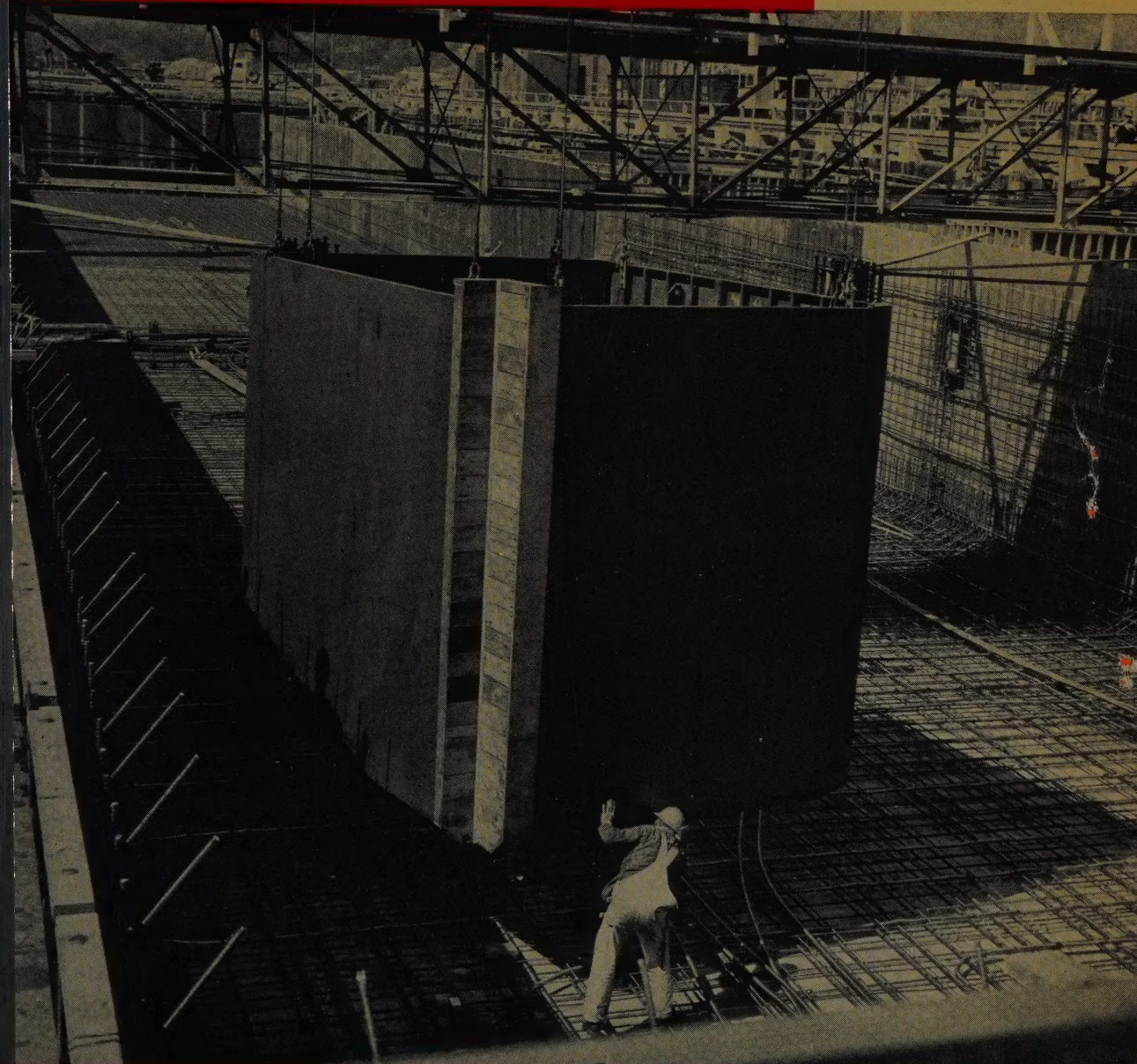


WESTERN

CONSTRUCTION



NOVEMBER 1958

Stressed pontoons for Hood Canal (Cover, p. 4) p. 29

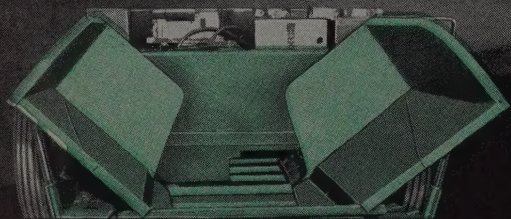
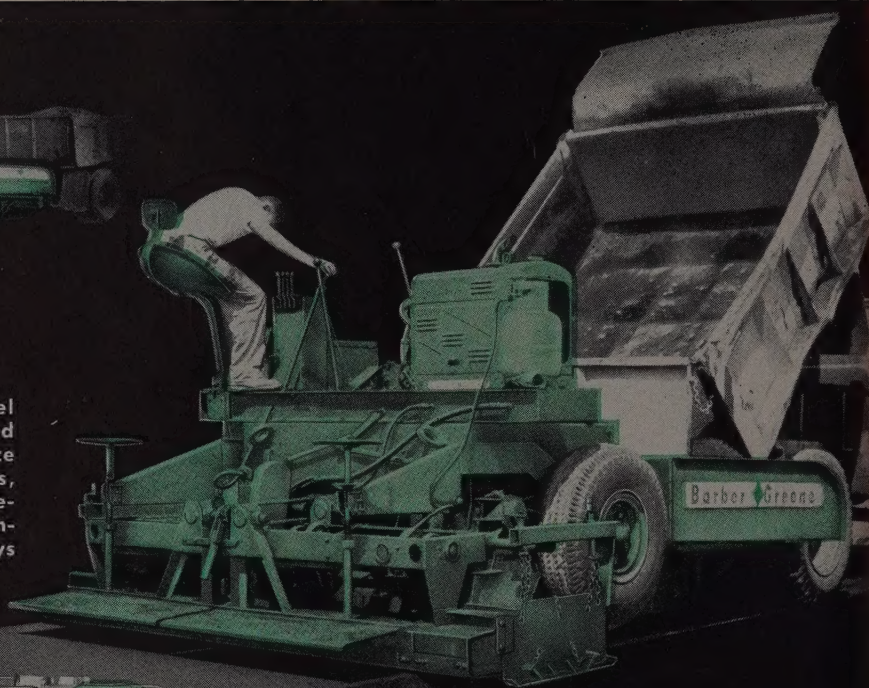
First work starts on \$350,000,000 John Day Dam p. 36

Best methods for installing and checking high strength bolts . . . p. 50



Towed on its own
pneumatic tires.

Completely new Model 873 Finisher has proved its superior performance in paving city streets, alleys, parking lots, driveways, playgrounds, highway shoulders, highways and many other jobs.



New folding hopper in raised position.

NEW BARBER-GREENE MODEL 873 FINISHER

paves on crawlers . . . travels on rubber

With crawler traction and flotation for the variety of bases encountered in paving all types of jobs—including parking lots, driveways, playgrounds, etc.—and trailed at truck speed on its own hydraulically retractable pneumatic tires, this new finisher includes advancements never before available.

Unmatched tamping, leveling and thickness control principles of the larger Barber-Greene Model 879-B Finisher.

Paves on crawlers. Paving all kinds of jobs, the 873 has crawler traction and flotation for all base conditions—especially less stable bases.

Travels on rubber. Hydraulically lifts itself on pneumatic tires for trailing with its own towing hitch.

New hydraulically folding hopper. Maximum capacity and truck clearance in open position. Sides hydraulically raise to feed automatically. No dead areas. Reduces transport width to 8'.

New simplified controls. Single steering lever. New hydraulic controls for material flow, screed hoist, towing wheels, and folding hopper.

Paving widths from 6' to 12' in 3" increments.

Paving speeds to 50 fpm. Towing speeds to 30 mph. Converts from paving to towing in seconds.

58-47-F

Write for information on this significant advancement in asphalt equipment

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AURORA, ILLINOIS, U.S.A.



CONVEYORS...LOADERS...DITCHERS...ASPHALT PAVING EQUIPMENT

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HIGH LIFTS or LOW LIFTS

they're easier with a **NORTHWEST!!!**

Go through the whole Northwest Machine—any model from the big 95 to the Model 25! Booms!—sturdier for workhorse lifting—Uniform Pressure Spring Clutches for smooth swinging, and accurate spotting... cool running, trouble-free!—the "Feather-Touch" Clutch Control with the "feel-of-the-load," free of the complication of delicate mechanisms, valves, pumps and compressors,—a choice of Boom Hoists including the Northwest Independent High Speed Boom Hoist, a rugged unit capable of trouble-free service in your after hour operation—a wide range of other equipment including Pivoted Gantries, Removable Counterweight, Sectional Boom Hoist Lifting and Pendant Lines, Telescopic Boom Struts, Adjustable Jibs, Extended Boom Point Sheave Shafts, and 3rd Drums that make possible three load lines.

Add to this that Northwest quality of "always being ready to go." We hear it everywhere and Northwest users will tell you so. It's the big reason why Northwests are money makers.

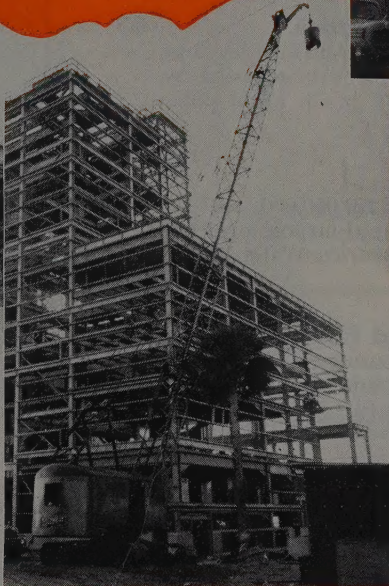
NORTHWEST ENGINEERING COMPANY
35 South LaSalle Street, Chicago 3, Illinois

Left: Two Northwests coordinate smoothly to place a heavy precast concrete beam.



A big Northwest 80-D makes an easy job of pouring. Plenty of boom and the jib make placing easy over a wide area of floor.

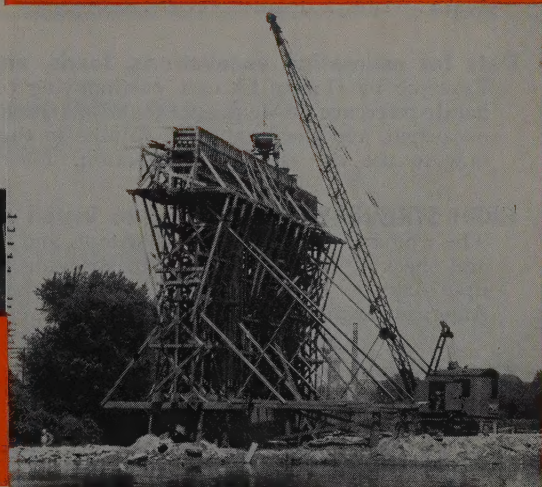
Below: A Northwest Model 41 pours smoothly to forms for a bridge pier.



Above: High floors are no problem with a Northwest.



Left: Pulling sheeting, jacking or driving piles or sheeting is all in the day's work for a Northwest.



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WESTERN



CONSTRUCTION

November

1958

Vol. 33 No. 11

TABLE OF CONTENTS

Prestressed concrete pontoons for floating bridge 29

Longest prestressing job in nation, 360 ft., is feature of concrete pontoon construction for floating bridge across Washington's Hood Canal. Huge concrete units are towed 50 mi. from graving dock to job site.

Rolling forms speed seats for stadium in Arizona 33

At Arizona State College, contractor F. H. Antrim develops ingenious form that moves on rubber wheels and is adjusted by jacks. Savings estimated at 30% time and 45% labor. Light poles are prestressed concrete.

First contracts awarded for John Day Dam 36

John Day Dam, with an estimated cost of \$350,000,000, will be the last of the huge Lower Columbia River multipurpose projects. Colonel Paul Symbol of the Army Engineer District, Walla Walla, Wash., writes a detailed review.

Data for estimating excavations, loads, and fills 42

Research by Horace Church, earthmoving consultant, develops a handy reference on weights of materials, swell and shrinkage when excavated, and the compacted volume in the fill. Examples show how to use the tabular information.

HIGH STRENGTH BOLTS—How to install and inspect 50

The why and the how of the best tools and methods for installing and checking high strength bolts. Bringing this fast-growing field up-to-date is Samuel Clark, San Francisco District Engineer, American Institute of Steel Construction.

Best manuals on contractors' pumps 88

FRONT COVER—A workman guides into position an interior steel form for one of the huge concrete pontoons being built for the floating bridge across Washington's Hood Canal. Article starts on page 29.

New Equipment	18 & 92	Calendar	79
Editorial Comment	27	Supervising the Jobs	80
News	60	Master Mechanic	86
Alaska Newsletter	62	New Literature	88
Hawaii Report	64	News of Distributors	102
Low bids and contract awards	68	Unit Prices	107
Engineers and Contractors	79	Classified Advertising	109

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The Plan Room Building

1417 Georgia Street

Los Angeles 15, California

Phone: Richmond 9-5540



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609 Mission Street

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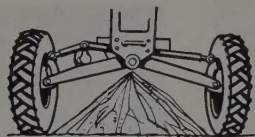
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For 32 years serving the construction needs of the 11 Western States

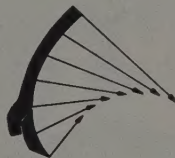
Allis-Chalmers FORTY FIVE performance

- 120 brake hp
- 6 forward speeds to 20.6 mph
- 3 reverse speeds to 7.0 mph
- 23,800 lb approx.

Advantages that mean more production . . .
less maintenance . . . easier and better operation



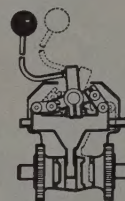
Extra high axle and throat clearance means bigger loads at the blade.



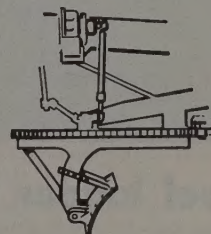
The ROLL-AWAY moldboard rolls dirt, gives more performance per horsepower, more production per gallon.



Fully enclosed power steering — easy control under all conditions.

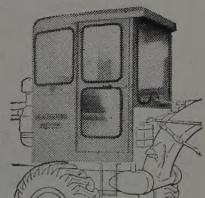


Toggle-type controls are exclusive with Allis-Chalmers.

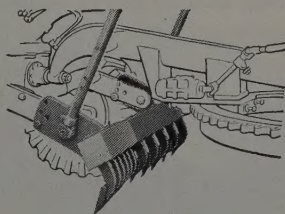


Front-mounted lift cases eliminate long shafts that twist under loads.

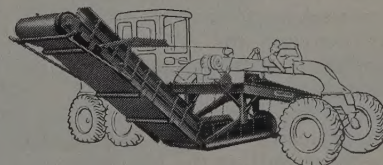
Matched attachments and accessories make it
a year-round producer



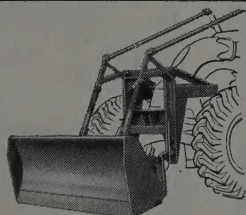
All-steel, stand-up cab



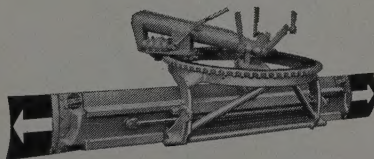
11-tooth, V-type scarifier



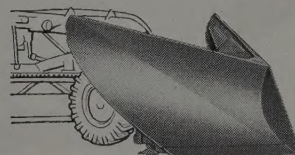
Hancock elevator



8-foot bulldozer



Hydraulic, shiftable moldboard



V-type snowplow

ROLL-AWAY is an Allis-Chalmers trademark.

. . . for more details, circle No. 12 on Reader Service Postcard

NEW EQUIPMENT

Obtain more information on these new developments in construction equipment by circling the corresponding numbers on reply postcard.



Wheel loader has torque converter

A low-priced wheel-type loader, the 420, with power boosting torque converter drive has been announced by the J. I. Case Co. Standard equipment also includes self-leveling bucket, shuttle transmission, and full-time power steering. Secret of the new tractor's power is torque converter drive which actually doubles push-power at the all-important low working speeds. Formerly available only on larger, more expensive wheel loaders and crawler tractors, the torque converter increases the 420's traction because the operator can "nudge" the bucket into the ground or stockpile smoothly, and apply extra power steadily, without spinning wheels or stalling the engine.

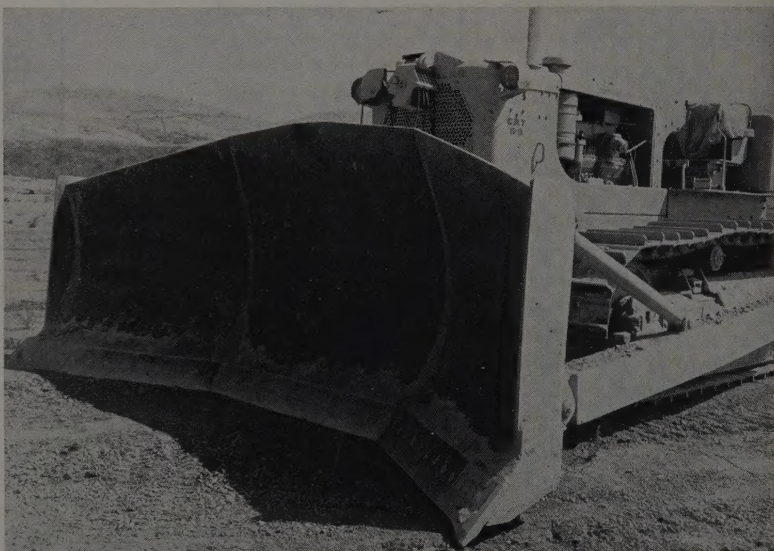
The unit has a 21-gal. per min. hydraulic pump. Because the torque converter prevents the engine from being "pulled down" by heavy loads, the pump continues to deliver maximum break-out power. The torque converter also cushions shock loads and prevents damage to engine or power train; automatically adjusts travel speeds to varying loads, and completely eliminates clutching and engine stalling. A simple lock-out lever on the dash permits operators to

switch the unit from torque converter to direct drive while "on-the-go" for faster cross-country or highway travel between assignments, for safer downhill operation, and for using the backhoe.

... Circle No. 151

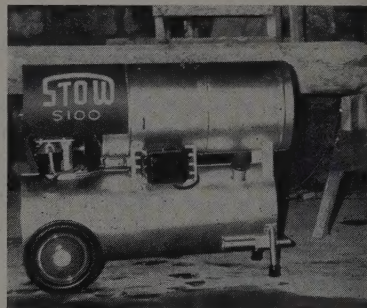
SHEPHERD MACHINERY CO., has recently introduced the Shepherd M488 Bulldozer for use with the Caterpillar D9 Tractor. This is believed to be the world's largest production bulldozer. Measuring 16 ft. 11 in. wide by 6 ft. 8 in. high, this giant U-type dozer is fabricated from T-1 steel for maximum strength.

... Circle No. 153



Portable heater has built-in thermostat

Stow Mfg. Co. has just put on the market a unique recirculating oil-fired portable heater designed for the construction industry. Compact and ruggedly built, the heater



features a built in room thermostat (similar to the one in your home). Once the operator sets the temperature by the thermostat dial it automatically turns the heat on and off to maintain a constant comfortable temperature. This unusual feature saves considerably on fuel and allows the Stow heater to run up to 30% longer on one tank of kerosene or number one, or number two fuel oil. (It can be left on all night.)

... Circle No. 152

drive the new 1959 *Power Giant*



CHANGES ... WHERE THEY COUNT!

New performance! New comfort!

Look into the cab—look into the chassis! Wherever you look in the new 1959 Dodge trucks, you'll find changes that *mean something*. New convenience, for instance, in suspended brake and clutch pedals, and hydraulically operated clutch. New heavy-duty electrical system. Greater dependability. Increased G.V.W.'s on tandems. Concealed running boards on medium-tonnage models.

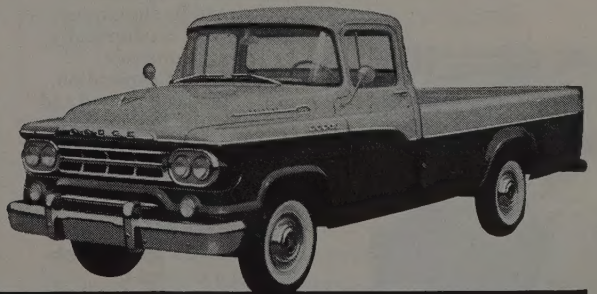
You'll find new cab comfort, too, and better heaters. Plus new instrument panels designed especially for medium- and high-tonnage requirements.

Ask your dealer about all the new Power Giant advancements. And about the new network of Dodge Truck Centers that let him give quick delivery of any Dodge truck to meet your exact needs. Plus hurry-up parts service. See him soon!

★ ★ ★

Striking new Dodge low-tonnage models!

This spirited new Sweptline Pick-up leads a complete line of new 1959 Dodge low-tonnage trucks. Advanced models for every need, from 5,100 to 10,000 lbs. maximum G.V.W.



every trucking need



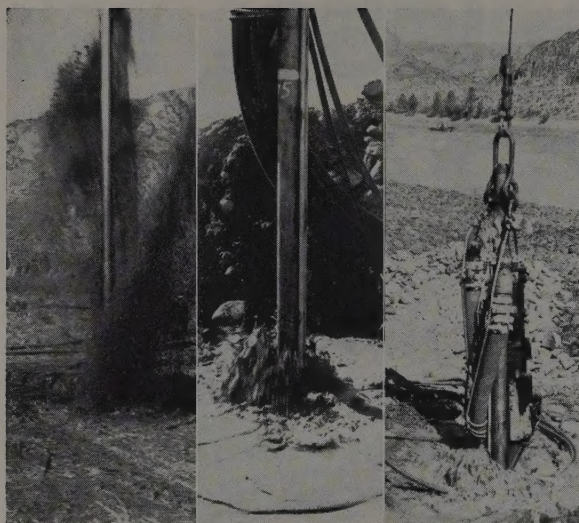
4-WHEEL-DRIVE Models W100, W200, W300, W300M, W500 — G.V.W.'s to 20,000 lbs.



FORWARD-CONTROL Models P300 and P400 G.V.W.'s to 15,000 lbs.

**TODAY ...
IT'S REAL SMART
TO CHOOSE DODGE
POWER GIANTS**

... for more details, circle No. 14 on Reader Service Postcard



Going-Going-Gone!

STANG JETS

**121' TO
BEDROCK
IN 30
MINUTES!**



The depth to bedrock was determined by a unique method at Wells Dam site on the Columbia River in eastern Washington, currently being investigated by the Bechtel Corporation for the Douglas County Public Utility District. Bechtel engineers, after consultation with engineers of the John W. Stang Corporation, decided that the many deep holes required to locate bedrock could be sunk most quickly and economically by jetting. Subgrade Engineering Corporation, using Stang engineered and manufactured equipment, performed the work. Depths ranged from 30' to 121'; time required ranged from 5 to 30 minutes per hole. If you have a jetting problem on a current or proposed project contact your nearest Stang office.

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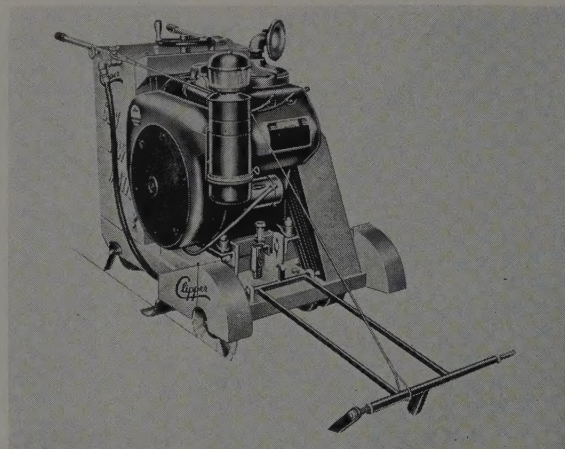
OMAHA, NEBRASKA
2123 South 56th Street
Telephone: Walnut 7796

TACOMA, WASHINGTON
2339 Lincoln Avenue
Telephone: Fulton 3-3438

TULSA, OKLAHOMA
4026 South Urbana Street
Telephone: Riverside 2-6929

New Clipper has less weight, more strength

For high production contraction joint cutting on highways, turnpikes, airfields, and for heavy-duty trenching operations, the **Clipper Manufacturing Co.** is now offering a 36-hp. concrete saw (Model C-363). The new saw features dual balance design, one-piece frame design for precision weight distribution and easy maneuverability. Its strength and durability have been increased over previous models and yet its weight is less. Line-up time is cut in half. Con-



stant, adequate weight over the blade during cutting prevents riding out of the cut even on the hardest aggregate and at fastest speeds. The ball-bearing positive screw feed quickly raises and lowers the blade into the cut and provides accurate cutting depth control. Positive screw feed also accurately compensates for abrasive blade wear. Separate off-the-pavement contact wheels eliminate the possibility of curing compound building up on the drive wheels, do away with down-time previously needed to clean the abrasive coated wheels, and insure a powerful forward thrust.

... Circle No. 154

Revolutionary road finishing float announced by Rex

A revolutionary longitudinal float road finishing machine has joined the fleet of **Chain Belt Co.'s** new Rex road building equipment. Basic frame members are made of tubular construction for additional overall strength with flanged frame corner connections for fast and easy disassembly for transportation. The modern, functional design of the float includes grouped controls and safety catwalks for ease of operation. The actual finishing operation of the new machine is accomplished by a carriage which travels transversely between the tubular frames on a set of single crown rails. Crown adjustment is done through a single point handwheel control at the front and rear of the machine for each crown rail. An independent power unit on the floating carriage allows independent control of carriage speed and traction speed. Automatic mechanical trip lever on the unit reverses carriage direction at each end of the cycle. The machine is supplied in two basic width adjustments, 10 to 15 ft. and 20 to 25 ft.

... Circle No. 155

(Turn to page 92 for more New Equipment.
New Literature can be found on page 88.)

The Public has its Ideas on Freeways

FREEWAYS will soon begin to reach into every city of size in the West. Highway engineers will be concerned more and more with public opinion on the subject. There is value in the opinions formed by citizens of metropolitan areas who have already experienced freeways and are expecting additional mileage of these expressways within their boundaries.

A poll recently conducted by the *San Francisco Chronicle* tapped public sentiment in an area which has become familiar with freeways and is concerned about additional mileage. Answers received from a questionnaire addressed to its readers indicated opinions that may develop in other populated areas where freeways will be planned and carried out.

Some of the questions resulted in non-conclusive replies, but some reactions were startling and cannot be lightly dismissed. The questions did not relate to any particular freeway, but asked opinions on freeways in general. Whereas 90% of the responses agreed that freeways are desirable between cities, only about 10% considered them desirable within municipal areas. This ratio of opinion deserves serious thought in freeway planning. Convenience and safety for inter-city travel is appealing and desirable when the metropolitan driver gets out of town. His needs are seldom met by the freeway as he moves about within his own locality. Further, the freeway is a means of bringing heavy suburban traffic into congested areas that are already loaded with local traffic.

Furthering this realization of the serious impact on local conditions, almost 60% of the responses indicated that local officials and planning boards should have control over freeway routings within their jurisdiction. This thinking was reinforced by a heavy majority (81.7%) contending that when freeways extend through built-up areas adequate consideration should be given to the prop-

erty values that are destroyed and the tax revenues lost by the community.

Possibly the most significant opinion expressed relates to the resulting parking problem from vehicles which have such convenient access to congested downtown areas. One of the heaviest expressions of opinion at 84.2% was to the effect that provision and financing of adequate parking for the automobiles delivered into a city should become an integral part of the freeway project. Again, this represents the conflict between local interests and those planning an overall state system. Commercial interests may have an advantage in the traffic drawn into metropolitan areas by freeways, but the local citizenry moves about with only occasional advantage and has growing concern over added traffic and parking problems.

One last expression of opinion which is of significance to freeway designers was the vote favoring adequate consideration of architectural treatment for all structures as well as financing for landscaping and its maintenance.

All of the ideas expressed, if put into effect, would tend to increase the cost of freeways extending into metropolitan areas and to emphasize the voice of local interests.

Freeways that stretch across wide Western spaces with easy grades and no cross traffic represent a highway development that seems to have universal acceptance. Where these routes tend to deliver heavy traffic concentrations, particularly from suburban areas, into congested cities, public opinion would seem to reverse itself. Highway planning that lacks public support deserves reappraisal.

Jim Ballard



A-W Hydraulic Crane shown bending pipe-type cable at Wright-Patterson Air Force Base, Dayton, Ohio. Two hydraulic outriggers on the sides of the crane hold the pipe while the boom pulls it up into the desired curve.

A-W Hydraulic Crane proved excellent on high-precision electrical project

says Helldoerfer-Castellini, Dayton, Ohio

One of the pioneers in laying underground pipe-type cable, Helldoerfer-Castellini recently completed its largest installation of this kind at Wright-Patterson Air Force Base. The project, which involved laying 10,000 ft. of new cable, cost \$2.5 million. Putting the 69,000 v line underground removed the serious hazard of overhead line interference, greatly increasing safety in landings and takeoffs.

The company informs us: "For the single crane we needed to handle this

pipe, we made a thorough study of the field, and chose an A-W for several reasons: it is more adaptable and maneuverable than other cranes; it is safe around substations; it has no long cables, the possible snapping of which would be very dangerous; its dependability assures low downtime.

"The 6-in. cast iron pipe sections were 40 to 45 ft. long and carried conductor cable drawn into them before being lowered into the trench. Unusual care was required in handling, bending

and installing these pipe sections because of a special insulation to protect them from corrosion.

"The A-W crane proved its capacity for handling pipe, fittings and material for the towers with precision and safety—both to personnel and the things it carried. The only alternative was rental of an \$18-an-hour crane. We saved well over \$100 a day by deciding to buy an A-W instead."

For complete details on this installation, write for Certified Gould Report No. 5704.

Austin-Western

Construction
Equipment
Division
Aurora, Ill.



ARIZONA—	WESTERN MACHINERY COMPANY	Phoenix
CALIFORNIA—	EDWARD R. BACON COMPANY	San Francisco 10
	SMITH BOOTH USHER COMPANY	Los Angeles 54
COLORADO—	MACDONALD EQUIPMENT COMPANY	Denver 16
IDaho—	ENGINEERING SALES SERVICE, INC.	Boise
MONTANA—	HALL-PERRY MACHINERY COMPANY	Butte
	HALL-PERRY MACHINERY COMPANY	Billings
	HALL-PERRY MACHINERY COMPANY	Great Falls
	HALL-PERRY MACHINERY COMPANY	Missoula

NEVADA—	GRAID EQUIPMENT COMPANY	Reno
NEW MEXICO—	N. C. RIBBLE COMPANY	Albuquerque
OREGON—	COLUMBIA EQUIPMENT COMPANY	Portland 14
UTAH—	WESTERN MACHINERY COMPANY	Salt Lake City 15
WASHINGTON—	COLUMBIA EQUIPMENT COMPANY	Seattle
	COLUMBIA EQUIPMENT COMPANY	Spokane
WYOMING—	KEREMI TRACTOR & EQUIPMENT COMPANY	Cheyenne



Prestressed pontoons for Hood Canal

Longest post-tensioning job ever tried in this country, 360 ft., is feature of spectacular floating bridge across Washington's Hood Canal. Smart formwork and concrete placement practice speeds operation.

HISTORY was made 20 years ago when Washington built a floating concrete bridge across Seattle's Lake Washington. The structure was an engineering and construction milestone at the time, and there is still nothing in the world that quite compares with it.

Now Washington is making history all over again by building another huge floating bridge, this one across Hood Canal, an ocean inlet which, along with Puget Sound, separates the populous Seattle area from Olympic National Park.

There are many similarities between the two bridges, for engineers of the Washington Toll Bridge Authority drew extensively from their experiences with the earlier bridge. But there are significant differences, too, differences which reflect the advances in engineering and technology which have occurred in the intervening years.

The floating section of the Hood Canal will be 6,471 ft. long, which is slightly shorter than the 6,620-ft. length of the floating portion of the

Lake Washington bridge. (A detailed article by Homer Hadley on the design and construction of the Lake Washington bridge appeared in the September 1939 issue of WESTERN CONSTRUCTION.) But Hood Canal is salt water, which is much more corrosive to reinforcing steel than the fresh water of Lake Washington. And the tide range in Hood Canal is about 18 ft., as compared to 3 ft. in Lake Washington. The pontoons for both bridges are held together with steel bolts to form a continuously rigid structure, but, in keeping with recent advances, high-strength bolts are being used for the Hood Canal bridge. Instead of vehicles traveling directly on the top slab of pontoons, the roadway on the Hood Canal bridge will be carried by superstructure 20 ft. above the water. This is necessary to protect vehicles from the salt spray and splash of the waves.

The floating portion of the bridge is connected at each end to fixed piers on the shore through 280-ft. steel trusses which are

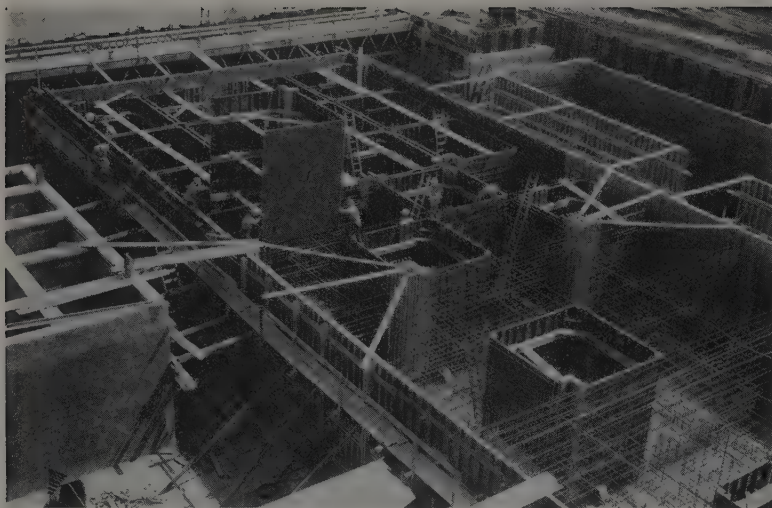
hinged at both ends. The gradients on the transition trusses will vary as the tide rises and falls. Heavy struts in the floor of each truss provide the floating portion with longitudinal stability. Transverse stability will be provided by 42 concrete anchors, each 900 tons.

At the center of the bridge two movable pontoon sections are provided which can be withdrawn between two pairs of guide pontoons to provide a ship channel 600 ft. wide. This opening can pass the largest vessels of the U. S. Navy.

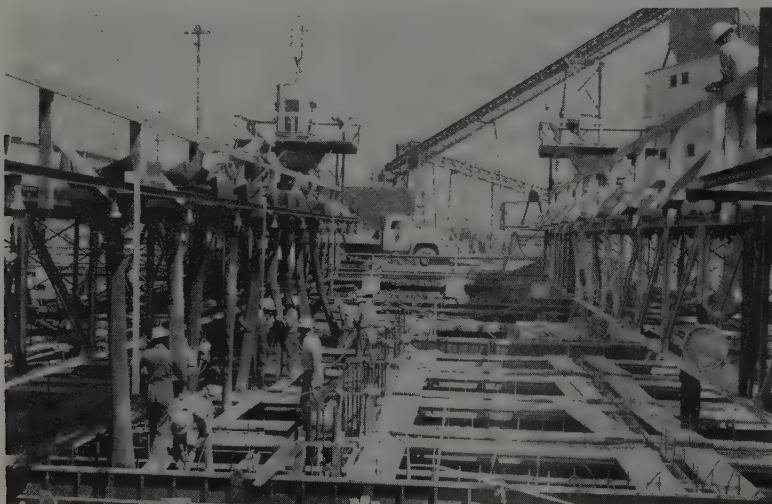
The Washington Toll Bridge Authority called for bids in October of 1957. Low at \$14,226,690 was a joint venture of Morrison-Kaiser-Puget Sound-General. Only \$130,000 behind was a joint venture of Halverson, Montag, Hoffman, and Austin & Babler. Less than \$8,000 further back was Peter Kiewit Sons' Co. In fourth place was a joint venture, Pacific Bridge, Fruin-Colnon & McLaughlin.

Record breaking prestressing

In the unit bids for the project which appeared on page 143 of the April issue of WESTERN CONSTRUCTION it is interesting to note that the winning contractor bid 15 cents for each foot of $\frac{3}{8}$ -in. round strand



IN SEATTLE DRYDOCK steel forms are swung in place as a unit for interior cells. See also this month's cover picture. Visible at left is part of completed concrete anchor.



CONCRETING is done from two pouring bridges which span two pontoons. Concrete is trucked from batch plant in background. Two pontoons are completed every month.

prestressing reinforcement, which totals 3,280,000 lin. ft. This tremendous amount of prestressing cable ranks the Hood Canal project among the largest prestressing jobs yet recorded. The 360-ft. pontoons are among the longest if not the longest units ever prestressed in this country. Prestressing consultant for the project is the imaginative and experienced Concrete Technology Corporation of Tacoma, Washington.

Carrying out the prestressing on a subcontract basis is the Soule Steel Co. The $\frac{3}{8}$ -in. strands are Tiger Brand supplied by Columbia-Genève Steel.

A total of 43 prestressing tendons, each containing 8 strands of

$\frac{3}{8}$ -in. high strength cable, are spaced through the bottom portion of the walls and bottom slab of the pontoons.

The first step in the prestressing operation is to stretch out on a 360-ft. long sheathing table the hollow flexible conduit (a product of Flexonics Corp.) which will contain the prestressing strands. A Fish tape is pushed manually through the cable from one end to the other. This is used to pull a $\frac{1}{4}$ -in. load line through. The 8 prestressing strands are attached to the end of the load line by means of a wire cable grip. The strands are pulled through the cable by an American hoist powered by a Wisconsin air-cooled gasoline engine. The cables are moved

the several hundred feet to the graving dock with the assistance of Mathews conveyor rollers. They are tied into position on the reinforcing steel of the pontoon with ordinary re-bar wire. Because the load on the pontoons (the buoyant force of the water) is continuous, the cables are placed in a straight line. A catenary or parabolic curve is customary in simply-supported bridge or building beams.

All reinforcing bars, bar chairs, pipes, and prestressing tendons have a minimum 2 inches of concrete cover on the outer surfaces exposed to sea water. One of the advantages of prestressing for use such as this is that it eliminates any cracks which might admit corrosive salt water to the reinforcing steel.

During concrete placement the prestressing strands are moved back and forth in the conduits to make sure they are not frozen by accidental leakage of concrete into the conduits. A Coffing hand hoist is used for this purpose. Stressing begins after five days or when the concrete has reached the strength of 3,000 psi. When tendons are stressed it is generally from the center of the pontoon outward. Stressing is done with two 100-ton Pine jacks. A jack is installed at each end of the line and with the assistance of Army field telephones the jacking is done simultaneously. On a standard line about 72 tons of force is applied. Initial tensioning stress is 70% of the ultimate strength, or 14,000 lb. per strand. The steel strands have an ultimate strength of 250,000 psi.

Elongation of the wire during stressing is about 26 or 27 in. The 360-ft. pontoons become about $\frac{5}{8}$ in. shorter when all the prestressing load is applied. When the wires have reached the desired stress and elongation an aluminum cone is driven into a female socket by a hydraulic plunger on the jack. The strands are thus held securely in position by the wedging action of the close-fitting cones.

After the aluminum plugs have been driven home, pinning the strands at the proper stress, the grouting operation commences. After the lines have been cleaned with air and water, the grout is introduced through a $\frac{1}{4}$ -in. hole in the plugs. Pumping continues until there is a constant flow at the other end. The grout is pumped at between 50 and 100 psi. The mix presently being used consists of about 4.5 gal. of water per sack of cement. Aluminum powder is added to expand the grout and eliminate voids.

The high strength bolts which are used to join the pontoons together rigidly are 1½ in. in diameter. Final tightening is 50% of ultimate strength. The torque will be measured by torque wrenches during the tightening of the nut and the readings will be taken while the nut is in motion. Shearing forces at the junction of the pontoons will be taken by large steel shear plugs which fit from one pontoon into the next.

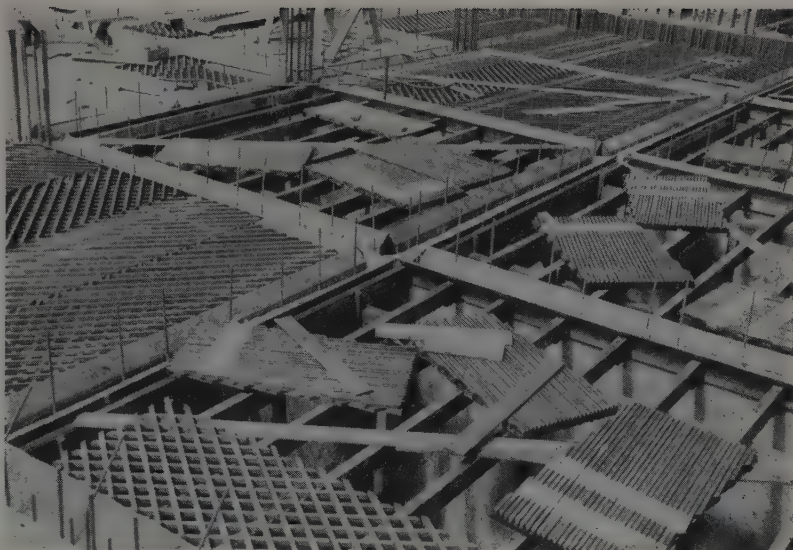
Placing and forming concrete

The 125-ft. wide by 400-ft. long graving dock is spanned across its short dimension by two rail-mounted steel gantries, or pouring bridges. The bridges are moved forward by manual hoists on each end. Concrete is placed in a hopper at one end of each bridge and is transported from there along the bridge with manual concrete buggies. From the buggies the concrete is dumped into 8 or 10 small movable funnels which are mounted on top of elephant trunks. Because of the great amount of reinforcing in the walls of the pontoons, the concrete is not poured into the top of the forms but is passed through flat sheet metal tubes 8 in. wide and 2 in. thick which are passed to the bottom of the forms between the reinforcing steel in the outside form. This slows up production somewhat but is essential to avoid honeycombing and voids in the concrete.

Eight or nine men positioned on the trailing edge of the lower deck of each bridge take care of the vibration with the use of Viber machines.

On the first pass concrete is placed in the walls until it is several feet high. Part of the concrete emerges from the bottom of the forms into the floor slabs. From the second pouring bridge, which is kept about an hour behind the first, the remainder of the walls is poured. The time lag between the two bridges is important, because if it were too short the concrete already placed in the walls would not be firm enough to support the weight of additional concrete and it would erupt into the floor slab from the bottom of the forms. If too much time elapses between placing the first concrete and the remaining concrete, a cold construction joint would result in the walls.

A completely automatic Noble batch plant with a pair of 2-yd. Smith tilting mixers is located adjacent to the graving dock. Aggre-



COLLAPSIBLE LATTICES are used to support forms for top slab. In collapsed form they can be removed from small manhole. Idea is thought to have originated in Europe.

CONCRETE MIX—1 cu. yd.

	Regular (4% air)	Lightweight (6% air)
Cement	540 lb.	611 lb.
Coarse aggregate	814 lb.	
Intermediate aggregate	1,173 lb.	
Fine aggregate	1,270 lb.	
Water	225 lb.	244 lb.
Plastiment	2 oz./sack	3 oz./sack
Darex	½ oz./sack	¾ oz./sack
Haydite "C" (¾-¾ in.)		506 lb. dry
Haydite "B" (¾-3/16 in.)		378 lb. dry
Sand		1,276 lb. dry

Note: Addition of Plastiment and Darex varies with air temperature.

gates are barged in and placed in stockpiles next to the plant. A system of colored lights is used by the operators of the batch plant to indicate what size of aggregate they wish placed on the conveyor which leads to the top of the plant.

The forms for the project were a considerable item because enough had to be purchased to handle an entire pontoon since pouring had to be continuous. The walls of each pontoon have a total area to be formed of about 85,000 sq. ft. For efficient scheduling of the work it was desirable to have two complete sets of outside forms, bringing the total forming area up to close to 100,000 sq. ft. The forms were designed and built by the Dixie Form & Steel Co., of San Antonio, Texas. All are made of 3/16-in. steel and can be reused indefinitely.

When stripping the cell forms, a narrow strip of steel is removed from each corner and each of the four wall forms is drawn away from the concrete by the action of two hand ratchets at each corner of

the forms. This permits the four wall forms to be lifted out as a unit for re-use.

The exterior wall forms consist of a series of panels 14½ ft. high and 5 ft. wide. Even though the panels are designed to withstand full hydro static head, there are only 8 form ties per panel. The ties, a product of Williams Form Engineering Corp. of Grand Rapids, Michigan, consist of a 1¼-in. she-bolt and a ¾-in. high tensile tie rod. The large nuts which fit on the threaded end of the she-bolts have small projections which clean the concrete and dirt from the threads as the nut is removed.

An ingenious idea is being used to form the bottom of the top pontoon slab. All of the form work and shoring for the slab must be removed through a 2 x 4-ft. manhole. The shoring consists of collapsible lattice work made from 1 x 1 wood riveted together. Extended each section is 12 ft. long by 3 ft. 3 in. wide. Collapsed it is only 3 ft. by 3 ft. 3 in. This unusual shoring



PRESTRESSING CREW keeps in touch by telephone with men at other end of pontoon so jacking can proceed simultaneously. Hydraulic jack is operating at lower left.

AGGREGATE GRADING ANALYSIS

Sieve size	(% passing)		
	Coarse	Intermediate	Fine
1 in.	100		
¾ in.	40-70	100	
½ in.	0-10	80-100	
⅜ in.	0-5	40-60	
No. 4	0-2	0-4	95-100
No. 6			82-98
No. 8			68-86
No. 16			47-65
No. 30			27-42
No. 50			9-20
No. 100			0-7
No. 200			0-2

can be seen in one of the accompanying pictures. The idea, which is said to have originated in Germany, was also used to good advantage by Pacific Bridge on the recently completed floating bridge at Kelowna, B. C.

Each pontoon requires 1,744 cu. yd. of concrete. The superstructure for each pontoon contains 519 cu. yd. of concrete.

The graving dock is big enough to work on two standard pontoons at once. The contractor's schedule calls for the completion of two per month.

While concrete is being placed for one pontoon the outside forms and reinforcing steel for the other is being set. When the cell forms for one are stripped they are lifted by crane to the ground where they are cleaned, squared, and oiled and set in place for the second pontoon.

Major equipment includes a 50-ton Washington Iron Works whirley crane, a Northwest crawler-mounted 95 crane, and a 30-ton P&H truck crane.

Transverse stability for the floating structure will be provided by 42 large anchors which are connected by cables to mid point of each side of each pontoon. The anchors are 40 ft. long, 19 ft. wide, and 15¼ ft. high. The anchors have ten hollow cells, similar to the pontoons. During positioning at the site they will be suspended from beams spanning between two barges, filled with concrete and sunk to the bottom. Each anchor contains 900 tons of concrete which has a weight of 516 tons when immersed in sea water.

Anchor lines consist of two parts of 1¾-in. high-strength steel bridge strands in one continuous piece passing through a large eye at the front of the anchor with the free ends attached to an adjusting device inside the pontoons. Once the anchor lines are adjusted to proper tension, they will simply tighten or slacken as the tide rises and falls.

The lines will be protected from corrosion in the salt water by a cathodic protection system using

carbon anodes and impressed direct currents.

The bottom of Hood Canal is steep in places and it is possible that some of the anchor sites will have to be leveled by use of a floating clamshell or dredge.

General information

The floating structure will be protected by a timber fender consisting of vertical 6 x 8's on 5-ft. centers and horizontal 4 x 8's on 10-in. centers. Maintenance vehicles will be able to travel directly down the top of the pontoons underneath the elevated roadway structure. The elevated structure will be cast in place on the pontoons in Seattle before they are towed out to the site.

Lightweight aggregate is used for the slab and superstructure concrete on the draw pontoons to balance the section in flotation, and to cut down the power required to move the pontoons.

There will be a total of 40,400 cu. yd. of concrete in the pontoons, 13,667 cu. yd. of concrete in the superstructure, and 18,600 yd. in the anchors. Reinforcing steel totals 12,500,000 lb., ¾-in. prestressing strands total 3,300,000 ft., and the 1¾-in. anchor strand totals 84,000 ft. The structural steel comes to 2,400,000 lb. and the cast steel totals 940,000 lb.

Personnel

About 330 men are working on the job now on three 8-hr. shifts.

For the contractor, Morrison-Knudsen, Kaiser, Puget Sound Bridge & Dredging Co., and General Construction Co., project manager is Tom Moyer. Darwin Lind is general superintendent, and Glen Toy is project engineer. Ben Ostrom is rigging superintendent, Dan Etherton is labor superintendent, Bill Porter is batch plant superintendent, and Bob Young is carpenter superintendent. Office manager is Ralph Smith. Shift superintendents are Dave Stuart and Art Bateman. Lee Lowry is electrical superintendent.

For Soule Steel, B. D. Fowler is district superintendent, and Bart Pearce is job superintendent.

Chief consulting engineer for the Washington State Toll Bridge Authority is Charles E. Andrew. Project engineer is E. H. Thomas. H. S. Sitzman is design engineer. J. C. Tucker is resident engineer, assisted by Arnold Colby and Ed Kleppers. Resident engineer at the bridge site is K. B. Arkin.



TEMPE BUTTE provides the background for this construction scene at the new stadium. The form at the right has just been rolled into a

new position and is being adjusted. As soon as rebars are set the form at the left will be jacked onto its wheels and moved to the right.

Rolling form speeds stadium seats

Contractor-developed 48x30-ft. steel form that moved on wheels and was adjusted by jacks was used for pouring concrete at new football field at Arizona State College. Light towers are of prestressed concrete.

By **ROBERT SHIPLEY**
Phoenix, Ariz.

WEDGED BETWEEN the two peaks of Tempe Butte is the new football stadium just built for Arizona State College at Tempe. Construction of the 34,000-seat stadium was begun in January by the F. H. Antrim Construction Co. and recently completed for a cost of \$800,000. The stadium, built on a mountain composed entirely of broken granite, is not the conventional oval, but has two main parallel 350-ft. riser sections with short curved wings.

It was these long straight sections that enabled Antrim's engineers to design and use an entirely new type of steel form for pouring concrete. These forms and the stadium's unusual 84-ft. prestressed concrete light poles were the features of the project.

Before the concrete pouring could begin some 165,000 yd. of rock had to be blasted and ripped from the slopes of the mountain. And because the butte is less than a half mile from the center of the sprawling town of Tempe, conven-

tional methods of explosive excavation were not practical or even safe. Within several hundred yards of the site were new dormitories with large plate glass windows and many old but still occupied homes. Other working restrictions were the high voltage power lines that

marched right through the saddle and a short wave transmitter that was in continual use atop the butte. To achieve the necessary blasting control the contractor successfully used bag and stick powder in various ratios depending on the blast area and hole depth.

By drilling and shooting intermediate "satellite" holes the engineers were able to closely approximate the slope and bottom surfaces of the access ramps, retaining walls, and abutments. These changing conditions required a hole depth

POURING CONCRETE into one of the gang forms. Reinforcing steel has already been placed at the left. Three hours after the pour is finished the form will be rolled to its next position.





DETAILS of the solid-rubber wheels and jacks. For making a move the jacks raise the lower edge of the form and the two wheels are bolted on. After the form is rolled forward the jacks again raise the form so the wheels can be removed and the form lowered.

from sub-surface to 40 ft. and a blast area varying between 1,500 and 3,500 yd. per shot. When the pockets were smaller, the crews were able to make as many as three shots per day.

As blasting progressed, the citizens of Tempe grew apprehensive about underground installations and buildings. So to keep the public informed, a seismograph was installed at the site to monitor the ground shocks. The instrument showed that the concussions were well within safe limits.

The blasting material was supplied by the Apache Powder Co. and the Atlas Powder Co. Emit Richardson was in charge of these operations.

As the rock was shot out of the saddle it was hauled by scrapers and spread out at the periphery of the site. The foundations and retaining walls were poured and the careful grading for the concrete tread and riser sections began.

The most interesting aspect of this job was the type of forms Antrim used to pour the bench steps. These were gang forms of all steel construction 48 ft. wide by 30 ft. deep. Each of the four forms was equipped with two pairs of solid rubber wheels for horizontal move-

ment and six hand-operated screw jacks provided for vertical adjustment.

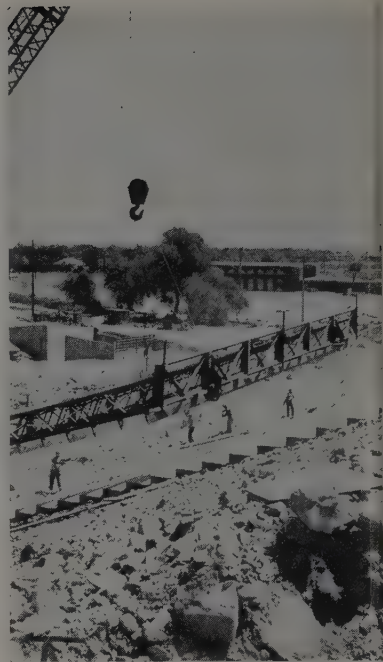
Bolted to the bottom members of the frame were the risers which were more than 48 ft. long, the width of the unit. These risers, which formed the face of the step, were easily adjusted horizontally for varying step depth and vertically for changes in height. The gang form was designed for a mean slope of 3 to 1 and the riser adjustments enabled the contractor to pour the stands in a slightly concave shape.

Forms save time and labor

These forms, which were easily moved and set to grade, turned out to be remarkably practical. Ollie Shullenbarger, general superintendent, estimates an approximate 30% time and 45% labor cost saving resulting from their use.

The top step was first cast the entire length of the stands and anchored to rock. Protruding from this curb and pointing down the slope were closely spaced reinforcing dowell bars to which were tied the entire reinforcing mat. As each 48 x 30-ft. section of hillside was graded and covered with the reinforcing steel, the gang form was rolled into position. The two upper wheels traveled on the completed top step. The form was secured with construction wire to temporary steel angles bolted to the bench bracket inserts cast in the face of the step. The jacks were screwed down, raising the form, and the wheels easily dropped off the unit by removal of four bolts.

The unit was then lowered to correct grade and the concrete poured. Two or three hours later



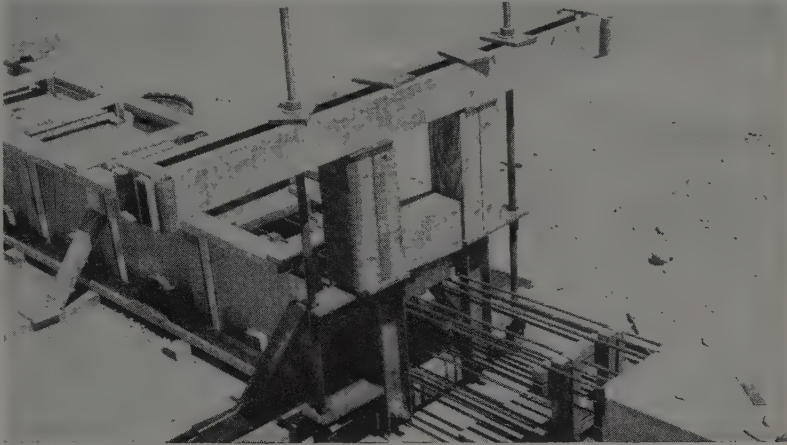
HANDLING the forms for longer moves was done by crane and light cable slings. Note the risers which form the face of the steps hanging down from the unit.

the gang form was jacked back onto its wheels and rolled to the right. For this next section the entire left end of the form, which has a 3-in. overhang, rested on the previous pour. Since the top and one side were then on grade, the levelman had to shoot only the lower right hand corner and the section was ready for the pour.

The gang form was originally designed by Antrim's engineers. Allison Steel of Phoenix was responsible for the detailed struc-

CREW operated on an obstacle course during the pour. Tops of the steps were hand finished, but the risers were produced directly by the form which is 48 x 30 ft. in area.





PRESTRESSED CONCRETE POLES for night lighting are 84½ ft. long, weigh 20 tons each. Four were cast on the same prestressed cables. Poles are 30 in. square at the base and 14 in. at the top. Taper was provided (lower picture) by a job-made choke that pulled the prestressed strands together. This permitted the economy of pouring four poles at the same time.

tural design and fabrication. Allison also furnished the reinforcing steel for the job.

It wasn't long before the crews were able to raise the gang form, roll it, and position it for the next pour in less than an hour and a half. With a 2½-in. slump the concrete took a sufficient set in 2 hr. for the form to be raised and moved for the next pour. The greatest time consumer was the manual placing of the ½-in. coil loop steel inserts that were cast in the step face. These inserts formed the threads for the seat brackets' coil bolts. Wood forms were used only on the short curved wing sections and here the crews found it very difficult to drive stakes in the broken rock.

Approximately 4,500 yd. of pre-mix concrete supplied by Arizona Sand and Rock were used for the stadium. Fibermastic expansion joints were alternated with cold joints every 48 ft. Aisles were made by leaving a 4-ft. space between the conventional wood benches. The football field which is now 12 ft. below the original grade was covered with topsoil

and growing grass more than two months before the stadium itself was completed.

PRESTRESSED LIGHT TOWERS

To light the field eight prestressed concrete poles were built by the Superior Sand and Gravel Co. of Phoenix. These unusual poles will stand a full 80 ft. above the ground with only 4½ ft. below the surface. To support each tower's 40,000-lb. weight a 14-ft. square reinforced concrete footing is topped by an 8-ft. square base. The lower end of the poles measures 30 in. square and tapers down to a 14-in. square top. To lessen the dead weight two 30-ft. voids were cast in the poles. The lower void is 15 in. in diameter and the upper void measures 10 in. Standard electrical conduit runs the length of the structures.

T. Y. Lin of Los Angeles submitted the preliminary prestress design to Magadini & Niebur, consulting engineers of Phoenix, who worked out the structural details under E. L. Varney & Associates, the stadium designers. To support a 32-bulb and transformer rack,

the poles were designed for a maximum wind load of 30 lb. per sq. ft. of frontal area.

To prestress the twenty 7/16-in.-7-wire strands, Superior used two 200-ton Rogers hydraulic jacks. To save time and labor four poles were cast top-to-top and bottom-to-bottom in a straight line. An initial tension of 18,900 lb. was pulled in each strand. Then steel plate spacers and chokers were alternately placed to space the strands, five in each corner, bringing them to the specified taper for each tower. By leaving the strands bare a direct bond was formed with the concrete. Since no anchor plates were used at either end, a 20% prestress loss was figured into the initial stress.

Instead of placing reinforcing bar hoops around the strands, Superior found that high strength steel strap was just as strong and more quickly installed. Because of the strap's flexibility and light weight, this company plans to find more uses for it in their prestress operations. After the concrete was poured, coil-loop inserts of 1 in. and 1½ in. were placed in one side as well as the cadmium plated steel ladder rungs. The lifting slings and light racks were secured by cold rolled bolts screwed into the inserts.

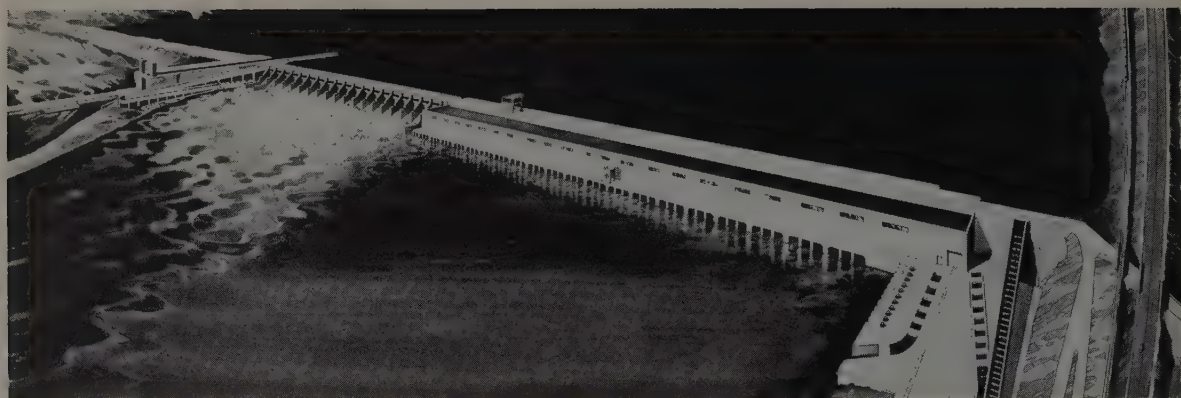
Although the poles are of an unconventional design they were specified because it was estimated that the material costs would be less than structures of steel. In fact, it is the unconventional methods used in the design and construction of this stadium that set it apart.

For many years to come the unique design and location of this stadium will be reflected on the rock slopes of the mountain every night a football game is played.

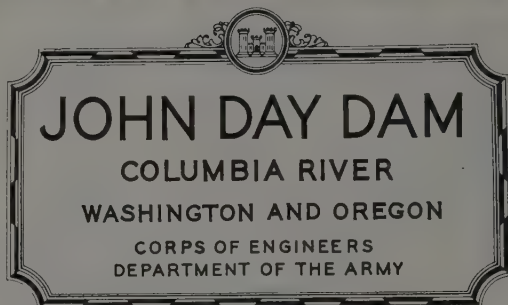
Inventory of materials

A STATE-WIDE INVENTORY of road building materials in Arizona is under way by the materials division of the highway department, according to Wayne O'Harra, engineer in charge of that division. The object of the study is to provide a permanent record of aggregate sources throughout the state with all pertinent engineering and geologic data.

The first section of this comprehensive report has been completed for a part of Maricopa County. This report consists of a pit-and-quarry map, photo geological map and tables.



Last of the huge Lower Columbia multipurpose dams will be . . .



By **COLONEL PAUL H. SYMBOL**

District Engineer
Army Engineer District, Walla Walla
Corps of Engineers

BEFORE the spring runoff and high water season of 1959, an elbow of steel cofferdam cells with rock-fill bank anchors will have pushed its way out from the Washington shore of the Columbia at river mile 215.6 and John Day Lock and Dam, last of the four multipurpose dams included in the U. S. Army, Corps of Engineers, comprehensive plan for development of the lower Columbia, will be under way.

Designed and to be constructed under the supervision of the U. S. Army Engineer District, Walla Walla, Corps of Engineers, John Day Lock and Dam carries an initial estimated construction cost of \$350,000,000 and will include under its multipurpose design, benefits for navigation, hydroelectric power, flood control, irrigation and recreation. It will be the only dam on the lower Columbia to include flood control benefits under its multipurpose scope. In addition, the John Day reservoir, to be known as Lake Umatilla, will eliminate the last fast-water stretch on the Columbia River and will complete slack-water navigation from tidewater 328 mi. upstream to the head of McNary Dam reservoir.

John Day Dam is being designed for a normal effective height of 105 ft. From its location at the headwaters of The Dalles reservoir, it will create a 77-mi. pool extending upstream to McNary Dam. With its proposed 8-ft. potential draw-down fluctuation and 3-ft. additional supercharge storage elevation, the reservoir will provide 500,000 ac. ft. for flood control.

No navigation stoppage

John Day Dam's work schedule is being planned to necessitate little or no navigation stoppage during its construction. Initial construction work will start on the north or Washington shore of the river where three contracts are now in effect. One, a \$176,382 contract held by Erwen Construction Co. of Pasco, calls for the building of 2.1 mi. of highway access road to the project site and is scheduled for completion in the late fall. A negotiated contract of about \$1,000,000 calls for the construction of a 1.6-mi. temporary shoofly on the SP&S railroad line around the north end of the construction area and is scheduled to start early this fall.

A third contract awarded to Morrison-Knudsen Co., Inc., is for the first step cofferdam and involves an expenditure of \$1,394,000. This work will include strip excavation in preparation for con-

struction of the navigation lock. Work was started in early September, with completion date set for June 1959. Other work to be carried on during the winter months will include a \$150,823 drilling and grouting contract awarded to Wilcox Drilling Co., McMinnville, Ore., designed to control water seepage through the navigation lock area, along with the construction of a resident engineer's office on the Washington shore.

Goal of the first year construction work at John Day Dam will be the completion of the cofferdam to provide a work area for the construction of the navigation lock, the north shore non-overflow section, abutment, spillway and north shore fish ladder. In design, the lock chamber at John Day will have a lock wall 5 ft. above the height of the maximum controlled pool level. Theoretically, with the lock wall height adopted, navigation can proceed through the lock chamber with 5 ft. of freeboard up to a river discharge of over 1,500,000 sec. ft., spillway capacity at maximum controlled pool level.

The downstream approach to the lock channel will be shielded from the spillway discharge by an intervening ridge of rock and a 700-ft. long guard wall. The north shore work area is located in an extrusive lava flow, associated with breccias or pyroclastic beds deposited

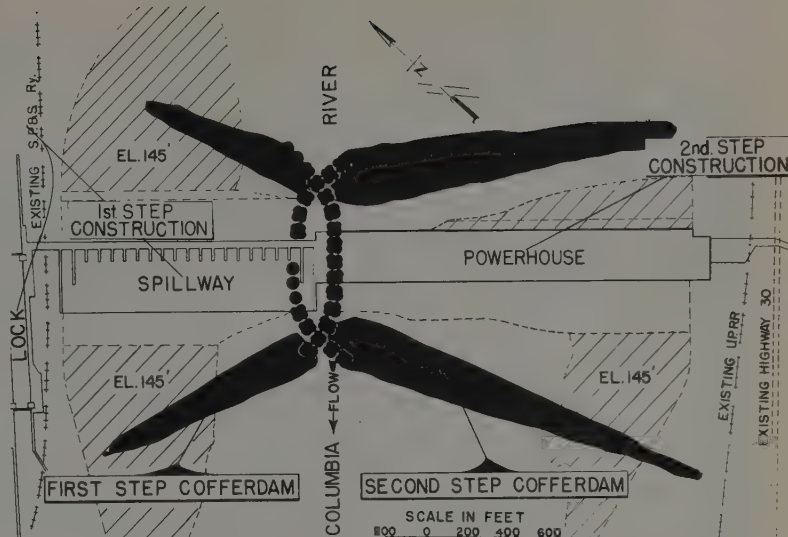
during the intervals of time by the successive outpourings of lava, and a considerable amount of grouting is planned to strengthen the formation.

Lock specifications

Navigation lock specifications call for a net clear length of 675 ft. and an 86-ft. clear width. These are the standard measurements incorporated in the design and construction of locks at The Dalles Dam, McNary Dam and Ice Harbor Dam, as well as those proposed at the three other approved dams on the Lower Snake River, Lower Monumental, Lower Granite and Little Goose. The minimum water depth over the lock sills will be 15 ft., with the normal upper water surface level in the chamber at elev. 265. The upstream or reservoir gate will be of submergible type, with an effective height of 27 ft. Downstream the gate will be of lift type, with a height of 114 ft.

During the first step construction period, river navigation will utilize the open channel along the Oregon shore of the Columbia. In order to utilize the John Day Lock throughout the second construction stage or south shore phase of the dam construction work, a temporary upstream channel will be necessary to permit navigation. This excavated channel will be 150 to 300 ft. wide, and will be of sufficient depth to make utilization of the lock possible until creation of the John Day pool with its deep water reservoir. A permanent downstream channel 250 ft. wide with bottom at elev. 139, will also be excavated.

Adjoining the navigation lock



LAYOUT AND SEQUENCE OF CONSTRUCTION PROGRAM

will be a 1,600-ft. north shore abutment embankment of rock fill, with impervious core, built to elev. 286, with a crest width of 30 ft. Availability of a large quantity of gravel within a 1,000-ft. haul to supplement rock from lock and dam excavation, makes this type of abutment construction economically inviting. Between the navigation lock and spillway on the stream side will be a concrete non-overflow section with a crest width of 32 ft.

North shore fish ladder

Between the lock and the spillway will also be located the north shore fish ladder. This ladder will be 20 ft. wide, with bottom slope of 1 to 16. The weirs in the ladder will be 6 ft. in height, placed on 16-ft. centers. Upper exit or reg-

ulating section will be equipped with eleven tilting weirs and a telescoping regulating weir to accommodate upper pool.

The John Day Dam spillway will have an over-all length of 1,252 ft. and will consist of 20 bays, with 50-ft. openings. Spillway flow will be controlled by radial or tainter gates 50 ft. wide and 58.5 ft. in effective height. The spillway is designed for a maximum flow of 2,250,000 sec. ft. This flow represents the maximum probable flood for the drainage area possible of occurrence from the maximum flood producing combination, meteorological and hydrological, probable within the region.

The stilling basin below the spillway will be of horizontal baffled apron type. One row of streamlined baffles and a vertical end sill will be provided. During the construction period, 18 bays of the spillway will be left low at elev. 130. These low bays will be used for river diversion during the second step construction work after the south shore cofferdam is completed. Following completion of the second-step construction, the low spillway bays will be raised to their full designed height inside of a third-step cofferdam.

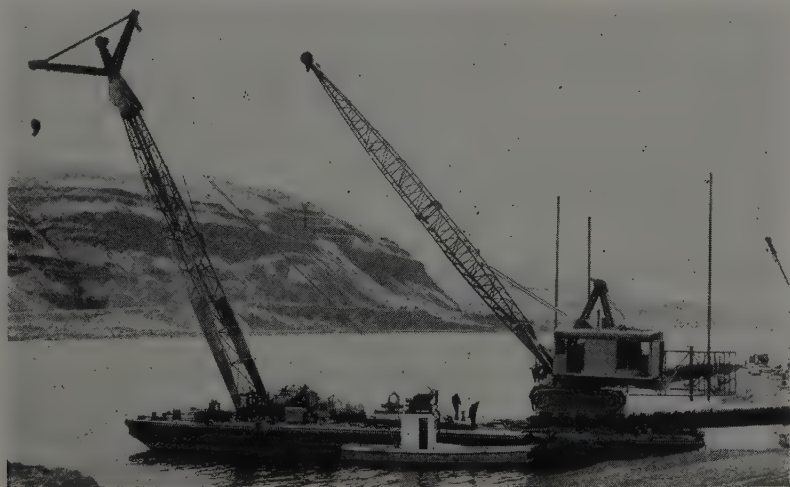
Powerhouse installation

The powerhouse will have an over-all length of 1,921 ft. and a width of 243 ft. Turbines will be Kaplan, six-blade type, spaced at 87 ft. and turning at 92.3 rpm. Each turbine will develop a rating horsepower of 171,100.

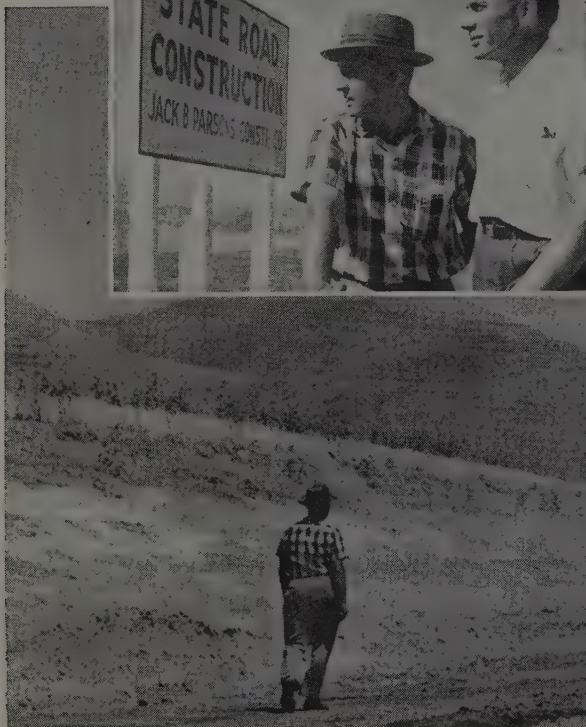
Generators will have a nameplate rating of 108,700 kw. each,

(Continued on page 40)

FIELD WORK is under way at the site. Cranes are being barged-mounted and prepared for driving steel sheet-piling for the First Step cofferdam cells.



Many planning sessions such as this one, between Jack Parson (left) and Glen Foulger, the C.I.T. field representative, caused Mr. Parson to comment, "C.I.T. people are familiar with the equipment costwise . . . know what it can do and the problems contractors are up against."



Parson Construction Company... Rocky Mountain

... C.I.T. is on the job, too

High in the Wasatch range of the Rockies, 90 miles north of Salt Lake City, the Jack B. Parson Construction Company of Smithfield, Utah, is straightening and widening a 10 mile segment for the new Interstate Route 82S. The Parson bids captured *both* the first and second contracts for the job. A giant million and a half dollar fleet of Parson equipment is moving millions of yards of rock, earth fill, bituminous plant mix and road gravel. C.I.T. Corporation helped finance over

\$500,000 worth of this profit-making equipment. This highly mechanized operation, needing only 10 hand laborers and 45 equipment operators, has kept the Parson Construction Company comfortably ahead of schedule on this job.

No stranger to this territory, the Parson company has handled airports, road and reclamation projects throughout the Western states. Jobs of this nature require a resourceful financing connection. As Mr. Jack B. Parson, owner of the company says, "By hav-

C.I.T. CORPORATION • MACHINERY AND



Road Straightener

g a firm such as C.I.T. to work with you to help purchase the right equipment, you keep other lines of credit open for payrolls and purchasing materials."

How Job-Engineered Finance Plans Help Contractors

ayd Plan equipment financing terms to 6 years with payment schedules related to depreciation, or equal monthly payments over 36 months, or skip-payment

plans where needed . . . these are just a few of the helpful financing tools offered by C.I.T. Corporation.

In addition to equipment purchase financing, C.I.T. can help improve contractors' bid and bond capacity, meet current operating expenses or other business needs by arranging capital loans. C.I.T. representatives know how to lay out "job-engineered" finance plans, carefully devised to fit the needs. Why not call or write? No obligation, of course.

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TEMPLATES 60 to 70 ft. in diameter are being assembled on the north shore in preparation for driving sheet piling. The resulting cofferdam will enclose a work area for the navigation lock, spillway, fish ladder facilities and non-overflow section.

and an overload capacity of up to 125,000 kw. Present plans at John Day call for the initial installation of 12 units and initial completion of 8 skeleton units for a total of 20 ultimate units. Initial plant capacity with 12 generators will be 1,304,400 kw. and the ultimate with 20 generators will be 2,174,000 kw. The ultimate capacity of John Day powerhouse, including overload, will be about 2,500,000 kw., greater than that of Grand Coulee Dam.

In its installation the powerhouse will also contain an assembly bay and a station service bay complete with superstructure. The station service bay will be about 236 ft. wide and the assembly bay 208 ft. wide. Skeleton bays will be 87 ft. long.

Intake for the powerhouse

The intake structure of the powerhouse will be constructed monolithically with the powerhouse substructure and will provide space for intake water passages and trash sluice channel. Intake deck will provide space for operation on an intake gantry crane and rails for transportation of power transformers. Water passages for each unit will be divided into three openings, each 20 ft. wide, which can be closed by gates. An ice and trash sluice channel 16 ft. wide will also be provided in the intake structure. Discharge into the sluiceway will be controlled by adjustable weirs.

The powerhouse substructure will allow for a 14-ft. passageway between the generator barrel and the downstream powerhouse wall.

Lighting arresters, disconnecting switches, high voltage bus and associated equipment, will be located on the roof of the superstructure.

The station service generators will be located in the station service bay. Administrative offices and clerical space will be located in a building on the intake deck. The assembly bay floor will be ample to assemble and erect one turbine runner at a time. Also on this floor will be a visitors' gallery with public restroom facilities.

On the south shore, a fish ladder will be constructed to serve the powerhouse fish collecting system. This collection system will consist of a channel extending the full length of the powerhouse over the draft tubes and connecting with the south shore fish ladder. The ladder as proposed will be 30 ft. wide and with the exception of the additional width will be practically identical to the north shore ladder.

South shore embankment

The south shore abutment embankment will be about 600 ft. long, with maximum height of 110 ft., and will contain 460,000 cu. yd. of material. Because of the deep silty overburden on the south shore, excavation will be made to bedrock within the theoretical embankment section. The embankment will be constructed largely during relocation of the Union Pacific Railroad and U. S. Highway 30. A central core is proposed because it will be constructed in advance of rock excavation for dam foundation, thereby lending itself to economical

placement of materials. This embankment will provide a simple tie with the south shore non-overflow structure. Railroads through the dam site will cross the dam axis approximately 10 ft. below embankment crest elevation.

No public highway crossing of John Day is planned. A concrete gravity section is proposed for use as a connection between the south end of the powerhouse and the south embankment. This section will be 182 ft. long and will be of typical concrete gravity dam design. It will form support for the upper end of the south shore fish ladder and permit termination of the south embankment slopes without undue interference with the south end of the powerhouse or the low levels of the fish ladder.

Work sequence plan

Construction sequence for John Day Lock and Dam calls for the first step cofferdam on the north shore to unwater the work area for the north shore abutment, navigation lock, fish ladder facilities, non-overflow section and spillway. The south or Oregon shore cofferdam will enclose a work area for the powerhouse, the south shore fish facilities and the south shore abutment. During the time of the south shore construction effectiveness, the flow of the Columbia will pass through the spillway bays on the north side of the river which will be left at a low level. The third step cofferdam will enclose the spillway bays during a low water season to permit their raising to final height. During this period, the river flow will be diverted through the skeleton units of the powerhouse.

The 15 steel-cell cofferdams will be of multiple cell type, with exception of two cells. Average height of the steel cells in the first step cofferdam will be 65 ft., with a minimum height of 80 ft. Average and maximum height for the second step cofferdam will be 62 and 72 ft. respectively. Steel cells will be founded on bedrock and overburden will be excavated prior to placing. Irregular areas at steel pile contact with bedrock will be filled with tremie concrete and the river side sealed with bags of sand and cement mix. Major portion of the cell fill will be clean, relatively pervious gravels.

Rock-fill embankments will be constructed as shore legs between the steel cells and high ground for all three cofferdams. Foundations for the shore legs of the first and second cofferdams are generally

(Continued on page 84)



New LIMA 64-T Truck Crane with 100' boom and 30' jib reaches out almost horizontally to pour concrete on foundation job.



LIMA 64-T . . . new 50-ton truck crane.

New LIMA 64-T Truck Crane combines high capacity, long reach, low weight

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The LIMA Type 64-T Truck Crane will raise a 150-ft. boom, plus 30-ft. jib (180'-0" total), from the ground without auxiliary aid.

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Weight, swell, volume of materials

Table compiled from many sources provides useful information on how the weight per cu. yd. of materials changes with excavation and compaction.

By HORACE K. CHURCH

Earthmoving Consultant
Shepherd Machinery Co.
Los Angeles, Calif.

FOR 100 YEARS, authoritative sources in America have been publishing tables on the characteristics of materials. Generally, these tables include specific gravities, weights in natural bed, swell factors from natural bed or cut to loose condition, weights in loose condition, swell and shrinkage factors from natural bed or cut to uncompacted and compacted embankments or fills, and weights in uncompacted and compacted embankments or fills.

Engineering organizations, both public and private, contractors, mining companies, machinery manufacturers, and writers of handbooks have contributed to this array of data.

However, these tables lack completeness, uniformity of treatment, and modernity because of today's excavation and embankment construction methods. California, for example, is letting contracts in terms of tons instead of yards of excavation, thereby calling for a knowledge of weights per cubic yard, bank-measure of materials in natural bed.

The writer has been unable to find a single all-inclusive table giving the desired characteristics of the common materials encountered in construction. The accompanying table is a summary of existing tables commencing with Trautwine's pioneering work in his "Civil Engineer's Pocketbook" of 1882 and ending with personal data gathered during the past thirty years.

The table is necessarily based on properly interpreted and weighted averages. It is therefore not absolute for a specific case. Engineering experience and judgment will guide the user in its proper application. The following explanatory notes apply:

Cubic yards in cut, loose and in the fill

Weight is in natural bed and contains natural moisture. The average weight is subject to about plus or minus 5% variation.

Percent swell from natural bed to loose condition is an average subject to about plus or minus 33% variation in both earthy and rock materials. Variations are multipliers and are not percentages to be added to or subtracted from the factors. The swell factor of 67%, given for several rocks, is an average figure obtained from existing data for solid rock, and it has been applied to solidly bedded rocks for which no swell factors are available specifically.

Weights in the loose condition are averages, except when calculated on the basis of the average 67% swell factor. All weights are subject to any adjusted value of swell factor.

Percent swell or shrink from natural bed to fill is an average, subject to about plus or minus 33% variation for earthy materials, and 33% variation for rock materials. Percentage is a multiplier.

In the case of rock materials, it is essential to distinguish between two methods of fill construction.

1. Natural or gravity compaction. This method, common years ago, is little used presently except in private construction as in the case of waste fills. The swell and shrinkage factors from natural bed to fill vary from -10% for earthy materials to +67% for rock materials. Because of different degrees of fragmentation from cut to fill and because of the wide latitude of fill construction methods in natural or gravity compaction, no figures are tabulated.

2. Mechanical compaction by rolling and wetting is today's accepted method, and swell and shrinkage factors and weights are tabulated for today's methods of fill compaction.

Two other influences affect factors and resultant weights. First, tractor-mounted rippers are producing better fragmentation and better grading of both earthy and rock formations. Second, the average so-called rock job really consists of an earth-rock mixture which in itself is pretty well graded.

These three factors, nature of material, use of rippers, and modern compaction methods, have made possible the prevalent high densities of fill, densities not in accordance with hitherto tabulated data on swell and shrinkage factors. The writer has used swell and shrinkage factors and weights, including moisture, resulting from average compaction methods.

It is a fact that certain friable rocks in weathered and parent rock zones have low swell factors from cut to fill. These rocks are really equivalent to rock-earth mixtures in their behavior. Rock swell factors are in terms of solid natural bed formations, and do not include allowances for overlain residual and weathered deposits or earthy and friable materials, which would reduce greatly the swell factors from cut to fill.

Characteristics of Western materials

MATERIAL	IN PLACE	LOOSE		IN FILL	
	lb./c.y.	Swell %	lb./c.y.	Shrink or Swell %	lb./c.y.
Adobe	3,230	50	2,140	-10	3,570
Andesite	4,950	67	2,970	43	3,460
Asbestos	4,040	67	2,420		
Ashes, coal	1,030	33	800		
Asphaltum	2,150	67	1,390		
Asphalt rock	4,050	62	2,500		
Aragonite					
Calcium ore	5,050	67	3,020		
Argentite					
Silver ore	12,300	67	7,360		
Barite					
Barium ore	7,560	67	4,520		
Basalt	4,950	64	3,020	36	3,640
Bauxite					
Aluminum ore	4,420	50	2,940		

MATERIAL	IN PLACE	Swell %	LOOSE	IN FILL					
	lb./c.y.		lb./c.y.	Shrink or Swell %	lb./c.y.				
Bentonite	2,700	35	2,000						
Biotite									
Mica ore	4,850	67	2,900						
Borax	2,920	75	1,670						
Breccia	4,050	33	3,040	27	3,190				
Calcite									
Calcium ore	4,500	67	2,700						
Caliche	2,430	16	2,100	-25	3,200				
Carnotite									
Uranium ore	4,150	50	2,770						
Cement			2,700						
Cerrusite									
Lead ore	10,970	67	6,560						
Chalcocite									
Copper ore	9,600	67	5,750						
Chalcopyrite									
Copper ore	7,060	67	4,220						
Chalk	4,060	50	2,710	33	3,050				
Charcoal			1,030						
Chat									
Mine tailings			2,700						
Cinders	1,280	33	960	-10	1,420				
Cinnabar									
Mercury ore	13,630	67	8,170						
Clay									
Dry	3,220	50	2,150	-10	3,570				
Damp	3,350	67	2,010	-10	3,720				
Clinker			2,570						
Colemanite									
Borax ore	2,920	75	1,670						
Concrete									
Stone	3,960	72	2,310	43	2,770				
Cyclopean	4,180	72	2,430	43	2,930				
Cinder	2,970	72	1,730	43	2,080				
Conglomerate	3,720	33	2,800						
Decomposed rock									
75% R. 25% E.	4,120	31	3,140	12	3,680				
50% R. 50% E.	3,750	38	2,710	- 6	4,000				
25% R. 75% E.	3,380	43	2,370	- 9	3,720				
Diabase	5,050	67	3,010	43	3,530				
Diorite	5,220	67	3,130	43	3,650				
Diatomite									
Diatomaceous earth	1,470	62	910						
Dolomite	4,870	67	2,910	43	3,400				
Earth, loam									
Dry	3,030	50	2,070	-12	3,520				
Damp	3,370	43	2,360	- 4	3,520				
Wet, mud	2,940	0	2,940	-20	3,520				
Earth, rock mixtures									
75% E. 25% R.	3,380	43	2,370	- 9	3,720				
50% E. 50% R.	3,750	38	2,710	- 6	4,000				
25% E. 75% R.	4,120	31	3,140	12	3,680				
Feldspar	4,410	67	2,640	43	3,080				
Gabbro	5,220	67	3,130	43	3,650				
Galena									
Lead ore	12,630	67	7,570						
Gneiss	4,550	67	2,720	43	3,180				
Gravel									
Dry—									
Bad Gradation	2,980	10	2,700	- 5	3,150				
Average G.	3,280	20	2,730	- 8	3,570				
Good G.	3,680	33	2,770	-11	4,130				
Wet—									
Bad G.	3,310	5	3,150	- 5	3,150				
Average G.	3,640	10	3,290	- 2	3,570				
Good G.	4,090	16	3,520	- 1	4,130				
Granite	4,540	72	2,640	43	3,170				
Gumbo									
Dry	3,230	50	2,150	-10	3,570				
Wet	3,350	67	2,020	-10	3,720				
Gypsum	4,080	72	2,380						
Hematite									
Iron ore	8,560	75	4,880						
Hessite									
Silver ore	14,300	67	8,560						
Ice	1,560	67	930						
Ilmenite									
Titanium ore	8,000	69	4,730						
Kaolinite									
Dry	3,230	50	2,150						
Wet	3,350	67	2,010						
Lignite	2,100	65	1,270						
Lime			2,220						
Limestone	4,380	63	2,690	36	3,220				
Limonite									
Iron ore	6,400	55	4,140						
Loam, earth									
Dry	3,090	50	2,070	-12	3,520				
Damp	3,370	43	2,360	- 4	3,520				
Wet, mud	2,940	0	2,940	-20	3,520				
Loess									
Dry	3,220	50	2,150	-10	3,570				
Wet	3,350	67	2,010	-10	3,720				
Magnesite									
Magnesium ore	5,050	50	3,360						
Magnetite									
Iron ore	8,470	54	5,520						
Marble	4,520	67	2,700	43	3,160				
Marl	3,740	67	2,240	43	2,620				
Masonry, rubble	3,920	67	2,350	43	2,750				
Millerite									
Nickel ore	9,530	67	5,710						
Molybdenite									
Molybdenum ore	7,910	67	4,750						
Mud	2,940	0	2,940	-20	3,520				
Muscovite									
Mica ore	4,860	67	2,910						
Niccolite									
Nickel ore	12,600	67	7,550						
Pavement									
Asphalt	3,240	50	1,940	0	3,240				
Brick	4,050	67	2,430	43	2,840				
Concrete	3,960	67	2,370	43	2,770				
Macadam	2,840	67	1,700	0	2,840				
Wood block	1,630	72	950	43	1,140				
Peat	1,180	33	890						
Phosphorite									
Phosphate rock	5,400	50	3,600						
Porphyry	4,630	67	2,770	43	3,240				
Potash	3,700	50	2,470						
Pumice	1,080	67	650						
Pyrites									
Iron ore	8,540	67	5,110						
Pyrolusite									
Manganese ore	7,560	50	5,050						
Quartz	4,360	67	2,610	43	3,000				
Quartzite	4,520	67	2,710	43	3,160				
Rhyolite	4,050	67	2,420	43	2,870				
Riprap rock									
Average	4,500	72	2,610	43	3,150				
Rock-earth mixtures									
75% R. 25% E.	4,120	31	3,140	12	3,680				
50% R. 50% E.	3,750	38	2,710	- 6	4,000				
25% R. 75% E.	3,380	43	2,370	- 9	3,720				
Salt, rock	3,670	67	2,200						
Sand									
Dry	2,880	11	2,590	-11	3,240				
Wet	3,090	5	3,230	-11	3,460				

Sandstone	4,070	61	2,520	34	3,030
Scheelite					
Tungsten ore	10,100	67	6,050		
Schist	4,530	67	2,710	43	3,170
Shale	4,450	79	2,480	49	2,990
Silt	3,240	36	2,380	-17	3,890
Siltstone	4,070	61	2,520	-11	4,560
Slag					
Furnace	4,840	98	2,690	65	2,930
Sand	1,400	11	1,260	-11	1,570
Slate	4,500	77	2,600	43	3,150
Snow					
Dry	220	0	220		
Wet	860	0	860		
Soapstone					
Talc ore	4,550	67	2,720		
Sodium niter					
Chile salt peter	2,710	50	2,470		
Sulphur	3,450	50	2,310		
Syenite	4,460	67	2,670	43	3,130
Taconite					
Iron ore	5,370	60	3,360		
Talc	4,640	67	2,780	43	3,250
Topsoil	2,430	56	1,620	-26	3,280
Trachyte	4,050	67	2,420	43	2,870
Trap rock					
Igneous rocks	4,710	67	2,820	43	3,300
Trash			400	-50	800
Tuff	4,050	50	2,700	33	3,050
Witherite					
Barium ore	7,230	67	4,320		
Wolframite					
Tungsten ore	12,280	67	7,350		
Zinc Blende					
Zinc ore	6,780	67	4,060		
Zincite					
Zinc ore	9,550	67	5,710		

Weights per cubic yard in cut are subject to average plus or minus 5% variation.

Swell and shrinkage factors for loose condition and embankment are subject to average plus or minus 33% variation.

Weights in loose condition and in embankment are subject to adjustments in accordance with modified swell and shrinkage factors.

All ores are in the mineral state, with no gangue.

EXAMPLES IN USE OF TABLE

Determination of pay load prior to job figure

This Caterpillar DW20 tractor—Shepherd 456S Long Haul scraper is being push loaded by two Caterpillar D9 tractors in damp mixture of sand-clay—50% sand



and 50% clay. Loose load capacity is 27.3 cu. yd. at 3:1 slope. Table gives sand at 3,090 lb. in cut with 5% swell factor to loose condition, and clay at 3,350 lb. in cut with 50% swell factor. Average for the mixture is then 3,220 lb. in cut with 28% swell factor. Calculated pay load is $27.3 \div 1.28$ or 21.3 cu. yd. in cut weighing 68,700 lb. for 3,220 lb. per cu. yd. mixture in the cut.

Note—During the job, pay loads were weighed, and results were:

Average pay load, 69,800 lb.

Weight per cu. yd. in cut (engineers), 3,190 lb.

Average pay load, bank measurement, 21.9 cu. yd.

Determination of pay load in advance of job figure

Caterpillar DW20 tractor—Athey PW20 Bottom Dump trailer units are set to work hauling fairly dry gravel of good gradation. Loose capacity is 31.2 yd. with 3:1 sloped load.



Table gives 3,680 lb. per yd. in cut, swell factor from cut to loose of 33%, and 2,770 lb. per yd. loose. Accordingly, pay load will be 86,500 lb., and 23.5 yd. bank measure.

Pay loads were weighed subsequently and showed: Average pay load of 91,600 lb., and weight per yd. (engineers) was 3,750 lb., with average pay load, bank measurement, of 24.4 yd.

Determination of body dimensions for desired capacity

Capacity of 40 tons of limestone is desired in side dump bodies, as pictured. The Caterpillar DW20 tractor—Athey PD 20 Side Dump trailer regularly has 20.5 yd. struck capacity and about 24.6 yd. loose capacity based on 2:1 sloped load. Table gave limestone loose



RPM DELO OIL ends 5 years of engine troubles



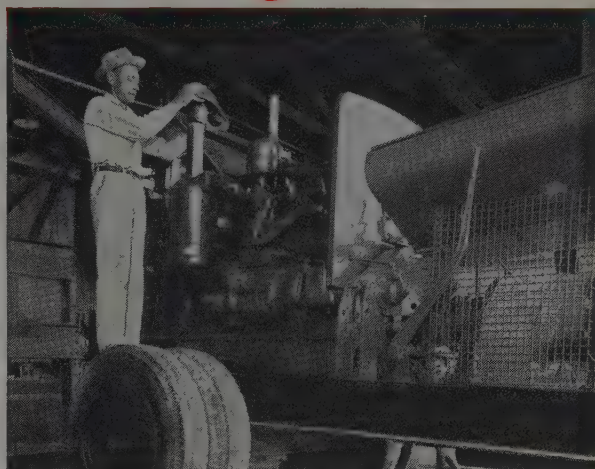
The pan has never been off the Caterpillar D7 engine of this Link-Belt Speeder shovel in 7 years, using RPM DELO Oil. Only repair was a single valve job—no other parts replaced. William Naumann, Sundt's Operations Manager, says, "We tried nine different major brands of oil in five years, trying to lick the frequent breakdowns that slowed our operations. Sometimes, main and rod bearings even froze solid on the crankshaft. We changed to RPM DELO Oil seven years ago, and, since then, have never had any engine troubles due to oil failure. We now use RPM DELO Oil exclusively in our 22 heavy-duty engines."



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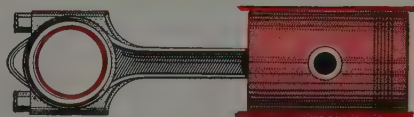


Lubricated with RPM DELO Oil, this Caterpillar D 13000 portable unit powered a rock crusher of M. M. Sundt Construction Co. for a total of 8976 hours before overhaul. "In spite of extremely dusty conditions the only time the engine was touched was to replace a head—no other repairs were necessary," reports master mechanic Billy Gray, shown replacing air cleaner on unit following overhaul.



Austin 101 rock crusher, powered by Caterpillar unit described above, works 20 hours a day at firm's materials stockpile outside Tucson. Company works year around on road paving, grading, foundations, building construction.

Why RPM DELO Oils reduce wear —prolong engine life



- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearings
- Inhibitor resists crankcase foaming

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weight at 2,690 lb., the swell factor being 63%. Required sloped capacity is 29.7 cu. yd.

It is felt that the particular limestone weighs slightly more than 4,380 lb. per yd. in place and a 12-in. lip is added to standard body giving sloped capacity of about 27 yd. An average pay load of 40.5 tons is carried.

It is probable that the limestone is more dense than was estimated and that swell factor is less than 63%.

Determination of pay load in rock

Caterpillar DW21—Athey PR21 Rear Dump trailers are moving in on a rock excavation job of a mixture of breccia and solid basalt, both requiring blasting.



Loose capacity at 2:1 slope is 22.5 yd. Table gives 33% swell for breccia and 64% swell for basalt, averaging 48% for the mixture from cut to loose condition. Pay load therefore is 15.2 yd. bank measurement. Upon completion of job, contractor felt that job average was about 15 yd.

Determination of ripper production in tons per hour

It is known that the 4-yd. shovel will load out 350 yd. bank measure hourly of 50% rock and 50% earth



mixture, and that the D9 tractor with two-shank ripper can rip 600 yd. comfortably. The basis of payment is tons and the tonnage production of both shovel and ripper are desired to determine highway haulage unit requirements and excess D9 time available for bulldozing assistance.

For rock-earth mixture of 50% proportion, table gives weight in cut of 3,750 lb. per yd. Shovel production is then 657 tons hourly. Conservative ripper capacity is 1,120 tons hourly, thus allowing 41% of total time available for bulldozing.

ACKNOWLEDGEMENT

The writer is indebted to some twenty-five authorities for data. Approximately 1,000 values for densities, weights, and swell and shrinkage factors were analyzed, interpreted, and weighed for good averages.

It is hoped that the data will be of help to earth-movers in the construction industry of the entire West.

UNDERGROUND POWER PLANT AND ITS BUILDERS



INSIDE this power plant site blasted out of solid granite, the Pacific Gas and Electric Co. has built one of the few underground hydro plants in this country. The plant is a feature of Kings River Project which was described in a comprehensive article appearing in *Western Construction*, November 1957. Excavation of the 173 x 56 x 90-ft. chamber was carried out by Kings River Constructors.

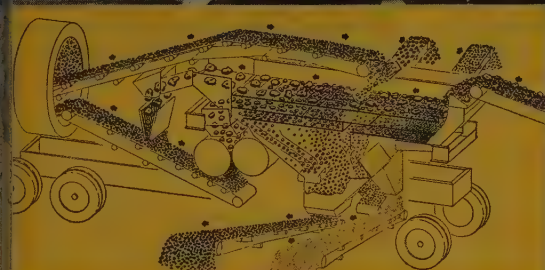
Structural steel and concrete work for the plant and access shaft were carried out by Rothschild, Raffin & Weirick. Inspecting the completed work (below) are (l. to r.): Charles Sedam, engineer of station construction, PG&E; Ben Raffin, Bob Rothschild and Don Weirick, partners of RR&W, and Joe Pirtz, manager of hydroelectric construction for Pacific Gas and Electric Co.



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NEWEST
Big Producer**

THE

CHALLENGER



THE MOST VERSATILE PLANT EVER DESIGNED

For 100% crushed or fractured product, you can feed the Challenger from the front (as shown in the flow diagram) to by-pass all sand and fines. Or feed it from the rear when the percentage of crush isn't important. With six different screen deck arrangements, you can produce a single product, add another size of rock, or chips, or sand, or produce all four . . . take off each size separately or blend them in the desired proportion.

The Challenger's triple deck horizontal vibrating screen is a compact 48" x 14' size for portability. Its efficient design assures extremely high capacity per square foot of screening area, eliminating the need for a large, bulky screen.

TYPICAL PRODUCTION REPORTS

"My new Challenger is producing over 500 tons per hour of $\frac{3}{4}$ " minus, with 35% crushing."

"By using a rock chute over the Challenger's screen, all sand is removed before it enters the circulating load. The plant is producing 220 tons of $\frac{3}{4}$ " material per hour, crushing 65%."

"My Cedarapids Challenger has tough going in wet, sticky material, but it's turning out $\frac{3}{4}$ " minus product at a 240 to 300 tph rate."

"I'm meeting 100% crush specifications with my Challenger and producing around 130 tons of $1\frac{1}{4}$ " material per hour. A Cedarapids Twin Jaw Intermediate Crushing and Screening Plant is working ahead of the Challenger."

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40% to 100% greater primary capacity!

Big tonnages—1 to 4 sizes!

100% crushed or fractured material—or blended

Now Cedarapids puts a Twin Jaw Crusher in this new portable plant to step up primary crushing 40% to 100% over plants with a single-jaw primary of comparable size.

The Twin Jaw combines overhead eccentric, force-feed design with *two synchronized movable jaws operating at high speed* to provide a high velocity jaw action for big capacity crushing of even hard material.

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IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.

HIGH STRENGTH BOLTS

A full description of the best methods and tools for installing and inspecting high strength bolts, with the answers to questions most often asked and a list of references for further reading.

By SAMUEL H. CLARK

District Engineer
American Institute of Steel Construction
San Francisco District

WITHIN the past eight years high strength bolts have gained such wide acceptance as replacements for rivets in field connections in structural joints that inspection procedures have become almost commonplace. There are cases, however, where a small quantity of bolts is required and an inspector may for the first time be faced with the problem of making sure that these bolts are installed properly. This article summarizes much of the previously published information available in literature on the subject of inspection of high strength bolts in structural joints.

Its purpose is to facilitate compliance with requirements of "The Tentative Specification for Assembly of Structural Joints Using High Strength Steel Bolts" as issued by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation, February 1954, with Appendix B. This document is incorporated in most building codes and is referred to in many job specifications.

A logical sequence of operations is outlined here for a typical high-strength-bolted structural steel project. Steps are given from identification and testing of the bolts through the various methods of calibrating, tightening, and checking bolted joints. A discussion follows on some of the questions which commonly arise, and a list of references is shown.

Identification. Each high strength bolt assembly, consisting of a bolt, two washers, and a nut, should be identifiable, to distinguish it from other types of bolts with similar appearance.

The bolt must have three radial marks, or lines on its head, which



TURNING THE HEAD instead of the nut is a satisfactory way to tighten high strength bolts. This is sometimes necessary to avoid having long bolt ends interfere with fireproofing. The modified turn of the nut method is being used which allows the nuts to be run up snug and then tightened one half turn. Filler plates, not visible, have been welded to upper column flanges.

identifies it as meeting requirements of ASTM A-325.

The washers are hardened, either by being carburized, or quenched and tempered. ASTM specifications do not properly require identification marks, but amendments have been proposed to Spec. A-325 which would require some standard marking. One manufacturer is marking washers with three evenly spaced raised nubs on the outside edge. Hardened washers can be identified easily by their resistance to a file cut. Bevelled washers, used with Standard I-beams and channels, must be hardened the same as circular washers.

The nut required is a heavy hexagon nut with a minimum Brinell hardness of 121. Proposed amendment to A-325 will require marking by three circular arcs equally spaced on the end of the nut. Some manufacturers have already started marking nuts in this manner.

Testing high strength bolt material. Procedure for testing and sampling is outlined in ASTM A-325. Tested lots should be identified by some means to avoid confusion. See Table No. 1 for tests and samples required.

Bolt lengths. When bolts are used in the flanges of standard I-beams, standard Channels, or Kaiser Wide-

Flange shapes, bevelled washers are required, and bolt lengths should be increased by $\frac{1}{8}$ in. compared with flat circular washers, for each bevelled washer used. The bolt should extend all the way through the nut in all cases.

Bevelled washers. Bevelled washers are required in all cases where slope of the inner face of the flange is greater than 5%. Slopes of various flanges are given below:

American Standard	
I-Beams	16 2/3%
American Standard	
Channels	16 2/3%
Bethlehem Wide Flange	
Beams and Some	
Light Columns	5%
Kaiser Wide Flange	
Beams	10 1/2%
Other Wide Flange	
Beams	0%

Bolted parts

Painting and finish of contact surfaces. Painting of contact surfaces may be permitted in cases where slippage into bearing is acceptable. This, however, is not for the inspector to decide. This is a decision for the design engineer to make. Normally the job specification or the drawings will cover this.

(Continued on page 53)

However, where no specific mention is made of finish, the "Specifications for Assembly of Structural Joints Using High Strength Steel Bolts", (hereinafter called the HSSB Specification) contains a guide in Section 5 of Appendix B. The wording is: "In adopting the present wording of Section 3(c) the Council expected that engineers in general would sanction the shop painting of most, if not all joints, in building frames, (the exceptions perhaps being rigid frame splices and crane runways) but that, consistent with other more conservative practices in the case of bridge constructions, bridge engineers might prefer to leave the shop paint off many of the joints in their structures."

Galvanized structural steel. The HSSB Specification Appendix B says galvanized contact surfaces should be limited to joints where slippage into bearing is acceptable.

Slippage into bearing. Most engineers recognize that it is virtually impossible to make up a joint having punched holes 1/16 in. larger than the bolt diameter, and not have many of the bolts virtually in bearing. "Slippage", therefore, is largely non-existent. Tests have been made at the University of Washington in Seattle to determine the effect of paint, and these show that the frictional resistance of joints without paint is greater than those with paint. However, inspections made periodically of building frames erected with painted contact surfaces have shown that there was no slipping in the connections of these frames over a long period of time. In any case, "slippage" is not critical for most building frames. In the Research Council's report of December 1953, one of the conclusions of Project Committee 4 was "Bolted joints can be relied upon to resist slip at working stresses."

Assembly of joints

After a joint has been assembled (either with HS Bolts for fitting-up or otherwise) the tightening may be done either by manual torque-wrenches, or by power impact wrenches. Inspection, or checking for tightness can be done, likewise, by either hand torque-wrenches, by a calibrated power impact wrench. Please refer to Table No. 2.

Manual torque wrench—tightening method. As pointed out in the HSSB Specification, in a footnote to Table III, "If torque rather than tension is to be measured, the torque-tension ratio shall be

TABLE NO. 1—TESTS REQUIRED

Number* of bolts	Proof load		Ultimate load	Hardness tests			Carburization** determinations
	Bolts	Nuts		Bolts	Nuts	Washers	
1 to 50	1	1	1		1	1	1
50 to 100	2	2	2		2	2	2
100 to 200	2	2	2	2	2	2	2
200 to lot ***	3	3	3	3	3	3	3

SAMPLES REQUIRED

Number of bolts	Bolts	Nuts	Washers
1 to 50	1	1	1
50 to 100	2	2	2
100 to 200	4	2	2
200 to lot	6	3	3

*Number of bolts of each size on job (each length of each diameter).

**If washers are carburized.

***See A.S.T.M., A-325, Paragraph 10.

DIAMETER INCHES

5/8 to 1 inch incl.

over 1 inch

NO. OF PIECES IN LOT

5000 or fraction over 200

2500 or fraction over 200

determined by the actual conditions of the application." Values given in this table (See Table No. 3) are experimental approximations, based on laboratory conditions with all bolts dry. Most bolts are manufactured with a light detergent oil which acts as a corrosion inhibitor, and often gives torque values which are lower than those in Table No. 3 for equivalent tension in the bolt.

When manually-operated torque-wrenches are used, the torquing value should be 15% higher than that required to produce minimum tension in the bolt, as shown in Table No. 3. These torque wrench readings may vary as much as 15% either way; which would still provide the minimum values. Normal practice is to tighten the bolts in a staggered pattern. For each pass, the nut must be in motion when the torque is measured.



WRENCH CALIBRATOR, manufactured by Skidmor-Wilhelm, measures tension in the bolt by hydraulic pressure shown on dial gage.

Power impact wrench—tightening methods. When power impact wrenches are used, at least four methods of obtaining the required tightness are available. Any of these can be checked or inspected by using a calibrated power impact wrench or by a manual torque wrench. The four methods of tightening are: 1. Calibrated Impact Wrench. 2. Automatic Torque-Control Impact Wrench. 3. Rotation of the Nut from "Hand Tight" (1 turn). 4. Rotation of the Nut from "Machine Snug" (1/2 turn).

Equipment. In general, the following equipment is necessary:

a. An air impact wrench of suitable size with required sockets and accessories.

b. An adequate air supply.

c. An air-regulator valve attached to a suitable length of hose from valve to wrench. (This is not necessary for automatic torque control air impact wrenches.)

d. Calibrating equipment.

e. Hand spud wrenches for holding, or backing up.

The compressor and auxiliary receiver (when required) should be capable of developing and maintaining the required line pressure at each wrench at all times. Normally the auxiliary air receiver should be located not more than 200 ft. away from the tools using the compressed air. Bolts up to 7/8-in. diameter may require 100 to 110-psi. pressure at the air compressor with some equipment. Larger diameter bolts may require 110 to 130 psi. Should the work have a range of bolt diameters, pressure regulators can be used for the smaller bolt diameters to

(Continued on page 56)

"USING FORD HEAVIES HAS MADE A BIG CUT IN OUR MAINTENANCE COSTS"



*says Allen Grosse
Fleet Supervisor
Green Bay Box Company*



Handling heavy loads with ease, this Ford C-1000 used by the Green Bay Paper and Pulp Company (an affiliate of the Green Bay Box Co.) grosses 60,000 lb. It is equipped with 260-hp 477-cu. in. Super Duty V-8, Extra Heavy Duty 5-Speed transmission and 6.50 to 1 rear axle ratio.

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Greater operating economy with new, faster rear axle ratios and wide choice of transmissions.

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the operating effort needed for the previously used type.

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Our records show that our average monthly parts cost, including major overhauls, has been reduced over 24%.

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SAFETY GLASS
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. . . for more details, circle No. 27 on Reader Service Postcard

TABLE NO. 2—TIGHTENING AND INSPECTION

Tightening tools and method	Normally used for	Remarks	Reference	Tools for inspection
A. Manual Torque Wrench or Manual Plain Wrench Method	Small jobs	Torque-Tension Ratio must be determined for actual job condition	HSSB Spec.—Table 111—and footnotes	Manual Torque Wrench
B. Power Impact Wrench Methods				
1. *Calibrated Impact Wrench (Wrench stalls at proper torque)	Large jobs (Calibration procedure costly)	Calibration must be checked each morning and each time length of hose is changed	HSSB Spec. For minimum tension values	Calibrated Impact Wrench or Manual Torque Wrench
2. Automatic Torque Control Impact Wrench (Wrench stalls at proper torque)	Small or large jobs	Ingersoll-Rand Mod. 5340T or Chicago Pneumatic Mod. 610 RTP	Manufacturer's recommendations	Ditto
3. Rotation of the Nut—From "Hand Tight" (Tension measured by "turn of the nut"—one full turn)	Small or large jobs	Calibration of impact wrench not required	"Tightening High Strength Bolts"—AREA Bulletin Vol. 56, No. 520 Jan. 1955—pgs. 599-629	Ditto **
4. Rotation of the Nut—From "Machine Snug" (Tension measured by "turn of the nut"— $\frac{1}{2}$ to $\frac{3}{4}$ turn)	Small or large jobs	Calibration of impact wrench not required	Civil Engineering Magazine, Jan. 1958, Page 63	Ditto **

*Calibration may be either with manual torque wrench or with special tension calibrator which measures actual bolt stress.

**In small jobs simply observing rotation of the nut would be adequate.

TABLE NO. 3—BOLT TENSION AND TORQUE

Bolt Size in.	*Tension for calibrating wrenches lb.	**Minimum tension lb.	***Equivalent torque for minimum tension lb.-ft.
$\frac{1}{2}$	12,500	10,850	90
$\frac{5}{8}$	20,000	17,250	180
$\frac{3}{4}$	29,000	25,600	320
$\frac{7}{8}$	37,000	32,400	470
1	49,000	42,500	710
$1\frac{1}{8}$	58,000	50,800	960
$1\frac{1}{4}$	74,000	64,500	1,350

*Approx. 15% in excess of the required Minimum Bolt Tension.

**Equal to 90% of Minimum Proof Load of the Bolt (ASTM A-325).

***Equal to 0.0167 lb. t. per in. bolt diameter per lb. tension for non-lubricated bolts and nuts. Values are experimental approximations.

IMPORTANT—If torque rather than tension is to be measured, the torque-tension ratio shall be determined by the actual conditions of the application.

permit use of the same high power wrench required for the larger bolts.

It is recommended that a constant hose length be maintained between the air-regulator valve and the wrench for any one job. In any case, the hose, the regulator and the wrench should be used as a unit without change unless and until the unit is recalibrated. (Again this is not necessary for automatic torque control air impact wrenches.)

Each air impact wrench should be operated within the range of its designated air pressure. The manufacturer's specifications should be consulted in order to match the capacity of the wrench to the size of the bolts to be tightened. See

Table No. 4 for typical wrench capacity information.

1. *Calibrated impact wrench.* Calibration is done by special calibrating equipment (such as the Skidmore-Wilhelm calibrator) which measures actual tension in the bolt. The wrenches should be calibrated at least once a day. Under conditions where line freezing may occur, more frequent calibration is necessary.

Special calibrating equipment with which direct measurement of tension in the bolts is made provides accurate operation. With the Skidmore-Wilhelm equipment, a bolt the same size as required for the work is placed in the yokes and a bolt tension reading 15% higher than the required minimum

is obtained (see Table No. 3).

The air impact wrench to be calibrated is used to tighten the bolt, and the air pressure is regulated until the wrench stalls at the point of required tension. Some steel fabricators have developed and built equipment of their own.

The actual tightening of the bolts after wrenches are calibrated requires that the wrench be "stalled" on each bolt. At this point the chuck vibrates with little advance. An additional round, or rounds of tightening according to the same pattern will be necessary in all but the simplest connections. A staggered pattern is recommended. Universal or extension adaptors reduce the torquing power up to 20%, and should be avoided wherever possible. Straight extensions built into the wrench do not involve power loss, and can be used without calibrating.

2. *Automatic torque-control impact wrench* method of tightening is comparatively new, and calibration should be done in accordance with the manufacturers' instructions. The Ingersoll-Rand model 5340T or Chicago Pneumatic model CP-610RTP is the only equipment available at the present time. These can be reset for different size bolts up to $\frac{7}{8}$ -in. maximum to different required torque values by checking against a special hydraulic calibrator measuring bolt tension directly (Skidmore-Wilhelm). The wrench automatically shuts itself off, or kicks out when



Working on the Bon Tempe Water Treatment Plant

PETERSON USES THE NEW MC-430 MOTO-CRANE THREE WAYS

Norman C. Peterson Inc. uses the new 30-ton Lorain Moto-Crane with a hoe boom to dig trenches and excavate foundations on a job for the Marin Municipal Water District. The MC-430 is also used with the lighter, stronger square-tubular-chord boom to pour concrete.

...more capacity without high cost. Compare this new Moto-Crane on a Lorain 8 x 4 carrier anyway you like with other 30-ton rated rubber tire machines. See how much more you get for your money with the MC-430.

...onger (160" wheelbase) carrier

- 8 x 4, with two solid front axles on rocker beams
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This all adds up to greater capacities "on rubber," particularly at the radii where you work the most. Add 15 forward speeds to 47 mph, better soft and rough ground travel, a new folding mast gantry, and you have a machine that will get you there and back fast and get the job done fast.

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WORTHAM MACHINERY COMPANY
Cheyenne, Casper, Sheridan and Rock Springs, Wyo.

YUKON EQUIPMENT INCORPORATED
(for Alaska)
Fairbanks, Alaska

TABLE NO. 4—TYPICAL WRENCH CAPACITY

Model Wrench	Range Bolt Sizes	Recommended Approx. Air Pressure
I-R 514	3/4" dia.	90 psi
CP-3630	3/4" dia.	90 psi
I-R 534	3/4" to 1" dia.	110 to 120 psi
CP-365	3/4" to 1" dia.	110 to 120 psi
CP-610	7/8" to 1 1/4" dia.	120 to 130 psi
I-R 538	7/8" to 1 1/4" dia.	120 to 130 psi

TABLE NO. 5—REQUIRED NUT TURNS

Give At Least 1/2 Turn			Give At Least 3/4 Turn	
Bolt Dia.	Bolt Grip	Bolt Length	Bolt Grip	Bolt Length
3/4"	to 5"	to 6 1/2"	5" to 10"	6 1/2" to 12"
7/8"	to 5"	to 6 1/2"	5" to 10"	6 1/2" to 12"
1"	to 8"	to 9 1/2"	8" to 12"	9 1/2" to 14"
1 1/8"	to 8"	to 10"	8" to 12"	10" to 16"
1 1/4"	to 8"	to 10"	8" to 12"	10" to 16"

The above table is a conservative standard. The actual amount of turn required for proper tension as determined by checking against the hydraulic calibrator may be less than shown. In no case, however, should there be less than one-half turn.

the required torque is reached. Tightening procedure should be the same as for calibrated impact wrenches, as outlined above.

3. *Rotation of the nut from hand tight* method is sometimes called the "one-turn-of-the-nut" method. In this case nuts are run up on the bolts to a "finger-tight" position or "hand-tight," after bolted parts are fitted properly in contact with each other. From this position, the nut is given one full turn with the wrench. Turning is normally controlled by checking against a mark on the outside of the wrench socket, or chuck.

In using this method, it is extremely important that the tightening operation does not start until the joint is tightly fitted and all bolted parts are in good contact. Where this cannot be done with ordinary erection bolts, the joint should be brought into a tight fit by preliminary tightening of a few high strength bolts. These bolts must be identified, and released and retightened properly, after all other high strength bolts in the joint have been tightened.

4. *Rotation of the nut from machine snug* method differs from the hand-tight method described above mainly in the point from which the tightening is measured. In both "turn-of-the-nut" methods the principle is that the tension in the bolt which produces the clamping action is a function of the elongation of the bolt itself, rather than a function of the torque applied to the nut.

The following is a recommended procedure:

1. Fair-up holes with enough pins to maintain dimensions and plumbness of the structure. Pins

are not to be removed until bolts in balance of holes have been tightened.

2. Install bolts in the remaining holes.

3. Tighten a pattern of bolts as you would for riveting, being sure that the **CONNECTED PARTS ARE PROPERLY FITTED**.

4. Using the impact wrench, spin the nut of each bolt **NOT USED** to fit-up to a "snug" condition, then continue to tighten it at least one-half (1/2) to one (1) turn, depending on the grip length. "Snug" is indicated by the wrench when it starts to impact.

5. Replace pins with bolts, and tighten as in item 3.

6. Check tightness of each fit-up bolt with impact wrench. Usually no further torquing is required. Some may need one-quarter turn.

7. Bolting crew should mark completed work with identifying symbol. Nut turn required for bolts of the most common diameters and lengths is shown in Table No. 5.

Inspection of bolted joints

Identification of tightened connections. Tightened connections should be marked. As indicated in the last tightening method described, each torquing crew should mark their completed work.

Checking or inspecting bolts with manual torque wrench. One method is to set the wrench at 15% above the required minimum torque (See Table No. 3) and try to tighten the nut further. Since bolts should preferably be tightened to 15% above minimum tabular values, as outlined above, this setting should be reached in all cases.

Another method of checking is to set the gage at the equivalent torque for minimum tension (See Table No. 3). The nut position is then marked, the nut backed off, and then retightened until equivalent torque is reached. This torque must be read while the wrench is in motion. The re-tightened position of the nut is considered tightened properly in the first place if it is at, or beyond the original position by no more than 1/8 in.

Another acceptable method involves checking the "Static" torque from the point where the proper tension reading is obtained on the hydraulic calibrator (Skidmore-Wilhelm). This establishes the torque-tension ratio, and the checking is simpler than trying to read the torque wrench while it moves.

Usual practice is for the inspector to check each floor, or section after it is tightened, by checking about 10% of the tightened bolts.

Checking or inspecting bolts with calibrated air impact wrench. The air impact wrench to be used for checking should be calibrated as outlined above. The same wrench equipment used for calibration should be used for inspection. The wrench should be applied for a burst of about 5 sec., and if the nut does not advance more than 1/8-in. average, the bolts are considered as having been properly tightened in the first place. Once again, the inspector usually checks each floor, or section by checking about 10% of the tightened bolts. Full time inspection is normally required during installation of the bolts. This method of checking, of course, depends upon the availability of equipment.

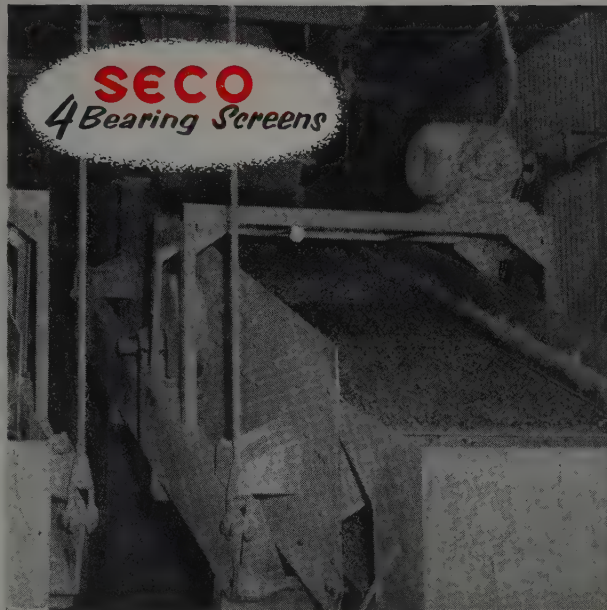
Proof of nut-turn requirements. The amount of turn required, for the "Machine Snug" or modified Turn-Of-The-Nut method described above is determined as follows:

At least 3 bolts of each diameter for lengths up to 6 in. (longer bolts must be given a separate check), selected from the actual bolts on the job, will be tightened in the calibrating device with an impact wrench until the required tension is reached. The amount of turning after impacting is begun will be the amount used on the particular job.

Other methods and equipment. The objective, in all methods of tightening mentioned above, of course, is to insure that minimum specified tension is provided in the bolts. Any practical method which

(Continued on page 84)

2 BEST WAYS TO PROFIT ON AGGREGATE SCREENING



TIME-PROVED SECO SCREENS GIVE INCREASED TONNAGES, MORE ACCURATE SIZING, WITH LITTLE OR NO DOWNTIME! THERE'S A RIGHT MODEL FOR ANY JOB!

Now, there's a Seco Twin-Bearing or Seco 4 Bearing screen that's exactly right for any aggregate screening job . . . from Ag-lime to rip-rap . . . single, double, triple, 3½ deck models and special models engineered to meet your exact screening requirements.

Take it from producers who know . . . you'll be ahead in trouble-free volume performance with SECO screens on your job.

They're designed, engineered and manufactured by folks who have been specializing in vibrating screens exclusively for over 25 years.

With customers demanding cleaner, better sized products, you can't afford to put your material through obsolete or inferior equipment. Go modern . . . with Seco 4 bearing screens or Seco Twin-bearing screens . . . the 2 best ways to profit on aggregate screening. Write SECO for recommendations for your job now!

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CLOSNER EQUIPMENT CO.	San Antonio, Texas	ENGINEERING SALES SERVICE, INC.	Boise, Idaho
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WESTERN MACHINERY CO.	Spokane, Washington		

**NOW IS THE TIME TO MODERNIZE
WITH SECO SCREENS...FOR GREATER PROFITS**

Send for SECO 4 Bearing Screen Catalog #204
and SECO Twin-Bearing Screen Bulletin TB-21

SCREEN EQUIPMENT CO., INC.
Buffalo 25, New York



... for more details, circle No. 29 on Reader Service Postcard

Corps of Engineers program outlined

CIVIL WORK PROJECTS to be carried out by the Army's Corps of Engineers during the coming fiscal year are provided by an all-time high appropriation of \$808,622,500 for the entire nation. This figure compares to the previous appropriation of \$638,293,100. This fund does not apply entirely to construction, since it must include the financing of surveys, planning and operation and maintenance of federal flood control, harbor and other projects. The sum available for construction and planning is \$603,246,500.

Among the larger project appropriations for this Western region is the sum of \$22,500,000 for Ice Harbor Dam, \$18,500,000 for flood control and drainage in Los Angeles County, \$13,500,000 for The Dalles Dam and \$13,000,000 for the Hills Creek reservoir in Oregon. In some cases this money will serve to extend projects now under way. In other cases the appropriations will start a new project.

Some other outstanding Western projects, principally for flood control, include \$7,000,000 for the

Painted Rock reservoir and \$1,500,000 for the Whitlow Ranch reservoir, both in Arizona.

Among the California projects, in addition to the Los Angeles County work, will be about \$9,000,000 for Sacramento River improvement and ships channel. Flood control work on the San Lorenzo Creek and River will total about \$4,000,000. Montana has an appropriation of \$6,500,000 for the construction of the second power plant at Ft. Peck dam. Largest project to be carried out in New Mexico will be the Abiquiu reservoir at \$1,250,000.

An \$8,000,000 appropriation will get construction well under way on the John Day Dam project on the Columbia River.

Equipment from big job to be sold at auction

ONE OF THE LARGEST inventories of construction equipment ever offered for auction will be sold November 15. With comple-

tion of the large project built by the U. S. Navy for airbase facilities on San Clemente Island, off the Southern California coast, the equipment—valued at \$2,225,000—will be sold. The contract was carried out by a joint-venture group known as CHAD-J. V. (Cox Bros. Construction Co., J. E. Haddock, Ltd., The Arundel Corporation and L. E. Dixon Company). The group is selling the equipment, which includes tractors, scrapers, trucks, water tanks, rollers, compressors, etc. The equipment has been moved to Seal Beach, Calif., and is now available for inspection.

The auctioneers are Michael Tauber-Paul Arons Co., and Max Rouse & Sons, both of Beverly Hills, Calif. A special feature of the auction is a financing arrangement for purchases to be made with a 25% down payment after credit arrangements have been made with the auctioneers.

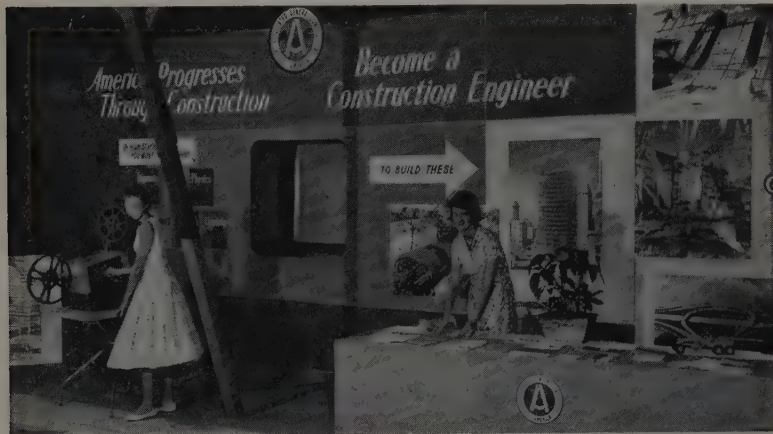
Power plant will use steam from geysers

THE FIRST electric power plant to use natural steam from geysers is being planned by the Pacific Gas and Electric Co. The utility has taken steps to secure steam from property holders in a hilly area in Sonoma and Lake counties, Calif. The next step would be an application to the state commission for authorizing installation of a 12,500-kw. plant. Additional generating units are planned if the first installation is successful and sufficient steam can be produced. The initial program would cost about \$2,000,000.

Owners of the steam producing area would pipe steam to the power plant at a pressure of 100 lb. per sq. in. and a temperature of 348 deg. F. This would be the first plant of its kind for commercial power production in America and would be the first privately financed plant in the world, since previous plants have been subsidized by governments in Italy, New Zealand and Mexico.

AGC EXHIBIT PROMOTES CONSTRUCTION ENGINEERING

Top award for an exhibit in the Educational Division at the California State Fair was won by the Northern California Chapter of the AGC. The exhibit was prepared by the administrative assistant of the chapter, R. E. McCann, who designed the display to supplement showing of the AGC film, "The Constructors". This film gives high school students an introduction to a career in construction engineering.



AIR POLLUTION TEST

*Proves
Cleanliness
of*



Equipment that Serves

MADSEN ASPHALT PLANTS

MADSEN TRIPLE WET TUBE DUST WASHER

99.7% EFFICIENT

THE TEST... Air Pollution Test #C-415 conducted Oct. 30, 1957 by the Air Pollution Control District, County of Los Angeles.

THE FACTS... Plant was operated at the average rate of 169.7 tons of production per hour and was burning heavy fuel oil at the time test was conducted. Aggregate feed to dryer carried heavy dust content.

THE RESULTS... Stack emission of solids to the atmosphere—only 10 lbs. per hour—or 99.7% EFFICIENCY! (Los Angeles County Air Pollution Control District allows up to 40 lbs. per hour.)

PLANT LOCATION—Saugus, California
PLANT SIZE & MODEL—Madsen Model 391 5000-lb.
HOT ROD Asphalt Plant
WET WASHER—Madsen Triple Wet Tube Dust Washer
Model No. 7809
DRY DUST COLLECTOR—Madsen 12' dia. round cyclone
DRYER—Madsen 84" x 30'



Industrial Asphalt, Los Angeles, California, owns and operates the Madsen Model 391 HOT ROD Asphalt Plant shown above. Plant is located at Saugus, California.

MADSEN Asphalt Plants are built in capacities from 1000 lbs. per batch to 6000 lbs. per batch. Whatever your asphalt plant requirements are, there's a MADSEN Plant designed for you.

We've talked about the clean operation of MADSEN Asphalt Plants ... and now here's the proof. Even under adverse operating conditions MADSEN Asphalt Plants meet the strictest requirements for clean operation!

The MADSEN Model 391 HOT ROD Asphalt Plant (shown above in full operation), is streamlined in appearance with no extras or "trimmings." It is designed for easy transport and fast set-up, yet it is ideal for the operator who wants to set up permanently.

Here are some of the outstanding features of the MADSEN HOT ROD:

- Fully-enclosed (running in oil) gear box reduction unit that connects right to the mixer shafts... eliminates exposed mixer timing gears.
- MADSEN Twin-Shaft Pug Mill Mixer (patented) with externally removable sectional liners, improved mixing and faster discharge.
- Exclusive bin design (Pat. Pend.) eliminates segregation.
- MADSEN Asphalt Pressure Injection System (patented) for faster asphalt injection, improved mixing and reduced mixing time.
- Fast air operation of bin gates, weigh-box gate, asphalt pressure injection and mixer gate.
- And, of course, **CLEAN OPERATION** to meet air pollution requirements everywhere.

Built in capacities of 4000 lbs. and 5000 lbs., the MADSEN Model 391 HOT ROD Asphalt Plant has shown an ability to produce in excess of 200 T.P.H. at a highly consistent rate. Ask your MADSEN Distributor for Catalog No. 391 or write MADSEN WORKS, Baldwin-Lima-Hamilton Corporation, P.O. Box 38, La Mirada, California or Baldwin-Lima-Hamilton Corp., Lima, Ohio

FOR YOUR CONVENIENCE—MADSEN MAINTAINS A COMPLETE PARTS STOCK IN LOS ANGELES AND LIMA, OHIO

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	1659 6th Ave., West, Eugene, Oregon
Evans Engine and Equipment Company	
4300 11th Avenue, N.W., Seattle, Washington; P.O. Box 894, Anchorage, Alaska	
Foulger Equipment Company	1361 2nd West, Salt Lake City, Utah
C. H. Grant Company	2515 Willow Street, Bay Shore Station, Oakland, California
Hall-Perry Machinery Company	Butte, Montana
Branch Offices: Great Falls, Billings. Sales Office: Missoula.	
Modern Machinery Company, Inc.	East 4412 Trent Avenue, Spokane, Wash.
Reno Equipment Sales Company	1700 West 4th Street, Reno, Nevada



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The Sawtooth Company 1115 Grove Street, Boise, Idaho
Western Machinery Company 820 N. 17th Ave., Phoenix, Arizona
Studer Tractor and Equipment Company East Yellowstone Hwy., Casper, Wyo.
... for more details, circle No. 30 on Reader Service Postcard

ALASKA Newsletter

By CLIFFORD S. CERNICK, Fairbanks

INTERIOR ALASKA — Here in the heart of the Golden North—in country which is, in many ways, still as raw and rough as the vast Yukon frontier which Robert Service made so famous, the big news this winter of 1958 is construction and oil. As this is being written, several major oil firms are engaged in a scramble for "black gold" leases in Umiat region of the Arctic north of Fairbanks. Oil has already been struck in Alaska—on the Kenai peninsula—and Alaskans are hopeful there's an oil field in the Arctic also. Apart from the construction work that an oil discovery would stimulate, considerable excitement is being generated in the new state's construction circles concerning the 1959 outlook. Biggest job now under way, of course, is the missile detection site at Clear, just 60 mi. south of Fairbanks on the Alaska Railroad. The Clear job, and a similar project going up on Shemya Island in the Aleutians, are expected to soak up a lot of Alaska's unemployment.

CLEAR PICTURE—A glimpse of work at Clear, based on a visit to the site, is revealing. The \$250,000,000 project is being scratched out of a desolate stretch of Alaskan wilderness. Morrison-Knudsen, in association with Patti-MacDonald, is carrying out the initial phase of the job at Clear, erecting a camp which will house 800 workers. Construction boss on the job is a quiet, solidly-built veteran of many a big-time project, George Fowler. Fowler arrived on the job with a small crew on Aug. 28. An Alaska Railroad freight train from Anchorage halted in the wilderness clearing and about \$1,000,000 worth of construction equipment was unloaded. On Aug. 29, another load of equipment, this one worth about \$500,000, was brought in from Fairbanks. Fowler squinted at the bleak, tree and brush-strewn desolation and figuratively rolled up his sleeves.

TWENTY DAYS LATER — Less than three weeks later, about 50 ac. of land had been cleared and 250,000 yd. of dirt moved. The urgent task now is to chalk up progress on barracks and other buildings before icy blasts of winter slow

down the job. Supply on the job is one problem the contractors have whipped in the modern way. M-K has set up an airfield at which a converted Liberator bomber lands, bringing in emergency requirements like spare parts for bulldozers and scrapers. Approximately 200 men are now on the job. These include machine operators, electricians, plumbers, carpenters, laborers, truck drivers and cat skinnners.

FEBRUARY DEADLINE — Fowler's deadline for completion of the camp is Feb. 28. Shortly after that date, the barracks and other facilities will be needed to house the workmen who will construct the missile site itself. The present contractor seemingly has the inside track in bidding on the big contract for the overall base. For one thing, M-K and P-M now have their crews and heavy equipment on the job and would not have to import them, which other contractors would have to do at considerable cost. Being already on the job with crews, equipment and know-how will no doubt give these contractors the edge when the time comes to submit bids on the detection site itself.

PHONY JOB OFFERS—Fraud artists offering non-existent "high-paying" construction jobs in the new state are still preying on gullible Americans. A typical case is that of Melvin Greenberg of La Puente, Calif., who complained to Territorial Employment Service Director M. R. Schrock at Anchorage. Greenberg's wild-goose chase to Alaska was launched by a classified ad in a Los Angeles paper offering "wonderful jobs in Alaska." After paying the fee, Greenberg flew to Alaska but found no jobs available. The temporary job the Alaska Employment Service found Greenberg didn't pay as much as the work he had abandoned to come north. So Greenberg returned to California, sadder but wiser. "I'm ready to testify against that rat," he told Schrock. The Employment Service reports that quite a number of jobless men have been showing up in Anchorage in response to the misleading advertisements.

WINTER JOBLETTER—A check

of the Territorial Employment Service and the latest report issued by the Bureau of Employment Security, U. S. Department of Labor, shows that the winter job picture in Alaska is not an optimistic one. The usual winter drop in construction employment is now being felt. The Department of Labor report, from which we quote an excerpt, should be a sobering one to those who have entertained ideas of "going north" this winter. The report states: "The outlook for employment in Alaska during the next several months is not favorable. The size of the work force in the construction and logging industries is expected to change little before weather conditions force a reduction in employment or a close-down. Normal decline in tourist business combined with reductions in employment in other outdoor activities is expected to result in further curtailment of employment in secondary industries. Although a relatively large number of workers separated from employment in Alaska leave the Territory in the fall, the number of unemployed persons in Alaska is expected to mount."

AIRPORT PROGRAM—Alaskans are hoping Congress will approve a \$15,000,000 program to bring Anchorage and Fairbanks international airports up to the standards needed for the jet age. The program of airport improvement was first presented to Congress about two years ago, however recently there has been doubt as to whether Congress would appropriate the funds for the work. The two Alaska airports and the international airport in Washington, D. C., are the only federally-operated airports in the nation.

DREDGING BIDS OPENED—Bids have been opened on dredging two important channels off the Southeastern Alaska coast—Dry Pass and Rocky Pass. The U. S. Army Engineer District announced the apparent low bid of \$993,457 for the entire job was submitted by Bolivar & Associates of Seattle. Dry Pass dredging will require 126,000 cu. yd. of common excavation and about 19,560 cu. yd. of ledge rock excavation to provide a 70-ft. channel to a depth of minus-12 ft. at mean-lower-low water. Rocky Pass dredging will require 12,295 cu. yd. of common excavation and 4,880 cu. yd. of ledge rock excavation. The channel at Rocky Pass will be 150 ft. wide.

Gilliss resigns as head of Calif. Dept. of Public Works

C. M. GILLISS has resigned as director of the department of public works of California to accept the position as road commissioner for Los Angeles County. In this position he will succeed Sam R. Kennedy, who is scheduled to retire within a few months. Gilliss gave as his reasons, in his letter to the governor, the fact that the proposed reorganization of the road department for Los Angeles County represents a distinct challenge, provides civil service advantages and also carries a higher salary. A complete reorganization of the county road department has been authorized following a study by management consultants which indicated that the department was adequately staffed with technical men, but needed revision in administration and management levels. The department carries an annual total budget of about \$42,000,000, and employs more than 2,000.

The question of possible civil service examination for the position has been raised, but the county commissioners have urged the civil service board to declare an examination impracticable for the position. Gilliss would then be appointed by the commissioners.

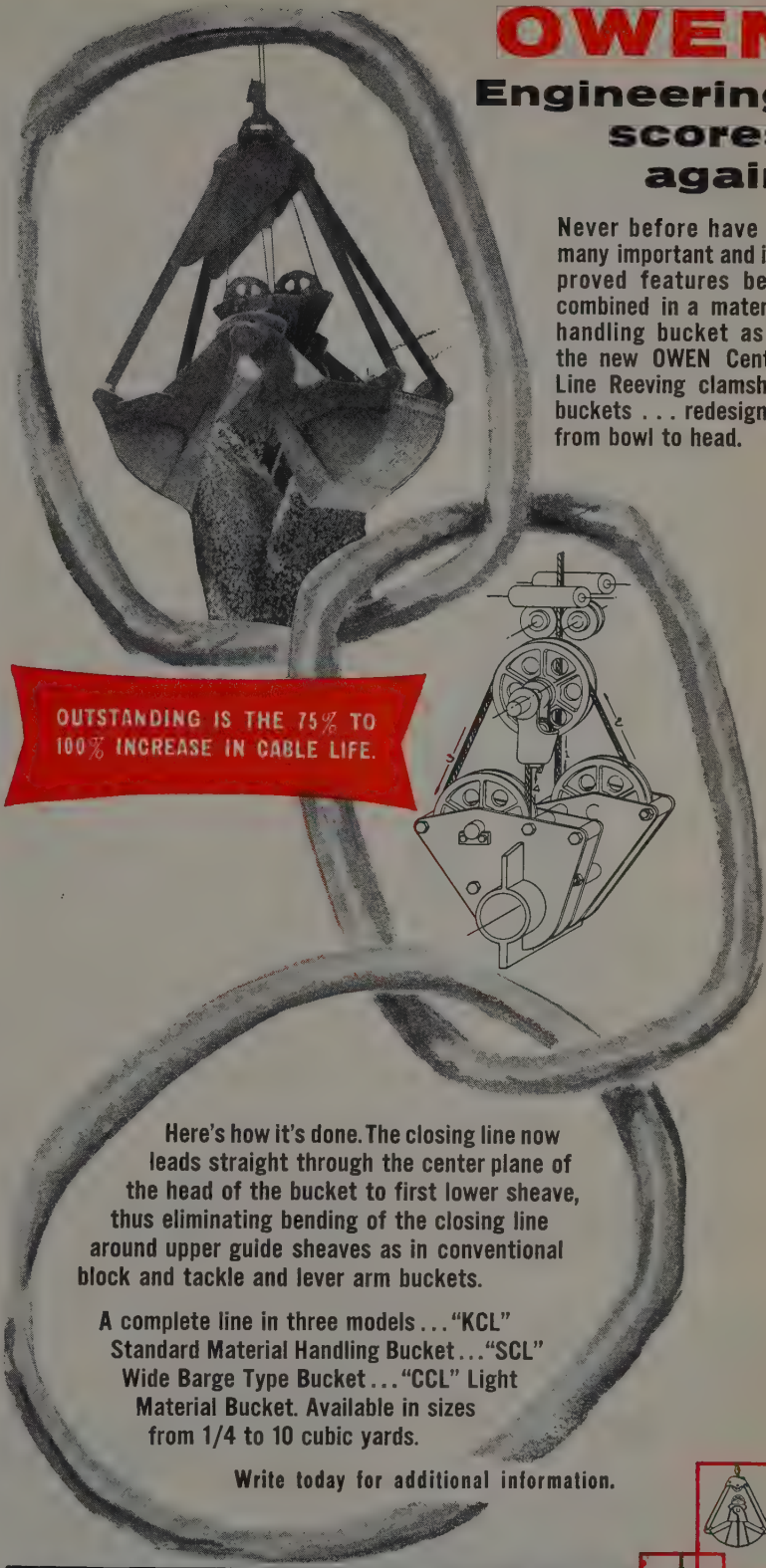
Reservoir of Wanapum Dam will require higher bridge

THE RESERVOIR which will be formed behind the Wanapum Dam, to be built across the Columbia River near the town of Vantage, will require the proposed new highway bridge at this location to be raised for adequate clearance. The location is on Interstate route U.S. 10 and plans had already been made by the Washington State Highway Department to replace the present 2-lane Vantage bridge with a new bridge somewhat south of the existing structure.

Because of the reservoir level the proposed bridge will have to be raised and this will increase its cost. With a preliminary estimate of \$16,000,000 for the bridge proposed by the state highway department a figure of about \$20,000,000 is now estimated depending upon the clearance required. The added cost for the raise in elevation will be met by the Grant County Public Utility District, the agency building Wanapum Dam.

OWEN Engineering scores again

Never before have so many important and improved features been combined in a material handling bucket as in the new OWEN Center Line Reeving clamshell buckets . . . redesigned from bowl to head.



OUTSTANDING IS THE 75% TO 100% INCREASE IN CABLE LIFE.

Here's how it's done. The closing line now leads straight through the center plane of the head of the bucket to first lower sheave, thus eliminating bending of the closing line around upper guide sheaves as in conventional block and tackle and lever arm buckets.

A complete line in three models . . . "KCL" Standard Material Handling Bucket . . . "SCL" Wide Barge Type Bucket . . . "CCL" Light Material Bucket. Available in sizes from 1/4 to 10 cubic yards.

Write today for additional information.

The OWEN BUCKET Co.
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BRANCHES: New York • Philadelphia • Chicago
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. . . for more details, circle No. 31 on Reader Service Postcard

HAWAII Report

By ALAN GOODFADER, Honolulu



"WHAT'S 'BONDED BUY'?"

When you make a "Bonded Buy" purchase from your Caterpillar Dealer on any used Cat-built machine, he gives you a Guarantee Bond of up to \$10,000.

And you can be sure that the used equipment you buy is in the best possible condition at the lowest reasonable price.

"ANYBODY ELSE OFFER 'BONDED BUY'?"

No—just your Caterpillar Dealer.

"DOES HE OFFER ANY OTHER KIND OF PROTECTION ON USED EQUIPMENT?"

"Certified Buy." This covers any make machine and includes his written guarantee. And "Buy and Try"—which carries a written money-back agreement.

"WHAT DOES ALL THIS MEAN TO ME?"

That you can be sure of a safe buy when you buy used equipment from your Caterpillar Dealer. Call him today.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR

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**BEST BUY IN NEW
AND USED EQUIPMENT**

... for more details, circle No. 32

THE AIR IS FULL—With Election Day approaching, Honolulu's air is full of promises and proposals for public works. Candidates at the Territorial and City levels are busy dreaming up new ideas and taking credit for past construction. The Democratic candidate for mayor, William C. Vannatta, an engineer, has come up with the most ambitious proposal. He wants to build a \$100,000,000 freeway from metropolitan Honolulu to the rural area of Ewa. Included in the plan is construction of two tunnels under Honolulu harbor. And, he says, this could be paid for by filling in harborfront land and leasing it to industries. His opponent, Republican Mayor Neal S. Blaisdell, claims credit for strengthening and speeding school construction, on which the City is spending more than \$1,000,000 a month.

SCHOOL CONSTRUCTION—On the school construction front, Honolulu announced recently that contractors have finished 43 projects worth \$6,366,727 so far this year. Another 23 projects totaling \$3,147,881 are due for completion by the end of the year, and four projects totaling \$1,984,809 are scheduled for completion shortly after year's end. Twenty-eight new projects amounting to \$6,272,720 are on the drawing boards.

BIG FACTOR—Construction continues to play a leading role in keeping the Territory's business at high levels, according to James H. Shoemaker, the Bank of Hawaii's business research director. And construction expenditures will increase, Shoemaker adds. He notes that skilled building tradesmen have received 25c to 35c an hour increases in the last year, but remain below West Coast levels. Rain slowed construction somewhat this summer, but Shoemaker sees "a very substantial backlog" of work for builders.

LARGEST LIFT-SLAB—Contractor Ben M. Hayashi is building the largest lift-slab building ever erected here, an \$800,000 six-story building for American Mutual Life Insurance on Oahu. Hayashi is head of Vagtborg Lift-Slab of Hawaii, the subsidiary of Vagtborg Lift-Slab

Corp. of Los Angeles. Work started in May and Hayashi expects to beat his Dec. 31 deadline.

NEW ENTRIES—Two young newcomers to Hawaii have jumped into the fast-growing cooperative apartment construction field here with plans to build two 12-story buildings costing an estimated \$6,000,000 in Waikiki. They are John Barkhorn, 42, designer of industrial and other construction, and John W. Foltz, 33, until recently a financial management executive. They plan to build of poured concrete. Their two buildings will include about 282 apartments and two-level underground garages.

DREDGING PROJECT—The dredge McLeod has started eating out an 80x500-ft. canal at the \$16,000,000 Barber's Point housing project job held by the Murray-Sanders Construction Co. of Santa Ana, Calif. When the canal is finished, the dredge will scoop out a 35-ac. lagoon in the center of the project. Earth from the lagoon will be used as fill on the job.

BUILDING COSTS RISE—The Builders Report Service says Hawaii's construction cost index climbed almost three points here between July and August to 133.4 after dropping in March to 130.8. The costs of labor, interest, steel, concrete blocks, and fire sprinkler systems were blamed for the jump.

NEW HIGHWAY SET—The way has been cleared for calling of bids for a Territorial-Federal Aid highway project between Kahului and Wailuku, Maui, according to Erwin F. Morrison, Territorial district engineer for Maui. The project calls for rebuilding of a 3-lane highway into a 4-lane divided road.

FEDERAL FUNDS APPROVED—Military projects approved recently by Congress include the following projects in Hawaii: Army, \$1,293,000 for Schofield Barracks, \$154,000 for Kawaihae harbor, \$130,000 for Ft. Shafter, and \$127,000 for Helemano; Navy, \$1,271,000 for Ford Island Naval Air Station and \$159,000 for Pearl Harbor Naval Shipyard; Air Force, \$839,000 for Midway Island and \$144,000 for Hickam Air Force Base.

Another Caterpillar Improvement That Lowers Maintenance Time and Costs

—NEW DRY-TYPE AIR CLEANERS FOR THE DW20 AND DW21!

The engine's worst enemy, air-borne dust really takes a licking from the new Caterpillar dry-type air cleaner, now standard equipment on DW20 and DW21 Tractors. Another of many earthmover features developed under Caterpillar leadership, this new cleaner not only slashes maintenance time and costs, but also increases engine efficiency and life. For example:

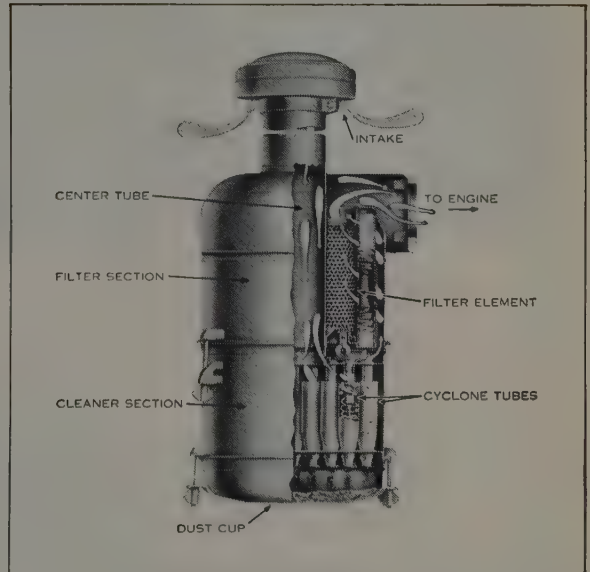
MORE EFFICIENT! New dry-type air cleaner removes 99.8% of all dirt in intake air, where oil-bath cleaners normally remove only 95 to 98%. In addition, effectiveness of the new dry-type unit is *constant* at any engine RPM, is not adversely affected by temperature changes or oil that needs changing.

This constant efficiency means that the most serious thing that can happen is reduction of air capacity—and temporary loss of engine power. But dirt *does not* get through into the engine. Excessive black smoke is an immediate visual reminder that HP is decreasing and that the cleaner needs servicing.

EASIER TO SERVICE! Both dry-type and oil-type cleaners should be serviced at intervals depending on dust conditions. But with the dry-type all that's required is removing the pan and emptying the dry material—a matter of 5 minutes, as against 20 minutes it usually takes to service the often messy oil-type. There's 15 minutes *more* for production at each service period!

MORE ECONOMICAL! The paper filter element can be cleaned easily and reused several times making replacement costs lower than the sum normally spent for oil to service the oil-type. Servicing is also faster, reducing labor costs.

Here's proof again that Caterpillar is the leader in *lowering* earthmoving costs. For complete information on the new dry-type air cleaner in Cat DW20 and DW21 Tractors, see your Caterpillar Dealer!



HOW THE DRY-TYPE AIR CLEANER WORKS

Operation of this moisture-proof unit is simple. Air enters it through the stack cap and passes through the center tube. The cap has a 14 x 14 mesh which removes most large, troublesome particles. From the center tube the air passes through the cyclone tubes.

These cyclone tubes swirl the air causing the heavier particles of dirt to drop out by centrifugal action through the funnel section into the dust cup. The relatively clean air then passes to the resin impregnated paper filter. This removes the remainder of the dirt. After passing through it, the air moves to the intake manifold of the engine.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR

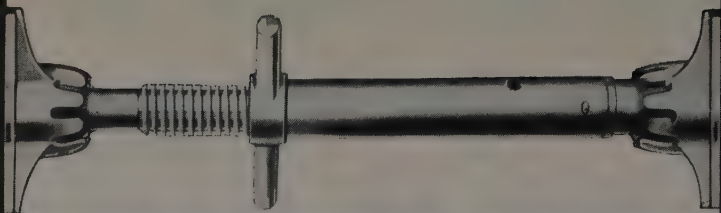
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**NEW DRY-TYPE AIR CLEANERS
FOR GREATER EFFICIENCY
AND ECONOMY!**

FIND YOUR CATERPILLAR DEALER IN THE

YELLOW PAGES





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Duff-Norton Trench Braces

Cave-ins of trenches and other excavations can be dangerous and costly. Don't take chances with old timbers or other make-shift devices. See your local distributor for details on prices and delivery of the various types of precision-made, sturdy, Duff-Norton adjustable trench braces and timber fittings . . . or write the world's oldest and largest manufacturer of lifting jacks for bulletin AD-17A.

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. . . for more details, circle No. 34 on Reader Service Postcard

Dam project in Montana advances toward start

THE \$100,000,000 Yellowstone Dam project on the Big Horn River near the Montana-Wyoming border has moved another step forward. For several years there has been controversy over the payment to the Crow Indian tribe for land which will be flooded out by the reservoir. Payment for the 7,000 ac. of reservation has now been established at \$2,500,000 by a bill signed by President Eisenhower. This is not the figure requested by the tribe and may result in court action. However, the bill represents a further step and the Bureau of Reclamation is ready to move into the final planning stage now that the question of land payment has been settled.

San Francisco freeway subject of a new report

ANOTHER STEP in the controversy on a freeway extending into San Francisco has been taken with the filing of a report that proposes twin tunnels 1 mi. long. The \$65,-000,000 freeway extension, financed by federal and state funds, has been the subject of extended controversy as to location. The route proposed by the Division of Highways called for tunnels only 3,700 ft. long, and an extended section in open cut. Residents of the area protested the route and a further study was made by the engineering firm of Wilbur Smith & Associates at the request of the Board of Supervisors.

The project will provide a fast 6-lane expressway from the freeway that leads into San Francisco from the south to the Golden Gate bridge approach on the north. As an indication of the right-of-way problems and pressure from local residents, the proposed route would involve 995 dwelling units and 56 commercial properties having an estimated value of \$12,500,000.

Alaska has prestress plant

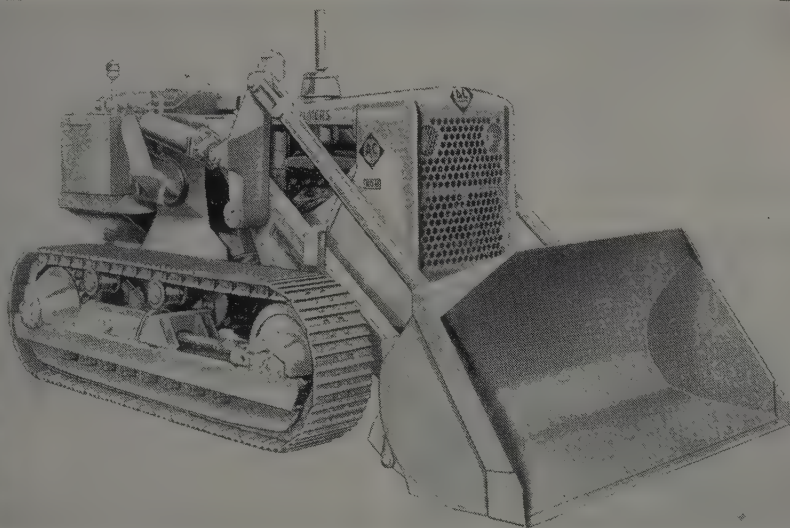
THE FIRST prestressed concrete plant is in production for Alaska. Prestressed Concrete Co., which is under the same ownership as the Anchorage Sand & Gravel Co., began casting in August. The two organizations will use the same material and manufacturing facilities in Anchorage. First units from the new plant were roof beams used for a warehouse at Palmer and were 50 ft. long.

For Top Tractor Shovel Performance Try Allis-Chalmers—the Look-Ahead Line

The superior operating ease and economy of Allis-Chalmers tractor shovels make them ideal for work in gravel pits, production loading into trucks, clean-up work at job sites and general excavating work. These powerful units are available in four sizes with bucket capacities up to 7 cu yd to fit every material handling and earth-moving job.

A broad line of interchangeable attachments includes light materials buckets, rock buckets, lift forks and rippers — to further extend the usefulness and adaptability of the units.

Your Allis-Chalmers construction machinery dealer will demonstrate the machine of your choice . . . on your job . . . no obligation. Call him today to arrange the date.



Talk about versatility, this HD-11G is available with your choice of 13 different front-end attachments to match a multitude of jobs.

Wide Range of Sizes Matches Various Materials, Conditions

HD-6G

1½ cu yd
72 net engine hp
19,600 lb

HD-11G

2¼ cu yd
111 net engine hp
32,000 lb

HD-16G

3 cu yd
150 net engine hp
(torque converter drive)
47,800 lb

HD-21G

4 cu yd
225 net engine hp
(torque converter drive)
66,500 lb

**Look ahead...move ahead
...and stay ahead with**

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Southern Idaho Equipment Co. of Boise, Inc.—Boise

MONTANA
Mountain Tractor Company—Missoula and Kalispell
Seitz Machinery Company, Inc.—Billings

NEVADA
A D Machinery Company, Inc.—Elko and Las Vegas
Reno Equipment Sales Co.—Reno

OREGON
Haupt Tractor Company—Medford
Wood Tractor Company—Portland
Timber Tractor Company—Springfield

UTAH
Cate Equipment Company, Inc.—Salt Lake City

WASHINGTON
Pacific Hoist & Derrick Company—Seattle & Puyallup
American Machine Company—Spokane

WYOMING
Studer Tractor & Equipment Company—Casper

ALASKA
Yukon Equipment, Inc. Seattle, Anchorage, Fairbanks & Ketchikan

... for more details, circle No. 35 on Reader Service Postcard

C. E. WAITE, deputy state highway engineer of California, will serve as general chairman for the California Street and Highway Conference to be held in Berkeley, Jan. 28-30. Waite, who is the deputy for administration and management of the Division of Highways, is a member of the executive committee of the Western Association of State Highway Officials.

The conference, which is presented annually by the Institute of Transportation and Traffic Engineering, Univ. of Calif., will concentrate the 1959 program on the many local problems resulting from the stepped-up highway program and population growth.

A DYNAMIC population growth will continue in the Los Angeles metropolitan area, with a forecast of 10,300,000 by 1975. This prediction was part of a forecast study prepared by a consultant for the Union Bank. The population estimate is 7,700,000 in 1965.

Sections of the metropolitan area which has the greatest amount of undeveloped land will absorb the

The December issue of WESTERN CONSTRUCTION will be devoted to the Glen Canyon Dam project in northern Arizona. The methods and machines in use in all phases of the project, including the Colorado River Bridge, will be described and illustrated. Special articles by the construction men in charge will be presented along with staff-written job reports to form an up-to-date review of the nation's biggest project.

larger part of the new population.

The report did not present definite information on construction activity which would result from this population growth, except to point out that facilities would be required to meet this trend. One particular figure which ties in more closely with construction activity is the prediction that the Los Angeles area will have a total of about 4,800,000 automobiles on its streets by 1975 as compared to an estimated 2,800,000 in 1957.

Baker & Ford Co. of Bellingham, Wash., received a \$459,111 contract for erection of a tower building for the U. S. Army on Shemya in the Aleutians. **Lease Co., Inc.**, of Seattle, Wash., submitted a low bid of \$732,500 for construction of an exchange sales store and cafeteria at Elmendorf Air Force Base.

Western Constructors, Inc., of Phoenix submitted a low bid of \$339,841 for 2.8 mi. of grading and surfacing northeast of Nogales in Santa Cruz County.

Ukropina, Polich & Kral of San Gabriel submitted a low bid of \$2,-445,261 for 2.7 mi. of grading and surfacing and construction of 6 bridges in the cities of Anaheim and Fullerton, Orange County. A \$1,956,609 contract was received by **Daley Corp.,** San Diego, for grading and paving 2 mi. of 8-lane freeway on State Route 94 in city and county of San Diego. **J. A. Payton** of Riverside submitted a low bid of \$853,523 for 5.3 mi. of grading and surfacing near Chino in San Bernardino County. **Stecker & Scott** and **Jesse N. Harrison** of San Ardo submitted a low bid of \$839,020 for 2.9 mi. of grading and surfacing north of Ytias Creek in Santa Barbara County. A \$801,717 contract was received by **Mercer, Fraser Co., Inc.,** and **Mercer, Fraser Gas Co., Inc.,** Eureka, for grading and surfacing on 1.6 mi. of 4-lane expressway on U. S. 101 north of Arcata in Humboldt County. **Sully Miller Contracting Co.,** Orange, received a \$614,389 contract for grading and surfacing 3.3 mi. to widen Lincoln Ave., U. S. Highway 91-State Sign Route 18 in Orange County. A low bid of \$588,847 was submitted by **Erickson, Phillips & Waisberg** of Concord for construction of one bridge across Grant Line and Fabian-Bell canals on Tracy road in San Joaquin County. **W. F. Maxwell Co.,** Fontana, received a \$297,-287 contract for constructing a bridge over Alamitos Bay and grading and surfacing approaches, in and near Long Beach in Los An-



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les County. **Bos Construction Co.**, Berkeley, received a \$295,664 contract for constructing a bridge over adding Creek on State Sign Route in and north of Fort Bragg in Mendocino County. **C. B. Tuttle**, Alamosa, submitted a low bid of \$375,029 for bridge construction over American River at Fair Oaks in Sacramento County. **Close Construction Co., Inc.**, and **Krull & Paeco** of Hayward received a \$356,000 contract for reconstructing and widening 1.7 mi. of Santa Rita Road and construction of one bridge between Arroyo Mocho Bridge and Pleasanton in Alameda County. **Fredrickson Bros.** of Emeryville received a \$255,336 contract for grading and surfacing on 1.9 mi. of the Tuolumne-Sonora road at Tuolumne in Tuolumne County. **I. L. Croft & Son, Inc.**, of Sausalito submitted a low bid of \$5,319 for 9.9 mi. of grading and surfacing on Cameron Road west of Pacheco in Kern County. A \$8,571 contract was received by **C. Jones & Sons** of Berkeley for grading and surfacing a storage area at the U. S. Naval Air Station in city and county of Alameda. **McCoy, Inc.**, Bakersfield, submitted a low bid of \$195,984 for 7.2 mi. of grading and surfacing on the Overline Road in Kern County. A low bid of \$195,785 was submitted by **J. D. Archibald Co.** of Woodland City for 8.2 mi. of grading and surfacing east of Dos Rios in Mendocino County. **Thomas Construction Co.**, Fresno, submitted a low bid of \$191,594 for grading, surfacing and construction of one bridge east of Center in Fresno County. **Madonna Construction Co.**, San Luis Obispo, submitted a low bid of \$186,312 for grading and surfacing 1.4 mi. of the Old Creek Road in San Luis Obispo County. A low bid of \$177,887 was submitted by **Har- Smith & Son**, St. Helena, for grading and surfacing 1.4 mi. of road-damage portions of Route 1, near Solano County Line.

COLORADO

Schmidt Construction Co., Arapahoe, received a \$808,849 contract for 17.6 mi. of grading, structures, and surfacing between Joes and Lia on S.H. 102 in Yuma County. A low bid of \$528,535 was submitted by **Herron-Strong** of Platteville for 6 mi. of grading, surfacing, and structures on S.H. 119 in Boulder County. A low bid of \$10,139 was submitted by **Gard-**

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ner Construction Co., Glenwood Springs, for construction of viaduct over A. T. & S. F., C. & S. and D. & R. G. W. railroads in city and county of Pueblo. **Blanchard Construction Co.**, Derby, received a \$387,845 contract for 7 mi. of grading, structures, and surfacing between Wildhorse and Kit Carson on S.H. 8 in Cheyenne County. **Latimer Construction Co.** of Denver received a \$349,667 contract for construction of bridge and approaches between Ft. Morgan and Brush on Interstate Route 80S in Morgan County. **Pioneer Construction Co.**, Pueblo, received a \$230,114 contract for 5.2 mi. of grading, structures, and surfacing on S.H. 163 in Conejos County.

IDAHO

Rogers Construction Co., Portland, Ore., received a \$1,616,087 contract for construction of underpass, bridges, and grading and surfacing approaches and related work on 7.7 mi. of Interstate 82 in Elmore County. **John E. Alexander** of Seattle, Wash., received a \$391,246 contract for constructing 2 railroad underpasses on U. S. Hwy. 95 in Lewis County.

MONTANA

Robertson & Cave, Inc., of Great Falls, received a \$730,033 contract for 17.7 mi. of grading and surfacing on the Wolf Creek-Augusta road in Lewis and Clark County. A \$507,106 contract was received by **Long Construction Co.**, Billings, for 9.7 mi. of grading, surfacing and draining on the Gardiner-Livingston road in Park County. **Studer Construction Co.**, Billings, received a \$261,056 contract for 8.7 mi. of grading and surfacing and one structure on the Shawmut-Hedgersville road in Wheatland County. **Francis Tindall** of Lewiston received a \$197,133 contract for 2.1 mi. of grading and surfacing on Big Spring-North road in Fergus County. A \$138,700 contract was received by **Kiely Construction Co.** of Butte for 10.4 mi. of grading and surfacing on the Dillon-Twin Bridges road in Beaverhead and Madison counties. A \$126,455 contract was received by **United Construction Co.**, Bainville, for 5.6 mi. of grading and surfacing on the Brandenburg-Garland-Miles City road in Custer County. **Contractors & Excavators, Inc.**, and **Zuber Bros. Contractors** of War-

den, Wash. (a joint venture), submitted a low bid of \$185,910 for earthwork and structures for completion of Spokane Bench Laterals, Helena Valley Unit, Mont., Missouri River Basin Project.

NEVADA

Dodge Construction, Inc., of Fallon, received a \$1,173,681 contract for 15.4 mi. of grading and surfacing, and related work on U. S. Highway 93 north of Contact in Elko County. A \$1,328,985 contract was received by **Wells Cargo, Inc.**, Las Vegas, for 8.5 mi. of grading and surfacing on U. S. 91, southwest of Jean in Clark County.

NEW MEXICO

Adams Construction Co., Inc., Santa Fe, received a \$1,398,674 contract for 8.3 mi. of grading, surfacing and other related work on Jct. US-66-84-West and Signing-Santa Rosa-West, in Guadalupe County. **Brown Construction Co.**, Albuquerque, received a \$723,319 contract for grading and surfacing on 12 mi. of the Escondido-South road, U. S. Highway 54 in Otero County.

(Continued on page 74)

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WESTERN CONSTRUCTION—November 1958

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Power steering and individual turning brakes give the Work Bull 1001 agility that means extra profits in your pocket whether you're loading borrow in open country or loading spoils in a crowded project. "No blind spot" visibility lets you operate safely with dollar-saving accuracy and speed!

A husky rig in a compact package, the Work Bull 1001 digs efficiently where others simply spin and bounce! That's because Work Bull's low pivot points put the line of thrust below the wheel axle... traction increases in ratio to resistance encountered. Torque converter automatically adjusts power between speed and load requirements.

Big payloads every time! 43° bucket rollback at ground level and a full 5,200 pounds of break-away let you get big bites. Special shock-load absorber helps you keep them by cushioning loads over rough terrain. Dumping into high-back trucks and hoppers? It's a breeze with a Work Bull 1001! Telescoping lift arms give 124" clearance to the bucket hinge!

Versatility converts idle-time losses into profits! This top-quality 7/8-yard Loader becomes a Pick-Up Sweeper, Backhoe(with its own backfill blade), Fork Lift, Crane, Angle Dozer, Rotary Broom, and a Loader-Scarifier right in the field! You'll find it costs you less to own a Work Bull 1001 with the attachments you need than you normally pay for just one single-purpose machine!



Work Bull 1001

Work Bull 303 with 500 Loader and Dave Backhoe

Work Bull 202 with Dave Loader Backhoe

Work Bull Fork Lift

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(Oregon) **Union County Grange Supply**, Island City, Oregon; **Frank Lane Machinery Co.**, 603 McKinley St., Eugene, Oregon; **Valley Equipment Company**, 2840 North Pacific Highway, Medford, Oregon; **Rickreall Farm Supply, Inc.**, Rickreall, Oregon.

(Montana) **Reichenbach & Sons Implement Co.**, 920 Ave., North, Billings, Montana; **Haas & Associated Implement Co.**, 206 5th Ave. South, Great Falls, Mont.

(Idaho) **Starline Equipment Co.**, 503 South 16th St., Boise, 1977, Boise, Idaho.

(Wyoming) **York's Shop**, 152 East Montana Ave., Sheridan, Wyoming.

(Arizona) **Trimble Equipment Co.**, 1419 S. Central Ave., Phoenix, Ariz.

(In New Mexico) **Durand Tractor & Equipment Co.**, 929 Fourth St. S.W., Albuquerque, New Mexico; **Leeper Equipment Company**, Box 155, Farmington, New Mexico.

(In Utah) **Lund Machinery Co.**, 2350 Southwest Temple, Salt Lake City, Utah; **Thompson Lumber & Hardware Co.**, 2380 South 1900 West, Ogden, Utah.

(In Colorado) **McCrary Oil Co.**, 1101 River St., Canon City, Colo.; **Modern Farm Service, Inc.**, 357 Mountain Ave., Berthoud, Colo.

(In Texas) **The Myers Co.**, 140 North Cotton, El Paso, Texas.

... for more details, circle No. 41 on Reader Service Postcard

Low bids and contract awards

(Continued from page 70)

Skousen-Hise Contracting Co., Albuquerque, received a \$416,279 contract for 6.5 mi. of grading and surfacing on the Mesa Rica-Conchas Dam road in San Miguel County. A \$366,032 contract was received by **Wylie Brothers Contracting Co.** of Albuquerque for 5.2 mi. of grading and surfacing on the Mountnair-West road in Torrance County. **Haake Construction Co., Inc.**, Santa Fe, received a \$365,305 contract for 5.6 mi. of grading and surfacing on the Gila Forest Boundary-South road in Grant County. **Imperial Paving Co.**, Oklahoma City, Okla., received a \$175,890 contract for 15.2 mi. of grading and surfacing Highway 1-40 in Guadalupe County. **Joseph C. Hastings** of Albuquerque received a \$160,546 contract for 1.8 mi. of grading and surfacing the Correo Connection to 1-40 in Valencia County. A \$138,412 contract was received by **Henry Thygesen & Co.** of Albuquerque for 2.1 mi. of grading and surfacing on U. S. 66, north of Navajo Indian Reservation in McKinley County.

OREGON

Keystone Construction Co., Inc., and **Associates of Prineville** submitted a low bid of \$2,614,943 for construction of Prineville Dam, Crooked River Project. **Cherf Bros., Inc.**, & **Sandkay Contractors, Inc.**, and **Cheney Construction Co.** of Ephrata, Wash., submitted a low bid of \$305,851 for Schedules 1 and 3, earthwork, lining and structures, Talent Division, Rogue River Basin Project. **Natt McDougall Co.**, Portland, received a \$1,126,788 contract for 6 mi. of grading and surfacing north of Eugene, on Pacific Highway in Lane County. **Peter Kiewit Sons' Co.**, of Vancouver, Wash., received two contracts for road work in Linn and Josephine counties: a \$311,314 contract for Tallman Branch and Bond overcrossings in Linn County; and \$329,936 for Rough and Ready Creek-Dwight Creek bridges in Josephine County. **White Bros. Construction Co., Inc.**, Walla Walla, Wash., received a \$270,577 contract for 1.3 mi. of grading and paving the Comstock-Anlauf section of Pacific Highway, south of Cottage Grove.

UTAH

W. W. Clyde & Co., Springville, received a \$596,773 contract for grading, structure, and surfacing on 8.6 mi. of U. S. Highway 40 in Uintah County. **Nelson Bros. Construction Co.**, Salt Lake City, submitted a low bid of \$446,072 for earthwork and structures, Bountiful Subdistrict Laterals, Davis Aqueduct Lateral System, Weber Basin Project. A low bid of \$366,269 was submitted by **Fife Construction Co.**, Brigham City, for 4.7 mi. of grading and surfacing U. S. Highway 6 and 50 in Carbon County. **Thorn Construction Co.** of Springville submitted two low bids for work in Juab and Sanpete counties: a \$485,342 bid for 9 mi. of grading and surfacing State Highway 28, south of Levan in Juab and Sanpete counties; and \$234,828 for 9.2 mi. of grading and surfacing State Highway 148 in Juab County. **Sorensen Construction Co.**, Murray, submitted a low bid of \$325,564 for grading and surfacing between Temple Mountain Junction and Hanksville in Wayne and Emery counties. A low bid of \$203,427 was submitted by **Wheelwright Construction Co.** of Ogden for construction of bridge and approaches on State Highway 39 near Ogden in Weber County. **Mac Construction Co.** of Salt Lake City submitted a low bid of \$119,385 for earthwork, canal lining, and structure, Gateway Canal Revision, Weber Basin Project.

WASHINGTON

Northwest Construction Co., Seattle, received a \$1,797,426 contract for surfacing, and paving 5 mi. of the Tacoma Freeway in and near Tacoma in Pierce County. **Osborg Construction Co.**, Seattle, received a \$1,069,758 contract for clearing, grading, and surfacing from Cedar River east of Tokeland, east of Smith Creek in Pacific County. **Wilder Construction Co.**, Bellingham, received a \$404,227 contract for widening and constructing a bridge at the Chuckanut Drive interchange north of Burlington in Skagit County. A \$245,629 contract was received by **Owens Bros.** of Port Angeles for constructing the Lyre River, Susie Creek bridges and approaches in Clallam County. **Northwest Asphalt Co.** and **Rainier Asphalt Paving Co.**, Seattle, received a \$157,073 contract for 7.2 mi. of grading and surfacing near Pierce County Line

in King County. **Walter G. Meyers & Son** of Spokane received a \$144,927 contract for constructing the Providence Coulee Bridge and N. P. Railway overcrossings in Adams County. A \$165,925 contract was received by **Hardisty Construction Co., Inc.**, of Vancouver, for 1.7 mi. of grading and surfacing Vancouver City streets in Clark County.

WYOMING

Asbell Bros. Construction Co. of Riverton received two contracts for road work in Sheridan and Carbon counties: \$881,930 for 3.1 mi. of grading and surfacing on 4-lane divided highway on the Sheridan-Ranchester road in Sheridan County, and \$671,331 for grading, surfacing, structures and related work on 9.6 mi. of the Lamont-Muddy Gap road and the Beebe access road in Carbon County. **Wilbur Christensen Construction Co.**, Rapid City, S. Dak., received a \$744,831 contract for grading and surfacing and culvert installations on the Buffalo-Gillette road in Johnson County. **C. H. Elle Construction Co.**, Pocatello, Idaho, received a \$755,000 contract for 2.8 mi. of grading and surfacing the Dayton-Kane route in Big Horn National Forest in Sheridan County. **Knisely-Moore Co.** of Douglas received two contracts for roadwork in Johnson and Natrona counties: a \$358,234 contract for 1 mi. of grading, surfacing and culverts on the 4-lane divided highway, Buffalo-Gillette road in Johnson County; and \$297,836 for interchange structure and slab spans and related work on the Midwest-Casper road in Natrona County. **Lamb Construction Co.** and **D. W. Hopkins**, Lusk, received a \$303,964 contract for 3.1 mi. of grading and surfacing on the Torrington-Cheyenne road in Goshen County. **Garton & Garton** of Cheyenne received two contracts for roadwork in Sheridan and Johnson counties: a \$182,534 contract for one service road bridge and miscellaneous work on 3.1 mi. of the Sheridan-Ranchester road in Sheridan County; and \$132,750 for one interchange structure and miscellaneous work on 1 mi. of divided highway on the Buffalo-Gillette road in Johnson County. **A. H. Read Co.**, Cheyenne, received a \$130,500 contract for grading, surfacing and related work on parking lots and connecting road at the Wyoming Highway Department building site at Cheyenne in Laramie County.

ENGINEERS and CONTRACTORS



HERB H. SELLECK, Alaska superintendent for Peter Kiewit Sons' Co. of Seattle, receives plaque awarded by the U. S. Army Engineer Division, North Pacific, for superior achievement in accident prevention on military construction in 1957. Participating in the ceremonies held at Eielson AFB are, from left: Col. Allen F. Clark, Division Engineer, Maj. Gen. W. K. Wilson, Jr., Deputy Chief of Engineers for Construction, Washington, D. C., Selleck, and Col. P. V. Kieffer, Jr., District Engineer.

Vaud E. Larson, who led the first Reclamation investigations crew into the Colorado River gorge above Lees Ferry, Ariz., twelve years ago



Vaud E.
Larson

vision of H. C. McCarty, office engineer. Clarence E. Bovey, who had been engineer of city and cooperative projects, retired after 44 years of continuous service, and Melbourne H. West has been appointed as his successor. West has been assistant planning survey engineer.

* * *

Under the management of Ed W. Barnes, widely known construction



ELMO R. MORGAN, newly appointed Director of Highways for the State of Utah. He replaces Ellis L. Armstrong who is now Commissioner of the Bureau of Public Roads. A vice president of the University of Utah, Morgan was chosen for the important post because of his knowledge of engineering, business administration and Utah's highway problems.

and later selected the site for mammoth Glen Canyon Dam, is named assistant project construction engineer on this unit of the Colorado River Storage Project. He has been with the Bureau of Reclamation for 28 years, and has been assistant regional director in Region 3, Boulder City, Nev., since March 1956. He joined Project Construction Engineer L. F. Wylie at Page, Ariz., September 29.

* * *

Two veteran engineers of the California Division of Highways recently retired. E. J. Saldine, with a career of more than 32 years with the Division, retired as industry contact engineer. No successor to Saldine has yet been named, and for the present most of his functions will be placed under the super-

engineer, an industrial division has been formed by Hood Construction Co. The new division is housed in the present headquarters of the company in Whittier, Calif., and includes a team of experienced personnel headed by Walt Work, general superintendent, a veteran of the industrial construction field.

Correction—

An error was contained in an item appearing in the October issue relating to the supervisory personnel of Churf Bros., Inc., and Sandkay Contractors, Inc., a joint venture. Ralph Wells is superintendent of all field operations in the state of Idaho only. He presently has several jobs going showing nice progress within the schedules set up.

Marvin H. Churf is president of Churf Bros., Inc., and Roy F. Johnson is president of Sandkay Contractors, Inc.

CALENDAR

Dec. 1-5—American Association of State Highway Officials, annual meeting, Sheraton-Palace Hotel, San Francisco, Calif.

Dec. 5-6—Northern California Chapter, Associated General Contractors of America, annual convention, Sheraton-Palace Hotel, San Francisco, Calif.

1959

Jan. 14-15—The Beavers, fourth annual awards dinner, Los Angeles, Calif.

Jan. 19-22—American Road Builders' Association, annual convention, Dallas, Tex.

Jan. 25-29—Associated Equipment Distributors, annual meeting, Conrad Hilton Hotel, Chicago, Ill.

Jan. 28-30—The Institute of Transportation and Traffic Engineering, annual California Street and Highway Conference, Berkeley campus of the University of California.

Feb. 8-13—American Society of Civil Engineers, annual convention, Los Angeles, Calif.

SUPERVISING the jobs



THE FIVE construction men shown above are key men on a freeway contract recently won by Charles MacClosky Co., on a bid of \$1,062,522. Left to right, they are: *Vern Leidig*, general superintendent; *Eddie Surufka*, bridge superintendent; *Reuben Sell*, concrete foreman; *Wally Westbrook*, pile-driving foreman, and *John Bugby*, project engineer. Job is situated on U. S. 101 through Arroyo Grande in San Luis Obispo County, Calif., and consists of 4-lane concrete highway, with a 219-ft. long welded steel girder bridge; a prestressed concrete bridge 126 ft. long; a reinforced concrete girder bridge 172 ft. long, and a 170-ft. long concrete box girder bridge. Project will be finished about next June.

Bill Carter is foreman for Thorn Construction Co. on their \$152,000, 5.8-mi. project of grading and surfacing U. S. 30-S west of Snowville westerly in Box Elder County, Utah. *France Bradley* is superintendent in charge of gravel operations; *Byron Williams*, superintendent in charge of oiling.

Larry Mahan, superintendent; *Bill Ille*, and *Larry Heilman*, foremen; *Paul Larson*, mechanic, and *Al Morton*, crusher foreman, head the team for S. Birch, Inc. and S. Birch & Sons Co. on a recent job. Work, which began in August, is a \$205,803 award for 9.1 mi. of grading and surfacing on the Hilger-Winifred Big Sandy highway in Chouteau County, Mont.

A. R. Sime is project manager for Lewis Hopkins Co. and *A. R. Sime* on the Little Wood River Dam enlargement, Little Wood River Project, Idaho. Other key

men on the \$1,093,945 project are *J. K. Riggle*, general superintendent; *Jim Sime*, excavation foreman; *Larry Sharpe*, general foreman; *Jerry McMillin*, project engineer; and *L. Peters*, timekeeper. Work, which began in August, is expected to end in November 1959.

J. W. Briggs is project manager for Hamer Corporation on a \$756,590 award for relocation of U. S. Forest West Side Road in the dam area of Cougar reservoir on the South Fork, McKenzie River, south of Blue River, Ore. Working with him are *C. L. McMillan*, general superintendent, and *Jack McLean*, foreman. Work is scheduled for completion by the first of the year.

Dan Fiorito is paving superintendent on a recent award to Northwest Construction Co. Other key men on the \$1,281,938 project are *John Vinyard*, grading superintendent; *Mike Cernich* and *Glen*

Christiansen, grade foremen; *L. Tomaso*, forms and subgrade; and *Leon Judy*, master mechanic. The work, which will be over in December, consists of 11.2 mi. of grading, surfacing, Portage Creek to Con-way Junction in Snohomish and Skagit counties, Wash.

Donald E. Duke, superintendent for Isbell Construction Co., is in charge on a \$257,567 contract that has been under way since July. Project is 2.4 mi. of grading and resurfacing the State Highway System in and near Reno, Washoe County, Nev.

William E. Eccles, branch manager; *Robert W. Marshall*, superintendent, and *Homer Brunner*, asphalt foreman, are key men for Gibbons & Reed Co. on a grading and surfacing award on State Road 235, North Ogden in Weber County, Utah. Bid on the 2.8-mi. project was \$96,913. Work began in August.

Lonnie Lawler is project superintendent for Peter Kiewit Sons' Co. on their \$5,565,125 San Clemente Island project in California. Work, which began in August and is expected to be completed by January 1960, consists of paving runway, taxiway, parking apron, access roads, and related work. Other key men are *Arnie Glick*, project engineer; *Jim Kovack*, paving and crushing superintendent; *Ray Austin*, excavation superintendent; *Clark Tope*, paving foreman; *Dick Cummings*, master mechanic; and *O. K. Hoepner*, office manager.

Jack Coons is project manager; *Mitchell Humphreys*, project superintendent; and *Ralph Nelson*, office manager for Morrison-Knudsen Co., Inc. on 3.2 mi. of road work on the Hooskanaden Creek-Thomas Creek section of the Oregon Coast Highway north of Brookings in Curry County, Ore. Job went to M-K on a bid of \$554,745. Work will end sometime next year.

Arnold Blair, superintendent for Isbell Construction Co., is key man on road construction on U. S. 40, west of Reno, Washoe County, Nev. The \$270,376 job is about finished.

Head men on F. L. Somer's \$360,660 jetty repair job at the mouth of the Columbia River on the Washington side in Oregon, are *Harlan Weaver*, project manager;

HE - MAN

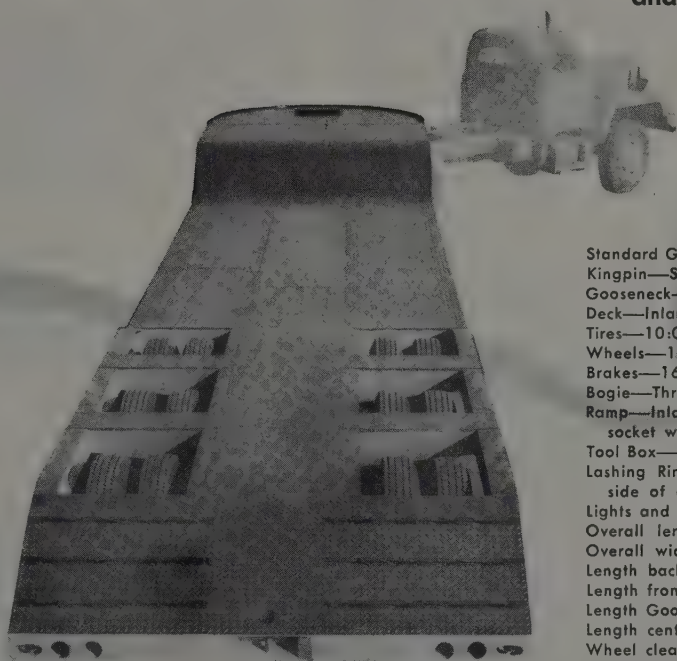
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35 TON MODEL 35-LT-KRS



50 TON MODEL 184-TA-50L

The new Miller & Smith 50-ton, 3-axle Lo-Boy Trailer is the answer to the contractor's needs of adequate transport equipment for hauling heavy machinery from job to job, as well as on the job-site. High tensile alloy steel used in the frame members makes it possible to arrive at the high "pay-load to trailer-weight" ratio of 5 to 1. The 3 axle spring-mounted bogie provides ample flotation to meet road and bridge standard loadings. The long, drop-center deck facilitates distribution of load over trailer and tractor axles.

SPECIFICATIONS AND DIMENSIONS

Standard Glad Hands and Jumper Cable Socket.	
Kingpin—Standard steel heat treated.	
Gooseneck—Full width - Decked with Inland 4-way Deck Plate.	
Deck—Inland 4-way Deck Plate.	
Tires—10:00x20 12-ply Nylon.	
Wheels—10 Hole Budd.	
Brakes—16 1/2 x 7 with individual air cylinders.	
Bogie—Three Axel Spring Suspension.	
Ramp—Inland 4-way deck plate - cleated - recessed tow bar socket with pin in center rear frame member at toe of ramp.	
Tool Box—Recessed in top of Gooseneck at front.	
Lashing Rings—D-Type-Swinging Type 6 each side - one each side of gooseneck.	
Lights and Reflectors—ICC specifications.	
Overall length	43'10"
Overall width	9'6"
Length back of gooseneck to front wheel well	16'6"
Length front wheel well to back of trailer	15'1"
Length Gooseneck deck	8'9"
Length center of kingpin to center of Bogie	32'3"
Wheel clearance from center kingpin	76"
Height - Top of loading deck to ground	36 1/2"
Height - Top of gooseneck to ground	59 1/2"
Clearance - Frame Bottom	18 1/2"
Height - 5th Wheel Plate to ground	51"
Height - Gooseneck Above Loading Deck	23"

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Al Matson, superintendent; and **John McCain**, master mechanic. Work began in August and will probably end in January 1959.

* * *

Carl Thyregod is project superintendent for Wells Benz, Inc. on a current \$1,362,409 award to that company. The project, which began in July and is expected to run for one year, was bid at \$1,362,409 and involves the construction of four 3-story barracks buildings at the Marine Corps Air Station, El Toro, Santa Ana, Calif.

* * *

Lindsey M. Henry is road superintendent for C. H. Elle Construction Co. on a grading and surfacing job on the Ketchum-Clayton highway, Sawtooth and Challis National Forest, Idaho. Other key men on the \$383,028 project, which began in July and is expected to run for one year, are **Earl E. Wilson**, bridge superintendent, and **Eli Taysom**, head mechanic.

* * *

Ray Tornow is superintendent on a \$146,140 repaving job consisting of 10 mi. of State Highway 3 in Kittitas and Yakima counties, Wash. Other key men on the Columbia Asphalt Paving Co. job are **Bennie Morigeau**, plant foreman;

Bob Johanson, street foreman. **T. R. Lonon** and **A. J. Turnbull** are partners in the company.

* * *

Project manager for Alton V. Phillips Co. on construction of two piers in the Columbia River, in



Powers Walters George

Douglas and Chelan counties, Wash., is **Albert H. Powers, Jr.** **Bill George** is superintendent; **Louie Brock**, pile buck foreman on the day shift; **John Fintowski**, pile buck foreman on the swing shift. Contractor began work in July and will finish in December. **Fred Walters** is resident engineer.

* * *

Harry Mitchell, job superintendent; **Charles J. Runey**, job superintendent; and **Lloyd B. Sargent**, job office manager, are key men

for Fred H. Slate Co. on a \$434,078 award for 2.7 mi. of grading and surfacing and structures, Knappton to Bean Creek in Pacific County, Wash. Begun in June, work is expected to last until the end of October 1959.

* * *

Howard Nelson, job superintendent; **Jules Ringsmeyer**, foreman; and **Donald Stroup**, job office manager, head up the crew for Fred H. Slate Co. and E. C. Hall Co. on a \$468,830 grading and paving job on the Wauna-Westport section of the Columbia River Highway in Clatsop County, Ore. Work began in August and is expected to reach completion by middle of July 1959.

* * *

Louis Keith is superintendent for Gibbons & Reed Co. on a job of 1.2 mi. of grading and surfacing U. S. Highway 40, city and county of Salt Lake, Utah. Other personnel on the \$302,768 project, which began in August and is expected to run until spring of 1959, are **Frank Young**, concrete foreman; **Steve Norris**, pipe foreman; and **Bud Bowman**, paving foreman.

* * *

James Davis is grade superintendent for Curtis Construction Co., while **Fred Curtis** and **Bill Sipes**

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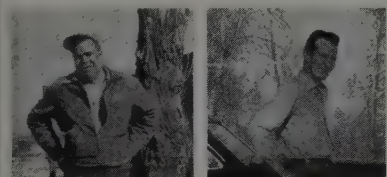
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are crushing superintendents on a Curtis Construction Co. project. The \$332,336 job includes 10.9 mi. of grading and surfacing on the Whitefish-Stryker highway in Flathead County, Mont. According to the company's office manager, work, which began in July, is now in the finishing stage.

M. K. Buick is general superintendent for Floyd R. Grubb on a \$236,694 job which includes earthwork, structures and clearing. Talent Division, Rogue River Basin Project, Ore. Other key personnel on the project, begun in August and expected to be finished in a year's time, are **Heber Menhoff**, job superintendent; **Dan Reiswig**, concrete foreman; and **Myron Layton**, grading foreman.

Wayne Walker is crusher foreman; **Charles Grimes** and **Kermit Gunter**, operators, and **Ike Bennett**, mechanic, are at work on T&S



Grimes

Gunter

Construction Co.'s recent \$138,659 project which began in July. Work includes 7.5 mi. of grading and surfacing on the Cedar Creek Reservoir road, Rogerson-Salmon Falls Dam, Twin Falls County, Idaho.

Ed Lively is superintendent and **B. Olson**, timekeeper for C. L. Hubner Co. The company is currently at work on a \$511,882 job east and west of Eckley in Yuma County, Colo., consisting of 11.6 mi. of grading, structures and surfacing. Job began in August and is expected to continue through November.

Dee Black, general superintendent, is supervising a \$461,181 recent award to Imperial Paving Co. for grading and surfacing over Wolf Creek Pass in Mineral County, Colo. Plant superintendent on this resurfacing job is **M. R. Sewell**. Scheduled for completion next June, the job got under way in September.

C. R. "Spot" Denton, superintendent for Northwestern Engineering Co., is heading the company's grading and surfacing job

on the Grass Range-Malta highway in Phillips County, Mont. Award was for \$392,756.

L. D. Arnold is superintendent for Armstrong Construction Co., Inc. on a grading and surfacing project in Luna and Dona Ana counties, N. Mex. The \$148,143 project began in July.

Heading Armstrong Construction Co.'s team on a grading, surfacing, and structures job in Mora County, N. Mex., are **Albert Sauls**, superintendent; **Ysidro Sisneros**,

structure foreman; and **L. D. Arnold**, crusher foreman. The \$334,753, 10.2-mi. project began in July and is expected to be over in December.

Paul Taylor is superintendent, and **Clyde Rossow**, grading foreman, on a \$153,128 contract being carried out by Armstrong Construction Co., Inc. Work, which began in July and is expected to end in November, is 8 mi. of grading and surfacing on the Ambrosia Lake Road in McKinley County, N. Mex.

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HIGH STRENGTH BOLTS

(Continued from page 58)

will produce this result uniformly should be allowed, subject to approval by the engineer, or authority having jurisdiction.

Answers to questions most often asked

Can you tighten the head instead of the nut? The HSSB Specification mentions this in Appendix B. Assuming both the head and nut bear against non-sloping surfaces, it is considered equally good practice to wrench up the head of the bolt. Slightly lower torque values can be expected than when tightening the nut for equal values of tension in the bolt.

How tight is too tight? Many qualified people feel that if a bolt does not fail in tightening it is satisfactory no matter how high the torque. It should be remembered that total stress in the bolt decreases by approximately 20% as soon as the nut stops moving.

Can high strength bolts be used for fitting-up? The main precaution here is to be sure that the proper length bolt, and two hardened washers are used. After the joint is bolted up, it is normally necessary to re-tighten the first bolts installed for fitting up purposes. In any case these should be checked.

What about high strength bolts used with low-alloy, high strength steels? The HSSB Specification covers this and the previous question in Appendix B. High strength bolts are allowed as substitutes for rivets conforming to ASTM A-141 when used with Low Alloy High Strength Steels (conforming to ASTM A-242) the same as when used with A-7 steel.

Are threads in the hole OK? The question of threads being allowed within the grip of the bolt, or in the hole, sometimes arises. Tests have shown that joints with threads in the hole, allowed to slip into bearing (due to painted contact surfaces), are as strong as those having no threads in the grip. Threads are permitted, therefore, within the grip of the bolt.

Is more than 1/16-in. clearance in the holes acceptable? In cases where old holes are used after rivets have been backed out many times, or where a hole has been enlarged by use of a drift pin, the AISC Specification, Section 33 (e), (f) and (g) on riveting requires that

holes be reamed, and the next larger size rivet used (this is implied by the statement that drifting to enlarge unfair holes is not permitted). In the case of high strength bolts (which are not expected to fill the hole as rivets are), some question exists as to the possibility of washers dishing, or breaking. In case of doubt, two washers can be placed under the bolt head and under the nut.

Must burrs be removed? Depending on the clearance of the die, and the thickness of the parts, a punched hole is likely to have a rough edge on the anvil side. The HSSB Specification calls for removal of all burrs, or pits which prevent solid seating of the parts (see Section 3(c)).

Informed opinion of some members of the Research Council is that possibly a greater frictional resistance would be obtained if these burrs were left on these punched holes, since the burr might provide an interlocking effect. On un-matching pieces, however, the reverse effect might be found. The subject is felt to warrant further study, possibly on a statistical basis, because of the question of the effect of different numbers of plies. In any case, it is felt that if burrs tend to be crushed down during the tightening, no further crushing or relaxation could be expected over a period of time, if the required minimum tension is obtained in the bolts.

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4. "High Strength Bolts—A New Concept in Structural Connections," by T. R. Higgins, AISC, and E. J. Rible, Research Staff, Association of American Railroads. Reprinted from Civil Engineering, September 1952.
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6. "1954 Inspection of Experimental Installations of High Strength Bolts in Steel Railway Bridges." AREA Bulletin, Volume 56, No. 520, January 1955—pages 592-598.
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10. "High Strength Bolting Gains Nationwide Acceptance," by M. H. Bell, Chief of District Engineers, AISC. Fasteners, Volume 11, No. 3, Fall 1956.
11. "High Tensile Bolts Code of Field Practice—Assembly of Joints." Technical Bulletin No. 3, Canadian Institute of Steel Construction.
12. Proceedings—1957 AISC Engineering Conference.
13. Bulletin 102—Model M. Calibrator, Skidmore-Wilhelm Manufacturing Company.

*Single copies available on request from AISC at your nearest district office in Seattle, San Francisco or Los Angeles.

JOHN DAY DAM

(Continued from page 40)

gap-graded sandy gravels or gravelly sands with sand strata, the depths to vary between 20 and 60 ft.

First and third step cofferdam fills on the north shore of the river will utilize relatively impervious gap-graded sandy gravel for fill. Natural deposits of this coarse sand and gravel are available for a suitable filter, and only a single zone is proposed for these fills. The second step cofferdam fill on the south shore will utilize fine clean silty material for impervious fill. Unless future exploration discloses a deposit of sand and gravel suitable for a single filter zone, it will be necessary to utilize a two-zone filter on that side. Wherever possible, embankment material will be obtained from required excavation. Suitable materials have been located for this proposed design.

The normal construction period for John Day Dam from start of the first step cofferdam to rise of the reservoir pool is estimated to be seven years, nine months. Elapsed time to generation of power would require two additional months.

Employment on the John Day project will extend over a longer period and will not reach as high a peak as during the construction of The Dalles Dam. A manpower study on employment potential is now being made by the Walla Walla District, Corp of Engineers. Tentatively, the prospects for project employment are light for the remainder of 1958, reaching a maximum of about 300 near the close of the year. Next year will be the big employment period for work on the Washington or north shore of the river, growing rapidly until a peak of 2,000 to 2,500 workers will probably be reached by the latter part of 1960 and the early part of 1961.

Hubert B. Elder has been named resident engineer at John Day, representing the U. S. Army Engineer District, Walla Walla, at the project. Elder was former resident engineer at The Dalles Dam and has been with the Corps of Engineers continually for 33 years.

All bid invitations and supply contracts for work or equipment at John Day Dam will originate at the Walla Walla District Office, Corps of Engineers, at the City-County Airport in Walla Walla, Wash. Information relative to John Day is also available at the Walla Walla District Office.



Ten-ton Blaw-Knox bridge deck form moves on traveler to new position. Steel chains for fir gates are cast integrally with girders. Old River Control Project is a \$47 million job designed to preserve Mississippi's flow into its lower basin.

Blaw-Knox steel forms cut costs, simplify concreting operations on Old River Control Project

Blaw-Knox multi-purpose bridge deck forms used in the construction of the Overbank Control Structure on the Old River Control Project near Simmesport, Louisiana amortized their cost for F&C Engineering Company, prime contractors on the huge project, less than three-quarters of the way through the job.

A three man crew strips and moves the form into position in less than a day. Six additional men align the form and position girder and curb forms which are fabricated on the ground and raised by crane. To

date, F&C has averaged one pour every third day.

With this kind of performance, it is easy to see why F&C expects to complete concreting ahead of schedule, at the same time cut job costs. The number of skilled carpenters is greatly reduced, along with material requirements. In your next concrete project, whatever its nature, call in the Blaw-Knox Steel Forms Consultation Service to help in planning for more efficient forming, lower costs, better job profits. There's no obligation, of course.



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Seals and their installation

By J. B. SINCLAIR
Service Department
Caterpillar Tractor Co.

VERY FREQUENTLY the parts doing a big job are small in size and, therefore, are seemingly insignificant. When compared to the size and cost of a crankshaft, the size and cost of the seal at the forward end of the crankshaft is negligible. Yet, that small seal, if not installed correctly or replaced shortly after a leak occurs, can permit serious damage to the engine.

A felt seal is ordinarily used where the principal requirement of the seal is preventing the entry of dust and the retention of oil or grease is not a requirement. When installing a felt seal, impregnate the seal with lubricating oil to protect the seal from overheating and wear. If the installation requires that the seal be split, the cut should be made at an angle.

Cork seals are sometimes used instead of felt seals. While cork seals give good protection at temperatures up to 150 deg. F. they are not recommended in applications where they will be exposed to acids, alkalis or high pressure.

Cork, when used against a solid backing such as on face type seals, effectively retain grease in a compartment and exclude water and dirt. When installing a face type seal with a cork face, coat the cork face with graphite grease.

Leather and rubber are widely used sealing materials. The most common usage is in lip type seals. However, leather is being replaced by synthetic rubber in many of its applications. The rubber lip seal, in most applications, provides better sealing at high speeds, high temperature and where misalignment and run-out conditions exist. Rubber lip type seals are also effective dirt seals.

There are definite reasons why rubber seals have not replaced leather seals in all applications. Therefore, it is suggested that unless a rubber seal is recommended, the original leather lip seal should be used.

When possible, prior to installing a leather lip seal, soak the seal in warm oil for about a half hour.

A rubber lip seal should just be dipped in oil. Install the seal with the wiping edge turned in the direction recommended. For single lip seals, leather or rubber, it is a general rule that the lip of the seal points toward the material to be sealed. That is, if the primary function is to seal lubricant in a compartment, the lip of the seal should point toward the compartment containing lubricant.

A double lip seal, whether leather or rubber, frequently has one lip which is wider than the other lip. In applications requiring such a double lip seal, the spring side of the seal, which has the wider lip, should always point toward the lubricant to be sealed. If two compartments containing lubricant are separated by a double lip seal, the wider lip should point toward the compartment containing the higher pressure or the compartment with the most fluid lubricant.

There are several ways to install lip type seals. If the seal to be installed must pass over a sharp shoulder, keyway or spline, shim stock should be wrapped over these areas and the shim stock lubricated to provide a smooth, sliding surface for the seal lip. If shim stock is not available, a heavy paper coated with grease will work satisfactorily. To drive the seal in place, use a driving member that will press against the outside rim of the seal.

Another commonly used synthetic rubber seal is the O-ring seal. This seal should be dipped in oil just prior to installing and should be rolled over the shaft on which it is to be installed, or placed into its groove with a minimum of stretching. Also, make sure the O-ring is not twisted when it is placed in its groove. O-ring seals are inexpensive and, once used, conform to the shape of the groove in which they are installed. They are, therefore, usually replaced at disassembly and seldom reused except in an emergency.

Chevron type packing seals are generally used in hydraulic cylinders. Direction of assembly is most important to effect a seal with this type of packing. In all applica-

tions, the chevron packing should be installed with the point of the chevron toward the flange of the piston. Installed in this manner, the lips of the packing will not catch on sharp edges. Always use sufficient shims behind the packing gland to give the chevron packing a slight press.

As previously pointed out, seals are normally small in size and cost very little; however, they play an important part in the life of earth-moving equipment.

EMSA Chapter Notes

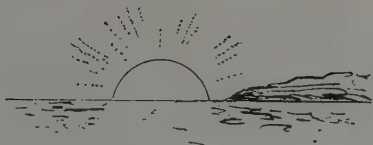
A large crowd turned up for the last meeting of the Los Angeles Chapter of the Equipment Maintenance Supervisors Association to partake in a very informative dual program. Over 80 members and guests listened intently as **Joseph Benskin** and **Dan Stoddart**, both of Lincoln Engineering Co., showed slides and introduced their company's new line of air-powered lubricant pumps. **Gerald Standcliff** of Standcliff Engineering then took the



floor to describe his company's efforts to create a cylinder head with greatly improved characteristics. A question and answer discussion period followed each speaker. In the photograph **T. I. Gibson** (center), Chapter president, is flanked by **Benskin** (left) and **Stoddart**.

At the last two meetings of the San Francisco Bay Area speakers were **Buster Peterson**, discussing the costs and advantages of push-loading, and **Ted Tomaszewski**, discussing turbo-chargers.

Those wishing to join the rapidly growing Bay Area Chapter can write to **W. D. Sorensen**, Secretary, Box 93, Station A, Berkeley, Calif. In Los Angeles the address is: Box 548, Alhambra, Calif. In the San Diego area the address is: 6265 Broadmoor Drive, La Mesa, Calif.



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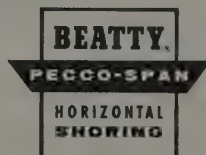
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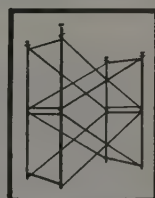
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NEW LITERATURE

To obtain free copies of literature described in this section, circle the corresponding numbers on reply postcard.

Hi-Electro cutting edges for scrapers and dozers

How well a cutting edge performs depends on its ability to resist wear, bending and breakage. An 8-page booklet, **Hi-Electro Hardened Cutting Edges**, points up the features of these recently developed parts for scrapers and bulldozers. Illustrated throughout with photographs and drawings, this 2-color booklet describes in detail the phases of testing and manufacture necessary to develop the Hi-Electro hardened edges. Cutaway sections of the new parts reveal the depth and configuration of hardness brought about by the specially developed heat treating process.

Actual photographs taken during "crash tests" emphasize the punishment inflicted on the new edges during development. Other illustrations show some of the many measures taken to insure quality control during manufacture. **Caterpillar Tractor Co.**

... Circle No. 156

suggestions and photographs of the equipment in use. The second publication is a 12-pager offering suggested methods for concrete shoring using standard Bil-Jax scaffolding and accessories. Presented are basic techniques developed by Bil-Jax users on the job. Typical applications for the company's scaffolding method include reinforced concrete floors, pan joists, beams, roofs, bridge floors, and slabs.

... Circle No. 158

The Buffalo-Springfield roller line

An attractive 12-page bulletin has been published covering the entire and expanded line of road rollers and compaction equipment manufactured by the **Buffalo-Springfield Roller Co.** Featured are the portable tandem rollers, the heavy-duty 2-axle tandem rollers and the 3-axle tandem rollers. Fully described is the company's well-known K-45 Kompressor. Condensed specifications on every piece of equipment are included.

... Circle No. 159

Scaffolding hints

Information on Auto-Lock tubular steel scaffolds is contained in an 8-page catalog published by **Superior Scaffold Co.** Dozens of "how to" tips are included to provide the most economical solutions to a wide variety of problems, such as bracing for height, scaffolding flat, sloping and curved ceilings, and shoring. Individual components as well as many typical set-ups are described and illustrated, with specifications and dimensions.

... Circle No. 160

Powerful rock busters

A 4-page folder is available describing the S&R rock busters manufactured by the **Jeffrey Mfg. Co.** Designed primarily for service as a secondary crusher, the unit will accept as feed, oversize screened-out material of the crushed product of primary crushers, or accept medium sized initial feed when the

product of secondary crushers can be screened in the "overs" recycled. Photographs, diagrams, and complete specifications of the powerful impact-type crusher are given in the folder.

... Circle No. 161

Literature Briefs

BLACKTOP PRESERVATION—

A 4-page folder listing major causes of asphalt deterioration and how they can be stopped is available from **Maintenance, Inc.**

... Circle No. 162

WIRE ROPE—and how its service life can be extended is the subject of an illustrated bulletin released by **H. K. Porter Co., Inc.**

... Circle No. 163

CRANE—A new all-electric deck crane is described in a 2-color folder from **R. G. LeTourneau, Inc.**

... Circle No. 164

PAYSCRAPER—Operations and specs on IH's 55 and 75 Payscrapers are detailed in a new 12-page catalog.

... Circle No. 165

HIGHWAY MAINTENANCE—A 4-page leaflet describes a turnpike maintenance department's success with bulk calcium chloride. **Calcium Chloride Institute.**

... Circle No. 166

SPRAY TANK—New bulletin from **Littleford Bros., Inc.**, on the Littleford Model 101 Utility Spray Tank for repairing rural roads, patching streets, etc., is being offered.

... Circle No. 167

FILTERS—Helpful service tips on filter replacement are given in an 8-page booklet by **Caterpillar Tractor Co.**

... Circle No. 168

ALUMINUM FOR THE HIGHWAY—is the title of a new 8-page brochure from **Revere Copper and Brass, Inc.**, in which five advantages of aluminum alloy extrusions for aluminum bridge railings are described.

... Circle No. 169

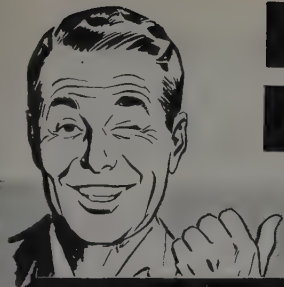
Booklet describes Manitowoc's new 1½-yd. shovel

Manitowoc Engineering Corp. announces the publication of a 12-page catalog describing the new Manitowoc 1½-yd. Model 2300 shovel which is easily converted to 1½-yd. clamshell or trench hoe, 1½-2½ yd. dragline or 35-ton crane. In addition to giving full specifications of the new 1½-yd. shovel, the bulletin outlines in detail many completely new features such as the easy hydraulic jack adjustment of the crawler drive assuring even crawler tension at all times, controlled clutch ventilation, and the new flat-designed 62-in. roller path which minimizes strain on the king pin.

... Circle No. 157

Two from Bil-Jax

Two catalogs are available from **Bil-Jax, Inc.**, manufacturers of scaffolding equipment. A 24-page bulletin illustrates and gives specifications for the company's end frames, braces, casters and base plates, rolling or stationary work towers, to mention a few. Included are use



Here's LOW COST Loading-Screening

WITH NO SACRIFICE OF STRENGTH OR CAPACITY



Model 202, 40' x 24", 6' x 36"
Model SB-60 Screen, Model VH-4,
17 to 30 HP Wisconsin gasoline
air-cooled engine, attached Recip-
rocating Plate Feeder, Hopper and
roof type grizzly bars.

KOLMAN
MODEL 202
CONVEYOR

Rugged Box-Type Construction Permits Amazing Low Price



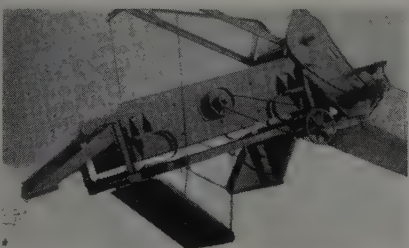
Single-deck vibrating screen folds into towing position without dismounting screen or any of the drive assembly.

The Model 202 meets the demand for a conveyor in the low price field stout enough to carry a large single or double-deck vibrating screen and loading trap in a completely portable conveyor-screen plant.

The under-slung power unit provides easy access for servicing and operation.

Folding Feature

The 202 is available with the Head Pulley Clutch feature which allows the belt to be stopped and started while the vibrating screen remains in operation.



Rugged construction of Model 202 permits use of double-deck KOLMAN screen to make several sizes of material at once.

"Box-Type" Construction

The rugged "box-type" construction of the Model 202 conveyor gives it unusual strength and rigidity. The sides are fabricated of 3/16" steel plate formed into a channel 16" deep with 2" legs. The steel belt cover reaches completely across the top, completing the box and completely encasing the return belt to prevent materials from working in to cause belt damage.

The KOLMAN Model 202 is rugged enough to carry a loading trap and large vibrating screen without additional support. It will take the kind of punishment that is dished out to a portable outfit—and will cost you far less money to own and operate. Available in 18" or 24" belt width, in lengths up to 50'.

SEE YOUR NEAREST DEALER NOW

SEND for FREE literature

KOLMAN MANUFACTURING CO.

5670 West 12th St., Sioux Falls, S.D.
Please send literature on—

- ☐ 101 Heavy Duty Conveyor
☐ 202 Conveyor ☐ 303 60" Loader
☐ Vibrating Screens
☐ Feeders ☐ Traps

Quote size or capacity

Name

Address

City

CALIFORNIA
LOS ANGELES—BAKERSFIELD, SAN DIEGO,
RIVERSIDE, SANTA BARBARA—Brown-Bevis
Industrial Equip. Co.
OAKLAND—Spears-Wells Machinery Co.
COLORADO
DENVER—Faris-Moritz Equipment Co.
IDAHO
BOISE, POCAATELLO—Intermountain Equip. Co.
MONTANA
BUTTE, BILLINGS, GREAT FALLS and
MISSOULA—Hall-Perry Machinery Co.
NEW MEXICO
ALBUQUERQUE—Construction Machinery Co.
NEVADA
ELKO—A-D Machinery Co., 251 W. Commercial
St.

OREGON
PORTLAND—Balzer Machinery Co., 2136 SE 8th
Ave.
UTAH
SALT LAKE—Rasmussen Equipment & Supply
Co.
WASHINGTON
SEATTLE—Sahlberg Equip., Inc., 5950 4th
Ave. So.
SPOKANE—Intermountain Equip. Co.
WYOMING
CHEYENNE, CASPER, ROCK SPRINGS and
SHERIDAN—Wortham Machinery Co.
ALASKA
FAIRBANKS, ANCHORAGE—The Carrington Co.
Western Representative
S. A. MADRID
1739 32nd Ave., San Francisco 22

... for more details, circle No. 49 on Reader Service Postcard

BIG! CAT! AUCTION!

\$2,225,000 VALUATION OF LATE

EARTH-MOVING EQUIPMENT

Mostly Purchased New in July 1957

Dissolution of Joint Venture by

CHAD-JV

Due to Completion of Major Project

**SALE STARTS 10:30 A.M.
SATURDAY, NOV. 15**

For convenience of sale,
equipment has been moved to

SEAL BEACH, CALIF.
(JUST EAST OF LONG BEACH
26 MILES FROM LOS ANGELES)

DIRECTIONS: Take Pacific Coast Hwy. thru Long Beach to large parking area of Airport Club at No. 5 Pacific Coast Hwy. Long Beach Municipal Airport is 2 miles away.

2 D9 CATS, SER. #18A1552 & #18A1553, with CCU Mod. 30, Dozer Mod. 95, Ateco Ripper with 3 Shanks & Dbl. J Breaker Teeth, Hydr. Tilt Cylinder.

6 D8 CATS (15A) with CCU Mod. 29, Dozer Mod. 8S & Tandem Push Frame.

6 D8 CATS (14A) with CCU Mod. 29, all dozer components (sheaves & controls) less dozer.

11 DW21 CAT SELF-PROPELLED SCRAPERS (58C) with Mod. 27 PCU, Top Extension.

3 CAT NO. 12 MOTOR GRADERS, lg. tires, power steer, wide scarifier, elec. starter.

2 CAT NO. 491 CARRYALL-TYPE SCRAPERS.

All Above Equipment Purchased New in July 1957

D8 CAT TRACTOR WITH DRILL RIG MOUNTED INTEGRAL; rear-mounted 600 CF compressor; 2 hydr. control units; 2 drill assemblies; 2 drill booms; 2 air drills; Also has Cat Dozer Mod. 8S and Cat DDP Mod. 25.

LeTourneau Carryalls • Southwest 5x5 Sheepfoot Rollers • Euclid Tractor Semi Water Trailers • Water Trucks • Chev. Pick-ups & Carryalls • Dodge Power Wagons • Trucks • Alemite Lube Units • Welders • Field Lighting Equip. • Pumps • Compressors Generators, etc.

A Rare Opportunity to buy Top-Notch Equipment at Auction Prices! Don't Miss This Sale!

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**MICHAEL TAUBER
PAUL ARONS CO.**

8912 W. Olympic Blvd.
Beverly Hills, Calif.
Phone: BRadshaw 2-8615

The best manuals on portable pumps

A roundup of the best available literature on the subject of portable contractors' pumps. All items described are yours for the asking.

Worthington

A series of large illustrated and diagrammed data sheets have been published by the Worthington Corporation to describe its line of contractor's self-priming centrifugal pumps. Also available from Worthington without charge is an extremely valuable booklet entitled, "Instructions for installation, operation, maintenance and list of parts." The booklet is carefully and thoroughly written and contains appropriate cut-away drawings and diagrams to illustrate the various subjects. Typical of the usefulness of this booklet is a section on repair which points out tips which make disassembly of any of the models easier.

... Circle No. 170

C. H. & E.

The C. H. & E. Manufacturing Co. has a series of folders available describing its complete line of pumps. Covered is the firm's line of self priming centrifugal pumps ranging in size from 1½ in. to 3 in., diaphragm pumps in 2-4 in. sizes, and large models ranging up to 8 in. The literature is printed in 2 colors, contains full specifications for each model including a description of special features, maintenance and operating information and useful tables showing capacity at various heads.

... Circle No. 171

Thor Power Tool

A 2-color folder published by Thor Power Tool Co. describes its three new sludge and sump pumps. The No. 275 sludge pump delivers 96 gpm. at 40-ft. head and 90 lb. air with a maximum suction lift of 20 ft. and a maximum delivery of 175 ft. The No. 51T sump pump delivers 200 gpm. at 10-ft. head and 90 lb. pressure and the No. 71T sump delivers 460 gpm. at 10-ft. head and 90 lb. pressure. The 51T weighs only 35 lb. (Aluminum

model weighs only 18 lb.) The pumps are clearly and completely described and the folder contains tables showing capacity for various heads and pressures.

... Circle No. 172

Jaeger Machine

A 20-page manual is available from Jaeger Machine Co. describing its extensive line of light-weight centrifugal and diaphragm pumps. The manual covers centrifugals in 1½-in. to 10-in. sizes ranging from 5,400 to 240,000 gph., and diaphragm pumps in the 3- and 4-in. class which range in capacity up to 7,000 gph. The manual is very well illustrated and includes full specifications and tables of performance characteristics. All models stress portability and light weight. The company also has available booklets on electric pumps, pressure pumps, and well-point systems.

... Circle No. 173

Carver

A 4-page, 2-color folder, published by the Carver Pump Co., describes its line of self-priming centrifugal pumps. The models range in size from 4,000 gph. to 125,000 gph. For each model the folder presents a photograph, the basic facts, and a capacity table according to the standards of the Contractor's Pump Bureau of the Associated General Contractors.

... Circle No. 174

Chain Belt

An excellent 20-page manual is available describing the light-weight pumps manufactured by the Chain Belt Co. The pumps, which are AGC rated, are fully described and illustrated and a series of photographs shows all interior parts. Explained is the adjustable air peeler which enables the owner to maintain original interior clearances which are essential for high efficiency. The manual includes a section of useful

... for more details, circle No. 50

information such as conversion factors, often-used physical constants, a formula for figuring water horsepower and a large table giving water friction in 100 ft. of smooth bore hose.

... Circle No. 175

Homelite

Homelite has published a 6-page folder describing its line of carryable gasoline engine-driven pumps which are self priming centrifugals. The description is built around how the pump measures up to the following standards: carryability, fast self priming, automatic seepage control, high suction lift, non-clogging design, maintained rated capacity, discharge pressure, dependability, and simple operation. Specifications are included as well as a detailed description of the interior working parts.

... Circle No. 176

Barnes

A fine 2-color manual describing the line of self-priming centrifugal pumps manufactured by Barnes Co. is now available for the asking. Starting with a section on the high standards followed during manufacture, the manual describes each model and closes with a valuable section entitled, "How to select the pump for the job." A clearly labeled drawing shows all the values which must be determined and a sample problem shows how the necessary answers are found. Tables are included which show friction loss per 100 ft. of pipe, friction loss in fittings, inches vacuum to feet lift, feet head of water to pressure, and tables on altitudes and temperature. The manual points out that for every gallon of gasoline used a Barnes pump moves 33,000 gal. of water.

... Circle No. 177

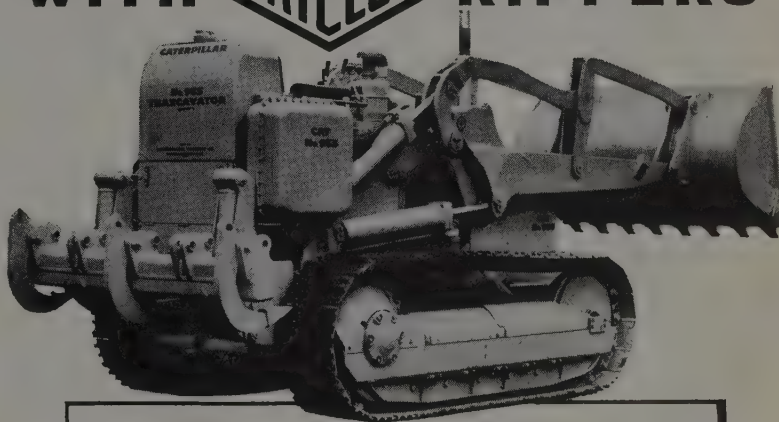
Carter

From the Ralph B. Carter Co. comes free literature describing the "Humdinger" single and double diaphragm pumps and self priming centrifugals. The centrifugal pumps come in sizes from 1½ in. through 8 in. with a choice of gasoline, diesel, or electric power. The diaphragms have a choice of gasoline or electric power. The literature contains specifications for each model and a series of clear photographs which show how the impeller can be adjusted to compensate for wear.

... Circle No. 178

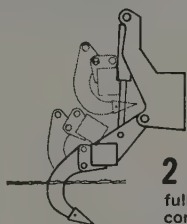
Boost Loader Profits 3 WAYS

WITH ATECO RIPPERS



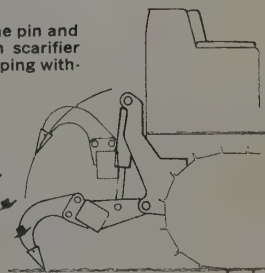
1. Get bigger payloads, faster
2. Handle jobs you never could before
3. Save loader wear and tear

Only ATECO Offers All These Profit Making Features:



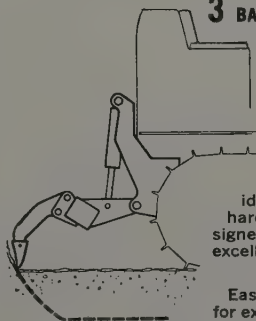
1 HINGE-AWAY SHANKS... Pull one pin and shanks automatically retract when scarifier is lifted, yet are instantly ready for ripping without replacing the pin!

2 INSTANT PENETRATION... Exclusive hinge action "knives" the points to full working depth instantly, even in corners... and even without forward tractor motion!



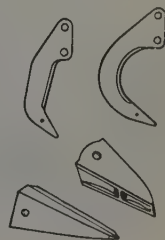
3 BANK AND FLOOR RIPPING...

With straight forged shank, your ATECO ripper rips the bank as well as the floor. Ideal for finishing work, preparing radius corners for swimming pools, terraces, etc.



4 CHOICE OF SHANKS AND POINTS TO FIT YOUR JOB... Curved shank is ideal for lifting and breaking pavement, hardpan, etc. Straight shank (optional) is designed for slitting, bank and floor trimming... excellent penetration for tough work.

Easy-penetrating dagger point is reversible for extra life; new "Holo-ground" point (in standard and heavy duty types) is self-sharpening, and extra-rugged for the tough-to-"impossible" jobs.



ATECO Profit-Building RIPPERS are available now for Caterpillar TRAXCAVATOR Models 933, 955 and 977. Write today for literature, prices.



American

TRACTOR EQUIPMENT

Corporation

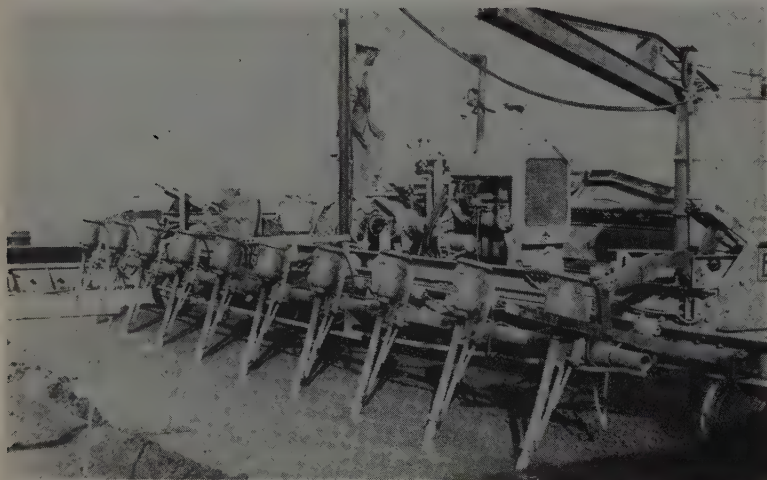
Designers and Manufacturers Since 1920

42 Dept. W11, 9131 SAN LEANDRO BOULEVARD • OAKLAND 3, CALIFORNIA

... for more details, circle No. 51 on Reader Service Postcard

NEW EQUIPMENT

Obtain more information on these new developments in construction equipment by circling the corresponding numbers on reply postcard.



Gang vibrators for thick slabs

For airport runways and highway slabs where specifications call for full-depth internal vibration, **Stow Manufacturing Co.** has available a gang assembly. This vibrator unit is complete with generator, hydraulic lift, frame, brackets, and Model BUSP 2-hp electric vibrators. Using various combinations of vibrators, generators and frames, the unit can

be adapted to use on slabs from 12½ to 25 ft. wide. The hydraulic lifting bar permits the vibrators to be lifted out of the concrete when not in use or can be used to set the vibrator heads at any desired depth. Each vibrator head is connected to a 2-hp. Universal motor which drives the 3 x 15-in. head at 9,000 vibrations per minute.

... Circle No. 179

Space heater for winter

Available in three sizes, **Muller Machinery Co.** has announced a new line of oil-fired space heaters for the building trade. The models are in sizes of 125,000, 250,000 and



500,000 btu. New design features include a burner nozzle which burns fuel so completely as to eliminate danger of fumes (proper ventilation is always necessary indoors since burners consume oxygen), and accessibility of the cleaning nozzle.

... Circle No. 180

New air cleaners for Eucs

Current models of the new Euclid TC-12 tractor are equipped with two Donaldson dry-type air cleaners—one for each engine. These cleaners replace four oil-type units on the former models. The primary cleaner has removable dust cup to be emptied and cleaned quickly. A special paper element in the secondary cleaner provides for long service and can be cleaned by compressed air or washing before replacing in the filter chamber. The



new cleaners are said to provide 99.9% efficiency and are much easier to service. Location of the cleaners is shown in the photograph. Field tests indicate that the high efficiency of the new cleaners results in better engine performance and lower maintenance costs. This announcement comes from Euclid Division, General Motors Corp.

... Circle No. 181

Tire for rough terrain

A rugged new tire for use in rough terrain has been announced by **The General Tire & Rubber Co.**

Called the Rock Rib LCM, the new tire, constructed of General's Nygen cord, has an ultra-heavy ribbed tread with a variable slope in the groove design which aids in ejection of rock fragments.



Its thick tread and shoulders consist of a specially compounded, cut resistant rubber stock. Four Nygen cord shock plies buttress the 12 to 14 in. rugged terrain. The Rock Rib was designed for use on front wheels of quarry, logging and earthmoving equipment as well as other heavy equipment operating in rugged terrain. The Rock Rib LCM comes in sizes of 10.00 x 20 through 14.00 x 25.

... Circle No. 182

Contractor FORMS 130 ft. DIAMETER TANK

13 ft. HIGH IN 9 HOURS!



ERECTION and STRIPPING COSTS—19¢ per sq. ft.!

Final Clarifier Tank
San Antonio, Texas
Sewage Treatment Plant
Curtis Hancock, Contractor

When a contractor can erect, align, and brace the forms for a 130 ft. diameter, 13 ft. high tank in a single 9 hour day — that's speed! And when total costs for erecting and stripping are only 19¢ per sq. ft. — that's economy!

This is the record of pre-fabricated UNI-FORM Concrete Panels used by Curtis Hancock in forming a final clarifier tank for the new 12 million dollar San Antonio, Texas sewage treatment plant expansion program.

In addition to UNI-FORMING the circular clarifier tank, Hancock used UNI-FORM panels to form four 30 ft. x 300 ft. aeration tanks, and a 1300 ft. concrete by-pass tunnel — approximately 135,000 sq. ft. of contact area in all.

In comparing the performance of UNI-FORM Panels on this job to a similar one done previously with forms he had built himself, Mr. Hancock estimates that he has saved at least four days in time alone!

It's performance like this that sells contractors and engineers on UNI-FORM panels. No other method of concrete forming can give you faster ground-to-ground forming speed, efficiency, flexibility, and economy. Why not investigate the advantages this modern concrete forming system can bring to you? Our strategically located Branch Offices and Distributors are ready to demonstrate and prove the advantages of UNI-FORM Panels to you. Write for the new UNI-FORM Panel Catalog today.



UNI-FORMED walls are clean, require little or no finishing.

UNIVERSAL FORM CLAMP CO.

1238 N. KOSTNER • CHICAGO 51, ILLINOIS

CONCRETE FORM SPECIALISTS SINCE 1912

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... products for Concrete

CONCRETE CURING COMPOUNDS

Clear — Pigmented — Black

TILT-UP COMPOUNDS

Wax Base — Non-Wax Base

LIFT SLAB COMPOUNDS

(YOUTZ-SLICK METHOD)

Wax Base — Non-Wax Base

SPRAY EQUIPMENT

Hand and Power Operated

JOINT-SEALING COMPOUNDS

(COLD APPLIED IN 3 TYPES)

Ready Mixed Rubber Base Mastic,
Rubber Base Emulsion and 2 Component Mastic

SEALING COMPOUND APPLICATORS

AIR-ENTRAINING AGENT

AIR-ENTRAINING AGENT DISPENSERS

AIR METERS FOR CONCRETE ENGINEERING

- Comply with all leading specifications
- Distributed and stocked in principal cities

DISTRIBUTORS

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Sacramento California, W. J. Burke & Co.
Los Angeles, California, W. J. Burke & Co.
San Diego, California, Squires-Belt Material Co.
Portland, Oregon W. J. Burke & Co.
Seattle, Washington, W. J. Burke & Co.
Billings, Montana, Midland Materials Co.
Casper, Wyoming, Casper Concrete Co.
Denver, Colorado, K. C. Construction Supply Co.
Albuquerque, New Mexico, W. J. Burke & Co.
Salt Lake City, Utah, Intermountain Concrete Specialties
Phoenix, Arizona, Superior Building Materials
San Antonio, Texas, Rufus A. Walker & Co.
Honolulu, T. H., R. L. Castendyk Company
Vancouver, B. C., Canada, Burrard Construction Supplies, Ltd.

TO BE SURE . . .



USE THE FINEST!

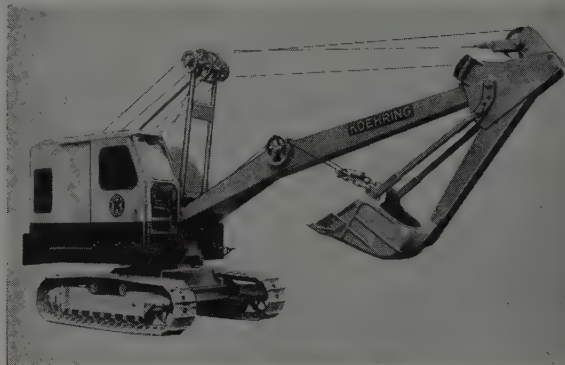
TECHKOTE COMPANY

INCORPORATED

600 Lairport Street, El Segundo, California

Tractor type crawlers offered on Koehring hoe

Tractor type crawlers, introduced recently on the Koehring Co. 305 Hoe, offer the pipeliner and other hoe users a track that not only gives longer service, but also requires less maintenance. Overall width of the crawlers with 20-in. wide shoes is 9 ft. 5½ in.

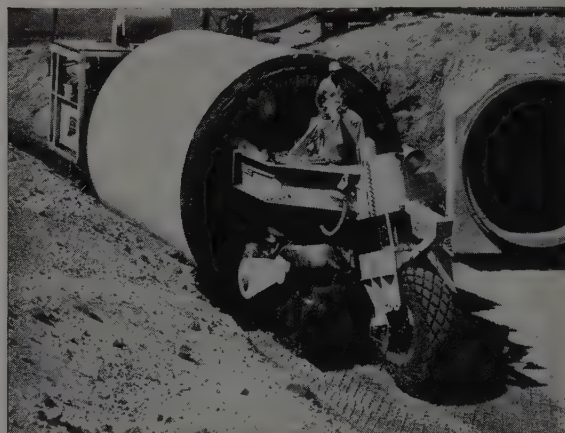


Overall length of the standard size crawler is 12 ft. Two-speed independent traction is optional. Maximum digging reach of the 305 model is 31 ft. Depth obtainable with the machine is 19 ft. 9½ in. The clearance height at maximum dumping height of the ¾-yd. dipper is 25 ft. 2½ in. Clearance height at the beginning of the dump is 12 ft. 10 in. This is increased to 18 ft. 7 in. at the end of the dump.

... Circle No. 183

Pipemobile hauls 68 tons

In an interesting application of tires and machinery, the American Pipe & Construction Co. has invented the Pipemobile, a machine which lifts, hauls and sets 68-ton concrete pipe sections in one operation. Riding on seven huge 21.00-25 Goodyear Earthmover tires, the



machine crawls part way through a section of pipe, picks it up, waddles it to position, jockeys it into place, then beats an orderly retreat for the next section. Each wheel of the diesel-powered Pipemobile has its own direct-current electric-drive motor. Four wheels are at the rear of the machine, two at the front. A single wheel, mounted forward at the end of a heavy-duty hydraulic cylinder, carries the load when the other two front wheels are elevated for the machine to pass inside the pipe.

... Circle No. 184

... for more details, circle No. 53 on Reader Service Postcard

WESTERN CONSTRUCTION—November 1958

FIRESTONE ON-THE-JOB TIRE SERVICE

ANSWERS YOUR
TROUBLE CALLS
ROUND THE CLOCK!



Firestone Giant Tire Service eliminates hours of costly downtime!

Firestone service trucks are on the job 24 hours a day to beat your downtime due to tires. Completely equipped trucks are ready to service construction tires on the spot. Trained servicemen have the know-how and the tools to handle the largest tubeless or tubed off-the-highway tires. Besides emergency tire service, a Firestone Tire Expert inspects tires regularly—checks for proper inflation. Count on Firestone to turn downtime delays into worktime profits! Contact your Firestone Dealer or Store about Firestone's Giant Tire Service. Combine Firestone's Giant Tire Service with Firestone off-the-highway tires to hold down tire costs. Remember—there's a Firestone tubeless or tubed tire for every piece of equipment on construction projects.



ROCK GRIP WIDE BASE® ROCK GRIP®
TUBELESS OR TUBED

When ordering new equipment always specify Firestone tires.

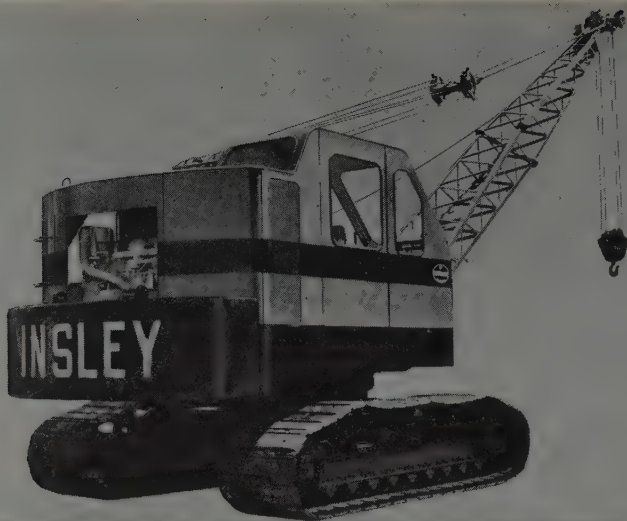
Enjoy the Voice of Firestone
on ABC television
every Monday evening.

Firestone

Copyright 1958,
The Firestone Tire & Rubber Company

BETTER RUBBER FROM START TO FINISH

... for more details, circle No. 54 on Reader Service Postcard

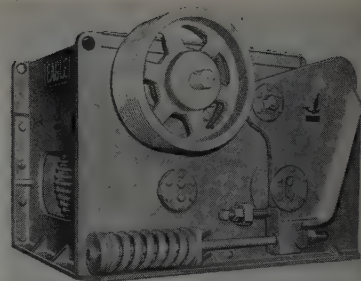


Insley has new excavator-crane

Featuring a cab with high visibility and a number of new design features, **Insley Manufacturing Co.** announces an excavator-crane identified as Type M. Mounted on rubber tires the unit has a 20-ton lifting capacity, and the axle loads allow the machine to travel on highways without a permit in most states. Features of particular importance

are the counterweight removable by gantry, removable outriggers, folding boom and a torque converter. Clutches are positive internal expanding type designed for rugged service requirements. When mounted on crawlers the machine is rated as a 15-ton crane or a $\frac{3}{4}$ -yd. excavator. Standard 12 $\frac{1}{2}$ -ft. crawlers can be equipped with either 24 or 30-in. shoes.

... Circle No. 185



operation. Heavy-duty, self-aligning, spherical roller bearings carry the tremendous loads in these crushers. All welded, heavy plate steel frame houses this newly designed unit. Through heavy-duty tension springs one roll is fixed and the other floats, supplying ample crushing pressure yet relieving undue strain resulting from tramp iron and other foreign materials. Adjustment of the opening between the rolls (up to 3 in.) is accomplished by adjusting screws on either side. According to manufacturer's specifications horsepower required for the smaller unit is 75 to 125 while the larger one needs 100 to 200. Respective weights are 12,000 lb. and 16,000 lb.

... Circle No. 187

Portable drill has water cooled bit

A new mobile, high speed, heavy-duty drilling machine that drills clean, perfect holes 10 to 15 times faster through reinforced concrete, marble, granite, cement, brick, tile, stone, glass and other hard, brittle, non-metallic materials has been announced by **Diamond Core & Saw**, division of Portomag, Inc. The new Di-Cor drill is equipped with a $\frac{2}{4}$ -

hp. electric drill motor and an integral water swivel which supplies water to the cutting face of a diamond drill to cool the bit and flush away cuttings. Water fitting may be connected to any supply line and, if running water is not readily available at the job location, the unit may be hooked up to a portable pressure water tank. Simple to operate, from a vertical or horizontal position, the unit can be swung through 360 deg. to drill in any position and at any angle. The wheel-mounted stand makes the unit flexible, easy to move, fast to handle. Also available is a telescopic metal tube for bracing the column of the drilling machine against ceiling when drilling.

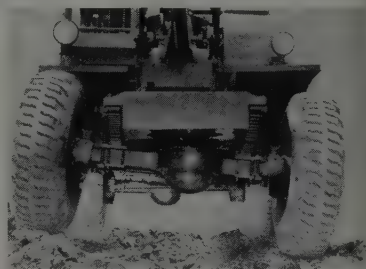
... Circle No. 186

Eagle Crushers

Eagle Crusher Co. has announced two new roll crushers in sizes 24x20 and 30x24. Rolls are of manganese steel and are furnished either both smooth or both corrugated or one of each. These pressure rolls are turned by steel cut gears running in oil for greatest efficiency and longer life as well as quieter

Off-highway mobility for self-propelled excavator

Fast, rubber-tire mobility and one-man operation have always been desirable characteristics of self-propelled excavators, but the bad terrain encountered on most construction jobs frequently has limited their use. Now, a new spring-mounted oscillating front



axle is standard on the $\frac{3}{8}$ -yd. Lorain Self-Propelled Model SP-107 that licks this problem. This new design allows the front wheels to hug the ground so the 4-wheel drive can apply the tractive effort necessary to carry this rubber-tire excavator over the rough, soft ground of off-the-highway construction sites. There are always enough wheels in contact with the ground to kick the machine over



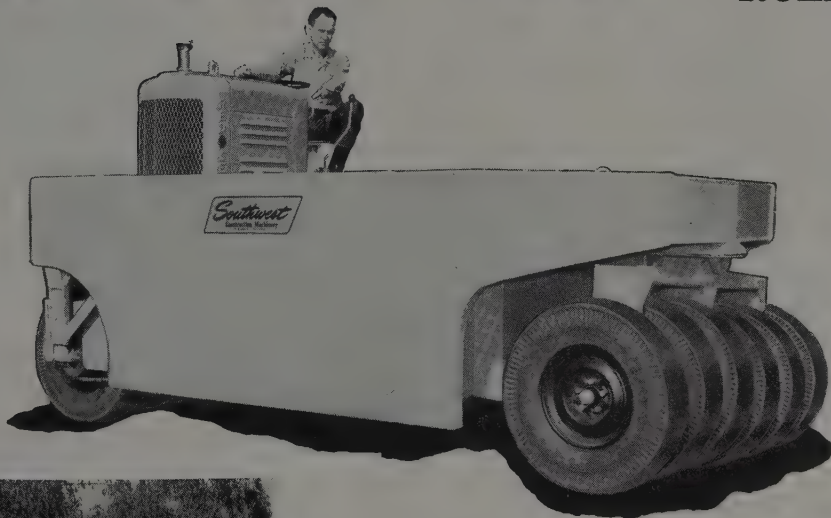
**NEW COMPACTION
EFFICIENCY**

with

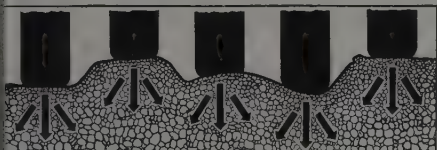
Southwest

VERTICAL-PAK

**SELF-PROPELLED
PNEUMATIC TIRED
ROLLER**



With Southwest VERTICAL-PAK, boulders, curbs and other obstacles are no longer a problem in close work.



VERTICAL OSCILLATION on the rear wheels affords uniform compaction on uneven or rocky surfaces.

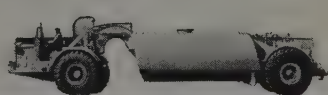
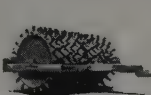
Here's a NEW design in Pneumatic Compaction Rollers that brings you VERTICAL OSCILLATION for the first time in Self-Propelled machines! The Southwest VERTICAL-PAK Roller affords VERTICAL action of the rear wheels. This means a constant, uniform wheel load, as well as uniform compaction on uneven surfaces, over soft spots, and where stones or boulders are present in the materials undergoing compaction. The VERTICAL OSCILLATION of VERTICAL-PAK affords new compaction efficiency.

VERTICAL-PAK action reduces tire hazard. Excessive weight on any one tire or wheel is impossible under normal operating conditions. Curbs and other obstacles are no longer a hazard in close work.

Seating arrangement and REVERSE-O-MATIC transmission place operator in a position to see both forward and reverse equally well at speeds in both directions up to 15 mph. Extra strong rear wheels are especially manufactured for this particular machine. Ballast capacity is 105 cu. ft. Individual, SELF-LOCKING differential chain drives to all 5 drive wheels.

Only SOUTHWEST offers ALL of the features found in VERTICAL-PAK. The 11 ton, 11 wheel model is powered by a 50 hp gas engine. Diesel power is optional.

COMPACTION IS BEST WHEN YOU USE SOUTHWEST. Investigate the NEW VERTICAL-PAK today.



Pneumatic Compaction Rollers • Sheepfoot Rollers • Rippers • Sprinkler Tanks

Southwest

PRODUCTS ARE SOLD AND SERVICED BY YOUR CATERPILLAR® DEALER

CONSTRUCTION MACHINERY DIVISION

Southwest Welding

& Manufacturing Co.

ALHAMBRA, CALIFORNIA

... for more details, circle No. 55 on Reader Service Postcard

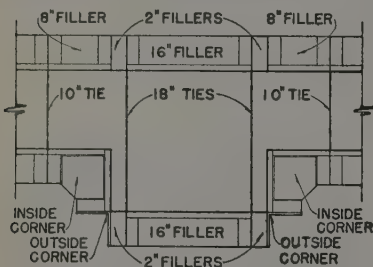
Power Plant Forming



Symons Forms Help Contractor Race Clock

**Pour 530 Yards of Concrete
in 5½ Hours**

Racing a siege of wet, windy weather, workmen on the new \$10 million Blue Valley Station of the Independence, Mo. power plant, teamed up to pour 530 yards of concrete during one 5½ hour period.



Pilasters similar to the ones shown are easy to erect with Symons Fillers and Corners.

Sharp Bros. Contracting Co., Kansas City, the contractor, is using 8,000 square feet of Symons Standard High Strength Forms to pour 40,000 square feet of concrete. Much of the concrete is in thick slabs and pedestal bases with wall thicknesses varying from six to 84 inches. Symons 84-inch washer ties are being used in pouring pedestals for the turbines.

You can rent Symons Forms, Shores and Column Clamps with purchase option. Information on Symons products upon request.



SYMONS CLAMP & MFG. CO.

634 Williams Street, San Leandro, California
Phone: Lockhaven 9-9159

... for more details, circle No. 56

the rough or soft spots. Hang-up and wheel-spin are no problems. When maximum crane lifting capacities are needed for crane operation, the front spring action can be "locked-out" easily, to give solid-axle, full 7-ton capacity over front, rear and sides without setting outriggers. The Thew Shovel Co.

... Circle No. 188

More carry-out capacity with new bucket

Automatic dragline buckets designed specifically for the sand, gravel and quarrying fields make up a new line now being produced by the Page Engineering Co. The new design features a longer and higher basket that carries out more payload on every swing. Dotted lines on the photo show the added capacity that is built into the new line. To utilize the advantages of the higher and longer basket, the buckets use a shorter dump rope that throws the front of the bucket sharply back when hoisting to prevent spillage of material. The new sand and gravel bucket is advantageous in underwater digging



where the material has a natural tendency to flow with the water in a direct line from the rear top of the basket to the lip. An added feature is the USS T-1 steel construction. T-1 steel, having more than three times the strength of ordinary steel, offers the user greater life and less repair and maintenance. It is abrasion-resistant and well suited for sand and gravel digging operations. Buckets are available with or without perforations.

... Circle No. 189



WITH the help of a new attachment, American Tractor Equipment Corp. tractor mounted rippers can lay underground cable, plastic pipe or direct burial conductor to depths of 72 in. with unusual speed. The attachment eliminates trenching. In operation, a tractor carrying a standard ATECO ripper makes one or two passes over the cable route laying the cable on the last pass. According to the manufacturer, cable or pipe to 3-in. diameter can be laid at substantial savings.

... Circle No. 190

Rock drill "inhales" dust

Hole blowing, water nuisance, and dust hazards are eliminated by a new dustless rock drilling system which sucks rock chips and dust through a hollow steel into specially designed dust-extracting tanks. The system is a product of the Thor Power Tool Co. The dustless air drills have suction instead of blowing action and utilize special hollow steels and bits. The dust extractors combine three interconnected cylinders, two cyclone units with emptyable heavy duck chip sacks and one filter unit with cleanable, renewable filter liner. Instead of sending a stream of air or





Mack Model LVX—22½-ton payload rear dumper.



Mack Model LRX—15-ton payload rear dumper.

Send a man instead of a boy!

Big yardages—smashing impacts—heavy hauls. That's when you need a truck with the guts and go of these famous super-capacity Mack off-highway dumpers. No doubt about it, the man-sized jobs are the Mack-sized jobs.

Check the specs with your Mack representative—but remember, Mack quality begins where specifications leave off. And be sure to ask him about Mack users—names, facts and figures—who are handling their big jobs with these profit-earning big Macks.

Mack Trucks, Inc., Los Angeles, Denver, San Francisco, Seattle, Portland, Salt Lake City, Albuquerque.

For capacities of 30 tons or more where maximum flotation and traction are required, a full line of tandem rear axle Macks is available.

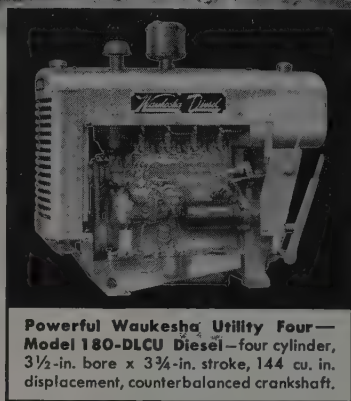
MACK
first name for
TRUCKS

... for more details, circle No. 57 on Reader Service Postcard



REICH
drills either way
ROTARY or
DOWN-THE-HOLE
 with

WAUKESHA
Diesel **POWER**



Powerful Waukesha Utility Four—
 Model 180-DLCU Diesel—four cylinder,
 3½-in. bore x 3¾-in. stroke, 144 cu. in.
 displacement, counterbalanced crankshaft.

The small rig that's designed for down-the-hole tool drilling of holes up to 6½-in. diam. in hard rock—the Waukesha Diesel-powered, Model C-250 Reich Drill is said to be the only machine of its kind in the world. It does the work of small hard rock rigs that drill with drifters; and large hard rock machines that drill with down-the-hole tools. But the Reich is only half the size...and half the cost...of large machines. The makers,

Reich Bros. Mfg. Co., Terre Haute, Ind., gave the drill an equally versatile power unit. The Waukesha 180-DLCU has special Diesel design characteristics including the patented spherical combustion chamber which gives lively responsive acceleration, smoothness of operation, and clean burning with high economies both of maintenance and fuel. Get the details of Waukesha dependability in Bulletin 1627.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

NEW YORK

TULSA

LOS ANGELES

399

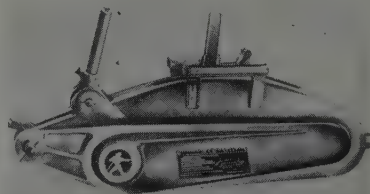
... for more details, circle No. 58 on Reader Service Postcard

water into the hole, the drills reverse the flow of air, using powerful suction to "inhale" rock cuttings into the bit face and through the steel and drill at a velocity approaching the speed of sound. Cuttings and dust are expelled from the back of the drills through a lightweight hose into the Thor dust extractors, which clean the air to dust counts under 10,000,000 particles per cu. ft.

... Circle No. 191

Griphoist announces new model

The new model T-35 Griphoist is a heavy-duty companion product of the standard model which has been in use for the past five years. Although the T-35 follows the



same basic principle, that is, two sets of alternately gripping, self-energizing jaws, it is a completely redesigned unit. The new features include a ball bearing crank, two-speed mechanism (cable travel from 3 ft. per min. on heavier loads to 9 ft. per min. on lighter loads), and a self-locking shackle type pin which permits quick anchoring of the unit. T-35 is rated at 3-ton capacity, weighs 60 lb. and uses 5/8-in. wire rope. An illustrated descriptive brochure is available. Griphoist, Inc. ... Circle No. 192

Shovel and crane safety

Designed and patented by the Andrus Machine Works is a device to minimize accidents and fatalities encountered on crane and shovel work. The Safety Circle is easily mounted on any make or model of crane or shovel. It frees the worker from fear since the circle inscribed by the outside perimeter of the device practically eliminates the possibility of a worker being in the death-zone when the equipment swings. In addition, there is a minimizing of danger from "pinch-points," an easy-access job-view platform provided, and the actual field of vision on a job is many times broader. When it is necessary to move equipment, the Safety Circle hinges upward and locks securely in position. The steel mesh



platform has an easy access hinged-door for entering or leaving the cab. When a new location is established, it's a matter of seconds to again drop the circle platforms and be in full operation.

... Circle No. 193

For fast loading of nitrate explosives

The operation of loading fertilizer-grade ammonium nitrate into holes for blasting has been speeded by a loading machine announced by Atlas Powder Co. Named the Jet-loader, the machine uses compressed air to blow the blasting agent as well as the sand stemming into the holes. Field tests indicate that the machine, in its present development, will blow 2½ lb. of the nitrate and diesel oil mixture per sec-



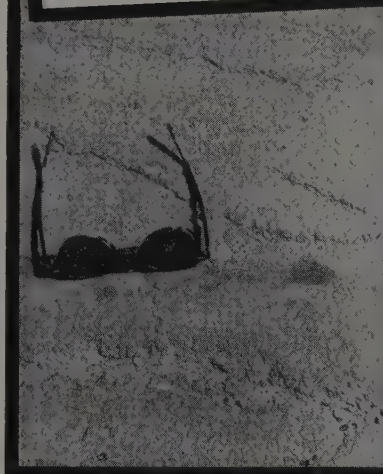
ond into a 50 to 60-ft. horizontal blast hole. Hand loading in the conventional way by a 3-man crew that would require about 30 min. of working time can be done with the mechanical loader in 2 min. The only equipment required for its use are a compressor to provide air at 45 lb., a truck to move the compressor and the loading machine, together with a sufficient amount of 1½-in. plastic pipe.

... Circle No. 194

BITUMULS SLURRY SEALS ARE REAL LIFE SAVERS*

For Pavements in Rochester, New York

*By permission of Beech-Nut Life Savers, Inc., for candies



These photos tell the "before and after" story of Bitumuls Slurry Sealing. Notice in the photo, right, how the large crack in foreground has been filled and sealed.

The City of Rochester, New York, was faced with a situation common to many communities today. The Problem: keep all streets maintained in serviceable condition; yet do it at a cost that will permit the complete replacement (out of Maintenance Department funds) of many miles of streets that are over-aged. The Answer: Bitumuls Slurry Sealing...a "life saving" technique for keeping distressed pavements in good serviceable condition!

The Bitumuls® emulsified asphalt slurry provided a holding action against

wear and weather at extremely low cost, with important savings over former methods. Very-costly winter patching of chuck-holes was completely eliminated. As a result, expenditures for repair and control of winter damage were **reduced by almost seventy percent!** And savings were diverted to reconstruction of streets that were beyond maintenance or repair.

Bitumuls Slurry Sealing should be regarded as only a **temporary treatment** for distressed pavements. Adequate repairs or pavement-replacement must eventually be made. Yet, it is truly a "Life Saver", since it seals, protects and preserves any basically sound pavement against further deterioration pending major repairs or complete replacement.

Your community, too, can benefit from the use of Bitumuls Slurry Seals. For further information on Slurry Sealing...or for the complete Bitumuls/Life Saver story...call our nearest office.



American Bitumuls & Asphalt Company

320 Market St., San Francisco 20, Calif.
Perth Amboy, N. J. Baltimore 3, Md.
Cincinnati 38, Ohio St. Louis 17, Mo. Oakland 1, Calif.
Atlanta 8, Ga. Tucson, Ariz. Inglewood, Calif.
Mobile, Ala. Portland 8, Ore. San Juan 23, P. R.

... for more details, circle No. 59 on Reader Service Postcard

News of DISTRIBUTORS

R. V. Robertshaw becomes general manager

Robert V. Robertshaw was recently appointed general manager at Sanford Tractor & Equipment Co., Reno, Nev., and George Miller is the new parts manager. Miller was formerly with Turner Equipment Co., Visalia, Calif.

Promotion, sales addition, new line

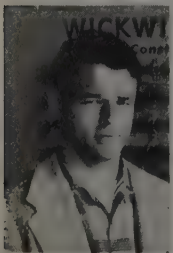
Announcement is made by Hamilton Engine Sales, Inc., Portland, Ore., of a change in managers. Myron L. Woodford is now filling this post. Hamilton has acquired dealership for the complete line manufactured by American Hoist & Derrick Co. for Oregon and the river counties of Washington. Lynn Perrott who has joined Hamilton Engine in the sales department will handle the sale of American shovels, cranes and hoisting equipment.

Philpott adds new lines

George M. Philpott Co. of Portland, Ore., recently added to its many lines the products of Wincharger Corporation and the Wacker Corporation. Philpott's sales engineers working out of Portland are Norbert T. Gleason, Jules Alric, Joe Wood, William Gillen, Coy Carter and Leonard Towhill.

Fray appoints sales representative

Fray Equipment Co. announces the appointment of Gordon Meyer as district sales representative. Well known among Northwest contractors, Meyer was recently employed



Gordon
Meyer

complete line of contractor's supplies. Featuring the new Oliver industrial crawler and wheel tractor line, Fray also distributes Colorado Fuel & Iron's Wickwire wire rope, Rice centrifugal and diaphragm pumps, Tri-State tractor parts, and others.

Additions at Portland

Balzer Machinery Co., Portland, Ore., recently took on the McCaffrey clamshell and dragline bucket lines and added a new salesman, Earle C. Tullar.

Otho Johnson named BJ pump dealer in Arizona

Willcox Pump & Equipment Co. has been appointed dealer for Byron Jackson Pumps, Inc., in the Cochise-Graham area in Arizona. Owner and operator of the new dealership is E. Otho Johnson, J., formerly Arizona manager for BJ pumps.

Stanco promotes Bernie Ashoff

Bernie Ashoff of Stanco Manufacturers and Sales, Inc., at Santa Monica, Calif., has been promoted to Midwest area manager with headquarters in Chicago. Stanco distributes Hiab hydraulic truck cranes, Flygt submersible pumps, Pionjar rock drills.

Diamond T announces new dealers

Diamond T Motor Truck Co. announces the appointment of two Western dealers for the firm's line of heavy-duty trucks: Mercantile, Inc., Oakland, and The Gasser Motors, Inc., Napa, Calif. The two newly franchised Diamond T organizations have full service facilities in addition to a staff of experienced heavy truck sales engineers.

Personnel additions at Miller Machinery Co.

Miller Machinery Co., Billings, Mont., has a new salesman, L. R. McKinney, also a new service man, Harlon Goddard.

Hatten adds Thew-Lorain; intensifies sales program

Hatten Machinery Co., Seattle, recently appointed western Wash-

ington dealer for The Thew Shovel Co., reports personnel and territory changes in conjunction with their expanded sales program. E. L. "Ed" Wellington, who has been specializing in heavy equipment sales, has been named sales manager for the company. H. V. "Whitey" Stratton, a recent addition to the Hatten sales staff, will cover the territory north of Seattle. Frank Longhi, formerly parts manager, and on the sales force for the past year as building construction equipment salesman, will concentrate on the area south of Seattle and the Olympic Peninsula. The most recent addition to the sales staff is Ed Taylor, formerly engaged in shovel and crane sales with other machinery dealers. His territory embraces central Seattle and adjacent territory.

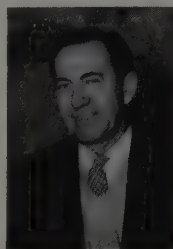
ESCO stocks Speedline in Denver

Electric Steel Foundry Co. is appointed distributor for Speedline corrosion resistant fittings in Wyoming, Montana and Colorado. Stocks will be maintained in the ESCO Denver warehouse. Electric Steel has been distributor for this line of pipe fittings in the other eight Western states for a number of years.

Wallace promotes Bill Selman; adds salesman

Promotion of William J. Selman to northern area manager for the Santa Maria and Paso Robles outlets of Wallace Machinery Co., of Oxnard, Calif., and addition of J. D. "Jim" Davis to the company's industrial sales staff is announced by Don Wallace, general manager of the Caterpillar and John Deere dealership. Formerly in charge of industrial accounts in Ventura, Santa Barbara and San Luis Obispo counties, Selman is now directing company operations in the north half of the territory. Jim Davis replaces him in the field sales force.

Selman joined the Wallace organization in 1957 after a year as



Selman



Davis

Dozes earth in summer

During Alaska's comparatively few weeks of summer, Geraghty's HD-6 works on road construction, clears homesites, digs basements, and landscapes. The tractor-dozer has plenty of power for these jobs.

Clears snowbound supply lines in winter

Through the long winter months, many families near the city and back in the bush are snowbound. They depend on Geraghty to keep roads to food and supplies open. His snow-clearing jobs range from a quarter mile to a full mile of road. Here's why Geraghty calls the HD-6 the best tractor we've ever owned.

Geraghty's HD-6 starts easily on the job site . . . is ready to work in a few minutes. Sure-fire, dependable direct electric starting right on the job saves from 5 to 10 gallons of fuel per month during the cold stretch.

Another reason for the increased production of Allis-Chalmers crawlers is the long lubrication intervals made possible by Allis-Chalmers design. There is no need for Geraghty to fight frozen earth to get at grease fittings—because the truck wheels, idlers and support rollers on his HD-6 need lubrication only once every 1,000 operating hours.

The advantages that Geraghty enjoys on the HD-6 are part of every Allis-Chalmers tractor-dozer. Models for every application range from 66.5 net hp to 225 net hp. Your Allis-Chalmers construction machinery dealer will be glad to demonstrate the machine you need on your job.

**Look ahead...move ahead
...and stay ahead with**



Mr. Clyde Geraghty, President, Mitchell Truck & Tractor Service, Inc., Fairbanks, Alaska.

He increased production 20%

with an Allis-Chalmers tractor-dozer

Clyde Geraghty's Allis-Chalmers tractor-dozer really pays off in Alaska's semi-arctic conditions. The day-by-day dependability of his 66.5 net hp HD-6 makes 20 percent more operating time available.



Summer in Alaska finds Geraghty pioneering roads, clearing homesites . . . during winter he uses his Allis-Chalmers tractor-dozer to keep vital supply lines free of snow.

ALLIS-CHALMERS



ARIZONA
B. McGinnis Equipment Company—Phoenix

NORTHERN CALIFORNIA
Industrial Tractor Sales—North Sacramento
White Truck & Equipment Sales—Redding
West Coast Engine & Equipment Company—Berkeley,
Branch: San Jose and Ukiah
City Tractor Company—Eureka

SOUTHERN CALIFORNIA
Instruction Machinery Co. San Diego
Joaquin Tractor Co.—Bakersfield
Law Sales & Service Co.—Los Angeles

IDAHO
Southern Idaho Equipment Co.—Idaho Falls and Twin Falls
Southern Idaho Equipment Co. of Boise, Inc.—Boise

MONTANA
Mountain Tractor Company—Missoula and Kalispell
Seitz Machinery Company, Inc.—Billings

NEVADA
A D Machinery Company, Inc.—Elko and Las Vegas
Reno Equipment Sales Co.—Reno

OREGON
Haupt Tractor Company—Medford
Wood Tractor Company—Portland
Timber Tractor Company—Springfield

UTAH
Cate Equipment Company, Inc.—Salt Lake City

WASHINGTON
Pacific Hoist & Derrick Company—Seattle & Puyallup
American Machine Company—Spokane

WYOMING
Studer Tractor & Equipment Company—Casper

ALASKA
Yukon Equipment, Inc. Seattle—Anchorage, Fairbanks
and Ketchikan

... for more details, circle No. 60 on Reader Service Postcard

executive secretary of the statewide Engineering and Grading Contractors Association. Prior to that time he had been in the construction industry with Winston Bros. and with Macco, and in sales with one of Southern California's largest Caterpillar and John Deere dealers. Davis comes to Wallace with ten years experience in serving the equipment needs of contractors in Southern California where he was associated with a leading regional Caterpillar Tractor and John Deere organization.

Cummins promotes La Verne Morgan

La Verne Morgan has been appointed shop superintendent for Cummins Service and Sales, Southern California distributor of Cummins diesel engines. He will have supervision over the company's shops at Los Angeles, Bakersfield and Montebello.

Additional dealer appointments by Massey-Ferguson

Additional dealer appointments are announced for Massey-Ferguson Industrial Division as follows: Evergreen Equipment Co., Tacoma, Wash.; Van's Equipment Co., Bur-

lington, Wash.; Turner Implement Co., Yakima, Wash.; Valley Equipment Co., Medford, Ore.; Rickreall Farm Supply, Inc., Rickreall, Ore.; Smith, Booth, Usher Co., San Diego, Calif.; Farm Machinery Center, Fresno; Cook Bros. Construction Machinery Co., Los Angeles; Reichenbach & Sons Imp. Co., Billings, Mont.

Promotions and additions

Lee Redman Equipment Co., Phoenix, Ariz., announces the promotion of Ralph Lane to vice president and general manager, and Jerome Koepe to the office of secretary-treasurer. Also reported is the appointment of William Marsh as sales representative. The Dart vibrator (concrete) was recently added to the equipment lines handled by Redman.

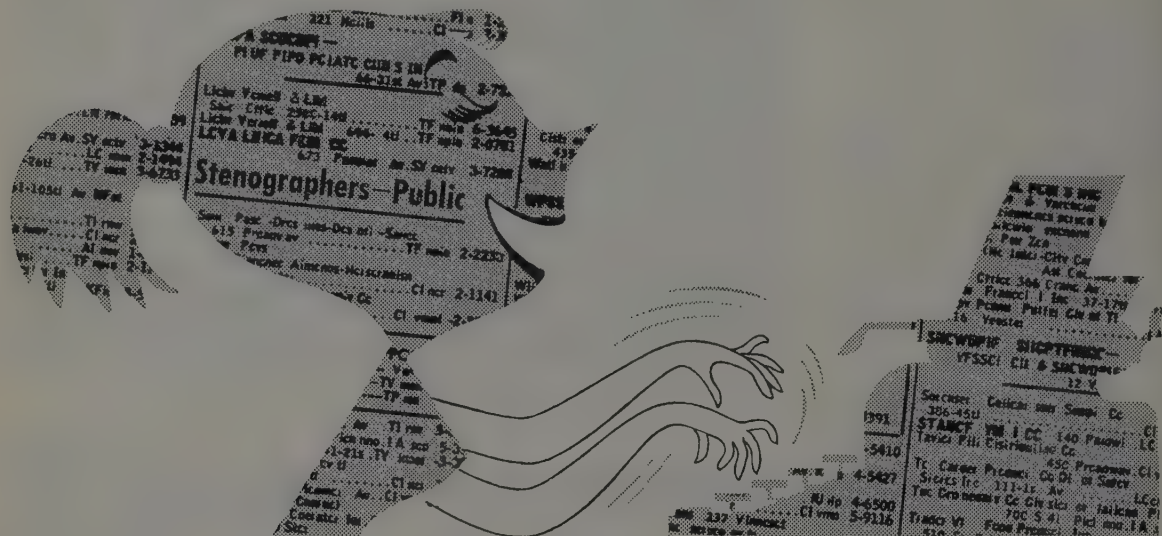
Northern California appointments

Chicago Pneumatic Tool Co., San Francisco, announces that Eureka Boiler Works, Eureka, Calif., has been named to handle the Chicago Pneumatic line in its area. Eureka Boiler Works has also been appointed a stocking distributor for Pacific Mercury electric plants in the area.

MANUFACTURERS

M-F holds dealer open house at Western Industrial Div. facility

Massey-Ferguson franchised industrial dealers recently held their first sales meeting at the new Los Angeles branch and Western regional sales headquarters exclusively devoted to Massey-Ferguson industrial equipment. The new facility is located at 2545 South Yates Ave. Regionally it covers the Western half of the United States serving 11 branches and 5 sub-branches. As a Los Angeles branch headquarters, it will eventually serve about 20 dealers in a tri-state area comprising Southern California, Arizona, and part of Nevada. According to John J. Vilven, regional industrial sales manager, the new office will serve as the Western focal point for marketing of the company's industrial equipment. The line includes several types of tractors with companion equipment such as fork lifts, sweepers, loaders, back hoes, snow plows and trenchers. In addition to Vilven, key personnel at the new headquarters include John D. Luck, branch man-



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*You'll find it fast
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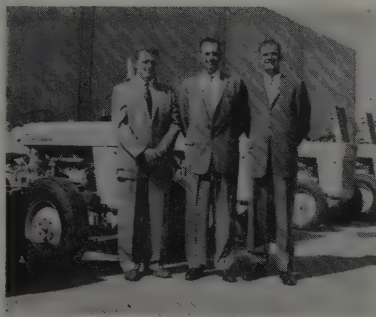
... for more details, circle No. 61 on Reader Service Postcard
WESTERN CONSTRUCTION—November 1958



Vilven Talmadge Hill

ager; Robert M. Prescott, industrial technician; Mahlon Pool, district manager, and Thomas V. Bowditch, distribution supervisor.

Open house activities included a tour by the dealers through the premises which provide 31,000 sq. ft. of warehousing, showroom and office space, storage and parking. Among the many who toured the new facilities were R. L. Stryker and Bill Bush of Cook Bros. Equipment Co., shown here with John D. Luck, M-F's Los Angeles branch manager.



Stryker Bush Luck

An evening banquet culminated the all-day program. Guest speakers included Charles F. Hill, new general manager of the M-F Industrial Division, and W. B. Talmage, M-F general sales manager, who emphasized an intensified 1959 parts program and a series of dealer conferences designed to analyze new product ideas. Ralph V. Laurel, president, Ram Equipment Co., and G. W. McNinch, president, Auburn Machine Works Inc., respectively, described their new lines of attachment equipment.

Change in A. C. Horn staff

Following five years as sales representative of the A. C. Horn Co.

in the Northwest, Bob Flynn moves from Seattle to become sales promotion and marketing manager. In his new duties he will headquarter at the Western Division offices in San Francisco and will have responsibility of coordinating advertising and sales promotion with field sales effort.

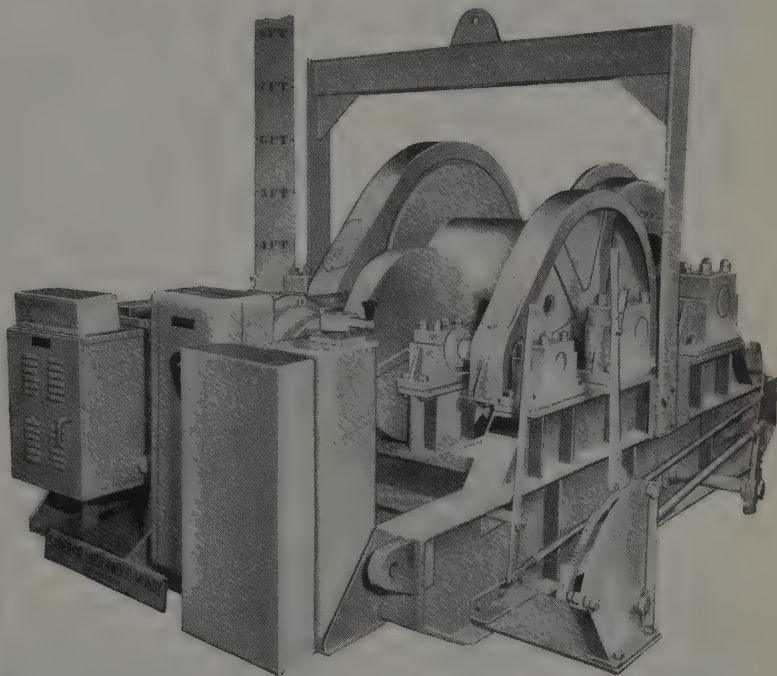
New Wire Rope representative

Norman Shabaz is the new district sales manager in the Los Angeles territory for the Wire Rope

Corporation of America, St. Joseph, Missouri. He will cover extensive sections of Southern California as well as Las Vegas and the Phoenix territory. Word of the new appointment comes from C. E. Karch, branch manager of Wire Rope Corp., in San Francisco.

Schild-Bantam builds 1,000

The Schild-Bantam Company of Waverly, Iowa, manufacturer of power cranes and shovels, has announced that it has produced



"ALL STEEL" ERECTION HOISTS *safe • reliable rugged • dependable*

These combined qualities are all included in the hoist shown and are provided by "All Steel" construction, no clutch, single lever "Deadman" type electrical control, lifting hitch for moving, and husky tie backs for anchoring.

The load is over 200 tons on multiple parts of line requiring a drum capacity of over 3000 ft. of 1 1/4" cable, the lift must be made with absolute assurance of reliability and the answer is a S-L-M "All Steel" erection hoist. Consult Superior-Lidgerwood-Mundy for your next reliable hoist.

Write for Bulletins and Catalogs

Superior-Lidgerwood-Mundy Corporation

MAIN OFFICE AND WORKS—SUPERIOR, WISCONSIN
Pacific Coast Representative: GEORGE E. SWETT & COMPANY
100 Howard Street, San Francisco 5, California

... for more details, circle No. 62 on Reader Service Postcard



Lubriplate No. 630-2 is a high temperature, extreme pressure, water-repellent, grease type lubricant. Ideal for the general lubrication of Industrial, Automotive, Construction, Farm and Marine Equipment. Lubriplate Grease Gun Cartridges provide an easy, quick, economical means of application. Prevent the waste and mess of hand filling. Packed 10 Cartridges in a handy carrying carton.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE



LUBRIPLATE DIVISION, Fiske Brothers Refining Co.
Newark 5, N. J. or Toledo 5, Ohio

DISTRIBUTED BY

L. A. Rubber & Asbestos Works. Los Angeles, Calif.
Garlinghouse Brothers. Los Angeles, Calif.
Degen-Fiege Co. Los Angeles, Calif.
Kenton Equipment Co. San Diego, Calif.
Miller & Stern Supply Co. San Francisco, Calif.
Hendrie & Bolthoff Co. Denver, Colo.
Sawtooth Company. Boise, Ida.
Paul Roberts Co. Pocatello, Idaho
Mott & Van Dyke, Inc. Klamath Falls, Ore.
Goodyear Rubber & Asbestos Co. Portland, Ore.
Industrial Supply Co. Billings, Mont.
Utah Bit & Steel Service Co. Midvale, Utah.
Western Sales Engineering Co. Salt Lake City, Utah
Campbell Industrial Supply Co. Seattle, Wash.
Northwater Company. Spokane, Wash.
Campbell Industrial Supply Co. Tacoma, Wash.
Dodge-Yakima Supply Co. Yakima, Wash.
Yukon Equipment Co. Seattle, Wash.
Fleck Brothers Ltd. Vancouver, B. C., Canada
Flury Supply. Roseburg, Oregon
George Myrmo & Sons. Eugene, Oregon
Wilkinson & McClean, Ltd. Calgary, Alberta, Can.



... for more details, circle No. 63

1,000 crawler models since model C-35 Bantam was introduced in 1953.

J. I. Case trains dealers

Dealer meetings have been conducted by J. I. Case to permit its distributors to offer an improved service to all users of its tractor-loaders and other power equipment. Special "how-to" meetings were conducted throughout the country under the direction of William Vogel, assistant sales manager.

Sales manager named for Great Western Aggregates

Thomas C. Brown has been appointed sales manager of Great Western Aggregates, Inc., a wholly owned subsidiary of Ideal Cement Co. Great Western produces a coated type of light weight aggregate at its plant near Laramie, Wyoming. The product—Idealite—was developed to answer the problem of reducing the weight of concrete as well as improving its quality. It has been used in many projects throughout the Rocky Mountain area and shipped as far as Seattle. The new sales manager will work out of the main office in Denver and will be in charge of all sales and service activities.

Mark Ogden, new manager of Cummins Sales in L.A.

Appointment of Mark Ogden as general sales manager of Cummins Service & Sales in Los Angeles has been announced by S. B. Cook, vice president. This organization is the distributor of Cummins diesel engines in Southern California. Ogden has been sales promotion manager for the organization since January 1956. His previous experience had included several years with Watson & Meehan, Cummins distributors in San Francisco, the editorship of "Diesel Progress" and some years in industrial advertising. He will direct a sales staff of eleven men in a territory covering all of Southern California, with branches in Bakersfield and Montebello.

Ingersoll-Rand moves in L. A.

The office of Ingersoll-Rand Company has moved to 5533 East Olympic Boulevard, Los Angeles 22, California, according to W. J. Heimes, manager. The office was formerly located at 1460 East Fourth St., Los Angeles.

New sales engineer at Standard

R. H. Hubbard has joined Standard Steel Corp. of Los Angeles as a sales engineer in the road machinery division. He will make his headquarters at the company's main office and plant in Los Angeles. Hubbard's background includes more than 25 years of experience in the sales and servicing of road machinery equipment.

W. A. Penner heads Worthington's Denver district office

Walter A. Penner has been appointed district office manager of Worthington Corporation's district office at Denver, Colo., replacing C. R. Walbridge. Penner has served in engineering and engineering sales capacities at the corporation's Washington, D. C., San Francisco, and Los Angeles district offices.

George Droke becomes BJ Arizona manager

George M. Droke has been appointed Arizona manager for Byron Jackson Pumps, Inc. Droke moves to his new assignment from a similar post in Texas. He replaces E. Otho Johnson, Jr., who resigned as Arizona manager to open a new Byron Jackson dealership in Willcox, Ariz. The new manager will headquarter at Byron Jackson's Casa Grande facility.

(Continued on page 109)



EFCO Steel Forms used on Brandeis University Library to save time, labor, material. Forms quickly lock together with a simple twist of a clamp. Easily aligned. Lifetime steel faces. Low original cost. Free form erection drawings for each project.

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Street address _____
City _____ State _____

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UNIT PRICES

Selected abstracts

for Western projects

HIGHWAY—3.7 mi. of 4-lane freeway

California—Shasta and Siskiyou counties—State. McCammon-Wunderlich Co., Wunderlich Construction Co. were low at \$4,140,558 for about 3.7 mi. of 4-lane freeway together with frontage roads, ramps, and connections to be graded and surfaced with concrete pavement on cement-treated subgrade, plant-mixed surfacing on untreated base, and eight bridges.

1) McCammon-Wunderlich & Wunderlich	\$4,140,558
2) Peter Kiewit Sons' Co.	4,759,241
Gibbons & Reed Co.	5,113,368
Guy F. Atkinson Co.	5,790,107

	(1)	(2)
13,900 sq. yd. Remove existing surfacing..\$	50	1.00
117 acres Remove concrete	15,000.00	50.00
Clear & grub	700.00	400.00
Dev. wat. sup. & furn.	92,310.00	126,000.00
wat. equip.	.10	.10
54,300 M gal. Apply water	.05	.10
7,500 sq. yd. Compact original ground	.65	.77
1,445,000 cu. yd. Roadway excav.	16.00	10.00
710 cu. yd. Struct. excav., Type A	4.00	4.15
35,610 cu. yd. Struct. excavation	5.00	5.95
28,220 cu. yd. Struct. backfill	1.50	2.00
3,690 cu. yd. Ditch & channel excavation.	.003	.005
3,600,000 sta. yd. Overhaul	1.50	1.05
28,500 cu. yd. Stabilization trench excavat.	1.70	3.10
20,580 ton Imported pervious material	6.50	5.55
15,400 lin. ft. Drainwells	1.25	1.65
135,400 ton Imported subbase material..	65.00	50.00
30 ton Straw	1.00	.25
1,420 lb. Seed	160.00	160.00
7 ton Commercial fertilizer	2.25	1.80
21,000 ton Untreated base	.22	.26
85,000 sq. yd. Mix., spread, & compact cement treat. subgrade	6.00	6.10
2,930 bbl. Portland cement	1.50	1.75
17,820 ton Mineral aggr. (cement treated subgrade)	39.00	44.00
86 ton Liquid asph., MC-2 (cur. sl.) ..	43.00	42.00
5 ton Asph. emulsion (pt. bdr.)	39.00	42.00
114 ton Liquid asph., SC-2 (pr. ct.) ..	6.00	38.00
1,170 ton Paving asph. (P.M.S.)	6.00	5.25
22,150 ton Mineral aggr. (P.M.S.)	1.30	2.00
590 sq. yd. Plac. P.M.S. ditch & spillway dwnrds.	.25	.23
22,580 lin. ft. Plac. P.M.S. dikes	6.00	12.00
30 ton Sand cover (pr. ct.)	17.00	21.50
20,630 cu. yd. Cl. A conc. (pavement)	.60	.50
14,000 ea. Pavement tie assemblies	50.00	2.300
274 cu. yd. Cl. A conc. (footing block)	70.00	80.00
1,314 cu. yd. Cl. A conc. (struct.)	461,380.00	559,000.00
490 lin. ft. Cl. A conc. (bridges)	2.00	3.60
104 lin. ft. Rubber waterstops	6.00	15.00
158,800 lb. Concrete railing	.15	.16
Bar reinf. steel	218,718.00	234,400.00
Bar reinf. steel (bridges)	1.00	3.00
(1,465,000 lbs.)	4.00	2.00
242 sq. yd. Mesh reinforcement	4.50	4.75
64 sq. yd. Membrane waterproofing ..	100.00	200.00
2,280 lin. ft. Furn. concrete piling	4.50	4.30
175 ea. Driving concrete piles	100.00	175.00
10,455 lin. ft. Furn. steel piling	9,670.00	10,000.00
238 ea. Driving steel piles	.40	.60
18,900 lb. Steel sign structures	100.00	100.00
Misc. iron & steel	37.00	40.00
Redwood covers & baffle	7.00	9.00
1,024 cu. yd. Cl. B conc. (curbs, gutters & sidewalks)	18.00	10.00
48 ea. Right of way monuments ..	50.00	52.00
21 ea. Survey monuments	45.00	70.00
28 cu. yd. Rubble masonry	4.00	4.45
32 cu. yd. Cl. B conc. (ditch lining) ..	4.00	4.00
8,920 lin. ft. Metal plate guard railing	350.00	200.00
1,878 lin. ft. Metal safety railing	6.00	8.00
372 ea. Pipe railing	4.50	10.00
16 ea. Guide posts & markers	.60	.68
posts	2.00	1.75
24,700 lin. ft. Freeway fence	100.00	150.00
10,360 lin. ft. 72" chain link fence	2.25	2.85
1 ea. 12" chain link gate	4.00	4.85
9,700 lin. ft. 8" C.M.P. (16 ga.)	6.00	6.80
4,560 lin. ft. 18" C.M.P. (16 ga.)	7.50	8.40
6,960 lin. ft. 24" C.M.P. (14 ga.)	10.00	10.50
1,450 lin. ft. 30" C.M.P. (14 ga.)	12.00	12.50
284 lin. ft. 30" C.M.P. (12 ga.)	14.00	15.00
1,100 lin. ft. 36" C.M.P. (12 ga.)	17.00	18.00
406 lin. ft. 42" C.M.P. (12 ga.)	27.00	27.00
254 lin. ft. 42" C.M.P. (10 ga.)		
180 lin. ft. 60" C.M.P. (10 ga.)		
232 lin. ft. 36" paved invert C.M.P. (12 ga.)	14.00	14.00

FLYGT



FLYGT PUMPS SAVE OVER \$55,000 ON DIFFICULT CALIFORNIA AIRPORT JOB

In the extension of runways for the Long Beach Municipal Airport, contractors built traffic underpasses for two main arteries in the City's roadway system. While under construction one underpass — Spring Street — presented some interesting and difficult de-watering problems. FLYGT SUBMERSIBLE ELECTRIC PUMPS proved a cost-saving solution to these problems.

The Contractor's first impulse was to install a well-point system for de-watering. Investigation revealed that such a system would have cost approximately \$60,000. Then the contractor observed a demonstration of FLYGT SUBMERSIBLE ELECTRIC PUMPS. A short time later, three FLYGT Model B-80L Pumps were put on the job. Total investment in FLYGT PUMPS: only \$3,000.

With funds from a Municipal Bond issue, runways were extended to 10,000 feet over the two roads, so as to accommodate the largest jet transports. The Spring St. underpass was designed to be 1083' long, 64'4" wide, and 31' high. Excavation for the 31-foot height revealed a "joker." After the dirt moving had been completed, the contractor moved in a crane to excavate foundation areas for the structure. This work required earth removal 12-feet below the 22-foot ground water level. Water intrusion was immediate.

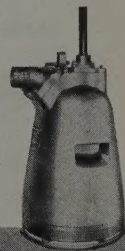
The job superintendent tells the story from that point in his own words: "We needed submersible pumps, each with a minimum 6000 gallon per hour capacity, that would reach a 35-foot head and move water at least 30-feet horizontally. Since the pumps would be working in both sand and clay, we had to have centrifugals which would move a heavy amount of solids. FLYGT met all those specifications, so we purchased three, 3" model B-80Ls. The nice thing about the electrically powered FLYGTs is that they can be put to work and ignored. They ran 24 hours a day on this job, and the only time we touched them was to lift and lower them with the water level, by a rope suspension. The FLYGTs easily managed to keep ahead of our water intrusion. We figure FLYGT PUMPS saved us over \$55,000 on this one job, so we adopted the FLYGT Pumping Method."

Pump operators find FLYGT PUMPS tops in performance. Users particularly like their foolproof features, the advantage that they work in any position, and the fact that they do not clog up. They can take a lot of solid stuff like mud and sand without hurting them in any way. The rubberized pump casing and hard chrome alloy impellers combine to make FLYGT PUMPS rugged equipment.

FLYGT centrifugal pumps range in size from 1½"-85 GPM capacity to 8"-3,000 GPM capacity. Head capacities range up to 210 feet. Weights range from 80 to 1200 pounds.

CHECK THESE FLYGT FEATURES

- ✓ Electric
- ✓ Resistant to Salt Water
- ✓ Submersible
- ✓ Easy to Handle
- ✓ Low Maintenance Costs
- ✓ Will Pump High Amount of Solids
- ✓ Heavy Duty
- ✓ Operates Unattended
- ✓ Runs Dry Without Damage
- ✓ Quick and Easy to Service
- ✓ No Installation Costs
- ✓ No Priming Needed



Stanco
— MFGS. & SALES INC. —

1666 Ninth St. (Corner of Olympic & Ninth)
Santa Monica, California

... for more details, circle No. 65 on Reader Service Postcard

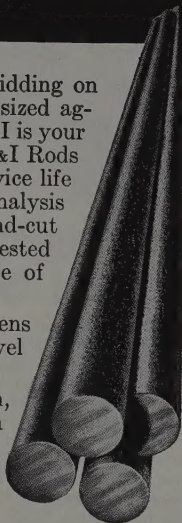
for manufactured sand... order

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Estimators—When you're bidding on jobs that require the production of sized aggregate and manufactured sand, CF&I is your western source for grinding rods. CF&I Rods will give you even wear and good service life because they're made from special analysis steel... machine-straightened and end-cut to exact squareness... and carefully tested and inspected through every stage of production.

CF&I also makes Industrial Screens and Wire Rope for the sand and gravel industry.

So for complete product information, quotations and quick delivery from one of our western mills, call the nearest CF&I office listed below.



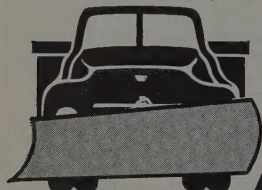
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Oakland • Phoenix • Portland • Pueblo • Salt Lake City

San Francisco • San Leandro • Seattle • Spokane 5665

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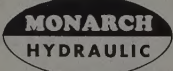
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From the Cab... AUTOMATICALLY!**

POWER



CONTROLS

Instant action! Snow removal is easier, faster, more efficient. Automatic snow plow operation right from the truck or jeep cab. Battery-Operated or Fan-Belt Driven Models. See your dealer or write for full information.

MONARCH ROAD MACHINERY COMPANY

1331 Michigan St., N. E. — Grand Rapids 3, Michigan

... for more details, circle No. 67 on Reader Service Postcard

526 lin. ft.	36" paved invert C.M.P. (10 ga.)	16.00	17.00
336 lin. ft.	8" welded steel pipe (14 ga.)	2.00	4.50
216 lin. ft.	36" welded steel pipe (7 ga.)	17.00	19.00
444 lin. ft.	6" dipped & wrapped welded steel pipe (14 ga.)	2.50	4.00
122 lin. ft.	12" dipped & wrapped welded steel pipe (10 ga.)	4.00	7.00
360 lin. ft.	24" dipped & wrapped welded steel pipe (7 ga.)	11.00	12.00
1 ea.	18" slide headgate	82.00	150.00
16,950 lin. ft.	8" perforated pipe under-drains	2.00	2.70
2,976 lin. ft.	12" perforated pipe under-drains	3.00	4.00
6,550 cu. yd.	Filter material	6.00	6.30
69,000 lin. ft.	Horizontal drains	2.50	3.15
22 ea.	Entrance tapers for 8" metal pipe downdrains	52.00	45.00
18 ea.	Entrance tapers for 12" metal pipe downdrains	80.00	70.00
1,060 lin. ft.	8" C.M.P. downdrains	2.50	3.00
368 lin. ft.	12" C.M.P. downdrains	4.00	4.50
450 lin. ft.	18" C.M.P. downdrains	4.00	6.00
27 ea.	Downdrain slip joints	36.00	35.00
31 ea.	Downdrain pipe anchors	24.00	25.00
41 lin. ft.	Pipe shaft manholes	25.00	53.00
20 lin. ft.	6" clay sewer pipe (drop manholes)	7.50	3.00
214 lin. ft.	6" asbestos-cement sewer pipe	2.00	2.50
700 lin. ft.	Finish roadway	10,000	2,000.00
724 lin. ft.	Raised traffic bars	2.00	2.00
	2" galvanized steel pipe	1.50	1.50
	Gate valves	308.00	300.00
1,265 sq. ft.	Metal bin-type retaining walls (Type A)	6.50	4.65
18,235 sq. ft.	Metal bin-type retaining walls (Type E)	10.00	8.90
	Hwy. light & sign illumination systems	17,000.00	25,000.00

HIGHWAY—6.5 mi. of grading and drainage

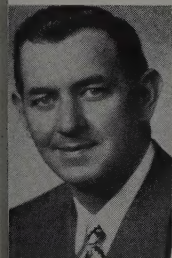
Arizona—Coconino County—State. Isbell Construction Co. submitted a low bid of \$1,009,724 for work beginning 9 mi. south of Flagstaff, and extending south over a new alignment of State Route 79 for approximately 6.5 mi. Work consists of grading and draining the roadway.

(1) Isbell Construction Co.	\$1,009,724
(2) Copper State Construction Co.	1,025,555
Fisher Contracting Co.	1,062,197
Tom L. Mulcaire	1,062,830

	(1)	(2)
140 ac.	Clearing and grubbing	\$ 850.00
531,500 cu. yd.	Roadway excavation	.68
5,000 cu. yd.	Overbreakage	.51
2,000 cu. yd.	Slides	.34
7,600 cu. yd.	Drainage excavation	1.00
22,500 lin. ft.	Grader ditches	.10
1,100 lin. ft.	Crown ditches	.35
3,160 cu. yd.	Structural excavation	3.00
124,800 cu. yd. mi.	Overhaul	.25
235,550 cu. yd.	Borrow	.43
1 lump sum	Provide water supply	1,000.00
30,500 M. gal.	Apply water	.50
5,800 hr.	Rolling	6.00
2,860 cu. yd.	Class A concrete (CIP)	47.00
392,300 lb.	Reinf. steel (bars) (CIP)	.13
582 lin. ft.	24 in. C.M.P. (CIP, except excavation)	6.00
1 lump sum	84 in. sectional plate pipe (std. 6963-4-81) & sta. 6968-4-35) (CIP except excavation)	23,000.00
4,680 lin. ft.	Furnish & deliver steel H-column pile (10 in. x 42#)	4.20
104 ea.	Driving piles (steel H-column) (CIP)	140.00
10 ea.	Splicing piles (steel H-column)	35.00
1 lump sum	Misc. remov. & other work.. Plain riprap (type E) (std. C-23) (CIP)	3,000.00
20 cu. yd.	Cattle guard (3 unit) (std. C-14) (CIP except excavation and concrete)	10.00
4 ea.	Road guard for bridges (std. RG-1) (CIP)	1,000.00
263 lin. ft.	R/W mkrs. (std. C-1) (CIP)	5.00
59 ea.	Line fence (std. C-16) (CIP)	12.00
69,900 lin. ft.	Special 5-wire line fence with wood post (CIP)	.22
3,850 lin. ft.	Steel fence gates (std. C-16) (type #1) (CIP)	.28
5 ea.	Wire fence gates (std. C-16) (type #2) (CIP)	75.00
7 ea.	Concrete catch basin (std. C-27, modified) (CIP)	40.00
4 ea.	Bank protection (type A) (std. C-23) (CIP)	300.00
700 lin. ft.	Bank protection (type B) (std. C-23) (CIP)	19.00
725 lin. ft.	Grader roads	14.00
20,500 lin. ft.	24 in. culvert pipe (CIP except excavation)	.20
446 lin. ft.	30 in. culvert pipe (CIP except excavation)	6.00
1,750 lin. ft.	36 in. culvert pipe (CIP except excavation)	7.00
206 lin. ft.	42 in. culvert pipe (CIP except excavation)	11.00
170 lin. ft.	48 in. culvert pipe (CIP except excavation)	13.00
124 lin. ft.		15.00

Western changes by Thew

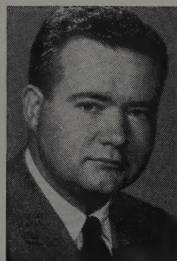
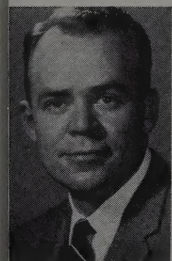
J. F. Beles, West Coast district sales manager for Lorain shovels and cranes for the past eight years, has been promoted to manager of parts and service for the Thew Shovel Co. with headquarters in Elyria, Ohio. As a result of this move, G. E. Gunther, domestic



Beles

Johnson
(below, left)

Rockwood
(below)



sales manager, announces the following Western changes. Frank L. Johnson, with eight years in competitive shovel-crane sales on the West Coast, is appointed Pacific Coast district manager at San Francisco. His territory covers California, Arizona, Utah, and Nevada. S. Rockwood, with Thew since 1948, the past six years as assistant district sales manager under Beles, now becomes Pacific Northwest district sales manager at Portland, Ore. He is responsible for the states of Washington, Oregon, Montana, Idaho, and Alaska.

Koehring equipment show

On September 8 Koehring Company held an equipment show in Milwaukee, at which recently introduced models, as well as the completely new Koehring models were shown. This million dollar display of construction equipment was viewed by the technical press among other interested persons.

Paceco opens So. California office

Pacific Coast Engineering Co., custom designers and fabricators of heavy equipment, has opened a

FOR SALE OR RENT

FOR SALE: Two fire tube boilers complete with controls, stacks, pumps, oil storage tank and 24' x 28' corrugated iron building. Total horsepower 100. For further information, contact:

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295 MADISON AVE. NEW YORK

Space is sold as advertisers' inches. All advertisements in this section are 1/8 in. short of contracted space to allow for borders and composition

FOR SALE:

Current Model Cleveland 320 ditcher. Cat Power 12 1/2' Wheel. 40" Wide Trench, 7 feet deep. Only 400 hours. A real bargain, as this machine is in excellent condition.

WILSON EQUIPMENT & SUPPLY CO.

Write Box 218 Phone 2-5581
Cheyenne, Wyoming

Southern California office at 1404 Cravens Ave., Torrance. Ewell "Tex" O'Bryan was appointed sales manager. His territory will also include Arizona. O'Bryan has been sales engineer for Paceco for several years working out of the main office in Alameda.

Zermer named Northwest district representative for Clark

Clarence E. Zermer is the new Clark Equipment Co. district representative in the territory of Oregon, Washington, Alaska, and British Columbia. He will work out of Bellevue, Wash. Zermer formerly handled the Texas-Oklahoma territory.

Failing named special field agent

Jay C. Failing has been named chief sales representative for a new line of rotary earth-drilling equipment designed under his direction and scheduled for production by Mobile Drilling, Inc., of Indianapolis, Ind.

Leschen moves Seattle headquarters office

Announcement is made that Leschen Wire Rope Division, H. K. Porter Co., Inc., has moved to a new address at 1041 Alaskan Way, South, Seattle 4, Wash. Charles Wallace is Leschen sales representative in this area.

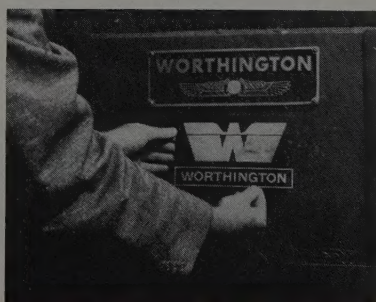
CB&I plans new Salt Lake facility

Plans for the addition of new facilities to its Salt Lake City plant have been announced by Chicago Bridge & Iron Co., Chicago. CB&I will erect a 100 x 400-ft. building of light construction, which will be equipped with 5-ton cranes for fabrication of small detail parts, fittings, etc.

BFG opens retreading plant

Production has started at the new Phoenix, Ariz., retread plant of B. F. Goodrich Co. R. W. Simpson, BFG district manager, reports the 10,000-sq. ft. building is equipped with the newest type of production machinery to handle retreads of all sizes used in road building and heavy construction.

A FAMILIAR SIGHT—the winged scarab Worthington Corporation trademark, at the top—is to be replaced by the bold new mark developed after two years of study. Replacement of the 73-yr.-old winged trademark with a modern design significantly reflects Worthington's progressive thinking and flexibility.



ADVERTISERS in this issue

A	F	N
Allis-Chalmers Mfg. Co. Construction Machinery Division.....16, 17, 43, 44, 67 & 103 Utility Tractors..... 11	Fiske Brothers Refining Co. Lubriplate Division106 Firestone Tire & Rubber Co. 95 Ford Motor Company54 & 55 Friction Materials Co. 51	Northwest Engineering Company 3
American Bitumuls and Asphalt Company101		O
American Pipe and Construction CompanyCover 3	G	Owen Bucket Company, The 63
American Tractor Equipment Corp..... 91	General Engines Company 82 General Motors Corporation Chevrolet Motor Division 5	P
Armco Drainage & Metal Products, Inc. 15		Pacific Telephone & Telegraph Co., The104
Atlas Copco 14	H	Pennzoil Company, The 70
Austin-Western Works, Construction Equipment Division, Baldwin-Lima- Hamilton Corporation 28	Hough, Frank G., Co., The 9 Hyster Co. Martin Trailer Division 69	Permanente Cement Company 75
Autocar Division, The White Motor Company 10		S
B	I	Screen Equipment Co., Inc. 59 Shell Oil Company 52 Southwest Welding & Mfg. Co. 97 Stanco Manufacturing and Sales, Inc..107 Stang, John W., Corporation 22 Superior-Lidgerwood-Mundy Corporation105 Symons Clamp and Mfg. Company 98
Baldwin-Lima-Hamilton Corporation Austin-Western Works, Construction Equipment Division 28 Lima Works, Construction Equipment Division 41 Madsen Works, Construction Equipment Division 61	International Harvester Co. Construction Equipment Division12 & 13 Iowa Manufacturing Company 49	T
Barber-Greene CompanyCover 2 Beatty Scaffold, Inc.8 & 87 Blaw-Knox Company 85 Bucyrus-Erie Company 71	J	Tauber Arons, Max Rouse (Chad JV Auction)..... 90 Techkote Company, The 94 Thew Shovel Company, The 57 Timken Roller Bearing Company Rock Bit Division 19
C	K	U
Caterpillar Tractor Co.....6, 7, 64 & 65 Engine Division24 & 25	Kolman Mfg. Co. 89	Universal Form Clamp Co. 93
Chevrolet Motor Division General Motors Corporation 5	L	W
Chrysler Corporation, Dodge Truck Division20 & 21	Lima Works, Construction Equipment Division, Baldwin-Lima- Hamilton Corporation 41 Lubriplate Division Fiske Brothers Refining Co.106	Warn Mfg. Co. 68 Waukesha Motor Company100 White Motor Company, The Autocar Division 10 Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation 23
C. I. T. Corporation38 & 39	M	Y
Coast Manufacturing & Supply Company 70	Mack Trucks, Inc. 99 Madsen Works, Construction Equipment Division, Baldwin-Lima- Division Corporation 61 Massey-Ferguson Industrial Division72 & 73 Miller Electric Mfg. Co., Inc. 83 Miller & Smith Manufacturing Company, Inc. 81 Monarch Road Machinery Co.108	Yuba Manufacturing Division Yuba Consolidated Industries, Inc. 26
Colorado Fuel & Iron Corporation, The.....108 & Cover 4 Wickwire Spencer Steel Division..... 23		
D		
Duff-Norton Company Coffing-Hoist Division 66		
E		
Economy Forms Corporation106 Eimco Corporation, The 76		

Johnston Stainless Welding Rods

Practical, Down-to-Earth Welding Rods
Alloys as they are supposed to be

Corrosion Resistant—
Clean metal

Strong—
low in cracking
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