Col. Seybold, was a most interesting feature. This dam, the largest rolled earthfill structure in the world, is being constructed under two separate contracts, from each side of the river. The Engineers were guests at noon luncheon in Riverdale, the government city near the damsite, of Peter Kiewit Sons' Co. and Morrison-Knudsen Co., Inc., contractors on the left embankment section, at their huge and entirely modern messhall.

Business session

At the closing business session of the convention, John H. Bliss, State Engineer of New Mexico, was elected president for the next year. Clarence Burch, of Oklahoma, was named vice-president, and J. J. Walsh, State Engineer of North Dakota, and 1949 president, was named to the executive board. The 1950 meeting will be held in Santa Fe, New Mex., but no date was established.

Four resolutions were adopted. They included one in support of the cooperative stream gaging and mapping programs of the Geological Survey; one against Valley Authorities, and in support of the Kerr Bill, now in the Senate, for a basin-wide study of the Red, White and Arkansas River basins; one urging "some government department" to adopt a simplified procedure for the development of small irrigation projects; and one of appreciation for those who participated in the program.

Aircraft Now a Valuable Job Tool

Contractors are now using planes to inspect job sites, switch key personnel, rush requisitions and expedite emergency repairs

By
R. W. F.
"BOB" SCHMIDT
Manager,
Tucson Airport Authority
Tucson, Ariz.

PIONEERS in many worthwhile fields have had to wait a long time to see someone follow in their footsteps because their fellow men have regarded their acts or ideas as foolhardy as flagpole sitting or bridge jumping. As we look back to the Jenny and DH we say it must have taken a lot of nerve to fly such bundles of kindling fastened together with baling wire, forgetting all the while that other types of contemporary machines, by today's standards, weren't such hot material either.

It is doubted that the proud possessor of, say, a Northwest Model 80 would gladly go back to the steam rig of thirty years ago, or that the owner of this year's sleek Cadillac would swap it for a 1919 model. Even so, thirty years ago there were tens of thousands of steam shovels and hundreds of thousands of automobiles while aircraft were still being counted in hundreds, and thus anyone using aircraft as a tool in his business, if he weren't directly affiliated with aviation itself, could most certainly be counted as a pioneer user of personal aircraft. That generally holds true for anyone who so used aircraft prior to World War II.

Aircraft as business tools

Probably the oil companies were the first non-aviation companies to widely use aircraft as tools in business, but even then, their objective was usually advertising and promoting and more often than not aimed at garnering what aviation fuel business there was. Hauling executives around, running pipeline patrols, and finally oilfield work itself, all came later.

As a matter of fact, one major oil company only recently permitted its top executives to fly in its own aircraft, having heretofore limited their flying to airlines and restricted their aircraft operation to aviation sales work, and another major oil company still refuses to permit its field men to fly on company business in their personally-owned aircraft while it spends millions of dollars annually in developing aviation products, sales and service!

More Westerners

The Civil Aeronautics Administration recently released some figures showing that the numerical superiority of privately owned aircraft had for the first time in our history shifted from the 26 Eastern states to the 22 Western states, and that coincidentally with that movement ownerships were transferring to the rural areas from the cities. Part of both movements is ascribed to the changing of title of surplus World War II aircraft from broker to user and to the decline of GI flight training in urban areas dumping more cheap aircraft into the waiting hands of the lower income groups, but in any event the westward movement and the rural migration are attributable in a large measure to the "flying farmers," who today constitute the greatest segment of users of personal aircraft.

Western contractors shorten long distances

While farmers in grain states and ranchers farther west were discovering jobs that the airplane could do for them, the general contractors began to find that aircraft could be employed in their business. Probably a long, heated, and silly argument could be developed here if the assertion were made that so-and-so had been the first contractor to use an airplane in carrying out company duties, an argument which would be refined in consideration of whether the aircraft was rented or owned and whether it was flown by a hired pilot or by the "Old Man" himself. Regardless of who was first, it must be conceded that Western contractors lost no time in seizing upon air transportation as an important factor in their operation. The best reasons for this early acceptance were the distances between job sites and the generally better weather conditions

DEL E. WEBB, right, is flown to jobs over the entire country in his twin-engined Beechcraft.

EDWARD O. EARL, above, President of San Xavier Rock and Sand Company, stands beside his Beechcraft Bonanza. Below, WADE PERONG of R. J. Daum Construction Co. and his Cessna 195.

which permitted use of aircraft more hours per day and more days per year before aids to air navigation and night flying had been developed or installed.

Thus it came about that Western contractors were among the very first prominent users of air mail and air express, and that along with other early patrons and believers they rode the Fords, Fokkers, Boeing's 40-B-4's and 80-A's, Bachs, Travel-Airs, and Lockheed's Vegas and Orions. They bought stock in airlines and aircraft ventures, hired or owned airplanes, and otherwise behaved as though the Air Age was here to stay.

Aircraft a job tool

Contractors owning their aircraft quickly found they could be used for more than the manufacturers' ballyhooed "executive flying" and they now employ them in routine reconnaissance of job-sites before bidding; submitting bids and attending lettings; surveying job layout and organization after award; switching key personnel such as foremen, specialized equipment operators, and powder-monkeys from one site to another; rushing reports and requisitions to headquarters; carrying supplies and payrolls to locations; expediting emergency repairs; transferring injured to hospitals, and taking recreational equipment such as motion picture projectors to isolated camps. Even the personnel employed by the contractors are high on the list of per capita ownership of aircraft, a fact testified to by a catskinner who, back in 1929, used to fly an OX-5 crate more than six hundred miles each weekend to be with his family. He became so proficient at cross-country flying that he later got a job as an airline pilot, saved his money, and went back into the contracting game with his own outfit!

It would not be possible to list all of the contractors who have turned to the ultimate in air transportation—that of owning and operating their aircraft as tools in their business. Among users of their own Beechcraft, Stinsons, Cubs, Navions, Cessnas, Bellancas, Luscombes and BTs are those listed in the accompanying box. Without the support of companies and men whom those cited so ably typify, civil aviation as we know it today could not exist, for mere courage and faith alone are not enough. Purchasing power and practical day-to-day utilization are prime requisites, and anyone who has lingered around a successful contractor's lash-up for more than a few minutes knows that he does not and cannot mess around very long with a gadget that doesn't pay its way. In combining these four attributes of courage, faith, purchasing power, and utilization, the contractors have played a role far more important than they themselves suspect in the development of aircraft, airlines, and airports.

"Flying Contractors"

A SURVEY MADE by *Western Construction News* shows that the following Western contractors and contracting firms use aircraft extensively as a job tool.

Silver State Construction Co., Fallon, Nev. (**A. D. Drumm, Jr.,** flies his own AT6 and Beechcraft Bonanza.)

Dodge Construction, Inc., Fallon, Nev. (**E. J. Maupin, Jr.,** President, flies his own Beechcraft Bonanza.)

Isbell Construction Co., Inc., Reno, Nev. (Their Ray, Arizona, operations are supervised by **C. V. Isbell** and **Guy Isbell** in a twin Beechcraft. Operations at Silver City, Nev., are supervised by **Roy Isbell** flying a Navion. Reno operations are supervised by **W. J. Isbell** flying a Cessna 190.)

C. J. Hostetler Co., Reno, Nev. (**C. J. "Pete" Hostetler** flies an AT6.)

Del R. Beebe of **Del R. Beebe Construction Co.,** Eugene, Ore.

H. Earl Parker, Inc., Marysville, Calif.

Westbrook & Pope, Sacramento, Calif.

John B. Powers, Reno, Nev. (**Powers** flies an AT6.)

Gibbons & Reed Co., Salt Lake City, Utah.

Utah Construction Co., Ogden, Salt Lake City and San Francisco. (This firm operates several planes.)

W. E. Thatcher, Ogden, Utah.

Ralph E. Childs, Springville, Utah.

Hutcheson Construction Co., Denver, Colo. (**L. R. Hutcheson** flies his own plane.)

J. E. Haddock of **Haddock-Engineers, Ltd.,** Oceanside, Calif.

Paul Spencer of **Paul Spencer Construction Co.,** San Dimas, Calif.

T. M. Page of **T. M. Page Corp.,** Monrovia, Calif.

Donald MacIsaac of **MacIsaac & Menke Co.,** Los Angeles.

Wade Perong of **R. J. Daum Construction Co.,** Inglewood, Calif., and Albuquerque, N. M.

Morrison-Knudsen Co., Inc. of Boise, Ida., uses a number of planes.

Porter W. Yett, Jr. of **Porter W. Yett,** Portland, Ore.

R. A. Heintz of **R. A. Heintz Construction Co.,** Portland, Ore.

H. A. Dick of **General Construction Co.,** Portland, Ore.

McLaughlin, Inc., Great Falls, Mont.

F & S Contracting Co., Butte, Mont.

S. J. Groves & Sons Co., Minneapolis, Minn.

McKinnon-Decker Co., Helena, Mont.

Riedesel Construction Co., Billings, Mont.

Carson Construction Co., Inc., Helena, Mont.

Albert Lalonde Co., Sidney, Mont.

McLaughlin Construction Co., Livingston, Mont.

S. Birch & Sons Construction Co., Great Falls, Mont., and Seattle, Wash.

Carson Sheet Metal Works, Helena, Mont.

Bechtel Corp. of San Francisco and Los Angeles.

Carl E. Nelson, Logan, Utah.

Del E. Webb of **Del E. Webb Construction Co.,** Phoenix, Ariz.

A. S. Vinnell of **Vinnell Co., Inc.,** Alhambra, Calif., and Phoenix, Ariz.

Al Biasotti of **Louis Biasotti & Son,** Stockton, Calif.

Eddie Earl of **San Xavier Rock and Sand Co.,** Tucson, Ariz.

Dick Bingham of **Bingham Construction Co.,** Sacramento, Calif.

Roy Barlinger of **Barlinger Construction Co.,** Chico, Calif.

One contractor, Porter W. Yett of Portland, Ore., says this about the value of his plane, used as a job tool . . .

"I manage to use my plane on a 50-50 basis between business and pleasure. Depending on the location and distance of our job from town, it saves many hours of pounding the road. It has made possible my attending to a job in one day's time as against three otherwise.

PORTER W. YETT, JR., flies this single-engine plane for business and pleasure.

"I had a call at noon from one of our jobs 245 mi. away by car. Our concrete paver was down and they were taking it apart. I determined what was wanted, robbed it from another paver belonging to another contractor, and at 5:30 P.M., took off and one hour and fifteen minutes later deposited the proper parts at the airport 1½ mi. from the job. One hour and twenty minutes later I landed back in Portland with the satisfaction of knowing that our paver would be operating in the morning, thereby losing ½ day. By other means of freighting, this would have been impossible. At least one more day would have been lost.

"I also believe that it affords me better use of my leisure moments and thusly benefits my business efforts. A leisurely Saturday afternoon and Sunday trip can take you as far away as Boise, Ida. Also, I have been able to broaden by perspective, knowledge and outlook on production methods by being closer to other contractors' plants wherever they might be."

Shrubs Replace Steel and Concrete

Success of erosion control on the steep slopes of Palomar Observatory road shows that millions of fine roots can hold soil better than elaborate steel and concrete structures

By

GUSTAF JUHREN

Silviculturist*
California Region,
U. S. Forest Service
San Francisco, Calif.

WHEN Palomar Mountain Observatory on the summit of Mt. Palomar near San Diego, Calif., was dedicated June 3, 1948, it meant that many scientific problems of great import had been solved. It also meant that the problem of building "the Highway of the Stars" up to the "Big Eye" itself had been satisfactorily solved despite the harsh topography of the locale.

In its conception, the engineering features of the road's construction were readily recognized. The drainage structures were designed to carry the heavy equipment. The mirror alone weighs 20 tons, and structural parts, such as the horseshoe, the cage and the tube, reached the tremendous weight of 140 tons. Alignment of the road was also predicated on the need of easy curvature to handle the bulky equipment. (Problems involved in delivery of the huge mirror by truck-trailer transport were discussed in the Jan. 1948 issue of *Western Construction News.*)

On the other hand, some of the vicissitudes imposed by nature were not so readily recognized. The locality contains steep, highly erodible decomposed-granite slopes. Also the area is subject to periodic rainfalls of high intensity. Experience gained during the course of construction indicated that a combination of structures and vegetative planting could solve the problem of erosion.

End-dumped fill gutted by rain

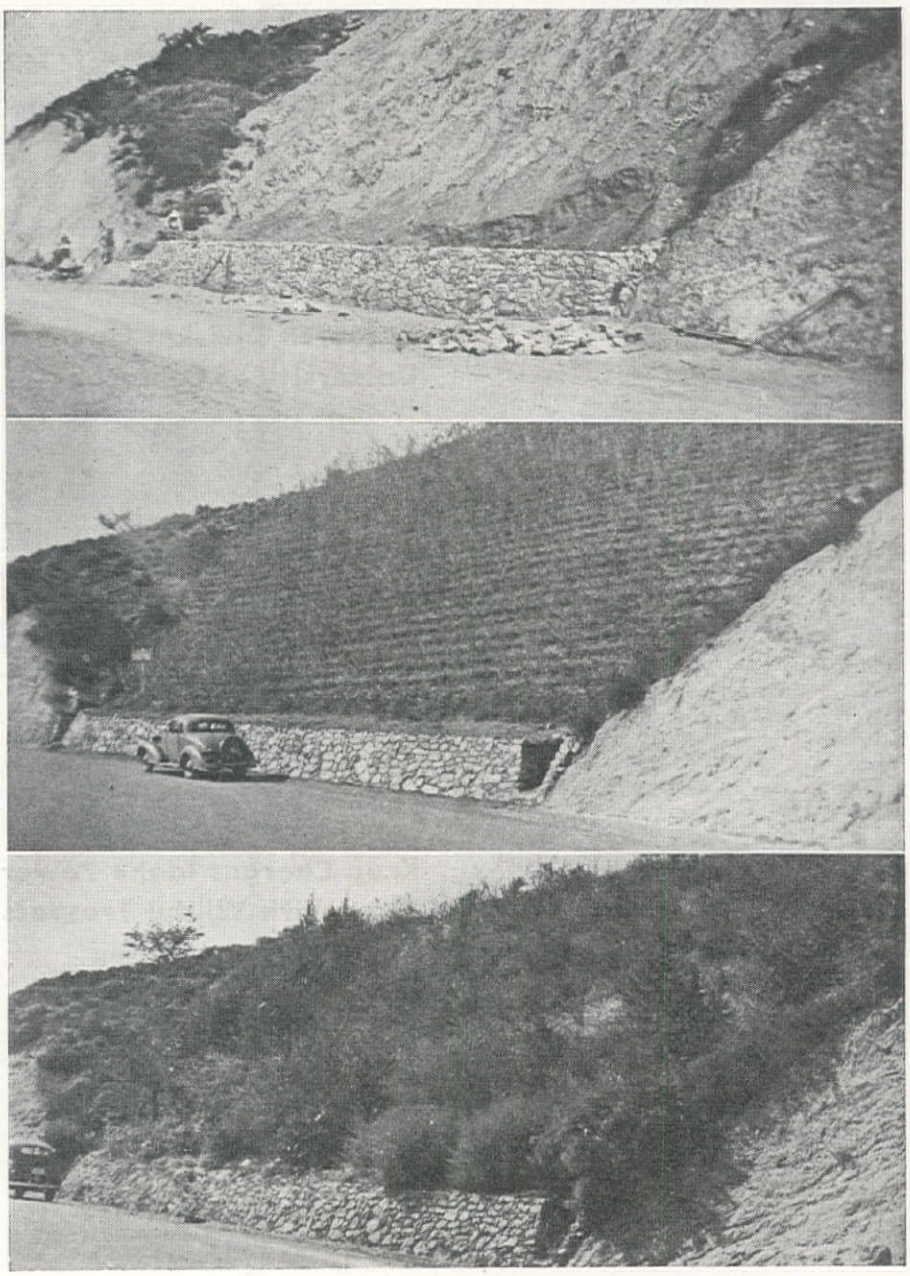
During original construction of the road, damage occurred due to ordinary rainfall washing the steep fill slopes. This occurrence was climaxed by a heavy rainfall when the road was completely gutted, especially on the lower four mile section. This lower section had been built largely by end-dumping the material as contrasted with later methods of building the road fills in 12-in. layers with side-slopes of 1½:1. It was clearly demonstrated that steep side slopes and lack of consolidation obtained by the end-dumping of material made the fills very susceptible to damage.

After the gutting, it was proposed to abandon the entire road project and build a new road on the east, or desert side of the mountain, where the rainfall is not so heavy. The thought was that a road built in this location would suffer less erosion damage. However, the late John Cole, Assistant Road Commissioner of the San Diego County Road Department, decided to attempt erosion control experimentally on a few fill slopes. These slopes were completed in February, 1938.

No definite methods of erosion control had been developed except by the U. S. Forest Service.‡ In addition, information was available concerning European practices in this field.

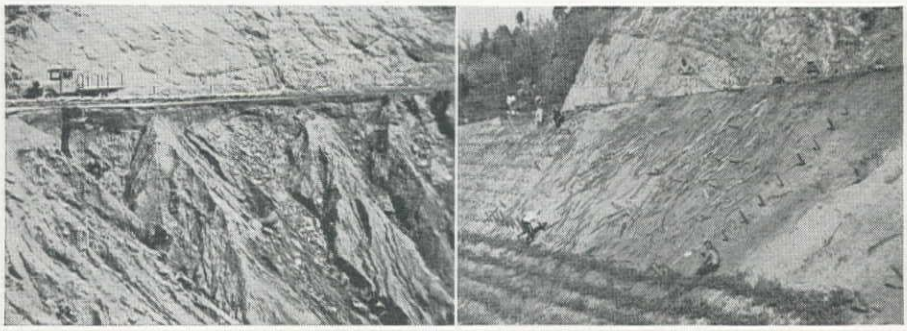
The general method employed consisted of contour wattling (bundles of brush placed end to end in contour trenches) seeding of cereal grains, plant-

LOSS OF SOIL was high on the slope pictured below before shrubbery stabilization was provided. The top view was in 1938; second view is one year later after the slope had been staked and wattled; third view is in 1948, with shrubbery dense and slope well stabilized.



*Formerly employed by San Diego County with the duties of planning and supervising installation of erosion control measures on Palomar Mountain Observatory Road.

‡Charles J. Kraebel, "Erosion Control on Mountain Roads," U. S. D. A. Circular No. 380, March 1936.



SOIL LOSS on this slope was 17,000 cu. yd. during one heavy storm. The slope was graded, sloped and wattled, right, so that ten years later, losses are negligible.

ing of willows and baccharis cuttings and the planting of trees and shrubs.

Wattling passes a test

A high intensity rain storm shortly thereafter, when 19 in. of rain fell in 24 hours at 4,500 ft. elevation, practically washed out the entire road. The only fill slopes which did not erode were those protected by erosion control measures. Two of these slopes had been refilled, staked and wattled only two days previous to the storm. The area of fill slopes controlled amounted to 4 acres.

After the storm, a survey of soil loss was made, revealing a total loss of 92,000 cu. yd. A loss of at least 25,000 cu. yd. was considered to have been caused by slides, drainage failures and the breakdown of shoulder berms, and 67,000 cu. yd. was due to action of rainfall on the unstable fill slopes.

All slopes wattled

In May of that year the San Diego County Road Department decided to go ahead with drainage improvement and erosion control work on all fill slopes over the entire road. The labor was furnished by the prison camp and technical supervision by the Road Department. The total area to be controlled amounted to 22 slope acres, and the man days required for stabilization amounted to from 200 to 500 man days per acre. Much of this time was spent in refilling, smoothing, reshaping and otherwise preparing the slope before the wattling operation.

The improvement of the drainage consisted of replacing some of the culverts with larger ones and the placing of additional culverts. In order to limit the runoff from the road bed to shorter distances, 170 open-type drains were constructed along the entire length of the 12 mi. road, or an average spacing of 410 ft. All of the drainage outlets were protected by rock talus or heavy riprap to prevent gouging. On the switchbacks, where slides from fill slopes on the upper portion might damage the lower portion of the road, dry retaining walls were constructed at the toe of the road fills.

Planting of the road fill slopes required a large number of native shrubs and trees. A "wild plant nursery" was therefore established at the prison camp near the foot of the road grade. About 5,000 trees and shrubs were donated to the project by the California Forest and Range Experiment Station, a branch of the U. S. Forest Service.

Trees and shrubs replace steel and concrete

An attempt was made throughout the project to plant the slopes with species that were ecologically suited to the planting sites. In order to measure the efficiency of certain species and their usefulness in controlling erosion, a portion of the donated native plants were planted in sample plots at various locations. From subsequent inspections made of these plots in 1939, 1946 and 1948, much valuable information has been obtained as to the source of death or injury to the various species planted and their ability to exist an various sites (soil, exposure and elevation).

Planting at the higher elevations (5000 to 5500 ft.) presented different problems as to the species used due to difference in temperature, site and soil. The most successful species planted on these areas were Black Locust, Pine, Catalpa, Red Bud, Siberian pea tree and Mountain Mahogany. Below 4000 ft. in elevation, Arizona Cypress, Pine, Sumac and Black Locust were most successful. Mule fat (baccharis) planted as cuttings, was growing excellently at all elevations.

Inspection 10 months after the original planting revealed that the principal causes of death or injury were: trampling by cattle and deer, heavy rodent population, drought, and the practice of work crews to dump slide material over the planted slopes.

A recent inspection reveals that the planting of mule fat (baccharis) is definitely dying out on road slopes up to elevations of 3500 ft., but is being replaced by invasion of native grasses, deer weed, buckwheat and a heavy growth of black and white sage. The plantings show exceptional growth of many species. The Cypress and Black Locust have reached a height of 20 ft., while the pines range from 6 to 15 ft., sumac is 5 ft. high with a spread of 8 ft. All are in very healthy condition with lush foliage.

Since the erosion control work was completed in 1941 there has been no damage from erosion to the road and fill slopes, and the control work can be considered entirely successful. It also proves that the millions of fine roots from plantings can do the work of holding the soil effectively and infinitely cheaper than more elaborate steel and concrete structures.

Research Division Opened at University of California

IF YOU NEED a "mechanical brain," or any of the complex resources of modern engineering science to solve your problems, a new division established on the Berkeley campus of the University of California may be able to help you. Establishment of a division of engineering research in the Department of Engineering has been announced by Morrough P. O'Brien, dean of the College of Engineering.

Through the new division the University will make its resources available to assist industry and government in solving the complex research problems for which no private facilities exist. These resources include a distinguished engineering staff and special facilities ranging from the world's largest universal testing machine with its 4,000,000 pound capacity, to microscopic equipment for studying infinitesimal particles of matter.

The Department of Engineering currently has in progress research programs involving more than a million dollars annually in the fields of civil, electrical and mechanical engineering, mineral technology and engineering design, sponsored by industrial firms and associations, and various government agencies. The new division was organized in recognition of the growing need for closer integration of industrial and engineering research with modern engineering education.

Krug Charges Idaho Power Firm With Willful Trespass

AN INJUNCTION was filed in the federal court at Boise, Ida., by J. A. Krug, Secretary of the Interior, charging the Idaho Power Co. with trespass on the public domain in construction of a $3,000,000 transmission line from Boise to American Falls. The injunction would prohibit further construction until the private power company obtained permission from the Interior Department, which has jurisdiction over the land on which the line was to be built. According to Krug, the company "made no efforts to seek, nor did it obtain, the permission required to be given under the law."

The Idaho power firm had applied to the Bureau of Land Management for an advance construction permit for electric plants and transmission lines in July of 1948 and application for right-of-way was filed in the following December. That application was withdrawn early this year and, in April, the company applied to the Federal Power Commission for a license to construct the line as part of its project to construct a new 75,000-kw. hydroelectric plant near Bliss on the Snake River and to erect terminal substations at an additional cost of $3,000,000.

Head-Deep Mud No Obstacle to Divers

Placing of main sewer across bay channel performed with train of barge-borne equipment and divers working entirely by feel in ooze and mud to connect joints on supporting piling

WORKING in soft mud sometimes over their heads, divers are putting in place the final sections of a 16-in. cast iron sewer line crossing under San Leandro Channel, a salt water passage connecting San Leandro Bay with the main body of San Francisco Bay. The channel separates Bay Farm Island from Alameda Island, both however being portions of the city of Alameda.

The City, under the direction of Carl Froerer, City Engineer, has just recently completed construction of sewers on Bay Farm Island, installing approximately 250 services to buildings formerly served by individual septic tanks. In addition, an underground pump station for forcing the sewage across the channel to the Alameda Island mains has been completed, and the present project will provide the means for conveying the material to the larger island for disposal.

Procession of barge equipment

San Leandro Channel was at one time dredged to a depth of about 30 ft. below mean lower low water, but through the years it has silted up until at most places the floor of the bay is now only a few feet below the surface of the water. The very fine mud filling is almost bottomless, and will support hardly any weight at all. Furthermore it is necessary to sink the pipe to a depth which will be clear should it be decided to dredge the channel once more.

The procedure, therefore, was to dredge a trench in the mud across the channel, 1,100 ft. wide at the point of crossing, then to drive timber piling upon which to support the pipe sections, and finally to place the pipe on the piling with divers working under water.

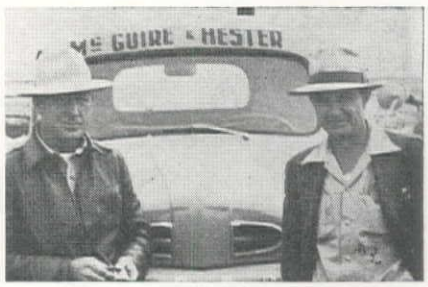
The contract for the project was awarded to McGuire & Hester of Oakland, and to perform the work the contractors brought in a whole string of barge equipment. First came a suction dredge, then a clamshell dredge, a pile-driver, two crane barges, a pipe barge, and a diver's barge.

Levee of quarry waste

The first operation was the construction on each side of the channel of an earth and rock-fill levee, for which about 7,000 tons of quarry waste material was used, and an additional 800 tons of riprap was laid on the south, or Bay Farm Island, levee for protection against waves.

A standard sewer line was run out through the south levee to a reinforced concrete junction box measuring 4 ft. by 7 ft., 9 in., on a heavy anchor base measuring 10 ft. by 11 ft., 6 in., and 8 ft. thick.

The sewer line enters this box and is split into two 16-in. lines, each with a valve. The first valve controls flow in the channel crossing line, and will normally be open. However, should any accident occur to the crossing, the sewage could be diverted through the second valve to the other line, which is only 100 ft. long and discharges directly into the Bay.

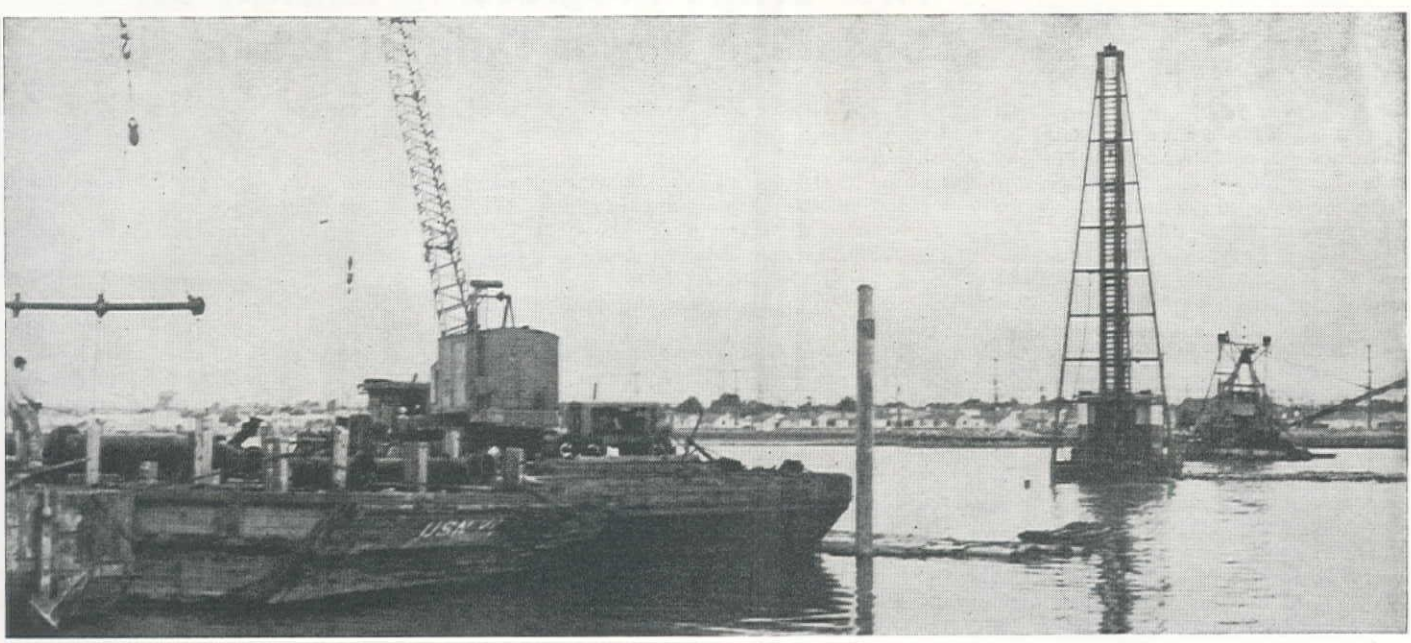


ROY SMITH, left, superintendent for contractor McGuire & Hester, and PAUL MARTIN, resident engineer for City of Alameda, on construction of the underwater crossing of the 16-in. trunk sewer from Bay Farm Island to Alameda, beneath San Leandro Channel.

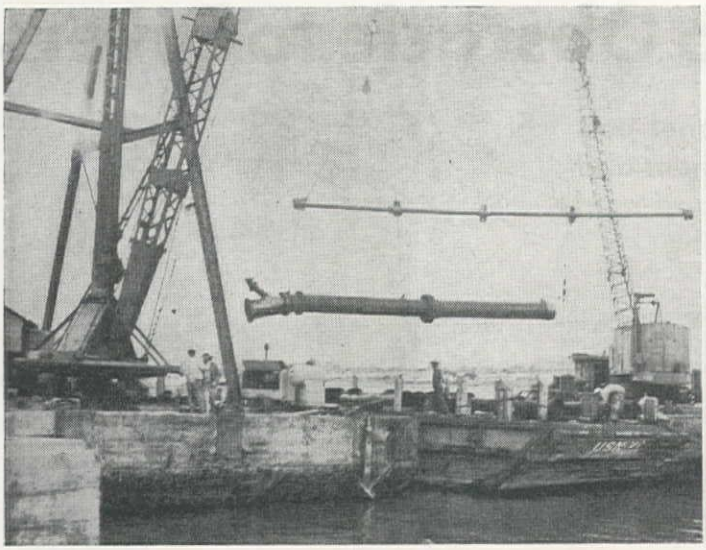
The suction dredge, first rig in the string of equipment at the crossing, did not have a ladder long enough to excavate the cross trench to sufficient depth. At the point of maximum depth this amounted to 41 ft., since the flow line of the pipe is located at 36 ft. below mean lower low water and it was desired to dredge to a further depth of 5 ft. for a working area. Accordingly, the suction machine dug to its deepest reach, about 20 ft. short of grade at the deepest point. It made an extra wide trench, to allow for slump of the soft material and for disposal of the mud subsequently renewed by the clamshell, which was the next rig in line. Whereas the suction machine discharged its material to a fill area on the Alameda Island shore, the clamshell merely cast to each side of the trench. Total excavation amounted to about 140,000 cu. yd.

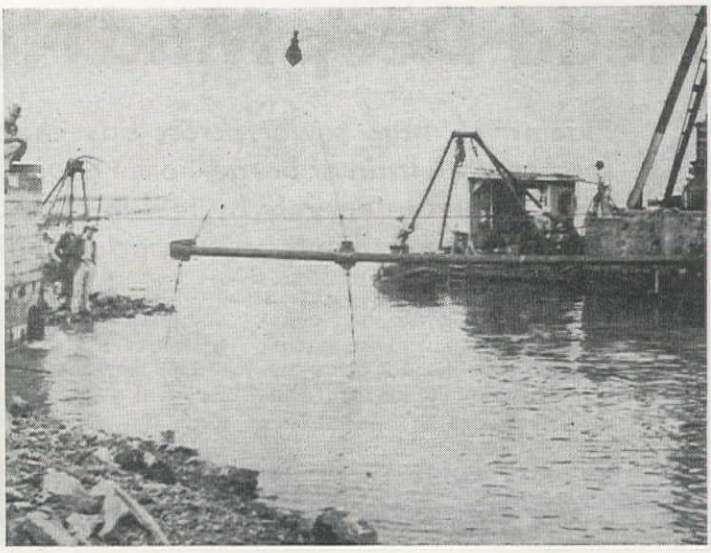
Divers "souped" to the gills

Following excavation of the trench, a pile-driver drove timber piling ranging in length from 25 ft. near shore to about 50 ft. in the middle of the channel, accurately on line, and on 12-ft. centers, so that each 12-ft. length of pipe would be

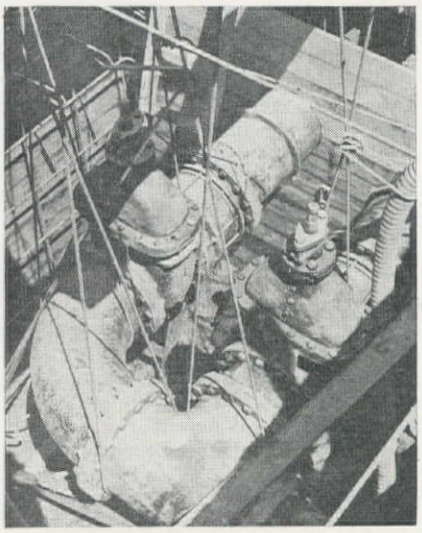


BARGE STRING on the sewer crossing included, in order of operation, right to left, (suction dredge not shown) clamshell dredge, pile driver, crane barge, pipe and work barge, another crane barge, out of picture is diver's operations barge.





FIRST JOINT of trunk sewer channel crossing is lifted from work barge, left, and lowered into position by "strongback," right, for bolting to flange in anchor box by diver, bubbles from whose helmet may be seen near the box. First section of pipe consisted of two standard lengths and an angle; later sections were three standard lengths.



VALVE BOX inside west anchor block. Valve at right is on the trunk crossing line, while that at left is on emergency relief line which would divert flow of sewage into the bay.

supported by one piling, at or near its center.

The proper cut-off for each piling had to be made by the divers, and had to be done entirely by the sense of feel, as the murky water of the channel prevented any vision, and in many cases the divers reported that the already thin mud bottom, made additionally "soupy" by the dredging, would not support their weight, and was in fact actually over their heads as they worked. They sometimes emerged with mud on the top of their helmets and shoulders. They made the cut-off with pneumatically-operated chain saws, but these were difficult to operate and clogged easily because of the action of the mud in the teeth and also because of the back-pressure on the air lines, which was considerably increased by the weight of suspended silt in the water.

After the piles were cut off at the proper elevation, a specially designed pipe saddle was placed on it. This was a rectangular chunk of reinforced concrete measuring 23 x 28 x 24 in., with an 8-in. circular recess 13 in. in diameter in the bottom to fit over the pile. In the top a semi-circular depression formed the bed for the pipe, and imbedded bolts on each side served to hold a cast-iron strap which was placed over the pipe after it had been set in the block. In addition, loops of reinforcing steel were left protruding from the top of the block to serve as lifting grapples in setting the block in place.

Pipe saddles placed by feel

The next operation was the placing of the pipe in the saddles, again done by the divers entirely by feel. The pipe is standard Usaflex ball-and-socket cast-iron pipe manufactured by U. S. Pipe and Foundry Co., with rubber gaskets at each joint, and the joints secured by bolted flanges. Each section is 12 ft. long and weighs 2,200 lb. Three sections are assembled at a time on the pipe barge, after which this 36-ft. length is raised by a crane and lifting "strongback," and lowered into position as indicated by the diver.

The diver, again often working in "soup" to the level of his head, must guide the socket over the protruding ball of the previously positioned pipe, get the three tons of pipe accurately seated in the concrete saddles, then bolt the flanges together.

Upon closure of the line across the channel to the 10 x 10 x 10-ft. anchor block on the Alameda shore, it will be given a 40-psi. air test, after which it will be connected to the existing 24-in. clay pipe main on the Alameda side and placed in service. The trench will be backfilled by the clamshell to the flowline of the pipe.

The sewer crossing of San Leandro Channel was designed in the office of Alameda's City Engineer Carl Froerer, with R. F. Lovejoy as chief design engineer and James R. Brummer as office engineer. Paul Martin is resident engineer for the city at the job.

Roy Smith is superintendent for McGuire and Hester on the approximately $80,000 contract.

First Stage Progressing Rapidly on Canadian Power Dam at Bridge River

WORK is now well under way on the initial stage of La Joie storage dam being built for the B. C. Electric Company at Bridge River, B. C., by the Northern Construction Co. and J. W. Stewart, Ltd., Vancouver. The work will be completed in the latter part of this year at a cost of $3,500,000. Approximately 400 men are now engaged on this project.

First portion of the ultimate dam will have a maximum base of 470 ft., height of 200 ft., and a crest length of 1,400 ft. Together with a diversion dam, completed last fall, it will provide storage for the first three units of 62,000 h.p. each at Bridge River. Water from the diversion dam travels between 35 and 40 miles before reaching the generators.

Two 600-ft. long tunnels go through mother rock on one side of the dam. These are lined with reinforced concrete and measure 14 ft. in diameter. Flow in the tunnels will be controlled by four 48-in. valves.

La Joie dam will store approximately 175,000 ac. ft. of water or about the same as Lake Coquitlam. Ultimately, when the dam is built to a base width of 680 ft., height 277 ft. and crest length of 3,300 ft., the storage will amount to 570,000 ac. ft., or somewhat larger than Stave Lake. Start on the second phase depends on power consumption demands in the lower mainland area.

Year-round water will be provided the 186,000-h.p. units now at Bridge River by the initial La Joie phase plus storage added by the diversion dam. Bridge River units Nos. 4 and 5 will require additional storage and this will be supplied by raising the height of La Joie Dam to ultimate stage. A third dam will be built further upstream.

CONSTRUCTION DESIGN CHART

CXI... Flow of Water in Semi-Circular Metal Flumes

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

THE SEMI-CIRCULAR metal flume is one type of open channel used for the conveyance of water. When all factors are considered such as seepage losses, frictional resistance to flow, supporting structures, etc., it is one of the more economical types of open channels.

A table of computed values for the carrying capacity of metal flumes, based on Kutter's coefficient of roughness $n = 0.012$ in the Chezy formula, will be found in that excellent hydraulic reference Handbook of Water Control.[1] The table assumes a freeboard of 6 per cent of the flume diameter. The assumed coefficient, $n = 0.012$, is for tangents and a smooth interior.

The accompanying chart is but a graphical plotting of these tabular values, and is solved by a single straight line intersecting all scales. Velocities above 80% of the critical velocities, should be used with caution in order to avoid serious wave action. The critical velocity is determined by the expression

$$V = \sqrt{g\frac{A}{T}}$$

in which

V = Critical velocity

A = Cross sectional area of channel

T = Top width of water surface.

A solution line has been drawn on the accompanying chart for a No. 48 semi-circular metal flume on a grade of 0.11 ft. per 100 ft. The following additional data will be noted on the respective chart scales:

Flume diameter = 30.5 in.

Discharge = 6.3 cu. ft. per sec.
= 12.5 ac. ft. per 24 hr.

Velocity = 2.9 ft. per sec.

Slope = 5.8 ft. per mi.

In order to compare the relative accuracy of the chart, the following information, taken from Table No. 31, Handbook of Water Control,[1] is quoted:

Flume diameter = 30.56 in.

Discharge = 6.3 cu. ft. per sec.
= 1.983 × 6.3 = 12.49 ac. ft. per 24 hr.

Velocity = 2.92 ft. per sec.

Slope = 5.81 ft. per mi.

The critical velocity for the assumed channel section, is

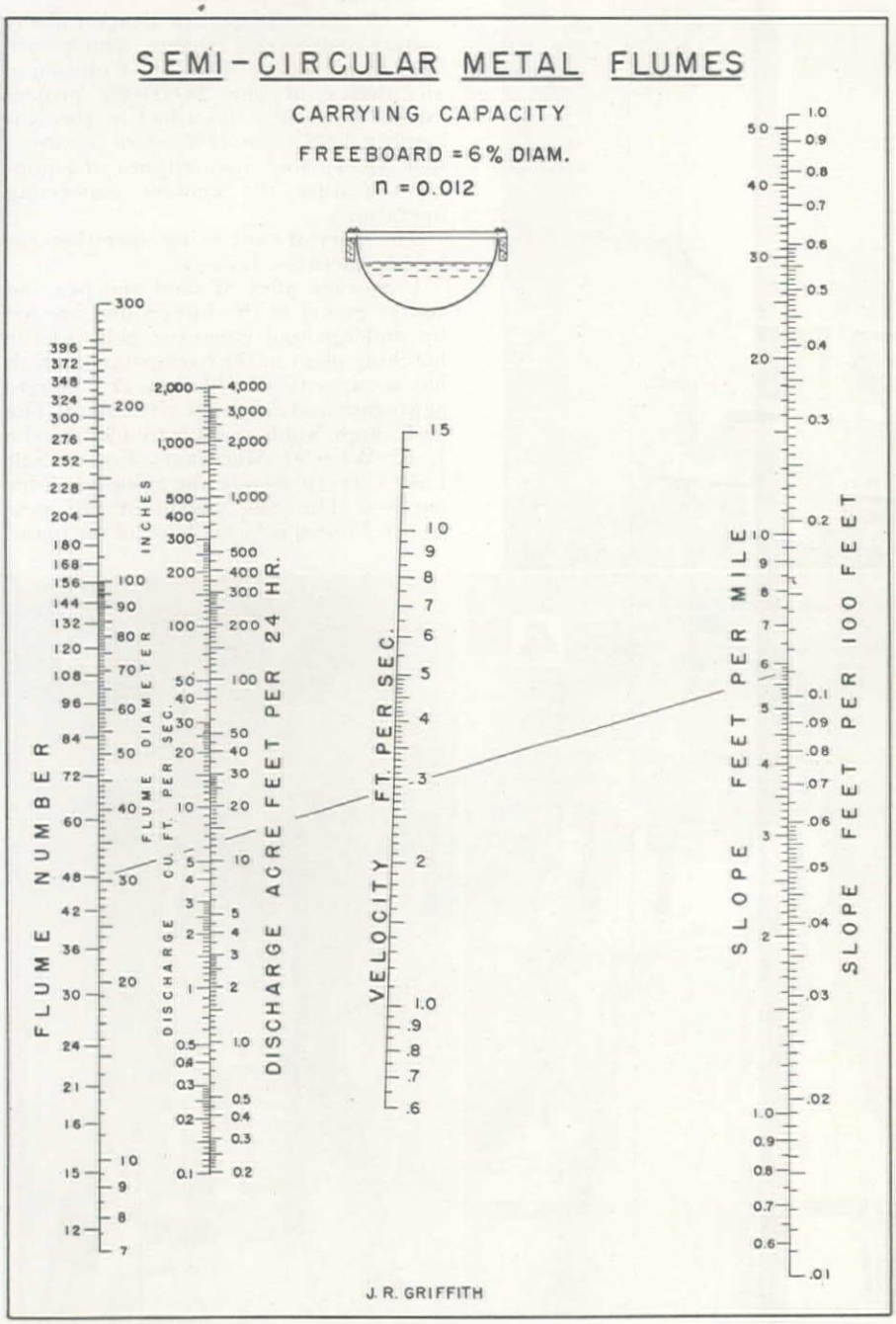
$$V = \sqrt{g\frac{A}{T}} = \sqrt{\frac{32.2 \times 2.158}{2.527}}$$

$$= 5.25 \text{ ft. per sec.}$$

Thus any velocity less than $0.80 \times 5.25 = 4.2$ ft. per sec., will be outside the uncertain range and will be satisfactory. Since the determined value was $V = 2.92$ ft. per sec., the assumptions would be permissible. Such a chart, as herein presented, may lack the accuracy of tabular values. It does, however, have the added advantage of giving intermediate values for estimating purposes, with maximum ease.

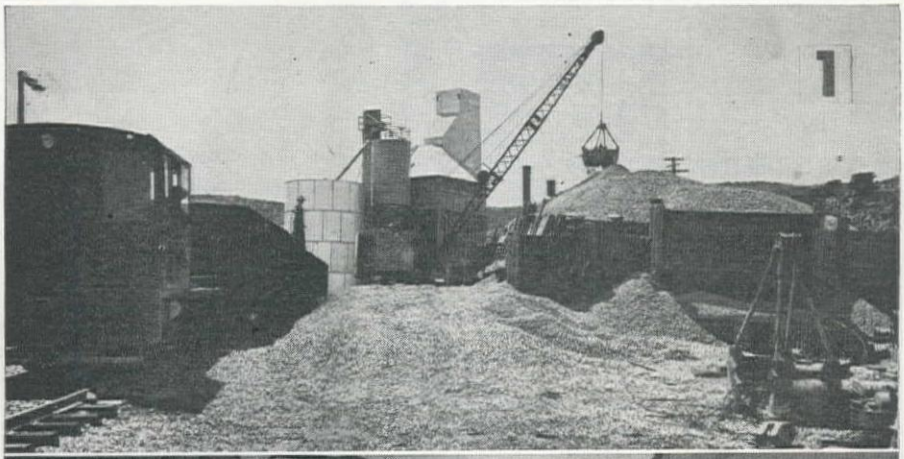
During the summer of 1947, an engineer from Kristiansands, Norway, came to see me relative to reworking these charts into units of the metric system for use in his country. I do not believe that he was particularly encouraged by my report of the time spent in preparing such charts. Like jig-saw puzzles, some charts fall into place with little effort. The accompanying chart, however, represents about 30 hours' effort. Fortunately, this one is the exception rather than the rule.

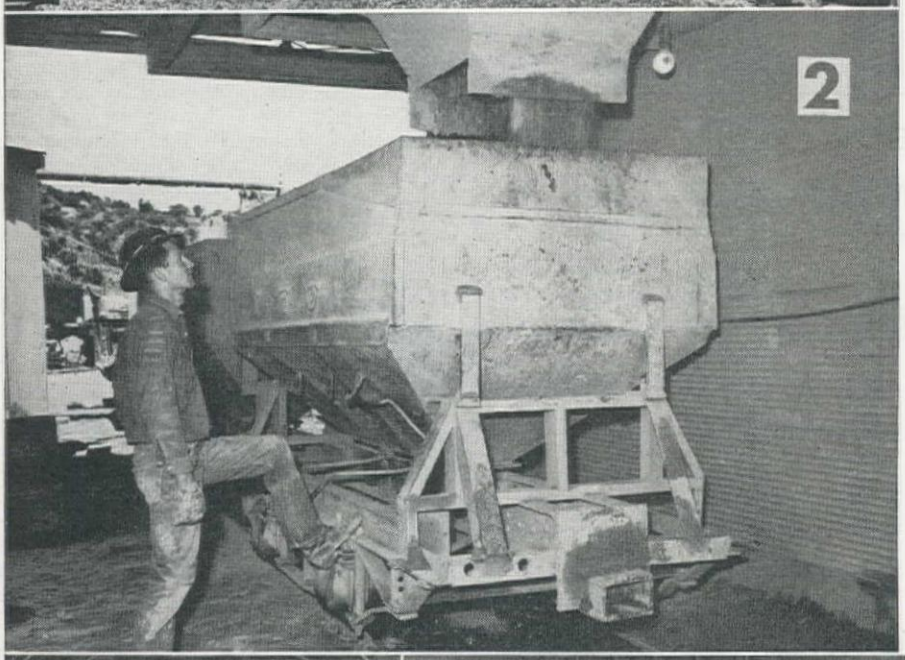
[1] Armco Drainage & Metal Products, Inc.



PRELIMINARY WORK is being pushed by Southern California Edison Co. on a 290-ft. dam on the San Joaquin River between the firm's Powerhouse No. 3 and Pacific Gas & Electric Company's Wishon Powerhouse. A crew of 250 men are now employed on the preliminary work and construction of a 7-mi. access road, and about 700 will be employed at the peak of construction.

Tunnel Lined by Equipment on Rails





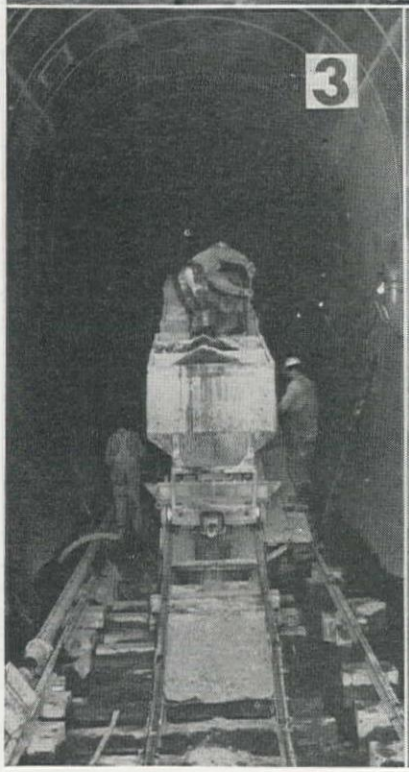
Dual mixer, Pumpcrete, shooting pipe and jumbos, all on rails, working as a unit for the concrete lining of Union Pacific's $8,000,000 Aspen Tunnel in Wyoming

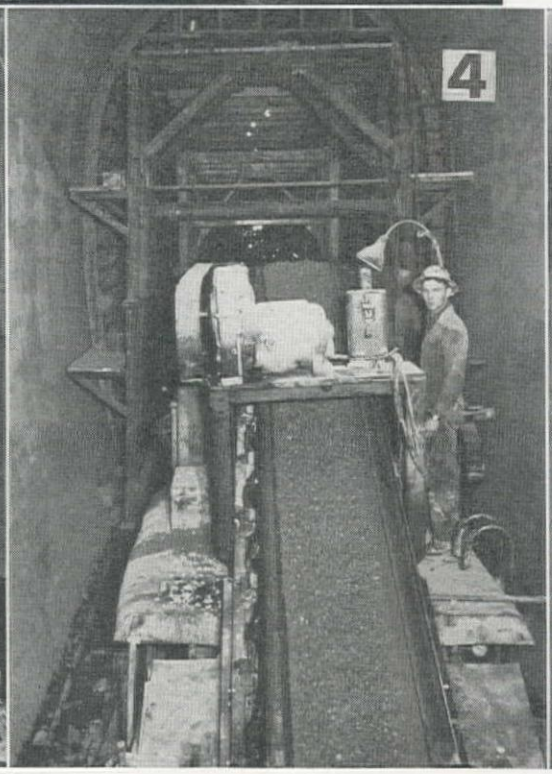
AFTER TWO YEARS of drilling, blasting and mucking, concrete operations are underway on completion of the new 6,700-ft. Aspen Tunnel for Union Pacific Railroad in western Wyoming. The veteran tunnel men of Morrison-Knudsen Co., Inc., headed by Lowell "Blackie" Thomas and Harry Carleton, to date have completed some 3,800 ft. of the 2-ft. thick concrete lining and approximately 4,600 ft. of the 2½-ft. thick invert in the horseshoe-shaped bore, which is 26 ft. from floor to top inside and 18½ ft. wide.

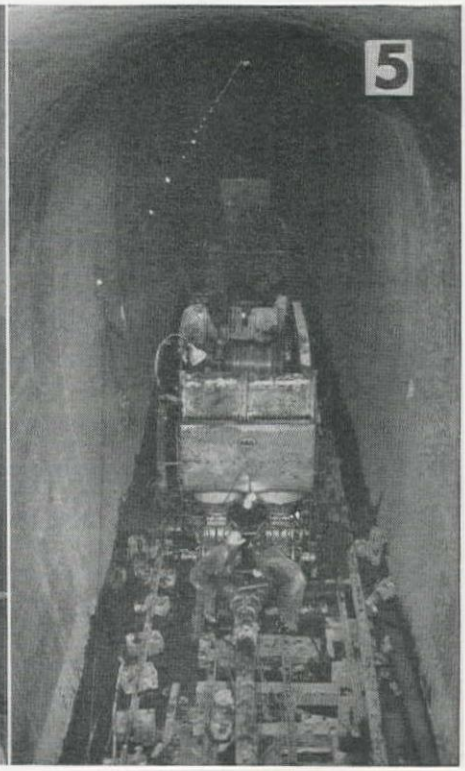
Aside from the narrow gauge railway system and several jumbos which have been employed by Morrison-Knudsen in all phases of the $8,000,000 project (which was fully described in the November, 1948, issue of *Western Construction News*), four major types of equipment feature the current concreting operations.

The story of concreting operations, as told by pictures, follows:

1. Storage piles of sand and pea and coarse gravel in the foreground are fed by underground conveyor belts to the batching plant in the background, which has a capacity of 350 tons of concrete aggregate and 2,500 bbl. of cement. The 50-ft. high Noble plant, provided by the J. K. Wheeler Machinery Co. of Salt Lake City, turns out one cubic yard dry batches. The east portal of the new Aspen Tunnel is ¼ mi. beyond the plant.







2. A batch of aggregate pours from the batching plant into the first compartment of the first narrow gauge dump car. Three 3-compartment cars carry nine batches on each trip from the plant to the tunnel.

3. The hopper-bottomed dump cars at the site of the concreting are run up an incline where they drop the batch, a compartment at a time, onto a 30-in. conveyor belt which carries the material to the mixer.

4. This 30-in. conveyor belt moves the batch from the dump cars to the mixer ahead. In the background is the concrete form. The incline and dump cars are to the rear of the photographer.

5. Shooting pipe, Pumpcrete and mixer are in the foreground; the incline and dump cars are in the background. The Pumpcrete (Chain Belt Co.) sends concrete at a rate of 35 cu. yd. per hour through the 8-in. diameter shooting pipe, which is 180 ft. long and shaped like the letter U laid on its side with the upper leg shorter than the lower and entirely mounted on wheels. The dual mixer is a Rex (Ransome Concrete Co.)

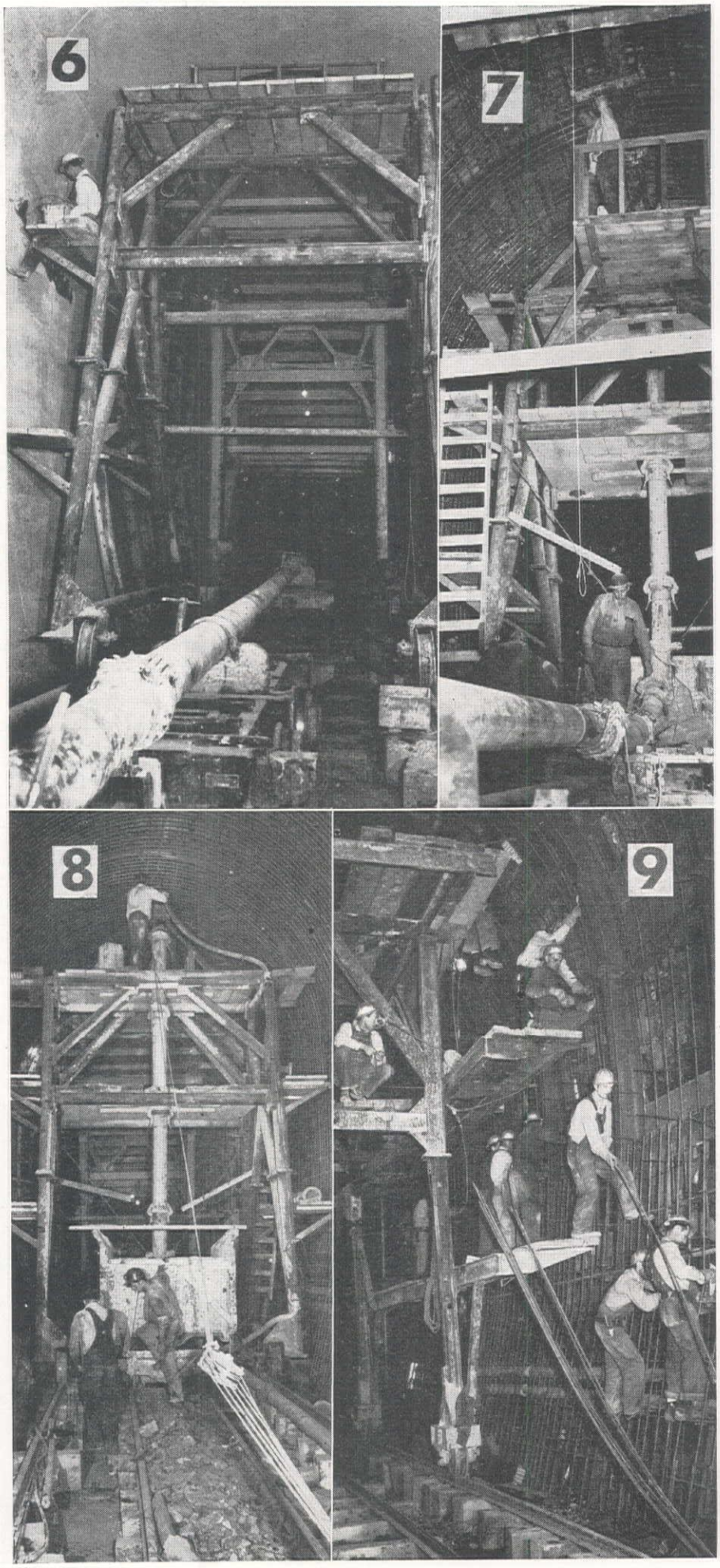
6. The shooting pipe from the Pumpcrete passes beneath a track-mounted finishing jumbo to the point—lost in the tunnel's blackness—where it turns upward to the tunnel ceiling. The shooting pipe's track mountings are visible in this view.

7. This view is from the far end of the concrete form at the point where the shooting pipe turns upward to the tunnel top, then passes back again over the top of the form. Bearing in mind again the simile of the letter U laid on side, the tip of the pipe's lower leg is connected to the Pumpcrete. The shooting pipe passes through the concrete form, turns sharply upward to the tunnel roof and then turns sharply again back toward the form, passing over the top of the form almost to the end of the form nearest the mixer and Pumpcrete. As concrete is pumped through the pipe and flows down between the form and the sides of the tunnel, the end of the form nearest the mixer and Pumpcrete is filled first.

8. Taken from the rear of the vertical portion of the shooting pipe, this view shows the block and tackle in the foreground tightening to pull the equipment a few feet forward, an operation performed at intervals to prevent the mouth of the shooting pipe from fouling in fresh concrete. The Pumpcrete, mixer dump car incline, shooting pipe and jumbos are moved forward as a unit.

9. Ahead of the concreting operations, tunnelmen working on a jumbo weave inner and outer curtains of reinforcing steel.

Two 54-ft. track-mounted jumbos built by the Consolidated Steel Corp. are being used on the project. The amount of concrete used in each setting of a form runs from 300 to 400 cu. yd., depending upon variations in the tunnel sides, and the pouring time for each setting ranges from 12 to 16 hours. Concrete is allowed to set after a pouring for 15 to 24 hours before the form is moved ahead. Forms are retractable from the set concrete through a series of jacks.



Portrait—Dredging Chief Engineer

Paul Enright, effectively combining his inventive and administrative abilities, has risen to the top in a field where the breakdown of one piece of equipment may mean failure

By BETTY THOMPSON
San Francisco, Calif.

NO NOTICEABLE black cats, witches or other ghostly phenomena have dogged the footsteps through life of Paul M. Enright, Chief Engineer for the Hydraulic Dredging Co., Ltd., Oakland, Calif. This despite the fact that his birth date, October 31, 1908, was also Hallowe'en.

Furthermore, Enright is one Texan who does not belong to the "That's a slur, sir!" school, members of which group are ready to fight the United States at any time or place, and name your own weapons. He attributes his more tolerant attitude to the chance of having been born in Waco and brought up in Texarkana. Both are border towns, subject to outside influence, and comparatively willing, therefore, to admit that they are American first and Texan second.

No dredging in early career

Enright's father was a Superintendent of Bridges and Buildings for the Cotton Belt Railroad, and the boy grew up in an atmosphere filled with construction talk and activities. Enright senior was not, however, enthralled when young Paul announced one evening that he was going to study engineering at Notre Dame. In fact, the paternal comment was a blunt, "Why on earth does he want to be one of those?"

This was the Knute Rockne era at Notre Dame, and the fame of the fighting Irish was heard throughout the land. But Paul, who in High School had played baseball, football and basketball, found now that studies allowed little time left over for athletics. He restricted his efforts to one year of track, during which he won his letter in the broad jump, and says that the only reason he stayed out for track in the first place was because he found such better food on the training table.

Between 1925 and 1930 he worked intermittently in the Engineering Department of the Saint Louis Southwestern Railway Company, in order to make enough money to continue his studies. His first job was that of Rear Flagman, a dangerous one in the Southwest of a few decades before, when the holder of that position was in constant danger of being picked off by Indians. It was safe enough by Enright's time, however, and he eventually advanced to the title of Chief of Party.

Depression assignments

In 1931 Enright was graduated cum laude, with the degree of Bachelor of Science in Civil Engineering. Now came the problem of finding a job in the worst period of the great depression.

He heard of a part-time teaching position at St. Edwards University, in Austin, Texas. It paid $100 a month, and was too good to pass up in times like those, so for two years Enright taught Strength of Materials, Reinforced Concrete Design, and Surveying. He was also, in 1933 and 1934, Structural Engineer with the Texas Civil Works Administration on bridges, buildings and low-water dams. A typical assignment was the design of a rigid frame reinforced concrete highway bridge, the design of its form-work, and the job engineering during its construction. Here his inventive tendencies first manifested themselves in the development of a new type of guard rail.

From 1934 to 1936, Enright got valuable experience in heavy construction with the Tennessee Valley Authority. At Norris Dam, he worked in the office of the Construction Engineer as Designer, and followed this with an assignment as Assistant Engineer in the Construction Plant Division at Knoxville, Tennessee.

Classmates can be valuable

One of Enright's classmates at Notre Dame, Paul Cushing, in 1936 offered Enright a job with his newly formed Hydraulic Dredging Company, Ltd. in Oakland, Calif. It was eagerly accepted, and from 1936 to 1941, Enright worked under general supervision, doing everything from making dredge performance studies and analyses, assisting in the development of methods for estimating dredge output, preparing cost estimates for contract work, and serving as job engineer on contracts. He also redesigned and prepared plans for new dredging equipment.

He says now, "It was all new and fascinating, and I only wish I knew as much today as I thought I did then at the end of my first year with the company."

PAUL M. ENRIGHT

From 1941 to 1943, while carrying on his duties as Engineer, he served as Superintendent of the dredge *Papoose* on continuous operations at Richmond Shipyards and the Oakland Naval Supply Depot.

Experience gained but weight lost

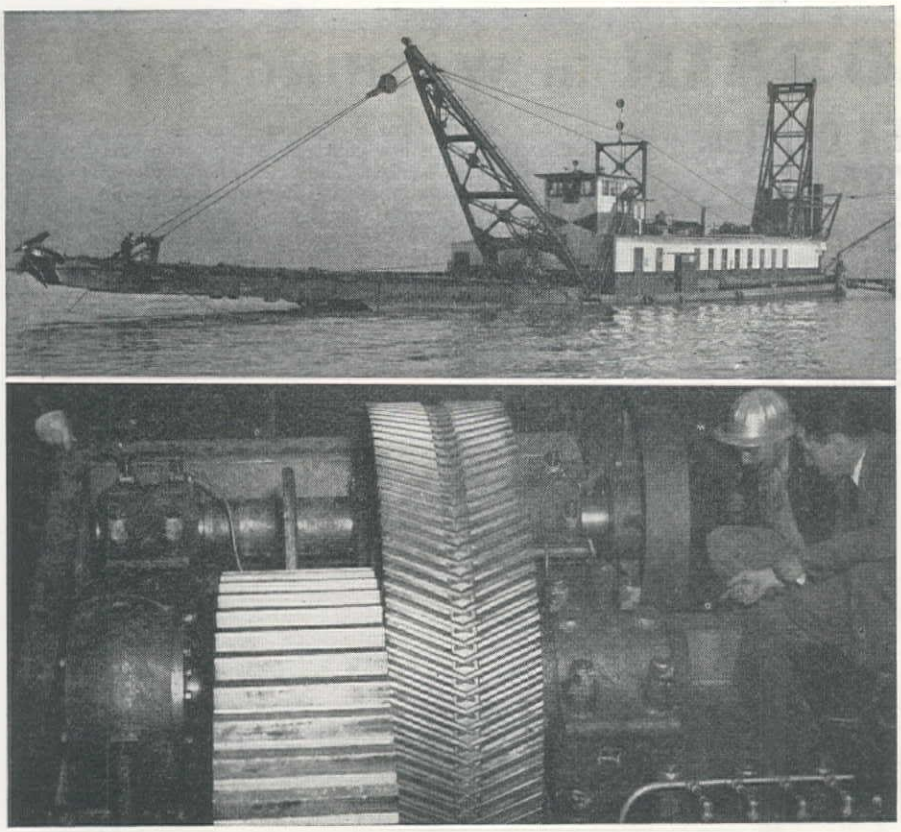
In 1943, at the request of the Army, he was given one year's leave from the Hydraulic Dredging Company in order to serve as Superintendent of Dredging for the Army Engineers at Honolulu in 1943 and 1944. There he organized and supervised the accelerated war-time program for dredging the Keehi Lagoon Seaplane Runways and the filling for the John Rogers Airport. He also was in responsible charge of all the operations of the hydraulic dredges *Hindes, Jefferson, Point Loma,* and *San Joaquin,* and of two clamshell dredges. The demands of his duties may be best illustrated by the fact that he weighed 170 pounds when he left San Francisco, and was down to 148 when he returned.

From 1944 to 1949, Enright was Chief Engineer for the Hydraulic Dredging Co., Ltd., and was in responsible charge of investigating, estimating and planning for all contract work. As such, he worked closely with the superintendent on the execution of jobs, was frequently representative of the company in negotiations with customers and general contractors, and also was responsible for the design of certain dredging equipment. A typical example of this last was the enlargement of the *Papoose* from a 1,200 hp., 20-in. to a 4,000 hp., 30-in. dredge.

An irritating breed

Dredgermen are a breed apart in the construction game, generally absorbed in their own problems, experiences and hazards. In Honolulu, for example, the Commanding Officer informed Enright that his men were a source of continual irritation, because "All they talk about is dredging." It becomes not a business, but an absorbing disease.

Enright merely smiles, however, when one of his friends, from another branch of the construction field, insists that dredging is the biggest racket of them all. According to this gentleman, "Silt is dredged from Redwood City, and turns up in a little while at Hunters Point. Another dredge goes to work there, and moves the stuff so that it can settle in another part of the bay. This goes on and on until finally the Harbor Commission gets the silt moved over the bar into the ocean—and by then it's been



THE SAFEST dredge afloat, the *Papoose*, top, carries many Enright-engineered innovations, such as a rock wiper for the dredge's suction mouthpiece and all pipelines above deck. Below, Enright (at right) looks over cutter drive reduction gears on the *Papoose*.

dredged so much that it's all worn out."

Actually, risks in any dredging operation are bound to be high. Bidding is done against unknown factors that can only be guessed at since a great deal of the work is done under water. Thus, all the dredgerman's eggs are in one costly basket. On a general construction job, for example, if a truck breaks down, the rest of the work goes on around the faulty piece of equipment. But when something happens to the dredge, the job is halted until repairs can be made.

Dredge sinks, but never again

One of Enright's grimmest memories concerns the time when he was Superintendent of the *Papoose* at Richmond Yard Number 2. Work was going on apace and Henry Kaiser was just getting ready to launch his first ship when one night about 2 a.m. Enright was awakened from a well earned sleep to hear the following report, "Sir, the dredge just sank!"

One of the below deck pipelines had blown apart. It took just thirty days to raise the submerged equipment. "And I learned right there," comments Enright, "that I had no ambitions to become a salvage master."

The near disaster had one good result, however. All pipelines on the *Papoose* are now above deck. In fact, today the *Papoose* is practically unsinkable, probably the safest dredge afloat.

However, all sinkings do not turn out so fortunately. Shortly after V-J Day, in 1945, the Hydraulic Dredging Co. lost one of their two dredges in a typhoon off Okinawa. The equipment had been commandeered by the Navy for work there. By the time an insurance payment finally came through, four years later, it was impossible to replace the dredge for under three times the total original insurance coverage.

Enright is a genial, relaxed appearing Irishman, who gets on remarkably well with the sometimes opinionated old-time dredgermen. He has a great deal of respect for them, in fact, insisting that before any job is taken over, it is always a good idea to discuss it with the men who are going to do the actual operation. Enright is also fortunate in having had so much previous engineering, construction and design experience—a combination comparatively rare in his present field.

Inventor and author

In recent years, he was co-inventor of a three-wire rigging arrangement for a hydraulic dredge, with full pilot-house control, which has been successfully used in contract work. A patent was granted on this device on February 8, 1949. He also invented, with patent pending, a rock wiper for the suction mouth-piece of a hydraulic dredge, also successful on contract work. In addition, he is co-author of the paper, "An Analysis of the Design of a Hydraulic Dredge," which was published in the 1947 Transactions of the American Society of Naval Architects and Marine Engineers. He is an Associate Member of the American Society of Civil Engineers.

In 1940, Enright was married to Mary Elizabeth Cushing, and is now the father of five girls, ranging in age from 0 to 8 years.

The increasing demands of this sizable family, combined with the above mentioned loss of one of his company's dredges, which naturally resulted in somewhat curtailed operations, have recently forced Enright to take a necessary step in furthering his career. This month, albeit with considerable regret, he severed his always harmonious connections with the Hydraulic Dredging Co. to join the San Francisco Bridge Co., the largest dredging company on the West Coast.

Between his work and his family, Enright has no outside time for hobbies or sports. He manages to enjoy life thoroughly, takes unconcealed pride in his handsome daughters, but at the same time is quite willing to dispense with any future remark comparing him with that other proud father, Eddie Cantor.

Orange County Groundwater Saved by Colorado Surplus

SURPLUS WATER from the Colorado River Aqueduct was turned into the Santa Ana River at Arlington, Calif., last month, marking the sale and delivery of the first surplus Colorado River water by the Southern California Metropolitan Water District. The 10,000 ac. ft. of water to be turned into the Santa Ana through an 18-in. intake valve where the aqueduct crosses the river at Arlington will be available to the Orange County Water District and will be utilized during the next 12 months to check the overdraft of that county's underground water supply. The water will flow down the Santa Ana into the irrigation ditches of the Santa Ana Valley Irrigation Co. and the Anaheim Union Water Co.

Purchase price for the 10,000 ac. ft. of water during the year will be $150,000. It is anticipated that the entire amount will be delivered within 120 days at a flow rate of 40 sec. ft.

Meantime, Orange County officials, in taking a further step to save underground water supplies, ran into protests from Riverside, Los Angeles and San Bernardino Counties. Orange County Supervisors had called for bids on a $117,000 pipeline project to tap the underground water supply above Prado Dam in Santa Ana Canyon, where the county has already spent some $400,000 for laying pipelines below the dam for collecting Santa Ana River surface waters. Protests from the other counties centered around the possibility that the project would drain water from their underground basins, although Orange County claims that the pipelines will capture 10,000 ac. ft. annually now lost through evaporation.

Orange County has appointed a committee of four to meet with the other counties in an attempt to settle the differences. They are A. A. Beard, County consulting engineer for the flood control district; M. M. Thompson, engineer for the Anaheim Union Water Co.; Paul Bailey, engineer for the Orange County Water District, and Ross Shafer.

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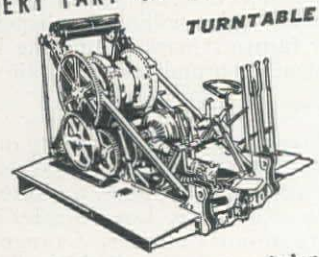

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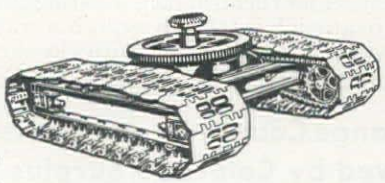

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Railroad Freight Yard Goes Modern

Remotely-controlled car retarders and power switches being installed at what is to be the West Coast's most modern freight yard

WELL UNDER WAY, a $2,500,000 project to give Los Angeles the most modernized railroad freight yard on the West Coast will be completed by Southern Pacific early next year. The yard project involves installation of electro-pneumatic car retarders in Taylor unit of the Los Angeles freight yard alongside the Los Angeles river (first such installation on the Pacific Coast) and increased yard trackage and one of the most complete and modern railroad yard intercommunication systems anywhere, including radio, teletypes, pneumatic tubes, loudspeakers and other devices.

Taylor Yard consists essentially of three units, namely: receiving, classification and departure yards.

The receiving yard where inbound freight trains come to a halt formerly consisted of 16 tracks totaling 70,200 ft. in length. This unit is being expanded to 24 tracks, with a total length of 122,-200 ft. It was necessary to raze two residences and move 7 others, move two four-family bunkhouses, and relocate portions of two streets and utilities to provide room for the increased track lengths.

Street relocation work, including grading, paving, sidewalks and curbs, and the construction of new sewers and reinforcement of other sewers is being done under contract by T. M. Page of Monrovia, Calif. Relocation of water, gas and electric lines is being handled by the respective utilities and all other work is being done by railroad forces.

Retarders control released cars

The classification yard is being completely rebuilt so that when completed it will have 40 classification tracks with a capacity of 1,250 cars. Eight two-section electro-pneumatically operated car retarders and 39 power switches of the electro-pneumatic type, all remotely controlled from three towers, are being installed between the new hump track and the classification tracks. Cars will be pushed over the hump crest at about a walking speed to accelerate to approximately 10 m.p.h. as they descend the hump to where the first retarder will decelerate each car. Succeeding retarders on the lead tracks will further decelerate the cars so that they will enter their respective classification tracks at a safe coupling speed. Gradient of each classification track is 0.23% descending, which will permit the cars to roll without gaining momentum.

Construction of the classification yard requires the removal of 58,400 ft. of track, relocating and raising 32,750 ft., excavation of 125,000 cu. yd. of earth and construction of 54,500 ft. of track. Also involved is the construction of several control towers, compressed air plant, signals, five 100-ft. floodlight towers and facilities for the inspection and oiling of cars as they move up the hump approach track.

This work is all being handled by railroad forces, except the grading which has also been contracted to the Page firm. Material being excavated is mainly fine sand deposited by the Los Angeles river and is being handled with tractor-hauled earth removers. Sprinkling is necessary to obtain compaction where the material is placed in embankment.

An extensive drainage system using both metal and vitrified pipe is being provided to care for sub-surface drainage around the retarders and surface drainage elsewhere. Runs of 8-in. perforated metal pipe are being installed on both sides of each retarder. Laterals with numerous catch basins will intercept surface drainage and a 24-in. main will carry the flow to the outfall.

Towers control all activity

The control towers are of reinforced concrete 12 ft. by 12 ft. and 22 ft. high to the operator's floor. Large sloping view windows are glazed with heat absorbing glass tinted green. Small air conditioning units are provided in each tower as are wash, toilet and locker facilities. A smaller tower of similar construction is being constructed adjacent to the crest of the hump to house the employe directing humping operations.

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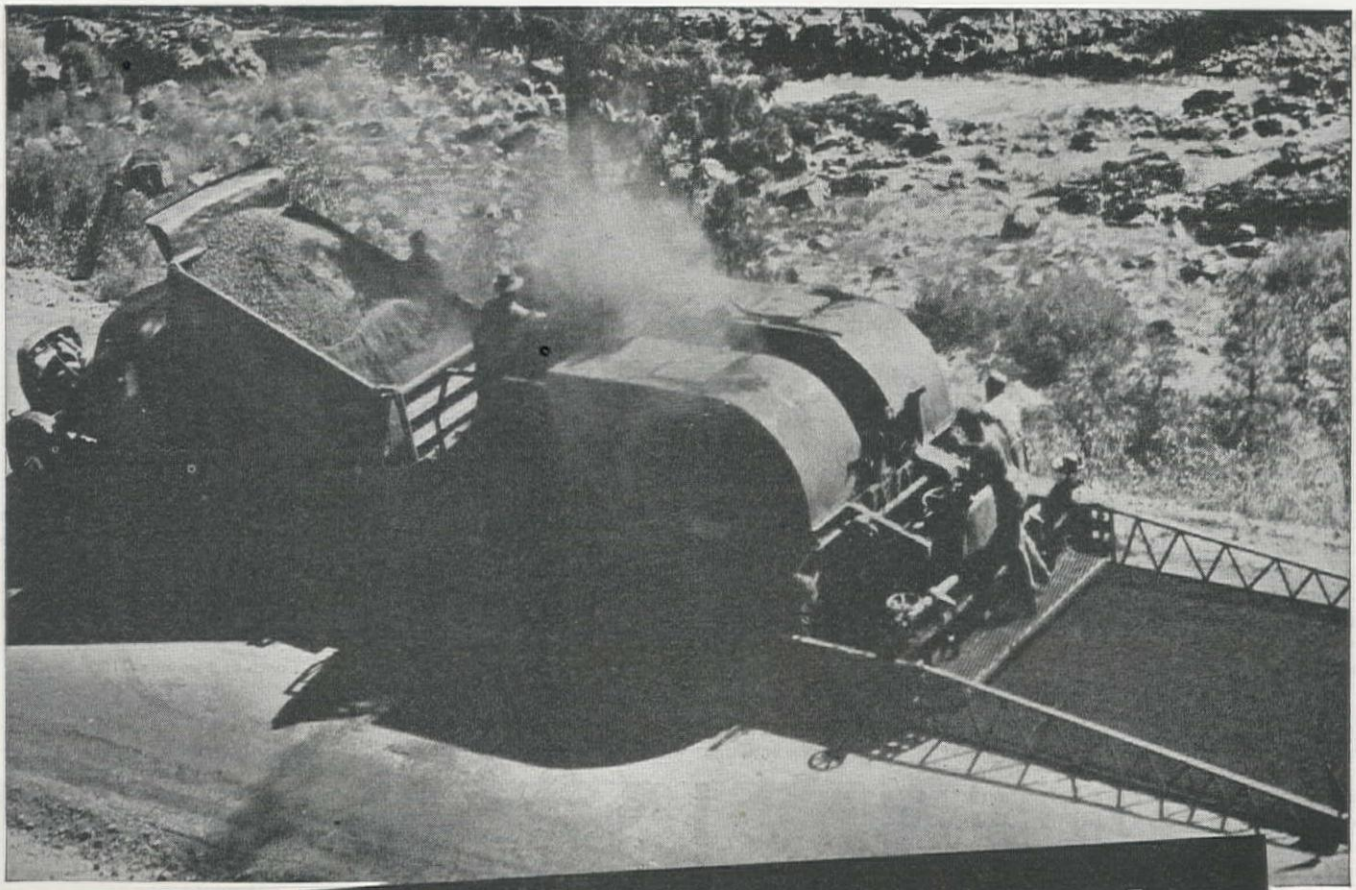
THE CAMERA takes an overall look at the installation of new trackage, top. A close-up of the retarder units that will slow freight cars to safe coupling speed, bottom.



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County Day Labor Limitation Feuded

California court considers limitation of $3,000 for county force account jobs amid protests from county officials

A HEAVY SLICE of construction and maintenance in California's 58 counties stands at the crossroads where the unlawful in public works departs from the lawful, according to a July 26 ruling of the California District Court of Appeal, Third District. The ruling of the court was this: No county in California can do day labor (force account) work when the cost of that work exceeds $3,000, until the Board of Supervisors of that county has first ordered definite surveys of the proposed work, directed preparation of profiles, cross-sections, plans, and specifications and advertised for bids.

Limitation may be hardship

Once this has been done, the county has the option of accepting the lowest responsible bidder, rejecting all bids as too high and readvertising, or rejecting all bids as too high and ordering the work done by day labor. This latter may be done in the event that the Board of Commissioners determines that the work can be done more cheaply by day labor. Clearly then, this recent court ruling slaps a heavy day labor limitation of $3,000 on counties that formerly had the sky as the limit on day labor work. In many cases, a county must prepare plans and specifications and advertise for bids, wait the necessary 10 days before opening, and then reject all bids as too high before proceeding with the maintenance job in the customary manner. By requiring the advertising of all bids on all work done by county crews, the emergency repair, costing over $3,000, of a damaged county road must by law be delayed 10 days, assuming that surveys, plans, and specifications can be done in nothing flat. A great number of counties state that this procedure will work a hardship on their engineering staffs, and result in much wasted money and time, since a number of borderline jobs costing slightly over $3,000 can be well on the way to completion by the time bids are called.

Complications

The entitre situation is further complicated by the fact that this decision was made by the Appellate Court in ruling upon the case in the lower trial court. The trial court upheld Section 2006 of the Streets and Highways Code (1947 Collier-Burns Highway Act) stating that "The board of supervisors of each county shall, prior to January 1, 1948, appoint a single road commissioner for all road districts in the county. The road commissioner shall be a registered civil engineer except that an unregistered person may be employed as road commissioner if approved by the board of supervisors as qualified and competent to handle the road and highway work of the county." The trial court then went on to state the rules controlling county day labor work under supervision of the road commissioner, and placed the hotly-contested $3,000 limitation in its ruling.

When is an engineer not an engineer?

Several months ago Chester Hard, citizen of Plumas County, filed a taxpayer's suit against the Plumas County Board of Supervisors complaining that (1) the Plumas County Board of Supervisors duly appointed on Dec. 2, 1947, E. G. McLain as Road Commissioner of that county, and determined that he is both qualified and competent to handle the road work of that county (2) that he is not a registered civil engineer (3) that the cost of proposed repairing and resurfacing three miles of roadway in that county will exceed $3,000 (4) that, unless restrained, the board of supervisors will purchase materials and perform the work by day labor under the road commissioner's supervision without first adopting plans and specifications or advertising for bids. Taxpayer Hard asserted that it was unlawful for the county to perform day labor work such as this except under the supervision of a registered civil engineer.

The original question resolves itself to this: The 1947 Collier-Burns Highway Act, Section 2006, quoted above, states that the county road commissioner need not be a registered civil enginer if the county supervisors determine that he is "qualified and competent to handle the road and highway work of the county." On the other hand, Section 1075 of the Streets and Highways Code, unchanged since its adoption in 1935, states that "In any county employing a **competent engineer** as road commissioner, the board may have any work upon county highways done under the supervision and direction of such engineer." Taxpayer Hard alleges that, under Section 1075, "competent engineer" means a duly registered civil engineer.

AGC interested too

It is unfortunate that Section 1075 does not define the required qualities of the road commissioner as specifically as does the Collier-Burns Act in Section 2006. However, regardless of whether the county job is a contract job or done by force-account, the courts have held in all cases that the road commissioner does not have to be a registered civil engineer, provided he is acceptable to the board of supervisors. It is no small point to have a detailed and lasting definition of the requirements needed to become a road commissioner. Conceivably, a contractor doing work for the county could be estopped from getting payment in the event that the construction was not properly supervised as required by law. In order to protect its member contractors, AGC has taken a direct interest in the present court decisions.

Uncertainties

C. R. Montgomery, Chief Counsel for the California Department of Public Works, in an address to the California County Supervisors and County Engineers Joint Meeting on June 30 at Hoberg's, stressed the importance of legality in public work contracts. He said, "As early as 1862 (Zottman vs. San Francisco, 20 Cal. 96) the Supreme Court of this State laid down the rule that a contract made in disregard of a law requiring competitive bidding is absolutely void. The court said that not only could the contractor not enforce the contract, but he could not recover for the reasonable value of the work done and the materials furnished." A great number of contractors are concerned with county work, and it is of primary importance for them to be assured that their contracts are within the law.

Under these present muddled conditions, neither contractors nor counties can proceed with certainty on a great deal of work now in progress. Clearly, if the risks on a job rise—and they will until the courts settle the disturbed sections of the Streets and Highways Code—the corresponding bids on a job will rise, at the counties' expense. On the other hand, many California counties conduct their maintenance on a fast, high-gear schedule, and a $3,000 limitation on day labor work will shoot rental equipment costs and depreciation schedules sky high. The counties cannot afford to have their heavy equipment rusting away without use.

Inadequacies

In addition to the conflicts or ambiguities previously mentioned between Section 2006 and Section 1075 of the Code, concerning registered civil engineers, Section 1075 states: "Such work may be done: a. By letting a contract covering both work and materials. In such event the contract shall be let to the lowest responsible bidder as provided in this article. b. By purchasing the material and letting a contract for the doing of the work. c. By purchasing the material and having the work done by day labor." Nowhere in Section 1075 is the maximum cost mentioned under which work may be done by day labor without adopting plans and specifications and advertising for bids. It has been under this section of the Code that California counties have been governed since 1935. It now appears, however, that under the latest court ruling the counties will now be held to the $3,000 limitation as put forth in Code sections 1071 to 1073. These sections state that if the county

Concluded on page 132

HOW IT WAS DONE

JOB AND SHOP TIPS FROM THE FIELD

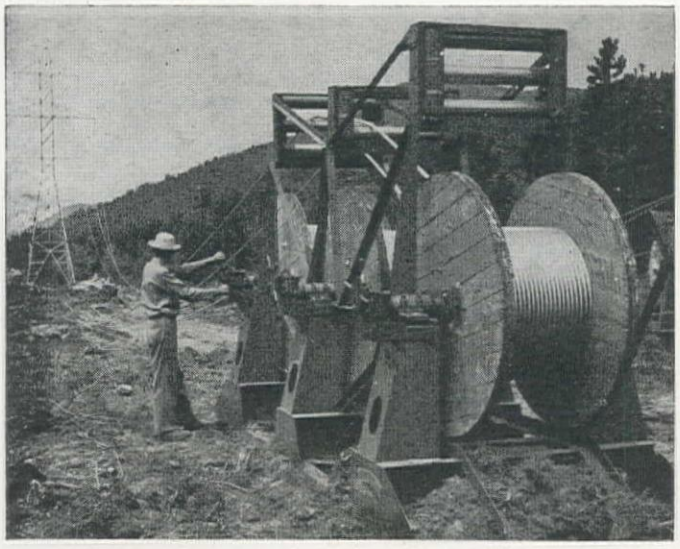
New Type Tension Sled Cuts Power Line Stringing Costs

A "REEL TENSION SLED," employed this year in stringing wire on a mountainous section of Bonneville power transmission line, has resulted in lowering costs by as much as $1,000 per mile! Using three of the sled units, Parker-Schram Co., contractors of Portland, Ore., set what is believed to be a record for double circuit, 230-kv. power line by stringing, "sagging" and dead-ending 7.7 mi. in a 10-day period during June.

The idea for a new reel tension sled to enable heavy reels of power cable to be handled and unspooled under exact control was originated by J. E. Stone, superintendent for Parker-Schram. The firm holds contract for access roads, tower foundations, steel erection and wire stringing on a 60-mi. stretch of Bonneville power line extending from Foster Creek Dam site to Snohomish, Wash.

Stone took his idea to Stemm Brothers, Inc., Leavenworth, Wash., manufacturers and metal fabricators, who developed and patented the equipment as the Stemm tension reel sled.

Basically, the Stemm tension reel sled is a welded steel framework, mounted on tubular skids. Three cable reels in tandem position are secured to individual axles by means of



a dog on the side of the reel. Each reel is controlled by a manually operated friction brake, to maintain exact tension while unspooling. Overhead fairleaders, ball bearing equipped, guide the cables as they are drawn out under tension. Full reels are loaded and empty spools rolled off along channels built into the sled. A hydraulic lift is built in below each of the three reel axles.

In stringing double circuit lines, a pair of the sleds, plus a smaller single-reel unit for static line, are grouped near the base of the chosen set-up tower. All seven cables are attached to a single yoke, drawn by a winch-equipped tractor. As the cables reach succeeding towers, they are passed over travelers and elevated by means of tag lines left by tower erection crews. One reel tender controls the tension on all seven cables, following a foreman's instructions relayed by telephone or portable radio.

One advantage of the sleds is that one reel tender can handle all 7 lines on double circuit work. Also, a much smaller area at the base of each tower has to be leveled, saving considerable bulldozing. Lagging to protect cables between towers is greatly reduced through better control of tension. Moving is simplified since three sleds can be hitched in tandem and skidded to the next set-up site with the same tractor used for other purposes on the job.

Overhead Loader Attachment For Both Mucking and Loading

"LONG JOHN" AUSTIN, veteran tunnel driving and earth moving superintendent in the Rocky Mountain region, has gone into the equipment manufacturing field. First product of John Austin, Inc., Longmont, Colo., is a new loader that combines the time-saving principle of straight-in-line mucking with a hauling unit.

The construction world is keenly interested in the entrance of "Long John" into the manufacturing field. He has been noteworthy for his ability to engineer and build special jigs, tools and equipment to meet specific problems as they developed on the job. This was an important factor in hanging up the long string of records for tunnel driving which adorn Austin's career, particularly in connection with the Lawrence Adit Section of the Colorado River Aqueduct, the famed Carlton Tunnel at Cripple Creek, Colo., and in the portion of the Alva B. Adams tunnel of the Colorado-Big Thompson Project driven under his direction.

An Austin Overshot Loader, with 1½-cu. yd. bucket capacity, is now working on two tunnels of the flood control project at Hot Springs, Ark., and is said to be cutting average mucking time from 8 to 2½ hours, the single machine replacing two shovels of another type.

While no specific time studies have been made as yet, one

"LONG JOHN" AUSTIN'S Overshot Loader in action. The load is scooped up and lifted over the sheltered tractor and then dumped at high speed into a waiting truck.

of the Austin loaders of 4-cu. yd. bucket capacity is proving its efficiency at Loveland Pass on U. S. Highway 6. The pass over the Continental Divide carries motor traffic at an elevation of 11,992 ft., and most of the "going" on the $444,000 widening, straightening, grading and surfacing contract is through granite and terrain locked in ice to a depth of 8 ft. The project is under contract to Colorado Constructors, Inc., with M. K. Berry the superintendent. Accompanying pictures show Austin's loader in action on this project, operated by J. W. "Bill" McCullough.

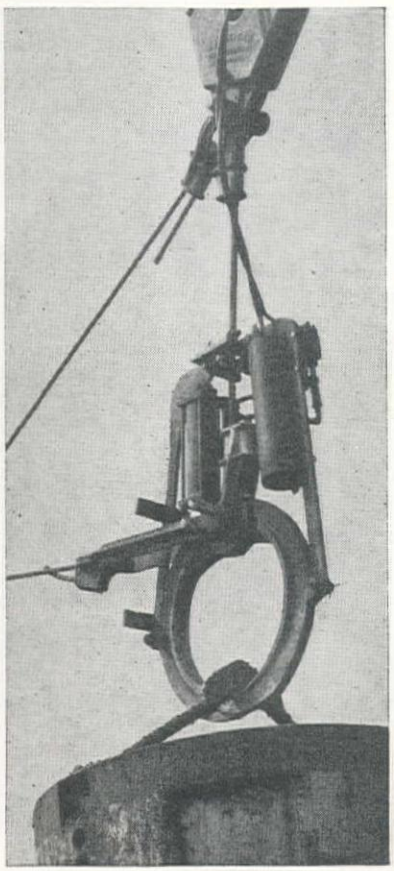
Details of the loader are as follows. It is an attachment for converting any late model crawler-type tractor into a loader. One lever gives the operator control of the attachment, and enables him to stop the loaded bucket at any position. Power is taken from the tractor and actuates two hubs upon which is wrapped and unwrapped a web and chain. This results in a variable speed drive, slow at the dozing position, accelerating as the load is raised and gaining maximum speed at the extreme dumping position.

Three models have been manufactured so far, with bucket capacities of 1½, 2½ and 4 cu. yd., the buckets requiring clearances of 17 ft., 9 in., to 21 ft., 10 in. Widths are 6 and 7 ft.

"Just because I am known as a 'rock-hog'," says John Austin, "don't get the idea that this equipment is only good for boulder and slab mucking. I think it will be ideal for all sorts of stockpiling, large scale snow removal and handling sand and gravel, and with special forks instead of the bucket, it can be made ready for handling timbers, ties, etc."

Compressor-Ram Hooks and Unhooks Concrete Buckets

A MECHANICAL hooking device for concrete buckets has been designed by an employee of the Mittry Brothers Construction Co., Los Angeles, contractor working on the Hulah Dam project near Bartlesville, Okla., project of the Tulsa District, Corps of Engineers.



Hooking and unhooking of two- and four-cubic yard concrete buckets has always been a time consuming, costly, and sometimes extremely hazardous operation, but results to date on this device have been satisfactory enough to warrant application for a patent and possibility of a new item that will be a boon to contractors.

The hooking device is relatively simple and its design will help to keep service and maintenance at a low cost level. Principal functionary parts are an air-compressed opening ram which is actuated by an electrical solenoid that is operated from the cab of the crane. The device is constructed so that the hook will not open under air pressure when loaded, nor will it open when loaded even though air pressure is lost. These two features assure a much needed safety factor.

At present the hooking device does not permit turning (or moving) the bucket while concrete is being placed, but the designers are now working on a swivel device to provide 180 deg. movement of the bucket. At the present time the apparatus is being used only on the 1201 Series Lima Crane, but additional modifications are also planned in order that the fair lead line can be eliminated and the device used on a Gantry-type crane with equal success.

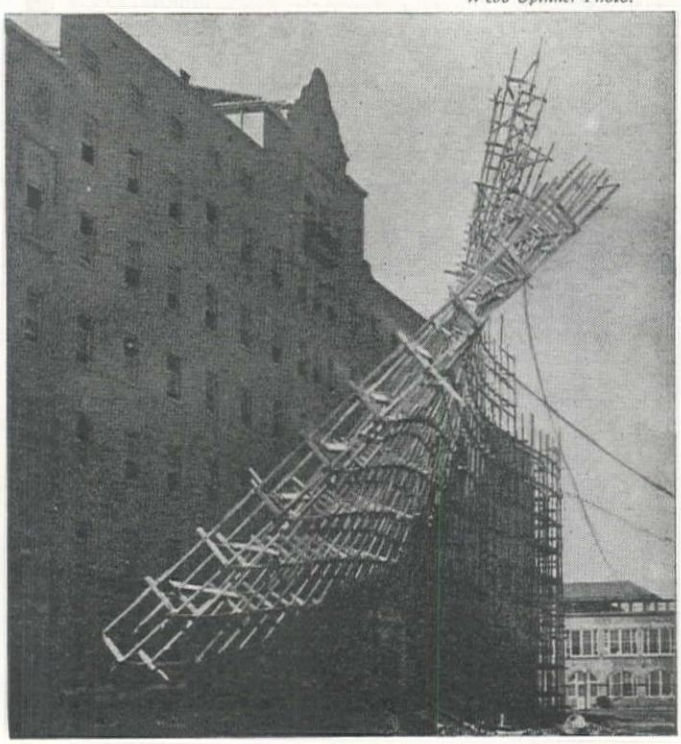
Row of Drifter Drills Lines Out Curbs Before Excavation

TO REMOVE the outer two of four sets of streetcar tracks from San Francisco's Market Street and prepare for resurfacing, Eaton & Smith, San Francisco contractors, employed this unusual unit to line out along curbs and tracks before excavating. Cutting of the asphaltic concrete base material was done by a row of 3-in. automatic-feed, drifter drills, mounted in adjustable saddles on a heavy crossbar. By using a "new standard" Jaeger 600-cu. ft. compressor on the unit, instead of an ordinary standard 500-cu. ft., the contractor was able to add a fifth drill, thereby increasing his daily length of cut 25%. A row of five 2⅛-in. holes, 12 in. apart, was drilled in about 30 seconds. The truck was then shifted 6 in., and a second series of holes drilled between, and one hole beyond the first series before the truck moved on to the next drilling position. This preparatory cutting prevented over-break on the pavement when excavating.

TIMBER-R-R! SCAFFOLDING DOWN IN EIGHT SECONDS

WHEN they were ready to remove scaffolding from the front of the new Veterans Administration Hospital at Livermore, Calif., workmen of the Del E. Webb Construction Co., Phoenix, Ariz., hooked lines onto it and brought it down in 8 seconds. Despite the speedy drop, the quantity of salvageable lumber was surprisingly good.

Webb Spinner Photo.



Planet Power—What, Why, How

Planet power drive is something new in crawler tractor field—Here is an inside look at the system as used on the International TD-24

USE OF PLANET gear systems in the final drive of the new International TD-24 Diesel crawler tractor has aroused wide interest. Because planet power final drive is something new in the crawler tractor field, the same questions keep popping up every time tractor men get together. What is planet power? How do planet gears perform? What advantage does the planet power final drive offer over other drive methods?

These are normal questions and deserve a rational answer. But first let us examine the background of planet gear systems in heavy-duty applications. They are used in airplane engines as propeller reduction gears to transmit several thousand horsepower in a safe and efficient manner. They are used in winches, hoists and draglines where dead loads subject them to terrific torsional strains. They are used in twin-speed rear axles for heavy-duty trucks, and in certain heavy-duty transmission assemblies. In a modified form, they are used in practically every automobile differential. This variety of uses is possible because planet gear systems offer one of the most efficient methods of variable-speed power transmission known to engineering science.

The drive in the TD-24

Planet power final drive in the TD-24 serves two distinct functions. It permits gradual turns with power on both tracks or pivot turns with one track locked, and provides a high-low speed range (both forward and in reverse) without shifting of transmission gears. This high-low speed range, in conjunction with the four-speed transmission and the reverse lever, gives the TD-24 eight forward and eight reverse speeds.

In operation, the planet power final drive system acts like two dual-speed rear axles, each coupled independently to its respective track, and each hydraulically controlled by a separate lever. Thus, with one control lever in the high-speed range position and the other in the low-speed range position, the tractor makes a gradual turn with power on both tracks. With both control levers in the high-speed position, the tractor travels straight forward in high speed range. The same principle applies with both levers in the low-speed position. A third position of either lever locks the corresponding planet drive and track and puts the tractor into a pivot turn.

Operational convenience of this set-up is apparent. The hydraulically boosted controls of the planet power system are easy to manipulate. The combination of gradual and pivot turning increases tractor maneuverability. The high-low speed range is available without shifting or de-clutching.

How planet gears work

Planet gear operation is easy to understand. The example illustrated here will show this. Figure A is a rear view of an elementary planet gear assembly. Parts included are: (1) drive bevel pinion which receives power from the transmission; (2) bevel gear which drives the planet gear housing assembly; (3) planet gear housing assembly which is mounted on and turns with the bevel gear; (4) planet gears which are mounted in planet gear housing but which spin freely on their own axes; (5) sun gear which is in constant mesh with planet gears, and which is integral with the tractor final drive shaft.

Let us assume in this example that each of the planet gears has 20 teeth and that the sun gear has 80 teeth. When the sun gear (5) is stationary and the planet gears (4) are carried once around it by a single revolution of the planet gear housing assembly (3), it is evident that each planet gear will have to make four revolutions on its own axis (80 divided by 20 equals 4).

Now let us assume that the planet gears can be locked so that they **cannot** rotate on their own axes. In this condition, when they are carried around the sun gear (5) by the rotating planet gear housing (3), the sun gear is carried with them and delivers power to its shaft.

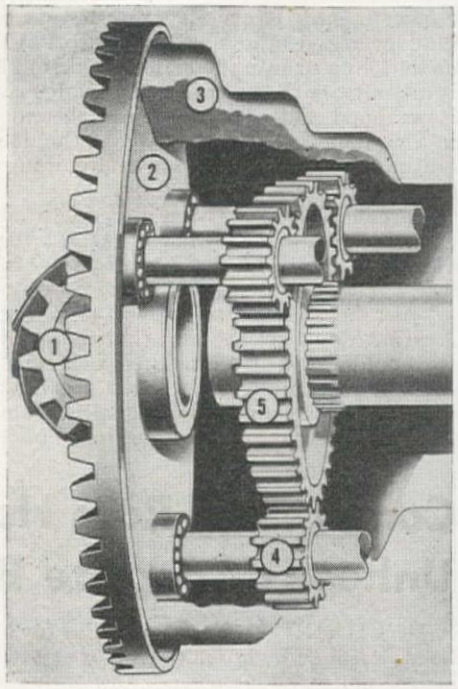


FIGURE A—Rear view of an elementary planet gear assembly (Explained in text).

Now let us consider what happens when the rotation of the planet gears is "controlled." If permitted to rotate only twice on their **own** axes during one complete revolution of the planet gear housing, it is clear that only 40 planet gear teeth will be presented for meshing with 40 of the 80 sun gear teeth. Thus the sun gear (5) will be carried through one-half revolution during each complete revolution of the planet gear housing assembly.

This, then, is how the "driving" planet gears operate. By "controlling" the speed at which they rotate on their **own** axes while being carried around the sun gear, any ratio of speed reduction between the planet gear housing assembly and the final drive is possible. This speed control is usually secured by means of "pacing" planet gears integral with the driving planet gear. This will be explained in the following description of the TD-24 planet power final drive.

How the TD-24 final drive works

Figure B is an exploded rear view showing the right half of the TD-24 planet power final drive assembly. Here pinion gear (1), ring gear (2), planet gear housing assembly (3), driving planet gears (4), and driven sun gear (5) correspond to the parts shown in Figure

FINAL DRIVE of the TD-24 is a hydraulically-controlled planetary gear train.

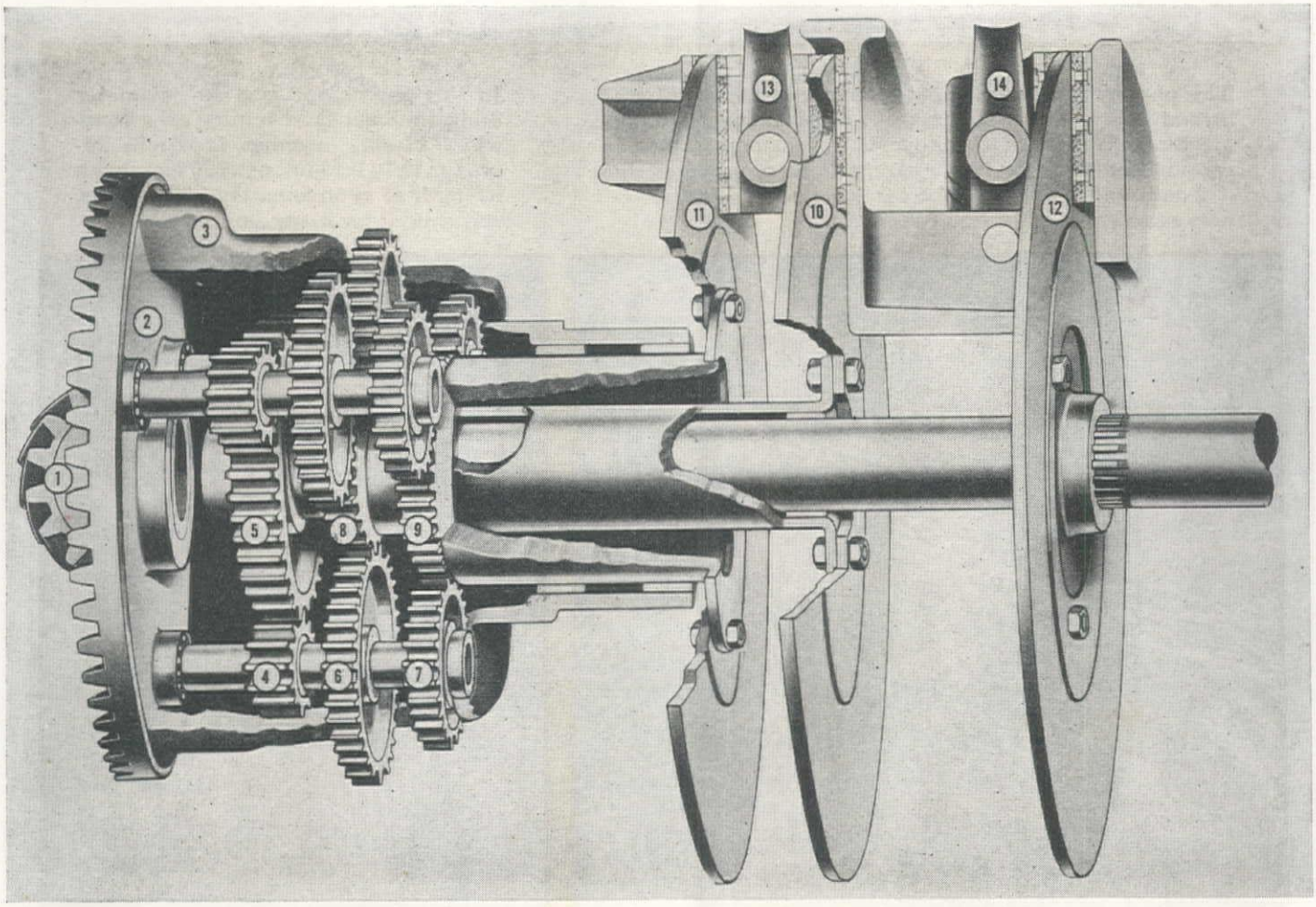


FIGURE B—Exploded rear view of the TD-24 planet power final drive assembly.

A. We have, however, added "pacing" planet gears (6) and (7) which are integral with planet gear (4) together with their respective independent sun gears (8) and (9). The only function of these pacing planet gears is to "control" the speed of the driving planet gears by means of different gear ratios. Also shown are high-speed range locking disk (10), low-speed range locking disk (11), pivot brake locking disk (12), and brakes (13) and (14).

For clarity, let us now note certain characteristics of this assembly:

1. Planet gears (4), (6) and (7) are an **integral unit** on the same shaft and therefore must rotate at the **same** speed.

2. Sun gears (8) and (9) are **not** connected to the tractor final drive shaft, but are integrally connected to locking disks (11) and (10) respectively by means of sleeves on the drive shaft.

3. The gear ratios between the three integral planet gears and their respective independent sun gears are different. The ratio between driving planet gear (4) and sun gear (5) is 12:45; between pacing planet gear (6) and high-speed range sun gear (8) is 33:24; and between pacing planet gear (7) and low-speed range sun gear (9) is 24:33.

4. Locking disk (12) is connected to the drive shaft and is used only for locking this shaft during pivot turns.

5. Locking disk shoes (13) and (14) are so controlled that **only one disk is locked at a time while the other two spin freely.**

With these characteristics in mind, operation of the planet power final drive system should become clear. Let us see what happens when we manipulate the controls that lock each disk.

"Controlled" speed

When high-speed-range locking disk (10) is held, thus stopping sun gear (8), the speed of all three planet gears must conform to that of planet gear (6) as it is carried around its locked sun gear by planet gear housing (3). As the gear ratio between planet gear (6) and high speed range sun gear (8) is 33:24, this will impart a "controlled" speed of 24/33 of a revolution on its own axis to driving planet gear (4) during each revolution of the planet gear housing assembly. As disk (11) and its connected sun gear (9) are spinning freely, they do not oppose the speed of planet gear (12).

When low-speed-range locking disk (11) is braked, thus stopping sun gear (9), the ratio between these gears, 24:33, will impart a controlled speed of 1-9/33 revolutions on its own axis to planet gear (4) for each complete revolution of planet gear housing assembly (3). Now disk (10) and sun gear (8) are spinning freely and do not oppose the speed of planet gear (6).

Note carefully that the **faster** the driving planet gear (4) is allowed to rotate on its own axis the **less** speed it imparts to sun gear (5). Thus when it is making 1-9/33 revolutions for each revolution of planet gear housing assembly (3), the tractor travels 27 per cent slower than when it is making only 24/33 revolutions.

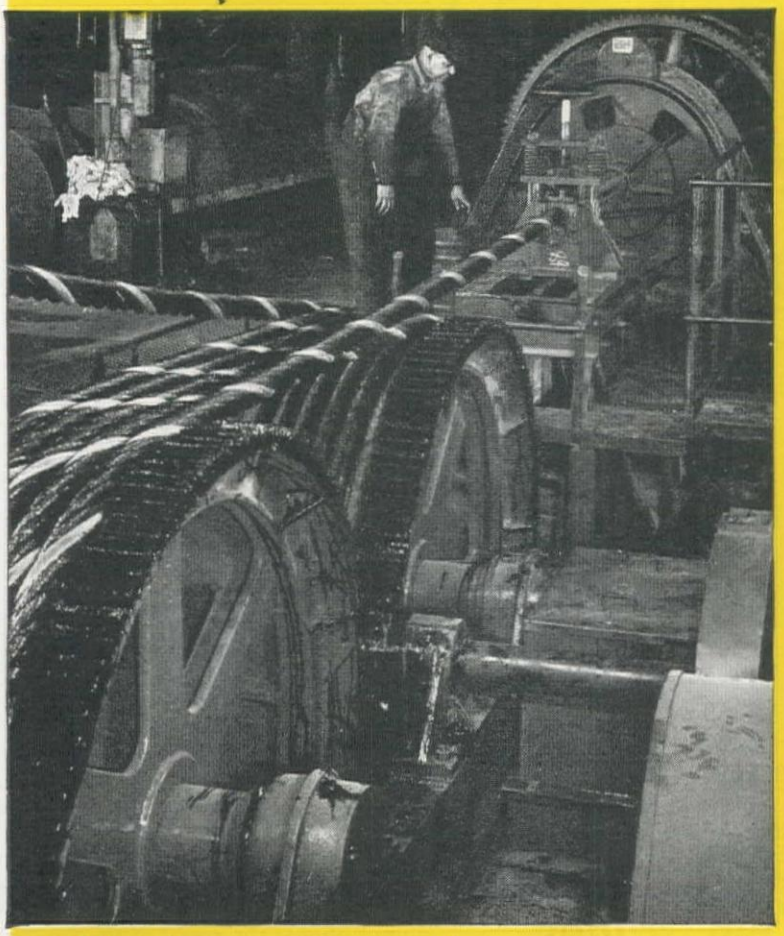
When locking disk (12) is braked, thus stopping sun gear (5), both sun gears (8) and (9) are spinning free and do not oppose the speed of their respective planet gears. In this condition, the drive shaft is locked along with its corresponding track, and all power is delivered to the opposite track.

Portal-to-Portal Pay to Construction Men Denied

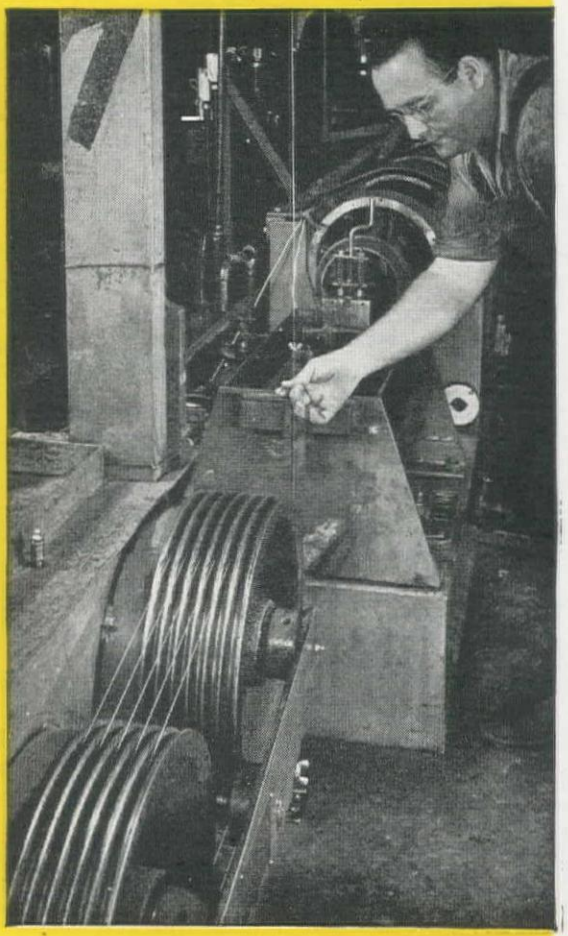
DISMISSAL of overtime wage suits, based on portal-to-portal pay claims, brought against three contractors by six wartime workers on Aleutian island air bases in Alaska, has been upheld by the 9th District Circuit Court of Appeals at San Francisco. The workers were suing for overtime and attorney fees, under terms of the Fair Labor Standards Act of 1947, for work done in 1944 and 1945. Originally, the workers had won judgment, but the employers appealed the case to the circuit court and it was remanded to Seattle. There, the employers' defense was successful.

The suits were those of H. A. Lassiter and others against the Guy F. Atkinson Co.; Vernon O. Tyler, William Leslie Cole, Owen McNally and Arthur Seusing against S. Birch & Sons, and Raymond M. Naylor against the Western Construction Co.

This photograph shows a 3⅛" diameter Monarch Whyte Strand Wire Rope coming off a Macwhyte closing machine. Weight of this rope is approximately 16.65 pounds per foot. It has a strength of approximately 392 tons and is used for the digging line on large dragline excavator with 35 cu. yd. bucket.



In this photograph is a 3/64" diameter Stainless Steel Cord coming off a Macwhyte closing machine. It weighs approximately 0.35 lbs. per 100 feet; has a strength of approximately 270 pounds, and is used for many small cord needs.



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Automatic Method for Hard-Facing

With the development of continuous high-alloy wires, the field of automatic welding has been expanded to include hard-facing—More speed, efficiency and uniformity are the results

By
H. W. SHARP
Metallurgist
Stoody Co.
Whittier, Calif.

AUTOMATIC electric welding, in extensive use for a good many years, has greatly widened the scope of welding. Until recently this process was applied primarily to the joining of steel parts in fabrication, using the conventional mild-steel and low-alloy welding wires in continuous coil form. Now, however, with the development of continuous high-alloy wires, the field of automatic welding has been enlarged to include hard-facing.

The automatic method has these distinct advantages: completely uniform deposits are continuously welded at a much higher welding speed, welding efficiency is higher since no hard-facing alloy is lost in stub ends, and deposits are far superior to the best manual welding. All these factors result, of course, in lower cost.

Best in stringer beads

Experience has shown that the automatic application is readily adapted to practically any equipment or parts on which hard-facing may be laid in a series of continuous stringer beads. This may be on a cylindrical piece where beads are placed circumferentially or on flat work where the deposit may be made as a series of straight stringer beads.

The fabricating process of making manual hard-facing alloys has been in use at the Stoody Co., Whittier, Calif., for 20 years. Automatic hard-facing wires are produced on machines which form a continuous tube from mild-steel strip; the granular or powdered-alloying ingredients are added as the strip is being formed. This fabrication method permits the production of material of higher alloy content than is possible to obtain in a conventionally drawn wire, yet retaining sufficient flexibility for coiling and unreeling during automatic welding. Most automatic electric heads now on the market will handle the tubular hard-facing wires or can by minor mechanism changes be adapted to them. Wire in tubular form permits an almost unlimited variety of alloys. Iron-base materials can be produced with alloy content as high as 60%.

Time saved, human element removed

Most of the hard-facing alloys now available as manual electrodes can be made for automatic application. One group of hard-facing wires is made with alloy content varying between 5 and 10%. These materials have hardness values ranging from 35 to 55 Rockwell C hardness. Deposits of these materials possess good abrasion resistance in combination with impact strength and are low in cost. Another group of hard-facing wires includes those containing alloys from 10 to 35%. This group of materials can be made with a high carbon content to provide excellent resistance to abrasion or they can be made with alloys which impart heat and corrosion resistance. Tungsten carbide tube-type material is also available for automatic electric application to parts subject to severe earth abrasion.

With automatic welding, manufacturers are able to produce longer wearing hard-faced parts uniformly and economically with the human element removed. At the present time there are a number of manufacturers using the process. Most notable are two of the major producers of tool joints for drill pipe. Several bands of tungsten carbide type material are applied in grooves; the welding time is a matter of 6 to 10 minutes per joint, depending upon size, and the deposit is of better quality than can be produced by the normal manual method which would require up to 30 minutes.

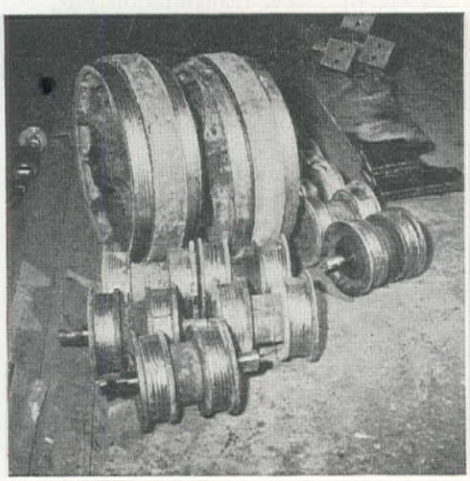
Blades and tractor rollers hard-faced for long life

One manufacturer of carrying-scraper units has standardized on automatically hard-faced blades for this equipment. Here a submerged arc deposit of medium-alloy material is applied at 800 amps and a travel speed of 15 inches per minute, resulting in a bead nearly an inch wide. With the wear-resistant overlay a medium carbon steel blade blank is suitable. Another concern producing coal augers has installed automatic equipment for welding the preformed flight to the shaft and follows the joining procedure with a bead of hard-facing applied to the outer edge of the flight with the same machine.

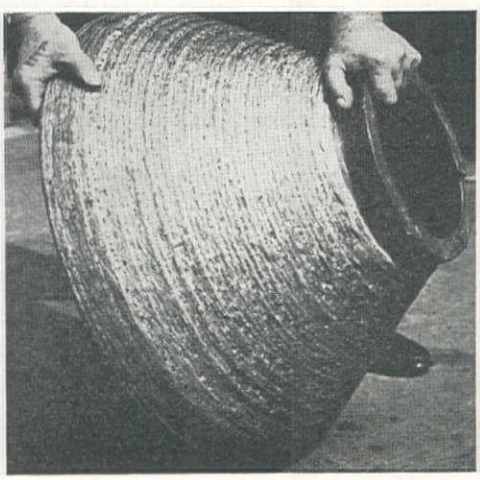
A growing number of privately owned job shops have set up automatic equipment for maintenance of construction equipment. There are now some twenty job shops equipped to handle the rebuilding of worn heavy equipment in the Western states alone.

The rebuilding of tractor rollers, manually welded for many years, was the first job shop work performed with automatic hard-facing. Rollers are of such size and shape that they are handled easily for automatic rebuilding. Tractor rollers are rebuilt to full size for usually one-half of the cost of replacement

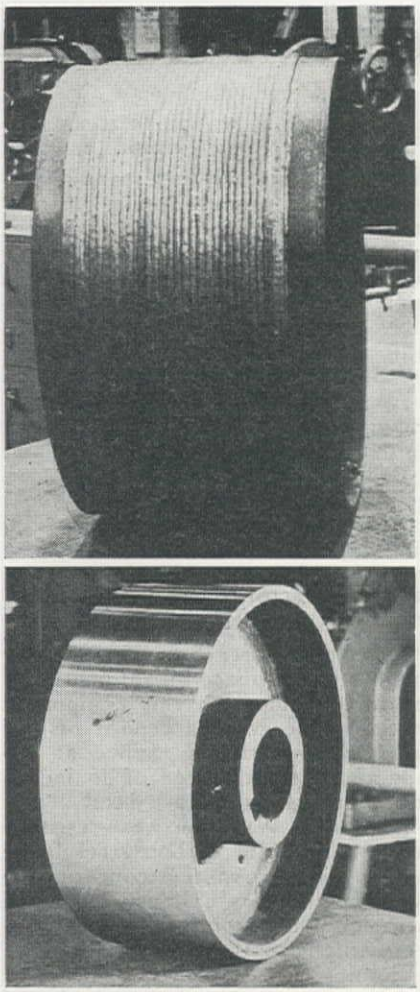
ROLLERS and idlers ready for re-assembly on a tractor after speedy automatic hard-facing.



A TWO-FOOT short head crusher cone hard-faced with 25 lb. of high-alloy automatic wire.



A FOUR-FOOT cone in the process of being hard-faced. It will require 250 lb. of metal.



MILL BRAKE drum of 24-in. diameter hard-faced, top, and after finish grinding, bottom. Some of these brake drums have been in service for over two years, and full life expectancy after hard-facing will be upwards of ten years.

parts. The life of rebuilt rollers has been two to four times the life of factory-replacement parts. Naturally the alloy metal used for reclaiming rollers is the reason for the life extension. It has been proved that hard-faced rollers definitely cause less wear on track rails.

Small cost repaid by service

The possibilities offered by the automatic method of hard-facing are tremendous. The maker of equipment, parts of which are subjected to extreme wear, can at small cost add enormously to the service life of his product. Maintenance shops of large organizations such as heavy contractors, mines, steel mills and the like can profitably install automatic heads to take care of their equipment. Job shops located in areas where there is available sufficient business to provide a reasonable volume of similar wearing parts will find the automatic head a valuable addition in providing hard-facing service for local customers.

While the automatic method is yet in the test stages in many industries, the basic advantages are well proven in view of the results already achieved. Experimental work is constantly going forward and improvements in both alloy analysis and methods of application are continually being developed.

New Work Contracted on McNary Dam Cofferdams

NOTICE to proceed with the construction work on the Oregon shore at McNary Dam on the Columbia river under the terms of a $15,835,539 contract has been issued to McNary Dam Contractors, Col. William Whipple, Walla Walla District Engineer, Corps of Engineers, announces.

The notice was sent to Guy F. Atkinson Co., Ostrander Construction Co., and J. A. Jones Construction Co., the three firms comprising the McNary Dam Contractors, in South San Francisco, Calif. It stipulates that work must start within ten calendar days after receipt of the notice and that the contract must be completed not later than May 1, 1951.

Under this contract a "junior" cofferdam will be built to enclose an area for a portion of the powerhouse excavation, the concrete substructure for two main power units, station service unit and assembly bay for the powerhouse will be erected, a portion of the Oregon shore abutment will be placed, and a "second-step" cofferdam will be constructed to provide for the final powerhouse and spillway work. It also includes temporary fishways for the passage of fish during the construction period.

Electrification Loans

. . . Continued from page 71

tion line and acquisition of 38 mi. of distribution line; and to Sierra Electric Coop., Hillsboro, $175,000, for 92 mi. of distribution line and system improvements.

North Dakota

To McLean Electric Coop., Garrison, $25,000, for farmstead wiring and purchase of electrical appliances; and to Kem Electric Coop., Linton, $1,045,000, for 670 mi. of distribution line and completion of earlier construction.

Oklahoma

To Northwestern Electric Coop., Woodward, $750,000, for 516 mi. of distribution line and 32.5 mi. of tie line; to Kiwash Electric Coop., Cordell, $260,000 for 122 mi. of distribution line, 22 mi. of tie line and a 2-way radio; to Southwest Rural Electric Assn., Tipton, $640,000, for 274 mi. of distribution line, 5 mi. of tie line and 2-way radio; and to Northfork Electric Coop., Sayre, $540,000, for 353 mi. of distribution line, 7 mi. of tie line and 2-way radio system.

Oregon

To Douglas Electric Coop., Roseburg, $170,000, for 40 mi. of line; to Benton-Lincoln Electric Coop., Corvallis, $925,000, for 84 mi. of distribution line, 16 mi. of tie line and other system improvements; to Coos-Curry Electric Coop., Coquille, $165,000, for headquarters facilities, 2-way radio system and completion of earlier work; to Eastern Oregon Electric Coop., Pendleton, $150,000, for 22 mi. of line and other system improvements; and to Blachly-Lane Coop. Electric Assn., Blachly, $250,000, for 19 mi. of 33-kv. transmission line and other improvements.

South Dakota

To Kam-Wal Electric Coop., Selby, $1,515,000, for 983 mi. of line and completion of earlier work; to Central Electric Assn., Pierre, $775,000, for 21 mi. of transmission line and 436 mi. of distribution line; to Upper Grand River Electric Assn., Lemmon, $620,000, for 3.5 mi. of transmission line, 455 mi. of distribution line and acquisition of a generating plant; and to Cherry-Todd Electric Coop., Mission, $810,000 for 20 mi. of transmission line and 491 mi. of distribution line.

Texas

Brazos River Transmission Electric Coop., Waco, $6,480,000, for two 11,500-kw. steam generating units for its Oak Charter plant near Belton, 11 new substations, 211 mi. of transmission line, and general improvements; to McLennan County Electric Coop., McGregor, $335,000, for 160 mi. of distribution line, 46 mi. of tie line and 2-way radio system; to Grayson-Collin Electric Coop., Van Allstyne, $245,000, for 168 mi. of line; to Coleman County Electric Coop., Coleman, $46,000, for headquarters facilities; to Lone Wolf Electric Coop., Colorado City, $28,000, for headquarters facilities; to Magic Valley Electric Coop., Mercedes, $385,000, for 155 mi. of distribution line, 28 mi. of tie line and headquarters facilities; to Concho Valley Electric Coop., Inc., San Angelo, $285,000, for 164 mi. of distribution line, 15 mi. of tie line and 2-way radio system; to Greenbelt Electric Coop., Wellington, $80,000, for 57 mi. of line and additions to the radio system; to Erath County Electric Coop. Assn., Stevenville, $1,080,000, for 444 mi. of distribution line, 128 mi. of tie line and 2-way radio system; and to Jackson Electric Coop., LaWard, $350,000, for 183 mi. of line and system improvements.

Washington

To Lincoln Electric Coop., Davenport, $168,000, for headquarters facilities and system improvements; to Douglas County P. U. D. No. 1, Bridgeport, $2,318,000, for acquisition of 50 mi. of 33-kv. transmission line and 82 mi. of distribution line from Puget Sound Light & Power Co., and construction of 36 mi. of 33-kv. transmission line, 265 mi. of distribution line and other system improvements; to Benton Rural Electric Assn., Inc., Prosser, $375,000, for 80 mi. of line and other system improvements; and to Nespelem Valley Electric Coop., Nespelem, $170,000, for completion of previously improved construction.

Wyoming

To Wyrulec Co., Lingle, $585,000, for 206 mi. of 33-kv. transmission line and 9 mi. of tie line; and to Sheridan-Johnson Rural Electrification Assn., Sheridan, $670,000, for acquisition of 10 mi. of distribution line in Big Horn and construction of 38 mi. of 34.5-kv. transmission line, and 234 mi. of distribution line.

NEWS OF WESTERN CONSTRUCTION

SEPTEMBER 15, 1949

Bids Called for $21,000,000 Lucky Peak Dam Job in Idaho

FIRST construction work on the $21,000,000 Lucky Peak flood control and irrigation dam on the Boise River, approximately 10 mi. southeast of Boise, Ida., was advertised for bids August 19. The work advertised includes excavation of an inlet channel, intake structure, and installation of concrete and steel tunnel lining for 1,200 linear feet of the 23-ft. diameter tunnel.

Excavation will total an estimated 176,000 cu. yd. It is estimated that 1,264,000 lb. of ½-in. steel liner and 670,000 lb. of ¾-in. steel liner will be required for the tunnel. Also required will be 326,000 lb. of structural steel tunnel liner stiffeners and 100,000 lb. of structural steel for tunnel bracing. Concrete tunnel lining is estimated at 6,000 cu. yd. and a concrete transition section at 1,580 cu. yd.

The contract will be awarded as a whole to one bidder and 365 days will be allowed for completion. Prospective date for opening bids is October 5 at 2 p.m.

The Lucky Peak project will consist of an earth fill dam 1,730 ft. long at the top and having a height of 318 ft. from foundation to crest. Height from tailwater to normal pool level will be 243 ft. There will be a gate control spillway with a maximum capacity of 125,000 cu. ft. per sec. The reservoir will extend upstream 13 mi., will have a usable flood control storage of 280,000 ac. ft., and will cover about 2,850 ac. at normal pool level.

The Lucky Peak project was authorized for flood control, but as a result of cooperative studies by the Corps of Engineers and the Bureau of Reclamation a multiple purpose plan has been developed. Under this plan Lucky Peak will be operated together with Anderson Ranch and Arrowrock dams and will store 280,000 ac. ft. of water which can be used when necessary for irrigation as well as its flood control benefits. It will require about three years to complete the entire project.

Nevada License Board Warns Out-of-Staters

TANGIBLE WARNING that California contractors will get into trouble if they bid and operate on jobs in Nevada without first being licensed by the Nevada State Contractors Board was given last month when the Collins Electric Co. of Stockton, Calif., was fined $300 for engaging in electric work on the new

HUNGRY HORSE DAM — THIRD, FOURTH OR FIFTH? DEPTH of excavation in the crushed rock of a fault zone will determine whether the Bureau of Reclamation's Hungry Horse Dam in Montana will be the world's 3rd, 4th or 5th highest concrete dam. At left, jackhammer operators drill in the fault zone prior to blasting. Right, the left keyway for the dam up the steep canyon wall of the South Fork of the Flathead River forms a backdrop for loading of excavated rock. General-Shea-Morrison is rushing completion of plant facilities to permit first placement of concrete in the 3,000,000-cu. yd. dam in September.

Reno high school building and operating without the license. According to Edward L. Pine, Secretary of the Nevada license board, three large California contracting firms have violated this law within recent weeks.

W. T. Hargrove, inspector for the Nevada licensing board, filed the complaint, and William Legg, foreman on the high school project for the Collins company, pleaded guilty in behalf of the firm.

Land Subsidence Results in Long Beach Shipyard Lay-Off

THE NAVAL Shipyard, Long Beach, Calif., currently employing about 5,800 persons, is to be inactivated as rapidly as feasible, the Navy has announced. Work planned for the yard, but not yet in hand, will be distributed to other shipyards in the Pacific area.

Approximately 400 employees will ultimately be retained at the Long Beach yard for maintenance, preservation, and security.

For several years, the Long Beach Naval Shipyard and adjacent commercial properties have been faced with a serious subsidence problem. It is believed that the removal of oil from beneath the area has caused the land upon which the yard is built to sink. The rate of sinkage is now about one foot a year. Thorough studies by the Navy Department have failed to provide a gage for the future rate of subsidence or its ultimate magnitude.

In order to protect the Government's investment, bulkheads costing approximately $4,500,000 will have to be constructed around the docks and piers to keep the sea from flooding the area. These bulkheads cause a reduction in the efficiency of operations at the yard.

$70,000,000 Approved For Utah Reclamation

APPROVAL for the $70,000,000 Weber Basin reclamation project in Utah came on Aug. 29 when President Truman signed his name to a legislative bill authorizing the project. Under discussion for the last ten years, the project will consist of enlargement of the Pine View Reservoir on the Ogden River, construction of the Perdue Reservoir on the Weber River and construction of an aqueduct down Weber Canyon to carry culinary water as far south as Bountiful.

Bid Advertisements Set for Major Reclamation Projects

THE BUREAU of Reclamation has announced a number of projects upon which bids are to be advertised in succeeding weeks. All types of construction work will be involved. The principal projects and the approximate dates of advertisement for bids are as follows:

Sept. 15: Construction of 3 reinforced concrete pumping plants with all accessories and water and sewage systems, on the Wellton-Mohawk canal, about 20 mi. east of Yuma, Ariz.; reconstruction of 2.7 mi. of highway along the west side of Granby reservoir near Grand Lake, Colo.; reconstruction of 3.7 mi. of main canal on the Fort Sumner Project north of Fort Sumner, New Mex.; construction of 30 residences with utilities at Lindsay, Calif., 24 residences with utilities at Cachuma dam site near Goleta, Calif., residences, laboratory and garages near Cambridge, Neb., and a residence and utilities at Heart Butte dam near Glen Ullin, N. Dak.

Sept. 16: Construction of 70 mi. of 115-kv. wood pole transmission line from Brush to Limon, Colo.; construction of a 1,500-kva. capacity substation at Lusk, Wyo.; construction of concrete footings for the Roza switchyard near Yakima, Wash.

Sept. 26: Placing 10,000 sq. yd. of buried asphaltic membrane lining on the main canal of the Deschutes Project near Bend, Ore.; and construction of 16 residences at Boulder City, Nev.

Other invitations to be issued within the next two months, but for which definite dates have not yet been assigned, include: the 6.5 mi. Tecolote tunnel and 1.8 mi. of access road near Goleta, Calif.; Keyhole dam, an earthfill structure 109 ft. high and 3,300 ft. long on the Belle Fourche River 18 mi. N.E. of Moorcroft, Wyo.; a 26-mi. concrete pipe distribution system from the Friant-Kern canal near Delano, Calif.; installation of motors, pumps, etc. at the Granby pumping plant near Grand Lake, Colo.; and installing equipment at the water treatment plant at Boulder City, Nev.

Canals to be advertised in the next two months include: 17 mi. of 2,500-cfs. concrete canal about 4 mi. south of McFarland, Calif.; 15.5 mi. of 3,100-cfs. concrete canal near Quincy, Wash.; 13 mi. of 3,800-cfs. canal and 3.3 mi. of 2,000-cfs. concrete wasteway near Wheeler, Wash.; 8 mi. of the Delta-Mendota canal near Oro Loma, Calif.; 5 mi. of 1,500-cfs. canal near Fort Collins, Colo.; a section of the Fire Mountain canal near Somerset, Colo.; and 9.5 mi. of 1,300-cfs. concrete canal and relocation of 4.5 mi. of county road about 12 mi. east of Yuma, Ariz.

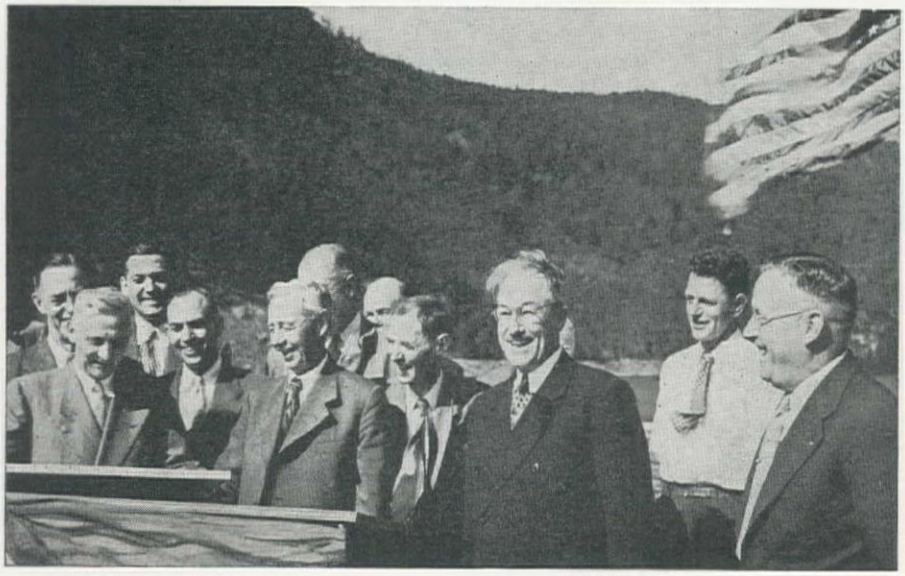
Electrical facilities soon to be constructed include: 42 mi. of 115-kv. wood pole transmission line between Kremmling and Oak Creek, Colo.; 41 mi. of 69-kv. wood pole line near Bismarck, N. Dak.; 19.3 mi. of 230-kv. steel tower transmission line near Perkins, Calif.; 5 mi. of 115-kv. wood pole line near Loveland, Colo.; 31 mi. of 115-kv. wood pole line from Estes Park to Longmont, Colo.; Coolidge substation, 132,000-kva. capacity near Coolidge, Ariz.; and a 60,000-kva. capacity substation at Mesa, Ariz.

Other projects for the near future include: relocation of 6.5 mi. of county road, including a 400-ft. bridge near O'Sullivan dam, Wash.; recreational facilities at Cambridge and Enders, Neb.; drilling of 7 irrigation wells about 12 mi. north of Rupert, Idaho; installation of water lines and a sprinkling system at Boulder City, Nev.; clearing of the Shadehill reservoir site 15 mi. south of Lemmon, S. Dak.; 18 dwellings at Parker dam, Calif.; 4 residences at Needles, Calif., and buildings at Trenton, Neb. and Boulder City, Nev.; and installation of a Ventura meter, 75 in. in diameter, near Ogden, Utah.

Bid calls previously announced but now postponed include construction of Moorhead earthfill dam, near Moorhead, Mont., and stringing conductors on 238 mi. of transmission line from Davis Dam to Prescott and Mesa, Ariz.

COMPLETION OF SEATTLE'S ROSS DAM CELEBRATED ATOP STRUCTURE

SEATTLE City Light's Ross Dam was accepted from General-Shea-Morrison Aug. 18 with an impressive ceremony atop the dam. Among those participating, with faces visible in this picture, were, left to right: J. B. CAIN, Seattle Bldg. Superintendent; THOMAS ORME, project manager for G-S-M; E. LEE, General Electric Co.; R. W. FINKE, Seattle City Engineer; CHESTER MORSE, Seattle Water Dept. Superintendent; HERBERT FAULKNER, resident engineer during most of the construction; E. R. HOFFMAN, City Light Superintendent, and C. TYLER and P. C. SPOWART.



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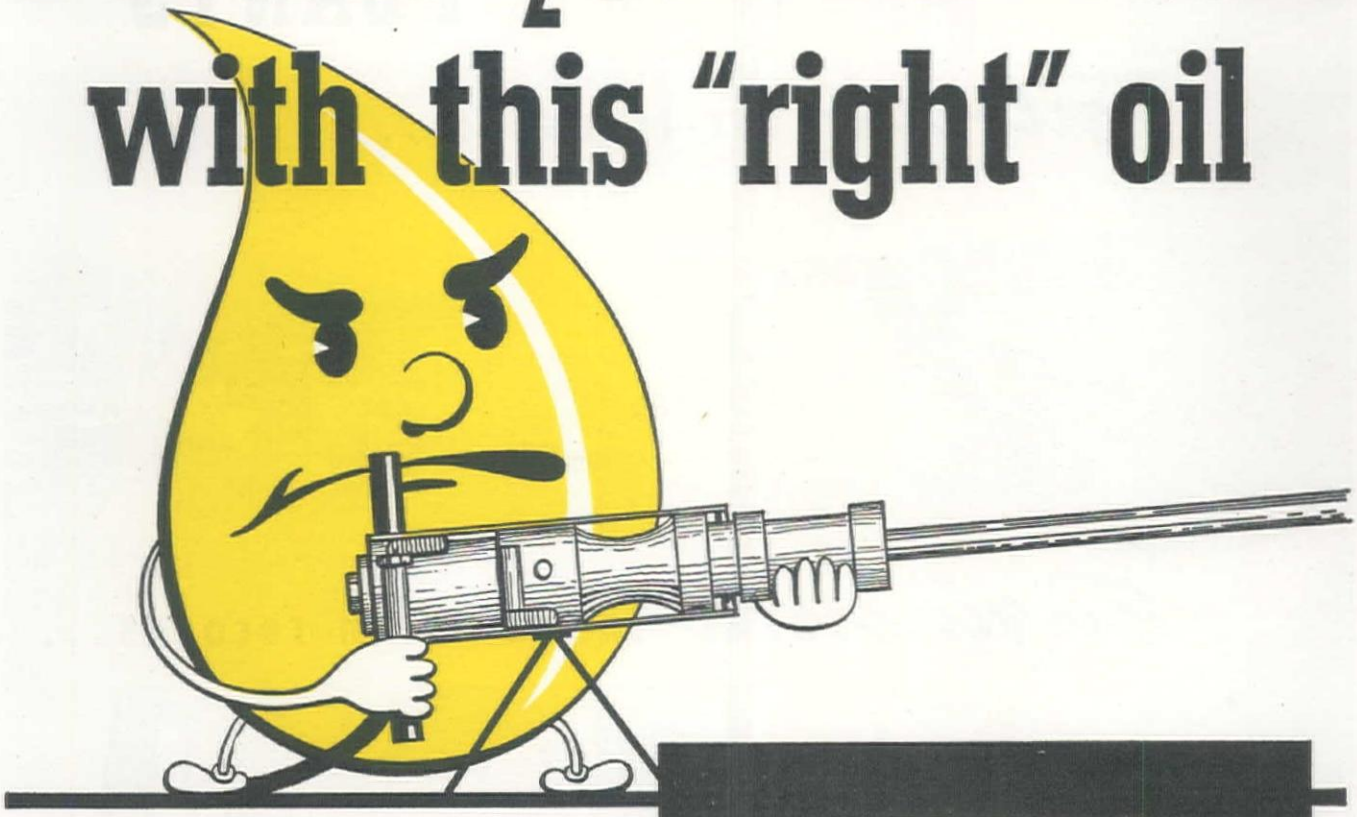

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✓ **EXTRA ADHESIVE** to string out over fast-moving surfaces . . . to stay on the job and keep oil consumption down

✓ **AN EXTREME PRESSURE** lubricant, with the tough body and high film strength to guard against surface scoring at all times

✓ **READILY EMULSIFIABLE,** so that it won't be washed away by moisture entering the tool through the air line. That's another assurance of *constant* lubrication. And a safeguard against rust formation, too

Shell makes Trochus Oil in 3 grades, to cover the whole field of pneumatic tool lubrication. Let your Shell representative prescribe the proper grade or grades for your use. You can't get a finer oil.

SHELL TROCHUS OIL

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FOR ALL PNEUMATIC TOOLS

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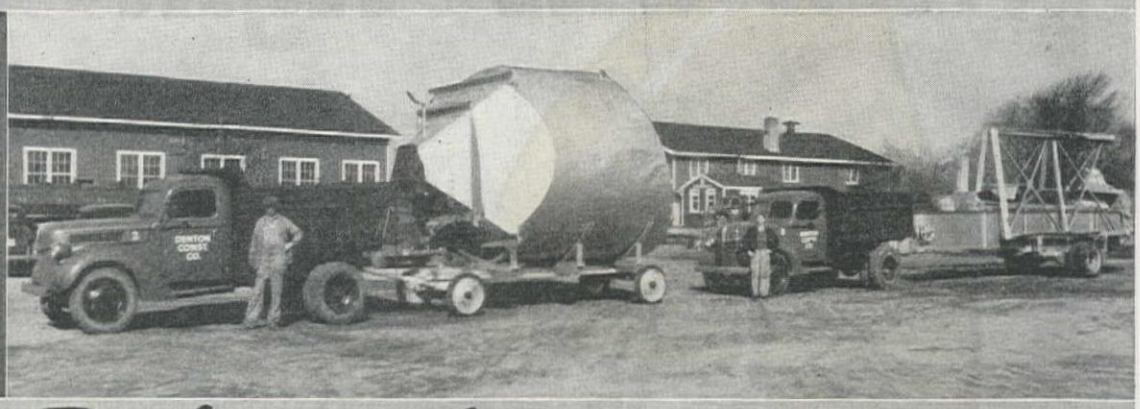
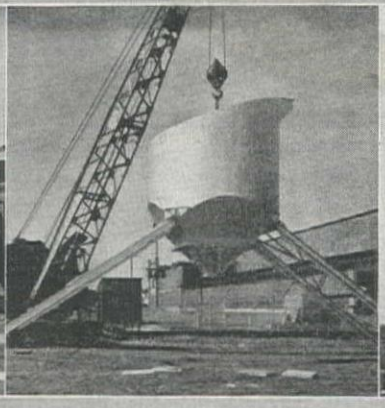


Engineered for erection records...



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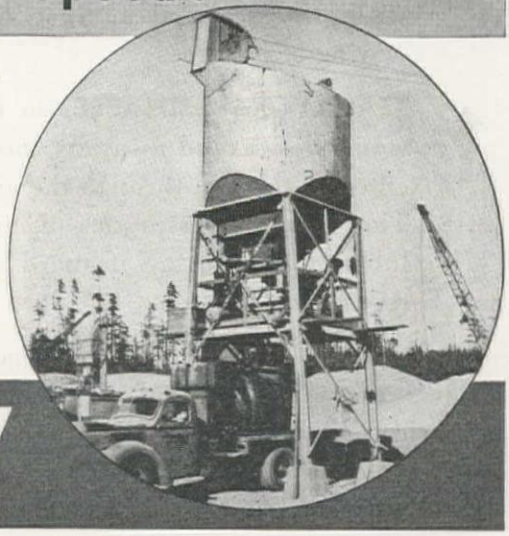
There's the story! That's why the country's foremost contractors "buy BUTLER" year after year. That's why BUTLER equipment is playing such a leading part in the great national highway construction program. The secret, of course, is **BUTLER** ***Engineered Design.***



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PERSONALLY SPEAKING

C. E. Stahl, Montana State Highway Engineer, reorganized the Montana State Highway Department effective last month. Eleven highway administrative districts were abolished and replaced by eleven maintenance districts. In addition, there are now five division headquarters. Thus, instead of eleven district and eleven resident engineers, there are now eleven maintenance engineers and five division engineers. All maintenance is now directed by State Maintenance Engineer **Ray Percy.** Under him there are the following district maintenance engineers: **Don De Vore** at Great Falls; **Joseph Mulligan** in Butte; **L. R. Sampson** in Billings; **Bruce Randall** at Wolf Point; **H. H. Kuphal** in Missoula; **Fred Wells** in Kalispell; **Herbert Price** in Havre; **Oscar Ostenson** in Miles City; **A. E. Harcharik** in Lewistown; **George Barrett** in Bozeman, and **W. K. Brittain** in Glendive. **George Poore** of Helena was named as Assistant State Highway Engineer for engineering phases, and **W. O. Whipps** of Helena was named Assistant State Highway Engineer for the administrative phases. Under the reorganization plan, some divisions are combined into one administrative unit. **Pete Spurzem** in Kalispell heads the Kalispell-Missoula division; the Butte-Bozeman division is headed by **Fred Quinnell** in Butte; Havre-Great Falls by **Alec Middleton** in Havre; Lewistown-Billings division by **Jack McGhee** in Lewistown, and the Miles City-Glendive-Wolf Point division by **Frank Small** of Bozeman in Glendive. **Martin Powers** of Helena becomes Assistant Maintenance Engineer with headquarters in Helena. **L. F. Schuknecht** is the newly-appointed supervisor of plant and equipment for the entire department. **Ray Kuhns** of Helena is taking a one-year leave of absence as construction engineer, and he has been replaced by **E. B. Martin,** formerly district engineer at Billings. **Cliff Thompson,** formerly district engineer of the Great Falls district, has been transferred to Helena as reconnaissance engineer in the preconstruction phase of highway work.

ARVIN S. WELLBORN, engineer with the Navy Department, Bureau of Yards and Docks, is the new Managing Engineer of the Pacific Coast Division of the Asphalt Institute. He replaces W. A. BUGGE, who resigned to become Washington State Highway Director.

* * *

FRICKSTAD

Walter N. Frickstad, city engineer of Oakland, Calif., for the past 19 years, retired from that office Sept. 1. Under provisions of the Oakland City Charter, Frickstad was required to retire from his position of Superintendent of Streets and Ex-Officio City Engineer when he reached the age of 70. Before accepting the position at Oakland, he spent 11 years with the Bureau of Public Roads in the San Francisco office. Frickstad has participated in some of the greatest developments in Oakland's history. He was in charge of the expenditure of two-thirds of a 1945 $15,000,000 bond issue for street improvements and sewerage, and he was instrumental in bringing together Metropolitan Oakland cities on the project to eliminate pollution along their waterfront and the Oakland Estuary. Work is now under way on this project, directed by the East Bay Municipal Utility District and financed by a $21,000,000 bond issue. He is a life member of the American Society of Civil Engineers, as well as many other civic and engineering organizations.

* * *

Allan C. Johnson, assistant to the president of Vermilya-Brown Co., builders of New York City, has been named director of the engineering and construction division for the projected $500,000,000 nuclear reactor testing station at Arco, Idaho. Bid calls for the first major work on this project are expected to be issued late this fall.

* * *

John C. Oliver, former assistant city engineer, has been appointed chief engineer for the City of Vancouver, B. C. He succeeds **Charles A. Battershill** who was dismissed following months of rumored discontent in the engineer's department.

* * *

William J. Bobisch, Professor of Civil and Structural Engineering at the California Institute of Technology, and **Charles P. Morgan,** until recently superintendent of the Long Beach Department of Building and Safety, have opened offices at 608 F & M Bldg., 320 Pine Ave., Long Beach, Calif., as consulting engineers.

* * *

Sam G. Neff, recently of the Corps of Engineers, Denver District, became Executive Officer of the Walla Walla, Wash., District, Aug. 1, replacing **Lt. Col. Vincent C. Frisby,** who has been assigned to the Operations Division to have charge of all utilities relocation in the Walla Walla District. A large portion of Frisby's work will be in connection with the railroad and highway relocation made necessary by the building of McNary Dam. Neff, who has been with the Corps of Engineers for 20 years, served as an officer in World War II and was retired with the rank of Colonel. He transferred from Denver to Walla Walla on July 1.

NEFF

FRISBY

* * *

ITSCHNER

Colonel Emerson C. Itschner assumed the duties of District Engineer, Seattle District, Corps of Engineers, last month. Colonel Itschner has served since May, 1946, as Chief of Construction, Operations Division of Military Construction in the Office of the Chief of Engineers, Washington, D. C.

* * *

The Upper Colorado Basin Commission, chartered by ratification of the Upper Colorado River Basin Compact, met last month and chose a vice-chairman and two committees to carry out the organization routine. As previously announced, **Harry W. Bashore** of Mitchell, Neb., was named chairman of the committee. **Judge Clifford H. Stone** of Denver, Colo., was chosen vice-chairman. Named to the by-laws committee were **Clinton D. Vernon,** Utah; **Fred E. Wilson,** New Mexico; **Jean S. Breitenstein,** Colorado; **Norman Gray,** Wy-

oming, and **J. G. Will** of the Bureau of Reclamation. Members of the committee that will prepare a suggested operation program are **C. O. Roskelley,** Utah; **Earl Lloyd,** Wyoming; **John R. Erickson,** New Mexico; **Frank C. Merrill,** Colorado, and **John R. Riter,** Bureau of Reclamation. September 19 was set for the next meeting of the Commission to take place at Grand Junction, Colo.

* * *

TANDY

Colonel Fremont S. Tandy last month assumed his new duties as District Engineer of the San Francisco District, Corps of Engineers, immediately upon his arrival from active service in Panama. Colonel Tandy saw active combat service in France during the last war, serving with the 20th Corps—the famous "Ghost Corps"—of the Third Army commanded by General Patton. During the rapid advance of Patton's Army across France, Colonel Tandy was the Engineer responsible for all major bridging operations of the 20th Corps, including the Aisne Bridge at Chartres, the Seine at Fontainbleau, the Marne at Espernay, the Meuse at Verdun and the Moselle at Metz. He now completes three years of service in Latin America, where he organized and put into operation the Inter-American Geodetic Survey.

* * *

BYRNE

Wayne S. Byrne has transferred from the position of Construction Engineer in charge of construction work on Bonny Dam on the South Fork of the Republican River in eastern Colorado to become Liaison Engineer with the Bureau of Reclamation in the Office of the Chief Engineer at Denver, Colo. There he will carry out the technical supervision of projects under construction in the Bureau's Regions 4 and 7, covering construction now in progress on the Republican and Smoky Hill Basins; the North and South Platte Basins; the Colorado-Big Thompson Project and other projects in Colorado and Utah. Byrne has been with the Bureau for 16 years, and was formerly Construction Engineer on the W. C. Austin Project near Altus, Okla.

* * *

J. Swain, County Engineer of Asotin County, Wash., for more than 40 years, has asked for retirement on Jan. 1 to go into private practice.

* * *

Professor **Harold B. Gotaas** succeeds Professor **Bruce Jameyson** as Chairman of the Civil Engineering Division of the University of California at Berkeley.

* * *

McNEIL

Joseph A. McNeil, general contractor of Los Angeles, is the new chairman of the Contractors State License Board after four years of service on the Board. He succeeds **Cedric Roberts. Roy M. Butcher,** electrical contractor of San Jose, was named vice-chairman. Registrar **E. E. Zeiss** remains as executive secretary.

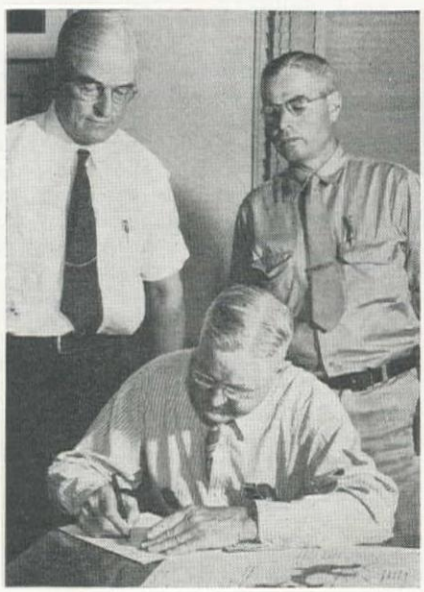
* * *

Colonel Samuel N. Karrick, in charge of the San Francisco District for the Corps of Engineers as District Engineer for the past 2½ years, retired last month from actitve duty. He will establish a consulting engineer office in San Francisco. Colonel Karrick leaves active duty after 32 years of service. During his varied career, he directed construction of the tunnels on Corregidor in the Philippines, roads on Bataan, large Army bases at Milne Bay and Biak Island in the Pacific, and commanded 100 Engineer troop organizations in the Manila area. He has served as District Engineer for the Baltimore District, the Chicago District and the Manila District.

* * *

Three Bureau of Reclamation employees have received cash awards from the Department of Interior for developing money-saving equipment and methods for the Bureau's Columbia Basin Project. Those honored are **James E. Motsenbocker, H. W. Laurance** and **W. I. Morgan.** Motsenbocker developed techniques for placing concrete around the large hydroelectric generators at Grand Coulee Dam. Laurance devised a special meter to measure the consistency of concrete to insure a uniform mixture. Morgan suggested use of a special check valve on drainage hose used in operating drum gates which control the flow of water over Grand Coulee and other dams. The device prevents accidental movement of the gate if equipment fails to function correctly.

W. I. MORGAN, seated, and J. E. MOTSENBOCKER, right, authors of money-saving ideas, with U. S. B. R. District Manager F. A. BANKS.



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Walter E. Blomgren, Assistant Director of the Bureau of Reclamation's Region 7, is soon to be appointed Assistant Chief Engineer for the entire Bureau and will serve under the Bureau's Chief Engineer, **L. N. McClellan,** at the Denver headquarters. Blomgren has been with the Bureau intermittently since 1909 and continuously since 1929. In 1920, he was a designing engineer with A. J. Wylie, Idaho consulting engineer. Again with the Bureau in 1929, he had charge of designs, estimates and reports for several large dams, including Shasta and Davis. He was appointed assistant regional director of Region 7 in May, 1947. His new appointment was approved last month at a meeting of Bureau of Reclamation regional directors at Boulder City, Nev., but will not be formally announced until civil service papers are cleared.

* * *

LUPLOW

Colonel W. D. Luplow, for the last three years Assistant Chief of Engineers for Military Operations at the Office of the Chief of Engineers in Washington, D. C., is now District Engineer, Los Angeles District. During the last war, he served in the European Theater of Operations.

* * *

Freeman H. Cushman, Senior Highway Engineer for the California Division of Highways, retired July 31 after 27 years of state service. From 1910 to 1920, he was Assistant Engineer for the City of Tacoma, Washington, and during World War I was a Captain in the Army Engineers Corps. After a term of service as field engineer for the Portland Cement Concrete Association, he entered the California Division of Highways as a staff engineer where he remained until his retirement. He was one of the originators of the present Stores Department of the Division, organized in 1947.

* * *

Walter Luney, head of Luney Bros. & Hamilton, Ltd., has been elected President of the Victoria Building Industries Exchange, Victoria, B. C. He succeeds **George H. Wheaton,** who has served for the past two years.

* * *

Correcting an error made last month, **Stanley B. Roscoe** became city engineer July 11 of Eureka, which is in California and not Oregon.

OBITUARIES . . .

Charles Alton Ellis, 74, who worked with the Strauss Engineering Corp. of Chicago on design of San Francisco's Golden Gate Bridge, died Aug. 22. Durhis career he was vice-president of the Strauss firm, was with the American Bridge Co., and was a private consulting engineer.

* * *

Howard M. Hunt, 65, Assistant Division Engineer for Engineering of the Bureau of Community Facilities, San Francisco, died Aug. 21. He came to California in 1923 and had been associated with the equipment and construction business since that time. He was Chief of the Building Department of Huntington Park, and was identified closely with earthquake damage repair in Southern California in 1933. He also did much of the engineering work after the earthquake in the Imperial Valley in 1938.

* * *

W. J. Scofield, 65, former Office Engineer for the U. S. Bureau of Public Roads at Portland, Ore., died Aug. 11.

* * *

Leo W. Barclay, 56, Public Relations Director of the Los Angeles Department of Water and Power, died last month.

* * *

F. Howard Crowell, 82, retired general contractor of Denver, Colo., died Aug. 4. He participated in the building of a number of major buildings in the Denver area.

* * *

John W. Howard, 67, building contractor of Cheyenne, Wyo., died Aug. 4. His firm erected several of Cheyenne's largest and best known structures.

* * *

C. M. Cheatham, retired contractor of Spokane, Wash., died last month.

* * *

John Nicholas Nelson, 75, retired civil engineer of Los Angeles, died Aug. 7.

* * *

Thomas William Hart, 83, retired building contractor of Los Angeles, died Aug. 8.

* * *

Thomas Burnette, 68, building contractor and founder of the firm of Burnette-Garke in Wenatchee, Wash., died last month.

* * *

Edward Lambert Williams, 72, civil engineer at Baker, Ore., died July 30.

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Jesse J. Kiler, 72, retired civil engineer of Los Angeles, died Aug. 10.

* * *

Two brothers were killed on the Hungry Horse Project in Montana on Aug. 10. The dead are **Wilbur H. Garnett,** 44, carpenter and foreman, and **George H. Garnett,** 36, carpenter. The victims fell 40 feet when a belt conveyor collapsed.

It's the pressure at the tool that counts!

The cooler air discharged from Gardner-Denver Two-Stage, Water-Cooled Portables has less heat to lose on the way to the tool. Therefore — in accordance with basic laws of physics — the air loses less of its pressure along the way. It reaches the tool at a higher pressure, and this vigorous air pressure lets every tool work at full capacity — full speed — full efficiency.

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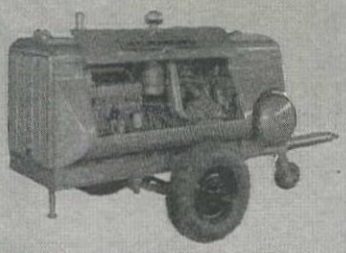
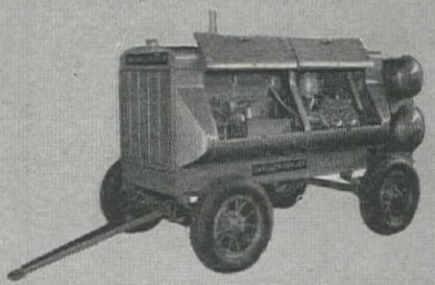
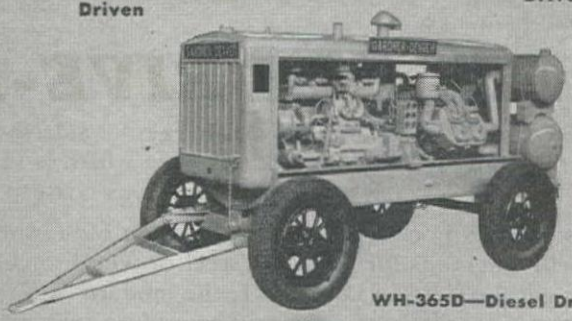


WH-105—Gasoline or Diesel Driven

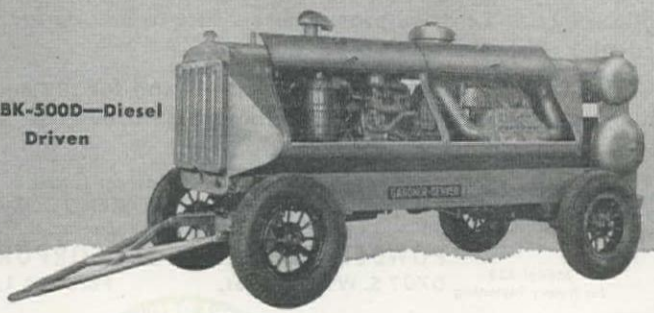


WH-315—Gasoline or Diesel Driven



WH-365D—Diesel Driven

WH-420D—Diesel Driven



WBK-500D—Diesel Driven

NEW Gardner-Denver Quality in a 60 cubic foot compressor

ADO-60—Utility Portable Air Compressor

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SUPERVISING THE JOBS

R. I. "Pop" Gunn is the superintendent and **Orval Smith** is assistant superintendent for Swinerton & Walberg, San Francisco, general contractors for construction of the $21,000,000 plant for Fibreboard Products, Inc., at East Antioch, Calif. General foremen are **Caesar Osburn** and **Joseph Johnson.** Carpenter foremen are **George Petko, Fred Copeland, Howard Viera** and **John Spencer. Howard Madden** is cement foreman. **Paul Collop** is millwright superintendent, and **William Rich** is his assistant. Millwright foremen are **Chas. Boyer, G. W. Swanberg** and **Charles Willett. Herbert Henderson** is general labor foreman, and labor foremen include **Ora Graham, Wilbur Shook, Abel Brown,** and **Roland Haddox. R. P. Willis** is the job office manager. **Al Ferreira** is superintendent on the job for **James A. Nelson,** subcontractor for heating and plumbing installations. **S. B. Jessup** is superintendent for Pacific Electrical & Mechanical and Fishback & Moore, electrical subcontractors. Moore Dry Dock Co. is handling the structural steel work and **Al Berger** is their general foreman. On boiler installation by C. C. Moore & Co., **Al Smith** is the general foreman. On machine installation by Black & Clausen, **Al Krutschevski** is in charge. On steel tank erection by Consolidated Western Pipe & Steel, **Ed P. Murphy** is general foreman. On reinforcing steel work by Soule Steel Co., **Ed Morrow** is general foreman. On miscellaneous iron work by Pacific Iron Co., **Art Pollard** is general foreman and key men are **D. R. Fraser** and **W. R. Kumero.** On structural steel work by Judson Pacific & Murphy Corp., **Arthur Scott** is general foreman, and **William D. Hubbard** is foreman. For Martinez Sheet Metal, **Charles N. Wade** is general foreman.

* * *

Thomas H. Paul is the district manager and **Keith C. Wasson** is general superintendent for Peter Kiewit Sons' Co., Porterville, Calif., on their contract for construction of the Friant-Kern Canal from Lindsay, Calif., to the White River. **J. W. Lowe, Jr.,** is the project engineer, **W. W. White** is structures superintendent, and **Jim Garver** is grading superintendent. **Walt Powers** is master mechanic. **A. L. Ellis** is the job office manager, **Ken West** is job accountant, and **Jim Bett** is office engineer. **Jim Ward** is assistant structures superintendent, and **Tom Powell** is steel foreman. General foremen are **E. R. "Red" Fyler, W. E. Morgan, M. R. Miller** and **Fred Scales.** Grading foremen are **C. R. Fowler, G. O. Walker** and **D. E. Wiginton. S. J. "Sailor" Hamby** is shop foreman. **Chester Corbly** is truck foreman, **L. E. Smith** is concrete foreman, **Jimmy Davis** is rigger foreman, **Frank Crowder** is night trimmer foreman, **C. B. Smith** is carpenter foreman, **Leo Morgan** is concrete foreman, **A. J. "Art" Cummings** is carpenter foreman, **R. H. McKinney** is structures foreman, and carpenter foremen include **A. C. Jones, L. H. Adams** and **G. F. Young.**

* * *

Roy Phillips is superintendent for Alex Robertson Co., Clearwater, Calif., on the contract for construction of the Auxiliary Loop to the Texas Big-Inch gas line, a 30-in. feeder that will run from Puente, Calif., to Inglewood. Spread foremen are **Howard Beasley** and **Ted Drewry. Walt Rensder** is the job office engineer. Temporary paving on the project has been let in a subcontract to **Guy J. Payne,** contractor of Los Angeles, and is under the supervision of **C. H. "Chuck" Jorgensen.** The permanent paving has also been awarded to the Payne firm, and foremen on this part of the project are **George Feldmiller** and **Gene Bruce.**

* * *

S. O. Ponath is project manager for McLaughlin, Inc., on their $1,755,150 contract for construction on Glenn Highway, Section B1, consisting of grading and bituminous surfacing near Palmer, Alaska, the job being sponsored by the Alaska Road Commission of the Department of the Interior. **Leon R. Reiter** is general foreman of the job, and **M. F. Lund** is job office manager.

* * *

Fred Chisholm is superintendent and **Charlie Corson** is project manager for **Elmer Johnson,** utility contractor, on construction of a sewer system and treatment plant for the City of Harlem, Mont., at a cost of $150,000. Foremen on the job are **Julius Strompro, E. Sillamp** and **Harold Christensen.** On construction of a sewer and water system at Fort Peck, Mont., by the same firm, **Olaf Overlamp** is superintendent and **Roy Johnson** is acting as project manager. **Don Bertz** is foreman on pipe installation and **Jake Swigert** is foreman on excavation.

* * *

On construction of the $10,301,653 Bonny Dam near Hale, Calif., a Bureau of Reclamation project, **James D. Fogg** is the project manager and **Robert G. Davidson** is general superintendent for the Utah Construction Co., San Francisco. **C. Ptacek** and **A. H. Rahn** are the assistant general superintendents. **J. F. McCreight** is the project engineer, **L. F. McCulla** is master mechanic and **H. O. Dixon** is office manager. Foremen include the following: **G. R. Zimmerman,** dirt; **A. J. Klopotek,** lubrication; **L. C. Wheeler,** labor; **G. E. Benefiel,** dirt; **E. S. Noon,** shovels; **P. E. Hatch,** dirt; **H. G. Braisted,** dirt; **L. G. Armstrong,** powder; **M. M. Moorehead,** mechanic; **C. A. Barns,** mechanic, and **L. Peterson,** welder. **H. C. Isenhart** is the project accountant and **T. B. O'Connor** is the paymaster.

* * *

P. C. Shorr, Jr., is project manager and **H. H. Hueske** is superintendent for Commonwealth Electric Co. on their subcontract for electrical work at Garrison Dam in North Dakota.

* * *

Fred Brandt is the general superintendent and **Al Melcher** is assistant superintendent for Granby Constructors on construction of the Bureau of Reclamation's $4,140,000 Granby Pumping Plant near Granby, Colo. **Cal Rickel** is directing the swing shift work and **"Tobe" Wight** is on the graveyard shift. **Bill Guyot** is the master mechanic. **Bert Sandberg** and **Don Eichner** are the job engineers, and **Howard Miller** is the job office manager.

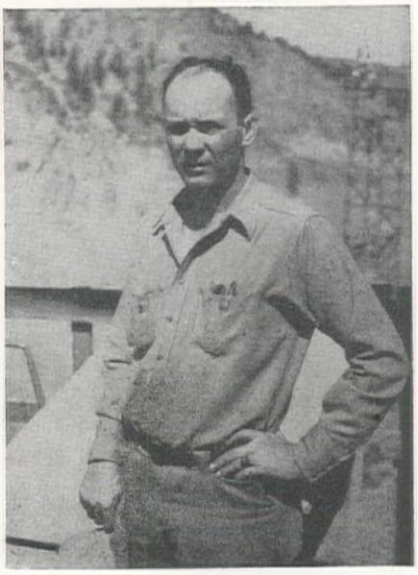
* * *

C. T. Leeds, Jr. is the project manager and **J. G. Lawrence** is superintendent for Underground Construction Co. on their subcontract to N. M. Ball Sons for construction of storm and sanitary sewers on the Hollywood Freeway in Los Angeles. Foremen on the job for Underground are **Everett Wilson, Leo Chesney** and **R. Schley. Al Thompson** is the job engineer. **J. F. Dixon** is Los Angeles City Inspector and **Herb Belford** is the State resident engineer.

* * *

T. J. Collins is superintendent and **B. B. Collins** is project manager for J. H. Welsh & Son Contracting Co. of Phoenix, Ariz., on construction of a $95,000 pipeline for the City of Willcox, Ariz. T. J. Collins is also superintendent and **Earl Ince** and **Owen Phelps** are foremen for J. H. Welsh & Son Contracting Co. on contract for construction of a $255,000 fire protection water line for the City of Phoenix. Collins is also the

JAMES D. FOGG



superintendent for the firm on their $100,000 contract for construction of a booster pumping station for the City of Phoenix. **Jay Vargo** is the project manager on the latter job.

* * *

L. Ralston is the project manager and **Ole Hovland** is the general superintendent for Mackley & Ralston of Minot, N. D., on construction of the $425,000 addition to the grade school at Minot. For construction of a $100,000 garage in Minot, **George Benton** is foreman, and for construction of a $50,000 grocery store at Minot, **L. Luchingser** is foreman.

* * *

J. P. Steele is acting as project manager and **W. F. "Bill" Horsewood** is superintendent for J. P. Steele Construction Co. on their $4,612,376 contract for construction of Class "A" buildings at the University of Wyoming, Laramie. Job engineer is **Ronald Whiston. C. "Stretch" Henning, W. W. "Woody" Strickland, J. Naughton** and **George Hill** are carpenter foremen. **R. B. "Bob" Snider** is shop foreman. **Moses Heath** is cement finisher foreman. **C. W. Pollei** is steel erection superintendent, and his foremen are **R. R. Potter** and **C. W. Wilson. H. Hemenover** is plumbing sup., **Tom Laws** is electrical sup., **B. M. Vanselow** is masonry sup., **Tony Ortega** is labor foreman, and **John Bergman** is stone foreman.

* * *

Fred Kerns is supervising for George E. Kerns, Long Beach, Calif., the completion of the 48-in. pipe line nearing completion from the Dominguez Reservoir in Wilmington to 9th St. in Long Beach, traversing Santa Fe Ave. **Ray Mueller** is his foreman. This is the first part of the $6,400,000 expansion program under way by the Long Beach Water Dept.

* * *

John N. Dorbo is the superintendent for Carl N. Swenson Co., San Jose, Calif., on the $750,000 construction of the structural steel and concrete courthouse at Ukiah, Calif. **Herb Raymond** is foreman on the job.

* * *

Este Allen is superintendent for A. W. Peugh & Son, Eureka, Calif., on construction of a $155,000 concrete block building in Eureka. **Carl F. Beed** is the job engineer.

* * *

George Wiggers is superintendent and **Jack Arave** is project manager for J. E. Haddock, Ltd., Pasadena, Calif., on construction of the overcrossings at Santa Monica Blvd. and Normandie St. on the Hollywood Parkway in Los Angeles. **Dwight Mathias** is engineer on the jobs. **Art Anderson** is foreman for the Normandie structure and **Ed Stonas** is foreman for the Santa Monica Ave. structure. **Pat J. Murphy** is the job office manager. Wiggers and Arave are also directing construction of the overcrossing at Edgeware Road on the Hollywood Parkway for the firm. **Joe Armen-**

MAINTENANCE COSTS ARE LOWER

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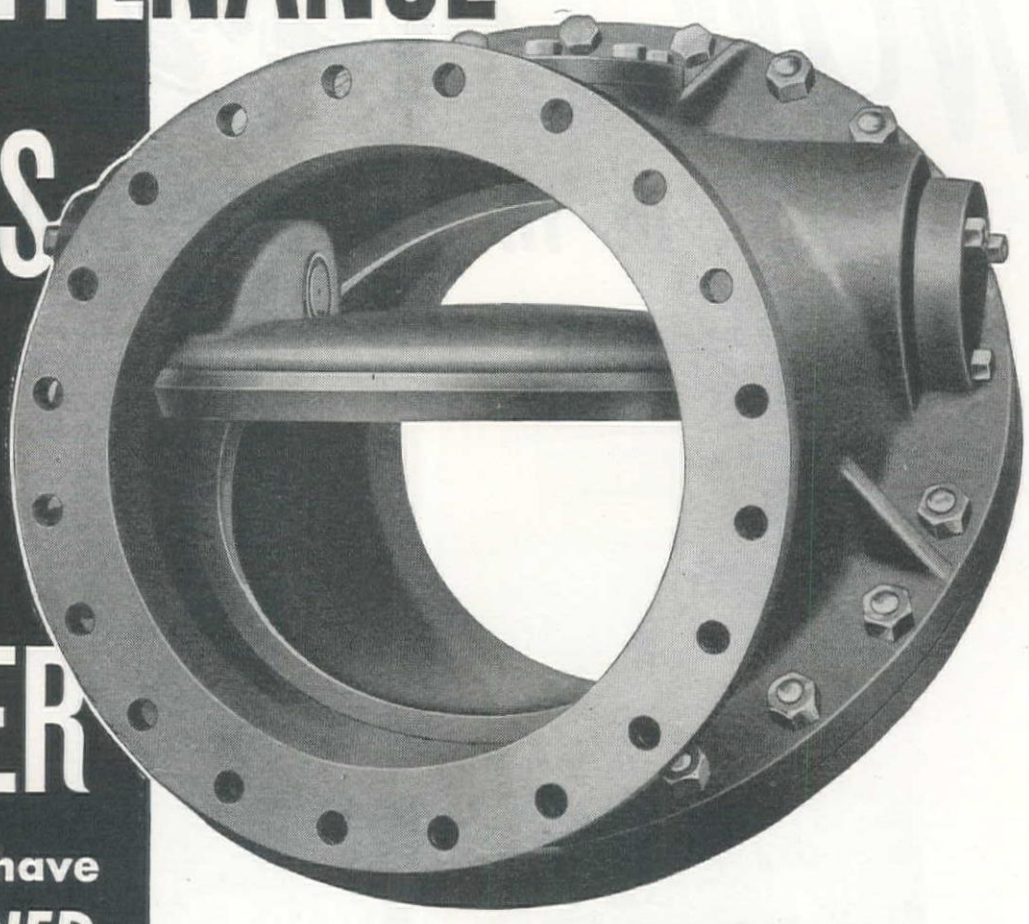
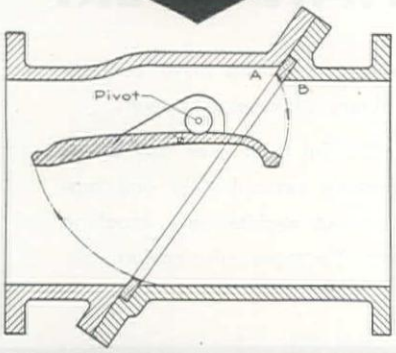


of — CHAPMAN CHECK (TILTING DISC) VALVES



Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

That's right! Maintenance costs *are lower* with Chapman Check Valves . . lower because the balanced disc works *with the stream.* There's no slamming to cause destructive pipe line stresses and increase maintenance costs. Nor is there any rubbing on seats . . . the disc closes quickly and quietly with no sliding or wearing action.

Yet that's only half the story. Head losses are actually 65% to 80% lower than for conventional type check valves. And, when used on pump discharge lines, substantial power savings are possible.

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CONTRACTORS' EQUIPMENT & SUPPLY CO.....Albuquerque, New Mexico
NEIL B. McGINNIS CO.....Phoenix, Arizona
FEENAUGHTY MACHINERY CO.....Portland 14, Oregon
FEENAUGHTY MACHINERY CO.....Boise, Idaho
FEENAUGHTY MACHINERY CO.....Seattle 4, Washington
FEENAUGHTY MACHINERY CO.....Spokane 2, Washington
EDWARD F. HALE CO.....Hayward, California
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 & EQUIPMENT CO.....Helena, Billings, Montana

dariz is foreman on this job and **D. G. Snyder** is the job office manager. **Ed Brier** is the resident engineer. On construction of the $450,000 overcrossing at Los Angeles and Aliso Streets on the Santa Ana Freeway in Los Angeles for the Haddock firm, **Neal Saul** is the project manager and **Henry Rollston** is the general foreman. **Roy Bennett** is the night foreman and **Don Snyder** is the job office manager. **Jim Woodbridge** is resident engineer.

* * *

A. G. Starling is project manager and **H. C. McFarlan** is superintendent for Mercer-Fraser Co., Eureka, Calif., on construction of a $108,000 reinforced concrete and frame building in Eureka. **E. Hoffman** is general foreman and **A. Swanback** is carpenter foreman.

* * *

Frank Malfitano is the project manager and **Earl Baker** is superintendent for M. Malfitano & Son, Inc., Pittsburg, Calif., on their contract for excavating and grading for levee setbacks and bank protection along Miner Slough on Ryer Island near Walnut Grove, Solano County, Calif. **George Graham** is the grading foreman and **S. J. Lucido** is the office and project accountant.

* * *

W. T. Stone is project manager and **W. A. Quisenberry** is superintendent for Wyoming Construction Co. on a $300,000 grading job near Echo Lake, Colo. **Charles E. Stultz** is foreman on the job.

* * *

Andy Jensen is now superintendent for Allison Honer Co. of Santa Ana, Calif., on construction of the million-dollar reinforced concrete building for Buffom's Department Store in Santa Ana. **W. C. Horton** is carpenter foreman and **M. L. Crane** is labor foreman. **Allison Honer** and **Fred McCandless** are handling the purchasing. **William Dorman** is the engineer on the job representing the Buffom interests.

* * *

Sam Upton, Jr., is supervising construction for his father, Sam Upton, contractor of Alhambra, Calif., on construction of the Bolsa School, in Orange County, Calif. **Andy Wilson** is Upton's superintendent on construction of a school building at Moorpark, Calif.

* * *

D. B. Adams is superintendent for Carl Overaa & Co., Richmond, Calif., on construction of a $300,000 concrete and steel store building for the J. C. Penney Co. in Richmond. Foremen on the job are **Fred Campbell** and **Gill Davis.**

* * *

K. O. Taylor, superintendent, is in charge for Bechtel Corp., San Francisco, of work at both the Big Creek and North Fork locations of building and electrical construction for the Southern California Edison Co., at Big Creek, Calif. **Ray Stater,** assistant superintendent, heads up all work in the Big Creek No. 1 and 2 areas. **Keith Fullenweider** and **M. S. Morris** are assistant superintendents in charge of electrical work at Power Plant No. 1. **O. S. "Bill" Hughes,** general foreman over carpenters and laborers, is in charge of building construction. **E. F. McNatt** and **O. E. "Slim" Fallon,** assistant superintendents, and **A. E. Olsen,** electrical engineer, are supervising the work at Big Creek No. 2 area. **M. L. Rhodes** is cost engineer and **Don Johnson** is office manager. Foremen on the job include **D. Hubbard** and **W. McKinley,** carpenter; **Harry Strange, Bill Young** and **George Harlan,** labor; **J. Sanders, Jack Johnson, V. J. Boyd, C. Dix, H. Engert, D. Timmons, Jess Griffith** and **C. L. Smith** in charge of electrical gangs. Electrical general foremen are **T. T. Brown** and **Harry Yeager. R. L. "Buck" Weipert** is the buyer and **R. L. McNamara** is paymaster. For Southern California Edison, **H. A. Barber** is resident engineer at Big Creek No. 1 and **Bill Reilly** is resident engineer at Big Creek No. 2. For the Shaver Dam grouting work, **Jess Bennett** is Bechtel engineer, **Bill Young** is Bechtel foreman, and **F. W. Lundquist** is Edison engineer.

* * *

Neal Spencer is the superintendent for R. J. Daum Construction Co., Inglewood, Calif., on construction of the Junior College at San Bernardino, Calif. Carpenter foremen are **Wiley Smedley** and **Bill Mauck,** and **Rudy Jubero** is labor foreman. **Frank Lippitz** is foreman for steel work, and **W. J. Penrose** is job office manager. **H. M. "Red" Welch** is resident engineer for the School District.

* * *

S. O. Dingman, formerly office manager for the Sound Construction & Engineering Co. (with Peter Kiewit Sons' Co.) on construction of 1000 houses at Richland, Wash., is now office manager for Peter Kiewit Sons' Co. and Fred J. Early Jr. Co., Inc., on their four contracts for construction of the Hyperion Activated Sludge Plant at El Segundo, Calif.

* * *

W. K. Bertken is project manager and **Charles Shoop** is superintendent for Rand Construction Co., Bakersfield, Calif., on construction of 4.2 mi. of highway near Lompoc, Calif., at a cost of $305,000. **Harry Crawford** is equipment foreman and **James Black** is labor foreman. For the California Division of Highways, **M. A. Dawson** is resident engineer, **Harry Aldrich** is his assistant, and **A. Campbell** is office engineer.

* * *

Norman F. McKinley, builder and contractor of Tempe, Ariz., is supervising the installation of 6 mi. of cast iron pipe and rock work in connection with the base for a 1,000,000-gal. storage tank for the City of Tempe.

* * *

Frank Wintermuty is the superintendent on construction at the Fullerton Union High School and Fullerton Junior College at Fullerton, Calif., for contractor G. Iannini Co. of Redondo Beach, Calif. The work consists of demolishing part of the high school property, construction of two science buildings and erection of a new ceramics building, at a total cost of $455,000, **Ray Bowlby** is carpenter foreman.

* * *

Clarence W. Ashbach is the project manager for Ashbach-Steenberg Co., Inc., Exeter, Calif., on their $4,826,544 contract for construction of earthwork, structures and lining on the Friant-Kern Canal, between Woodlake and Lindsay, Calif. **Carl M. Steenberg** and **Thomas A. Steenberg** are the general structures superintendents. **Holger Nielsen** is river structures sup., **Frank Kath** is canal machines sup., **Charles Weinke** is batch plant and yard sup., **John Matthews** is wasteway construction assistant sup., and **Paul Steenberg, Jr.,** is assistant superintendent of bridge construction. Carpenter foremen on the job are **Alven Lee, Ted Weathers, Pete Bensen, Oscar Bramblett, Hubert Smith** and **Floyd Headley. Eddie Firster** is concrete foreman on all operations, and **Elmer "Bob" Evenson** is cement finisher foreman on all operations. **Herb Braun** is cement finishing foreman. **Walter Gobby** is canal trimming machine foreman. **Fred Hogodone** is canal lining machine foreman. **"Mike" Herrera** is labor foreman. **"Slim" Pipkin** is trimmer machine foreman, and **Jack Herring** is labor foreman. For subcontractors Marshall, Haas & Royce of San Mateo, Calif., on earthwork, **Sam Marshall** is project manager, **Carl Mauer** is superintendent, and **Richard C. Peterson** is rock superintendent. For earthwork subcontractors McBride and Britten of Stockton, Calif., **L. K. McBride** and **William Britten** are managing the work. For the Holman Erection Co. on steel work, **Ralph Holman** is project manager and **Rodney Birks** is superintendent. For the Hunt Process Co. of Los Angeles, **William Barton** is on the job as foreman. **Joseph Blasco** of Los Angeles is the subcontractor for batch hauling and he is being assisted by **Lou Sanchez. Hugh Pollard** and **Claude Pollard** are managing construction of underdrains for Pollard Bros., Ltd., Fresno, Calif. **David A. Richardson** of Klamath Falls, Ore., is the subcontractor for timber bridges and his superintendent is **Bob Steuteville. Glen R. Craig** is the subcontractor for minor structures. Other men on the job for the prime contractors are **C. H. Ingersoll,** master mechanic; **Lee F. Goodson,** finishing foreman; **W. J. Ballantyne,** labor foreman; **L. E. Morgan,** compaction foreman, and **R. E. Woods,** office manager.

* * *

Thomas E. Kennedy is the superintendent for Riedesel-Lowe Co., Cody, Wyo., on construction of a $256,000 gymnasium building at Sheridan, Wyo. **George Waters** is the firm's superintendent on construction of a $294,500 gymnasium and swimming pool for the School District at Riverton, Wyo., and **W. R. Reiman** is the project manager on the job. W. R. Reiman is also project manager and **Bernard Prentiss** is the

superintendent on the firm's $250,000 contract for construction of gymnasium at Lander, Wyo. **Sterling Spiegelberg** is the firm's superintendent on construction of a $339,000 gymnasium for the school district at Powell, Wyo., and Reiman is project manager.

* * *

K. A. Johnson is the general superintendent and **A. T. Branham** is foreman for A. C. Johnson & Sons, Eureka, Calif., on construction of a $134,490 elementary school building at Trinidad, Calif. K. A. Johnson is acting as project manager and **George S. Johnson** is acting as superintendent on the firm's construction of $100,939 school building at Loleta, Calif. **V. W. Soucie** is foreman on the latter job.

* * *

Charles Hettick is the superintendent and **Lyle Stutts** is operating engineer for Macco Corp., Paramount, Calif., on demolishing of an old bridge at Olive, Calif. The new bridge has already been completed.

* * *

Everett Maus is the superintendent for F. J. Kirchhof Construction Co. on their $400,000 contract from the City of Denver for additions to the administration building at the Stapleton Municipal Airport at Denver, Colo. **Lonie Nigh** is carpenter foreman, **James Collier** is labor foreman, and **Bob Montgomery** is iron work foreman.

* * *

J. M. Davidson, contractor of Sturgis, S. D., is personally supervising a number of building construction jobs in that city. **Harold Anderson** is acting as his project manager.

* * *

C. R. Denton is the superintendent for Northwestern Engineering Co., Rapid City, N. D., on a blacktop paving job near Brockton, Mont. **Leo Grogen** is the job foreman and **Johnny Wright** is in charge of the retort and distributor. **C. R. Denton** will also act as superintendent for the firm on another job coming up near Medora, N. D.

* * *

Joe Seabury is the general superintendent for Grafe-Callahan Construction Co. & Gunther & Shirley, Los Angeles, on construction of the Bureau of Reclamation's $5,000,000 Horsetooth Dam near Fort Collins, Colo. **Jack Luckcuck** is master mechanic. Foremen on the job include **John Reed, Harry Braistade, Al Marberger** and **Elmer Clauson.**

* * *

Glen Haines is superintendent for C. M. Hanes Construction Co. on construction of a bridge across Cherry Creek in Denver, Colo. **H. R. Brown** is the carpenter foreman.

* * *

W. F. "Wild Cat" Chambers is the superintendent and **Harrold Greer** is project manager for Stanley M. Davis, contractor of San Leandro, Calif., on a large housing project at Fairfield, Calif. **Chock Rayford** is carpenter foreman, **B. Flanagan** is saw man, and **Jim Palmer** is layout man.

* * *

Stanley Ball is the project manager and **Chet Orcutt** is the superintendent for N. M. Ball Sons, Berkeley, Calif., on two contracts totaling $2,227,809 for construction of the Hollywood Freeway between Grand and Virgil Avenues in Los Angeles. **George Lewis** is grading superintendent and **Walt Butler** is grading foreman. **Doug Spencer** is job office manager and **Bill Dumas** is utility man.

* * *

On the $1,000,000 construction of the Tajigos Highway 101 between Santa Barbara and Gaviota in Southern California by Clyde W. Wood, Inc., North Hollywood, Calif., **Wesley Meyers** is superintendent, **George Lewis** is equipment superintendent, **Frank Harvey** is office manager, and **L. H. Hora** is master mechanic.

* * *

Scott Cross is general superintendent for J. P. Steele Construction Co. of Laramie, Wyo., on their half-million dollar contract for construction of two schools at Rawlins, Wyo. **Willis Weers** is brick foreman on the job and **Jim Littlejohn** is electrical foreman. **E. J. Richardson** is carpenter foreman.

Ray Ingersoll is superintendent for contractor Oscar Drake on construction of a large church building at Casper, Wyo.

* * *

Albert J. Adams, building contractor, formerly at Tolleson, Ariz., has moved to Phoenix, Ariz., where he is specializing in cabinet work and interior finishing of new homes and commercial buildings. His business location is 6827 N. 25th Ave., Phoenix.

* * *

Al Sorenson is project manager and **Marlin Hecht** is superintendent on construction of Fire Station No. 3 in Long Beach, Calif., for contractors Millie and Severson, Inc., Long Beach. **William E. Lessley** is carpenter foreman and **Ernie Dewitt** is labor foreman.

* * *

On construction of a City Yard at Fullerton, Calif., Mills Bros. Construction Co. of Anaheim, Calif., are the contractors and **John J. Ockels** is superintendent.

* * *

J. C. Shelton is the superintendent for E. T. Haas Co., San Francisco, on their $119,000 contract for construction of water distribution lines in Alameda and Contra Costa Counties for the East Bay Municipal Utility District. **W. P. McFadden** is the foreman for the Contra Costa work and **Vic Blakely** is foreman for the Alameda work. **Ed Odland** is in charge of paving work, and **Max Townsend** is labor foreman.

* * *

D. R. Carlson is project manager for contractor **L. Hancock** on the $175,000 construction of a school building at Buffalo, Wyo. **Frank Shreve** is foreman on the job. Other key men are **George Kuzua** and **Harold Greene.**

* * *

O. H. Petersen is the superintendent for Central Concrete, Inc., on dragline work and dirt moving and provision of sand and gravel at the site of the projected atomic plant at Arco, Ida.

* * *

Fred S. Miller, who for a number of years supervised construction for Vido Kovacevich Co. of Los Angeles on sewer work, is now directing completion of that firm's contract on Atlantic Ave., in the Southgate area. **Leland W. Sixt** is resident engineer for the state on the project and assisting him is **W. R. Fowler** as field inspector.

* * *

Roy F. Johnson is project manager and **Emil Wikmer** is superintendent for Morrison-Knudsen Co., Inc., on their $6,136,234 contract for construction of the West Canal of the Columbia Basin Project near Ephrata, Wash. **William Goodwin** is rock foreman on the job. **Arthur Sorrells** is assistant superintendent of excavation. **Lee Ellis** is master mechanic. **Tom Barber** is the job engineer, and **T. K. Jensen** is the operating engineer. **J. R. Barnes** is the office engineer.

Contracts . . .

Summary of Major Construction Contracts Awarded Last Month

Wunderlich Construction Co., Omaha, Neb., with a bid of $4,787,874, were awarded the contract by the Bureau of Reclamation for construction of the Olympus and Pole Hill tunnels and access roads of the Estes Park-Foothills Aqueduct and Power System on the Colorado-Big Thompson Project near Loveland, Colo. A total of 1,300 working days are allowed for completion.

J. A. Terteling & Sons, Boise, Ida., with a bid of $1,060,000, were awarded a contract by the General Electric Co. for construction of a railroad connection with Yakima Branch of the Union Pacific Railway at Richland, Wash.

With a bid of $1,385,463, **Fisher Contracting Co.,** Box 4035, Phoenix, Ariz., were awarded the contract by the Bureau of Reclamation for construction of earthwork and structures on the Wellton-Mohawk and Gila canals of the Gila Project near Yuma, Ariz., with 525 days allowed for completion.

Swinerton & Walberg, Box 1379, Denver, Colo., were awarded the $1,275,615 general contract by the City and County of Denver for construction of the Municipal Stadium at Denver.

J. A. Terteling & Sons, Boise, Ida., were awarded a $1,266,056 contract by the Bureau of Reclamation for construction of earthwork, concrete canal lining and structures on the Courtland Canal of the Bostwick Division of the Missouri River Basin Project near Superior, Neb., with 700 days allowed for completion.

MacDonald, Young and Nelson, 351 California St., San Francisco, and **Morrison-Knudsen Co., Inc.,** 810 Title Guarantee Bldg., Los Angeles, were awarded the $4,486,000 contract as joint-venturers by the City of San Francisco for construction of San Francisco's North Point Sludge Treatment Plant.

Marshall, Haas & Royce, Box 411, San Mateo, Calif., were awarded a $1,626,250 contract by the Bureau of Reclamation for all work on the Trenton Dam foundation construction on the Republican River near Trenton, Neb. A total of 330 days are allowed for completion.

Bechtel Corp., 220 Montgomery St., San Francisco have been awarded the contract by Standard Oil Co. of California for expansion of refinery facilities at Salt Lake City, Utah. Construction will start in 1950 and overall cost of the project will be approx. $10,000,000.

L. H. Hoffman, 715 S.W. Columbia St., Portland, Ore., was awarded a $980,620 contract by the City of Portland for construction of a sewage treatment plant in Portland. **General Construction Co.** of Portland was awarded a $983,950 contract by the City for construction of the East Glisan-Greeley Unit of the Portland Interceptor Sewer and Sewage Treatment Project.

Acting as joint-venturers, **J. C. Boespflug Construction Co., Peter Kiewit Sons' Co.,** and **Morrison-Knudsen Co., Inc.,** Hoge Bldg., Seattle, Wash., were awarded a $4,612,354 contract by the Commissioner of Indian Affairs for construction of a hospital at Anchorage, Alaska. Completion time is 1,380 days.

Vinnell Co., Inc., 1145 Westminster Ave., Alhambra, Calif., with a bid of $609,976, were awarded a contract by the Arizona State Highway Commission for the clearing, grubbing, grading, draining and bituminous plant-mix surfacing of 5.5 mi. of the Ashfork-Williams Highway in Arizona.

Bechtel Corp., 220 Montgomery St., San Francisco, have been awarded a contract at approximately $2,250,000 for construction of a petroleum plant for the General Petroleum Corp. at Torrance, Calif.

C. J. Montag & Son, Portland, Ore., were awarded a $986,853 contract by the Oregon State Highway Commission for the grading, surfacing and paving of approx. ½ mi. of the Tillamook St.-Broadway Bridge Section of the Pacific Highway West in Portland. The job includes construction of three reinforced concrete structures.

J. E. Haddock, Ltd., 3538 E. Foothill Blvd., Pasadena, Calif., was the successful bidder before the California Division of Highways for construction of 1.8 mi. Ramona Parkway, between Evergreen Ave. and Helen St., Los Angeles. The $1,255,490 contract includes cement concrete pavement on cement treated

subgrade, three reinforced concrete box girder bridges, and the lengthening of two existing pedestrian overpasses.

Morrison-Knudsen Co., Inc., and **M. H. Hasler,** Box 387, Santa Ana, Calif., were awarded a $4,273,872 contract by the Bureau of Reclamation for construction of earthwork, concrete lining and structures of the Delta-Mendota Canal near Volta, Calif.

Campbell Bennett, Ltd., Vancouver, B. C., were awarded a $1,119,694 contract for construction of an additional 16 mi. of the 83-mi. extension of the Pacific Great Eastern Railway from Quesnel to Prince George in British Columbia.

Consolidated Western Steel Corp., Box 2015, Terminal Annex, Los Angeles, were awarded a $641,280 contract by the Corps of Engineers for furnishing and installing a miter gate and appurtenances, operating machinery, stop-logs, etc., for the navigation lock at McNary Dam on the Columbia River.

Mead & Mount Construction Co., 42 Denver National Bank Bldg., Denver, Colo., were awarded the $2,038,000 general contract by the Colorado State Hospital for construction of a dormitory and rehabilitation center for the Hospital at Pueblo, Colo.

Nomellini Construction Co., Box 542, Stockton, Calif., were awarded the $2,643,363 general contract by the Reno School District No. 10 in Nevada for construction of a new high school building in Reno.

Arizona Sand & Rock Co., Box 596, Phoenix, Ariz., were awarded a $514,078 contract by the Arizona State Highway Commission for grading, draining and bituminous plant-mix surfacing of the Tucson-Picacho Highway State Route 84, northwest of Tucson.

Fred J. Early Co., 369 Pine St., San Francisco, were awarded a $787,500 contract by the University of California at Berkeley for construction of a sewage treatment plant and refuse disposal unit.

L. H. Hoffman, 715 S.W. Columbia, Portland, Ore., was awarded the general contract for construction of a new rod, wire and electrical cable plant at Vancouver, Wash., for the Aluminum Co. of America. Total cost of the construction is $7,000,000.

Dinwiddie Construction Co., Crocker Bank Bldg., San Francisco, were awarded a $1,061,600 contract for completion of an auditorium building for the Board of Education, Berkeley, Calif.

M. M. Sundt Construction Co., 440 S. Park Ave., Tucson, Ariz., was awarded a $1,078,125 contract for construction of buildings and appurtenances at St. Mary's Hospital in Tucson.

M. J. Brock and Sons, Inc., 2894 Rowena Ave., Los Angeles, were awarded a contract for construction of additions to the Riverside Hotel in Reno, Nev., the job to cost approx. $1,500,000.

Valley Construction Co., Portland, Ore., were awarded a $434,547 contract by the Oregon State Highway Commission for construction of the Dewey Avenue grade separation project in Baker, Ore.

Colorado Constructors, Inc., 4080 Galpago St., Denver, Colo., were awarded a $444,074 contract by the Colorado State Highway Commission for the grading, gravel surfacing and oil processing of 8 mi. of highway in Clear Creek and Summit Counties in Colorado.

Contract for the construction of levees along the north bank of the Yakima River and the west bank of the Columbia River to protect the Richland, Wash., area from the waters of McNary Reservoir has been awarded to **Parker-Schram Co.,** of Portland, Ore., by the Corps of Engineers.

Johnson-Western-Tavares, Box 569, La Jolla, Calif., have started work on a $1,750,000 housing project at La Jolla.

Stanton-Reed Co., 816 W. 5th St., Los Angeles, has been awarded a contract in the amount of $814,275 by the University of Southern California, to erect a 4-story brick and concrete dormitory building for 200 women at 35th and Figueroa Sts., Los Angeles.

J. H. & N. M. Monaghan & Associated Companies, Derby, Colo., has received a contract valued at $515,903 from the Colorado State Highway Department for grading, surfacing and structures on 7.8 mi. of State Highway 185 between Fort Collins and Wellington.

United Concrete Pipe Co., Box 425, Baldwin Park, Calif., will construct 4.9 mi. of cement concrete pavement on cement-treated subgrade, and a reinforced concrete slab bridge between Turlock and Keyes on a $466,436 contract from the California Division of Highways.

Isbell Construction Co., S. Virginia Rd., Reno, Nev., is starting work on a contract from the Nevada Department of Highways, Carson City, Nev., in the amount of $319,581, to construct 17.7 mi. of gravel surfaced road near Tuscarora, Nev.

TRADE WINDS

News of Men Who Sell to the Construction West

Western Distributor News Round-up

Carl Danielson, President and Owner of the CAPITOL TRACTOR & EQUIPMENT CO., Sacramento, Calif., announces his company's appointment as Northern California distributors for R. G. LeTourneau, Inc. They will also distribute products manufactured by Pettibone-Mulliken Corp., including buckets, speed-loaders and shovels. Among other lines that they will distribute is that of Mixermobile Co.

☆ ☆ ☆

THE RICHKRAFT CO., Chicago, manufacturers and distributors of reinforced waterproof building papers and road curing blankets, has announced the appointment of four new salesmen to cover the territory of Arizona, New Mexico and Texas. **E. B. Randall** will have headquarters at Houston, Texas; **Dave Gibson, Sr.,** at Amarillo, Texas, and **D. V. Livoni** and **C. H. Hays** at Phoenix, Ariz.

☆ ☆ ☆

Steve Drovetto has been named to the position of Field Representative for the California and Southwest United States territory of PACIFIC CAR & FOUNDRY CO., Renton, Wash. The company manufactures the Carco line of tractor winches for all crawler tractors, arches, dozers and rigging fittings. Drovetto replaces **Jim Miller,** who has accepted a position with BURAN EQUIPMENT CO. of Willits, Calif.

☆ ☆ ☆

CHAIN BELT CO., Milwaukee, Wis., manufacturers of sprocket chains and power transmission machinery, conveyors and process equipment, announce the appointment of **Douglas Jones** as Manager of the Salt Lake City, Utah, District Office of the firm. He will operate his business as the DOUGLAS JONES CO. Jones, a Civil Engineer and graduate of the University of Utah, has spent many years in engineering work, including five years in charge of sales for a Salt Lake City machinery distributor.

☆ ☆ ☆

STAR MACHINERY CO. of Seattle, Wash., has been appointed distributors for Noble Co. of Oakland, Calif., manufacturers of batching plants and equipment.

☆ ☆ ☆

R. S. McBeth has replaced **E. J. Hegre** as District Manager for CHICAGO PNEUMATIC TOOL CO. at their Seattle office.

☆ ☆ ☆

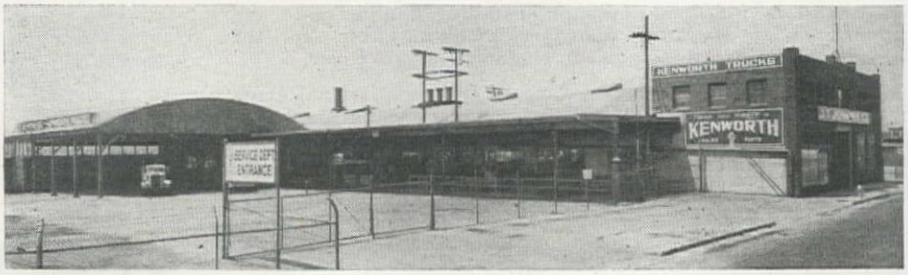
CONTRACTORS EQUIPMENT CORP., Portland, Ore., announce the appointment of **Robert E. Craney** as sales representative covering southern Oregon. He will make his headquarters in Medford. Craney formerly covered the same territory for Howard-Cooper Corp.

☆ ☆ ☆

Maurice Griesel has been appointed to the sales staff of P. L. CROOKS & CO., Portland, Ore. He will cover southern Oregon and will headquarter at Roseburg.

☆ ☆ ☆

The Los Angeles headquarters of J. T. JENKINS CO., distributors of Kenworth trucks in California, Nevada, Arizona and New Mexico, are now located in new and more spacious quarters at 2160 East 25th St. in the Vernon District. The firm's building was completely remodeled and modernized on the inside, and plans for improving the exterior are now going ahead. President of the firm is **J. T. Jenkins.** The new quarters now incorporates an enlarged Service Parts Department under the management of **Harry Cleveland,** formerly of the Kenworth Motor Truck Corp. plant in Seattle. The firm's large repair shop is being managed by **O. A. Richer.** In addition to the Los Angeles headquarters, the company maintains well-equipped branches in San Francisco, Fresno and Phoenix.



NEW Los Angeles headquarters of J. T. Jenkins Co., Kenworth truck distributors.

☆ ☆ ☆

COLUMBIA EQUIPMENT CO., Seattle, have been appointed distributors for Mixermobile Co. **F. B. McBath** is President of the firm.

☆ ☆ ☆

SHEPHERD TRACTOR & EQUIPMENT CO., Los Angeles, recently have made the following appointments. **J. W. Hinchliffe** is now General Credit Manager. **Jim Davis** is now Purchasing Agent. **C. Perry Harden,** who was formerly Purchasing Agent, has been transferred to the company's San Diego branch as Manager of their expanded marine parts department.

☆ ☆ ☆

Edward Bonette, formerly assistant Regional Manager for Cummins Engine Co. with offices in Los Angeles, has joined the sales staff of CUMMINS & MORAN, Phoenix, Ariz. He will cover the Arizona territory and will specialize in construction equipment.

☆ ☆ ☆

WESTERN MACHINERY CO., Los Angeles, have added **Arthur W. Chaffee** to their sales staff. He was formerly with Shaw Sales & Service Co. and Brown-Bevis Co.

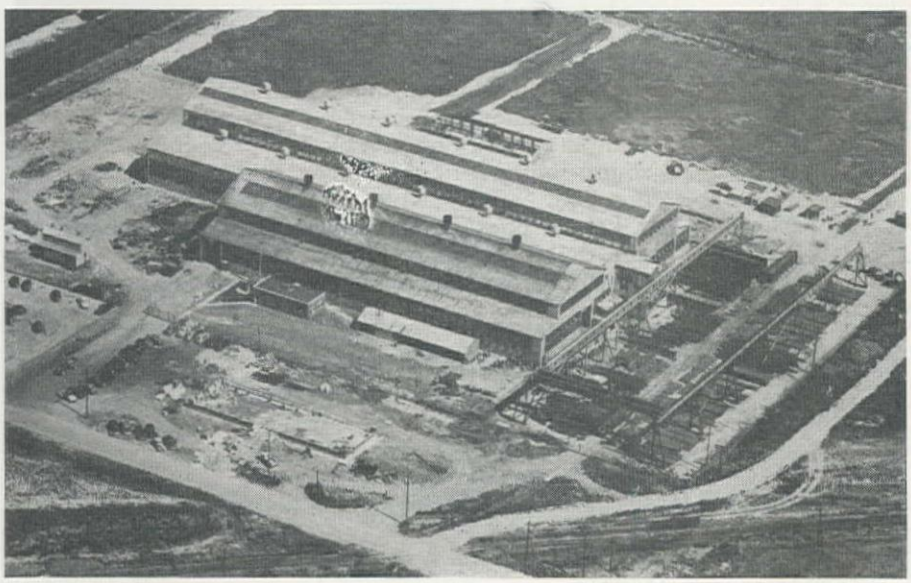
☆ ☆ ☆

E. R. Johnson, for many years with Harron, Rickard & McCone Co., has been appointed sales manager of the BROWN-BEVIS CO., Los Angeles, according to President **John A. Beynon.**

☆ ☆ ☆

FORNACIARI CO., Los Angeles, announces the appointment of **Ronald "Ronnie" Johnson** to their sales staff. He was

AERIAL VIEW of Chicago Bridge & Iron Company's new plant at Salt Lake City, Utah, was made July 21. The longest building, 100 by 300 ft., is the No. 2 shop. Visible are the completed crane runway, shop office building and garage building. Foundations for a new main office building and templet shop were being installed and the storeroom was under construction. The plant is equipped to supply the firm's full line of products.



formerly with Westinghouse and International Business Machines Co.

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SOUTHERN EQUIPMENT & SUPPLY CO., San Diego, Calif., were recently appointed distributors for the Hough Payloader in San Diego County.

☆ ☆ ☆

BRAMAN-DICKERSON CO., Riverside, Calif., were recently appointed distributors for Quick Way Shovel Co. and Pettibone-Mulliken. Their territory is Riverside and San Bernardino Counties.

☆ ☆ ☆

Charles S. Conrad, formerly manager of sales for Columbia Steel Co., has resigned that position to accept the appointment as director of steel sales for TAYHOLBROOK, INC., San Francisco, distributor of industrial sheet metal and plumbing supplies

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HEIL EQUIPMENT CO. have been appointed Northern California distributors for Crescent Tool Co. of Long Beach, Calif., manufacturers of hydraulic boom cranes for trucks, the cranes ranging in capacity from 1½ to 10 tons.

☆ ☆ ☆

H. G. Engle, Zone Manager for the FOUR WHEEL AUTO DRIVE CO., was a recent visitor to the West Coast.

☆ ☆ ☆

Maurice McCormick, formerly with Edward F. Hale Co., Hayward, Calif., has been appointed Parts Manager and Sales Manager for the WESTERN MACHINERY CO. of San Francisco.

☆ ☆ ☆

STILLEY

Howard Stilley has been appointed Sales Manager of BAY CITIES EQUIPMENT, INC., Oakland, Calif., according to **Virgil Gray,** President. Stilley is well known in the construction field, having been with R. G. LeTourneau, Inc., for many years. More recently, he was Sales Manager for Soulé Equipment Co. Stilley announces the first delivery of the International TD-24s to Bay Cities stock.

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Bob Olsson, formerly parts manager for EDWARD F. HALE CO., Hayward, Calif., has been appointed to their sales staff, according to **Robert Taylor,** General Sales Manager. He will cover the San Francisco East Bay territory.

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Joe Frank, Sales Manager of the WISCONSIN MOTOR CORP., was a recent visitor in all of the 11 Western states, where he called on distributors of Wisconsin engines.

☆ ☆ ☆

BALZER MACHINERY CO., Portland, Ore., have appointed **F. L. Tromley** to their sales force. He will cover the Port-

land area. He was formerly with Linde Air Products Co., Denver, Colo.

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HAWKINS-HAWKINS CO., Berkeley, Calif., announce their distributorship for "Scotchlite" traffic signs and reflectors, and "Centerlite" glass beaded reflective compound, manufactured by Minnesota Mining & Manufacturing Co. According to Hawkins, Standard "Scotchlite" and enameled traffic signs conform to specifications as set forth in the 1948 "Manual on uniform traffic control devices for streets and highways" issued by the Public Roads Administration. The company also manufacture at their Berkeley plant the "All Metal Sight-Post" used on State, Federal and County highways.

TRADE WINDS

News of Manufacturers in the West

Sales personnel in the Portland, Seattle and Boise offices of TIMBER STRUCTURES, INC., have been announced by **Ralph Fulbright,** vice-president in charge of sales for the firm. **Harry R. Swanson, Jr.,** has been appointed division sales manager with headquarters in Portland. Formerly, he was Portland district sales manager. **William E. Welch,** Portland, has been appointed resident manager at Seattle to succeed **Andy Toth,** resigned. **Richard E. Anderson,** formerly at Boise, succeeds Welch at Portland. He will handle sales in Oregon outside the Portland area, with headquarters in Portland. **J. D. Jones,** formerly of the Spokane office, has been assigned to Boise. **R. W. Mayer,** who was production control manager of the company before he entered the sales department, has been appointed operations assistant to **W. J. Van Arnam,** executive vice-president.

☆ ☆ ☆

A manufacturing and sales agreement which will increase West Coast production of large diameter steel pipe for the growing pipe line industry has been announced jointly by KAISER STEEL CORP., Oakland, Calif., and the BASALT ROCK CO., Napa, Calif. **Henry J. Kaiser,** president of Kaiser, and **A. G. Streblow,** president of Basalt, disclosed that the Basalt plant at Napa on the San Francisco Bay, which presently produces standard sizes of electric resistance weld steel pipe, is adding facilities to enable it to produce expanded electric fusion weld steel pipe up to 36 in., which will meet the high yields required by the oil and gas industries. Plate for the pipe will be supplied from the Kaiser steel mill at Fontana, Calif. The Kaiser sales organization will market the steel pipe produced at Napa under the label "Basalt-Kaiser" steel pipe.

☆ ☆ ☆

The INDUSTRIAL BROWNHOIST CORP. of Bay City, Mich., recently announced the appointment of **H. D. Wright** as Director of Sales, Western Region, with headquarters in San Francisco.

☆ ☆ ☆

Merritt Mason has joined NOBLE CO., Oakland, Calif., manufacturers of batching and concrete handling equipment, as

THE FACTORY BRANCH of Fruehauf Trailer Co. at Los Angeles recently moved into this new concrete and steel building as new quarters at 1444 Alameda St. An enlarged service department can now accommodate 27 large trailers simultaneously. In addition to the area occupied by the building, there are 12 acres of outside facilities.

engineer in charge of steel form design. Mason has 24 years' experience designing and fabricating steel products with Berkeley Steel Construction Co., Western Pipe & Steel Co. and Bethlehem Pacific Coast Steel Corp.

☆ ☆ ☆

KNAPP

HAGENS

WHITE MOTOR CO. has appointed **William C. Hagens** as wholesale manager for the San Francisco area. **Joe C. Knapp,** formerly with the San Francisco and Los Angeles branches of the firm, is being transferred to Portland to replace Hagens there.

☆ ☆ ☆

L. A. Bearden, Sales Manager for the Western Division of the FRUEHAUF TRAILER CO., announces that **L. H. Chaillé** has been appointed Regional Manager. Chaillé was formerly director of public relations. In his new capacity, he will be active in the supervision and administration of Fruehauf's sixteen factory branches in the Western Division.

☆ ☆ ☆

MORGAN

J. W. Morgan has been advanced to the position of assistant sales manager of the HYSTER COMPANY's Eastern sales division, according to the firm's general sales manager, **Philip Hill,** at Portland, Ore. Morgan will be in charge of tractor equipment sales activities and will be located at the Hyster, Peoria, Ill., plant. His experience covers two years as Hyster district representative in addition to several office sales positions.

☆ ☆ ☆

E. J. Duffy has been named assistant general superintendent of the KAISER STEEL CORP. plant at Fontana, Calif. He returns to Fontana after 17 months as manager of the Kaiser-Frazer Parts Corp. blast furnace at Provo, Utah.

☆ ☆ ☆

William Dale Wadlington has been appointed sales representative for CALAVERAS CEMENT CO. in the north Sacramento Valley territory. He will headquarter in Chico, Calif.

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KAISER CO., INC., the West's largest independent steel producer, has taken on a new name—KAISER STEEL CORP. According to **Jack Ashby,** vice-president and general manager, it is believed that the new name will be more readily identifiable with the firm's type of business. As the only fully integrated steel plant on the Pacific Coast, Kaiser Steel Corp. operates

six rolling mills with two more to be added by the end of the year to manufacture plates, strips, sheets, structurals, pipe, skelp and bars.

☆ ☆ ☆

A change in the administration of the INTERNATIONAL HARVESTER CO. plant at Emeryville, Calif., will make the plant's motor truck manufacturing operations a self-contained operation. Cited as the reasons for the change were the geographical location of the plant and the nature of the problems involved in the manufacture and distribution of the products manufactured there. **J. W. Zimmerman, Jr.**, formerly special sales representative at Emeryville, was named manager of the Emeryville operation. **I. W. Davies**, manager of the plant since its opening in 1946, will continue as works manager, and **Robert Urich** will continue as chief engineer.

TRADE WINDS

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CHERRY RIVET CO. of Los Angeles is now offering solid steel rivets and bolts in California, Arizona and Nevada, according to **E. H. Stau**, general manager. Recent purchases of specialized heading and threading equipment enable the company to offer Western concerns standard diameters of solid steel rivets up to ⅜ in. and in lengths to 3 in.

☆ ☆ ☆

S. L. Gidley has been appointed by the PARAFFINE COMPANIES, INC., as Paint Sales Supervisor of Pabco's Central District. Gidley, and the sales force under his direction, with headquarters in San Francisco, will service all the independent Pabco Paint dealers in Northern California, Utah, Nevada, Wyoming and Colorado.

☆ ☆ ☆

Fred Sime, District Manager for MACWHYTE CO., Kenosha, Wis., announces the appointment of **Art Leach** to their sales staff. He will cover the Sacramento Valley and will headquarter in Sacramento. Leach, a graduate engineer, has been with Macwhyte for the past 10 years and was formerly in the firm's production department at Kenosha.

☆ ☆ ☆

J. M. Cosgrove has been named Northwest District Sales Manager of KAISER STEEL CORP., and will headquarter in the Hoge Building, Seattle. He has been a district sales representative for Kaiser Steel in the Northwest since 1945.

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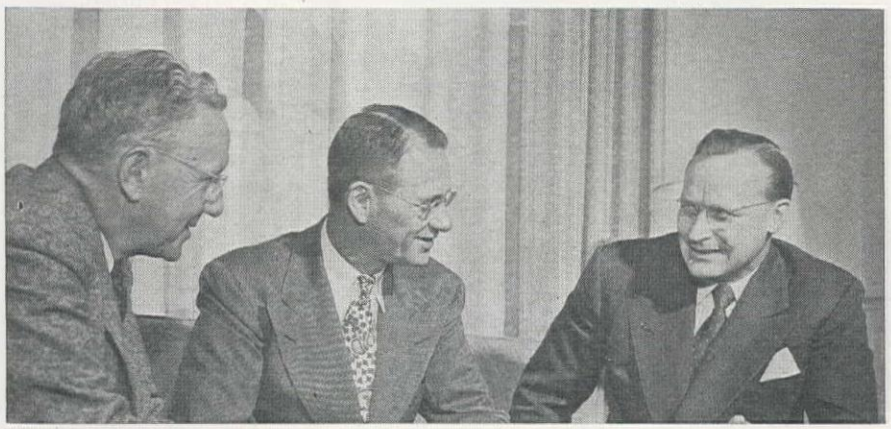
Milton George Lucke has recently joined PIONEER RUBBER MILLS as Superintendent of its Hose Department, and will be located at the Pittsburg, Calif., Pioneer plant. During the past two decades, Lucke's

CHARTING the course of Western steel, ALDEN G. ROACH, right, President of Columbia Steel Co., greets his newly-elected vice-presidents in charge of sales and operations. O. L. PRINGLE, left, long associated with Western steel production, will head Columbia's Sales Department. LAURENCE S. DAHL, center, formerly with Carnegie-Illinois and an expert on flat-rolled steel products, will take charge of Operations.



activities have included both executive supervision of hose manufacturing as well as technical development of industrial rubber products.

☆ ☆ ☆

John A. DeGroot, formerly of Pittsburgh, Pa., has been transferred to San Francisco and appointed to the post of assistant to the Pacific Coast District Manager of WESTINGHOUSE ELECTRIC CORP. He succeeds **W. J. Howell,** who has been appointed assistant to the corporation's apparatus sales manager, with headquarters in Pittsburgh.

☆ ☆ ☆

E. M. Burger, who recently completed a training course in foreign operations at GOODYEAR TIRE & RUBBER CO.'s Plant 2, Akron, O., has been assigned to the company's Mexico City plant as manager of mechanical goods development and technical service. A mechanical engineering graduate, Burger has been with Goodyear since 1943.

☆ ☆ ☆

By mutual agreement ANSUL CHEMICAL CO. of Marinette, Wis., is offering sales and service for Ansul dry chemical fire extinguishers in the Pacific Coast states, formerly served by SNOWDEN CHEMICAL CO. of Modesto, Calif. Ansul has opened West Coast offices in Oakland, Fresno and Los Angeles. **Robert E. Sexmith,** a veteran fire protection expert, has been named West Coast manager, Fire Extinguisher Division. He will be located in Los Angeles.

☆ ☆ ☆

Harold Q. Noack has been appointed as Assistant to **O. L. Pringle,** Vice-President in Charge of Sales of COLUMBIA STEEL CO. Noack resigned as Pacific Coast Manager of Phelps Dodge Copper Products Corp. to accept the new position. He will handle assignments in connection with Columbia's customer relations program.

☆ ☆ ☆

Manufacturing News From the East and Midwest Regions

J. H. Yearling is the new general sales manager of the JAEGER MACHINE CO., Columbus, Ohio, manufacturers of construction and paving equipment. Yearling has been associated with Jaeger for 22 years and has been manager of advertising and market research since 1941. As sales manager, much of his time will be spent in the field coordinating the work of the Jaeger sales organization with distributors. Jaeger sales are exclusively through distributors, with whom the work of the company's own field representatives is closely integrated.

☆ ☆ ☆

Charles Hosmer Morse III, Vice-President in Charge of Manufacturing for FAIRBANKS, MORSE & CO., Chicago manufacturers, and eldest son of **Colonel Robert H. Morse,** President of the company, was killed recently in an airplane accident.

☆ ☆ ☆

Lawrence E. Dickson, president of the Standard Safety Equipment Co. of Chicago, was elected president of the INDUSTRIAL SAFETY EQUIPMENT ASSN., New York City, for the second consecutive year at the annual meeting of the Association. **Charles H. Gallaway** was elected vice-president, and **William J. Parker** was named secretary-treasurer.

☆ ☆ ☆

John N. Dodds, 42, Service Engineer for the CLEVELAND TRENCHER CO., Cleveland, Ohio, died in Cleveland, July 29, after a long illness. He had been with the Cleveland company for nine years, and was widely known throughout the construction industry.

☆ ☆ ☆

J. M. Davies, associate director of research at Caterpillar Tractor Co., has been named director of research, succeeding **C. G. A. Rosen** who vacated the position due to ill health. Rosen, a recognized authority on Diesel power, will devote his time to the further development of Diesel engine design and performance in an advisory capacity. Davies has been with Caterpillar since 1925, when he joined the firm at San Leandro, Calif., as a laboratory engineer. Later he became a research engineer at San Leandro and was transferred in the same capacity to Peoria in 1933, where in 1939 he became assistant chief engineer and in 1942 assistant director of research, three years later becoming associate director of research. Succeeding Davies will be **Dr. L. A. Blanc,** who has been assistant director of research.

☆ ☆ ☆

Reorganization of the LeTourneau service department into Eastern, Central and Western territories has been announced by R. G. LeTOURNEAU, INC. This new set-up aligns the functions of the service department with those of the sales organization, thus assuring maximum service to LeTourneau distributors and the customers

TRADE WINDS

they serve. **Cloyd W. Richards** heads the department as general service manager. **Pat Edwards** is Eastern service manager; **George Crafton,** Central service manager; and **Jack Lewis,** Western service manager. All of the service managers headquarter at Peoria. **Clyde E. Clair** has been named special service representative, also with headquarters in Peoria. **Robert L. Gilmore,** coordinator of claims for the past two years, has been appointed claims manager.

☆ ☆ ☆

Paul A. McDonald has been appointed a district manager of the EUCLID ROAD MACHINERY CO. of Cleveland, Ohio, succeeding **J. W. Bloomquist,** who became assistant sales manager of Euclid recently. McDonald will represent Euclid in North and South Dakota, Minnesota, upper Michigan, and parts of Iowa and Wisconsin. At one time McDonald was employed as an engineer with the California Division of Highways, and before joining Euclid in 1948, he was project engineer at Clearwater Dam in Missouri for Mittry Bros. Construction Co. of Los Angeles.

☆ ☆ ☆

Sterling G. Maisch has been appointed production manager of the Axle Division of EATON MANUFACTURING CO., Cleveland, to fill the vacancy created by the death of **Charles H. Hunt.** This appointment was recently made by **Stewart Walls,** Division factory manager.

☆ ☆ ☆

The appointment of **H. N. Propp** as assistant district manager, Central Territory, Crusher and Process Machinery Divisions, is announced by **D. A. Cheyette,** vice-president of NORDBERG MANUFACTURING CO., Milwaukee, Wis. **J. B. Bond** is district manager of the Central Territory, with offices at the company's Milwaukee plant. Propp was transferred to Milwaukee from the San Francisco district office. **J. W. Crandall** was transferred from Milwaukee to the San Francisco district office to serve as sales engineer under **T. D. Davis,** district manager. **J. M. Thistlewaite** continues as Nordberg's Crusher Division special representative in the Central Territory, with headquarters at Sheridan, Ind.

☆ ☆ ☆

Henry W. Dodge has joined MACK TRUCKS, INC., as executive vice-president with special responsibility for sales and advertising, it is announced by **E. D. Bransome,** president and chairman of the board. Dodge, chairman of the board and director of Air Products, Inc., at the time of acceptance of his new position, was on loan to ECA as chief of petroleum on the staff of Ambassador W. Averell Harriman in Paris. He resigned both positions to take over his new duties with Mack.

☆ ☆ ☆

CARNEGIE-ILLINOIS STEEL CORP. announces two appointments in the executive personnel of this U. S. Steel subsidiary's Gary, Ind. steel works. They are **Paul E. Thomas,** who has been chief engineer, to become assistant to the general superintendent, and **Daniel E. Wise** to succeed him as chief engineer. Thomas has been chief engineer of the Gary plant for the past year and Wise has been serving as chief engineer of the Clairton (Pa.) works since Jan. 1, 1948.

UNIT BID SUMMARY

Dam . . .

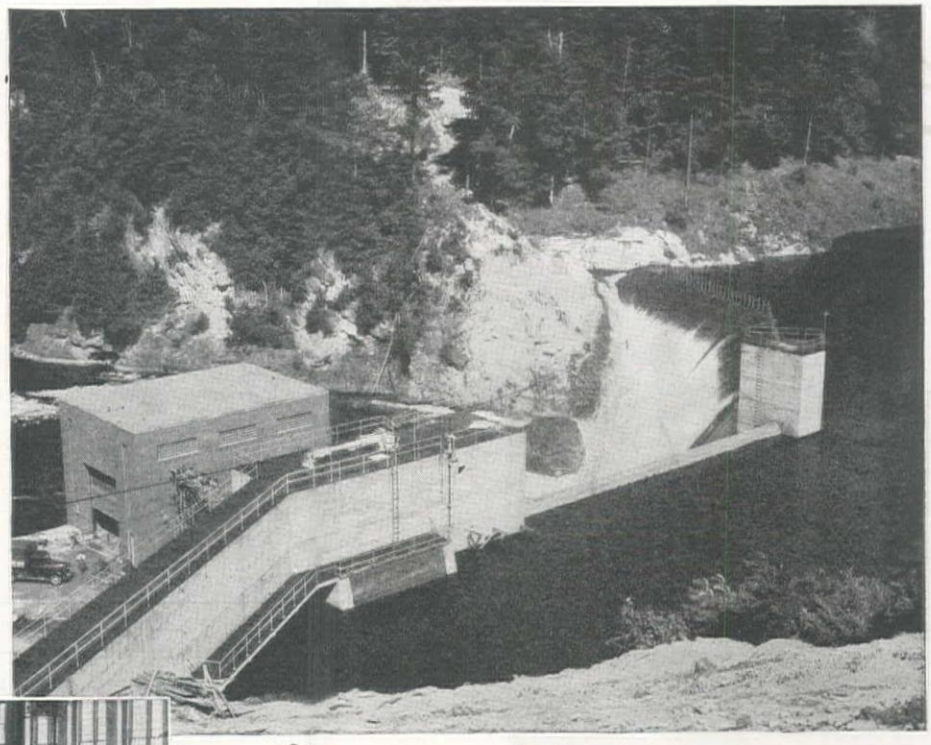
Oregon—Umatilla County—Corps of Engineers—Cofferdam; Misc.

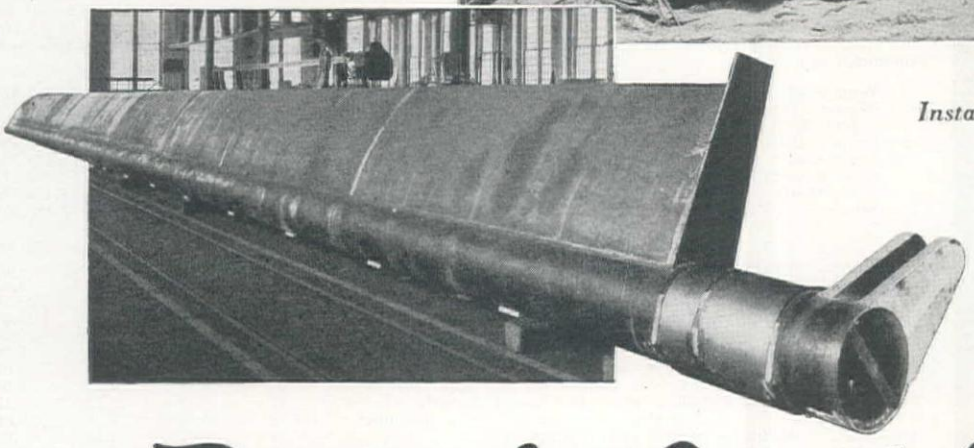
Guy F. Atkinson Co., Ostrander Construction Co. and J. A. Jones Construction Co., joint-venturers of San Francisco, with a bid of $15,835,539, were low before the Walla Walla District, Corps of Engineers, for construction of the Oregon Shore cofferdam, excavation and embankment work, foundation grouting and exploration, construction of the main "second step" cofferdam, and placement of a portion of the Oregon Shore abutment embankment at McNary Dam on the Columbia River near Umatilla, Ore., and Plymouth, Wash. The contract will call for completion not later than May 1, 1951. Construction of the second step cofferdam will close off the remaining channel of the river and divert water over the spillway section now being built. Unit bids were submitted as follows:

(1) Guy F. Atkinson Co., Ostrander Construction Co., and J. A. Jones Construction Co. $15,835,539
(2) General Construction Co., Shea Co., and Pacific Bridge Co. 18,648,000
(3) Government Estimate 12,784,132

		(1)	(2)	(3)
COFFERDAMS—				
25,000	cu. yd. cofferdam excav., unclass.	.90	2.00	.59
5,300	ton straight-web steel sheet piling	115.00	160.00	153.00
950	ton mill-fabricated T-section piling	190.00	250.00	235.49
8,650	tons placing straight web sheet steel piling	220.00	160.00	291.21
1,400	tons placing T-section piling	120.00	160.00	301.88
245,000	cu. yd. fill in cofferdam cells, in place	2.04	2.00	1.30
6,500	cu. yd. impervious zone for cofferdam shore fills, in place	1.75	2.00	1.12
220	cu. yd. conc. blanket, in place	24.00	50.00	20.77
20,000	cu. yd. random fill for cofferdam shore fills, in place	.40	.80	1.12
25,000	cu. yd. dumped-stone revetment for cofferdam shore fills, in place	1.50	2.00	.64
15,000	cu. yd. dumped-and-rearranged stone revetment for cofferdam shore fills, in place	1.40	2.50	.76
800	cu. yd. grout for revetment, in place	35.00	30.00	18.55
4,500	conc. blocks, in place	120.00	120.00	91.24
3,500	tons Class B stone from excav., in place	3.50	3.00	2.09
15,000	tons Class B stone from quarry, in place	5.50	4.00	4.07
50,000	cu. yd. Class C stone, in place	2.60	2.00	1.07
7,500	ton spalls for closure embankment, in place	3.50	3.00	1.07
30,000	cu. yd. impervious matl. for closure embankment, in place	1.10	3.00	.85
4,000	cu. yd. filter blanket for closure embankment, in place	2.50	3.00	2.36
7,000	tons dumped-stone revetment for closure embankment, in place	2.00	5.00	.71
1	timber crib, compl., in place	$100,000	$100,000	$62,105
1	pumping facilities for Oregon shore cofferdam, in place	$57,500	$40,000	$13,145
1	initial pumping facilities of 50,000-gmp. capacity for main second-step cofferdam, in place	$40,000	$60,000	$33,180
15	1,000-gpm. additional pumping facilities for main second-step cofferdam, in place	300.00	$2,000	220.31
2,000	ac. ft. pumping	3.00	8.00	5.94
1,630	pieces removal of steel sheet piling	10.50	60.00	19.85
225,000	lb. structural steel for temporary fishladder, in place	.20	.25	.24
80	M.f.b.m. lumber and timber for temporary fishladder, in place	200.00	200.00	176.19
375	tons steel sheet piling for temp. fishladder, in place	160.00	300.00	160.80
250	cu. yd. concr. for temporary fishladder, in place	30.00	60.00	24.48
1	removing Cell No. 4 of first-step cofferdam to elevation 262	$3,000	$3,000	$1,308
EXCAVATION AND EMBANKMENT—				
14,000	cu. yd. stripping borrow areas	.26	.50	.56
350,000	cu. yd. excav., com.	1.20	2.40	.329
300,000	cu. yd. excav., rock	4.70	6.00	1.65
17,500	sq. yd. foundation cleanup, abutment area	2.90	4.00	.75
195,000	cu. yd. borrow for impervious core	.45	1.50	.53
50,000	cu. yd. excav. from rock stockpile	.50	1.00	.743
20,000	cu. yd. excav. from random fill stockpile	.42	1.00	.41
100	cu. ft. sand-cement slurry	7.50	4.00	3.67
290,000	cu. yd. rock fill, in place	.75	1.00	.50
25,000	cu. yd. spalls, in place	1.00	4.00	.21
25,000	cu. yd. sand and gravel filter, in place	2.35	4.00	.86
25,000	cu. yd. sand filter, in place	2.60	4.00	.74
25,000	cu. yd. gravel filter, in place	2.60	4.00	1.83
125,000	cu. yd. impervious core, in place	.42	1.00	.175
27,500	cu. yd. random fill, in place	.20	.60	.22
5,000	M. sq. ft. additional rolling, two passes	.30	.60	.23
5,000	M. gals. sprinkling	2.60	5.00	3.20
Lump sum,	timber-crib retaining wall	$12,000	$1,970	$3,634
FOUNDATION GROUTING AND EXPLORATION—				
4,000	lin. ft. drilling holes depth 0 ft. 90 ft.	2.50	3.00	2.03
1,000	lin. ft. drill holes depth over 90 ft.	2.50	3.00	3.05
4,000	lin. ft. drill wagon drill holes, depth 0 ft. 35 ft.	1.10	3.00	1.86
8,000	lb. miscl. pipe fittings and valves for grouting and drainage, in pl.	.70	.60	.25
5,000	bag pressure grouting	1.50	4.00	1.35
200	ea. min. payment for pump conn. and pressure grouting	5.00	15.00	5.00
3,500	lin. ft. drill holes depth 0 ft. 90 ft.	5.00	12.00	8.92
2,000	lin. ft. drill holes, depth over 90 ft.	5.00	12.00	10.74
500	lin. ft. drilling 6-in. dia. holes, depth 0 ft. to 90 ft.	18.00	25.00	13.52
CONCRETE—				
37,000	cu. yd. mass concrete	12.50	20.00	9.10
2,500	cu. yd. struct cover 1½-in. max., coarse agg.	34.85	70.00	15.32
140,000	cu. yd. struct. cover, 3-in. max., coarse agg.	34.85	38.00	20.93
510	cu. yd. concr. in assembly floor	34.85	60.00	56.73
16,000,000	lb. steel reinf., in place	.107	.11	.085
13,000	lb. copper water stops	1.25	2.00	1.05
350	lin. ft. Type A rubber water stops, in place	4.00	6.00	6.39
1,200	lin. ft. Type B rubber water stops, in place	3.50	8.00	3.64
100	lin. ft. 6-in. diam. porous concr. drain tile, in place	5.00	2.00	4.98
700	lin. ft. 6-in. diam. drain tile, in place	1.40	2.00	1.33
4,000	lin. ft. drilling and grouting anchor bars	3.00	2.00	1.15
240,000	bbl. Portland cement	3.85	4.80	4.68
STRUCTURAL STEEL—				
207,000	lb. struct. carbon steel, in place	.16	.30	.27
480,000	lb. semi-corrosion resisting steel, in place	.30	.35	.34
85,000	lb. nickel steel, in place	.32	.50	1.17
86,000	lb. welded steel tanks, in place	.20	.30	.20
6,500	lb. iron castings, in place	.80	.60	.51
200,000	lb. anchor bolts and inserts, in place	.38	.30	.34

(Continued on next page)





Installation and shop views of Bascule type Crest Gates

Bascule Crest Gates *by* SMITH

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S. MORGAN SMITH Co.

YORK, PENNA. U.S.A.

PIPING—			
160,000 lb. fabricated steel plate pipe, in place	.24	.32	.35
24,000 lb. galv. wrought iron pipe, in place	.35	.60	.32
13,500 lb. black wrought iron pipe, in place	.32	.50	.21
18,000 lb. black steel pipe, in place	.225	.45	.17
44,000 lb. cast-iron pipe, flanged, in place	.16	.25	.36
54,000 lb. cast-iron soil pipe in place	.20	.60	.14
100 lb. brass pipe, in place	1.30	1.00	4.32
1,500 lb. floor drains, in place	1.00	.80	.82
9,500 lb. special cast-iron bell fittings, in place	.50	.60	.38
ELECTRICAL WORK—			
12 lin. ft. 6-in. galv. conduit and fittings	20.50	25.00	6.46
110 lin. ft. 4-in. galv. conduit and fittings	7.75	10.00	2.83
2,000 lin. ft. 3-in. galv. conduit and fittings	2.75	3.00	1.58
1,700 lin. ft. 2½-in. galv. conduit and fittings	2.50	2 80	1.24
1,900 lin. ft. 2-in. galv. conduit and fittings	1.75	2.40	.87
950 lin. ft. 1½-in. galv. conduit and fittings	1.60	2.00	.74
1,500 lin. ft. 1¼-in. galv. conduit and fittings	1.30	1.50	.63
2,800 lin. ft. 1-in. galv. conduit and fittings	1.00	1.00	.51
7,600 lin. ft. ¾-in. galv. conduit and fittings	.90	.80	.39
70 lin. ft. 5-in. "Transite" conduit with fittings as required	5.25	6.00	2.06
870 lin. ft. 4-in. "Transite" conduit with fittings as required	2.50	3.00	1.44
2,250 lin. ft. 3-in. "Transite" conduit with fittings as required	2.30	2.60	1.01
1,000 lin. ft. 2-in. "Transite" conduit with fittings as required	1.60	2.00	.82
(x) 1,300 lb. special galv. cast iron boxes	2.50	3.00	1.47
150 lb. electrical cabinets and special boxes, galv. sheet steel	12.00	10.00	1.04
26 pier nose lighting fixtures installed, less wiring and lamp	75.00	100.00	26.92
11 sluiceway lighting fixtures installed, less wiring and lamp	90.00	100.00	135.20
2,000 lb. copper ground conductor, bare	1.25	2.00	1.14

Tunnel . . .

Colorado—Larimer County—Bur. of Recl.—Conc. Lined

With a bid of $4,787,874, Wunderlich Contracting Co. of Omaha, Neb., were low before the Bureau of Reclamation at Denver, Colo., for excavation and concrete lining of the Olympus and Pole Hill Tunnels for the Estes Park-Foothills Power Aqueduct of the Colorado-Big Thompson Project near Loveland, Colo. The job includes construction of access roads, and 1,300 working days are allowed for completion. Unit bids were submitted as follows:

(1) Wunderlich Contracting Co.	$4,787,874
(2) Western Paving Construction Co., Gibbons & Reed Co., Johnson, Drake & Piper and John R. Austin Construction Co.	5,084,407
(3) Grafe-Callahan and Rhoades Bros. & Schofner	5,436,494
(4) Peter Kiewit Sons' Co. and Morrison-Knudsen Co., Inc.	5,978,104
— S. S. Magoffin & Associates	6,397,973
— S. A. Healy Co.	7,130,776
— Stolte, Inc., United Concrete Pipe Co. and Ralph A. Bell	7,353,531

	(1)	(2)	(3)	(4)
2,400 cu. yd. excavation, common, for open cut	1.00	.73	3.80	4.00
4,200 cu. yd. excavation, rock, for open cut	2.50	3.60	3.80	4.00
155,000 cu. yd. excavation, all classes, in tunnel	18.60	21.52	22.36	25.50
10 cu. yd. excavation, common, for tunnel outlet drain	5.00	3.00	18.50	10.00
25 cu. yd. excavation, for tunnel outlet drain	20.00	3.00	18.50	30.00
30 cu. yd. backfill in tunnel outlet drain	5.00	5.00	4.60	5.00
19,000 lin. ft. constructing 6-in. diam. tunnel drain	6.00	3.85	3.00	5.00
120 lin. ft. furn. and lay. 6-in. diam. sewer pipe with cem. jts.	3.00	4.70	4.05	2.00
750,000 lb. furn. and installing perm. steel tunnel supports	.15	.19	.22	.17
150 M.b.m. furn. and erecting permanent timbering in tunnel	250.00	345.00	370.00	350.00
414,000 lb. installing permanent tunnel supports	.06	.07	.13	.07
4,000 lin. ft. drilling feeler or pilot holes ahead of tunnel excav.	1.25	1.10	5.05	4.00
2,000 lin. ft. drilling grout holes not more than 10 ft. deep	3.00	3.50	.67	3.00
2,000 lb. furn. and placing grout pipes and connections	1.00	1.20	1.25	1.00
4,000 cu. ft. pressure grouting	3.00	2.95	5.10	3.00
91,000 cu. yd. excav., all classes, for roadway	1.26	1.25	1.00	1.30
6,500 cu. yd. excav., common, from borrow for embks. in canal section of roadway	.60	1.45	.84	1.20
200 cu. yd. excav., common, for road structs.	1.50	1.70	3.40	4.00
800 cu. yd. excav., rock, for road structs.	5.00	4.90	6.75	7.00
4,600 cu. yd. selected roadway borrow	.60	.62	.90	1.50
7,900 cu. yd. selected roadway surfacing	.90	.85	1.00	1.75
5,400 cu. yd. compacting embankments	.50	.60	.77	.35
12,200 sta. cu. yd. overhaul of roadway excav.	.025	.015	.03	.035
142,600 sta. cu. yd. overhaul of matl. from bor. of embks. in canal section of roadway	.025	.02	.03	.025
55,000 sta. cu. yd. overhaul of selected roadway borrow	.025	.02	.02	.025
475,000 sta. cu. yd. overhaul of selected roadway surfacing	.025	.02	.02	.025
8,300 cu. yd. backfill	.50	.35	1.10	2.00
5,500 cu. yd. compacting backfill	3.50	2.50	7.30	2.50
430 cu. yd. riprap, 24-in. and 18-in. thick	6.00	9.30	7.10	6.00
270 cu. yd. riprap, 12-in. thick	6.00	9.80	8.00	7.00
770 cu. yd. concrete in structures	75.00	82.00	84.00	75.00
42,500 cu. yd. concrete in tunnel lining	30.00	25.50	29.00	31.00
93,500 lb. furn. and placing reinf. bars	.15	.14	.18	.15
30 sq. ft. furn. and placing elastic filler	1.00	.55	3.50	2.40
1,000 lb. furn. and placing metal water stops	.50	.35	.50	.30
117 lin. ft. furn. and laying 36-in. diam. extra-str. conc. culv. pipe	15.00	16.00	19.75	19.00
134 lin. ft. furn. and laying 24-in. diam. corru. metal pipe	5.00	5.50	7.85	6.00
522 lin. ft. furn. and laying 36-in. diam. corru. metal pipe	10.00	10.00	13.25	11.00
344 lin. ft. furn. and laying 42-in. diam. corru. metal pipe	11.00	11.30	14.75	12.00
96 lin. ft. furn. and laying 48-in. diam. corru. metal pipe	13.00	14.40	18.25	14.00
116 lin. ft. furn. and laying 54-in. diam. corru. metal pipe	15.00	18.40	21.25	17.00
140 lin. ft. furn. and laying 66-in. diam. corru. metal pipe	25.00	25.00	30.75	25.00
94 lin. ft. furn. and laying 78-in. diam. corru. metal pipe	35.00	36.00	39.90	35.00
120 lin. ft. furn. and laying 84-in. diam. corru. meta lpipe	40.00	40.00	43.70	38.00
62 lin. ft. furn. and erecting 10-ft. span multiple-plate corru. metal arch	45.00	45.00	37.80	45.00
96 lin. ft. furn. and erecting 13-ft. span multiple-plate corru. metal arch	60.00	54.00	49.45	60.00
3.0 mi. furn. and erecting right-of-way fence	$1,500	$2,160	$1,600	$1,500
3 gate furn. and installing metal fence gates	40.00	36.00	110.00	100.00
17 gate furn. and installing barbed wire fence gates	15.00	12.00	31.00	25.00
1.3 mi. removing fences and gates	160.00	310.00	816.00	500.00
10 cattle guard furn. and const. cattle guards	250.00	$2,150	852.70	950.00
228 post furn. and erecting guard posts	5.00	5.00	8.20	4.00
Lump sum, removal and reconstr. of telephone lines	$1,259	600.00	573.00	$1,000
1,790 lin. ft. furn. and constr. cable guardrail	2.00	2.80	3.00	4.00
1,500 lb. furn. and installing miscl. metalwork	1.00	.85	1.65	.40

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Sewerage . . .

California—Alameda County—District—Outfall

Ben C. Gerwick of San Francisco and George C. Pollock Co., Sacramento, Calif., with a bid of $1,687,916, was low on Schedule I, and Healy Tibbitt Consrtuction Co., San Francisco, with a bid of $1,267,071, was low for Schedule II for construction of the land section of the sewer outfall and subaqueous section for the East Bay Municipal Utility District, Oakland, Calif. A description of the work involved and those submitting bids were as follows:

SCHEDULE I—LAND SECTION OF THE SEWER OUTFALL

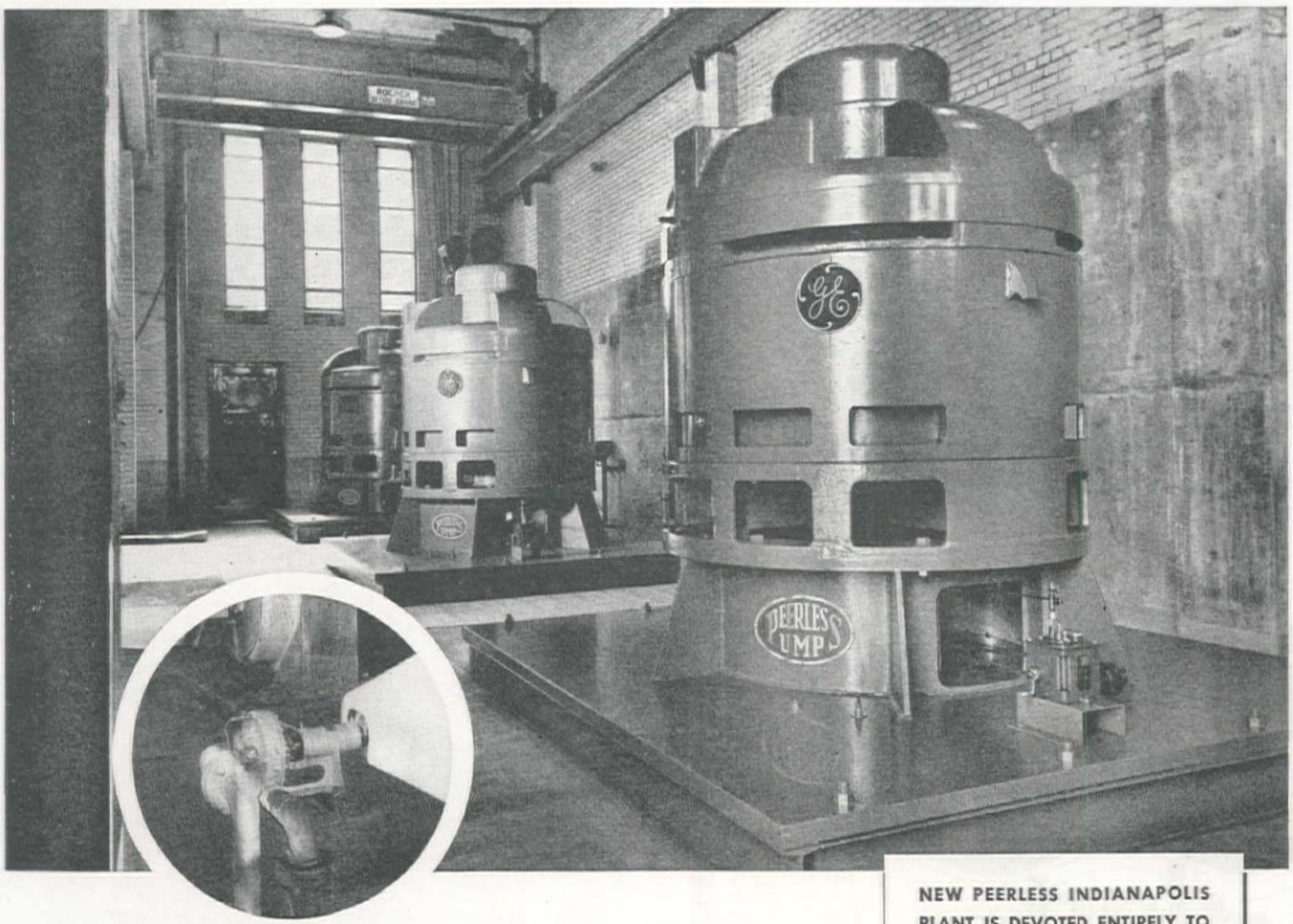
(A) Ben C. Gerwick and George C. Pollock Co.	$1,687,916
(B) Artukovich Bros.	1,867,867
(C) Steve P. Rados	1,927,198
(D) M & K Corp., Piombo Construction Co. and Fredrickson & Watson	2,197,443
(E) San Francisco Bridge Co., Duncanson-Harrelson, and Stolte, Inc.	2,208,159
(F) P. & J. Artukovich	2,547,773
(G) Guy F. Atkinson Co.	2,632,863

(1) 69,000 cu. yd. trench excav.
(2) 37,700 cu. yd. backfill and compaction
(3) 2,200 cu. yd. furn. and install a cr. rock base
(4) 40,000 sq. ft. sheeting ordered left in place
(5) 8,864 lin. ft. furn. and deliv. 108-in. ID reinf. conc. sewer pipe in 8.0-ft. minimum in lengths and two 4-ft. lengths
(6) 136 lin. ft. furn. and deliv. 108-in. ID reinf. conc. sewer pipe with manhole, in 8.0-ft. minimum lengths
(7) 68 lin. ft. furn. and deliv. 108-in. ID reinf. conc. sewer pipe with bolt assembly
(8) 25,700 cu. yd. load and haul clean, coarse and backfill matl.
(9) 9,000 lin. ft. install 108-in. ID reinf. conc. pipe
(10) 7,600 cu. yd. furn. and install Class A conc.
(11) 1,105,000 lb. furn. and place reinf. steel
(12) 11,417 bbl. furn. Portland cement
(13) 131,354 lin. ft. furn. timber piles up to 70-ft. long
(14) 96,484 lin. ft. furn. timber piles over 70-ft. long
(15) 356 piles install timber piles up to 40-ft. long
(16) 1,456 piles, install timber piles, 40- to 50-ft. long
(17) 456 piles, 50- to 60-ft. long
(18) 406 piles, 60- to 70-ft. long
(19) 300 piles, 70- to 80-ft. long
(20) 190 piles, 80- to 90-ft. long
(21) 190 piles, 90- to 100-ft. long
(22) 290 piles, 100- to 110-ft. long
(23) 90 piles, 110- to 120-ft. long
(24) 6,700 lin. ft. furn. steel pipe piles
(25) 10 piles, install steel pipe piles, up to 40-ft. long
(26) 10 piles, 40- to 50-ft. long
(27) 10 piles, 50- to 60-ft. long
(28) 10 piles, 60- to 70-ft. long
(29) 10 piles, 70- to 80-ft. long
(30) 10 piles, 80- to 90-ft. long
(31) 10 piles 90- to 100-ft. long
(32) 10 piles, 100- to 110-ft. long
(33) 10 piles, 110- to 120-ft. long
(34) 3,950 lin. ft. fur. and install timber test piles
(35) 732 lin. ft. furn. and install steel pipe test piles
(36) 1,000 lin. ft. test borings
(37) lump sum, furn. and install cement-lined and coated, welded steel pipe
(38) lump sum, furn. and install seamless steel pipe piles between Sta. 14 plus 20 and Sta. 14 plus 81
(39) 6,840 lin. ft. remove, replace and install fence bet. Sta. 21 plus 90, and Sta. 90 plus 30
(40) 200 sq. yd. replace bit. pavement
(41) 1,340 lin. ft. furn. and install 12-in. ID vit. clay sewer pipe
(42) 830 lin. ft. furn. and install 15-in. ID vit. clay sewer pipe
(43) 560 lin. ft. furn. and install 18-in. ID vit. clay sewer pipe
(44) 7 manholes, furn. and install manhole for vit. clay sewer pipe
(45) 2,120 lin. ft. construct drainage ditch
(46) lump sum, relocate floodlight poles
(47) lump sum, furn. and install 12-kv. temp. underground serv.
(48) lump sum, furn. and install temp. overhead fire alarm system
(49) lump sum, remove and rebuild overhead electrical construction
(50) lump sum, furnish and install conduit system
(51) lump sum, install and connect 12 kv. oil switches
(52) lump sum, furnish and install grounding sys.
(53) lump sum, furn. and install 12-kv. cable
(54) lump sum, furn. and install series street lighting
(55) lump sum, furn. and install fire alarm system
(56) lump sum, furn. and install telephone cable
(57) lump sum, final cleanup.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
(1)	3.40	5.00	4.00	6.32	8.70	7.50	9.00
(2)	.85	.75	1.00	2.02	1.70	1.50	1.25
(3)	5.60	3.50	6.00	6.50	6.60	4.00	6.50
(4)	.075	.30	.45	.13	.10	.30	.15
(5)	82.00	68.25	76.40	79.50	71.00	80.00	76.00
(6)	139.00	112.00	128.80	130.00	163.00	120.00	120.00
(7)	133.00	140.00	161.80	162.00	166.00	143.00	150.00
(8)	.40	1.00	1.00	.75	1.00	1.00	.75
(9)	7.70	9.00	17.45	18.50	11.00	15.00	25.00
(10)	12.00	12.15	10.00	16.00	17.50	36.00	32.00
(11)	.065	.10	.07	.077	.083	.12	.08
(12)	3.00	4.85	6.30	6.05	6.00	6.00	5.00
(13)	.44	.41	.33	.45	.68	.50	.65
(14)	.52	.55	.41	.63	.80	.70	.80
(15)	20.00	26.84	20.50	32.00	16.50	50.00	44.00
(16)	20.00	26.84	21.20	32.00	19.50	55.00	46.00
(17)	22.00	28.05	22.25	32.00	25.00	58.00	48.00
(18)	22.00	29.70	24.00	32.00	30.00	67.00	50.00
(19)	26.00	40.32	29.00	44.00	34.00	71.00	52.00
(20)	26.00	42.19	30.50	44.00	37.00	78.00	55.00
(21)	26.00	43.50	32.00	44.00	44.00	85.00	60.00
(22)	33.00	51.86	36.50	57.00	48.00	98.00	65.00
(23)	33.00	64.35	44.00	70.00	52.00	1.20	70.00
(24)	3.20	3.58	3.25	4.00	4.50	3.50	4.00
(25)	43.00	32.45	25.75	40.00	40.00	69.00	54.00
(26)	55.00	35.75	28.75	40.00	60.00	90.00	56.00
(27)	63.00	35.75	29.75	40.00	70.00	115.00	58.00
(28)	67.00	35.75	30.25	40.00	85.00	125.00	60.00
(29)	79.00	48.95	37.25	44.00	100.00	140.00	62.00
(30)	90.00	52.25	39.75	57.00	110.00	165.00	70.00
(31)	95.00	52.25	40.75	57.00	125.00	185.00	80.00
(32)	108.00	52.25	41.75	57.00	135.00	210.00	90.00
(33)	112.00	52.25	43.75	70.00	150.00	220.00	100.00
(34)	3.00	2.69	1.65	3.10	3.00	2.50	3.00
(35)	6.00	5.50	5.00	6.30	7.00	5.00	10.00
(36)	4.30	3.25	1.60	3.80	2.50	4.00	2.50
(37)	$5,000	$6,400	$8,655	$6,500	$6,160	$4,300	$10,000
(38)	$13,600	$10,529	$5,575	$11,000	$11,850	$12,000	$22,500
(39)	1.00	2.00	.80	.75	.60	2.00	1.50
(40)	6.00	5.00	5.85	4.00	4.00	5.00	3.00
(41)	11.00	7.00	7.75	9.50	5.00	7.90	14.00
(42)	12.00	9.00	9.95	10.00	7.00	10.00	16.00
(43)	14.00	13.00	11.20	14.00	9.50	12.00	22.00
(44)	180.00	250.00	225.00	350.00	215.00	250.00	300.00
(45)	5.00	1.50	5.55	5.70	1.00	7.00	6.00
(46)	$1,033	$1,309	$1,190	900.00	835.00	500.00	$1,140
(47)	$16,240	$1,408	$1,280	$6,700	$6,450	$18,340	$8,795
(48)	276.00	717.20	652.00	300.00	290.00	350.00	392.00
(49)	904.00	872.82	793.50	700.00	675.00	568.00	929.00
(50)	$6,184	$6,102	$5,548	$7,000	$6,750	$4,168	$9,248

(Continued on next page)

WIDEST CAPACITY RANGE



FROM A COMPREHENSIVE LINE OF VERTICAL AND HORIZONTAL PUMPS

Peerless offers 2 to 220,000 gallons per minute

A tapful or a torrent! No matter what your water capacity requirements are, Peerless can meet your pumping needs.

Fractional hp horizontals, like the Peerless "Fluidyne" pumps handling cooling-jacket water in the inset above, furnish a few gallons a minute. The huge Peerless mixed-flow pumps in the larger photo, pump away drainage water at the rate of tens of thousands of gallons a minute.

Widest capacity range is but one of a host of reasons why industries, municipalities and commercial businesses plan with Peerless for all their needs for pumps. Here are others:

ALL PRACTICAL HEADS: Lifting water from 1000 feet or more is a practical accomplishment of Peerless vertical deep well pumps. Pumping against heads of 690 feet is a common task for Peerless horizontal centrifugal pumps.

ALL TYPES OF DRIVE: Electric motor, right angle gear, engine, belt (V or flat) or combinations of the above, are all available from Peerless, with pump and driver engineered as a unit.

MODERN DESIGN: Peerless pumps are designed for top flight performance over extended periods of time. And the practical consideration of ease of maintenance and repair is figured in to their functional, good looking design.

NATIONWIDE SERVICE: Peerless sales and field service is available in all principal U. S. cities and abroad. Plan with Peerless for all your pumping needs. Individual bulletins on all types of Peerless Pumps are available upon request.

NEW PEERLESS INDIANAPOLIS PLANT IS DEVOTED ENTIRELY TO PUMP PRODUCTION AND SERVICE

Here is one of America's newest pump plants—19 acres of modern manufacturing facilities devoted to precision production of horizontal and vertical pumps, centrally located at Indianapolis. Plan with Peerless for pumps plus fast, complete pump service.

Peerless
VERTICAL AND HORIZONTAL
Pumps

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION

Los Angeles 31, California — Indianapolis, Indiana

District Offices: New York 5, 37 Wall Street; Chicago 40, 4554 N. Broadway; Atlanta Office: Rutland Bldg., Decatur, Ga.; Omaha, Nebr., 4330 Leavenworth Street; Dallas 1, Texas, 3905 Elm Street; Fresno, Calif.; Los Angeles 31, Calif.

PEERLESS PUMPS

(51)	229.00	327.25	297.50	$1,000	950.00	430.00	$1,306
(52)	188.00	387.20	352.00	300.00	250.00	150.00	340.00
(53)	$2,542	$17,308	$15,735	$16,500	$13,700	$8,250	$20,405
(54)	$4,736	$4,755	$4,323	$5,000	$4,700	$3,180	$6,406
(55)	355.00	521.40	474.00	650.00	630.00	365.00	859.00
(56)	79.00	404.77	136.95	140.00	130.00	50.00	179.00
(57)	$1,000	$2,000	$3,900	$11,000	$2,500	$4,000	$5,000

SCHEDULE II—SUBAQUEOUS SECTION OF THE SEWER OUTFALL

(A) Healy Tibbitt Construction Co. $1,267,071
(B) George Pollock and Ben C. Gerwick 1,416,861
(C) Pacific Bridge Co. 1,421,374
(D) Guy F. Atkinson Co. 2,097,379
(E) San Francisco Bridge Co., Duncanson-Harrelson, and Stolte, Inc. 2,575,236

(1) 5,280 lin. ft. furn. and deliv. 96-in. ID, 1750-D reinf. conc. pipe
(2) 64 lin. ft. furn. and deliv. 96-in. ID, 1750-D reinf. conc. pipe diffuser sects., two 24-ft. lengths and one 16-ft. length
(3) 32 lin. ft. furn. and deliv. 96-in. ID, 1750-D, reinf. pipe tees, two 16-ft. lengths
(4) 11 lengths, furn. and deliv. 96-in. ID, 1750-D, reinf. conc. pipe with one manhole, complete with cover, in each length. Lengths to be the same as those furn. under Item 1 hereof
(5) 12 lin. ft. furn. and deliv. 96-in. ID, 1750-D, reinf. conc. pipe in 4-ft. lengths
(6) 4 lin. ft. furn. and deliv. 96-in. ID, 1750-D, reinf. conc. pipe in 4-ft. lengths, with one end plain, having no bell
(7) 56 lin. ft. furn. and deliv. 78-in. ID, 1,000-D, reinf. conc. pipe, diffuser sects., one 24-ft. length and two 16-ft. lengths
(8) 56 lin. ft. furn. and deliver 60-in. ID, 1,000-D, reinf. conc. pipe, diffuser sects., one 24-ft. length and two 16-ft. lengths
(9) 40 lin. ft. furn. and deliv. 42-in. ID, 1,000-D, reinf. conc. pipe, diffuser sects., one 24-ft. length, and one 16-ft. length
(10) 24 lin. ft. furn. and deliv. 42-in. ID, 1,000-D, reinf. conc. pipe, diffuser end sect., one 24-ft. length incl. end manhole cover
(11) 16 lin. ft. furn. and deliver 96- to 78-in. ID, 1,000-D, reinf. conc. pipe reducer sect. in 16-ft. length
(13) 16 lin. ft. furn. and deliv. 60- to 42-in. ID, 1,000-D, reinf. conc. pipe, reducer sect., one 16-ft. length
(12) 16 lin. ft. furn. and deliv. 78- to 60-in. ID, 1,000-D reinf. conc. pipe, reducer sect., one 16-ft. length
(14) 48 lin. ft. furn. and deliv. 72-in. ID, 1,500-D, reinf. conc. pipe with tongue and groove jts. in 8-ft. lengths
(15) 68 lin. ft. install 108-in. ID reinf. conc. pipe with bolt assemblies
(16) 5,560 lin. ft. install 96-in. ID reinf. conc. pipe
(17) 32 lin. ft. install 96-in. ID reinf. conc. pipe tees
(18) 48 lin. ft. install 72-in. ID reinf. conc. pipe with tongue and groove joints
(19) 288 lin. ft. install 96-in. ID to 42-in. ID reinf. conc. pipe diffuser sections
(20) 150 lin. ft. excav. of trench 35- to 45-ft. depth from mud line to bottom of trench
(21) 260 lin. ft. same, 30- to 35-ft. depth
(22) 2,585 lin. ft. same, 25- to 30-ft. depth
(23) 2,175 lin. ft. same, 20- to 25-ft. depth
(24) 370 lin. ft. same, 10- to 20-ft. depth
(25) 340 lin. ft. same, 0- to 10-ft. depth
(26) 70 lin. ft. excav. of trench for 108-in. ID reinf. conc. pipe, east of transition struct.
(27) 6,600 lin. yd. excav. for struct.
(28) 90 cu. yd. furn. and install Class A conc.
(29) 335 cu. yd. furn. and install tremie conc.
(30) 687 bbl. furn. Portland cement
(31) 127 cwt. furn. calcined reactive siliceous matl.
(32) 28,000 lb. furn. and install reinf. steel
(33) lump sum, furn. and install steel manhole covers, monel bolts and washers and 12-in. ID steel vent pipe
(34) 2,000 lin. ft. subaqueous probings
(35) 126,300 cu. yd. furn. and install clean, coarse sand backfill
(36) 11,280 cu. yd. furn. and install 1½- to 2½-in. crushed rock or gravel
(37) 3,970 cu. yd. furn. and install 4- to 12-in. cr. rock
(38) 1,770 cu. yd. furn. and install 6- to 24-in. cr. rock
(39) 433 sq. yd. furn. and install paving
(40) lump sum, final cleanup.

	(A)	(B)	(C)	(D)	(E)
(1)	75.00	108.00	76.00	75.25	76.00
(2)	150.00	140.00	140.00	135.00	140.00
(3)	300.00	263.00	260.00	260.00	260.00
(4)	$2,500	$2,352	$2,500	$2.500	$2,515
(5)	130.00	136.00	120.00	125.00	205.00
(6)	325.00	150.00	170.00	170.00	168.00
(7)	140.00	148.00	130.00	130.00	130.00
(8)	125.00	133.00	110.00	115.00	115.00
(9)	110.00	120.00	100.00	100.00	100.00
(10)	135.00	113.00	120.00	120.00	122.00
(11)	250.00	192.00	230.00	230.00	230.00
(12)	200.00	158.00	180.00	180.00	183.00
(13)	135.00	113.00	120.00	194.00	122.00
(14)	25.00	25.00	25.00	22.00	23.00
(15)	135.00	18.00	25.00	100.00	150.00
(16)	48.25	10.25	25.00	102.00	80.50
(17)	65.00	15.00	25.00	100.00	180.00
(18)	30.00	25.00	25.00	100.00	145.00
(19)	45.00	10.00	25.00	100.00	180.00
(20)	50.00	100.00	120.00	201.00	510.00

	(A)	(B)	(C)	(D)	(E)
(21)	41.00	80.00	90.00	154.00	335.00
(22)	32.00	71.00	62.00	121.00	175.00
(23)	20.00	68.00	43.00	92.00	110.00
(24)	13.00	63.00	25.00	57.00	110.00
(25)	6.00	57.00	10.00	32.00	110.00
(26)	35.00	32.00	130.00	50.00	130.00
(27)	4.00	.75	1.50	1.00	4.25
(28)	80.00	55.00	50.00	90.00	200.00
(29)	30.00	27.00	80.00	70.00	43.00
(30)	4.00	3.45	5.00	4.50	4.00
(31)	1.40	3.00	2.00	2.00	2.00
(32)	.13	.11	.13	.10	.15
(33)	$1,100	$2,750	$2,000	$5,000	$1,500
(34)	5.75	1.15	3.70	3.00	4.00
(35)	1.50	1.35	2.30	2.00	2.90
(36)	4.00	5.30	7.20	4.00	9.00
(37)	8.00	5.00	6.20	4.00	17.00
(38)	5.00	6.20	8.40	4.00	13.00
(39)	2.00	3.25	4.00	3.00	7.00
(40)	$2,000	$2,000	$5,500	$5,000	$1,500

Highway and Street . . .

Arizona—Coconino County—State—Grade and Surf.

Basich Bros. Construction Co. and R. L. & N. L. Basich, San Gabriel, Calif., with a bid of $565,537, were low before the Arizona State Highway Department for the clearing and grubbing, grading, draining, select material, aggregate base and bituminous plant mix on approx. 5.5 mi. of the Ash Fork-Flagstaff Highway near Williams. Unit bids were submitted as follows:

(1) Basich Bros., R. L. & N. L. Basich....$565,537
(2) Vinnell Co., Inc. 609,976
(3) Phoenix-Tempe Stone Co. 614,122
(4) Arizona Sand and Rock Co. 619,327
(5) Yount Constructors, Inc. 632,248
— Orr & Orr Construction Co. $661,345
— Wallace & Wallace 664,332
— W. J. Henson 672,495
— Fisher Contracting Co. 729,224

		(1)	(2)	(3)	(4)	(5)
67	acre clearing and grubbing	395.00	500.00	140.00	280.00	300.00
354,965	cu. yd. roadway excavation	.60	.79	.76	.78	.70
4,300	cu. yd. overbreakage	.45	.5925	.57	.585	.525
2,200	cu. yd. slides	.30	.395	.38	.39	.35
9,555	cu. yd. drainage excavation	1.50	.80	1.75	.95	1.85
16,300	lin. ft. grader ditches	.15	.06	.07	.13	.10
2,350	lin. ft. crown ditches	.40	.12	.14	.41	.30
2,000	lin. ft. placing crown dikes	.40	.15	.21	.27	.30
1,965	cu. yd. structural excavation	3.50	2.50	3.00	2.30	3.10
52,700	cu. yd. mi. overhaul	.30	.30	.40	.30	.25
12,255	cu. yd. borrow (CIP)	.50	.56	.40	.60	.57
6,300	cu. yd. stripping pits	.25	.30	.20	.21	.30
13,150	M. gal. watering (CIP)	1.50	1.20	2.40	2.60	2.70
4,150	hr. rolling	6.00	6.50	7.00	5.60	6.50
27,200	ton select material for subgrade seal (CIP)	.48	.65	.45	.53	.80
16,700	ton select material (CIP)	.55	.55	.52	.62	.70
17,300	ton aggregate base (CIP)	.85	1.00	.85	1.00	1.40

(Continued on next page)

Los Angeles Freight Yard

. . . Continued from page 89

Another tower, slightly larger than the control towers and of similar construction is being built between the classification and departure yards to house the yardmaster controlling all activity in the three yard units by means of radio and loudspeakers.

Fourteen switch engines will be equipped with two-way radio for communication with the employes supervising yard operations. Twenty-seven high-level loudspeakers will be located throughout the yard for paging personnel who may then go to the nearest of 70 low-level talk-back speakers being installed and communicate directly with such employes.

A car inspection facility consisting of a reinforced concrete pit beneath and alongside the hump approach track will house inspectors viewing the undercarriages of the moving cars, and towers of steel frame with sheet iron covering will house inspectors viewing the sides and roofs of the cars. Floodlights and mirrors will aid the inspectors in the detection of defects.

Relocation of a large part of the car repair facilities was necessary.

Design and construction of the project is under the direction of E. E. Mayo, Chief Engineer of the Southern Pacific Company. H. W. Neuebaumer is Construction Superintendent in charge of the field work.

50	ton blotter matl. for bitum. surface treatment (CIP)	4.00	3.00	2.60	5.00	3.00
1,675	ton cover material for seal coat (Type B) (CIP)	4.00	2.60	3.25	4.75	6.00
12,000	ton bitum. mix (Cl. II-Plant Mix) (CIP except cost of liquid asphalt)	2.50	2.30	2.40	2.40	3.15
1,210	ton liquid asph. for bitum. mix and bitum. surface treatment (Grade SC-6) (CIP)	27.00	29.00	36.00	31.00	30.00
435	ton liquid asph. for prime coat and bitum. surface treatment (Grade RC-2) (CIP)	34.00	33.00	39.00	35.00	33.00
195	ton emulsified asph. for seal coat (Grade A) (CIP)	35.00	35.00	40.00	37.00	35.00
554	cu. yd. Class A Concrete (including cement)	60.00	50.00	50.00	52.00	44.00
60,000	lb. reinforcing steel (bars) (CIP)	.11	.11	.12	.11	.11
188	lin. ft. 24-in. corr. metal pipe (CIP except excav.)	4.75	4.60	4.25	4.80	5.00
446	lin. ft. 30-in. corr. metal pipe (CIP except excav.)	6.00	5.80	5.30	5.90	5.80
552	lin. ft. 36-in. corr. metal pipe (CIP except excav.)	9.00	9.00	8.00	8.70	8.00
564	lin. ft. 42-in. corr. metal pipe (12 ga.) (CIP except excav.)	11.00	11.00	10.00	10.20	9.50
56	lin. ft. 42-in. corr. metal pipe (10 ga.) (CIP except excav.)	13.00	12.00	11.50	12.35	11.50
116	lin. ft. 48-in. corr. metal pipe (CIP except excav.)	12.00	13.00	11.25	11.50	11.50
1	ea. cattle guard (3-unit) (std. C-14) (CIP except excav. and concrete)	750.00	600.00	850.00	796.00	700.00
1	ea. cattle guard (6-unit) (Std. C-14) (CIP except excav. and concrete)	$1,500	$1,200	$1,600	$1,546	$1,500
1	ea. reconstruct cattle guard, Lt. Sta. 379 plus 60 plus (CIP except excav. and concrete)	200.00	200.00	75.00	116.00	200.00
7,640	lin. ft. road guard (std. C-7) (CIP)	3.60	2.20	2.40	2.20	3.60
96	ea. guide posts (std. C-8) (Type B) (CIP)	5.00	4.00	4.75	5.50	6.00
46	ea. right-of-way markers (std. C-1) (any type) (CIP)	7.50	7.00	8.50	10.60	7.00
57,220	lin. ft. line fence (std. C-15 or C-16) (CIP)	.25	.14	.16	.18	.16
1	ea. steel fence gate (std. C-15 or C-16) (CIP)	50.00	35.00	65.00	56.00	50.00

California—Kern County—State—Grade and Pave

Griffith Co., Los Angeles, with a bid of $309,533, was low before the California Division of Highways for the grading and paving with Portland cement concrete on cement-treated subgrade and plant-mixed surfacing on Portland cement concrete base and imported borrow of about one mile of Golden State Ave. between 23rd St. and H St. in the City of Bakersfield. Unit bids were submitted as follows:

Griffith Co. $309,533
Guy F. Atkinson Co. 346,558
J. E. Haddock, Ltd. $351,104

		(1)	(2)	(3)
7,500	cu. yd. removing concrete	3.60	4.00	3.50
26,000	cu. yd. roadway excav.	.87	.90	1.03
2,650	cu. yd. struct. excav.	2.05	3.50	3.00
46,000	sq. yd. compacting original ground	.03	.06	.05
17,000	cu. yd. imported borrow	1.10	1.00	1.21
2,500	cu. yd. imported top soil	1.90	2.00	2.50
6,900	sq. yd. cultivation (preparatory landscaping)	.07	.10	.05
3,900	sq. yd. preparing Cl. "C" subgrade	.20	.15	.35
Lump sum,	dev. water supply and furn. watering equip.	$2,400	$5,500	$9,500
2,600	M. gal. applying water	1.55	1.50	1.75
56	sta. finishing roadway	22.00	35.00	20.00
41,600	sq. yd. mix. and compact. (cem. treated subgr.)	.28	.28	.28
1,850	bbl. P.C. (cem. treated subgr.)	3.90	4.00	3.70
35	ton liquid asph. MC-2 (curing sl.)	50.00	35.00	60.00
7	ton liquid asph. SC-2 (pr. ct.)	27.00	30.00	48.00
9	ton asphalt emul.	50.00	50.00	50.00
2,700	ton mineral aggre. (P.M.S.)	4.20	6.00	5.30
140	ton pav. asph. (P.M.S.)	20.00	25.00	25.00
760	cu. yd. P.C.C. base	12.00	15.00	15.00
9,625	cu. yd. Cl. "B" P.C.C. (pavement)	12.90	14.00	14.70
8,700	ea. pavement tie bolt assemblies	.60	.60	.60
13	cu. yd. Cl. "A" P.C.C. (structures)	90.00	100.00	100.00
700	lb. bar reinf. steel	.15	.20	.10
840	cu. yd. P.C.C. (curbs, gutters, sidewalk)	38.50	45.00	38.00
55	ea. curb dowels	1.00	1.00	1.00
14	ea. right-of-way monuments	8.00	10.00	7.00
7	ea. center line monuments	10.00	20.00	12.00
12	ea. moving and resetting street marker posts	25.00	20.00	25.00
6	lin. ft. 12-in. reinf. conc. pipe	3.00	3.00	3.00
426	lin. ft. 18-in. reinf. conc. pipe	3.50	4.00	3.10
1,278	lin. ft. 24-in. reinf. conc. pipe	5.00	5.00	5.00
225	lin. ft. 27-in. reinf. conc. pipe	6.50	7.50	6.00
48	lin. ft. salv. exist. 18-in. conc. pipe	1.25	3.00	1.00
48	lin. ft. relay. salv. 18-in. conc. pipe	1.25	2.00	1.20
354	lin. ft. salv. exist. part circle metal culv.	1.00	1.50	1.20
4	ea. salv. frames and grates	12.50	10.00	15.00
9	ea. catch basin frames and covers	27.50	75.00	60.00
1	ea. adjust. manhole to grade	30.00	50.00	30.00
14	ea. horizontal reflector units	10.00	20.00	8.00
1,450	lin. ft. ¾-in. galv. steel pipe (nozzle lines)	.45	.50	.41
2,175	lin. ft. 1-in. galv. steel pipe (nozzle lines)	.45	.60	.50
950	lin. ft. 1¼-in. galv. steel pipe (nozzle lines)	.50	.70	.64
18	ea. control assemblies	15.00	20.00	20.00

Wyoming—Crook County—State—Grade and Surf.

Peter Kiewit Sons' Co., Omaha, Neb., with a low bid of $442,933, was awarded the contract by the Wyoming Highway Department for the grading, base course surfacing, asphaltic treatment by the roadmix method and miscellaneous work on 20.4 mi. of the Colony Road. Unit bids were submitted as follows:

(1) Peter Kiewit Sons' Co. $442,933
(2) Inland Construction Co. 444,898
(3) Summit Construction Co. 451,645
(4) Lou Richardson 452,689
(5) Northwestern Engineering Co. $457,000
(6) S. Birch & Son Construction Co. 468,520
(7) Estimate 524,330

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
830	hr. scraper operation	15.00	15.00	12.00	16.00	12.00	12.00	12.00
1,750	hr. patrol operation	10.00	9.00	8.50	10.00	10.00	7.25	9.00
415	hr. sheep's foot roller operation	10.00	11.00	9.30	10.00	10.00	9.00	10.00
210	hr. bulldozer operation	10.00	11.00	10.00	10.00	11.00	9.00	11.00
1,500	M. gal. watering (emb.)	2.50	3.00	3.00	3.00	2.50	2.50	2.50
2,100	M. gal. watering (base)	2.50	3.00	3.00	3.00	2.50	2.50	2.50
870	hr. roller operation (base)	6.00	6.50	5.50	5.50	6.00	6.00	6.00
380	hr. pneumatic tired roller operation	5.50	5.50	5.50	5.50	6.00	6.00	6.00
2,700	ton stone chips, Type A	5.00	4.00	6.50	4.50	3.50	5.50	6.00
10,400	ton crushed gravel surfacing, Type B	.85	.76	.58	.60	.70	.76	.75
48,000	ton crushed gravel base course (1-in. max.)	.60	.72	.61	.52	.65	.72	.65
55,800	ton crushed gravel base course (2-in. max.) grading B	.48	.63	.54	.46	.60	.68	.55
905	ton asphaltic material MC-3	36.00	35.00	39.00	33.00	40.00	35.00	38.00
330	ton asphaltic material RC-Seal	38.00	40.00	40.00	33.00	39.00	36.00	40.00
590	ton asphaltic material MC-Prime	38.00	40.00	39.00	33.00	38.00	34.00	40.00
831,400	cu. yd. mi. haul	.108	.105	.108	.105	.12	.10	.15

(Continued on next page)

1,373,500 ton mi. haul of surfacing material	.06	.06	.0675	.071	.06	.07	.085
266,600 sq. yd. processing	.055	.06	.06	.05	.10	.05	.08
2 ea. R. C. project markers	25.00	20.00	30.00	30.00	25.00	30.00	25.00
2 ea. providing and maint. field testing laboratory building	500.00	600.00	500.00	500.00	766.00	800.00	500.00
9,000 ton special gravel surfacing—Type B	.40	.23	.36	.30	.30	.30	.30
514 lin. ft. 18-in. C.M.P.	5.00	4.83	3.25	4.00	4.00	4.00	4.50
186 lin. ft. 24-in. C.M.P.	7.00	7.10	5.75	6.00	6.00	6.00	6.00
126 lin. ft. 30-in. C.M.P.	8.00	8.65	7.00	7.50	8.00	7.00	8.00
98 lin. ft. 36-in. C.M.P.	12.00	11.40	10.25	11.00	11.00	10.00	11.00
36 lin. ft. 42-in. C.M.P.	15.00	13.70	11.00	12.00	12.00	12.00	15.00
16 lin. ft. 48-in. C.M.P.	18.00	21.00	14.25	18.00	16.00	15.00	20.00
200 cu. yd. excav. for pipe culverts	3.00	2.60	2.00	2.00	2.00	2.50	2.50
50 cu. yd. structure excavation	3.50	4.00	4.00	2.50	3.00	5.00	3.00
100 cu. yd. Class 1 riprap	20.00	16.00	15.00	20.00	10.00	12.00	15.00
103,600 cu. yd. excav. (selected embankment)	.40	.33	.35	.54	.30	.56	.40
90 hr. mechanical tamping	8.00	8.00	6.00	6.00	6.00	5.50	6.00
12 cu. yd. Class C concrete	85.00	65.00	100.00	110.00	75.00	90.00	70.00
2,120 lb. reinforcing steel	.20	.16	.15	.20	.20	.25	.25
5 cu. yd. structure excavation	3.50	4.00	6.00	2.50	3.00	5.00	3.00
5 cu. yd. grouted riprap	25.00	23.00	30.00	25.00	15.00	14.00	25.00
5 hr. mechanical tamping	8.00	8.00	6.00	6.00	6.00	5.50	6.00

Utah—Davis County—State—Pave

The Strong Co. of Springville, Utah, with a bid of $277,454 was low before the State Road Commission of Utah for the paving with Portland cement concrete of 5.85 mi. of the North Bountiful to Farmington highway, U. S. 89 and 91. Unit bids were submitted as follows:

(1) Strong Co. $277,454
(2) W. W. Clyde & Co. 280,682
(3) Parsons & Fife Construction Co. 290,925
(4) Gibbons & Reed Co. $299,627
(5) LeGrande Johnson 307,899
(6) Government estimate 280,770

	(1)	(2)	(3)	(4)	(5)	(6)
76,450 sq. yd. P.C. concrete pavement 8-in. thick	2.93	3.00	2.98	3.20	3.30	3.00
1,800 ton plant mixed bituminous surfacing	2.75	3.50	4.50	3.30	5.15	4.50
22,000 gal. bituminous matl., Type 120-150 pent.	.13	.12	.12	.115	.15	.12
7,150 gal. bituminous matl., Type MC-1	.14	.14	.11	.115	.15	.15
3,600 gal. bituminous matl., Type RC-4	.14	.15	.12	.17	.15	.15
180 ton cover material	3.50	3.00	4.00	4.40	5.00	3.00
46,000 ton cr. rock or cr. gravel surface course	.78	.70	.92	.77	.65	.70
475 1,000-gal. watering	1.60	1.50	2.00	1.50	2.00	2.00
350 hr. rolling	6.00	6.00	4.00	5.75	5.00	5.00
5.853 mi. shaping subgrade	200.00	350.00	300.00	435.00	800.00	150.00
5,000 ton cr. rock or cr. gravel surf. crse (place in stkpl.)	.72	.65	.80	.72	.65	.55

Montana—Fergus County—State—Grade and Surf.

H G R Construction Co., Inc., Great Falls, Mont., with a bid of $335,946, was low before the State Highway Commission of Montana for the grading, graveling and oiling of 13 mi. of the Lewistown-Roy Highway. The job includes a 38-ft. treated timber bridge. Unit bids were submitted by the following:

(1) H G R Construction Co., Inc. $335,946
(2) Thos. Staunton & E. C. Powell 353,656
(3) S. Birch & Sons Construction Co. 360,975
(4) Holzworth Construction Co. and Lou Richardson 370,193
(5) Nilson-Smith Construction Co. 373,830
— Peter Kiewit Sons' Co. $378,435
— Inland Construction Co. 379,849
— Stanley H. Arkwright, Inc. 416,437
— Taggart Construction Co. 418,875
— Union Construction Co., Inc. 495,294
— S. J. Groves & Sons Co. 521,209

	(1)	(2)	(3)	(4)	(5)
418,993 cu. yd. uncl. excav. and borrow	.16	.18	.17	.185	.18
2,418 cu. yd. culvert excavation	1.00	1.50	1.50	2.00	1.50
498,576 sta. yd. overhaul	.01	.015	.01	.01	.01
25,426 mi. yd. overhaul	.15	.20	.20	.10	.18
122,426 cu. yd. select. bor. base co.	.60	.70	.77	.71	.75
44,262 ton Type A top ¾-in. gr.	1.00	.85	.95	.95	1.02
257,607 gal. MC-3 asph. road oil	.14	.15	.135	.165	.15
9,600 M. gal. watering embank. and surf. crse.	1.50	1.50	1.90	2.00	1.75
900 unit rolling surface courses	7.00	7.00	6.50	7.00	8.00
13.067 mi. processing	$1,000	$1,000	865.00	$1,000	800.00
620 lin. ft. 15-in. reinf. conc. pipe cul.	3.00	2.73	2.75	2.75	3.00
64 lin. ft. 18-in. reinf. conc. pipe cul.	4.00	3.45	3.75	4.00	4.00
1,594 lin. ft. 24-in. reinf. conc. pipe cul.	6.00	5.03	6.00	6.00	6.00
72 lin. ft. 30-in. reinf. conc. pipe cul.	7.00	7.20	7.00	8.50	8.00
354 lin. ft. 36-in. reinf. conc. pipe cul.	10.00	10.25	11.40	11.50	11.00
378 lin. ft. 48-in. reinf. conc. pipe cul.	17.00	16.25	18.00	17.50	17.00
92 lin. ft. 60-in. reinf. conc. pipe cul.	25.00	24.00	26.00	25.50	25.00
482 lin. ft. 24-in. reinf. conc. pipe cul. E.S.	7.00	6.00	6.80	6.50	7.00
64 lin. ft. 72-in. S.P.P.C. Sec. M. 0.035	30.00	30.00	34.00	32.00	37.00
112 lin. ft. 84-in. S.P.P.C. Sec. M. 0.045	32.00	32.00	38.00	34.00	40.00
172 lin. ft. 90-in. S.P.P.C. Sec. M. 0.048	40.00	36.00	43.00	39.00	45.00
4,125 lb. reinforcing steel	.20	.15	.12	.15	.15
105 cu. yd. Class "A" concrete	80.00	80.00	60.00	70.00	60.00
151 sq. yd. grouted riprap	8.00	10.00	7.50	12.00	6.00
167 cu. yd. gravel backfill	3.00	2.00	3.50	3.00	3.00
7,900 lin. ft. wood slat snow fence	.45	.43	.55	.40	.60
2 ea. conc. project markers	25.00	15.00	15.00	15.00	25.00
162 ea. conc. right-of-way monuments	4.00	4.00	4.90	4.50	6.00
70 ea. conc. station markers	7.00	6.00	7.00	6.50	8.00
4 ea. refl. R.R. crossing signs	100.00	125.00	200.00	75.00	50.00
Lump sum, Rev. E. St. M. Tr. 107 plus 27 plus	500.00	500.00	$1,310	$1,500	$2,550
22 ea. 25-ft. tr. tim. piles	45.00	75.00	55.00	68.00	68.00
16 99 M.b.m. treated timber	240.00	300.00	285.00	248.00	248.00
0.86 M.b.m. untreated timber	200.00	300.00	260.00	248.00	248.00
3,944 ton stkp. cov. co. ½-in. gr.	1.50	1.10	.80	1.30	1.75
2,000 ton Type "A" stkp. ¾-in. gr.	1.10	.80	.75	.95	1.05

Oregon—Yamhill County—State—Grade and Surf.

J. R. Taggart & Co., Inc. and J. R. Taggart of Salem, Ore., with a bid of $414,346, were low before the Oregon State Highway Commission for the grading and paving with Portland Cement concrete and Class "B" asphaltic concrete of 5.2 mi. of the Newberg to McMinnville Section of the Pacific West Highway in Yamhill County. Unit bids were submitted by the following:

(1) J. R. Taggart & Co. and J. R. Taggart $414,346
(2) O. C. Yocom Co. 427,581
(3) J. C. Compton Co. $458,298
(4) Porter W. Yett 459,255

	(1)	(2)	(3)	(4)
Lump sum, clearing and grubbing	$9,500	$6,500	$9,000	$9,000
7,600 cu. yd. removal of pavement	.75	.50	.75	.95
2,300 cu. yd. structural excav., unclassified	2.50	2.00	2.50	2.75
133,000 cu. yd. general excav., unclassified	.27	.30	.35	.32

(Continued on next page)

Day Labor Limitation

. . . Continued from page 91

board of supervisors finds the estimated cost of the work to exceed $3,000, the board shall order surveys, plans, and specifications. Upon receipt of these, the board shall publish advertisements at least 10 days in advance of bid calls, and after the 10 days, shall publicly open all bids received. The county then has its choice of (1) accepting the bid of the lowest responsible bidder (2) rejecting all bids as too high and readvertising if the job must be done (3) rejecting all bids as too high and ordering the work done by day labor.

Section 1074 reinforces the 3 sections above by stating, "Whenever the board finds that the estimated expense of any work to be done upon any county highway is $3,000 or less, the board may **let a contract for such work without calling for bids, or may purchase the materials and do the work by day labor.**"

In enforcing Code sections 1071 to 1074, the court ruling does not say that counties cannot do any job by day labor if the cost is over $3,000; the court ruling says counties cannot do any job by day labor if the cost is over $3,000 **without first adopting plans and specifications, calling for bids, and then rejecting all bids as higher than the cost if done by day labor.** The counties believe, of course, that this is still an effective limitation of $3,000 upon their day labor work.

Had legislators rewritten Code sections 1071 to 1075 and coordinated them with Section 2006 in the Collier-Burns Act, they could have decided definitely: (1) The county road commissioner is (is not) required to be a registered civil engineer. (2) The county may (may not) do day labor work costing over $3,000 (or perhaps $10,000) without first calling for bids and determining whether or not they are lower than the cost by day labor.

The July 26 ruling of the California District Court of Appeal, Third District, as outlined in the first paragraph, may be changed. On August 22, by its own motion, the court granted a new hearing and will render a new decision.

Work Begins on Standard Oil's Salt Lake Pipeline

INSTALLATION of the 8-in. pipe for the first few miles of Standard Oil's Salt Lake City to Boise pipe line by Salt Lake Pipe Line Co. began last month. The 320-mi. line will cost approximately $6,000,000. Portions of the line will be somastic coated to prevent erosion. Overall construction of the line is slated for completion before the end of 1949.

The Burley, Ida., to Boise leg of the line, a distance of 186 mi., also went into the construction phase. This portion of the line is being installed by Oklahoma Contracting Co., Dallas, and Grafe-Callahan Construction Co., Los Angeles. The contract for construction of a pumping station housing three large pumping units near the Salt Lake refinery has been awarded to Utah Construction Co.

448,500 yd. sta. short overhaul	.015	.02	.015	.02
28,200 cu. yd. sta. long overhaul	.45	.50	.45	.45
1,600 cu. yd. excav. and placing topsoil	.85	2.00	2.00	2.00
9 acres preparing soil and seeding	185.00	600.00	500.00	100.00
5.20 mi. finishing roadbed and slopes	500.00	500.00	800.00	600.00
10,200 lin. ft. rounding cutbanks	.20	.15	.20	.20
1,300 lin. ft. 12-in. concrete pipe	1.50	1.25	2.00	2.00
1,300 lin. ft. 18-in. concrete pipe	2.50	2.25	4.50	3.10
20 lin. ft. 30-in. concrete pipe	4.00	3.25	6.00	5.00
80 lin. ft. 36-in. concrete pipe	7.00	7.50	7.50	6.45
120 lin. ft. 36-in. extra strength conc. pipe, special installation	15.00	16.00	15.00	10.17
630 lin. ft. 6-in. concrete drain pipe	.70	.60	.90	.65
660 lin. ft. 8-in. concrete drain pipe	.75	.75	1.00	1.00
1,200 lin. ft. 8-in. perforated concrete drain pipe	.80	1.00	1.25	.85
430 lin. ft. 6-in. perforated metal drain pipe, coated	1.20	2.00	2.00	1.32
140 lin. ft. 8-in. sewer pipe	.95	1.50	1.50	1.15
2,100 lin. ft. 12-in. sewer pipe	1.20	2.00	1.75	1.72
120 lin. ft. extra for installing pipe under pavement	3.00	3.00	3.00	3.50
1,100 lin. ft. salvaging culvert pipe	2.00	1.25	2.00	1.75
170 cu. yd. rock or gravel backfill in drains	4.00	4.00	5.00	4.00
15 only concrete catch basins	55.00	55.00	55.00	60.00
3 only Type "A" manholes	200.00	200.00	200.00	300.00
1 only Type "B" manholes	170.00	170.00	170.00	300.00
24 cu. yd. Class "A" concrete	55.00	55.00	55.00	60.00
3,500 lb. metal reinforcement	.14	.14	.14	.12
210 cu. yd. concrete curbs and gutters	50.00	50.00	50.00	60.00
14 cu. yd. concrete island nosings	45.00	45.00	45.00	70.00
Lump sum, recesses for traffic control markers	65.00	65.00	65.00	300.00
1,300 lin. ft. 2-in. fibre duct	.41	.41	.41	.50
2,400 lin. ft. 1¼-in. rigid metal conduit	.47	.47	.47	.60
250 lin ft. ¾-in. rigid metal conduit	.20	.20	.20	.27
18 only concrete anchor bases	38.00	38.00	38.00	30.00
7 only transformer boxes	10.50	10.50	10.50	20.00
10 only 30-ft. monotube standards (10-ft. to 18-ft. brackets)	208.36	208.36	208.36	250.00
8 only 30-ft. monotube standards (4-ft. to 8-ft. brackets)	182.75	182.75	182.75	230.00
17 only incandescent luminaires	33.00	33.00	33.00	40.00
1 only mercury vapor luminaire and ballast	95.10	95.10	95.10	111.00
1 only series-multiple IL transformers (500 watt)	49.40	49.40	49.40	52.00
6 only series-multiple IL transformers (350 watt)	49.40	49.40	49.40	52.00
Lump sum, wiring and control equipment	$3,082	$3,082	$3,082	$2,100
39,000 cu. yd. 3-in. - 0-in. rock in base	2.22	2.50	2.55	2.70
11,400 cu. yd. ¾-in. - 0-in. rock in base and shoulders	2.55	2.50	2.75	2.80
1,400 M. gal. sprinkling	3.00	3.00	3.00	3.00
760 cu. yd. ¾-in. - 0-in. rock in binder course	5.00	3.75	5.00	3.60
2,500 sq. yd. Portland cement concrete pavement, 7-in.	4.00	4.50	4.50	4.00
2,100 lin. ft. contraction joints	.15	.15	.15	.30
70 cu. yd. ½-in. - 0-in. materials in cushion course (cu. yd.)	5.00	4.00	4.00	4.00
23,700 ton Class "B" asphaltic concrete	6.35	6.10	6.55	6.60
750 lin. ft. asphaltic concrete traffic markers	1.00	1.50	1.00	1.00
120 ton furnishing and placing RC-3 asphalt in binder course	35.00	40.00	40.00	40.00

Bridge and Grade Separation . . .

California—Los Angeles County—State—Concrete Slab

Peterson & Baker of Los Angeles, with a bid of $186,007, were low of 22 contractors for construction of a reinforced concrete slab bridge across Compton Creek channel on Santa Fe Avenue, Los Angeles County road. Unit bids were as follows:

(1) Peterson & Baker	$186,007	(4) Lars Oberg	$221,110
(2) Bent Construction Co.	204,263	(5) Macco Corp.	222,962
(3) Chas. MacClosky Co.	218,887	(6) Hermann Co.	223,765

Also bidding on the job were Erickson, Phillips & Weisberg; Granite Construction Co.; Byerts & Sons; K. B. Nicholas; Northup Construction Co.; Oberg & Cook; Sharp & Fellows Contracting Corp.; Oberg Bros. Construction Co.; Guy F. Atkinson Co.; John Strong; J. E. Haddock, Ltd.; Wunderly Construction Co.; Fred A. Chadwick & Co. and McDonald & Kruse, Inc.; Norman I. Fadel; Carlo Bongiovanni Construction Co., and Johnson Western Gunits Co.

	(1)	(2)	(3)	(4)	(5)	(6)
2,425 cu. yd. structure excav.	3.50	5.50	3.30	9.50	4.00	6.75
3,100 cu. yd. Class "A" P.C.C.	26.00	30.00	38.00	30.00	34.00	32.70
31,000 lb. misc. steel	.26	.31	.25	.23	.30	.27
12,630 lin. ft. furn. conc. piling	2.41	2.40	2.40	2.50	3.00	2.75
436 ea. driving piles	51.00	65.00	46.00	66.00	55.00	53.00
465,000 lb. bar reinf. steel	.07	.065	.0675	.07	.07	.0775
506 lin. ft. steel rail	6.00	6.50	6.50	7.00	7.00	7.05
Lump sum, office facilities	600.00	$1,000	290.00	$1,500	600.00	211.00

California—Tulare County—County—Steel and Concrete

With a bid of $14,860, L. C. Clark of Visalia, Calif., was low before the Tulare County Surveyor for construction of two steel and concrete bridges and a culvert. Unit bids were submitted as follows:

(1) L. C. Clark	$14,860	(5) Threewitt & Webb	$19,480
(2) F. Fredenburg Construction Co.	15,525	— Evans Construction Co.	21,790
(3) Thomas Construction Co.	16,442	— Bos Construction Co.	22,482
(4) Anderson Construction Co.	16,695		

	(1)	(2)	(3)	(4)	(5)
250 cu. yd. Class "A" Portland cement concrete	40.00	42.00	46.00	48.00	52.00
43,000 lb. furnishing and placing bar reinforcing steel	.09	.09	.09	.09	.12
165 lin. ft. steel railing	6.00	7.00	6.50	5.00	8.00

Montana—Rosebud County—State—Steel and Conc.

With a bid of $71,064, Walter Mackin & Son of Billings, Mont., were low before the State Highway Commission of Montana for construction of a 200-ft. steel and concrete bridge over the Tongue River on the Crow Agency-Broadus Highway. Unit bids were submitted as follows:

(1) Walter Mackin & Son	$71,064	(4) Peter Kiewit Sons' Co.	$85,199
(2) Schye & Sullivan	73,528	(5) Northwestern Engineering Co.	89,021
(3) Holm Construction Co.	77,923	(6) Inland Construction Co.	90,152

	(1)	(2)	(3)	(4)	(5)	(6)
158,320 lb. structural steel	.165	.1675	.18	.21	.19	.22
40,320 lb. reinforcing steel	.14	.14	.15	.18	.17	.20
233.9 cu. yd. Class A concrete	65.00	85.00	75.00	80.00	84.00	81.00
122.2 cu. yd. Class AD concrete	70.00	85.00	75.00	85.00	89.00	97.00
402.12 lin. ft. steel bridge rail	9.00	10.00	14.40	17.00	11.00	9.00
490 cu. yd. str. ex. bent 1 Piers 2 & 3	22.00	12.50	16.00	14.00	28.00	20.00
3,380 cu. yd. str. ex. bent 4	3.00	2.50	8.00	5.00	9.00	8.00

NEW EQUIPMENT

MORE COMPLETE INFORMATION of any of the new products or equipment briefly described on the following pages may be had by sending your request to Equipment Service, Western Construction News, 503 Market Street, San Francisco 5, Calif. For quicker service, please designate the item by number.

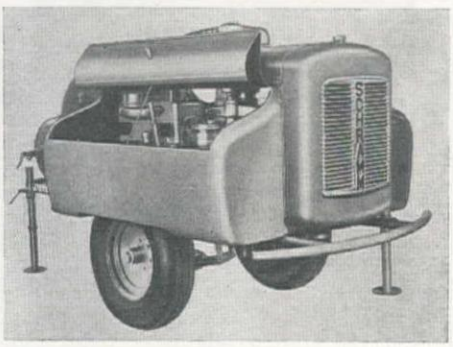
901

Four-Cylinder Compressor Unit

Manufacturer: Schramm, Inc., West Chester, Pa.

Equipment: Compressor unit with actual air delivery of 105 cu. ft.

Features claimed: The new unit has a 4-cylinder Schramm engine operating the 4-cylinder compressor. More than 90% of the engine parts are inter-



changeable with the compressor, reducing the necessity for carrying service parts to a minimum. The unit is equipped with the Schramm Pneumostat, assuring variable speeds and the elimination of continuous loading and unloading. Simplified design has resulted in a rugged outfit capable of 24 hours of continuous service and the elimination of two staging and intercoolers.

902

Hydraulic Tire Remover

Manufacturer: Goodyear Tire & Rubber Co., Akron, Ohio.

Equipment: Ram, pump and hose that make it possible to loosen damaged tires from rim so as to effect quick changes on the job.

Features claimed: Portable and compact, the equipment consists of a ram assembly 19 in. long weighing 25 lb., together with a pump and hose which provide hydraulic pressure for operating, the latter two pieces weighing 16 lb. These work on both front and back side of the rim. Especially designed to facilitate the breaking loose of large earthmover tires, the tool will operate on any tapered bead rim of Goodyear design.

903

Industrial Type Welder

Manufacturer: Lincoln Electric Co., Cleveland, Ohio.

Equipment: "The Fleetwelder 200," a 200-ampere AC welder.

Features claimed: Because of its exclusive Arc Booster and outstanding reserve capacity, the unit is suited for both job shop welding and industrial welding. It can handle an exceptionally wide range of work in thick as well as thin material. Electrodes ranging in diameter size from 5/64 to ¼ in. may be used with it. The Arc Booster feature adjusts the welder to start the arc automatically the instant the electrode touches the work on either thin or heavy material. The arc is given an extra burst of current which starts the arc and secures penetration at the start of the weld. The current automatically returns after a few seconds to the correct amount set for the job. The compact design of this welder allows the entire unit to be enclosed in a pressed steel case standing only 24 in. high.

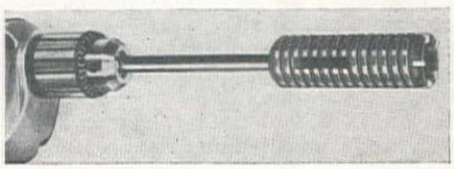
904

Rotary Core Drill

Manufacturer: Concrete Termite Drill Co., Pasadena, Calif.

Equipment: Core drills which start immediately on drilling to carry pulverized material from the tip.

Features claimed: Users report fifty feet of concrete drilled, with steel reinforcing bars encountered, before these fast-drilling core drills needed resharp-



ening. Each drill has the new style "All-Worm" feature that carries pulverized material from the tip. This means less friction, faster drilling and longer life. The drills are available from one to 2½-in. diameters.

905

Concrete Compression Testing Unit

Manufacturer: Forney's, Inc., New Castle, Pa.

Equipment: Portable hydraulic press permitting control over all of the variables which can affect the compressive strength of building units.

Features claimed: Exerting a ram pressure of 175 tons, and equipped with a specially calibrated pressure gage for direct reading at a glance, the testing unit had dual manually operated pumps, one of which brings the platen into position very slowly in accordance with A.S.T.M. specifications. Thus, two readings are available; one when the first sign of fracture appears, and another at the point of ultimate destruction. A leveling plate is provided on the table so that blocks can be easily checked for high spots, and the lower platen is self-aligning in order to compensate for surfaces slightly off parallel. A high-walled tray into which blocks are placed before testing protects the operator in case of bursting or shattering.

906

Two-Wheel Carrying Scraper

Manufacturer: American Tractor Equipment Corp., Oakland, Calif.

Equipment: Hydraulically-controlled scraper with heaped capacity of approx. 2 cu. yd.

Features claimed: The scraper is designed for use with 20 to 35-hp. wheel tractors and small track-layers. Like larger ATECO scrapers, the front apron

of the J-2 operates independently of cutting and spreading. The operator can regulate cutting or spreading depth from the tractor seat. Cutting depths range from 0 to 4 in.; spreading from 0 to 11½ in. For scarifying, ripper teeth are fastened to the square bar across the front of the scraper. The manufacturer recommends this scraper for leveling, grading stock pond building, terracing, overburdened stripping, light scarifying, etc. The unit can be converted easily into a tool carrier.

907

Rotary Plow and Grader Team

Manufacturer: Sicard, Inc., and Austin-Western Co., Aurora, Ill.

Equipment: The Sicard Snow Master Rotary Plow combined with Austin-Western power graders.

Features claimed: Austin-Western has contracted to become the sole distributor of the Snow Master when used as a grader attachment. Completely controllable casting is achieved in the Snow Master by its patented revolving telescopic chute. Snow can be cast in a full 220-deg. arc for any distance from 3 to 150 ft. Trucks can be loaded from either side of the machine, or from the front at no sacrifice of operating efficiency. Blower housing and wrist action chute combined enable the operator to cast to the exact spot desired. A-W graders with their control by four wheel drive and steer, back the rotary snow plow. The four wheel drive furnishes traction for every pound of weight, while the four wheel steer adds the maneuverability necessary when rounding sharp corners or working in narrow streets. The graders can be converted in a few hours from their normal grading operations to use with the Snow Master.

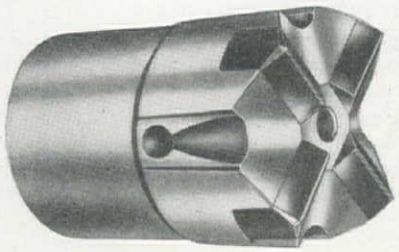
908

Rock Bit

Manufacturer: Joy Mfg. Co., Pittsburgh, Pa.

Equipment: Joy Sulmet rock bit, designed for general drilling application.

Features claimed: The new bit is of the skirt type with four-point cross design with tungsten carbide inserts for maximum penetration. It is available in sizes immediately as follows: 1⅜, 1½, 1⅝, 1¾ and 2¼ in. Other sizes will be made available at a later date.



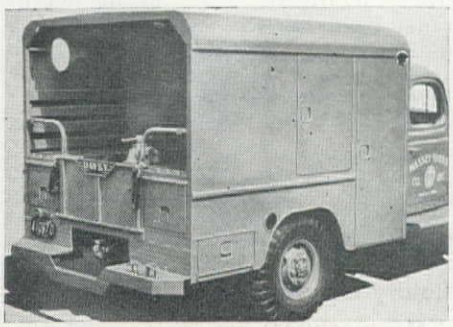
909

Mobile Field Service Unit

Manufacturer: Davey Compressor Co., Kent, Ohio.

Equipment: Unit mounted on a 4-wheel truck and including all equipment necessary for the field servicing of construction machinery.

Features claimed: Main equipment items include a 300-amp. welder and 8-kw. a-c generator. These are driven direct from the truck engine through a model P-80 Davey Heavy Duty Power Take-off. Power for operation of the unit's high pressure lubrication equipment is provided by a Davey "Little Workhorse" compressor operating at 150-lb. pressure. Other equipment includes: Oxy-acetylene welding, cutting and brazing outfit; an 8-in. electric motor-operated bench grinder; portable arbor press; floodlights; 7500-lb. winch; a complete complement of service tools, electric drills, etc. The all-steel utility and service body provides space for the transportation of the driver and six passengers.



910

Plaster-Mortar Mixer

Manufacturer: Koehring Co., Milwaukee, Wis.

Equipment: Ten-cubic foot mixer.

Features claimed: Mounted on two wheels with extra wide treads for fast and easy towing, the new mixer is a non-tilt, end discharge type. A push-down tow pole feature makes handling the machine easy for on-the-job movements and prevents tipping. The low charging height of 46 in. makes it easy to load and reduces manual effort. Non-clogging mixing blades in the drum are arranged for radial and longitudinal adjustment and produce end-to-end mixing action and rapid discharge. A 15-hp. air-cooled engine furnishes power for the mixer and the 800-lb. capacity hoist for delivering batches above the ground level.

911

Rock Drill Attachment for Tractor

Manufacturer: Le Roi Co., Milwaukee, Wis.

Equipment: Combination tractor and air compressor and rock drill attachment to drill holes for slurry pumping equipment.

Features claimed: With the Le Roi Tractair and special Trac-Jac attachment, one man handles the drilling unit and performs all operations from the driver's seat. This is possible since the rock drill has an integral air cylinder type feed, and is fed into the ground and retracted by air pressure controls within his reach. The Tractor-compressor can be driven and operated as a compressor at the same time. With allowances for bit changes and minor adjustments, 600 holes can be drilled per day through 7-in. concrete. The bit life has been found to be about 60 holes. Ideal for line breaking for ditching operations.

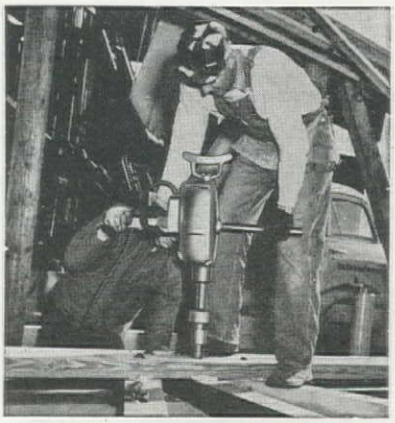
912

Electric Drill

Manufacturer: Mall Tool Co., Chicago, Ill.

Equipment: The Model 540A 1¼-in. capacity electric Mall Drill.

Features claimed: The new drill is especially designed and engineered for all types of heavy construction and maintenance work, and is a time saver for drilling metal and wood, driving lag screws and running nuts. Special construction features include a heavy-duty Universal motor for 115-volt AC-DC, also 230 volts; an interlocking reverse switch, detachable side pipe handle, Timken roller bearings, a No. 3 Morse taper, and a 150 rpm. triple gear reduction. Optional equipment for the drill includes a ⅝-in. Jacobs chuck, and a slip clutch that can be set for predetermined pressures.



913

Tubeless Tires

Manufacturer: B. F. Goodrich Co., Akron, Ohio.

Equipment: Tire that seals punctures while you drive.

Features claimed: The new tire, which performs without use of the conventional inner tube, seals punctures while you drive, retains a constant air pressure longer than conventional tires, gives a softer ride, and in the event of a bruise or break, lets down slowly with plenty of warning to the driver. Treads of the new tire are made of the longer

wearing "cold" rubber. Goodrich began producing the tire for first distribution in the West on September 1 at its new Los Angeles plant.

914

Concrete Vibrator and Generator

Manufacturer: Maginniss Power Tool Co., Mansfield, Ohio.

Equipment: Set comprised of Hi-electric vibrator, gasoline-engine driven generator and line cable.

Features claimed: The Hi-electric concrete vibrator has no flexible shaft, contains a 180 cycle motor in the head, weighs only 12 lb., and is only 2⅜ in. in diameter. It has a conveniently located on and off switch and is operated by one man regardless of the type of work on which it is used. The generator operates two vibrators simultaneously, or one vibrator with floodlights. Hi-electric line cable may be any length up to 200 ft. from vibrator to generator. In operation, the generator is set off the job out of the way and need not be moved or attended.

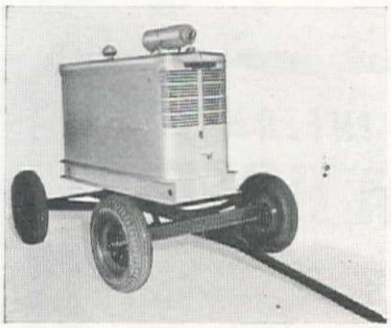
915

Trailer-Mounted Electric Generator Sets

Manufacturer: International Diesel Electric Co., Long Island City, N. Y.

Equipment: Sets ranging in capacity from 10 to 85 kw.

Features claimed: The units, especially designed for on-the-job operation,



can be easily moved from location to location. Available in both Diesel and gasoline, 50 and 60 cycles, and in all standard voltages, the sets consist of an engine driving a generator, with an instrument panel containing all starting controls and switchgear, spring-mounted on a sturdy, pneumatic-tired 4-wheel trailer. The trailer is equipped with a steel angle drawbar for attaching to truck or tractor.

916

4-Cylinder Diesel Engine

Manufacturer: Cummins Engine Co., Inc., Columbus, Ind.

Equipment: High-speed engine with a maximum rated horsepower of 110 at 1800 rpm.

Features claimed: The new HR-400 is light in weight and compact in size. It has a 5⅛-in. bore and a 6-in. stroke, and a piston displacement of 495 cu. in. Like all Cummins Diesels, the HR-400 is a four-cycle engine, and uses the exclusive Cummins Fuel System. It is equipped with standard two-valve heads; a new increased flow lubricating system; continuous groove main bearings, and standard HR liners and head gaskets. Available in an automotive model and five industrial models.

917

No-Gap Electrode

Manufacturer: Eutectic Welding Alloys Corp., New York.

Equipment: Eutec - Hand - Omatic AC-DC Electrode.

Features claimed: The new electrode is merely pressed against the metal and drawn straight along, like a pencil, without any back and forth or weaving action. A perfect weld results automatically and since there is no arc gap maintained, the ease of operation is readily apparent. Thin sheet can be welded with a negligible risk of burning through. Due to the high speed of welding, a saving of up to 50% in electrode material is obtained. No special equipment is needed.

918

New Type Geared Motor

Manufacturer: Sterling Electric Motors, Inc., Los Angeles, Calif.

Equipment: Enclosed motor constructed for atmospheres containing non-explosive dusts, vapors, and injurious foreign materials.

Features claimed: This new Sterling "Slo-Speed" "Klosd-Tite" motor, Type FWFB, is totally enclosed and includes such Sterling features as labyrinth seals, liberal heavy duty ball bearings lubricated for life and the Sterling patented Herringbone rotor. The motor and gears are combined in a balanced design from the power intake to the drive shaft. An external fan forces powerful cooling blasts of air over the streamlined case. The motor can be mounted in any position without modification.

919

Tool for Installing Cylinder Sleeves

Manufacturer: International Tool Corp., National City, Calif.

Equipment: Portable power unit with

adapters for removing and installing dry cylinder sleeves in heavy duty truck engines.

Features claimed: With this new

power equipment, dry sleeves can now be quickly and safely installed to factory precision with the engine in or out of the chassis and with the crankshaft in or out of the engine. Air pressure from any standard shop air line is all that is needed to operate the equipment. Each pound of air pressure applied exerts 115 lb. of mechanical pressure at the ram, providing smooth power sufficient to remove even the tightest of dry sleeves. Designated as Model 10, the basic power unit operates on the same pneumatic-hydraulic principle as its predecessors, Models 8 and 9, which have been used for years by general automotive rebuilders.

920

Six-Inch Log Log Slide Rule

Manufacturer: Pickett & Eckel, Inc., Alhambra, Calif.

Equipment: Shorter rule bearing the regular 10-in. Log Log scale arrangement.

Features claimed: Needle-sharp gradations on the dimensionally stable magnesium alloy body of the rule make for easy reading, easy settings and computational accuracy comparable with that on the 10-in. rules. Scales are as follows: Front—A-B, T, S, C-D, LL2, and Back—LL3, DF-CF, CIF, CI, C-D and L. The combination of C-D scales on both sides of the rule, together with folded and reverse scales, speeds figuring and avoids going "off-scale." Comes in a leather pocket case.

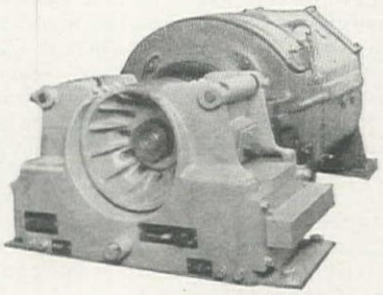
921

D-C Two-Shoe Two-Magnet Brake and a D-C Crane Hoist Control

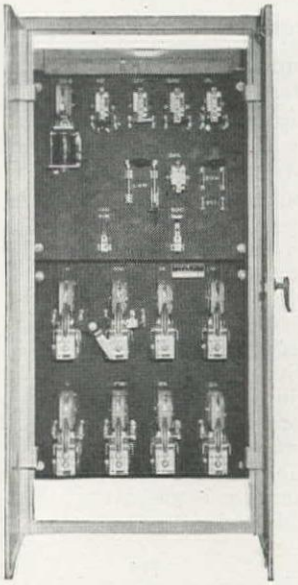
Manufacturer: General Electric Co., Schenectady, N. Y.

Equipment: Brake designed for use on steel mill drives, cranes, hoists, bridges, conveyors, etc. Hoist control designed for use on whirley, revolver, gantry and overhead cranes.

Features claimed: The brake consists of a malleable iron frame, two self-aligning shoes which pivot on spherical bearings, two armatures pivoting on sealed graphite bearings, two symmetrical E-type magnets with cast-in coils, and ventilated wheel of molybdenum alloy. A torque-setting indicator gives a direct reading of foot pounds torque setting and the clearly marked operating gap indicator provides a ready visual check on magnet gap and lining wear. The brake is applicable for either right or left hand mounting, either on the floor or with brackets on motors. The new crane hoist control incorporates several unique features. It provides hoisting and power dynamic lowering, depending upon the requirements of the load on the hook. The change from power to dynamic braking lowering is inherent in the control and hence is independent of either the operator or any particular



New G-E Two-Magnet Brake



New G-E Crane Hoist Control

control device. When decelerating, the speed is reduced automatically before the solenoid brake sets, thus minimizing mechanical brake maintenance and protecting both motors and hoist equipment from excessive wear and shock. In addition, both overshoot and down drift are eliminated.

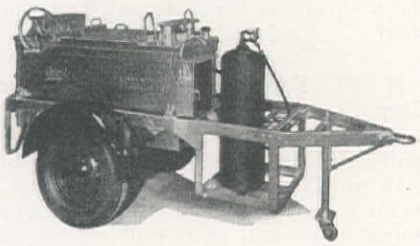
922

Asphalt Kettle

Manufacturer: Aeroil Products Co., Inc., South Hackensack, N. J.

Equipment: New 50-gal. kettle for heating and melting rubberized asphalt and other joint sealing compounds.

Features claimed: The No. 50 DVP is constructed on a "double boiler" sys-



tem with a unique multiple oil bearing tube system running through the melting compartment for uniform heating and speed in melting. The kettle is fired by a single L. P. G. burner with an average consumption of 21 cu. ft. per hour. Accurate thermostatic controls include a shock-proof, two-pole thermostat of the rigid, contact type with a dial knob calibrated from 100 to 550 deg. F.

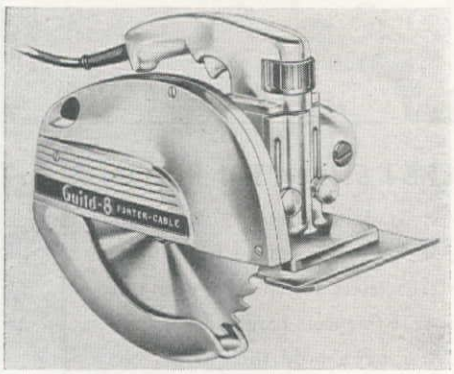
923

Eight-Inch Saw

Manufacturer: Porter-Cable Machine Co., Syracuse, N. Y.

Equipment: Model A-8 Guild Saw, weighing only 13½ lb.

Features claimed: With its light weight, the saw has sufficient power and cutting speed to handle general con-



struction work, heavy duty cross-cutting and ripping, maintenance work, etc. Standard equipment includes a combination blade for ripping and cross-cutting. Optional equipment includes a tilt attachment which enables the saw to be adjusted for any angle from 45 to 90 deg. The maximum depth of cut is 2⅞ in. The 8-in. blade has a ⅝-in. standard round hole and is fully guarded, protecting the operator at all times. Helical gear drive delivers a maximum percentage of motor power to the cutting blade. Although powered for professional use, the tool is priced within the reach of the home craftsman.

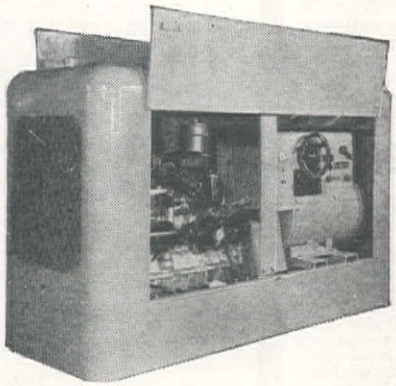
924

Heavy Duty Arc Welder

Manufacturer: Air Reduction Pacific Co., San Francisco.

Equipment: The Wilson 36A "Yellow Jacket," built in 300 and 400 ampere sizes.

Features claimed: The "Yellow Jacket" is a direct current, 40-volt,



NEMA-approved variable voltage generator. It features simplified control of current output by means of a sturdy hand-wheel mounted on the control cabinet. Close calibration of the current dial eliminates the need for meters. For instant recovery voltage over short circuit, the generator is self-excited with excitation of the main field obtained through an auxiliary brush. It is a complete two-bearing unit, engine-driven by sheaves and steel cored V-belts. It is powered by a 6-cylinder industrial engine and is available in stationary or portable models. It is 76 in. long, 28 in. wide and 49 in. high.

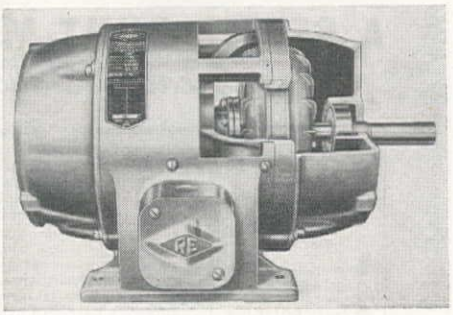
925

Electric Motor with Fluid Drive

Manufacturer: Reuland Electric Co., Alhambra, Calif.

Equipment: Fluid-Shaft motors featuring a single frame, integral design of motor and fluid-drive coupling.

Features claimed: Fluid-Shaft motors offer many advantages wherever loads



require smooth acceleration, protection from "jamming" and shocks, or are difficult to start. Typical of these installations are conveyors, extractors, bridge and trolley drives on cranes, winders and mixers. Loads that are tough to bring

up to speed, even with special motors, are accelerated easily because the motor is practically up to speed before any load is applied. All starting and operating shocks are absorbed in a cushion of oil. All units can be mounted horizontally or vertically, and are available in standard foot mounted, or round body frames. Sizes in production are from ½ to 10 hp.

926

Pipeline Boring Machines

Manufacturer: Lube Jack Co., Santa Monica, Calif.

Equipment: Machines to permit laying of pipe without the need of breaking surface ground.

Features claimed: The newly-improved line of Earthworm boring machines will now permit laying of pipe lines of all types up to 3 in. in diameter and up to 150 ft. in length. In many applications, it is possible to use pipe or conduit as drill stem sections and leave it underground as a permanent installations. The Earthworms are ideal for laying lines under highways, parking lots or other sites where surface excavations would be costly and inconvenient. Accuracy of the units, when drilling lines as long as 150 ft., can be maintained within one inch of the target area. In operation, water is forced through the drill stem as a lubricant and to wash back the cuttings.

LITERATURE FROM MANUFACTURERS...

Copies of the bulletins and catalogs described in this column may be had by addressing a request to the Western Construction News, 503 Market Street, San Francisco 5, California.

927

PAVING BREAKER—**Le Roi Co.,** Milwaukee Wis., is featuring a bulletin describing the "Effortless Air Lift" of Le Roi - Cleveland's Air - Jac Paving Breaker. The 52AJ is an adaptation of the firm's Model 52 heavy breaker, with an integral air lift cylinder operated from the breaker handle. The bulletin tells how line air pressure is utilized to lift the 80-lb. class breaker and free stuck steels.

928

HARD FACING—**Wall Colmonoy Corp.,** Detroit Mich., has published a 4-page bulletin telling how to hit "A Bull's Eye in Hard Facing Methods with the Colmonoy Spray-welder," a powder metallizing gun that has as its only complicated parts four valves—the oxygen and aetylene controls, one controlling the propellant air and one controlling the rate of powder flow.

929

REFRACTORY PRODUCTS AND INSULATING MATERIALS—**Denver Fire Clay Co.,** Denver, Colo., has just published their new Refractory catalog containing 105 pages. In addition to a listing of the refractory products

manufactured and sold by the Denver firm, the catalog describes methods of using all types of refractories; a section on the selection and use of refractories; a general section on types of refractories, and an interesting, informative section on refractory construction. Reference data and tables for every refractory user are included in the catalog.

930

BUYING ALLOY STEEL—**Joseph T. Ryerson & Son, Inc.,** Los Angeles, Calif., have published a 25-page booklet entitled: "How to Specify and Buy Alloy Steel With Confidence." The booklet covers three control steps which should be taken if alloys are to be purchased and used with complete confidence, detailing the safest methods of specifying and buying so that the user may be protected against the possibility of (1) getting the wrong alloy, (2) errors in heat treating, and (3) costly breakdowns resulting from using the wrong alloy or failure to properly heat treat the right alloy steel. How the hazards involved in the purchase and use of alloy steel can be minimized or eliminated is discussed under such heading as, "How Alloys Are Selected," "How to Make Sure of Getting the Right Alloy," and "How to Check for Compliance with Your Specifications."

931

TRANSMISSION BELTING—**United States Rubber Co.** has published a 28-page catalog giving detailed design, engineering and performance data for its line of transmission belting. Tables on speed, arc of contact, friction, horsepower correction, and service factors are included in the manual, together with hints on the proper selection of a belt and the procedure for analyzing belt drives.

932

WELDING AND CUTTING MANUAL—**Linde Air Products Co.,** New York City, have published a 208-page handbook on the oxy-acetylene process that should be useful as a reference and instruction book for anyone who does welding and cutting. The style is simple and easy to read and instructions are given in step-by-step photographs of actual repair jobs. While the book is written primarily for the repairman, mechanic and maintenance men, there are hints, short-cuts and instruction material which will help any welding operator do a better job. For example, one chapter gives 100 time and labor-saving things to do. Other chapters give short-cuts and instructions for bronze-welding; fusion-welding, hard-facing; cutting steel and cast iron; heating, forming and straightening metals; welding and cutting pipe, and welding non-ferrous metals. The appendix contains useful charts and tables, a complete glossary of welding terms, and a list of 100 repair jobs with recommended welding methods. Price of the book is only $1.80.

933

CORE DRILL SUPPLIES—**Joy Manufacturing Co.,** Pittsburgh, Pa., has just published a 36-page catalog entitled "Joy Core Drill Supplies and Equipment." For use by owners and operators of core or diamond drills, the catalog contains illustrations and specifications for a complete line of core barrels, bits, drill rods and other equipment necessary for diamond core drilling operations.

934

BELT CONVEYORS—**Lippman Engineering Works,** Milwaukee, Wis., is releasing a 32-page bulletin presenting complete information on stationary, portable and 16 types of special purpose belt conveyors, both troughed and flat belt. Included are future applications and methods of selection of belt conveyors; dimension weights and specifications for standard head, tail and intermediate sections; lattice, channel and timber frames, and terminal machinery.

935

DESIGNING DRAINAGE STRUCTURES—**Republic Steel Corp.** has published a 16-page manual of interest to anyone specifying or designing drainage structures, entitled: "Engineering Data—Toncan Sectional Plate Pipe, Pipe-Arch, Arches." It contains essential data on Republic's

new sectional plate drainage products with 2-in. corrugations. Illustrated with both drawings and pictures of sectional plate structures, it includes tables needed by the engineer in his work. Typical are those on minimum gages for strutted and unstrutted pipe, length and spacing of struts, standard sizes of arches, weights of the various products, plate arrangements, etc.

936

EXPLOSIVES—**Illinois Powder Manufacturing Co.**, St. Louis, Mo., is releasing a 40-page explosives handbook. Of convenient pocket size, the catalog presents detailed information on the characteristics of various types of explosives, together with a useful table entitled: "Explosives Recommended Under Average Conditions." In addition, a reference guide is provided for assistance in determining quantities of explosives required in specific applications.

937

APPLICATIONS OF STAINLESS STEEL—**United States Steel Corp.** has released a new technicolor motion picture illustrating many of the present-day applications of stainless steel. The movie's story centers around a gift of a stainless steel orchid to a design engineer. He convinces a friend of the qualities of the wonder metal and, by flashback technique, illustrates the modern uses of stainless steel, explaining the reason for selecting it. It is available in 16 and 35-mm. sound versions.

938

POWER CRANE AND SHOVEL OPERATING COSTS—**Power Crane and Shovel Association,** New York City, has released an Operating Cost Guide Bulletin as an aid to the owners of power cranes and shovels in correctly estimating the cost of ownership, operation and maintenance of this type of equipment. Aside from being of value to construction equipment owners, the breakdown of costs should be of interest to contracting engineers, cost estimators, highway and public works administrators, plant and material handling engineers and engineering students majoring in construction methods and equipment. Copies of the booklet are available for 50 cents each.

939

PIPE AND PIPE FABRICATION—**L. B. Foster Co.**, Pittsburgh, Pa., has published a 4-page reference folder on pipe and pipe fabrication. Complete information is given on pipe sizes, prices, weights and dimensions. The folder gives advantages and extra services available when buying new-tested pipe, hydraulic pipe, double extra heavy pipe, lightweight tubing, spiral weld pipe, etc.

940

FIBERGLAS ACOUSTICAL MATERIALS—**Owens-Corning Fiberglas Corp.**, Toledo, Ohio, has published an 8-page bulletin covering the forms, properties and methods of installing Fiberglas acoustical materials, including plain and perforated tile, and board. Use of Fiberglas thermal insulations for acoustical purposes is also described. The publication is illustrated with numerous application photographs.

941

APPLICATIONS OF HARD-FACING ALLOYS—**Stoody Co.**, Whittier, Calif., have issued a 50-page edition of a hard-facing guidebook that provides detailed information on the choice and application of various hard-facing metals commonly used in heavy construction, mining, cement, brick and clay plants, dredging, rock products plants and similar operation. Approximately 100 common uses for hard metals are described; data include types of metals recommended, the method of application and the approximate amount of alloy required for the job in question.

942

NON-AGITATING DELIVERY OF CONCRETE—**Dumpcrete Division, Maxon Construction Co.**, Dayton, Ohio, have published an 8-page three-color pamphlet entitled: "Dumpcrete Hauls and Places Quality Concrete at Lowest Cost." It is full of on-the-job pictures showing non-agitating delivery and placement of concrete on jobs ranging from sidewalks to the giant dam projects. The pamphlet describes how the Dumpcrete saves on original purchase price and on daily maintenance, operation and upkeep, and why superior centrally mixed concrete delivered in the Dumpcrete can be controlled more accurately for specification work.

943

PRESSURE REGULATORS—**Air Reduction Pacific Co.**, manufacturer of industrial gases and welding equipment, has announced the availability of a 32-page catalog covering its complete line of pressure regulators. The catalog includes regulators for welding, cutting, special flame processes, for maintaining gaseous pressures in electrical equipment and other operations where controlled gas pressure is required. The catalog illustrates 26 regulators and describes over 100. Three pages are devoted to flow and pressure charts.

944

GEARMOTORS — **Link-Belt Co.,** Chicago, Ill., have released a new 12-page book (No. 1815A) replacing all previous catalogs on Link-Belt Gearmotors. Double and triple reduction units of new design are illustrated and described. Dimensions are shown for Gearmotors having open drip-proof, splash-proof, totally enclosed and explosion-proof motor enclosures. The booklet embodies a simplified catalog practice whereby the previous three Selection Tables are replaced by a single table providing easier and more accurate selections of Gearmotor size.

945

HEAVY DUTY TRUCKS — **The GMC Truck & Coach Division of General Motors Corp.,** Pontiac, Mich., has published a broadside presenting in pictures and text the facts on GMC's 69 heavy duty truck models. Gasoline and Diesel models are pictured and described for every type of hauling need. The GMC valve-in-head engine is pictured in cutaway views, and details of the GMC "H" model's chassis are illustrated.

946

WELDING MILD STEEL — **Lincoln Electric Co.,** Cleveland, Ohio, has published another in their series of Weldirectories, this one on mild steel and low-alloy, high-tensile steels. Information and procedure pointers on shielded arc welding are included in the manual. Applications, physical properties, welding procedures and other important details for the welder are provided on each of Lincoln's electrodes for mild steel.

947

HYDRAULIC BULLDOZERS — **Baker Manufacturing Co.,** Springfield, Ill., has published a colorful 24-page booklet on the Baker-manufactured hydraulic bulldozers that are designed for each Allis-Chalmers tractor. The booklet describes how Baker engineers work closely with Allis-Chalmers engineers to design bulldozers to exactly match the tractor. Units as designed for different Allis-Chalmers tractor models are described in detail and illustrated in action photographs.

948

DIESEL LOCOMOTIVE CRANE —**American Hoist & Derrick Co.,** St. Paul, Minn., has published a bulletin on the new American Model 410 crane of 10-ton capacity. Specifications and action photographs tell how this small crane is packed with big crane qualities. Features of the crane are its quick-action boom hoist, enclosed gears running in oil, a new tandem band air-controlled clutch, three-speed transmission and welded construction throughout.

OPPORTUNITY SECTION

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