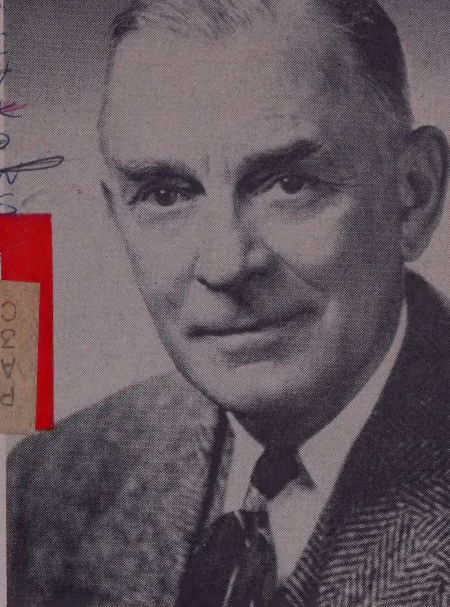


WESTERN

CONSTRUCTION

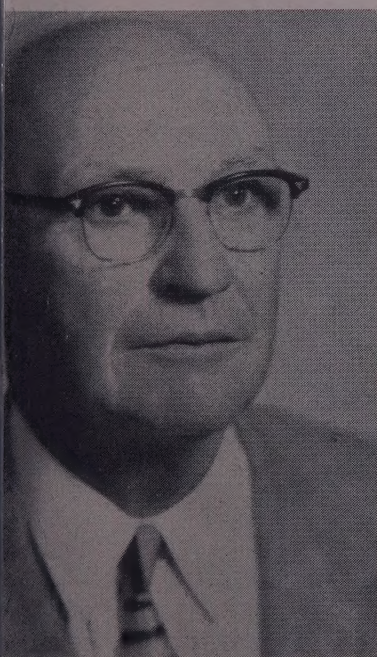
HLF
ADC
BRW
WEK
AIP
ECW
JSS

PORTLAND CEMENT ASSN.
ATT: LIBRARY
33 W. GRAND AVE.
CHICAGO 10, ILL.



FEB 11 1957

Edwin M. Whipple

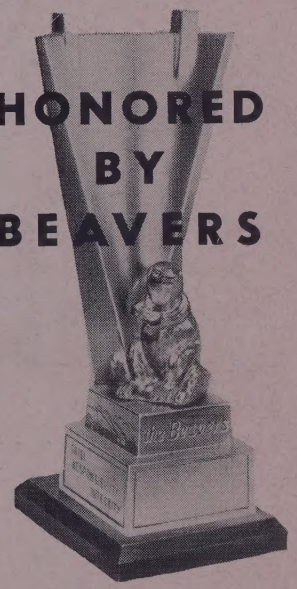


Augustine H. Ayers



Ben Arp

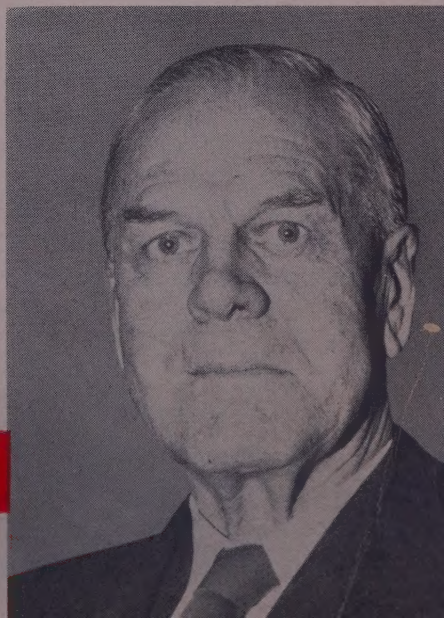
**HONORED
BY
BEAVERS**



Otto W. Peterson

This month's feature . . .

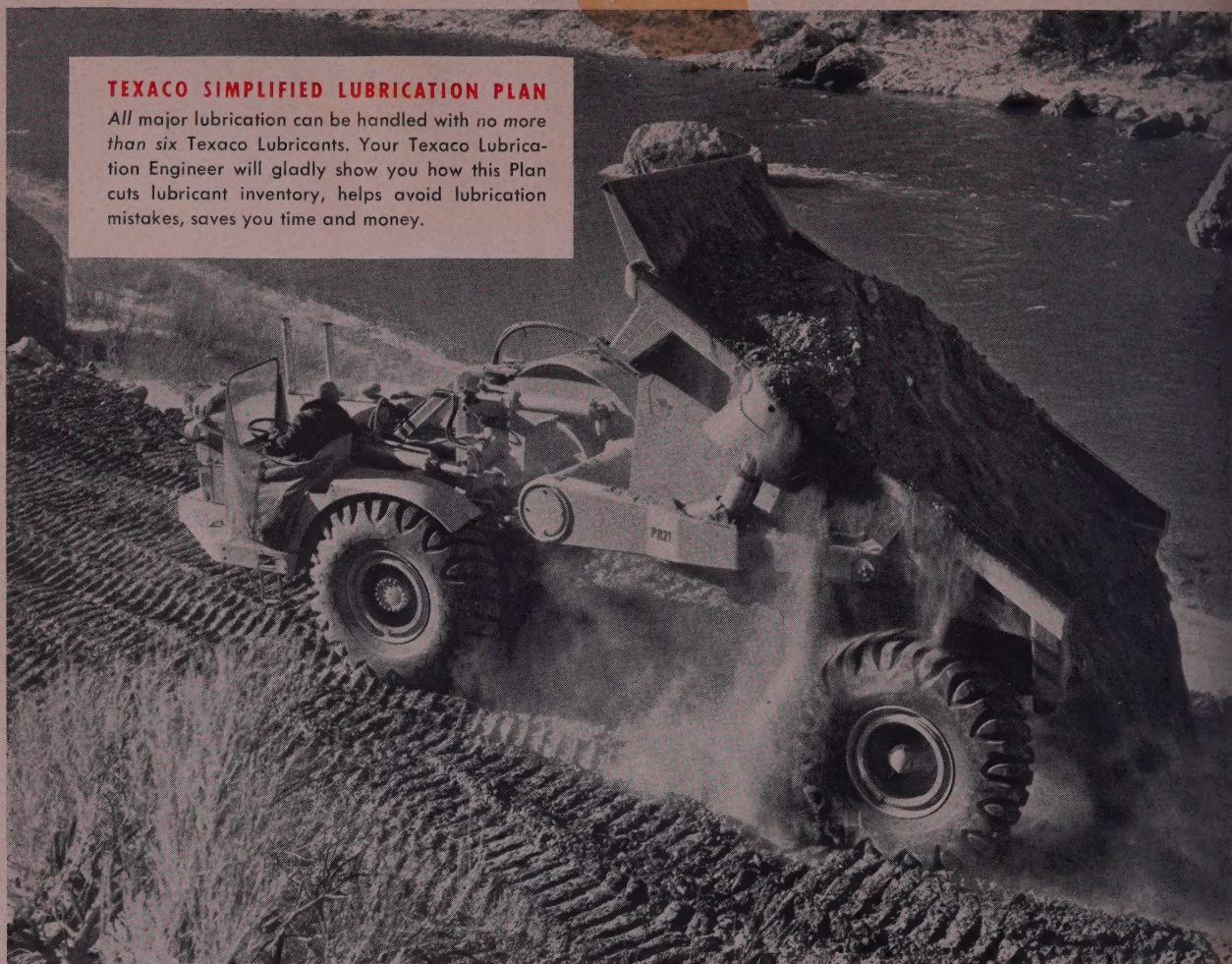
GLEN CANYON DAM
By L. N. McClellan, Chief Engineer
U. S. Bureau of Reclamation



FEBRUARY 1957

TEXACO SIMPLIFIED LUBRICATION PLAN

All major lubrication can be handled with no more than six Texaco Lubricants. Your Texaco Lubrication Engineer will gladly show you how this Plan cuts lubricant inventory, helps avoid lubrication mistakes, saves you time and money.



Keep your engines **POWER-FULL**

Full power performance from diesel and heavy duty gasoline engines depends on effective lubrication. And that, to contractors everywhere, means *Texaco Ursa Oils*. There is a complete line of these famous lubricants especially refined and processed to assure *more power with less fuel over longer periods* between overhauls.

Texaco Ursa Oils are detergent and dispersive. They assure clean operation. This means no harmful deposits—rings stay free, valves seat properly, you

get full compression and complete combustion. Wear is reduced to a minimum. Both operating and maintenance costs are bound to come down.

For air compressors and hydraulic mechanisms, use *Texaco Regal Oil R&O*. It prevents rust and harmful deposits in compressor systems . . . prevents rust, sludge and foam in hydraulic systems.

For your drills, use *Texaco Rock Drill Lubricant EP*. You'll get longer drill life, and full protection against rust whether drills are running or idle.

Let a Texaco Lubrication Engineer help you simplify your lubrication and reduce your costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

ROCK DIGGING is ROCK DIGGING

Anywhere!



... and, it doesn't matter whether it's Dragline work or Shovel work, you want equipment that can produce and make money.

Here's one of several Northwest Model 95's on the \$12,000,000 Wishon Dam project for the Pacific Gas and Electric Co. near Fresno, California. The job involves three and a half million cu. yd. of material, mostly granite with 6,000 cu. yds. of concrete slab on the upstream face. The contractors are Morrison-Walsh-Perini, all of whom as individual contractors have been consistent Northwest users for many years. Here as always Northwests are showing their versatility and ability to produce.

Northwests make the Dragline jobs easy. They bring you a combination of advantages that let you get the most out of a job. Northwest Crawler Mechanism with self-cleaning action stands up under the abuse of long travel. Travel gears are fully enclosed and run

in oil. Adjustable Hook Rollers (most hook rollers are not adjustable) can be kept snug against the roller flange. Smooth swing, assured by Uniform Pressure Swing Clutches, makes spotting easier and reduces spillage at the truck. The "Feather-Touch" Clutch Control takes fatigue out of operation without resorting to complicated valves, pumps and tubing. Simplicity of design assures easy upkeep. The Northwest Cushion Clutch eliminates shock overloads *before* the overload reaches the machinery.

These and other Northwest advantages combine to make one out of every three Northwests sold a repeat order in the hands of successful contractors. You can plan to have a Northwest on your job. Write for full details or talk to a Northwest sales agent listed below.

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



call your local **NORTHWEST** Sales Agent

RENO, NEV., Sierra Machinery Co., Inc.
CHEYENNE & CASPER, WYO., Keremi Tractor & Equip. Co.
DENVER, COLO., Power Equipment Co.
MEDFORD, ORE., Cal-Ore Machinery Co., Inc.
SPOKANE, WASH., General Machinery Co.
WENATCHEE, WASH., Elliott Equipment Co.

PORTLAND, ORE., Balzer Machinery Co.
SALT LAKE CITY, UTAH, Arnold Machinery Co.
PHOENIX, ARIZONA, Superior Equip. Co.
EUREKA, CALIF., Brizard-Mathews Machinery Co.
REDDING, CALIF., Gerlinger Steel & Supply Co.

SAN FRANCISCO, CALIF.
255 Tenth Street
VERNON 58, CALIF.
3707 Santa Fe Ave.
SEATTLE, WASH.
1234 Sixth Ave. South

ARTICLES

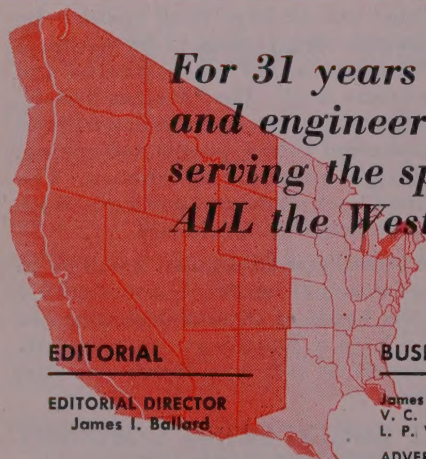
- Slurry seal—A review of California highway experience.** 25
By M. L. Nelson
- Glen Canyon Dam—A pre-bid description.** 28
By L. N. McClellan
- Building with prestressed concrete floors.** 36
By Sam Hobbs
- Fast earthmoving at Beardsley Dam.** 40
- Timber arch spans for warehouse roof.** 44
- California Water Plan moves ahead.** 53
- Highway signing in Wyoming.** 56
By Robert C. O'Connell
- Structural Design Chart—VII.** 61
By Thomas Haran

DEPARTMENTS

- Editorial Comment. 23
- News 68
- Contract Awards 76
- Engineers on the Move. 82
- Supervising the Jobs. 84
- Tricks of the Trade. 92
- Alaska Newsletter 98
- Reports from the Courts. 101
- New Literature. 102
- New Equipment. 108
- News of Distributors. 128
- Unit Prices 134
- Classified Advertising. 136
- Advertisers in This Issue. 138

FRONT COVER

AT their second annual dinner meeting the Beavers presented awards to eleven outstanding men who have been closely associated with construction in the West. The four on our front cover have been outstanding in directing field operations on notable projects. Biographical sketches are on page 70.



*For 31 years the construction
 and engineering publication
 serving the special needs of
 ALL the West and Alaska*



EDITORIAL

EDITORIAL DIRECTOR
 James I. Ballard

ASSISTANT EDITOR
 Robert L. Byrne

NEWS EDITORS
 May A. Carroll
 Hope Griswold

PRODUCTION MANAGER
 Patricia N. Mann

BUSINESS

James I. Ballard. President
 V. C. Dowdle. Vice President, Advertising Sales
 L. P. Vrettos. Secretary and Treasurer

ADVERTISING SALES

NEW YORK—Fred Lockwood, 121 North Broadway,
 White Plains, New York. Phone: White Plains 8-2801

CLEVELAND—Robert J. Lick, 313 East 216th St., Cleve-
 land 23, Ohio. Phone REDwood 1-8562

CHICAGO—Gordon H. Gannett, 1386 Asbury Ave.,
 Winnetka, Ill. Phone Rogers Park 4-4500

MILWAUKEE—Richard W. Morey, 765 No. 116th St.,
 Wauwatosa 13, Wis. Phone SPring 1-2511

SAN FRANCISCO—John R. Vanneman, 609 Mission St.,
 San Francisco 5, Calif. Phone YUkon 2-4343

LOS ANGELES—Jerome E. Badgley, 128 So. Mansfield
 Ave., Los Angeles 36, Calif. Phone WEbster 8-8512

WESTERN MANAGER
 Robert L. Logan, 609 Mission Street, San Francisco 5
 Calif. Phone YUkon 2-4343

Published monthly by

KING PUBLICATIONS

Publication office
 416 Wall Street
 Los Angeles 13, California

Editorial, advertising & circulation
 office

609 Mission Street
 San Francisco 5, California

CIRCULATION

CIRCULATION MANAGER
 James R. Stevens

For change of address, write Circulation Dept., 609 Mission St., San Francisco 5, Calif.

Subscription rate is \$6 per year in the U.S. and countries in the Pan American Postal Union. All other countries, \$7 per year. Single copies 50c.

Entered as Second Class Matter at the Post Office in Los Angeles, California, under the Act of March 3, 1879. Postmaster: Please send Notice 3579 to Western Construction, 609 Mission Street, San Francisco 5, California.

Copyright 1957 by
 King Publications

Toughest job in construction

TOUGHEST JOB in construction is that of "Inspector." It is the vital link between design and its fulfillment in the field. The inspector is too often underrated in the engineering organization and looked upon as a necessary evil by contracting forces. However, the function is essential in the contract system; inspectors and their problems deserve more understanding and upgrading from both sides.

It is grossly unfair to consider the inspector a detective trying to find intentional deviations from plans and written specifications. Any contractor with the attitude that the inspector is placed on the job to hunt for dishonesty does not deserve to be in contracting.

If all inspectors possessed ideal qualifications, if they had experience coming from years in engineering and contracting, if they had wisdom adequate for a supreme court judge, if they were masters in the art of human relations there would be little reason for the usual misunderstandings. However, there are factors that rule against complete harmony.

Inspectors are usually young engineers with a minimum of practical experience; tradition and economy make the job one for a beginner. The function can hardly justify a man qualified by years of training. Improvement must be in the direction of better personnel selection based on aptitudes, and more supervision and instruction.

It is a stubborn fact that an inspector has authority to point out deviations from specifications, but does not have corresponding authority to approve changes, however minor. This leads the contractor, or his harassed general superintendent, to complain that the inspector can always say "No," but is never able to say "Yes." This is not a fair or logical complaint. The function of the inspector begins and ends with seeing that field operations produce results called for in the plans.

Occasionally an inspector appears to take

delight in using his authority in situations that exhibit pure cussedness. To illustrate: Several years ago during an editorial trip over a job with the construction engineer we found the pouring of the invert in a by-pass tunnel temporarily shut down and the foreman fuming over the action of the inspector. The work stoppage resulted from the inspector finding boot tracks made by a finisher on the concrete surface and stopping the pour until they were removed. This was concrete to be covered by rock ballast for the railroad and at the end of construction the tunnel was to be permanently plugged. Such action of the inspector would appear to be lacking in reasonable judgment although it must have been in accord with the letter of the specifications. However, there is always the other side to such an incident. Possibly this inspector had been pushed around by the contractor's supervisory staff until he was waiting in desperation for some opportunity to retaliate and assert his authority.

Working under strict orders and guided by the legal phrases of the specifications, the inspector fills a most difficult position as he watches over the results of each day's work.

If he has the qualities of firmness with patience, and judgment with a desire to be correct but practical, he will fulfill his function on the construction team. And if the contractor advises his staff to appreciate the function of the inspector, even as they use their own methods for accomplishing the results he must secure, then the other half of the team is in harmony. This combination will result in securing the completion of the contract with minimum friction, maximum speed, and complete effectiveness.

Jim Ballard

Working around short-radius curves is easy for Austin-Western Power Graders . . . impossible for graders with front steer only.



AUSTIN-WESTERN POWER GRADERS

Twice as maneuverable...30% more power at the blade

Only Austin-Western offers you the unbeatable combination of all-wheel steer *plus* all-wheel drive *plus* torque converter drive in 4-wheel and 6-wheel models. All-wheel steer means top maneuverability . . . you ditch around sharp curves, move dirt up slopes from deep, wet ditches, grade super-elevated curves with no gouging or wasting. A-W Power Graders turn around on narrow roads with only one backup, travel quickly and easily where ordinary models cannot go, move the heaviest windrows farther and faster. All-wheel drive means that every pound of the machine is harnessed to a driving wheel — no idling wheels, no lazy front ends to use up power and lower efficiency. Every pound is working weight, contributing 100% to traction, utilizing the whole engine output, de-

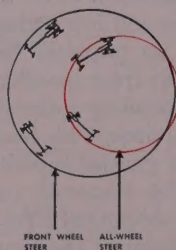
livering maximum power where it counts — at the blade.

Together, all-wheel steer and all-wheel drive make possible A-W's unique Controlled Traction. By offsetting the machine, the operator can put front and rear wheels where traction is best, can eliminate all side-thrust at the toe of the blade (usable over its entire length), and can balance the whole

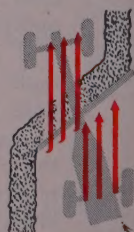
power of the grader against the load.

In addition, you get unusually versatile blade manipulation, and fingertip management of all blade and wheel movements by full hydraulic control. And A-W Power Graders have the most complete line of time- and labor-saving attachments in the industry. See your nearby A-W distributor. Or write us for detailed information.

The two circles above, with their 62 and 90-ft. diameters, illustrate the difference that all-wheel steer makes. This extra maneuverability saves time on every job, makes it possible to do more jobs—faster, easier and cheaper every month of the year.



All-wheel steer and all-wheel drive team up with the blade on A-W Graders—the rear drivers push behind the toe of the blade, the front drivers pull ahead of the heel of the blade. As a result, the machine moves straight ahead under perfect control.



AUSTIN-WESTERN WORKS



Construction Equipment Division

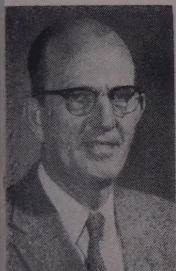
ARIZONA—
SHRIVER MACHINERY COMPANY..... Phoenix
CALIFORNIA—
EDWARD R. BACON COMPANY..... San Francisco 10
SMITH BOOTH USHER COMPANY..... Los Angeles 54
COLORADO—
MACDONALD EQUIPMENT COMPANY..... Denver 16
IDAHO—
ENGINEERING SALES SERVICE, INC..... Boise
MONTANA—
HALL-PERRY MACHINERY COMPANY..... Butte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

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

FEBRUARY 1957

SLURRY SEAL—where and how to use it

Emulsified asphalt slurry seal is rapidly becoming recognized as a valuable maintenance tool. But its value depends on an understanding of what it can and can't do, together with a knowledge of the best methods for its application. An engineer with the California Division of Highways, the agency which pioneered its development, brings the subject up-to-date.—EDITOR.



By
MERLE L. NELSON
Highway Engineering
Associate
California Division
of Highways
Sacramento, Calif.

THE WORDS "slurry seal coat" seem to have struck a rather magic chord for engineers in the field of construction and maintenance of highways and streets. This interest has not been domestic in scope as many requests for information relative to the process have been received from foreign organizations both public and private.

In character, the slurry seal mixture is not a new development. The writer can recall that many years ago a very similar mixture was used somewhat spasmodically for paving tennis courts and other small areas. The slurry process faded from interest and lay more or less dormant until some three or four years ago when the City and County of Los Angeles, California, started patching and crack filling on city streets and county roads with a mixture of fine sand, crusher dust and emulsified asphalt which they called "slurry seal." Full scale interest in the process began to materialize as the Los Angeles organization progressed in perfecting the mixture along with the technique of mixing

and applying it to the pavement surface in a full scale operation.

Details regarding the ingredients, composition and mixing techniques of the slurry have been well covered in prior publications and there is no need for much repetition here. A very comprehensive article on these details appeared in the February 1956 issue of *Western Construction*.

It's not foolproof

I should like to direct this article to potential users of the slurry seal treatment and to pass on some of the things which I have learned through participation, observation and discussion. First let me say that the emulsified asphalt slurry seal coat is funda-

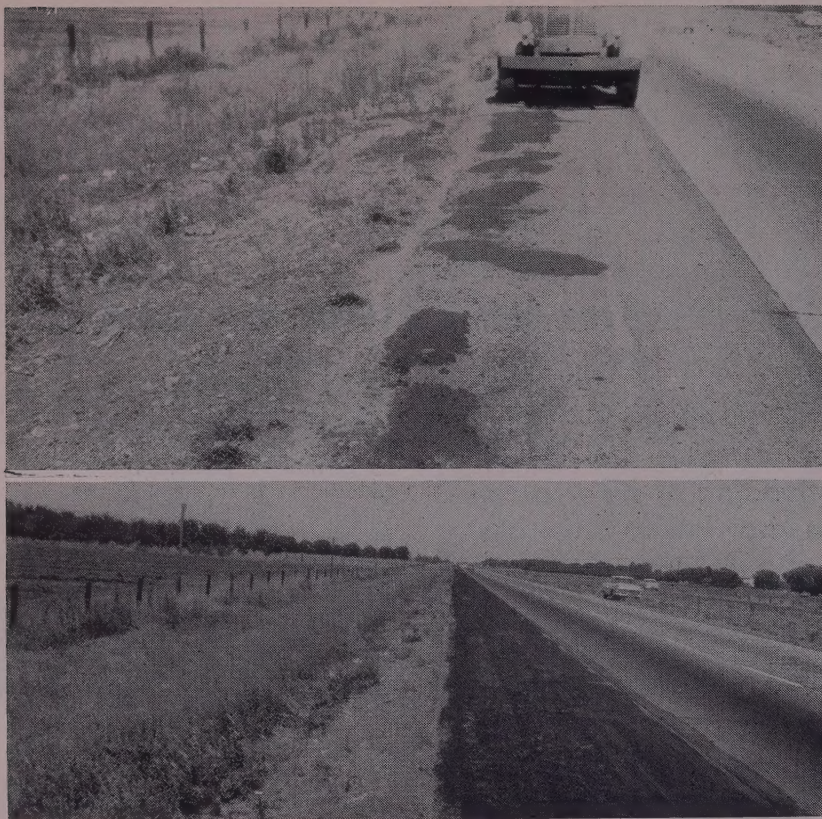
mentally a relatively simple process but one which will do a good job of surface treatment providing we realize its inherent limitations and capabilities. It has its pitfalls and is by no means foolproof either in its composition, application or function. By this I mean that certain basic controls must be exercised in all phases of the treatment and like any operational procedure there are tricks to the trade. Smooth operation and good results are achieved by experience.

Before deciding to use slurry seal we must analyze the condition which we are attempting to correct or improve and then have sufficient knowledge of the capabilities of the slurry seal to decide whether or not it will do the job. There is general agreement among experienced users of slurry seal that it cannot be used to build up a structural section and must be applied before structural deterioration of existing pavement has occurred to gain the benefits it can provide. We are here dealing with a mixture which has low inherent stability and must be used in relatively thin layers strictly as a surface treatment.

The mixture has excellent possibilities in rejuvenating old, dried and oxidized bituminous pavements; it dresses them up with a new look, uni-



LIMITATIONS OF SLURRY SEAL must be understood as well as its capabilities. In the case shown the blocks formed by alligator cracking were moving under traffic. Slurry seal did not correct.



SHOULDER REJUVENATION was very successful on this 25-mi. project. Shoulder was dry, raveled, and patched, giving a ragged appearance (top photo). Slurry provided protective coat (bottom).

form in color, and provides a good protective seal on the surface. It does a fine job of filling cracks in the old pavement and will remain in the cracks providing the slabs formed by the crack pattern are not rocking or moving unduly under traffic action. The old pavement must be cleaned thoroughly of all dirt and loose matter. Reports are that a tack coat of say 0.05 gal./sq. yd. of a dilute emulsion has proven beneficial in many cases.

Good for city streets

The slurry is very appropriate for use in city streets especially those of the smaller communities where budgets are usually on the lean side and the streets may be showing signs of wear in the form of raveling or some kindred distress which presents a rather unsightly appearance. Numerous applications of the slurry can be applied over a period of years maintaining a pleasing appearance while avoiding the problem of drainage interference and curb grade controls which must always be a consideration when treatments of greater thickness are employed.

There are numerous cases where slurry seal will provide an excellent and completely satisfactory surface

treatment at a very nominal cost if we exercise some caution in its use and make sure that the pavement we are treating is in a *structurally sound* condition.

Practical aspects

Fine aggregates, preferably minus No. 8 sieve size, mixing type asphaltic emulsion and water are mixed together to form a creamy-textured slurry which will flow smoothly and be of a proper consistency to flow into and fill all cracks, pits and minor inequalities in the pavement surface.

Consistency is of great importance. The mixture should flow in a wave approximately two feet ahead of the strike-off squeegee in order that the material may flow down into the cracks and pits in the pavement, thus filling them before the strike-off passes over. Another important point in this operation is to keep the spreader box moving after being charged with slurry. Any appreciable delay will result in the liquid draining from the mixture.

If the mixture is too stiff it will have a tendency to pile up immediately in front of the strike-off and instead of filling the cracks may simply bridge across them. For normal aggregates the amount of emulsion has

been fairly well established at about 18 to 20% by weight of the dry aggregates. The amount of mixing water will of course vary according to conditions but will normally be about 10 to 12% by weight of the dry aggregate. This of course includes the water already in the emulsion and whatever amount may be present in the aggregates.

The amount of either emulsion or water is, of course, a variable and must be selected to fit existing conditions. I would strongly recommend that trial batches be made prior to full-scale operations. Various grading specifications have been proposed for the aggregates but there is not much evidence that any stringent grading requirements are really necessary. It is my opinion that a fine sand or combination of sand and crusher dust which will all pass a No. 8 sieve, have 60 to 90% passing a No. 30 and say 3 to 10% pass a No. 200 sieve is about what we want. I witnessed one job where the aggregates were of No. 4 maximum size and the results were disappointing. The coarser particles would not pass freely under the strike-off and left streaks in the completed seal and also deposited clusters of the coarser aggregates resulting in a very poor appearance.

Mixing procedure

The mixing process must be given close attention if a satisfactory homogeneous mixture is to be obtained and this uniform quality must be obtained if the slurry is to do the job expected of it.

Due to its adaptability to speed and ease of operational procedure the conventional transit-mix concrete transports are pretty much standard equipment. The mixing action of the transit mixers leaves something to be desired in the slurry seal process and it is my opinion that a mixer on the order of the plaster mixer with paddles which cut through the mixture would do a much more thorough job. But the transit mixer, with its other made-to-order functions seems to be the best bet yet. The mixer can be readily washed clean with water immediately after discharging the slurry. Something which can be troublesome in the mixing operation is an occasional tendency for the mixture to form into balls the size of baseballs or larger. These balls form in the transit mixer and are coated on the outside with the emulsion but when broken open consist of completely raw and uncoated aggregate particles. These balls can be broken up as they appear in the spreader box thus permitting the uncoated particles to

become coated as they pass under the strike-off squeegee. They can be rather troublesome if they become too numerous.

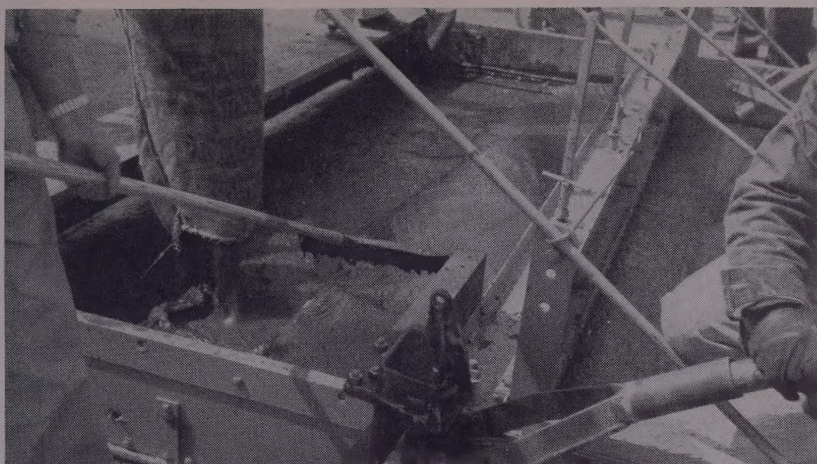
How to avoid balling

On one job the plaster sand crusher dust and water emulsion mixture were each added as a separate and individual component with the result that balling was quite a problem. Some investigation revealed that the culprit was the fine crusher dust which was forming into balls upon contact with the liquid. This problem was almost entirely eliminated by blending the sand and the dust together before adding to the liquid mixture. Apparently the sand provided the necessary effect to break up the congregating of the fine particles of dust. Another method of adding the components of the mixture reported by our District VII Maintenance Department in Los Angeles as working very satisfactorily is to add all of the ingredients simultaneously by weighing the aggregates for each batch prior to entering the mixer and by metering the emulsion and water.

With a little preliminary experimenting and after observing a few batches of the slurry it becomes relatively easy to judge the proper consistency of the mixture. In the event that the mixture arrives on the job too "stiff" to be workable, water can be added to the mixture as it comes from the discharge chute of the transit mix to the spreader box.

There appear to be certain types of aggregates which are critical to an excessive amount of mixing water in that the mixture as it cures on the road will tend to become stratified through the apparent migration of the asphalt particles. This condition may not always be the result of an excess of water, it may be due to some characteristic of the aggregates or the emulsion. In any event, should this condition arise, latest reports are that the addition of a small amount of filler such as a commercial limestone dust say 1.0% by weight of the dry aggregate is very beneficial in correcting the trouble. Limited experiments have indicated the slurry seal may be a very satisfactory method of deslicking worn and polished P.C.C. pavements which have become smooth textured to the point of presenting a skid hazard. The slurry sticks tenaciously to the concrete and provides a sandpaper finish.

On a recent project some 20 or 30 lineal miles of 8-in. shoulder was treated with slurry seal. The shoulder was adjacent to the travel lanes of a



SPREADER BOX above was designed by District VII maintenance forces serving the Los Angeles area. In right foreground the workman is operating a side-mounted steering wheel.

4-lane divided highway paved with P.C.C. The shoulder was constructed of a granular material and had been surfaced with a penetration treatment of asphalt. The surface of the shoulders was becoming very dry and raveling was in evidence as well as numerous patches which all in all presented a somewhat ragged appearance. The shoulders were structurally sound and the surface intact. The slurry seal provided a pleasingly uniform color throughout in addition to rejuvenating and providing a protective seal over the shoulders and the delineation between shoulder and concrete pavement was remarkable.

The spreader box

The spreader box is, of course, a very important and necessary part of the slurry process. The writer has seen a good many variations ranging from the very crude which was little more than a drag to the elaborate with all the refinements. A satisfactory spreader box and one which has spread many miles of slurry seal is shown in the accompanying photographs. This box was designed and built by the California Division of Highways, District VII maintenance forces serving in the Los Angeles area. The box spreads one traffic lane width. Heavy rubberized belting is fastened to the inside of the side members by bolts and a heavy metal strip. The belting material should be slotted at the bolt holes so that it can be raised or lowered to make contact with the pavement surface to prevent the slurry from escaping under the bottom of the side members which are also the runners. The center cross member, the strike-off or "squeegee," is a heavy piece of neoprene rubber with sufficient flexibility to maintain

contact with the pavement surface in depressions and compress sufficiently to pass over high spots. The squeegee is fastened to the bottom of the cross member which is sectional and can be adjusted for the crown of the existing pavement by means of the adjustment screws visible in the photograph. A wheel is mounted on the side which operates on a hinge principle and has a piece of 1½-in. pipe for a lever to apply pressure to the wheel. A man riding on the small platform provided on the rear of the spreader box simply applies pressure with the lever and the box will follow the tow truck in a perfectly straight line. Without the guide wheel the result is usually a snake track edge pattern.

A very desirable feature has since been added to the style of box shown here. Three longitudinal members to serve as baffles have been installed between the middle or strike-off cross member to the cross member forming the front of the spreader box. This feature provides for compartments and on cross slopes or excessive crown prevents the slurry from all flowing to one side of the box. One or both of the outside members forming these compartments can be moved toward the center to take care of spread widths of less than a full traffic lane.

I believe we have a good and relatively low cost surface treatment in this process and I sincerely hope that anyone contemplating its use will think of it as a surface treatment or dressing, realize its limitations.

In other words, don't try to build a structural section out of slurry seal. If the pavement has deteriorated to the extent that a 1-in. blanket or heavier structural build-up is indicated, don't expect slurry seal to do the job.



A pre-bid look at site and construction problems of . . .

GLEN CANYON DAM



By L. N. McCLELLAN

Assistant Commissioner and Chief Engineer
Bureau of Reclamation
Denver, Colorado

CONSTRUCTION of the second highest dam in the United States will begin early this year. It is the Glen Canyon Dam, a key structure of the Bureau of Reclamation's Colorado River Storage Project. The project was authorized by the Congress in the spring of 1956 to develop the land and water resources of the Upper Colorado River Basin, a 10,000-sq. mi. area containing a rich potential of agricultural, industrial, and recreational assets.

Glen Canyon Dam, to be about 700 ft. high above its foundation—second in height only to the 726-ft. Hoover Dam—will be built on the Colorado River in north-central Arizona, about 15 river miles upstream from Lees Ferry and 12 river miles downstream from the Arizona-Utah state line. It is about 370 mi. upstream from

Hoover Dam on the Lower Colorado River.

Glen Canyon Dam is designed to serve multiple purposes by creating a reservoir for conservation storage, power generation, silt retention, recreation, and fish and wildlife conservation. It will be a concrete arch structure having a volume of 4,770,000 cu. yd., a crest length of 1,500 ft., and a maximum thickness at the base of 300 ft. The reservoir will have a capacity of 28,040,000 ac. ft. and will extend 186 mi. up the Colorado River and 71 mi. upstream on the San Juan River. Glen Canyon reservoir and other storage units in the Upper Colorado River Basin will provide hold-over reserves of water to meet terms of the 1922 Compact of the Colorado River. Glen Canyon Powerplant, to be built concurrently with the dam,

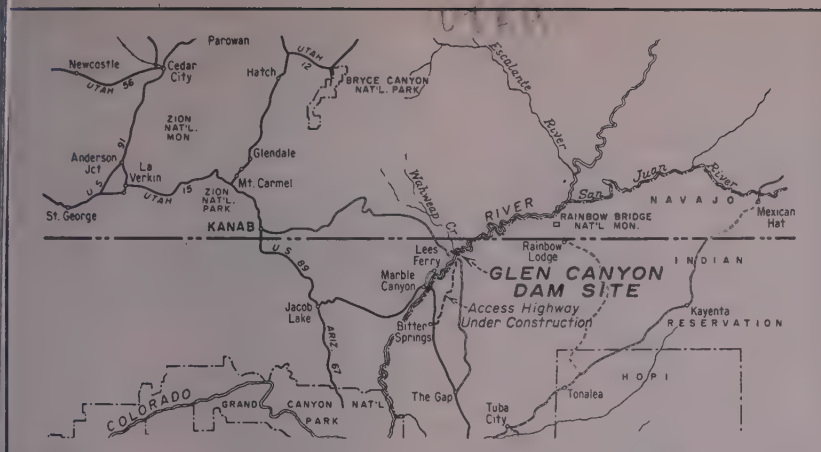
has been designed to include an installed capacity of 900,000 kw.

Problem of access

By virtually any construction standard, access to the remote Glen Canyon area imposes major problems in the transportation of supplies and equipment from established areas to the site. As an illustrative example, although it is approximately 1,200 ft. from one rim of the canyon to the other at the dam site, it was necessary, until recently, for vehicular traffic to go 225 mi. to get from one side of the canyon to the other.

Flagstaff, Ariz., a railhead, is 135 mi. from the dam site; the railhead at Marysville, Utah, is 200 mi. from the dam site, via Kanab, Utah, the nearest town.

First major construction at the dam site began Oct. 2, 1956, following award of a \$2,452,340 contract to Mountain States Construction Co., Denver, for construction of the right (west) diversion tunnel. The 2,740-ft. tunnel has a diameter of 43 ft. 6 in. in its upstream portion and a diameter of 46 ft. 6 in. in its downstream portion.



REMOTENESS of location is a major problem in construction plans for Glen Canyon Dam. Kanab, Utah, is the nearest town, and Flagstaff, Ariz., 135 mi. south, is the nearest railroad. Until recently it was necessary to drive 225 mi. to get a vehicle from one side of the site to the other.

GLEN CANYON DAM AND POWERPLANT Principal Quantities Required for the Dam, Spillway, Outlets and Power Features

Excavation, common, for dam and powerplant	985,000	cu. yd.
Excavation, rock, for dam and powerplant	1,650,000	cu. yd.
Excavation, all classes, in open cut for spillways	1,325,000	cu. yd.
Excavation, all classes, in spillway tunnels	132,000	cu. yd.
Excavation, all classes, in diversion tunnels	182,000	cu. yd.
Concrete in dam	4,770,000	cu. yd.
Concrete in spillway and diversion tunnel lining	110,000	cu. yd.
Concrete in appurtenant structures, except powerplant	155,000	cu. yd.
Concrete in powerplant	157,000	cu. yd.
Reinforcement	28,900,000	lb.
Tubing and fittings for grouting	755,000	lb.
Tubing and fittings for cooling concrete	4,650,000	lin. ft.
Spillway radial gates and hoist	1,950,000	lb.
Penstock and outlet pipes	21,000,000	lb.
Fixed-wheel gates and hoists for penstocks	3,180,000	lb.
Ring-follower gates and hollow-jet valves for outlets	1,300,000	lb.
Trashrack metalwork	1,880,000	lb.
Structural steel for powerplant superstructure	4,250,000	lb.
All other metalwork required for the dam, outlets, spillways and power features	5,140,000	lb.

Specifications calling for bids for construction of the dam, powerplant, and the left diversion tunnel, having the same diameters as the right diversion tunnel but a length of 2,900 ft., were planned to be issued early in January.

The principal quantities required for the dam, spillway, outlets, and power features are shown in the accompanying tabulation. Most of the materials listed will be supplied and installed by the general contractor during the period of the contract,

which is expected to extend for about 7 years. In addition to these materials, the Bureau will purchase the larger items of special machinery and equipment under separate advertisements to be issued as soon as designs have been completed.

In the following summary, plans for construction of the Glen Canyon Unit of the storage project are briefly discussed to indicate the scope of the development and the many challenging construction problems to be resolved.

Glen Canyon dam site

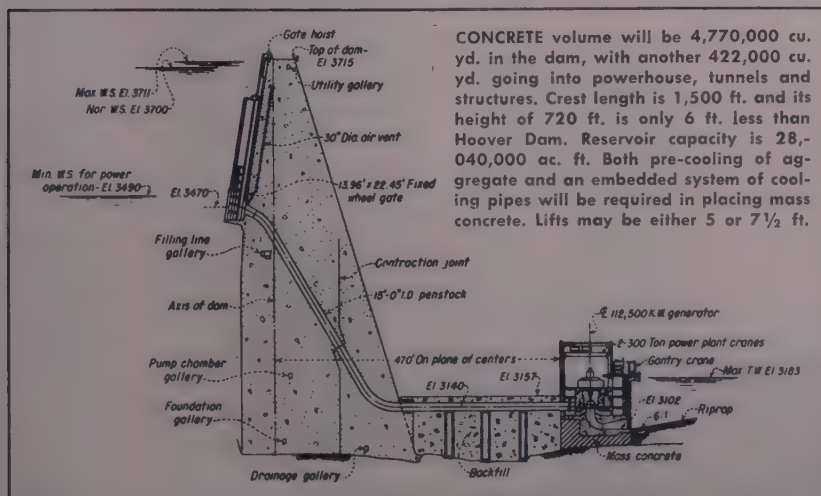
Glen Canyon covers a 176-mi. section of the Colorado River Basin from the lower end of Cataract Canyon, 14 mi. above Hite, Utah, to Lees Ferry, Ariz. This canyon is one of the spectacular cuts by the Colorado River. Throughout most of its length, Glen Canyon is a narrow river gorge confined by massive sandstone walls variable in height, the maximum being 1,200 ft. above river level. At Lees Ferry, the lower terminal of the canyon, the nearly vertical walls recede, and the river flows for a short distance in a relatively open valley before entering the narrow gorge of Marble Canyon.

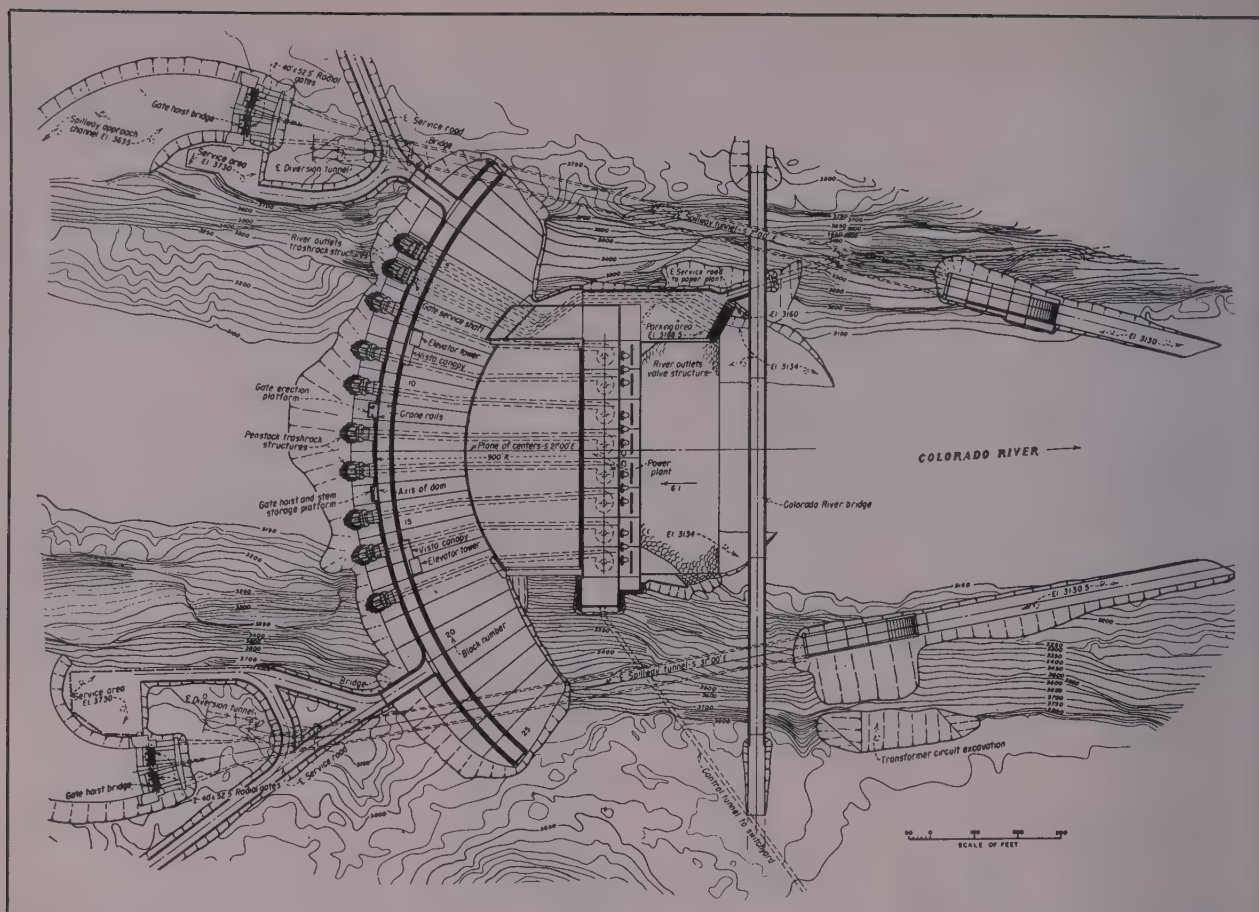
Above the rim of Glen Canyon and extending for some distance on either side is a gently rolling upland plain dotted with isolated buttes and mesas and cut at intervals by deep narrow canyons leading into the Colorado River. The entire area is a vast expanse of wasteland, uninhabited except for a few ranchers on the northwest side of the river and scattered Indian families on a reservation to the southeast.

The Glen Canyon area is a small but typical part of the Colorado Plateau Province, a vast area of nearly horizontal sedimentary rocks that have been elevated without materially disturbing the component layers. It is essentially a country of broad, cliff-edged mesas cut by narrow, steep-walled canyons.

The dam site lies in a narrow straight-walled section of Glen Canyon about 1 mi. below the mouth of Wahweap Creek. At this site, the sides of the canyon rise abruptly from the bed of the river in nearly vertical walls 650 ft. high.

Both abutments and the foundation area at the site are in the Jurassic Navajo sandstone. The Navajo formation is a massive, highly cross-bedded, buff to red, medium- to fine-grained sandstone made up essentially of white and pink quartz grains and a few grains of other minerals.





EIGHT generators will have a combined capacity of 900,000 kw. The double spillway will handle 276,000 sec. ft. Diversion during the construction period will be through the spillway tunnels. Mass concrete

will rise in columns, as large as 55 x 170 ft. in section at the base. Cement content is now anticipated to be 2 sacks of portland cement and 1 of pozzolan per yd. Concrete will be placed at 50 deg.

GLEN CANYON DAM, RESERVOIR, AND POWERPLANT Physical Data

DAM

Type	Concrete arch
Height above river bed	580 ft.
Height above lowest point in foundation	700 ft.
Crest length	1,500 ft.
Crest width (width of roadway)	35 ft.
Base width	300 ft.
Concrete in dam	4,770,000 cu. yd.
Crest elevation	3,715
Maximum discharge through spillways	276,000 sec. ft.

RESERVOIR

Capacity	28,040,000 ac.-ft. at normal water surface elevation 3,700
Area	164,000 ac. at normal water surface
Elevation maximum water surface	3,711
Length	186 mi.

POWERPLANT

Capacity	900,000 kw.
Number of units	8
Capacity of each generator	112,500 kw.
Capacity of each turbine	155,500 hp.

The climate in the vicinity of the dam site is dry. Summers are hot and winters are relatively mild. Maximum recorded temperatures for June and July are 114 deg., a minimum temperature of 2 deg. has been recorded

in December and January. Snowfall is light and will not create any construction problem. For the past 20 years of record at Lees Ferry, the average annual snowfall was about 4 in. Annual precipitation is 6 in.

DAM CONSTRUCTION

For construction of the dam, the contractor will be required to erect and maintain a complete concrete plant. The plant will include equipment for processing, conveying, and stockpiling concrete aggregates; storage and handling facilities for both cement and pozzolan; mixing and batching facilities; refrigerating equipment for cooling aggregates and mixing water; and a cableway or other means of conveying the concrete to and placing it in the dam.

Aggregates to be used in the concrete for the dam will probably be obtained from Government-owned property known as the Wahweap deposit, located on Wahweap Creek about 7 mi. upstream from its junction with the Colorado River. The aggregate will require washing and some wastage to obtain the desired quality and grading. As the aggregates are potentially reactive with alkalis in cement, low-alkali cement will be called for in the dam.

It is anticipated that the mass concrete for the dam will contain about two sacks of portland cement and one

sack of pozzolan per cubic yard. About 3,000,000 bbl. of cement and 225,000 tons of pozzolan will be used.

The dam is to be divided into columns or blocks by radial and circumferential contraction joints. Blocks will range in size from 55 x 170 ft. in the downstream portion at the base to 70 x 130 ft. in the upstream portion. To insure monolithic action of the dam and to secure the desired stress distribution in the structure, the contraction joints will be grouted. For the injection of grout into the joints, a system of pipes is to be embedded in the concrete adjacent to the contraction joints.

Contraction joints are to be interlocked by keys formed to provide a maximum cross-sectional area for resistance to shear after grouting. The contractor will have the option of placing the concrete in the dam in either 5- or 7½-ft. lifts. The rate of placing concrete in any block will be restricted so that not more than one horizontal lift can be placed in 72 hr. A maximum vertical difference of 25 ft. in the top surface of adjacent blocks will be permitted.

Temperature control measures will consist primarily of precooling the various parts of the concrete mix to obtain concrete placing temperatures of not more than 50 deg. F., and of artificially cooling the concrete by an embedded pipe system to temperatures of between 40 and 50 deg. Precooling measures will include cooling the aggregate either by immersion in an ice-water bath or by refrigerated air blasts, cooling the mixing water and by adding slush or chip ice to the mix.

In addition to the refrigerating capacity required to carry out this precooling, there must be added the cooling load from the embedded pipe system which is needed to cool the concrete so that the contraction joints in the dam can be filled with cement grout before the reservoir water load is placed against the dam. About 950 mi. of pipe or tubing will be embedded in the concrete of the dam to accomplish the artificial cooling.

Foundation treatment

The general plan for grouting the foundation rock will consist of low-pressure shallow grouting at the upstream face of the dam, followed by grouting a high-pressure deep curtain in the same area. The low-pressure grouting will be done through holes drilled on 20-ft. centers to a depth of 25 ft. prior to placement of concrete. After concrete has been placed to a sufficient height, the deep high-pres-

COLORADO RIVER STORAGE PROGRAM

As authorized by the Congress, the Colorado River Storage Project provides for construction of four major units and twelve participating projects. Expenditures, not to exceed \$760,000,000, were authorized by the Congress to carry out the construction.

The four storage units—Glen Canyon, Flaming Gorge Dam and Powerplant on the Green River in Utah, Navajo Dam on the San Juan River in New Mexico, and the Curecanti Unit on the Gunnison River in Colorado—will provide about 34,500,000 ac.-ft. of reservoir capacity. Glen Canyon and Flaming Gorge powerplants will have an installed generating capacity of about 1,000,000 kw.

Of the twelve participating projects, which include the existing Eden Project in Wyoming, four are in Wyoming, two in Utah, one in New Mexico, and five in Colorado. These participating projects will supply water to irrigate more than 130,000 ac. of presently dry land and supplemental water to about 230,000 ac. of land now irrigated.

Development of the Upper Colo-

rado River Basin, through the basic storage project and participating projects, will also make possible the development of the Upper Basin's vast resources of fuel, oil, minerals, and timber. It will also meet the urgent need for water to supply municipalities. Other benefits will be obtained in the Upper Basin from recreation, flood control, and fish and wildlife conservation, and in the Lower Basin from sediment retention and river regulation for power production and flood control.

Virtually all of the costs of constructing and developing the four-dam storage project and the participating projects are reimbursable. Power revenues will be used to repay costs of construction which are beyond the ability of the water users to carry. Interest will be paid on costs allocated to power and to municipal water, including interest during construction. Irrigation revenues from the participating projects will pay the operation, maintenance, and replacement costs of these projects allocated to irrigation, and, in addition, will repay a part of the capital cost.

sure grouting will be done through holes drilled from the foundation gallery at 10-ft. centers and at depths varying up to 250 ft.

Drainage of the foundation will be provided by a series of holes drilled into the foundation rock from the floor of a main foundation gallery and from the roof and floor of the foundation tunnels which will extend into each abutment. A second foundation gallery parallel to and downstream from the main foundation gallery will be located in the dam and drainage holes will be drilled from this gallery if future foundation drainage conditions require them. Drainage from the foundation galleries will be collected in a sump off the lowest point in the gallery system and pumped out of the dam.

Powerplant construction

Glen Canyon Powerplant is to be constructed about 470 ft. downstream from the axis of the dam. It will be a reinforced concrete structure 665 ft. long, 113 ft. wide, and 150 ft. high above foundation. The powerhouse superstructure will be a structural steel frame having reinforced concrete enclosure walls. The roof will be built of precast concrete slabs and cast-in-place concrete. Specifications will offer the contractor the alternative of placing either precast panel walls or cast-in-place walls in the superstructure.

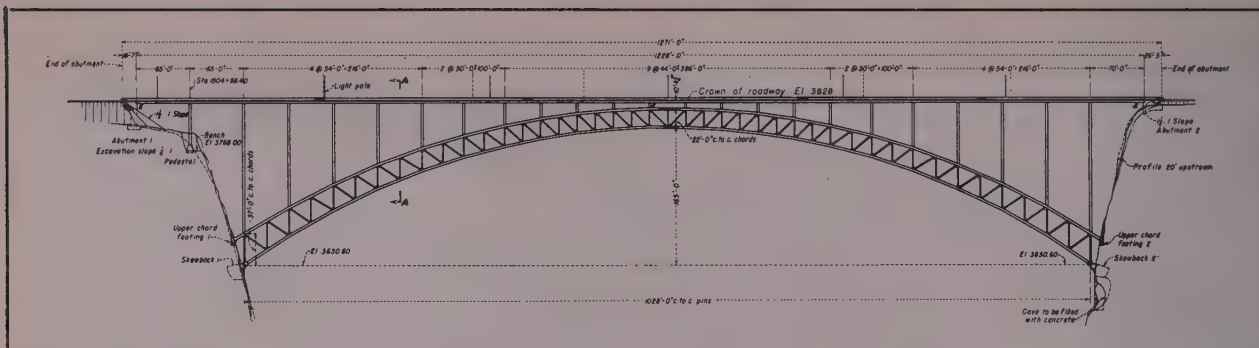
Construction of the powerhouse will be carried out in two stages. First-stage construction, which is to be part of the prime contract for the dam, will include placement of 87,000 cu. yd. of structure concrete, 10,700,000 lb. of reinforcing steel, and 4,250,000 lb. of structural steel. In addition, 60,000 cu. yd. of mass concrete are to be placed beneath the powerhouse.

Second-stage construction, which will be carried out under a separate completion contract, will include placement of 30,000 cu. yd. of concrete and 3,000,000 lb. of reinforcing steel. The completion contract, to be awarded after completion of the major portion of the prime contract, will call for installation of the generating equipment, exposed piping and electrical conduits, architectural finish, heating and ventilating equipment, and other finish work.

The powerplant is designed for an ultimate installation of eight 112,500-kw. generating units. Capacity of each turbine is 155,500 hp.; rated head is 450 ft. Water will be conveyed to each generating unit through a 15-ft. steel penstock embedded in the dam. The penstocks emerge at the toe of the dam and span the intervening distance between the toe and the powerhouse on concrete piers.

Hydraulic features

Spillway tunnels having their en-



ACCESS TO, and around the Glen Canyon Dam site is a major problem of the construction program. Rather than a temporary bridge for construction, the Bureau will build this 1,028-ft. steel arch located 865

ft. downstream from the dam axis (see plan). Deck is 700 ft. above river level. Arizona and the Bureau of Public Roads will participate in the cost of this permanent highway facility.

trances about 600 ft. upstream from the dam will be used to pass flood waters. The inflow design flood was based on a combination of snow and rain floods during the months of April, May, June, and July. Peak discharge is 380,000 sec. ft. and has a total volume of 29,060,000 ac.-ft. This peak discharge is about 1.7 times as large as the maximum recorded discharge of 220,000 sec. ft. which occurred June 18, 1921. By storing about 1,850,000 ac.-ft. of the flood waters, the maximum discharge through the spillways will be 276,000 sec. ft. An additional 15,000 sec. ft. of the flood will be discharged through the outlets and 10,000 sec. ft. through four units of the powerplant.

Crests of the entrance channels for the spillway tunnels are controlled by two 40 x 52.5-ft. radial gates for each tunnel. Tunnels will each be concrete lined and will have transitions from the crests to 41-ft. diameter tunnels. Lining of both tunnels is to be done under the dam contract. Ski-jump buckets at the downstream ends of the spillways will raise the water so that it will be deflected into the center of the river channel.

Although entrance channels of the spillway tunnels will be unlined, the discharge velocities of the water, as high as 162 ft. per sec., will require that the elbow areas have a special finish to minimize cavitation.

From hydrological investigations, the following flood frequencies have been determined in analyzing the diversion of the river:

PEAK

5-year flood.....	118,000 sec. ft.
10-year flood.....	150,000 sec. ft.
25-year flood.....	196,000 sec. ft.

MAXIMUM 15-DAY VOLUME

5-year flood.....	2,723,800 ac.-ft.
10-year flood.....	3,180,000 ac.-ft.
25-year flood.....	3,550,000 ac.-ft.

Closure of the left diversion tunnel

will be in two stages. Initial work will install the first section of the tunnel plug containing three 4x5-ft. high-pressure slide gates. This will be accomplished during the low-flow season when the flow of the river will be confined to the right tunnel. The gates in the plug section will control the discharge downstream and will allow storage in the reservoir to begin when the right tunnel is closed.

Final closure of the left tunnel will be made when the reservoir fills to the level at which the river outlets in the dam can supply minimum downstream releases of 3,000 sec. ft. At this time, the slide gates will be shut, the gate passages and chambers filled with concrete, and the final section of the concrete plug installed.

Closure of the right diversion tunnel should be scheduled in time to store the spring runoff in the reservoir. It is contemplated that a normal spring runoff with minimum downstream releases will fill the reservoir to minimum power storage level. During the closure the contractor will be required to release 1,000 sec. ft. through his closure structure until sufficient head is available to pass 1,000 sec. ft. through the gates in the left tunnel plug. After final closure at the upstream portal, construction of the concrete tunnel plug can begin.

The river outlets, located on the left abutment, will provide river releases for downstream commitments when the powerplant is not in operation and when final closure is made of the diversion tunnels. Capacity of the outlets is 15,000 sec. ft. at minimum water surface elevation. Outlets consist of four 96-in. steel pipes controlled by hollow-jet valves and have ring-follower gates for emergency closure. The intakes are at an elevation 10 ft. above estimated 100-year silt level, and will be protected from trash and debris by concrete trashrack structures on the upstream face of the dam.

COLORADO RIVER BRIDGE

A striking feature of the Glen Canyon construction is the Colorado River bridge about 700 ft. above river level. The bridge, to be built 865 ft. downstream from the axis of the dam, is to be a single span steel arch, having a rise of arch of 165 ft. and a length of 1,028 ft. It will have a reinforced concrete deck for a 30-ft. roadway and two 4-ft. sidewalks, one on each side of the roadway.

Live load design is based on the loading of a 20-ton truck followed by a 16-ton trailer, in accordance with the latest requirements for the Interstate Highway System. The concrete foundations, or skewbacks, supporting the arches are to be placed in sound rock of the Navajo sandstone formation at each canyon rim where geological joints are at a minimum.

Specifications for the bridge call for the contractor to furnish and install 8,000,000 lb. of structural steel, 250,000 lb. of reinforcing steel, 100,000 lb. of handrailing, and 1,000 cu. yd. of concrete in the bridge deck.

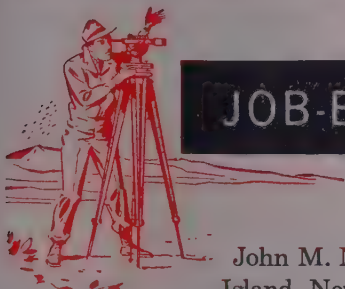
The bridge is to be built under an agreement with the State of Arizona which calls for the Bureau of Reclamation to pay from its own funds \$1,800,000 (the amount a temporary bridge would cost), and the Bureau of Public Roads \$600,000. Arizona will pay the remaining costs, except in the event that the cost should run over \$3,200,000, the United States will pay 75% of the amount of such excess cost.

Access roads are problem

To overcome the difficult problems of access to the remote dam site and to assure a steady flow of materials and supplies for construction, the Department of the Interior entered into an agreement with the State of Arizona which called for construction and maintenance of a 25-mi. access



Building a Highway Bridge in Fort Edward, New York



JOB-ENGINEERED FINANCE PLANS



John M. Mullins, Inc. of Green Island, New York puts highway bridge members in place so that Route 4 in Fort Edward, New York can hurdle this stream. Mr. Mullins subcontracted the steel erection as part of the Collins Brothers Construction Company prime contract.

Mr. Mullins finds C.I.T. Corporation very useful in his day-to-day operations. He feels this way, "C.I.T. capital loans have helped

me expedite my jobs and complete them profitably."

Why not check ahead on your spring job schedule? You may find that a C.I.T. capital loan can strengthen your cash position—put you in a position for more jobs. Perhaps you have gaps in your equipment fleet. C.I.T. equipment financing can put powerful new roadbuilding machines to work for you quickly. Call or write the nearest office below for immediate assistance.

C.I.T. CORPORATION

MACHINERY AND EQUIPMENT FINANCING

416 West 8th St.
Los Angeles 14, Calif.

120 Montgomery St.
San Francisco 4, Calif.

Equitable Bldg.
Portland 4, Oregon



road 34 ft. wide to the site of the dam and the Colorado River bridge. The agreement with Arizona makes it possible to bring the road up to the standards of a primary highway—beyond temporary construction needs of the Bureau of Reclamation—and is the first step toward a permanent loop off U. S. Highway 89. The terminals are in Kanab, Utah, and Bitter Springs, Ariz., a distance of about 96 mi.

The highway and bridge will permit ready access to the dam site from presently existing improved highways over which construction materials and equipment will be trucked from the railheads. The highway will also provide a tourist route to the scenic recreational area and reservoir created by construction of the dam.

The arrangement with Arizona is made possible by an easement signed by the Navajo Tribal Council for use of land to be crossed in the Navajo Indian Reservation. It is also keyed into participation by the Bureau of Public Roads, which agency will provide additional funds needed to bring the Colorado River bridge to the standards of a primary highway.

Construction of the highway is being carried out under two contracts—a 4½-mi. section, running from Bitter Springs under a \$1,156,234 contract held by the Strong Company of Springville, Utah; and a 20-mi. section, completing the highway to the bridge site, under a \$1,011,819 contract awarded to W. W. Clyde & Co., also of Springville, Utah. Both contracts are for construction of the roadway up to subgrade and the installation of pipe culverts. Surfacing will be completed under separate contracts. Although the amounts for the two contracts are similar despite the difference in mileage involved, they are offset by the large quantities of rock excavation required under the Strong Company's contract.

The Clyde Company's contract includes construction of the Waterholes Canyon bridge, 9 mi. south of the dam site. The bridge is a reinforced concrete articulated frame structure, having a clear span of 97½ ft. a roadway width of 34 ft., and a total length of 140 ft.

The Bureau has constructed a temporary access road extending from the Colorado River bridge site on the west side of the river to the Utah-Arizona border. Utah has completed a link of largely unimproved road from the border to Highway 89 at Kanab. Arizona has also completed a temporary road from The Gap on

Highway 89, which is being used for access to the east side of the dam site.

Ford-Fielding, Inc., of Provo, Utah, under a \$36,801 contract, is completing the gravel surface of the 8-mi. road to the Utah border and the 3-mi. road from the Wahweap Creek gravel beds to the road running from the state line to the dam site.

This contractor is also building a 3,000-ft. airstrip 80 ft. wide which will be near the 8-mi. section of road from the dam and which will be suitable for use by light airplanes. The airstrip extends in a northeasterly direction and is about 2 mi. northwest of the dam site.

Glen Canyon community

Because of the remote location of the project from existing towns, it is necessary to construct a complete community near the site. This community will house both the forces required by the contractor in the construction of the dam and powerplant and the Bureau's administrative and engineering personnel supervising construction.

The contractor may employ an estimated 4,000 people at the peak of construction, which would represent a population of about 6,000; to this would be added a Government force of about 500, representing a population of about 2,000. Thus the Glen Canyon community will have a total estimated population of about 8,000.

This town will be similar in many respects to Boulder City, Nev., constructed in the early 1930's by the Bureau for the Hoover Dam Project, except that private enterprise will be encouraged to develop community facilities to the fullest extent practicable.

The Glen Canyon community will be a modern urban development, having bituminous-surfaced streets,

electric street lighting, and water purification and sewage disposal systems. The streets will be curved and patterned to conform to the topography. Space will be provided for a school, playgrounds, hospital, shopping center, parks, and other community facilities.

As soon as definite locations are established, the Bureau will construct for its employees 125 three-bedroom permanent houses and 75 two-bedroom houses (masonry unit construction), and 130 three-bedroom and 60 two-bedroom wood-frame temporary houses. Also to be built are an administration building, a garage and fire station, a laboratory, and a warehouse. Current plans call for contemporary architecture in the design of the houses and buildings. They will be air-conditioned to assure comfortable living conditions during hot summer months.

This community construction will be undertaken under various Bureau specifications which will require the contractors to furnish and install all materials. In the meantime, portable, five-room houses for use at the dam site are being built under a contract awarded last August to Transa Homes, Inc., Fullerton, Calif. These portable houses are to be completed with heating, plumbing, and electrical systems and ready for installation and connection to utilities to be provided under future contracts.

Personnel

W. A. Dexheimer, whose offices are in Washington, D. C., is Commissioner of the Bureau of Reclamation. The storage project is in the Bureau's Region 4; E. O. Larson is Regional Director. L. F. Wylie is project construction engineer for the Glen Canyon Unit; his office is at Kanab, Utah.

San Luis Project report to Congress

A BUREAU OF RECLAMATION report on the economic and engineering feasibility of the proposed San Luis Unit of the Central Valley Project in California has been forwarded to the Congress. Secretary of the Interior Fred A. Seaton announced recently.

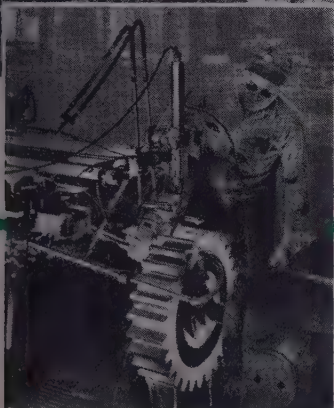
The San Luis Unit would provide a full water supply to 440,000 ac. of land along the west side of the San Joaquin Valley. Most of this land is presently irrigated by pumping from private wells but the water supply is being rapidly depleted and it is estimated that not more than 150,000 ac.

can be sustained in permanent irrigated agriculture without additional water being made available.

The major works reported upon—estimated to cost approximately \$229,000,000—include the million-acre-foot initial capacity San Luis Reservoir, the San Luis pumping plant to pump water from the Delta-Mendota Canal, and a system of main canals through the irrigated area. In addition to the major features of the San Luis Unit, other features—principally the distribution system—would cost an estimated \$170,000,000.



Cutting a new highway through a peat bog, 15 feet deep in spots, is this $\frac{3}{4}$ -yd. Bucyrus-Erie 22-B dragline owned by K. L. Goulter & Son, Seattle. The job was located between Lake Stevens and Everett, Wash.



Most gears and pinions are flame hardened to give them the strength and hardness needed for most efficient service.

How Bucyrus-Erie's Close Attention to Quality Pays Off For You

Close attention — during manufacture — to the little things that mean outstanding quality — that's the basis for the fine performance you get with a Bucyrus-Erie excavator or crane. Take the steels they're made of, for example. To the naked eye there is very little difference, in comparison with other machines. But a microscopic examination of vital parts would show the many important *little* differences that together make such a *big* difference in performance on the job.

At Bucyrus-Erie, hammer forging, annealing, heat treating, case hardening, and flame hardening — each

process is applied where it contributes most to strength, toughness, and hardness. The most modern arc welding is used, plus stress relieving by heat treating, where this will contribute greater strength and longer life.

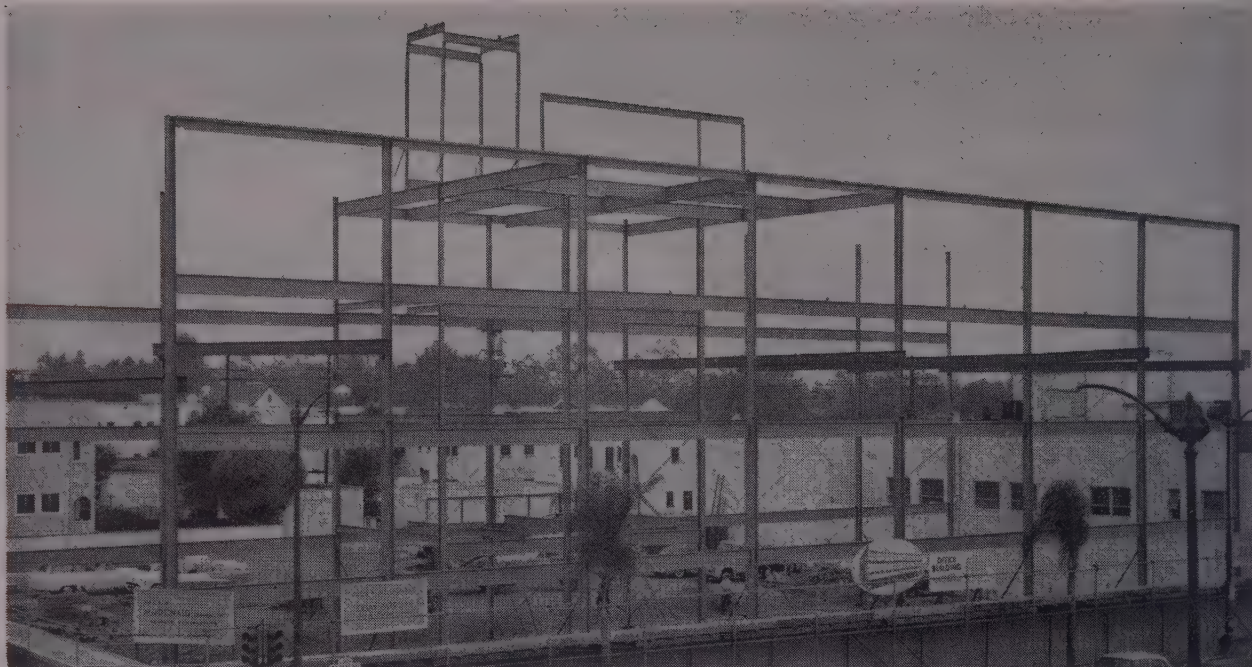
Have the Bucyrus-Erie distributor in your area show you a modern Bucyrus-Erie in action. You'll soon know why owners agree you get more for your money with a Bucyrus-Erie, and back that statement with their repeat orders. Bucyrus-Erie Company, South Milwaukee, Wis.

222E56C-1

SEE US FOR COMPLETE INFORMATION

The Border Machinery Company . . . El Paso, Tex.; Carlsbad, N. M.
Great Northern Tool & Supply Company . . . Billings, Montana
Colorado Builders' Supply . . . Denver, Colorado; Casper, Wyoming
Intermountain Equipment Company . . .
Boise & Pocatello, Idaho; Spokane, Washington
West Coast Engine & Equipment Company . . . Berkeley, California
Clyde Equipment Company . . . Portland, Ore.; Seattle, Wash.
Crook Company . . . Los Angeles & Bakersfield California

R. L. Harrison Company, Inc. Albuquerque, New Mexico
Lang Construction Equipment Company . . . Salt Lake City, Utah
Northern Commercial Company
(For Alaska & Yukon Territory) Seattle, Washington
Westmont Tractor Company . . . Missoula & Kalispell, Montana
Tractor Equipment Company Reno, Nevada
Road Machinery Company Phoenix, Arizona



Steel goes up in 6 days; concrete takes only 3

By **SAM HOBBS**
Formerly, Structural Engineer
Portland Cement Association
Los Angeles, California

REINFORCED CONCRETE floors have been limited to relatively short spans in conventional building design because of the depth required to produce necessary strength in flexure and to keep deflections within reasonable limits. The introduction of plant-produced prestressed concrete sections is changing the picture materially, making it feasible to design for strength and deflection control in relatively long spans with shallow depth.

Typical installation of 50-ft. units

In the Los Angeles metropolitan area, a recent project demonstrates clear span floor construction using 50-ft. members without intermediate

support. The structure is a four-story office building for La Peer Properties at 8929 Wilshire Blvd. in Beverly Hills. The owners wanted to eliminate the usual row of columns along the center line of the building to facilitate efficient and flexible layout and use of floor space. The prestressed concrete design filled these requirements.

Rockwin units used

The Rockwin Prestressed Concrete Corporation of Norwalk, southeast of Los Angeles, produced the units for the LaPeer Building floors. Units had been furnished previously for a similar 4-story building at 3400 West Sixth St., Los Angeles. The Rockwin plant is equipped with four casting beds, each 400 ft. long, for the manufacture of double-T sections for use in floors and roofs. In addition, three

beds have been installed for the production of beams, bridge members and other heavy sections. The plant capacity for the manufacture of floor and roof sections is about 25,000 sq. ft. per week.

Plant procedure

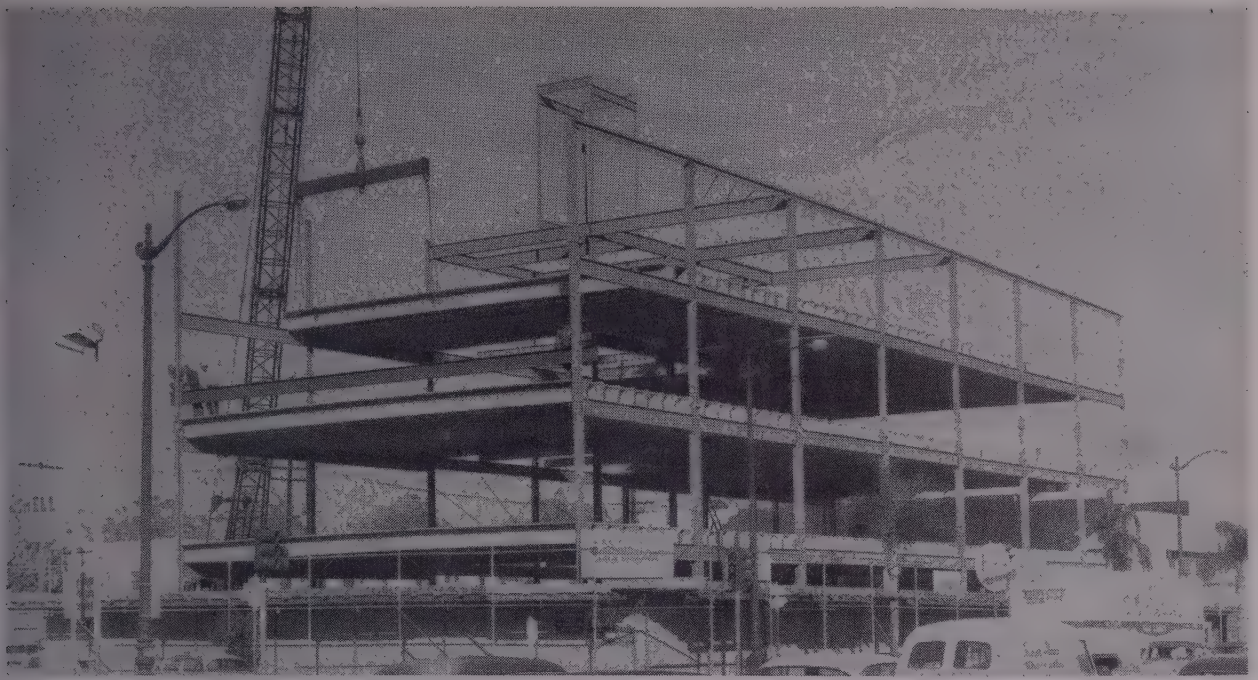
In its prestressing operations, the Rockwin plant pretensions by the long-line method, in which wires are tensioned full length of the bed and anchored at the ends. Forms are set, divided by bulkheads to produce members of desired length, concrete is cast and cured for the time necessary to attain the required transfer strength, when wires may be cut and the tensile stress in the steel transferred by bond to compression in the concrete. The elements used for prestressing are in general $\frac{3}{8}$ -in. strands of 7 wires each, located in a vertical plane in the webs or stems of the floor members. The strands are placed at a spacing of about $1\frac{1}{2}$ in. at the ends and are depressed at midspan by a harping device and brought into contact with a lowering of center of gravity to agree with the requirements of design.

High strength at an early age is required in concrete mixtures for efficient and economical production. This is accomplished by the use of Type III portland cement, careful proportioning of concrete materials, placing at low-slump consistency and compaction by vibration, followed by adequate curing at optimum temperature. In general, steam curing

About the writer:

Sam Hobbs retired Nov. 1, 1956, after 33 years with the Portland Cement Association, the last 29 of them in the Los Angeles office. For many years he represented the Association on the Pacific Coast Building Officials Conference and

has been especially active in code work. He was general chairman of the regional meeting of the American Concrete Institute in Los Angeles in 1954 and is local chairman for the 1959 ACI meeting. Sam's combined ability as an engineer and writer has been demonstrated often in the pages of *Western Construction*.



FAST ERECTION was feature of project. Steel framework as shown on previous page took only six days. Placement of concrete floor members

shown nearing completion took three days. The crane is removing a temporary strut used to brace the steel framework.

under canvas at moderately high temperature has been used, and the hot water jacket method is also being employed. Concrete mixtures are designed to produce 28-day strength in excess of 4,500 psi., while a minimum transfer strength of 3,500 psi. is required. Using the methods described, this transfer strength is obtained at an age of 18 to 24 hr., satisfying the requirements for efficient production.

High strength concrete and judicious use of prestressing make plant production of long span members feasible and desirable.

Design and details

Design assumptions and procedures for prestressing are in general agreement with the Criteria for Prestressed Concrete of the U. S. Bureau of Public Roads. In the LaPeer

Building, floors are designed for a live load of 50 lb. per sq. ft., plus a partition load allowance of 20 lb. In 3-ft. end sections of the members, shear resistance is provided on the basis of conventional reinforced concrete calculations.

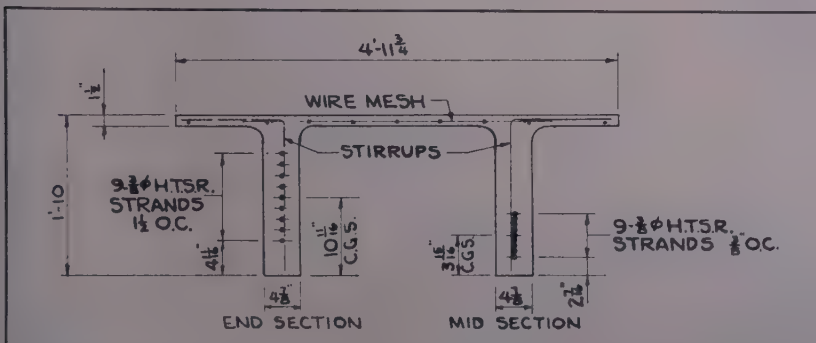
The typical double-T unit has a nominal width of 5 ft. The stems are $4\frac{7}{8}$ in. thick and 1 ft. $8\frac{1}{2}$ in. deep below the $1\frac{1}{2}$ -in. flange or top slab, which has an overhang of about 1 ft. at each edge. The flange section is cut off at each end of the member, allowing the stems to be built into and enclosed by the brick masonry wall. At midspans of beams in 3rd and 4th floors, the members serve as struts. At each end of a member, a weld plate is inserted flush with the stem face, providing for a bead weld at the soffit edge in contact with the steel beam.

Columns of the steel frame are spaced 21 ft. on centers on the front and rear except for slightly shorter end bays. The prestressed concrete floor members span transversely the full width of the building, resting on the steel beams and seated in the masonry walls. Two interior bays are in part of the short span prestressed units and in part cast in place in the elevator and stairway area. Construction of the 2nd, 3rd and 4th floors required a total of 18,000 sq. ft. of prestressed concrete floor members. In a typical bay 21 ft. wide, four units were placed side by side, leaving a 1-ft. closure space. This was filled by casting integrally with a $2\frac{1}{2}$ -in. cover slab which provided desired diaphragm action and space for the laying of conduit.

Field procedure

The 50-ft. floor members were trucked from the plant to the job site, a distance of over 30 miles, and were handled and placed in the building by a 35-ton crane. Pick-up loops anchored in the concrete were located $2\frac{1}{2}$ ft. from each end. Although each unit weighed only $5\frac{1}{2}$ tons, made with Rocklite aggregate blended with natural sand, it was necessary to raise each unit outside the building frame to a height sufficient to clear it. Then it was necessary to reach sufficiently to center

(Continued on page 48)



CROSS-SECTION shows position of prestressing wires at the end and the middle of the 50-ft. long floor members. The strands are depressed by a harping device at mid-span.



Double Asphalt surface treatments: (1) 0.4 gal/sq yd of rapid-curing Asphalt cut back (RC-3) with 1/2-inch chips; (2) 0.2 gal/sq yd of RC-3 with 3/4-inch chips.

4 inches of 2-inch crushed rock with 2 gal/sq yd of 85-100 penetration Asphalt.

This ASPHALT superhighway costs New Hampshire



Since June 25, 1950, this New Hampshire Toll Road has been proof-in-operation of Asphalt pavement economy. Low in first cost. Low in maintenance cost.

ASPHALT construction saved \$85,000 per mile in first costs, as well

Yes! This is the figure reported by New Hampshire authorities. \$36.07. That's for maintaining pavement alone . . . all four lanes. The average cost per mile, per year during the first five years operation of New Hampshire's 14.7-mile Asphalt Turnpike . . . linking Asphalt Turnpikes of Maine and Massachusetts.

What's the five-year overall total? \$2,651.06! Per year? \$530.21! Per vehicle? (there were 14,520,723 of them) \$.000175!

Can these be considered "yardstick" figures?

Yes! Other modern heavy-duty Asphalt pavements that carry heavy traffic and are in areas of severe weather variation have maintenance costs comparable to these. These maintenance figures seem remarkable . . . almost unbelievable . . . but such remarkable savings can be expected when heavy-duty rugged Asphalt pavements are properly engineered and constructed.

How was this low-maintenance pavement designed?

The section above shows basic construction . . . first a carefully selected sub-base, then two courses of Asphalt penetration



Only \$36.07 to maintain (per mile, per year)

macadam, topped with a double Asphalt surface treatment. Most sub-base material came from the right-of-way or adjacent borrow.

Bids for the Asphalt structure ran \$85,000 per mile under next lowest bids for pavement of comparable specifications. Such a saving pays for many years of maintenance . . . not only of the pavement but of the entire right-of-way.

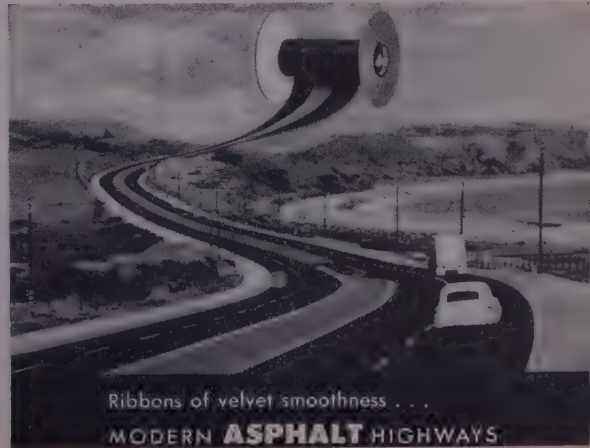
What about performance?

John O. Morton, New Hampshire Commissioner of Public Works and Highways, has this to say, "The pavement has shown performance during its first five years of use that leaves nothing to be desired."

For low costs, long life, high performance . . . for smooth, safe riding . . . design for Asphalt construction.

Safety is not a function of cost

Despite its low construction and maintenance costs, New Hampshire's Asphalt Turnpike has achieved one of the best safety records on major highways in the nation.



THE ASPHALT INSTITUTE

Asphalt Institute Building, College Park, Maryland

Fast finish for Beardsley Dam

Contractor averaged 16,000 cu. yd. per day to finish 3,120,000-cu. yd. earthfill dam—part of Tri-Dam Project. Power is expected to go on the line in March, a full 20 months early.

THE FIRST UNIT of California's Tri-Dam Project is nearly completed. In just 10 months the entire 3,100,000 cu. yd. of material which makes up Beardsley Dam was put in place by Tri-Dam Constructors, a joint venture sponsored by Morrison-Knudsen Co., Inc., and including Peter Kiewit Sons' Co., Macco Corp., and Stolte, Inc. August was the peak month when over 100,000 cu. yd. per week was excavated, placed and compacted.

The Tri-Dam Project is an irrigation and power development on the Stanislaus River in Tuolumne and Calaveras counties in north central California. The main features are Donnell's Dam, tunnel, penstock, and the power plant; Beardsley Dam, power plant, and afterbay dam; and Tulloch Dam power plant. Donnell's is a concrete arch, Beardsley an earthfill, and Tulloch a concrete gravity structure. They are being constructed for the South San Joaquin Irrigation District and the Oakdale Irrigation District.

Beardsley Dam is on the Middle fork of the Stanislaus River. It is a rolled earth, sand, gravel and cobble fill embankment with dumped rock on the upstream and downstream slopes. It will store about 97,500 ac. ft. The embankment is 885 ft. long at the crest with a maximum height of 265 ft. above the river bed. The spillway is a concrete-lined structure on the right abutment, with four radial gates, each 40 ft. wide and 30 ft. high. A concrete-lined tunnel in the right abutment was used for diversion during construction and then will serve as the power tunnel.

The powerhouse has one main generating unit consisting of an 11,100-kva. vertical-shaft generator driven by a Francis-type turbine.

The afterbay dam is located about 1 mi. downstream from the main dam and will be a rock-filled timber crib about 24 ft. high with a downstream fill of heavy rock. This will be built on an impervious rolled-earth blanket extending about 200 ft. upstream. The abutments will be protected by

dumped rip-rap. A prefabricated cement-mortar lined and guniting-coated steel conduit and valve chamber will be installed through the dam and a sluice gate will control release of water.

The development of the Tri-Dam Project has been followed closely by **Western Construction**. The first plans were reviewed in the November issue of 1952. Seven pages of unit bids were published in June of 1953. These first bids were rejected, however, because of a change in the bond market. The financial and legislative picture was reviewed in considerable detail in the February 1954 issue. In 1955, the specifications were altered slightly and changes were made in the overall program to provide for stage construction. Details of the new plan, with information for bidders, was brought up to date in **Western Construction** in February 1955. A 5-page article was published in July of 1956 describing the initial phases of construction on Donnell's, and the history of the Tri-Dam Project.

An unusual feature of Beardsley Dam is the railroad which is being constructed across the top of it. The line will be operated by the Pickering Lumber Co. which takes out about 75,000,000 board feet of lumber per year.

The first men arrived on the job in June of 1955 and began the tasks of building the camp and constructing 6 mi. of permanent access roads to the site of the dam. The access road was a bid item and involved about 170,000 cu. yd. of excavation. The road was finished in August. In July work started on the 1,100 ft. diversion tunnel, a horseshoe design 15½ ft. high. It was holed through in just 28 days.

The camp is located 4 mi. from the job site and includes 2 barracks of 50 units each, a mess hall which seats 100, office building and a bull cook office. The trailer court has space for 85 units. At the job site are a field shop for quick maintenance, a main maintenance shop, a warehouse and a first aid station.

Flood caused setback

The foundation excavation totaled about 300,000 cu. yd. and ran about 50 ft. deep to bedrock. The grout curtain was small because of the good condition of the rock. During the early stages of the excavation, the stream was carried through the



LOADING pervious zone material this Maniotowoc handled a 5½-yd. bucket. During peak operations fill in all zones was placed at a rate of more than 100,000 cu. yd. per week.

MAJOR EQUIPMENT

- 1 17-yd. Euclid belly-dumps
- 4 17-yd. Dart end-dumps
- 11 15-yd. Euclid end-dumps
- 1 10-yd. Euclid end-dump
- 5 17-yd. Euclid end-dumps
- 1 4500 Manitowoc shovel
- 3 Northwest 80D shovels
- 1 Bucyrus-Erie 54B dragline
- 1 Northwest 6 1½-yd. shovel
- 1 Euclid elevating belt loader
- 1 Caterpillar Traxcavator
- 1 Hough Payloader
- 1 P & H truck crane
- 2 Caterpillar No. 12 motor patrols
- 7 Caterpillar D8 tractors
- 2 Caterpillar D9 tractors
- 1 Warner-Swasey Gradall
- 1 Link-Belt truck crane
- 2 Ferguson 50-ton pneumatic compactors
- 1 Caterpillar DW20 tractor
- 1 Caterpillar D4 tractor
- 3 Gardner-Denver Air-Trac drills
- 6 Ingersoll-Rand wagon drills
- 2 Gardner-Denver stationary electric 500-cf. compressors
- 1 Ingersoll-Rand electric 800-cf. compressor
- 2 Ingersoll-Rand portable 600-cf. compressors
- 1 Gardner-Denver portable 600-cf. compressor
- 1 Conveyco 2-yd. batch plant
- 1 Pioneer Duplex 46VE screening plant
- 1 Universal 20 x 36 jaw crusher

site in a 72-in. pipe. During the flood season of December 1955, the water rose from 200 cfs. to 30,000 cfs. in one day, bypassing the diversion pipe and filling in 70% of the excavation which had been completed. The contractor was unable to return to the stream bed until February 1956 and the embankment work did not resume until the end of March.

Despite this setback, Project Manager O. H. Tucker still aimed at completing the embankment before the next rainy season, and the necessary equipment was brought in to do the job. The pace increased steadily. The peak was reached in August and September when over 100,000 cu. yd. of material was put in place per week.

The contractor was able to maintain this rate mostly because of the exceptionally good condition of the material in the borrow pits. All the material was close at hand, about 1 mi. upstream from the dam, was fairly easy to excavate, was already very near the optimum moisture content, and compacted with a minimum of effort. No washing or screening was required.

The impervious and transition material was loaded with a Euclid elevating loader, and the pervious material was loaded with a Manitowoc 4500 shovel with a 5½-cu. yd.



ZONES are clearly visible in this view of the top of the embankment. Beardsley contains rolled earth, sand, gravel and cobbles, with dumped rock on the upstream and downstream slopes.

bucket. No blasting was needed. Maximum haul road grade was about 4%.

Most of the compaction was carried out by two Ferguson 50-ton pneumatic compactors. When the embankment area was large loaded Euclid bottom-dumps helped out on the compaction. A loaded 6-cu. yd. Koehring Dumptor was used for compaction near the abutments along with several Triplex tampers.

For the impervious and transition zones 100% of standard AASHO was achieved with about 6 passes of the 50-ton roller. Optimum moisture content was about 14%. During the heat of the summer this was achieved by installing a sprinkler system in

the borrow pit. Euclid water wagons worked on the fill.

Power is expected to go on the line in March, a full 20 months earlier than the date called for in the specifications.

The Tri-Dam Project is being supervised by Tudor-Goodenough Engineers with B. W. Goodenough as project engineer, assisted by Ray Overholser. A. H. Griffin is resident engineer on Beardsley Dam, with Tom Sutton as chief inspector and Lloyd Garst, chief of the soils lab.

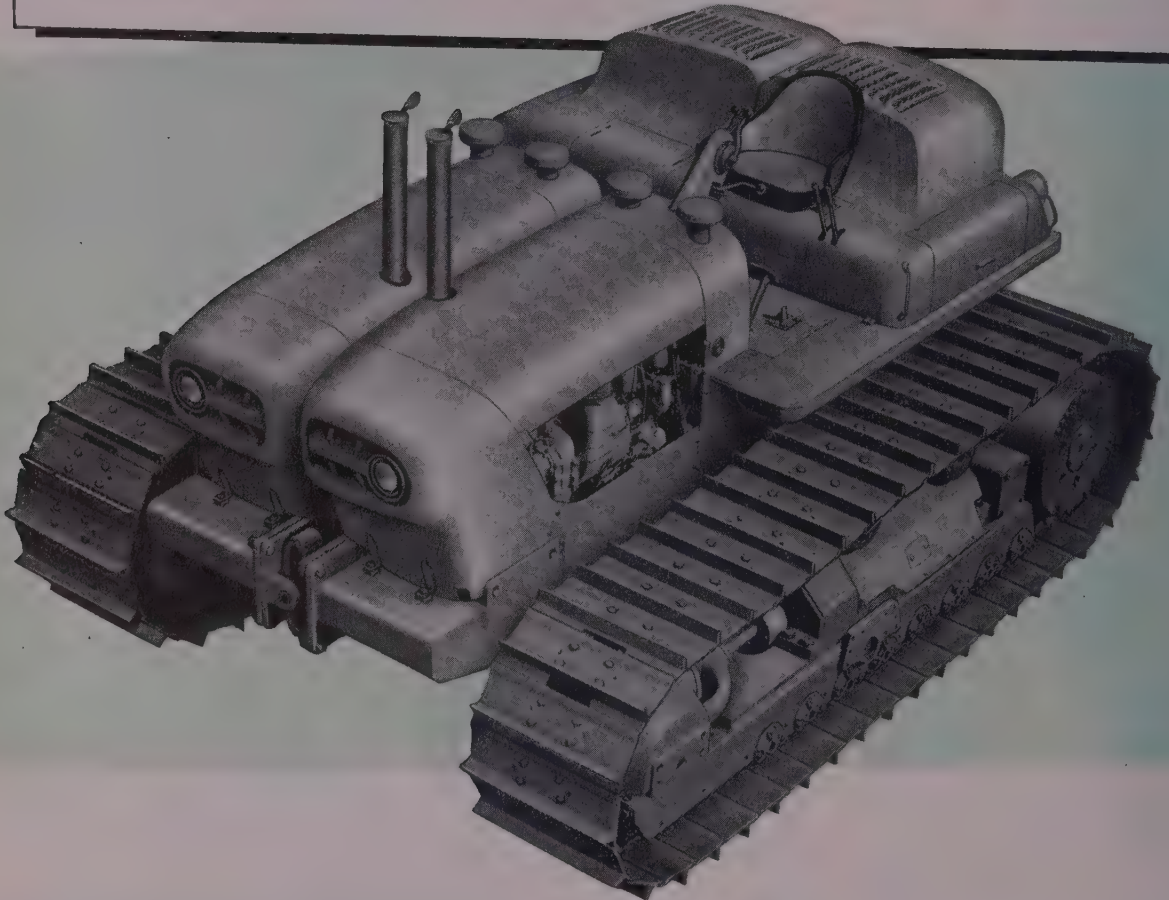
Project manager for Tri-Dam Constructors is O. H. Tucker, project engineer is D. Richards and office manager is J. Hobson. K. J. Hayes is excavating superintendent.



SIGN overlooking dam is kept up-to-date to show visitors the amount of fill remaining to be placed. Above picture was taken in late fall when 600,000 cu. yd. were left to place and compact.

NOW THE **Euclid TC-12** GIVES YOU

***more horsepower... more track area...
more accessibility than any other crawler!***



Ever since it was introduced more than a year and a half ago, the Euclid TC-12 Tractor has set completely new standards of crawler production and performance. It has proved, on job after job, that it is years ahead of the field in ability to do more work—faster, easier and cheaper. Now the TC-12 has even more power to handle the biggest tractor jobs.

Powered by two 218 h.p. engines with separate Torqmatic Drives for each track, there's a total of 436 horsepower. Big 27" standard shoes and

8 track rollers give good balance with the additional horsepower, heavy duty dozer blades and other attachments.

This new TC-12 Crawler has many other improvements that put it even further ahead of other tractors . . . in performance, ease of operation, maneuverability and service accessibility. Ask your Euclid dealer to prove that the TC-12 has no equal for big tractor jobs and have him show you why ***Euclids are your best investment.***

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



20% MORE WORK-ABILITY



▲
Euclid "Twins"—the TC-12 Tractor and Twin-Power Scraper—will move the cheapest dirt on the big road program or on any earthmoving job. They can set new production records at lower cost on your operations.

The Euclid TC-12 has exceptional maneuverability because each track has a separate power train. Operator has excellent visibility and "hair trigger" control of steering in any of the three speed ranges, forward or reverse.



▲
With separate Torqmatic Drive for each big track, the TC-12 is fast on its feet, with plenty of power and traction for any big tractor job. It has proved its ability to outwork any other tractor on dozing, clearing, push-loading scrapers and pulling big equipment.



▲ A high production machine, the TC-12 is easy to operate—delivers more push-pull drawbar horsepower at high travel speeds. Utilized assemblies and easy accessibility of major components permit servicing without

For push-loading big scrapers the Twin-Power "Euc" crawler has no equal. Torqmatic Drive provides a smooth, steady flow of power—changes from one speed range to another and from forward to reverse

Warehouse has 179-ft. Glulam arches

*Roof over area of 86,333 sq. ft.
supported on timber framing. Structure is
largest of its type in Southwest.*

By **PAUL E. SCHREINER**

Construction Engineer
Potash Company of America
Carlsbad, New Mexico



WHEN Potash Company of America decided a lot more warehouse storage was needed for potash, we naturally wanted as much volume as possible for the lowest possible cost. We got it—2,993,500 cu. ft. of space out of a floor area of 86,333 sq. ft.! A warehouse that is 163 ft. wide by 563 ft. long, and 72 ft. high. In getting that large storage capacity we made use of some radically new construction methods. New for the potash industry, that is.

Originally we had planned to build the warehouse, located about 25 mi. east of Carlsbad, much like our other warehouses, of structural steel. We learned however, that it would take a year and one half, including fabrica-

tion time, to obtain steel, even before the steel strike increased the waiting period. Although all Potash Company of America's warehouses had been built with steel, and steel had proved satisfactory, it was decided to look into the advisability of using wood structural members.

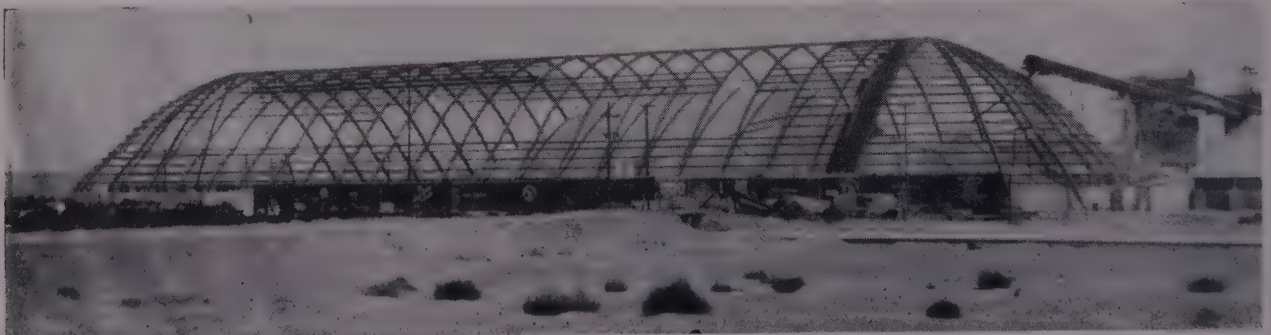
Study showed that in addition to being less costly, glue-laminated wood ribs could be delivered in a much shorter time, and would be equally strong. In a warehouse for potash, fire is not a problem, however we learned that fire in such a wooden structure would not be as serious as might be thought. In fact, the wooden structure would be less apt to collapse in case of fire. The

length of time required for fire to char members would be quite long, thereby giving fire fighters time to extinguish the blaze.

Another factor taken into consideration was that, although potash is corrosive to steel, it would not harm wood, and therefore only outside surfaces exposed to the weather would have to be painted.

As a result, we placed an order for the wooden structural portions of the building with Timber Structures, Inc., Portland, Ore., on May 10. Stearns-Roger Manufacturing Co., Denver, began work on the concrete piers and walls of the warehouse.

Tilt-up construction was used for the walls, surrounding the same con-

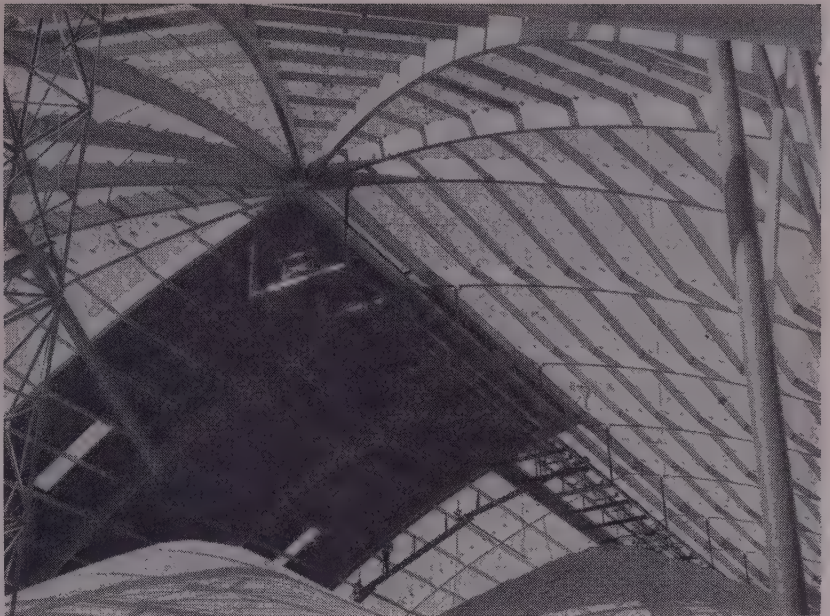


ROOF over this 2 ac. of storage slab is supported by 21 Glulam arched bents, and 16 half arches. From lower pin to lower pin the ribs extend

179 ft. 8 in. Storage and removal of potash was not interrupted during the entire roof construction.



DETAIL of lower and pilaster pin connections showing the lower end of the Glulam rib.



ROOFING under way with the placing of Galbestos sheets. A 24-in. conveyor belt supported from the ribs, and a traveling tripper allow the stored potash to be distributed evenly.

crete slab that had previously been used for outside storage. The wall sections were poured on the slab and lifted into place, facilitating the continuous loading and shipping of potash in the center of the slab. During the entire construction operation, more than 60,000 tons of potash rested on the slab, and work went on around it without interrupting shipping schedules.

A crew of twelve

By the time the concrete work had been completed, the wooden arch members had arrived, and erection started August 15. Carroll & Co., Dallas, Texas, were subcontractors through Timber Structures, Inc., for erecting the framework. In only two months, with a crew of about 12 men, erection was completed.

Two cranes were used to lift members into position, and the sequence called for lower ribs to be assembled first and upper ribs later by means of a single hinge pin on each side and center shear-plate dowels. Construction on this phase was carried out without unusual problems.

Ribs 27 in. thick

The Glulam ribs were 27 in. thick and 7 $\frac{7}{8}$ in. wide on the lower section. They were fabricated from 17 pieces of 2 x 8 glued together with waterproof resin. The lower ribs were 37 ft., 1 $\frac{3}{4}$ in. long, measured pin to pin, and curved on a 120-deg. radius. Upper ribs were 24 in. thick and 7 $\frac{7}{8}$ in. wide. They also, by cord measurement on a 120-deg. radius, measured 77 ft. 5 $\frac{5}{8}$ in. long, pin to

pin. The entire span of the ribs from lower pin to lower pin was 179 ft., 8 in.

The entire structure was made up of 58 ribs with forty 3 x 12-in. purlins between ribs. Purlins, precut for fast erection, were spaced on 5 ft. 9-in. centers, and served both to stabilize the ribs and support the roof. Each purlin is supported at the ribs by means of metal stirrups. Construction was completed on Oct. 17, with the installation of the last purlin.

Conveyor installed

A conveyor gallery to accommodate a 24-in. belt with a traveling automatic tripper device was hung from the top of the ribs by metal hangers spaced 20 ft. apart. The tripper is used to distribute the potash evenly throughout the warehouse.

In order to align the ribs, the baseplates were shimmed at their centers

and, after all leveling had been completed, the baseplates were then grouted.

The H. H. Robertson Co., of Pittsburgh, Pa., furnished Galbestos covering for the structure. Galbestos, used elsewhere on our warehouses, is composed of asbestos impregnated asphalt on corrugated sheet metal. The Robertson organization completed the covering in December. Incidentally, 6 x 3-ft. sheets of Galbestos V-beam were strapped to an upper girt, and nailed into the 8-in. concrete wall at the bottom by means of Ramset gun. This raised the inside wall level 6 ft. above the concrete for a total wall height of 14 ft.

At the ridge of the building are five 20-in. ventilators to insure adequate air circulation.

After the entire warehouse was covered it was washed with water, and an asphalt flood coating was brushed on.

Los Angeles Harbor work to cost \$100,000,000

DURING the next fifteen years Los Angeles will spend more than \$100,000,000 to improve cargo handling facilities at the Port of Los Angeles. Completion of the program will increase facilities by at least 20%. Among the structures planned will be five berthing slips for cargo vessels costing an aggregate of \$25,000,000; two passenger terminals to cost about \$8,000,000; a bulk cargo loader to cost \$5,000,000.

In addition two warehouses will be built costing about \$2,500,000 each

and added space at one of the existing berths will cost an estimated total of \$1,500,000.

Extensive dredging will be required throughout the harbor to secure the 45-ft. depth and this program will include Federal participation possibly up to a total of \$20,000,000.

Finally, other improvements, now in the design stage, will represent a \$30,000,000 replacement program for the cargo sheds at the Terminal Island location.

Clipper
"SAILS RIGHT THRU"
® ANNOUNCES

**The NEW SUPERMATIC
MASONRY SAW**

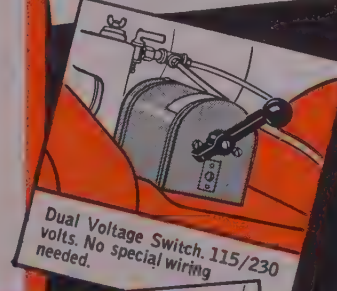
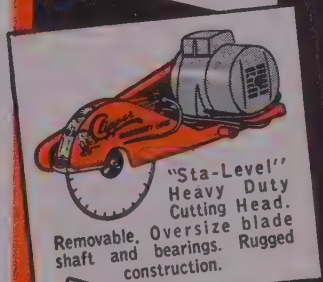
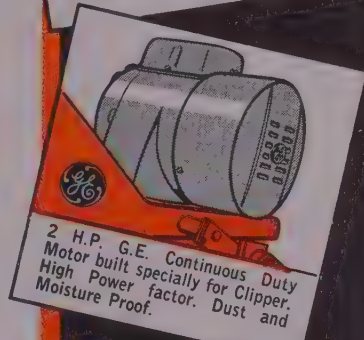
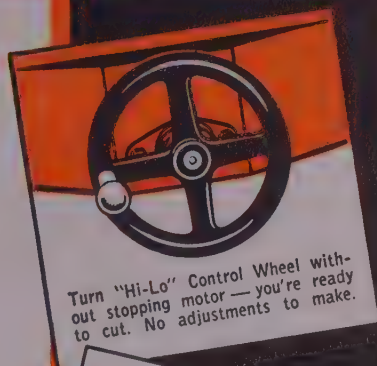
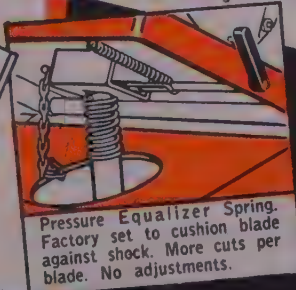
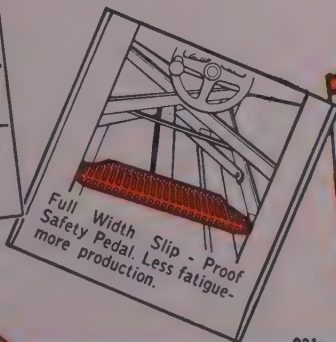
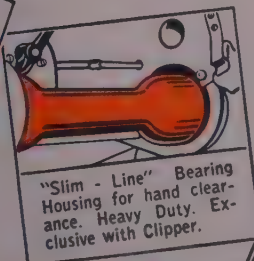
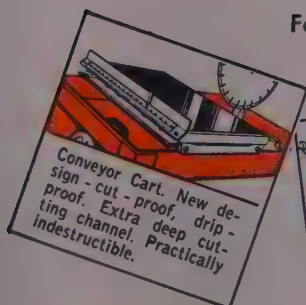
with over 30 Outstanding Features



Only **SUPERMATIC** has **STA-LEVEL CUTTING HEAD** **& HI-LO CONTROL WHEEL**

The New CLIPPER SUPERMATIC is "MATIC" because the recessed Hi-Lo Control Wheel automatically makes all adjustments. "SUPER" because it's ruggedly built to do a powerful job. No need to turn off motor to SAFELY—QUICKLY raise or lower the STA-LEVEL Cutting Head. From 0" to 17", the Cutting Head stays level in any position. Just turn the recessed Hi-Lo Control Wheel...you're ready to cut. NO ADJUSTMENTS TO MAKE. No gears, no slides or unnecessary parts to wear out. The SUPERMATIC is 5 saws in 1. Cuts Wet ... Cuts Dry ... Convertible to a Track Saw ... a Concrete Saw ... or a Triple-Width Saw. The New CLIPPER SUPERMATIC is Simple, Rugged and Dependable!

FREE TRIAL on your Job! Before you buy any Masonry Saw, see what this All New Clipper SUPERMATIC will do for you. Write, Wire or Phone Collect your nearest Clipper Factory Trained Representative.



Clipper
"SALES RIGHT THRU"

MANUFACTURING COMPANY

2800 WARWICK, KANSAS CITY 8, MO., VICTOR 2-3113

Genuine Clipper Products are Sold Direct from Factory Branches in Principal Cities. Consult Your Phone Book and Call for Immediate Same Day Shipment — Factories in England, France, Germany, Italy.



Sheet piling for trench lining

WALTER LENKEIT Co., San Francisco contractor, expects to cut costs three ways by using lightweight steel sheet piling rather than wood piling or other material for trench protection on a current sewer project.

First, the lightweight piling is cheaper. Second, its light weight makes it easier and quicker to handle and drive. But probably most important, Lenkeit figures to reduce the amount of pavement undermined (and therefore needing replacement) when the piling is pulled.

Lenkeit is pulling and re-driving the piling as the trench progresses. The same piling will be used five times on the project. This technique saves the contractor the cost of a large quantity of piling.

The firm is installing 1,800 ft. of precast pipe and 400 ft. of cast-in-place pipe on a \$212,000 City of San Francisco project at Lincoln Way and 35th Avenue. Part of the trench

passes through open area and part through paved sections. Throughout, the soil is sandy and very loose. Past experience in similar soil showed the contractor that when other types of piling were used and pulled, they left a large void which was quickly filled by the loose sand. In paved areas, this run-off of sand undermined the pavement, necessitating a repaving job at an added cost to Lenkeit.

By using the thin-walled lightweight steel sheet piling, Lenkeit expects to considerably reduce this damage, since the lightweight piling leaves almost no void after being pulled.

Lenkeit rented the piling from L. B. Foster Company's Los Angeles office and is driving it 16 ft. A McKiernan-Terry No. 3 air-driven hammer on a 25-ton American truck crane drives the piling. Air is supplied to the hammer by an Atlas Copco compressor powered by a Deutz air-cooled diesel engine.

Prestressed floor slabs

(Continued from page 37)

the unit over the bay desired, let the unit down at a clearance angle and swing and place each unit in true position.

Three-day installation

The installation of the prestressed concrete floor members was completed in three days, indicating that definite benefits and time savings may be obtained by plant manufacture of structural parts of buildings which can be quickly assembled in the field. This three-day job prepared three floor levels for the installation of end connections, the placing of the cover slab, casting of the small areas of pan-joint floor around the shaft sections, the construction of the masonry exterior walls and hung ceilings.

This project demonstrates the feasibility of prestressed concrete floor construction applicable to multi-story buildings and the practicability of unobstructed long span floor layouts. In the design of these floor units the approach used was to produce (by eccentric prestressing) a camber considered sufficient to balance the effect of the cover slab and the anticipated service loads which are to be applied.

In another structural application of Rockwin products in building construction, both double T-sections and supporting girders of prestressed concrete are being installed in the May Company specialty shops, located in West Covina.

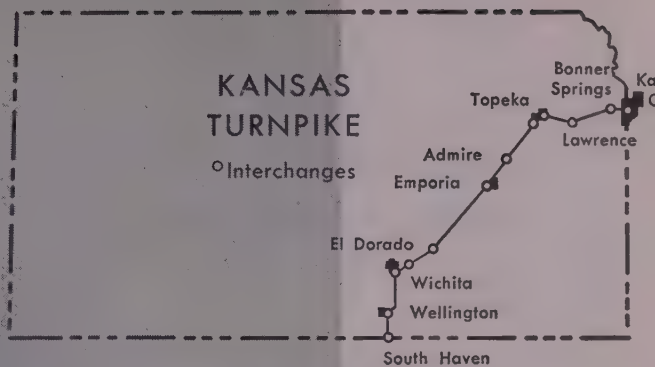
Credits

This office building for LaPeer Properties was designed by Jack H. MacDonald and Cejay Parsons, associated architects and engineers. Jack H. MacDonald Company was the general contractor, whose engineer is Ernest L. Schroeder. The steel frame, erected in 6 days, was furnished by Riverside Steel Construction. Lange Erection Service was responsible for the crane operations. Trucking service was performed by Mojave Corporation.

Rockwin Prestressed Concrete Corporation furnished the prestressed concrete units. In the Rockwin organization, Morris S. Pynoos is president, Wade Taylor is plant superintendent, Harold S. Dewdney is chief engineer, and Lawrence Becker is sales representative.

SPEED...

behind full blades... gets work done fast on Kansas Turnpike



123 hp Adams 550 blades base "on-the-run", helps rush completion of Kansas Turnpike section for contractor J. D. Armstrong.

Work on the Kansas Turnpike is now complete... linking Kansas City, Lawrence, Topeka, Emporia, and Wichita with Missouri's road system on the East, and Oklahoma's to the South. Construction of this modern, \$160,000,000 highway included 236 miles of preparatory grading... 176 miles of asphaltic surfacing... 60 miles of concrete paving. Completion of the new toll-road required many thousands of work-hours by motor graders.

Just-right speeds boost earnings

To get highest grader output per hour—and thereby cut grading costs—many Turnpike contractors equipped their fleets with 15-speed, Adams graders. Adams' wide range of power-speed combinations let operators match speed and power to load. Just-right speeds made every hour count.

Work full-power 32 to 572 ft. per min.

All 80 to 150 hp Adams graders give you 15-speeds*—8 forward, 4 re-

verse, 3 optional creeper gears—so your graders can work, maneuver, and travel at fastest, most productive rate. For normal grading work, Adams gives you 4 working speeds under 6.5 mph. This provides extra combinations of power and speed to push bigger, heavier loads... to cut deeper... to work faster and with greater accuracy than comparable machines.

For added flexibility, optional creeper gears permit full-power operation at speeds as slow as 32' per minute. Creepers give you extra push-power for ripping up asphalt, hardpan, and clay. They deliver precisely controlled power for work in rocks and roots. They provide low-low speeds for extra-fine grading and maneuvering in close-quarters.

Higher travel speeds cut waste time

Adams graders also boost output, reduce non-productive time, with 2 high back-up speeds—to 13.7 mph. Fast reverse saves time on shuttle grading, boosts output as much as 30% on one-way work. And high forward travel speeds—to 26 mph—save time mov-

ing between scattered assignments as well as on job-to-job moves.

SEE FOR YOURSELF!... how Adams' accuracy and big capacity for hard work can increase your earnings. Six models, 60 to 190 hp. Call us or write for a demonstration.

*Adams 190 hp POWER-Flow 660 provides an infinite number of power-speed combinations thru torque converter. 60 hp model "220" has 10 speeds, with optional creeper gears.



Amis Construction Co., of Oklahoma City, Okla., uses one of its 6 Adams 150 hp 660 graders to spread fill on Kansas Turnpike.

Adams, POWER-Flow—Trademark AG-1274-H-b-5



LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

FOR

Steadier Arc

Steadier Voltage

Smoother, Faster Application

USE

VICTOR

Automatic Rods

Victor automatic hardfacing alloys go on 3 to 4 times faster than manually-applied hardfacing, enable you to make big savings in labor costs. And if you're repairing equipment, cutting down time by $\frac{2}{3}$ or $\frac{3}{4}$ likewise is a terrific saving. You get a more uniform deposit, too, from Victor automatic hardfacing alloys, resulting in longer, more even wear. Check this chart — you'll find there's a Victor type for every hardfacing need.

Learn for yourself how hardfacing with Victor automatic rod reduces labor and repair down time. Ask your Victor dealer for Bulletin 358 — or better yet, order a coil of rod NOW and try it on your job.

**PROFITABLE
DEALERSHIPS OPEN;
INQUIRE NOW!**

33

VICTOR EQUIPMENT COMPANY

ALLOY ROD AND METAL DIVISION

Los Angeles 59, California • Wakita, Oklahoma



Note even deposit of Victor VA#3 automatic rod on gyrotory crusher cones.

TYPE	USES	PROPERTIES AND APPLICATION
VA#1	Crusher Rolls Gyrotory Crushers Crusher Mantels Scraper Blades	Rockwell 'C' 54-57 Impact Resistance—good Abrasion Resistance—high AC-DC submerged arc or DC open arc
VA#2	Pinch Rolls Tractor Idlers Tool Joints Coiler Rolls	Rockwell 'C' 50-52 Impact Resistance—good Abrasion Resistance—good Submerged arc only Suitable for multiple passes
VA#3	Roll Crushers Gyrotory Crushers Impellers Mill Guides	Rockwell 'C' 54-57 Impact Resistance—good Abrasion Resistance—high For use where abrasion is severe Submerged arc only
VA#4	Tractor Rollers Sheave Wheels Tractor Idlers	Rockwell 'C' 25-28 Impact Resistance—excellent Abrasion Resistance—good Submerged arc only Suitable for multiple passes Machineable
VA#5	Tractor Rollers Sheave Wheels Tractor Idlers Grader Blades	Rockwell 'C' 34-38 Impact Resistance—high Abrasion Resistance—good Suitable for multiple passes Submerged arc only
VA#6	Crane Wheels Roll Necks Pump Sleeves	Rockwell 'C' 38-41 Impact Resistance—high Abrasion Resistance—fair Suitable for multiple passes Deposit machineable Submerged arc only
VA#7	Excellent base for high alloy application. Mine Car Wheels	Rockwell 'C' 36-42 Impact Resistance—excellent Abrasion Resistance—good Suitable for multiple passes Deposit machineable Submerged arc only
VA#8	Tool Joints Grader Blades Scraper Blades Roll Crushers	Rockwell 'C' 51-54 Impact Resistance—high Abrasion Resistance—high Submerged arc only
VT#60	Tool Joints Grader Blades Scraper Blades	Automatic Tungsten carbide wire Abrasion Resistance—excellent (maximum) Deposits are heterogeneous Open arc—DC reverse only

Rod diameters 1/8", 5/32" and 3/16". Standard coil size, 22-1/2" inside diameter, 4" wide, approximate weight 100 lbs.

California Water Plan advances

Abstract of statement by Director Harvey Banks reviews the features of the program for complete development of the state's water resources. Legislation proposed to get the first unit into active construction.

PROGRESS toward an active start on the California State Water Plan can be expedited by the current session of the state legislature. Legal and financial problems will get a complete airing, and proposed legislation looking forward to active construction will be considered.

This comprehensive program for the orderly conservation and use of California's water resources, carrying a tentative cost estimate of \$11,000,000,000, was reviewed briefly in *Western Construction*, July 1956, p. 46. During the fall months nine meetings have been held at several locations to sound out public sentiment on the plan. Also, a Citizens' Conference on Water Problems was convened by Governor Knight.

One of the most recent, authentic summaries of the plan, its purpose, and legislation essential for its implementing was prepared by Harvey Banks, director, Department of Water Resources. It was submitted to the Joint Committee on Water Problems. The following abstract of the statement reviews the general philosophy of the plan, and the legislation that will be recommended.

History and reports

The State Water Resources Board was authorized in 1947 to conduct an investigation of the water resources of California. The adopted investigational program has the objective of formulating a long-range plan of comprehensive development of the water resources of the entire state. This is designated as "The California Water Plan," and is defined as the plan for full conservation, control, and utilization of the state's water resources.

First phase of investigation comprised an inventory on sources, quantities, and characteristics of water. The second phase dealt with present and ultimate requirements of water. The third and final phase of this initial planning program has been completed, the results of which were presented in the preliminary edition of Bulletin No. 3, "Report on The California Water Plan," dated May 1956.

The legislature, recognizing that

The California Water Plan is a framework within which development of water can take place, authorized continuing studies. This program has as its objective the detailed planning required for physical implementation of the plan, and studies which will make possible recommendations for authorization of specific projects for state construction or assistance. It will also recommend projects for construction by agencies other than the state.

Basic concepts

The following concepts have entered into the planning studies for The California Water Plan, and for proper evaluation of results, should be borne in mind:

1. The California Water Plan is conceived as an ultimate plan, one that will meet the requirements for water at some unspecified time in the future when land and other resources have reached a state of complete development.

2. The Plan is designed to be comprehensive. It will provide for future beneficial uses of water by individuals and agencies in all parts of the state. With legislative acceptance of the Plan, and with firm provision for its progressive implementation as component projects become necessary and feasible, sectional concern as to future availability of necessary water supplies should be eliminated.

3. The Plan is a flexible pattern into which future definite projects may be integrated in an orderly fashion, with due consideration being given to varying interests. As additional data and experience are gained, as technology advances, and as future conditions change in patterns which cannot be foreseen today, the Plan will be substantially altered and refined.

4. The Plan is designed to be susceptible of orderly development by logical progressive stages as may be dictated by the growing demands and requirements of the State.

5. The many features broadly embraced in the Plan, while believed to be endowed in common with engineering feasibility, have widely variant relationships to present concepts

of economic and financial feasibility. Economics of the distant future cannot be foreseen, and the planning effort is deemed necessary at this time in order that provision may be made for such development if and when it becomes necessary.

6. The Plan is designed to include or supplement, rather than to supersede, existing water resource development work. It also incorporates certain planned works now proposed or authorized by public and private agencies and individuals. Inclusion of such works in the Plan does not imply a proposal that they, or any other specific project, be constructed by the State of California. Of special significance in this respect is the Feather River Project, which is proposed as a unit for initial construction under the Plan, and has been authorized for construction as a state project.

What it is, and is not

A brief explanation of what The California Water Plan is, and what it is not, appears desirable. It is a framework within which development of all water resources of the state can take place in orderly progression as required and as desired by the people of California to attain maximum ultimate benefit. It is a master pattern to meet our present and foreseeable future needs for water for all beneficial purposes in all areas of the state.

The Plan is not a construction proposal. The exception is the Feather River Project, which is the initial feature and already authorized by the legislature. It is needed now. With this exception, we have not been able to concern ourselves with determinations of economic or financial feasibility, since we have been developing a plan for the distant future. However, economic justification and financial feasibility of component features will be considered in connection with specific construction proposals to be made later and based upon then existing conditions.

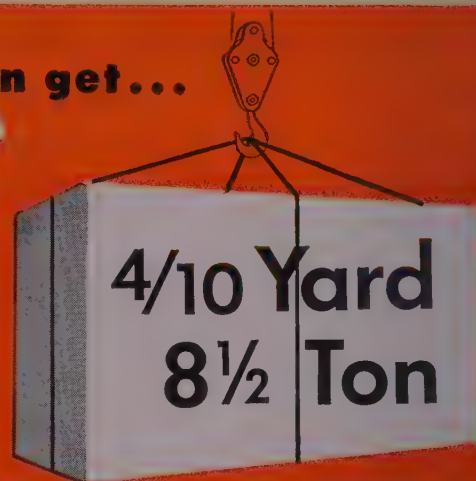
Above all, The California Water Plan is not proposed as a rigid, inflexible regulation. We who have been involved in its preparation have not the clairvoyant ability to determine exactly what yet unborn generations will do with the land and other natural resources of the state. Neither can we foresee the techno-

(Continued on page 90)

Why take less when you can get...

MORE!

MORE Big Shovel Features
MORE Capacity
MORE Work and Profits



at a "Small Shovel" Price

With the all new **85A "QUICK-WAY"**
4/10 Yard 8 1/2 ton

When you can make money with a small outfit, think how much more money you can make with the husky "QUICK-WAY" 85A. Why be satisfied with a 6 or 7 tons in the 3/8 yard class when you can get 8 1/2 tons in the 4/10 yard "QUICK-WAY" 85A—and for approximately the same price.

The new "QUICK-WAY" 85A has more Big Shovel Features than any other in the small shovel field. It has been engineered to meet rugged, heavy-duty specifications with fewer moving parts. The power train is oversize, all shafts are splined for easy maintenance. Extra strength has been built in the machinery frame and gantry for greater lifting power. It has been simplified for easy, economical maintenance of all parts. It operates smoothly and quietly with maximum production and minimum operator fatigue.

The All New "QUICK-WAY" Crawlers 85AC and 105AC



Now you can get the "QUICK-WAY" 85A and 105A on a crawler! You get the same "QUICK-WAY"

Big Shovel Features on the crawler that gets to its job easily, stays with the work, even in close, restrictive quarters. The new "QUICK-WAY" Crawler has independent travel—forward and reverse speeds of 3/4 miles per hour in low range and 1 1/4 miles per hour in high range. It is now available in 16" crawler shoes (5.1 psi ground pressure), 24" crawler shoes (3.5 psi ground pressure), and 32" crawler shoes (2.5 psi ground pressure). Width of 95" has been especially designed for hauling on trailers.

• The Most Complete Line in the Small Shovel Field with 5 Models—105A 5/10 yd., 10 1/2 Tons—105AC 5/10 yd., 7 tons—125A 6/10 yd., 12 1/2 Tons—with the famous money-making line of "QUICK-WAY" attachments for all models.



1 SIMPLIFIED CHAIN AND GEAR DRIVE for efficient, quiet operation—the combination of roller chains and precision machined gears gives efficient transmission of power through the minimum number of moving parts. Standard engine 47HP @ 1800 rpm.

2 MAIN HOIST AND HAUL BACK DRUMS are mounted on a single, accessible shaft with sealed anti-friction bearings. Two-piece cast laggings are easily changed. Large clutch and brake drums have separated surfaces with louvers for cooling.

3 LARGE SWING DRUMS are ribbed for cooling and are mounted on a king-sized horizontal swing shaft. Vertical swing shaft is mounted in double anti-friction bearings at top with an anti-friction needle roller bearing at bottom. One-piece, bonded brake linings provide more surface for smoother, cooler operation.

4 OVERSIZE CLUTCHES have more surface—for smoother, positive action. Hydraulically operated for easy, sure application of power, giving the operator the feel of the load at all times.

5 POWER UP AND DOWN BOOM HOIST IS STANDARD. Simple precision design makes safe, sure operation. A one-piece cast steel unit contains pawl teeth, windlass and brake drum. The cable end is located in an easily accessible place for quick attachment change-over.

6 ONE-PIECE FLOOR FRAME, HEAVY DUTY SWING TABLE GEAR AND HOOK ROLLERS—Floor frame electric welded in jig, then all bearing mounts machined at one time for precision alignment. One-piece, cast steel swing table gear. Four hook rollers distribute load.

7 ALL SHAFTS SPLINED, ALL ANTI-FRICTION BEARINGS—All shafts extra large for maximum strength, precision splined for easy maintenance. Anti-friction bearings used on all high-speed, continuous rotating shafts and drums. All shaft bearing surfaces are precision ground.

8 MACHINERY HOUSING DESIGNED FOR COMPLETE, EASY ACCESS to all machinery. New feature is an automobile hood-type cable trough cover that lifts high for complete access to central machinery. New cab has 360° vision through removable safety-glass windows.

"QUICK-WAY" TRUCK SHOVEL CO. • DENVER, COLO. Best Buy Subsidiary

GET THESE IMPORTANT BOOKS ... FREE!

- ☐ The new catalog on the "QUICK-WAY" 85A and 85AC Crawler.
- ☐ The new catalog on the "QUICK-WAY" 105A and 105AC Crawler.
- ☐ The new catalog on the "QUICK-WAY" 125A.

"QUICK-WAY" TRUCK SHOVEL CO., Dept. 187
2401 East 40th Ave., Denver 5, Colorado, U.S.A.

Name _____ Title _____
Company _____
Address _____
City and State _____



KEEP WORK "on Schedule"



FORTY FIVE, 120 brake hp, 23,800 lb

with the Allis-Chalmers

FORTY FIVE

Backlogs change quickly to "on schedule" operations when you use an Allis-Chalmers FORTY FIVE motor grader on spring grading jobs. This machine's *extra output* features help you catch up fast and then keep you ahead. Measured in production — the FORTY FIVE gives you more work per grader, more work per operator.

HERE'S HOW IT'S DONE

REAL WORK POWER — Allis-Chalmers 120-hp diesel engine with follow-through combustion provides outstanding lugging ability . . . furnishes all the power you need to roll big windrows. Smooth performance, clean combustion, extra long life keep your jobs on the move.

BIGGER LOADS — the ROLL-AWAY moldboard puts action into every load. Because load rolls up and

ahead of the moldboard, you handle bigger capacities at no increase in operating costs.

EASY, PRECISE CONTROL of every blade position is yours with exclusive toggle-type levers that engage jaw clutches without kickback. Mechanical action provides a positive "feel," giving you the precise operation you want.

PASSENGER CAR COMFORT for operators gives owners an extra measure of performance on all grading jobs. Fully enclosed power steering; adjustable foam rubber seat; clean, roomy platform; good visibility, plus many other features, helps operators stay at peak efficiency through an entire shift.

Your Allis-Chalmers dealer will show you a FORTY FIVE at work in your area. He offers sound equipment recommendations, a full parts stock, and complete maintenance and service facilities to meet your needs.

ROLL-AWAY is an Allis-Chalmers trademark.

Now is the best time to let your

ALLIS-CHALMERS

CONSTRUCTION MACHINERY DEALER

help you get ready for spring work.

ARIZONA

Neil B. McGinnis Equipment Company—Phoenix

NORTHERN CALIFORNIA

Industrial Tractor Sales—Sacramento
Shasta Truck & Equipment Sales—Redding
Aikins Tractor Co.—Eureka and Willits

SOUTHERN CALIFORNIA

San Joaquin Tractor Co.—Bakersfield
Shaw Sales & Service Co.—Los Angeles and San Diego

IDAHO

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

MONTANA

Mountain Tractor Company—Missoula
Richland Machinery Company—Sidney
Seitz Machinery Company, Inc.—
Billings and Great Falls

NEVADA

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

OREGON

Haupt Tractor Company—
Medford and Klamath Falls
Wood Tractor Company—Portland
Timber Tractor Company—Springfield

UTAH

Cale Equipment Company, Inc.—Salt Lake City

WASHINGTON

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

WYOMING

Studer Tractor & Equipment Company—Casper

Construction and permanent highway signs in Wyoming

By **ROBERT C. O'CONNELL**
Traffic and Planning Engineer
Wyoming State Highway Dept.
Cheyenne, Wyo.

THE STATE OF WYOMING recently added a new "contractor responsibility" to the multitudinous details of highway construction. As of December 1, 1956, all highway projects are to include the purchase and erection of permanent signs and markers as a bid item on contracts. This was necessitated by the fact that many construction jobs were completed on time but not opened to traffic because the permanent signs had not yet arrived, or perhaps, because the maintenance men just didn't get the signs up in time and the opening date was delayed one or two weeks. In either case, it was evident that the scheduling was bad and corrections had to be made along this line. The best solution was to let the contractor handle the signing and actually put permanent signs and markers in the project as a bid item so we could get the signs up in plenty of time for the opening of the road to traffic.

Adequate construction signs

A second responsibility in highway signing, but certainly not a new one, is the requirement that the project be "well signed" during construction so that traffic can move safely and surely to its ultimate destination. Some signing has always been required during the progress of construction, but over the last few years this single item has become so important that contractors are very much aware of it and devote considerable time and money toward having projects adequately signed. This two-fold sign requirement has also been a problem for project engineers of the Highway Department. Heretofore, the lack of emphasis on signs for construction over the past years has not made traffic engineers out of these construction specialists, and they are now burdened with the responsibility of locating the proper signs during construction.

Permanent signs and markers

For years, many states have required permanent signs and markers on construction projects, but this is

Contractors now required to bid on, and erect permanent markers, eliminates delays in opening to traffic. More emphasis on adequate signing during construction.

a new item for Wyoming contractors. Actually, this type of signing on the finished roadway is not too difficult providing the contractor is furnished with standard signs meeting the requirements of our specifications. Here in Wyoming, we are handicapped in this respect because we have not, as yet, published a state manual on uniform traffic control devices. This, of course, is being prepared, and when it is published all code numbers and sign details on the construction plans will refer to our manual without question. In the interim, we must rely upon the "Manual on Uniform Traffic Control Devices for Streets and Highways," published by the Bureau of Public Roads. This national manual is quite general and does not list many of the signs that are needed in our state. I would like to insert here that we are great proponents of standardizations and our policies do not conflict with the national manual, but the trouble arises mostly in directional signs, variable direction arrows and the like, that are not listed in the national manual. True, a plan could be drawn for these special signs, but our intent is to keep to a minimum the details of signing for contractors. We do not want to overburden them with the details which we can more easily take care of on a maintenance basis.

Bids include signs

The signs required on a project are listed in the summary sheet of the plans along with the other bid quantities. The listing includes location by station number, code number (from the "Manual on Uniform Traffic Control Devices"), a brief description, the size and the location of the sign with respect to the centerline (left or right). The item is bid as a lump sum for the convenience of the contractor, and to date we are quite pleased with this arrangement.

It is interesting to note that the signs have been overbid by some of the contractors by as much as 400% but this is easy to understand because of their lack of information on this item. We are certain that all bids will fall in line when more experience in signing is gained by the contractors.

Since these signs are included in Federal Aid projects, they must meet the approval of the Bureau of Public Roads, both on the plans and in the final field inspection. An interesting point in this connection is a Bureau requirement that signs will not be a participating item if they are fabricated by a state institution. In Wyoming for instance, all of our highway signs are purchased from the sign shop in the State Penitentiary at Rawlins, Wyoming. It would be very convenient for contractors to purchase the required signs from this source, but it cannot legally be done because of Bureau requirements that contractors must secure them from a commercial supplier.

Mention should be made of the standardization of sign numbers by commercial manufacturers in accordance with the national manual. They are to be complimented on their efforts to keep specific code numbers assigned to specific signs so that when mention is made of a certain sign, it can usually be found listed in all the commercial sign catalogs by the same number. This standardization makes it very convenient to use code numbers with a brief description of the sign in order to identify just exactly what we require on the job.

Construction signs and markers

The ever-increasing demands of traffic have made it mandatory that all construction projects be as drivable as possible with a minimum amount of delay to traffic. This is certainly a headache for the contractors, but since it is imperative to keep traffic moving on all jobs, they must accept it and work accordingly.

Warning signs are probably the most important and most abused of all signs used on construction. All warning signs should have a black legend on a yellow background, be diamond shaped (except for mirror exceptions), and be located approximately 500 ft. to 750 ft. in advance of the hazard. The misuse of these signs is very demoralizing to drivers and tends to weaken the respect that they have for highway signs. It is quite probable that you have driven, at one time or another, on a construction project and have seen sign after sign reading SLOW,

(Continued on page 66)



No special lifting equipment needed. The machine that dug the trench for this job was also used as a hoist in laying the pipe.

Here's the Way to Lower Your Drainage Bids Without Cutting Profits

It's easy to get the jobs *and* the profits when you figure drainage bids with Armco Corrugated Metal Structures. You save time, labor and equipment costs.

For example, with long, 20-foot lengths of Armco Pipe you have fewer pieces to haul and handle, fewer joints to make. A small crew with no special tools can do a fast, efficient job. And inclement weather is no problem.

Armco Drainage Structures are corrugated for high strength with light weight. A rope sling or a small A-frame can be used to handle the largest structure with no danger of cracking or breaking.

It will pay you to investigate Armco Corrugated Metal Structures for your next drainage bid. Wherever you may be, there's always a nearby cooperative Armco representative to assist you—and a nearby fabricating plant to help assure on-schedule delivery.

WRITE FOR HELPFUL DATA

ARMCO DRAINAGE & METAL PRODUCTS, INC.

CALCO AND NORTH PACIFIC DIVISIONS

Berkeley • Los Angeles
Portland • Seattle • Spokane



Joints can be made quickly and easily. Here one man tightens the two bolts on a connecting band with a hand wrench.

Armco Drainage Structures





Cofferdam completed for Montana's Cochrane Dam

AUTOMATION takes another step forward with the construction of the H. H. Cochrane Hydroelectric Development 8 mi. downstream from Great Falls, Montana, on the Missouri River. When completed, this dam and powerhouse, generating 60,000 kw., will be remotely controlled from the Rainbow Plant, 2½ mi. upstream. Only one man will be on duty at Cochrane.

Winston-Green, of Great Falls, began work on the \$10,000,000 project August 1956. It is a joint venture of Winston Brothers Co., Minneapolis, Minn., and Green Construction Co., Des Moines, Iowa. The work is headed by C. C. Carey, project manager.

This concrete gravity dam will bottle up a deep, narrow canyon. The dam, including seven spillways, will be 869 ft. long at the crest and 700 at the base, 98 ft. high, thickening from 17 ft. at the top to 92 ft. at the base. About 114,100 yd. of concrete will be used in the dam and the powerhouse.

Two 22-ft. penstocks will feed two 180-in., 6-bladed Smith-Kaplan turbines, each rated at 42,000 hp. at 128.6 rpm. under a head of 80 ft. Each turbine will power a 30,000-kw. Westinghouse generator, remotely controlled from and transmitting power to the Rainbow switchyard.

Access road building

Initial work by Winston-Green was the construction of an access road behind the dam from the borrow area to the river. This was largely handled by a 955A P&H shovel and three Cat D8 tractors with Ateco rippers.

As soon as this was finished, construction began on the north cofferdam. The low head permits the use of a rock and earth cofferdam, with a layer of impervious material on the outside of the upstream and downstream arms and on the inside of the channel side. This cofferdam, encircling the powerhouse, contains about



WORKING as a team two Cats handle one of the largest rocks at the toe of the cofferdam fill which contains 60,000 yd. of material.

60,000 yd. of material. The south cofferdam, to be completed after runoff next summer, will contain about 40,000 yd.

Material for the cofferdam is loaded into four 9.7-yd. Euclid trucks by a 54B Bucyrus-Erie dragline. Due to the swiftness of the river and the steep access grade which the loaded trucks must descend onto the cofferdam, operators are required to wear life jackets. The three D8s spread the fill, build roads and ramps, and clean up inside the cofferdam, often working in water over the tracks.

Much of the rock excavation around the job is handled by two motor cranes, an America 300 and a Lorain. Three Koehring WD60 Dumpsters are used for the shorter hauls. Maintenance work around the site is handled by a Cat No. 12 motor grader.

With the sealing up of the north cofferdam, excavation began for the powerhouse. The sandstone river bottom will be drilled by a Joy compressor and drill rig mounted on a Cat D8 tractor and three Ingersoll-Rand wagon drills.

A spur from the Great Northern rail line nearby has been constructed, with two under-track hoppers for unloading aggregate. Two 75-ft. elevating belts will feed two 100-ft. radial stackers. The material will be hauled by truck to the batch plant, which contains two 2-cu. yd. tilting mixers.

Trucks will haul the concrete to a 4-yd. Gar-Bro bottom-dump bucket working from a 1,400-ft. cableway strung between two laterally-traveling 70-ft. towers. Pouring of concrete is expected to start early in 1957. Steam and oil heaters will be used to protect the concrete during the winter.

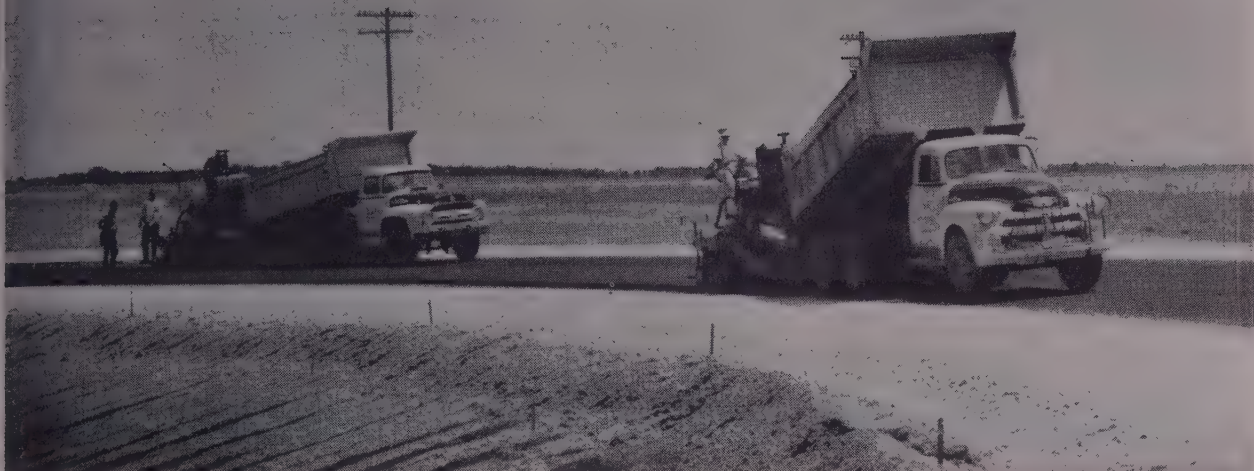
Cochrane will store about 2,700 ac.-ft. of water, without flooding any land. At the dam site, the canyon is 190 ft. deep.

Mr. Carey, project manager, is assisted by Ted Torgerson, general superintendent; T. A. Leines, project engineer; Charles Clark, office manager, and Dave Mendell, master mechanic.

Two access roads totaling ¾ of a mile, one to the top of the dam and the other to the powerhouse at river level, are being built by McLaughlin, Inc., of Great Falls, Montana.

Plans and specifications for the project were prepared by the Bechtel Corporation, Los Angeles, California.

G. M. Jones, Construction Manager, is in charge for The Montana Power Company.



Four more improvements in the Barber-Greene Finisher

Four new improvements give the Barber-Greene Finisher faster speed, faster travel, lower maintenance cost and increased power.

Improving the Barber-Greene Finisher is not something new. Scores of major improvements have been embodied in its design since it was first released to the field 20 years ago.

These improvements have been incorporated without spectacular announcements or fanfare. They have all been based on vast experience. In fact, the Barber-Greene Finisher is now paving its second million miles, which is many times the mileage and tonnage records of all other asphalt paving machines in the world combined.

These are all proven, sound improvements developed from experiences in laying every type of mix, in virtually all conditions. Machines embodying this group of design changes are now in production and are designated as the Model 879-B.

Columbia Equipment Co. Spokane, Washington
Seattle, Washington; Portland 14, Oregon
Keremi Tractor & Equip. Co. Cheyenne, Wyoming
Casper, Wyoming
Contractors Equip. & Supply Co. Albuquerque, New Mexico
Western Construction Equipment Co. Billings, Montana
Great Falls, Montana

Latest improvements include:

NEW TRANSMISSION—Provides both higher operating and travel speeds. The new transmission still provides 12 forward speeds giving a wider range of operation.

HIGHER SPEED TAMPER—This new design permits faster laying speeds and reduces maintenance costs.

NEW CRAWLERS—Precision-drilled pads and larger pins will further decrease maintenance costs.

NEW POWER UNIT—20% more power. This means pushing even bigger trucks, handling even steeper grades, greater reserve for high altitude, and higher speeds of operation.

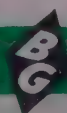
Note To Barber-Greene Finisher Owners

These latest improvements, as well as many previous improvements, can be incorporated in your old machine. Necessary parts are now made up in kit form for each modification separately. A folder describing the various kits is available.

Ray Corson Machinery Co. Denver 19, Colorado
Kimball Equipment Company Salt Lake City 10, Utah
Road Machinery Co. Phoenix, Arizona
Sierra Machinery Co. Reno, Nevada
Coast Equipment Co., Inc. San Francisco 3, California
Engineering Sales & Service Boise, Idaho
Santa Fe Equipment Co., Inc. Los Angeles, Calif

see your

Barber-Greene



distributor

AURORA, ILLINOIS, U.S.A.

For your concrete forming needs...

EFCO "LIFETIME" STEEL FORMS

available
on a

**PURCHASE
BASIS**



Increase profits, reduce costs — with EFCO "Lifetime" Steel Forms. They save time, material, money. Adaptable to wide use. Available in many types of regular and special sizes.

WRITE FOR CATALOG on EFCO "Lifetime" Steel Forms. And ask for details on Special Economy Steel Forms and the Economy Steel Form System on a rental basis.

Economy Forms Corp.
DES MOINES, IOWA

Offices in Denver, Colo.; Los Angeles, Calif.;
Oakland, Calif.

Other offices coast to coast

EASY TO REPLACE
ON THE JOB

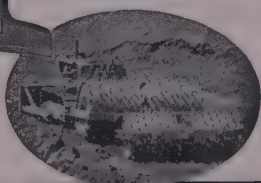
Tamprite Tips

NO WELDING!

DRIVE OFF WORN TIPS
DRIVE ON NEW TIPS

PREVENT COSTLY DELAYS by equipping your sheeps foot rollers with Tamprite Tips and Shanks. Simple to replace on the job. Available for immediate delivery. Write for information.

PATENT NO.
2131341



LOS ANGELES
STEEL CASTING CO.
6100 So. Boyle Avenue, Los Angeles 38, California

Structural Design Chart—VII

By THOMAS HARAN, Civil Engineer

THE ILLUSTRATED MATERIAL on the opposite page is a condensation of the author's interpretation of the structural design requirements for anchorage and shear of ACI 318-51. While all of the data are applicable to beams, specific references to beams have not been made, as much of the information is applicable to other structural members also. Symbols and abbreviations are those in current use; where exceptions occur they can be readily interpreted from the illustrations on the chart.

Starting at the top of the chart, standard hooks are shown in contrast to extended bars. Allowable maximum bar stresses are indicated and a graph is given which should be used on extended bars in addition to their formulas.

Various conditions for anchorage of longitudinal reinforcement are shown with some pertinent notes.

The facts on vertical (perpendicular) web reinforcement are illustrated by a part of a longitudinal section of a beam with the various cases of anchorage for web reinforcement called for and shown on the right. In cases 3 and 4, field welds are indicated; however, the Code merely specifies "welding". Case 7 is a reminder that at the closed end of a stirrup the stirrup must bend at least 90 deg. or be rigidly attached to the longitudinal reinforcement.

Correction: The term "4Eu" appearing in the f_v equations in the first two cases of "Perpendicular A_v " and in the first four cases of "Diagonal A_v " should be changed to "4Eu/D".

Under "Diagonal A_v ", several conditions of bent bars are illustrated with formulas for computing their respective maximum allowable stresses. The third case, of a bar extension of 12 diameters terminating in a standard hook, and the fourth case, of a web bar continuous with longitudinal reinforcement at both ends, have formulas containing f_s which is to be obtained from "Extended Bars" at the top of the chart. The next illustration shows the restrictions web bars are subject to when all web bars are bent up in one layer. Various requirements for web bars that are rigidly attached to longitudinal reinforcement are noted by an illustration that refers to cases under "Perpendicular A_v ".

Author's reply:

SIR:

In the January issue Mr. Lofgren states in his letter to the editor a warning against using reduced spans and column heights in the analysis of flat slabs, which were used in Structural Design Chart No. 3 for the method entitled "Continuous Frames." He recommends the use of the Portland Cement Association's "Handbook of Frame Constants" and "Frame Analysis Applied to Flat Slab Bridges."

The literature of the Portland Cement Association presents some excellent approaches to the design of flat slabs for buildings as well as bridges. However, since ACI 318-51 doesn't specifically require all of the refinements that PCA presents, Structural Design Chart No. 3 merely indicates that "Elastic Analysis by recognized methods" is acceptable to the ACI Building Code—this includes PCA's methods.

As for the use of reduced spans and column heights, it must be remembered that the method entitled "Continuous Frames" on Structural Design Chart No. 3 is actually only a semi-elastic analysis. The benefits of Poisson's ratio and the effect of 2-way strain are not utilized in the analysis even though they are certainly mobilized when the structure is deflected. This does not mean that the design engineer can go about his work indiscriminately ignoring column capitals.

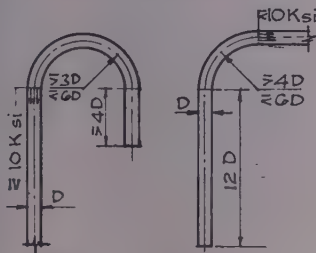
On the contrary, he must observe them and use his judgment and experience, realizing that the higher the ratio of the column capital size is to the span length, the greater is his theoretical error. If he doesn't feel the error to be negligible he should not employ reduced spans and column heights in his analysis.

Finally, it might also be remembered that the Code and "Structural Design Chart No. 3" have a safeguard against the use of theoretical moments that are considered too small, as it is required by the Code that the sum of maximum positive and negative moments shall be not less than the amount found by equation No. 18 of the Code; this equation also appears on Chart No. 3.

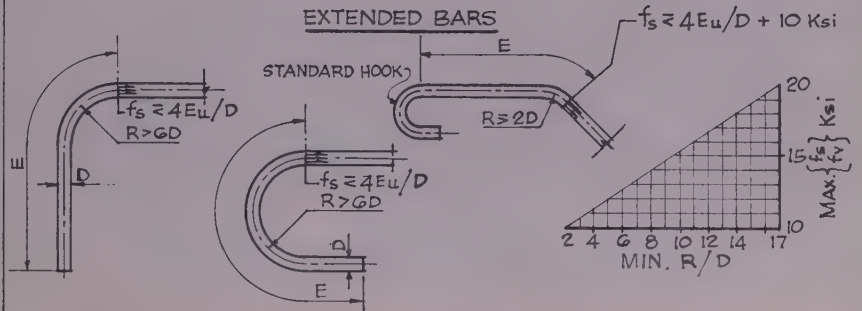
THOMAS F. HARAN

A.C.I. ANCHORAGE and SHEAR

STANDARD HOOKS

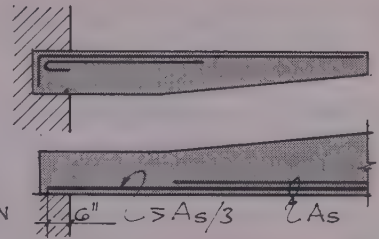
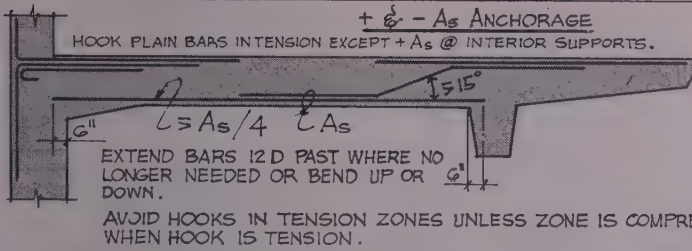


EXTENDED BARS

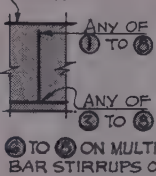


+ &- A_s ANCHORAGE

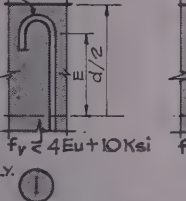
HOOK PLAIN BARS INTENSION EXCEPT + A_s @ INTERIOR SUPPORTS.



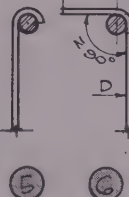
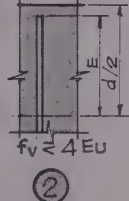
COMPRESSION SIDE.



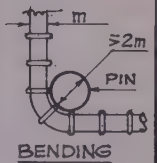
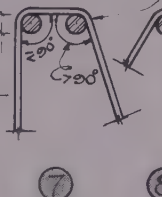
EITHER STANDARD HOOK.



⊥ A_v NOT ALONE IF v > .08E'

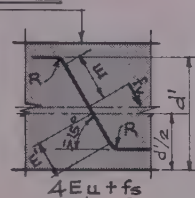
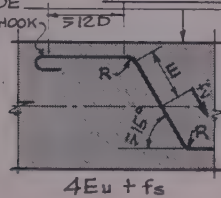
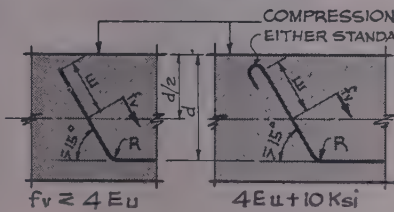


ATTACH RIGIDLY.

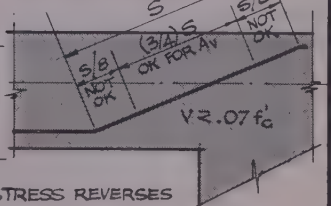


BENDING

DIAGONAL A_v

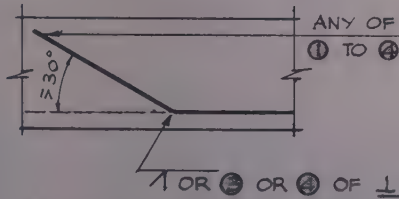


IF Σ A_v IS 1 LAYER:

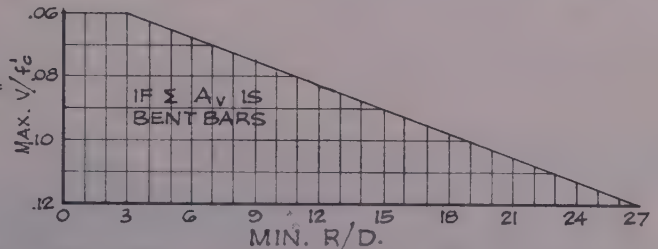


BENT BARS

R ≥ 2D



SEE EXTENDED BARS FOR f_s

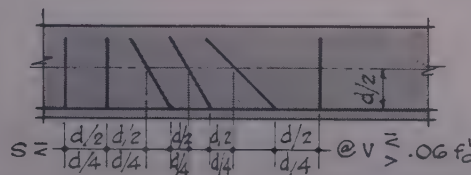


COMBINED A_v

$$V' \approx V_L + V_D$$

$$\frac{V_L}{V_D} \approx \frac{V'}{2/3}$$

SPACING



T. HARAN

MSS 1/4-58



FAST AND SIMPLE erection procedure builds walls and roof. The crew is applying adhesive for the neoprene joint strip before the panel is lifted to position on the roof.

Panels of aluminized steel form store walls and roof

By **WILLIAM A. WOOLFORD, Partner**

**Laffoon & Woolford
Engineers & Appraisers
Denver, Colorado**

PREFABRICATED, aluminized steel panels represent a recent development in the design and construction of durable, high-quality buildings for retail stores. Low cost is demonstrated by a figure of \$6.70 per sq. ft., including architectural and engineering fees, for a store built in Columbus, Neb.

The basic panel (Behlen Manufacturing Co.) from which the building is constructed has a width of 3 ft. 5 in. c.c. of bolt holes, and is available in lengths to suit almost any purpose. The fluted corrugation of the panel has a total depth of 7½ in.; and when fabricated from 16-gage steel, the panel has a section modulus of approximately 6.5 in.³. Panels are fastened together at 6-in. centers along the edges, with a neoprene sealer strip inserted between the panels to provide positive seal. No supporting members other than the panels themselves are used in the construction of buildings except the rods or trusses in long clear spans on gabled roofs.

The building is rectangular in shape, 162 ft. long by 59 ft. wide, with

one row of supporting columns carrying roof loads. Walls are approximately 14 ft. high and are completely self-supporting except at display window openings. Construction of the building shell was accomplished with Behlen panels fabricated from 16-gage aluminized steel. These panels are used to provide the building closure and supporting structure, being heavy enough to support all imposed loads. All panels were erected using the light A-frame dollies shown in the picture.

The roof structure is identical to the wall panels with a maximum span of 29 ft. 10½ in. between supports. A moment connection at the eaves prevents excessive deflection of the wall and roof panels. Cantilever supports carried on the center beam serve to distribute the reaction of the beam along the panels and prevent local buckling. Thus, the shell becomes a rigid frame with three supports: the two walls and the line of interior columns along the center of the building. Behlen panels are also used to provide a marquee over the entrance to the store.

BUILT at a cost of \$6.70 per sq. ft., the shell for this 59 x 162-ft. store consists of panels of aluminized steel. Roof panels span 30 ft. to the line of interior columns.

A serious problem encountered in the design of the building was the control of condensation on the interior surfaces of the exterior walls and roof. Two methods were used: below the ceiling line, full-thick insulation batts with a built-in vapor barrier were installed on the warm side of the wall; and above the ceiling line, a ½-in. coat of vermiculite plaster was sprayed directly on the panels. Interior finish of the walls was completed with drywall plaster over furring strips.

Heat loss and gain in the building received special consideration during the design stages due to extremes of temperatures. These range from lows of 10 below zero during the winter to above 100 during the hottest periods of the summer. Two horizontal gas-fired forced warm air furnaces provide heat, while summer air conditioning is handled with two water-cooled air conditioners mounted on the roof. The cooling units each have a rated capacity of 7½ tons.

Several other features were used to save construction costs. Among these was the use of unformed concrete below grade. This, of course, is not always possible, but if ground conditions permit, it may be used to advantage. All exterior foundation walls for the building were poured 7½ in. thick, unformed below existing grade to a depth of 3 ft. 4 in. below finished floor elevation. This procedure was possible due to the uniform loading imposed on the foundation by the building structure. Spread footings were used only for interior columns. All concrete was poured with a 6-sack mix and a maximum slump of 3 in.

The steel shell for the building was fabricated and erected by Behlen Manufacturing Co. of Columbus, Neb. General contractor for the building and paving was Walter Roth, of Columbus, Neb., whose son, Harvey, was superintendent. Architects and engineers for the building were Wurdeman and Reed, also of Columbus.





Carries pipe—One of Peter Kiewit's Michigans serves as all-around handyman on company's Indiana Turnpike contract. This 95 hp model lifts up to 11,000 lbs, carries 5,500 lbs at 4 mph. Note excellent all-around visibility given operator.



Breaks, loads asphalt—Before resurfacing street in Worcester, Mass., Contractor Charles Chaffee uses 1 1/4 yd Michigan to strip old asphalt. No "ramming" is required—powerful breakout quickly shatters paving.



Cleans pavement—Highway must stay open said Nashville officials, so Wright & Lopez do cleanup with small, agile 16 cu ft Michigan. Only 4'2" wide, 10'8" long, unit works rapidly, doesn't block traffic, doesn't damage newly-set pavement.



Removes sewer cover—When other big loaders failed, Kirby-Erwood's 133 hp Michigan succeeded in prying off this 2-ton concrete cover. Assignment was part of cleanup before widening Los Angeles freeway.

Digs shot rock—Time studies proved to Nelson Bros., Reading, Kansas, that this 2 3/4 yard Michigan would outproduce crawler-loaders in both pit-run and shot rock.



Breaks, loads concrete—On Philadelphia city street repaving job, Union Paving Co. breaks and loads 4 to 6-inch concrete slab with this 2 yard Michigan Model 125A.



Wyoming highway signs

(Continued from page 55)

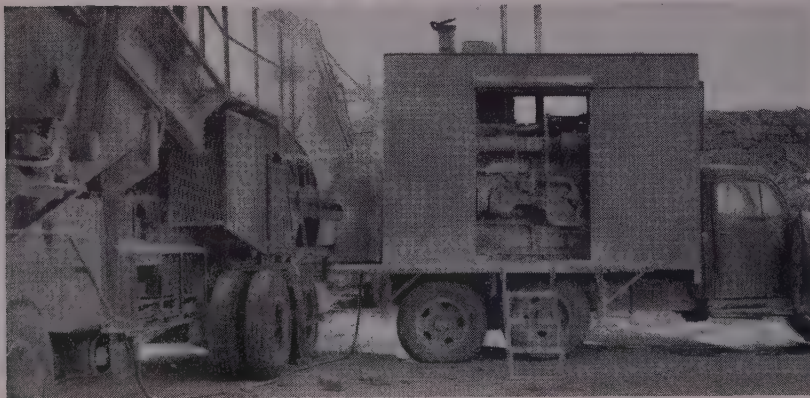
MEN WORKING, TRUCKS TURNING, SPEED LIMIT 25, and so forth and have reduced your speed according to the signs. After a mile or two of an excellent new road you begin to wonder just where these hazards might be located. It takes only one or two of these poorly signed projects to destroy any respect you might have had for highway signs.

The point to be brought out is that signs must "mean what they say," or drivers will pay no attention to them. Warning signs must be moved along with the progress of construction and taken down when not needed. Guide signs must clearly indicate detours with route markers, and should be removed when the detour is no longer used. Regulatory signs must be used only when absolutely necessary and should have the approval of a traffic engineer. For instance, an overall speed limit of 25 miles per hour cannot logically be applied to all construction projects, particularly after the base course is finished and obviously allows faster movement of traffic. Yet we have all seen this happen. It is a well established fact that drivers drive by what they see. If actual hazards are not present with the posted warning signs, then the signs are meaningless. A speed limit sign is absolutely useless unless the conditions are such that drivers realize the necessity for the reduced speed and voluntarily comply with the posted limit. Signs alone will not make drivers adjust their normal driving; there must actually be physical hazards present to justify the erection of the signs. This again is merely the application of the traffic engineer's golden rule: "Signs must mean what they say."

State highway departments must rely upon their project engineers to see that proper signs are posted on the job at all times. True, signing is a contractor's responsibility on a road under construction and may even protect him in litigation over an accident on the job, but it is something that generally is not given sufficient consideration until brought to the attention of the construction people by the project engineer. The National Safety Council has aptly coined the phrase "Signs of Life," which behooves us all to consider very seriously: is the sign needed; is it clean and erected so it can easily be read by all drivers, and will it be removed when no longer needed?

powering each portable
crushing plant

WAUKESHA *Diesels*



● These two portable crushing plants, shown operating near Appleton, Wis., are powered for production—with Waukesha Diesels. Both plants and their crushers were built by Highway Machinery Corp., Waukesha, Wis. In the primary-crushing plant (above, right) the 3' x 10' Simplicity Vibrating Scalper-Feeder and conveyor are driven by the current from a Waukesha-powered 100 KW generator in the truck (above, center). The 25 x 36 Jaw Crusher is powered by a 148-DKU Waukesha Diesel. This 6-cyl., 5½ x 6-in., 779 cu. in., 155 max. hp unit handles every load demand eagerly and easily, with power to spare. The secondary-crushing plant (above, left) consists of a Double Jaw Crusher with twin 8 x 36 units, a 25" x 40" Roll Crusher, a 5' x 12' Simplicity double deck Sizing Screen, and conveyors. Its separate, mobile Waukesha power plant is mounted in the truck (shown below) with a 100 KW Generator. This Waukesha NKDBSU Turbo-Supercharged Diesel—6-cyl., 7 x 8¼-in., 1905 cu. in., with counterbalanced crankshaft—drives the two crushers, and powers the generator which supplies current for all incidental equipment. A rugged, compact engine with lively acceleration, clean burning, prompt starting, great overall economy and smooth extra power up to 368 hp. Get Bulletins 1634, 1414.

330

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES

CLINTON WELDED WIRE FABRIC ... IN FAMOUS STRUCTURES EVERYWHERE



SAN FRANCISCO AUDITORIUM

beautifully built then...a beautiful building still

The famed San Francisco Auditorium, a magnificent structure when it was built almost 50 years ago, is still an imposing edifice today.

Much credit for such agelessness can be given to the Clinton Welded Wire Fabric used in the construction of the floors and for beam and column wrapping.

Over the years, Clinton Welded Wire Fabric has achieved an outstanding reputation for the contributions it makes to the durability of reinforced concrete structures.

Made by CF&I, Clinton Welded Wire Fabric is fabricated from our own steel wire, cold drawn

and electrically welded in our own plants, under CF&I's highest standards of quality control. Because of its quality, this fabric has gained the approval of contractors, designers, engineers, builders, owners—of hospitals, hotels, municipal buildings, factories, highways, etc.—everywhere.

Past performance proves . . . you can count on Clinton Welded Wire Fabric to provide maximum strength with minimum cracking on all your reinforced concrete projects. Consider using Clinton Welded Wire Fabric on your next job. Get full details on this fabric's advantages . . . consult our nearest sales office. Or write today.

WHEN THEY ASK . . .

"is it Reinforced"

SAY YES . . . WITH

CLINTON

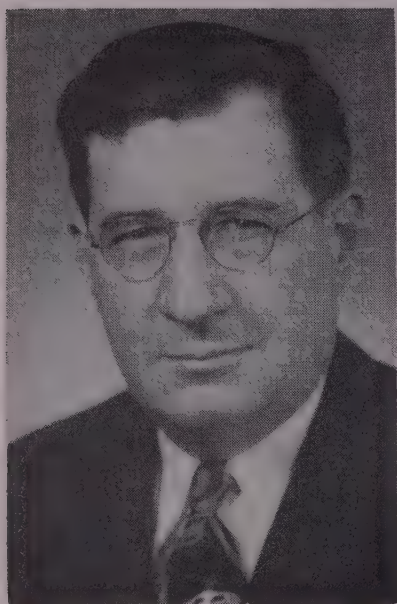
WELDED WIRE FABRIC

THE COLORADO FUEL AND IRON CORPORATION



THE COLORADO FUEL AND IRON CORPORATION: Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita. PACIFIC COAST DIVISION: Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane. WICKWIRE SPENCER STEEL DIVISION: Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia. CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg. CF&I OFFICE IN CANADA: Toronto

H. E. Foreman leaves post with AGC



THE EXECUTIVE COMMITTEE of the AGC has accepted "regretfully" the request of H. E. Foreman that effective April 1, 1957, he relinquish his duties as managing director of the association. In recognition of his "long and faithful service and his accomplishments in the management of the association" and in order to "make further use of his talents and experience" the committee adopted a resolution naming him Association advisor at the time.

"Doc" Foreman, who has been managing director of the association since October 1940, made his request to the committee for reasons of health which do not permit him to devote full time to the duties and responsibilities of the position.

At the time Foreman became managing director the construction industry was heading into a period during which it became mobilized for defense work at the time of Pearl Harbor. At that time the national association represented 2,500 member firms, and had a national staff of 25 men and women. During the war and post-war periods, growth of the association has been such that now it represents more than 6,700 member firms and has a national staff of 56.

Foreman is one of the most widely known men in the construction in-

dustry. He has been the spokesman for the general contracting industry before Congress and the government. During World War II he was very active in an advisory capacity in helping various government agencies mobilize the industry. Currently he is a member of a number of committees advisory to the Commerce Department, Labor Department, President's Conference on Industrial Safety, Bureau of the Budget, and Federal Civil Defense Administration.

He has made use of his training as an engineer and a lawyer in analyzing construction problems which have come before the association. He has been a member of the association staff since 1929 and an engineer and assistant managing director. Previously he had been an engineer, executive secretary and assistant to the director of the Ohio State Highway Department in Columbus. He is a native of Ohio. Effective April 1 his title of managing director will be discontinued.

James D. Marshall, who has been executive director since 1953, in April 1956 assumed full responsibility and authority of chief executive of the association's management.

International conference on prestressed concrete

AN INTERNATIONAL CONFERENCE on prestressed concrete will be held in San Francisco July 29-Aug. 2 by the University of California for some 600 engineers, scientists, architects, contractors and manufacturers from all over the world.

The conference is presented by the University in cooperation with the Prestressed Concrete Institute, the American Concrete Institute, the American Society of Civil Engineers and other technical societies.

The program will consist of papers on precast prestressed members, prestressed thin shells and slabs, research, design, and construction in various countries. Panel discussions will be conducted on basic principles, materials, techniques, production, inspection, design and specifications. One day will be devoted to field trips to construction jobs and visits to prestressing plants in the San Francisco Bay Area.

A feature of the Conference will be commercial exhibits of machinery, equipment, tools, prestressing wires, anchorages and related materials by American and foreign suppliers.

T. Y. Lin, professor of civil engineering at the University of California, is chairman of the general arrangements committee for the conference. Others on the staff are Professor J. W. Kelly, Professor Alexander C. Scordelis, Kenneth L. Downes, Jr., all of the University of California; Ben C. Gerwick, Jr., and Robert Singer of Ben C. Gerwick, Inc., San Francisco; and Harold A. Price and Jack Streblov of Basalt Rock Co., Inc., of Napa, Calif.



(Bethlehem Pacific Photo)

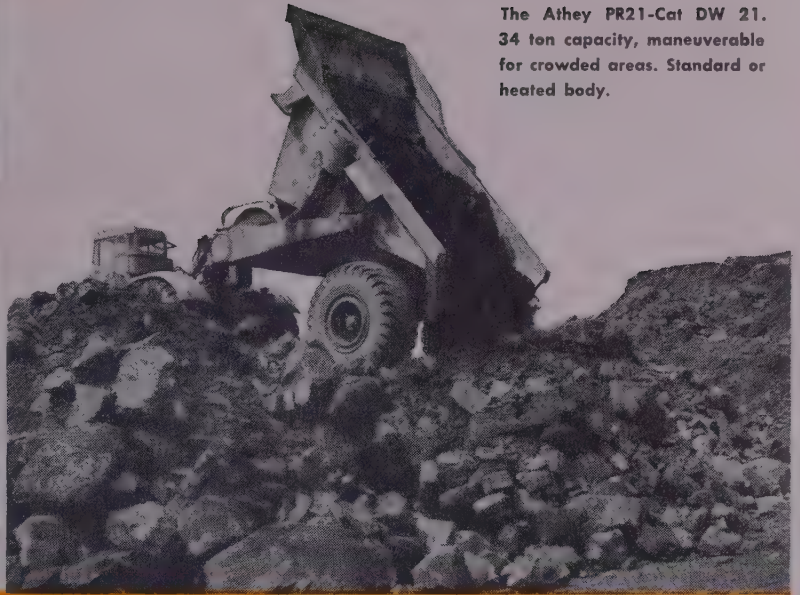
DANGLING high above the Cowlitz River construction workers at the Mayfield Dam site drill holes 30 ft. into the cliff. The following day long rock anchor belts were installed in these holes to help prevent rock slides.



The Athey PR20-Cat DW20. Capacity 22.5 cu. yd. speeds up to 32.1 MPH for high-speed hauling.



The Athey PR15-Cat DW15. Hauls 22 tons of rock or other material at speed to 31.3 MPH.



The Athey PR21-Cat DW 21. 34 ton capacity, maneuverable for crowded areas. Standard or heated body.

ATHEY OFFERS YOU *the only COMPLETE and PROVED Trailer Line*



The new Athey Hydraulic Ejection Trailer. Handles sticky, hard-to-discharge materials, controls dumping, spreads load at dump.



The Athey PD20-Cat DW20. Dumps on the go, speeds long haul jobs, capacity 31 tons at speeds up to 25.1 MPH.

For tough rock and earth jobs...

Whether it's big rock — gumbo clay — ore, mud or earth you have to move, there's an Athey Trailer to answer your material hauling problems. Athey is the leader in the trailer field and offers the only *complete* line of sizes and types of high-speed material handling trailers.

Each unit is built to rigid standards of quality construction that mean long life and low upkeep. Proven Athey design features are setting the pace for faster dumping, greater maneuverability, easier loading and higher production.

Select the exact size and features to gear your job for highest output. Depend on quality-built Athey Trailers powered by Caterpillar Wheel-Type Tractors. Ask your Athey-Caterpillar Dealer for information on "the complete line" today, or write direct to us. Athey Products Corporation, 5631 West 65th Street, Chicago 38, Illinois.



THE *Complete* TRAILER LINE... *by the Leader*

Beavers hold second meeting and honor Western construction men

Annual dinner brings together 1,000 leaders of the heavy construction industry. President L. E. Dixon presides and presents "Beavers" to eleven.

GATHERED for their second annual dinner meeting the Beavers and their guests enjoyed a social evening Jan. 17 at the Biltmore Hotel in Los Angeles, and awarded "Beavers" to eleven men who have made outstanding contributions to the heavy construction industry of this Western region. Those honored were: Management, W. J. Rohan and W. E. Kier; Supervision, Edwin M. Whipple and Ben Arp; Engineering, Augustine Ayers and Otto W. Peterson; Supply, A. F. Garlinghouse and S. J. Gock; Special, Wm. A. Johnson posthumously, Samuel D. Sturgis and Robert B. Diemer. Four of the recipients most directly connected with field operations are shown on the front cover of this issue, and their records are reviewed on this page. The other awardees, new officers and details of the meeting will appear in the next issue.

Augustine H. Ayers

Augustine H. Ayers was born March 1, 1883, at Concord, New Hampshire. He received his education at Dartmouth College and Thayer School of Engineering. Gus Ayers started his long engineering career in 1905 even before his graduation from school. Following the taking of his degree in 1906 he was Instructor in Hydraulic Engineering at the University of Wisconsin from 1907 to 1908.

He was married in Winona, Minnesota, in 1909 and is the father of six sons and one daughter. Gus was construction engineer or project manager on a multitude of important projects in the years that followed with most of the work being in U. S. Reclamation projects for canals, drainage, tunnels and dams. Irrigation projects at home and abroad claimed his attention later, along with drainage projects and both hard rock and soft ground tunnels.

From 1931 to 1936 he was Chief Engineer under the late Frank Crowe for the Six Companies on the Hoover Dam construction. Following that, he worked for Utah Construction Company on a great many other dams and large projects such as the building of the Central and South Pacific airbases.

Gus Ayers' consulting work has since taken him to Spain, Portugal, Africa, Cuba, Australia and New Zealand in addition to his work in the United States.

He served on the Executive Com-

mittee of the Construction Division of the American Society of Civil Engineers and is a life member of that organization. His life and works have won for him the respect and admiration of the heavy construction industry.

Edwin M. Whipple

Any list of great construction superintendents would include the name of Edwin M. Whipple. His active 45-year career spanned the construction of many concrete dams, tunnels, pumping, smelter and crushing plants, bridges, hydro-electric projects and other types of heavy construction.

Ed worked for Pacific Gas and Electric Co. on the Spaulding Drum Project which included the Spaulding Dam, one of the first large concrete dams built in Northern California. He was superintendent for many other companies including H. C. Vensana, H. E. Heller, Lynn and Guy F. Atkinson Co., L. E. Dixon Co., Broderick & Gordon, Bent Bros. & Winston Bros., The Arundel Corp., Bechtel Co., and others on such heavy construction projects as Pardee Dam, Big Tujunga Dam No. 1, Eleven Mile Canyon Dam, Morris Dam, Saw Pit Dam, Narrows Dam and Yosemite Valley R.R. relocation.

During the middle and late 30's Ed Whipple became associated with TVA and was construction superintendent on the Chickamauga Dam in Tennessee and assistant superintendent on the Norris and Pickwick Landing dams after which he returned to the West Coast for his later assignments.

The last few years prior to his retirement in 1950 found Ed in the Bechtel organization securing construction equipment and personnel for work in Arabia. His long and distinguished career has made Ed Whipple's name a by-word wherever construction men gather and he can look back upon hundreds of structures which do honor both to himself and to the industry in which he performed his life's work.

Otto W. Peterson

Prominent among the West's outstanding builders is Otto W. Peterson who for 30 years was Manager of the General Construction Department of Pacific Gas and Electric Company.

Otto Peterson was born December 31, 1880, in Berkeley, California. He took his engineering degree in 1904 at the University of California and went directly into irrigation and construction work. All of the hydro-electric dams, tunnels and powerhouses, power transmission lines,

substations, natural gas transmission mains and gas storage holders and several of the steam-electric generating stations built by P. G. & E. since 1920 were built under his direction. He has had direct supervision of the construction of the major portion of the company's \$800,000,000 expansion program since World War II, the biggest single utility expansion in the nation. A crowning achievement of his career was the completion of the world's largest diameter high-pressure natural gas transmission main, the 34-in. "Super Inch" pipe line stretching 501 miles from the California-Arizona border to San Francisco Bay.

He was chief engineer and general superintendent for the Suribong Water Power Project in Korea and many other large projects before accepting a permanent place in the P.G. & E. organization.

Otto Peterson has contributed much to the development of construction methods and his long and fruitful career has produced many structures of which the entire construction industry is proud.

Ben Arp

Davenport, Iowa, was the birthplace of Ben Arp, one of the great construction superintendents of the West. He was only 15 years old but had a man-sized physique already when he went to work for a contractor, S. R. H. Robinson, on a railroad job which was followed by the Belle Fourche Dam project. He came to California in 1906 to help build the Western Pacific railroad and got his first real taste of tunnel work. His section of the job was between Pulga and Belden and young Ben became known as a "good hammer man."

Railroads and tunnels were to play a big part in the life of Ben Arp and he joined Utah Construction Co. soon after that first California job and became an outstanding superintendent on large tunnels which they drove for railroad companies, for Alcoa, for Kennicott Copper Co., for Pacific Gas & Electric, for Nevada Irrigation Co., for the Metropolitan Water District of Southern California and many others.

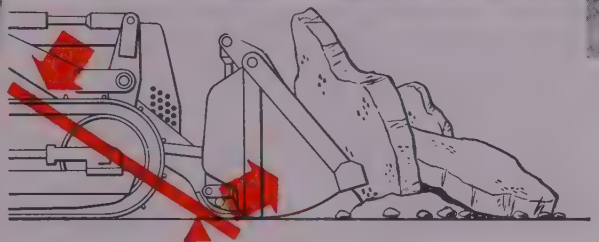
Tunnels in California, Wyoming, Mexico, North Carolina, New York and Utah; railroads in Oregon, Utah, California and other points—heavy construction jobs of all types—were a part of Ben's construction career including the S.P. tunnels on the Donner Summit and near King City and the railroad from Klamath Falls to Alturas; the Metropolitan Water District West Iron Mt. Tunnel, Angostura Dam and many others.

Hard rock or soft ground, big or little, long or short, if there was a tunnel to be driven Ben Arp could drive it. He is a most valuable member of the construction teams which have helped in the building of America.

How concrete-smashing PRY-ACTION BREAK-OUT... gets you jobs other rigs can't do!



Contractor Leon Sumler, Jackson, Tennessee, applies exclusive triple-power pry-action break-out with his TD-9 Four-In-One Skid Shovel. And without delay, he breaks-up, and yanks-up an old filling station's concrete slab and footings!



Patented and exclusive International Drott pry-over-shoe-break-out action gives you *up to six times as much excavating power* as ordinary front-end loaders can deliver!

Only an International Drott gives you this multiplied force of the scientific lever principle acting over big skid-shoes, and teamed with ground-level bucket roll-back. *No other loader even has skid-shoes!*

Only International Drott-developed reverse cylinder action produces the tremendous hydraulic power for pry-action break-out. And this pry-action principle shunts shock-stresses directly into the ground—so they can't maul loader or tractor.

Measure the job-getting, capacity-adding advantages of exclusive triple-power, pry-action break-out. Note how exclusive heap-keeping parallelogram raise action reduces spillage and increases your daily yardage, up to 18%! Prove that exclusive, shock-swallowing Hydro-Spring protects equipment, adds operator comfort. And try the exclusive International Drott Four-In-One that gives you *four-machine utility* for one moderate investment—in your choice of four sizes, one-yard to three-yard capacity. See your International Drott Construction Equipment Distributor for a demonstration!

Pry-action break-out force ranges from 12,200 lbs. on the International Drott TD-6 Four-In-One Skid Shovel—to 27,000 lbs. on the TD-18 model. For special applications like land-clearing, the TD-18 model can be equipped to develop 54,000 lbs. of break-out!



A tough oak tree with 22-inch trunk is uprooted with the tremendous pry-action break-out—applied by TD-14 using grubber blade attachment. Owner Lester H. Davis, Bennington, Vt., is clearing land.

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin



INTERNATIONAL
DROTT

Hawaii Report

By SYD LOVE

Honolulu, Hawaii

TUNNEL JOB REQUESTED—

Honolulu contractor E. E. Black has asked the City and County of Honolulu for permission to construct the second bore of the Wilson tunnel through Oahu's Koolau Range. Black, who is building the first bore, 2,700 ft. long, claims Honolulu could save \$1,000,000 and a year's time if he gets the job. It would take a special act of the legislature, which convenes Feb. 20. Mayor Neal Blaisdell favors the proposal. Black says the second bore could be completed more swiftly because it would not require going through debris of three cave-ins which slowed work on the first bore. In addition, construction would start with more know-how of handling muck which Black says is more dangerous than quicksand. Target date for completion of both tunnels would be April 1, 1958. Black is working on a \$6,500,000 project with the first bore.

MORE PALI TUNNELS PLANNED—

Plans are on the drafting board for a second set of tunnels to serve Oahu traffic traveling across the Pali through a portion of the Koolau Mountain Range. They would parallel tunnels of 1,000 and 500 ft. which are scheduled for completion March 1 under two contracts to J. M. Tanaka, of Honolulu, totaling nearly \$3,000,000. Two lanes of traffic would move in one direction through each set of tunnels. The Territorial Highway Department, which is designing the second set of tunnels, will submit plans for approval to Anatol Eremin, of the California State Department of Public Works,

Highways Division, who designed the first set.

MORE ROAD WORK—

The Territorial Highway Department was to open bids Jan. 17 for a new 3.4-mi. section on Volcano Road on the Island of Hawaii. Volcano Road is a popular tourist drive between Hilo, Hawaii, and famed Kilauea Crater.

BIG HARBOR PROJECT DUE—

Bids were to be opened Jan. 16 for a \$5,000,000 Kawaihae Harbor dredging project at the Island of Hawaii. The U. S. Army Corps of Engineers is in charge.

TETRAPOD JOB COMPLETED

—The placing of 600 French-designed concrete tetrapods weighing 33 tons each has been completed at Kahului Harbor on the island of Maui. Hawaiian Dredging and Construction Company of Honolulu did the \$1,200,000 breakwater repair job for the U. S. Army Corp of Engineers. The tetrapods, shaped like a child's toy jack, are designed to withstand the pounding of giant waves that have wrecked breakwaters there for 50 yr.

LAND ACQUIRED —

Territorial officials have signed a document agreeing to pay Mr. and Mrs. A. Lester Marks of Honolulu \$624,750 for seven acres of their property, part of which is needed for new Nuuanu Highway construction. The highway is an Oahu artery. The Territory sought the land for seven years. Two acres will be used for a two-mile section of the highway. Bids will be awarded soon.

PERMANENT TITLES GIVEN—

James O. Yapp, who joined the Terri-

torial payroll in 1916, has been named manager and chief engineer for the Board of Harbor Commissioners. He had been acting manager and chief engineer since May, when Ben F. Rush retired.

NEW SUPERINTENDENT —

William W. Wachter has taken over from Ben E. Nutter as Territorial superintendent of public works. Wachter, a 1939 Oregon State College graduate, was dean of the University of Hawaii College of Applied Sciences. Nutter resigned to become chief engineer of the Oakland Port Authority. With Wachter's new job go the titles of Territorial Highway Engineer, Chairman of the Board of Harbor Commissioners and Chairman of the Hawaii Irrigation Authority. Wachter recently returned from university sabbatical leave in New York City, where he was a consultant to the engineering firm of Howard, Needles, Tammen and Bergendoff. He became an instructor at the university in 1948. Wachter was with the U. S. Army Corps of Engineers during World War II and the Korean War, retiring with the rank of captain. He is a past president of the Hawaii Section, American Society of Civil Engineers.

NEW APARTMENT PLAN —

Construction is scheduled to start early this year on a 14-story steel and concrete apartment building of 140 units on Kapiolani Boulevard near Date Street in Honolulu. The developers, Harold Spector and W. Y. York, of Honolulu, said the contract for the \$2,000,000 job will go to Pacific Construction Co. Herbert P. Beyer is the architect. Units will be sold. Units will range in size from studios to three bedrooms. The development will be known as Leimoni Terrace. It will include swimming pool, paddle tennis courts, roof garden, a sundeck and a luau area.



WHITE ALICE IN ALASKA

STRUNG ALONG the Arctic rim White Alice installations like these strange towers tie together the warning defense networks of DEW-line (Distant Early Warning), Radar, and AC&W (Aircraft Control and Warning). The two sail-shaped towers are "forward propagation tropospheric scatter antennae" relaying warning of approaching aircraft. Gazing over his eerie domain is Eldon Burdeshaw, project engineer at Fort Yukon, Alaska, for the Alaska District Corps of Engineers. The Corps supervises White Alice construction for the U. S. Air Force at this and other sites across the Territory. The name White Alice is short for Alaska Integrated Communications Enterprise. The White preface is a gesture to the prevailing landscape in the region of the Far North.

4 FEET OF FROST



-BUT THE D9 IS BOSS

Boss of all bulldozers is the giant Caterpillar D9 Tractor. When this picture was taken last winter, John Arborio, Inc., was moving $1\frac{1}{2}$ million yards of frozen earth, 75% of it rock, to build a section of Route 17 in Sullivan County, N. Y. With four feet of frost in the ground, conditions were about as tough as possible.

That didn't stop the D9. With its CAT*-built No. 9S blade, this machine weighs over 34 tons, and its broad tracks with hardened steel grousers give it tremendous 'dozing traction. It has the *power* to dig into hard ground, too—320 HP at the flywheel, and 98,000 pounds maximum drawbar pull!

In repeated tests where accurate records have been kept, one D9 has outworked *two* bulldozers of the next size. Blade loads average 12 cubic yards of earth and are handled at higher speeds. On 'dozing hauls up to 100 feet, cycle times average less than $1\frac{1}{2}$ minutes, and production runs up to 600 cubic yards per hour.

The D9 is big, heavy and ruggedly built to lick the toughest jobs. Yet, with its power-booster controls and excellent visibility, it's one of the easiest of all tractors to operate. Maintenance is easy, too. The D9 is available with either torque converter or direct drive with oil clutch.

Your Caterpillar Dealer can show you performance records that prove the real economy of the D9 as a bulldozer, pusher or hauler. And he stands behind the long life of every machine with reliable, round-the-clock service and parts you can trust. See him today!

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

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**HEAVY-DUTY EARTHMOVER
FOR THE HARD WORK**

Court rules on lift-slab suit

JUDGE WILLIAM J. PALMER awarded court costs to Western Concrete Structures Co. of Los Angeles, defendants in the action for Violation of Confidential Disclosure, Trade Mark Infringement and Conspiracy in Unfair Competition brought in the California Superior Court by Vagtborg Lift Slab Corporation of Los Angeles and United States Lift Slab Corporation, Austin, Texas, plaintiffs.

The litigation was the result of the defendants competition in the slab lifting business with Vagtborg Lift Slab Corp., a Licensee of U. S. Lift Slab Corp.

Western Concrete Structures state that in 1952 they independently developed their own electronically controlled slab lifting equipment, before U. S. Lift Slab was formed. After lifting several buildings with their equipment, the defendants bid and were awarded the contract to pre-stress and lift the Santa Ana College Science Building, Santa Ana, Calif., in competition with Vagtborg Lift Slab Corp. Western Concrete Structures bid and were awarded several other lifting jobs in competition with Vagtborg Lift Slab Corp.

U. S. Lift Slab then threatened Western Concrete Structures with legal action if they did not take a license from U. S. Lift Slab to be in the slab lifting business. After several attempts at reaching an agreement on licensing terms, negotiations were terminated and Western Concrete continued in the lifting business.

Vagtborg Lift Slab and U. S. Lift Slab then filed suit, claiming that the defendants learned certain trade secrets from them in a confidential manner, that the words "lift slab" were their property, and that the

Western Concrete Structures was having the public believe that it was a licensee of the U. S. Lift Slab Corp.

Judge Palmer, however, found that "the evidence in this case not only fails to show the confidential relationship asserted by plaintiffs, but positively and convincingly shows that no such relationship existed, and that no information about the slab-lifting method acquired by defendants was obtained in or through any such relationship."

Regarding the plaintiff's claim of having an exclusive right to use the words "lift slab" in designating the slab-lifting method of construction, the court found the words "lift slab" to be merely descriptive, and have no trade mark, service mark or trade name significance and are not the exclusive property of anyone.

Further, the court found "The evidence in this case shows no deception in or from the conduct of the defendants, no act or omission that was likely to deceive, no intention to deceive, no probability of deception, and no effort whatsoever to 'palm off' defendants' service as that of the plaintiffs or either of them. The trade involved in this story is an intelligent, discriminating, bargaining trade in which the buyers are building contractors, architects and engineers. They work continually in a highly competitive market in which most of the descriptive terms of their jargon are used by many competitors. Not the slightest chance exists that the use of the words 'lift slab' by defendants to correctly denote a method of construction offered by them will deceive any of these potential buyers into contracting with defendants believing that the service contracted for will be furnished by plaintiffs or either of them."

Progress at Priest Rapids

WORK on the \$91,880,625 dam under construction at Priest Rapids by Merritt-Chapman & Scott for the PUD of Grant County, is on schedule, says R. J. Jenks, project manager. About 500 men are employed at present, and this number is expected to grow to 2,000 men in July 1957.

The powerhouse cofferdam, a spread "U" shaped structure approximately 4,000 ft. long, has been completed and water is being pumped from the pool behind the cofferdam. Work on the powerhouse will start in April 1957, and it is expected this structure will be about 40% complete by the end of 1957.

Jenks said more than 1,000,000 cu.

yd. of excavation has been removed. The contractor's construction plant is 70% complete.

Construction work amounting to \$6,000,000 was completed during 1956, and during the same year commitments were made to sub-contractors for supplies and materials in the amount of approximately \$25,000,000, Jenks said. This last figure includes turbines, generators and transformers that will be delivered throughout the next three years.

Pacific Power seeks license

PACIFIC POWER & LIGHT CO., of Portland, Ore., has filed an application with the Federal Power Commission seeking a license for its pro-

DEATHS

Lt. Col. Charles P. Delp, USA, ret., 64, died Dec. 22, at Sawtelle, Calif. For 35 years Delp was an engineer with the Imperial Irrigation District.

* * *

Robert M. Reindollar, 62, immediate past president of the American Road Builders' Association, died after several months illness in his home city of Baltimore, Md.

* * *

Lt. Gen. Lewis A. Pick, 66, Chief of Engineers from 1949 to 1953, who retired from the Army in 1953 after 36 years of service with the Corps of Engineers, died recently at Washington, D. C.

CALENDAR

Mar. 5-9—American Concrete Pipe Association, annual meeting, Shoreham Hotel, Washington, D. C.

Mar. 20-22—Road Builders' Clinic of the State College of Washington, annual meeting, Pullman, Wash.

Apr. 9-11—American Welding Society, Fifth Welding Show, Convention Hall, Philadelphia, Pa.

Apr. 28-May 5—International Commission on Irrigation and Drainage, third congress, Sheraton-Palace Hotel, San Francisco, Calif.

Apr. 29-May 3—National Materials Handling Exposition, Convention Hall, Philadelphia, Pa.

May 12-17—American Water Works Association, annual conference, Atlantic City, N. J.

posed Muddy hydroelectric project on the Lewis River in Skamania County, Wash.

The FPC granted Pacific a preliminary permit in 1953 to make the surveys and investigations necessary in preparation for the license application.

The Muddy project would include an earthfill dam approximately 280 ft. high, immediately downstream of the confluence of Muddy and Lewis rivers; a diversion dam and canal to divert the flow of Pine Creek into the reservoir; a saddle spillway; and a powerhouse about 700 ft. downstream from the dam. The powerhouse would contain two turbines and direct-connected generators with an installed name-plate capacity of 55,000 kw. each. The reservoir would have approximately 277,000 ac. ft. of usable storage. Estimated cost of the project is \$34,000,000.

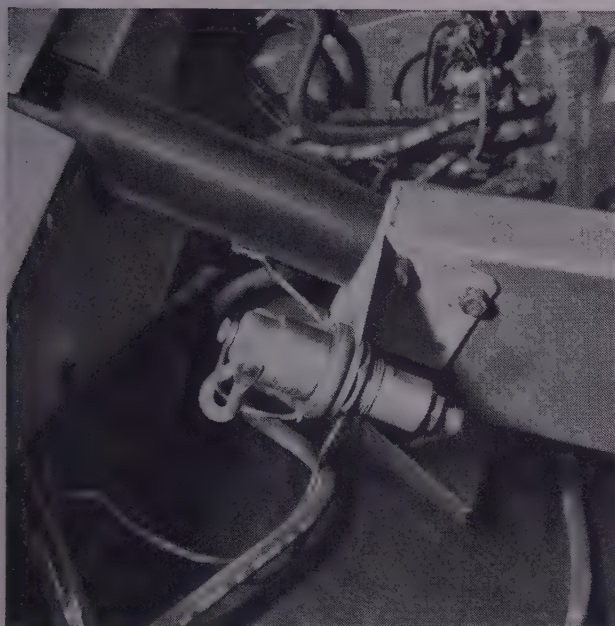
The Engineer's Field Report

CASE HISTORY

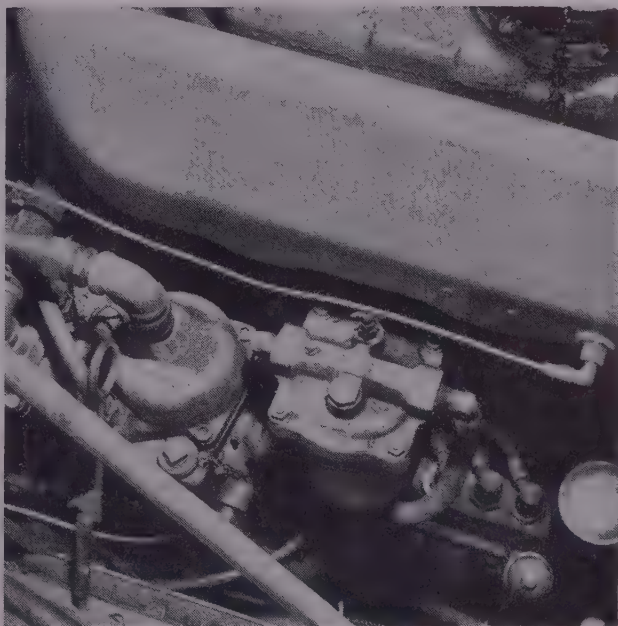
*Chevron Pressure
PRODUCT Primer System*

*Consolidated Freightways Inc.,
FIRM Portland, Oregon*

Pressure Primer System starts diesels on 1st or 2nd turn with regular batteries—at minus 40°



BELOW ZERO starting temperatures are common 5 months a year for Consolidated Freightways equipment operating in Mountain and Plain States. Two hundred and forty-four of the company's tractors are equipped with the Chevron Pressure Primer System. Since this installation, rigs start on first or second turn at 40° below zero—using regular equipment batteries! Normally in these sub-zero temperatures, regular batteries give out after about 4 turns. Sure starts plus the fact engines are primed with Chevron Pressure Primer bulbs, controlled from



within the cab, saves Consolidated Freightways important man-hours and speeds operating schedules. Picture above (left) shows a Chevron Pressure Primer Discharger mounted on steering column. Highly volatile priming fuel is atomized through tubing into manifold (right) under 250 lbs. pressure.

FREE FOLDER tells you more about Chevron Pressure Primer System and how to install it on different engines. Write or ask for it today.

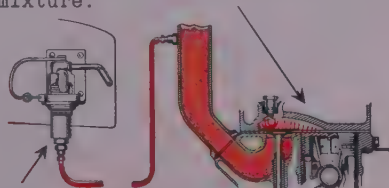


TRADEMARK "CHEVRON" REG. U. S. PAT. OFF.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

Why Chevron Pressure Primer System helps starting

Volatile Chevron Priming Fuel atomizes in induction system at temperatures as low as -65°F. Pressure or weakest spark from engine fires mixture.



Simple, rugged discharger prevents fuel leakage. Small, safe steel bulbs protect fuel from water and dirt.

STANDARD OIL COMPANY OF CALIFORNIA
220 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 745 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 545 • El Paso, Texas

Work at Palisades Dam to carry through 1957

WHEN the Bureau of Reclamation concludes the spending of \$7,200,000 on Palisades Dam in eastern Idaho during the coming year the structure will be practically complete and the money will also provide for the relocation of the state highway in the area. As a result storage of water behind Palisades Dam can begin almost immediately and the generation of power will start in December with the other three units coming on the line at regular intervals thereafter.

In addition to the work at Palisades, the Bureau will spend almost \$3,000,000 on a division of the Minidoka project, which will be mainly for wells and pumping equipment. Total expenditures for construction work by the Bureau of Reclamation in Idaho during the fiscal year will exceed \$12,000,000.

British construction book

The Federation of Civil Engineering Contractors in England have just published "The British Civil Engineering Contracting Industry—Illustrated History." This is a 190-page book 10 x 12 in. in size and profusely illustrated. It shows not only some of the modern works carried out by British contractors but also some interesting views of structures and construction jobs of historical significance.

The book is priced at approximately \$9.00 in United States money and further information can be secured directly from **The Federation of Civil Engineering Contractors**, Romney House, Tufton Street, Westminster, S.W.1. England.

bed of west approach to be graded, on the Garden Highway across the Feather River at Nicolaus in Sutter County. **Ralph B. Slaughter** of Julian submitted a low bid of \$228,528 for 3 mi. of grading, surfacing and construction of a concrete slab bridge in Imperial County. **M. W. Brown** of Redding submitted a low bid of \$696,866 for earthwork, structures and surfacing the connecting access road, Highway 299 to Trinity River Crossing, Central Valley Project. **E. L. Yeager** of Riverside received a contract of \$1,689,517 for 1.4 mi. of grading, paving and construction of seven bridges, city of San Bernardino, San Bernardino County. **Griffith Co.** of Los Angeles received a \$1,229,782 contract for 1.7 mi. of grading, surfacing and construction of one steel bridge in San Diego County. **Charles L. Harney, Inc.**, of San Francisco received a \$7,075,009 contract for construction of portions of a separation structure in San Francisco County. A low bid of \$2,433,496 was submitted by **Ukropina-Polich-Kral** of San Gabriel for 1.9 mi. of grading, surfacing, ramps, overcrossing, pumping plant and a bridge to be constructed in Los Angeles County.

Low bids and contract awards

ARIZONA

W. J. Henson, contractor of Prescott, submitted a low bid of \$377,628 for grading, draining and surfacing the Ashford-Flagstaff Highway, (approaches of Williams Overpass) in Coconino County. **Palmer Contracting Co.** of Phoenix submitted a low bid of \$174,218 for grading, surfacing and incidental work on the Ft. Huachuca-Brisbee Highway in Cochise County. A low bid of \$81,963 was submitted by **Phoenix-Tempe Stone Co.**, Phoenix, for 2.1 mi. of grading and surfacing the East Base Line Road in Maricopa County. **Heiskell Construction Co.** of Phoenix submitted a low bid of \$129,775 for grading and surfacing streets in Somerton, Yuma County. **Arizona Sand & Rock Co.**, Phoenix, submitted a low bid of \$363,767 for 8 mi. of grading and surfacing the Yuma-Parker Highway near Yuma, Yuma County. **Copper State Construction Co.** of Mesa submitted a low bid of \$169,372 for 4.5 mi. of grading and surfacing the Globe Highway, Rte. 77 in Pinal County. **Isbell Construction Co.** of Phoenix submitted a low bid of \$275,681 for 11.9 mi. of grading and surfacing the Phoenix-Payson Rte., Tonto National Forest in Maricopa County.

CALIFORNIA

McCammon-Wunderlich Co. and **Wunderlich Construction Co.** of Palo Alto submitted a low bid of \$3,601,981 for 6.1 mi. of grading, surfacing and construction of five structures between Heather Glen and Colfax in Placer County. **Oberg Con-**

struction Corp. and **Oberg Bros. Construction Co.** of Inglewood received a \$7,201,495 award for 4.7 mi. of free-way construction in the city of Los Angeles on the Ventura Freeway and construction of ten bridges and one pedestrian overcrossing and ten retaining walls, Los Angeles County. **Stolte Inc.** of Oakland received a \$1,129,955 contract for 4.9 mi. of grading and surfacing and construction of one bridge in Tehama County. **Tumblin Co.**, Bakersfield, received a \$672,346 contract for construction of two bridges and a bridge extension and grading and surfacing 1.4 mi. of highway north of Famoso Underpass in Kern County. **Clifford Borg & Co.** of Arcadia received a \$1,994,428 award for 9.2 mi. of grading, surfacing and construction of two concrete bridges north of Alberhill in Riverside County. **H. Earl Parker, Inc.**, of Marysville received a \$720,030 contract for 5.8 mi. of grading and surfacing between Red Lake and east of Blue Lakes Road in Alpine County. A low bid of \$494,432 was submitted by **Jesse H. Harrison** of San Ardo for 3.3 mi. of grading and surfacing east of Arvin in Kern County. **W. H. Darrough & Sons** of Yuba City submitted a low bid of \$357,318 for 3.3 mi. of grading and surfacing east of Arvin in Kern County. A low bid of \$6,419,254 was submitted by **Gordon H. Ball & Ball & Simpson** of Berkeley for 9.9 mi. of freeway together with frontage roads, ramp and interchanges to be graded and surfaced and 14 bridges and one pumping plant to be constructed near Warm Springs Junction in Alameda County. **C. K. Moseman** of Redwood City received a \$1,939,610 contract for construction of a bridge and a portion of the road-

COLORADO

Wangsgaard Construction Co., Logan, Utah, submitted a low bid of \$143,912 for earthwork, structures and surfacing the temporary access road to Flaming Gorge Dam Station, Flaming Gorge Unit, Colorado River Storage Project. **Hinman Bros. Construction Co.** of Denver submitted a low bid of \$154,156 for grading, structures and surfacing east of Stoner in Montezuma County. **Henry Shore Co.**, Littleton, submitted a low bid of \$274,402 for grading, structures and surfacing 8.9 mi. between Limon and Last Chance on S.H. No. 71 in Lincoln and Washington counties. A low bid of \$204,530 was submitted by **Peter Kiewit Sons' Co.** of Denver for grading and surfacing taxiway and aircraft parking apron, Stapleton Airfield. **C. L. Hubner Co.** of Denver submitted a low bid of \$590,118 for grading, structures and paving in Jefferson County. **Domenic Leone Construction Co., Inc.**, Trinidad, submitted a low bid of \$490,149 for grading, surfacing and structures in Otero County. A low bid of \$311,627 was submitted by **Graham Construction Co.** of Pueblo for grading, surfacing and structures south of Cortez in Montezuma County. A low bid of \$98,899 was submitted by **Trans-Western Construction Co.** of Denver for 4.7 mi. of grading and surfacing the Keyser Creek Road, Arapahoe Forest in Grand County. **Herren-Strong**, Platteville, submitted a low bid of \$628,046 for grading, structures and surfacing 8.8 mi. west of Craig in Moffat County. **Mountain States Construction Co.**, Denver, submitted a low bid of \$2,757,835 for

BLAW-KNOX BITUMINOUS PAVER FINISHER WINS WORLD-WIDE ACCEPTANCE!



**Speed — accuracy — quality of production proved by use in
44 States, Five Provinces of Canada and many Foreign Countries**

Owners of Blaw-Knox PF-90 Bituminous Paver Finishers in all parts of the United States, Canada and in many foreign countries are depending on them to give top quality bituminous paving at the lowest cost per yard. After its preliminary testing and development period and only 2 years on the market, this paver has proved to owners that they are getting a *better surface at higher speed and lower cost.*

Long wheelbase and accuracy of steering, possible only with wheels, produce a smooth ripple-free surface under the straight edge and even control on curves. Rubber tired mounting definitely reduces the time required for returning the

machine for restarts. Rubber tired mounting also reduces maintenance by eliminating 500 to 600 exposed metal wear parts and by absorbing vibration which cause wear and tear on a machine.

No matter where your next asphalt paving job is located you can be sure that no other machine can match the combination of speed and results of the Blaw-Knox Bituminous Paver Finisher. See your nearest Blaw-Knox distributor for complete details.

Want a paver for smaller paving jobs such as driveways and parking lots? Send for Bulletin 2539. It describes the New Blaw-Knox Model PF-45 Black Top Paver.

BLAW-KNOX COMPANY

Construction Equipment Division

45 Charleston Ave., Mattoon, Illinois



**FLUSH DIGGING AND
200° OPERATING ARC ON
DAVIS 210 BACK-HOE**



**DISCOVER
DAVIS**

**THE EQUIPMENT
THAT LEADS THE WAY**

New Back-Hoes and Loaders for 1957 Make More PROFIT FOR YOU!

Here's a whole new era of profits for you. The new Davis 210 Back-hoe with three interchangeable mounting points so you can switch digging positions from center to side for flush digging alongside buildings, fences, etc....and its exclusive hydraulic rotary boom swing cylinder gives you a smooth, continuous 200° cushioned operating arc without ever changing a pin...an engineering achievement desired by all, but accomplished only by Davis. Both the new 210 and America's largest selling back-hoe, the Davis 185, have 7,000 pounds of breakaway and new comfort design. They are both available as Davis' unique, low-cost, truck-mounted back-hoes that will fit any one-ton or larger flat-bed truck...compact in transport, self-powered, completely detachable. The popular Davis Loader has also been improved for greater utility...which means more profits for you in 1957, if you have Davis equipment.



Davis Truck-Mounted Back-hoe from the transport to the digging position.

The streamlined Davis Loader on John Deere 420 Crawler Tractor.

Davis products are available for most popular tractors, and are sold and serviced anywhere in the United States and Canada by better dealers. See your dealer or write for literature. Please specify tractor and equipment you desire.

MID-WESTERN INDUSTRIES, INC.

1009 SOUTH WEST STREET, DEPT. WC, WICHITA, KANSAS



completion of Williams Fork Dam and appurtenant features, city and county of Denver.

IDAHO

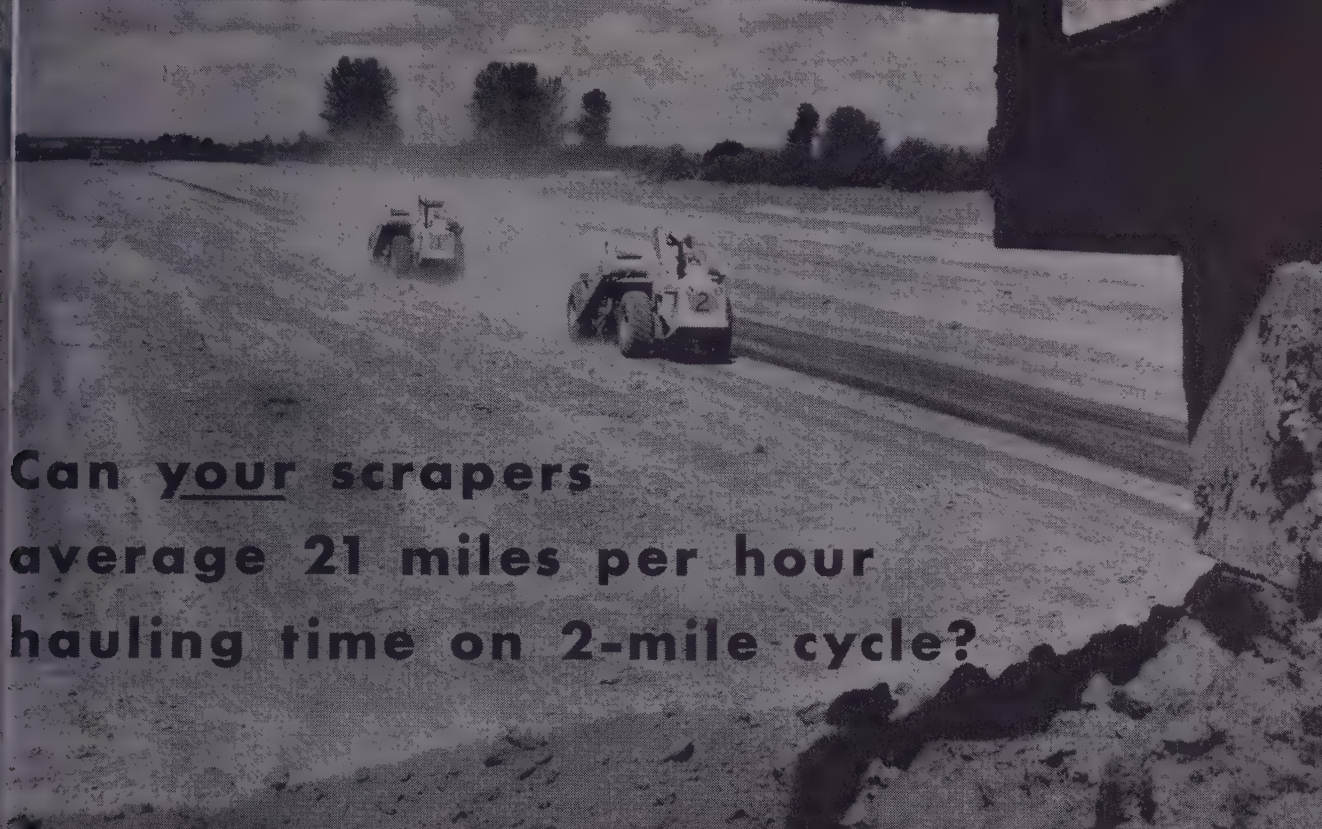
Carl E. Nelson Construction Co. of Logan, Utah, received a \$480,089 contract for grading, surfacing and construction of a bridge in Gooding County. Colonial Construction Co. of Spokane, Wash., submitted a low bid of \$90,260 for construction of a Railroad Underpass at Grangeville in Idaho County. Arrington Construction Co., Inc., of Idaho Falls was low bidder at \$216,385 for a contract to construct a steel reinforced maintenance shop in the Materials Testing Reactor area of the U.S. Atomic Energy Commission's National Reactor Testing Station.

MONTANA

Haggerty-Messmer Co. of Bozeman received a \$145,224 contract for construction of a steel bridge on the Gallatin Gateway-South Highway in Gallatin County. A \$216,825 contract was received by Kiely Construction Co. of Butte for 4.5 mi. of grading, surfacing and structures on Skalkaho Highway in Ravalli County. Norgaard & Hilling of Williston, North Dakota, received a \$325,288 contract for 8 mi. of grading and gravel surfacing the Nashua-Wolf Point Highway in Valley County. Baltrusch Construction Co. of Havre received a \$325,839 award for 13 mi. of grading, gravel surfacing and draining the Hilger-Winifred-Big Sandy Highway in Fergus County. A \$148,927 contract was received by Frank E. Olson of Williston, North Dakota, for 5.2 mi. of grading and surfacing the Wibaux-North Highway in Wibaux County. Northwestern Engineering Co. of Rapid City, South Dakota, received a \$278,681 contract for 7.4 mi. of grading and surfacing the Brockton-North Highway in Roosevelt County. C. B. Lauch Construction Co. of Great Falls submitted a low bid of \$1,929,000 for construction of a new East Junior High School in Great Falls. Guy H. James Construction Co. of Oklahoma City, Okla., submitted a low bid of \$2,095,041 for construction of Helena Valley Tunnel and Canal, Helena-Great Falls Div., Missouri River Basin Project. Misco-West Coast of Seattle, Wash., submitted a low bid of \$830,285 for construction of Helena Pumping Plant, Helena Valley Unit, Helena-Great Falls Div., Missouri River Basin Project.

NEVADA

Silver State Construction Co. of Fallon received an \$892,399 contract for 14.2 mi. of grading and surfacing north of Schurz in Mineral County. Jack P. Parson Construction Co. of Smithfield, Utah, received a \$612,192



Can your scrapers average 21 miles per hour hauling time on 2-mile cycle?

To complete 14 miles of 4-lane divided highway U.S. 99E 3 miles N.W. of Brooks, Ore., Roy L. Houck & Sons, Salem, Ore., moved 1,200,000 yds. of silty clay and mud. Most of the dirt hauled on this roadbuilding job was of the long haul variety.

Long hauls assigned to "C's"

Five high-speed C Tournapulls, push-loaded by two crawler-tractors, handled the long hauls... moved 90% of the total yardage. Hauling from ditch borrow-pit on a 7,000' cycle, each "C" averaged 125 pay-yards per hour. On a 1 mi. haul from borrow pit to fill, yardage moved per machine was 88 pay-yards per hour. Rigs averaged 5.5 min. on haul and return for an average of 21 mph.

Owner Roy L. Houck, Jr., said this about his Tournapulls, "I like their maneuverability. Work-

ing on a narrow fill like this, there aren't many rigs that can get up and swing around like these 'Pulls do." Operator Jerry Thomas added, "The 'C's' are easy to control. The hand throttle is a big help."

High-speed on hauls, and between jobs, may be the key to increasing *your* earthmoving profits. Let us show you owners' verified facts on Tournapulls' low-cost-per-yd. production.

NEW FULLPAK

A new, improved C Tournapull — the "Fullpak" — offers even better production than rigs described here. With a heaped capacity of 18 yds., the new, low, wide-bowl "C" loads faster, boils better, heaps a bigger load.

Roy Houck, Jr., figures top speed production and constant efficiency pay big dividends. 5 "C" Tournapulls are rotated for service checks on a regularly scheduled basis. Through this system, minor troubles are caught early on these service checks... are never allowed to grow into major repairs. Service is on a planned basis rather than on an emergency basis. System also provides major economies in repair-parts cost. In addition Houck gets top production on every hour worked. Mobile service set-up, designed by Houck himself, is moved with job on trucks and trailers. All necessary tools and spare parts are available on the job.



Fullpak—Trademark
Tournapull—Trademark Reg. U.S. Pat. Off. CP-898-H-b



LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

Which QUAKER HOSE do you need today... to cut costs tomorrow?

Rugged, non-twisting AIR HOSE?

Though lightweight for easy handling, this hose won't snake or twist under pressure. It takes dragging . . . resists oil damage . . . withstands cracking at temperatures as low as 20°F. Tough Neoprene cover withstands all weather conditions.

Easy-to-handle WATER HOSE?

This all-purpose water hose is long on wear and value. Easy to handle, it has a black, high-grade rubber cover that resists sun, weather, cracking and peeling. Black, non-porous tube.

Strong, durable SUCTION HOSE?

Here's a rugged, long-lasting hose for conducting water under pressure or suction. It resists kinking and crushing and has good sun, weather and abrasive-resistant qualities. Tube resists action of water containing light concentrations of alkalis, acids, grit and sand.

THESE are but a few of the many types of air, water and suction hose your Quaker-Quaker Pioneer distributor has on hand and ready to go. Call him—whatever your needs. For free brochures, write: *H. K. Porter Company, Inc., Quaker Rubber Division, Phila. 24, Pa., or Quaker Pioneer Rubber Division, Pittsburg, Calif.*

HKP **QUAKER RUBBER DIVISION**
QUAKER PIONEER RUBBER DIVISION
H. K. PORTER COMPANY, INC.



contract for construction of portions of the Secondary Highway System in Elko County. **Dodge Construction, Inc.**, of Fallon received a \$76,294 contract for 2.4 mi. of grading and surfacing near Wellington in Lyon County.

NEW MEXICO

Loganbaugh & Coe, Inc., of Albuquerque received a \$1,136,180 contract for 3.2 mi. of grading, paving and structures on the Glorieta-Western Road in Santa Fe County. **Allison & Haney** of Albuquerque received a \$716,000 contract for 4.7 mi. of grading and surfacing in the Apache National Forest in Catron County. **Brown Construction Co.** of Albuquerque received two contracts for road improvement in Hidalgo and Grant counties: \$1,558,595 for 6.7 mi. of grading and surfacing and structures on the Road Forks-West in Hidalgo County and \$2,059,515 for 10.5 mi. of grading, paving and structures on the Hidalgo-Grant County Line-East Road in Hidalgo and Grant counties.

OREGON

Perkins Bros. of Portland submitted a low bid of \$222,778 for grading and paving the Pacific Highway West in Yamhill County. A low bid of \$632,586 was submitted by **Roy L. Houck & Sons** of Salem for grading and paving the Columbia River Highway in Wasco County. **Tom Lillebo Construction Co.** of Reedsport submitted a low bid of \$96,533 for construction of a bridge on the Salmon River Highway in Yamhill County. A low bid of \$1,074,345 was submitted by **R. A. Heintz Construction Co.** of Portland for Howard Prairie Dam, Talent Division, Rogue River Project. **Central Paving Co.** of Independence received a \$263,160 contract for 16.2 mi. of grading and paving in Malheur County. A \$165,648 contract was received by **J. C. Compton Co.** of McMinnville for 1.1 mi. of grading and paving the Ashland Undercrossing-Helman St., Ashland Section of the Pacific Highway at Ashland. **C. R. O'Neil, Creswell**, received a \$1,246,997 contract for 2.8 mi. of grading the Myrtle Creek Unit, Myrtle Creek-Canyonville Section of the Pacific Highway in Douglas County. **Morrison-Knudsen Co., Inc.**, of Seattle, Wash., received a \$962,295 contract for 7.1 mi. of grading the Davis Slough-Beaver Lookout Section of the relocated Oregon Coast Highway south of Coos Bay in Coos County.

UTAH

Thayn Construction Co. of Salt Lake City received a \$427,387 contract for grading for taxiway and apron, Salt Lake Airport No. 1, Salt

Lake City. Industrial Construction Co. of Las Vegas, Nev., submitted a low bid of \$785,295 for 12 mi. of grading and surfacing of Route #35, East Paria Creek in Kane County. A low bid of \$953,088 was submitted by Floyd S. Whiting of Murray for 5.8 mi. of grading and surfacing U. S. Highway #30 between Henefer and Devil's Slide in Morgan and Summit counties.

WASHINGTON

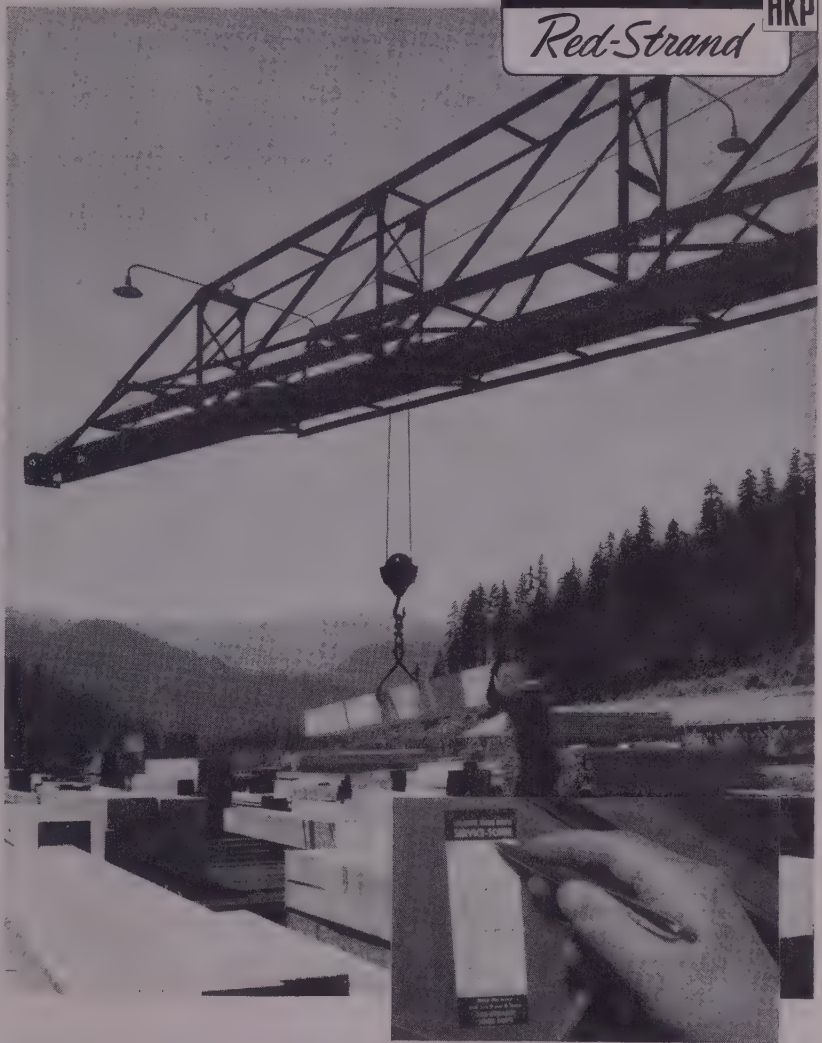
A low bid of \$888,968 was submitted by Cherf Bros., Inc., and Sandkay Contractors, Inc., of Ephrata for earthwork and structures, block 85, laterals, wasteways and drains, Royal Branch Canal Laterals, Columbia Basin Project. Ward Construction Co. and Alton V. Phillips of Seattle submitted a low bid of \$847,584 for Brewster Flats Pumping Plants and Discharge Lines, Brewster Flats Unit, Foster Creek Div., Chief Joseph Dam Project. Bocek Brothers of Hoquiam received a \$629,090 contract for 1.6 mi. of grading and surfacing the Raymond North Highway in Pacific County. A \$681,075 contract was received by Fiorito Bros. of Seattle for 5.2 mi. of grading and surfacing the North Burn Road to Conway Jct. in Snohomish and Skagit counties.

WYOMING

Knisely-Moore of Douglas received a \$963,582 contract for 1.2 mi. of grading, surfacing and construction of four bridges on Lake Absaraca, city of Cheyenne in Laramie County. A \$590,872 contract was received by W. E. Barling, Inc., of Meeteetse, for grading, structures and misc. work on 5.7 mi. of the Saratoga-Riverside Road in Carbon County. A \$461,307 contract was received by Stanley H. Arkwright Inc. of Billings, Mont., for grading and surfacing 4.5 mi. of the Diversion Dam-Dubois Road in Fremont County. Taggart Construction Co. of Cody received a \$693,422 contract for 3.1 mi. of grading and surfacing the Thermopolis - Shoshoni road in Wind River Canyon in Hot Springs County. A \$357,339 contract was received by Blanchard Construction Co. of Derby, Colo., for grading and surfacing 9.2 mi. of the Albin Connection Road in Laramie County. Ryan & Son of Wheatland received a \$99,232 award for grading and special embankment work on 9.9 mi. of the Zero Road in Natrona County. Knisely-Moore Co. of Douglas submitted a low bid of \$479,352 for earthwork, structures, bridge and surfacing for access road to Fremont Canyon Pumping Plant, Missouri River Basin Project and Kendrick Project. A \$795,000 contract was received by Eagle Construction Co., Inc., of Boise, Idaho, for 6.3 mi. of grading and surfacing the Buffalo-Tensleep Rte., Bighorn National Forest in Washakie County.

Improving wire rope service with

LESCHEN
Red-Strand **HKP**



How much can you save with Leschen wire rope service?

Wire rope costs can be reduced substantially—10%, 20% or more—by using the right rope type, construction and brand for every job.

How can you tell if you are using the right rope? How much can you save? There's a simple way to find out. You can obtain accurate, on-the-job performance data by using Leschen's Service-Score Sticker System. You'll prove to yourself which ropes work best. And when you see the score, you'll use more Red-Strand wire rope—because Leschen quality and Leschen engineering service can save you money.

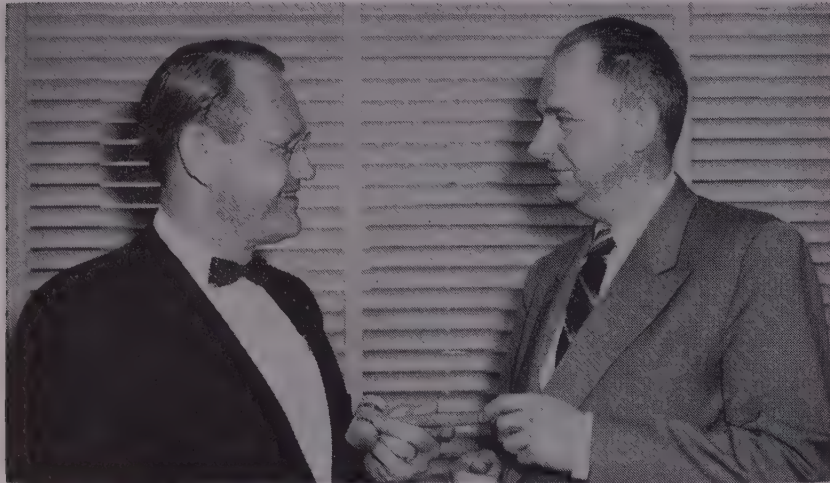
Service-Score Stickers are available from any Leschen field man or distributor. Just ask, or write Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Mo.

HKP

LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.

ENGINEERS

on the move



NEW PRESIDENT of the Structural Engineers Association of Northern California, **Henry J. Degenkolb**, right, receives gavel from retiring president **Walter L. Dickey**. Degenkolb is a partner in the firm of John J. Gould and H. J. Degenkolb, San Francisco consulting engineers. Other SEAONC officers elected are **J. Albert Paquette**, vice president; **Donald M. Teixeira**, secretary; **Samuel H. Clark**, assistant secretary, and **William K. Cloud**, treasurer.

The appointment of **Albert L. Love, Jr.**, veteran Texas paving engineer, to the post of district engineer for New Mexico, is announced. The new district office in the Southwest Division will open at Santa Fe early in January, and will bring to 24 the number of such regional engineering centers.

A registered civil and geological engineer, Love served with the Texas State Highway Department for 13 years before joining the Corps of Engineers in 1942 as an airfield paving specialist. He served with the Corps until 1953 when he accepted an assignment to Baghdad with a consulting engineering firm. Returning to the United States last June, Love spent several months as an airstrip construction consultant at Point Barrow, Alaska, on the sub-polar DEW-line perimeter.

* * *

W. A. Simpson, Jr., vice president of the William Simpson Construction Co., has been appointed to the Los Angeles Municipal Water and Power Commission. He will fill out the term of another construction man, **Ben P. Griffith**, who recently resigned for a more active part in the management of Griffith Construction Co.

* * *

A new general engineering contracting firm, the Geist Construction

Co., Inc., has been formed, with headquarters at 1804 Cleveland Ave., Santa Barbara, Calif. Its president is **Frank E. Geist**, who has had 17 years experience in the heavy construction business. Prior to starting the new company he was general superintendent of construction with Raymond Concrete Pile Co., Los Angeles. **A. C. Dinsmore**, vice president of the new contracting firm, obtained his general engineering license in 1931, and has operated his own business for the last twenty years. The firm will specialize in pile driving, concrete construction and steel erection.

* * *

Rear Adm. Charles T. Singleton, Jr., of Monterey, Calif., has been appointed head of the University of California's Extension Department of Engineering and Sciences at Berkeley. Admiral Singleton retired last year after a distinguished career with the Navy. The former head of Engineering Extension, **Professor Joe W. Kelly**, will now serve as vice chairman of the Department of Engineering in charge of special programs.

* * *

Franklin T. Matthias has been appointed chief engineer of the Aluminum Company of Canada, Ltd., succeeding **W. L. Pugh**, who is retiring. As a colonel in the U. S. Army

Engineers, Matthias won renown in World War II for his work in building the Hanford, Wash., atomic project in record time.

* * *

Recently announced by Arizona Highway Department is the addition of two new engineers to its staff. **Lyle Nelson** was assigned to the Bridge Division, and **Lawrence Byrd** as a new engineer-in-training. Nelson was formerly associated with Peter Kiewit Sons' Co. at Omaha.

Engineer **Amir H. Mehrvarz** of the General Highway Department of Iran is spending two months in the Phoenix office studying U. S. highway engineering under an exchange program of the Government. From Phoenix he will go to Chicago for the big Road Show to see its large machinery and equipment display.

* * *

Adam J. Heineman, chief of the channel maintenance section of the Portland District, Corps of Engineers, has resigned to join three other former engineers of the Portland District in Venezuela on construction of the \$70,000,000 Bocono concrete irrigation dam. There he will be in the employ of R. J. Tipton Associated Engineers of Denver, Colo., who are designing the project and furnishing technical supervision of construction. Heineman joins **Woodrow Burgess**, who was concrete engineer at Detroit Dam, and is now chief engineer on Bocono; **Jeff Boyer**, formerly of Detroit and Lookout Point dams, who is office engineer; and **Sam Sargent**, foundation engineer, who was most recently employed at The Dalles Dam.

* * *

Wilbur Smith and Associates, New Haven, Conn., announce the opening of a Western office at San Francisco, and the association of **Henry K. Evans** and **Curtis J. Hooper** with the firm. Evans will be in charge of the San Francisco office.

* * *

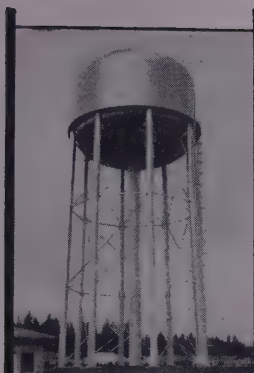
John A. Brownlie, widely known in engineering and construction circles, has been named vice president in charge of business development of Holmes & Narver, Inc., Los Angeles engineers and constructors.

* * *

James E. Martindale is now in the employ of Western-Knapp Engineering Co. as field engineer on construction of a copper smelter and pertinent facilities at Hayden, Ariz., for Kennecott Copper Corp. Prior to going on this 18-month long project for Western-Knapp, Martindale was in the employ of the general contracting firm of John Delphia.

* * *

A. V. Benedict has moved from The Dalles where he had been resident engineer for the Oregon State Highway Department, to Portland, where he now is assistant division engineer.



ELEVATED TANKS



PRESSURE VESSELS



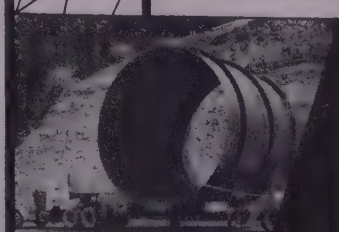
WELDED STEEL PIPE



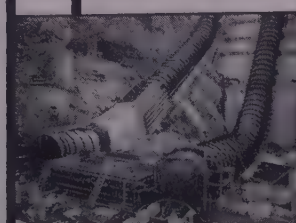
SILOS • HOPPERS • RETORTS



STACKS • BREECHINGS



TUNNEL LINERS



PENSTOCKS

33 years of experience
in STEEL PLATE FABRICATION
at your service!

You can realize substantial savings in time, trouble and money by taking advantage of American's long experience in fabricating a wide variety of steel plate products. Design and manufacturing know-how developed through the years, together with the complete facilities of a 19 acre plant with 183,000 sq. ft. of covered shop area, results in quality products at lower cost. Illustrated here are the solutions to typical problems. Bonus values built into every one of these jobs are the knowledge of the skilled craftsmen, the precision of modern machines, exhaustive testing to assure satisfactory operation, job-timed delivery by our own fleet of trucks, and engineering counsel constantly available.

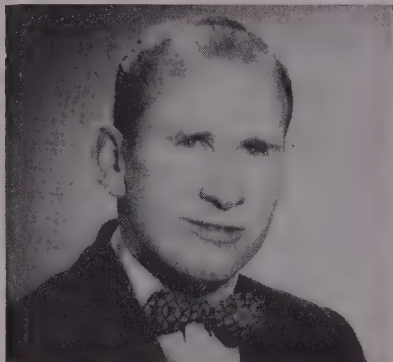
We'd like to work with you on your job. If it's already designed—call us for estimates. If we can help plan it—our sales engineers are at your service.



518 N. E. Columbia Blvd. Portland, Oregon
 Phone BUtler 5-2531
 Los Angeles • Hayward • San Diego • Phoenix

SUPERVISING the jobs

Promotion of **Kenneth M. Willis** to general superintendent of construction has been announced by Fisher Contracting Co. Willis will have supervision over all domestic



Kenneth M. Willis

construction projects of the Arizona firm. He succeeds **Carl Jacobson** who resigned to go into partnership with another company. A graduate civil engineer, Willis joined the Fisher organization as a superintendent trainee on leaving school in 1950. Lately he has worked as superintendent in charge of various construction projects in the West, most recently Montgomery Dam in Colorado (Western Construction, Dec. 1956).

* * *

L. V. Jorgensen, project manager, **T. E. O'Melveny**, project engineer, and **K. R. Simmons**, superintendent, are Robert E. McKee's top men on this contractor's award for construction of cadet quarters at the Air Force Academy, Colorado Springs, Colo. Work on this \$14,370,000 project involves concrete foundations and concrete flat floor slabs, structural steel columns, aluminum and glass curtain walls. With completion date scheduled about May 1958, work got started last month.

* * *

B. C. Henry, vice president of Johnson, Drake & Piper, Inc., has under his direction a contract award from the State of California for construction of four 3-story cell block units at the state prison, Soledad. The contract price for these buildings, which are of reinforced concrete, is \$3,743,700. General superintendent is **H. A. Sturney**, while **Gordon Lindsey** is superintending the job. **H. M. Carlson** is chief estimator, and **Walt Studebaker** is car-

penter foreman. Construction started in November last year and will probably finish in June 1958.

* * *

Among the recent job assignments of superintendents working for Wiscombe Painting Co. on some of the major projects in the West are these: **Oliver L. Bake** has been advanced to superintendent at Palisades Dam, Idaho, to complete two subcontracts from J. A. Jones and Tompkins, joint venture, and E. V. Lane Co. Superintending a subcontract from Morrison-Knudsen Co., Inc., on Donnell's Dam and Powerhouse in California is **Henry D. Struck, Jr.** **Ward A. Seeley** is superintendent in charge of painting blast furnaces at Geneva Steel Plant, Utah, and a subcontract for sandblasting and painting barges for use in placing of rock fill across Great Salt Lake, Utah, for the Southern Pacific Co. Also in Utah, **Preston L. Fitch** is superintending the painting of a new chemical plant under construction at the Geneva Works, U. S. Steel Co., by Blaw-Knox Co.

* * *

Bob Osborne, general superintendent, **Bill Melcher**, project engineer; **Bert C. Rowe**, superintendent, and **Les Johnson**, bridge superintendent, are Madonna Construction Co.'s top men on a recent award for relocation of Highway 101 around city of Paso Robles, Calif., construction of divided freeway and realignment of Highway 41. Five bridges are in-



F. M. FRANZ, recently appointed vice president and general manager of the McNeil Construction Co., has been a member of this 70-year-old Los Angeles construction firm for the past five years. Prior to this he was general superintendent and general manager of the John H. Simpson Co., Pasadena.

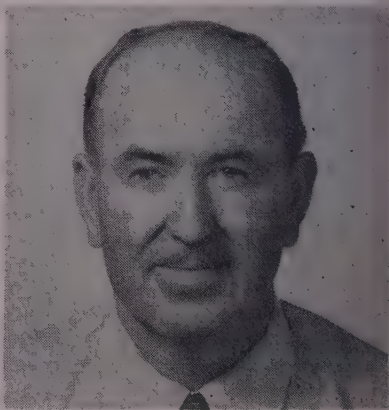
cluded in this \$3,346,749 grading and paving contract, work on which started the middle of last October, and is expected to be finished about October next year.

* * *

Frank Merrick, general superintendent, heads the job personnel of the joint venture firm known as Denver Tunnel Constructors and comprised of A. S. Horner, Colorado Constructors and Mid-Valley Utility Constructors, which have a \$1,600,000 contract at the east portal of Moffet Tunnel, Colorado. This is another project of the Water Board of the City and County of Denver, work having started here in November, with completion date estimated for April 1958.

* * *

L. V. Mulherron is general superintendent on the U. S. Air Force Radar Station at Ajo, Ariz. This \$2,450,000 project is contracted by Ashton-Mar-



L. V. Mulherron

dian Construction Co. **William Esslinger** is project engineer; **William Thompson**, job superintendent; **J. J. Quirk**, office manager; **A. J. Heimpel**, field engineer; **Carl Denny**, master mechanic, and **Lawrence Speir**, carpenter foreman.

* * *

Dan Handy, superintendent, has been in charge of a \$786,912 job of grading and structures located at Utah line to Bedrock, Colo., which was awarded by the State Highway Department to Lowdermilk Bros. The office has been in charge of **Lloyd C. Smith**. Another important man was **R. G. McGillivray**, structures superintendent. Other key men on the job: **Frank K. English** and **Thomas F. Dean**, grade foremen; **Winston O. Ferguson**, drill foreman; **Wesley Behil**, labor foreman, and **George E. Sloane**, mechanic.

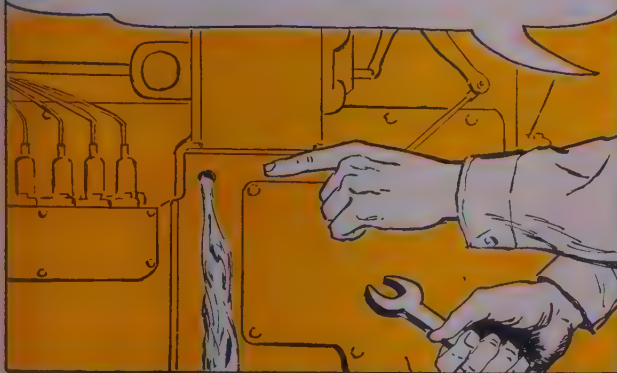
This project is about completed and the personnel are going over to another award to Hoyle Lowdermilk, Inc., under the above three top men, **Smith**, **Handy** and **McGillivray**. Also a State Highway contract, job consists of 8.53 mi. of grading, including structures and surfacing, in Montrose, and 7.85 mi. in San Miguel

THE CASE OF THE DANGEROUS DRUMS

THANKS FOR DROPPING BY, ART.
THINK I NEED A SET OF NEW
INJECTION VALVES.



BET YOUR TROUBLE'S RIGHT
HERE, FRED ----LOOK AT THE
WATER IN YOUR FUEL !



WE CLEANED THE
VALVES, FRED. THEY
CHECKED O.K. AND
ARE READY TO GO.



THANKS, ART.
YOU SAVED ME
MONEY. BY THE WAY,
I ORDERED
A NEW FUEL
STORAGE TANK
TODAY !

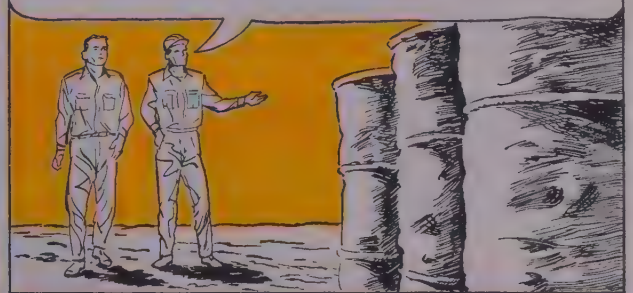


HMMM, YOUR
TRACTOR'S NOT
VERY OLD.
SHOULDN'T
NEED VALVES.

SURE ACTS LIKE
IT. THE ENGINE
IS MISSING AND
LOSING POWER !



FRED, YOU NEED BETTER FUEL
STORAGE FACILITIES. WATER AND
RUST ACCUMULATE IN THESE
DRUMS AND THERE'S NO EASY WAY
TO DRAIN IT AWAY. JUST IN CASE
THOSE VALVES ARE STICKY, I'LL BE
GLAD TO CLEAN AND TEST THEM.



CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.



LET ME HELP
KEEP YOUR CAT*
EQUIPMENT
ON THE JOB !

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

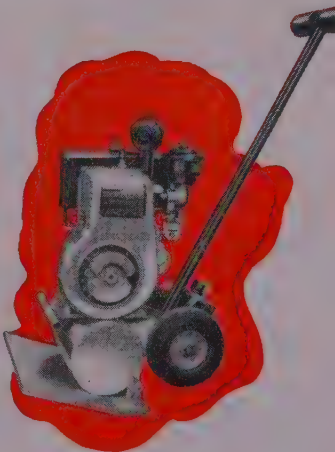
Mister... COMPACTION can be done at a profit



LISTEN

Here's how to get the LOWEST POSSIBLE AVERAGE COST

- **THE JAY TAMPER** is the **ONLY** machine that eliminates costly tamping and poor compaction.
- **THE JAY TAMPER** combines **VIBRATION PLUS IMPACT** to keyseat the material to maximum uniform proctor densities.
- **THE JAY TAMPER** is a **LOW CAPITAL** investment **SELF CONTAINED UNIT**. Needs no expensive auxiliary equipment.
- **THE JAY TAMPER** is **LOW** in **MAINTAINENCE COST**. Field reports prove 80c per machine per month parts expense.
- **THE JAY TAMPER** is **LOW** in **OPERATING COST**. **ONE MAN** can operate the Jay **ALL DAY LONG** without excessive fatigue on but two gallons of gasoline.
- **THE JAY TAMPER** gives you **HIGH SPEED PRODUCTION** contractors claim machine pays for itself in 3 days over methods previously used.
- **THE JAY TAMPER** is **PORTABLE** and **VERSATILE**. **COMPLETE** unit weighs only 240 pounds, has interchangeable tamping shoes that can be changed in seconds to fit any job or soil condition.



THE JAY
Company

170 Hosack Street • Columbus 7, Ohio

Please send me additional information on the **JAY TAMPER**

My name _____

Street _____

City _____

Zone _____

State _____

Mail coupon below
for name of nearest dealer.

County, Colo. This is a \$464,718 project on which grading and structures will be finished this winter, with oil completed in the spring. Grade foreman here is **John D. Palmer**; labor foreman, **Fred C. George**, and mechanic, **Sterling L. Jayne**.
* * *

R. H. Hazard, superintendent; **Don Tallman**, foreman, and **Don Huber**, engineer, comprise the top personnel for **S. S. Mullen, Inc.**, on a 3-mi. grading and surfacing job at Factoria interchange east, King County, Wash. A \$311,235 contract, work started in November and will probably end about mid-June.
* * *

George Harp is project manager on **Barney Wilkerson's** recent award at \$916,443 for construction of classroom buildings and dormitories at the California School for the Deaf at Riverside, Calif. Started Nov. 10, the project will run till next December. **Don Wilkerson** is superintending Part 1, and **Ted Spencer**, Part 2.
* * *

Joe Haak is supervising **Platte Valley Construction Co.'s** \$681,479 award for grading, surfacing, and pipe arch culvert installations on 10 mi. of Wheatland-Cheyenne road in Laramie County, Wyo., a job which has been under way since early November. Grade foremen are **A. Deporter** and **Dean Greenfield**. **Lawrence Nauman** is culvert foreman. July 1 is set as the completion date.
* * *

Page Thiers is project superintendent on the grading of .26 mi., and surfacing, between Phoenix and Globe, Ariz. Assisting him on this \$210,971 award to **Fisher Contracting Co.** are **Chris Hulls** and **Ed Metz**, general foremen, and **Doil Yocham**, concrete foreman. Field office manager is **B. H. Montgomery**.
* * *

John E. Nonenmacher, project manager for **J. H. Wise & Son, Inc.**, is directing a \$2,643,000 contract for construction of additions and modifications to the Assembly and Maintenance Building at the aircraft nuclear propulsion area of the U. S. Atomic Energy Commission's National Reactor Testing Station at Idaho Falls, Idaho. Superintending the erection of this 1 and 2-story steel structure, with caisson foundations, masonry and corrugated asbestos siding, is **Bob Harris**, while **James Canning** is in charge of the office. The project is scheduled for completion the end of this year.
* * *

John H. Tanner, general superintendent and engineer for **Tanner Bros. Contracting Co.**, has under his direction a recent award at \$284,850 for grading and surfacing the Nogales-Lowell highway in Santa Cruz County, Ariz., for which **Arthur W. Rogers** is superintendent. Grade foreman is **Chester T. Cooper**. Office manager and timekeeper is **Raymond Hershner**.



Now . . . most power of the low-priced 3 New **DODGE** *PowerGiants*

1957 line-up gives you up to 232 hp.

Dodge tops the low-priced field in V-8 power by a big margin—actually delivers as much as *31% more!* This *extra* power in reserve saves engine strain . . . wear . . . excessive repairs. What's more, Dodge V-8's use *regular* gas, help keep your cost per ton-mile *down!*

Extra payload capacity. You can haul more—up to *73%* more in the 300 model pick-up, for example.

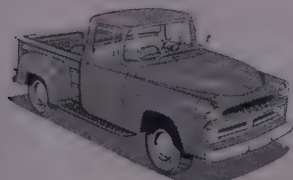
Extra handling ease. Exclusive push-button automatic transmission*! Sharpest turning and easiest steering in the industry!

See the new *Power Giant* line-up now at your Dodge dealer's. You'll see features that prove it pays to get your Dodge dealer's deal before you decide on *any* truck.

*Available on all low-tonnage and Forward-Control models.

DODGE TRUCKS

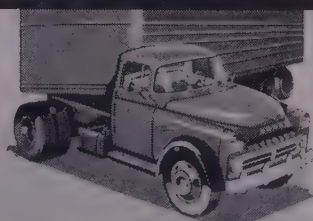
WITH THE FORWARD LOOK



Pick-ups



Stakes



Tractors

**DODGE meets
your hauling needs!**

Conv. Models	Max. G.V.W.	Max. G.C.W.	Max. V-8 HP.
100	5,100 lbs.	—	204
200	7,500 lbs.	—	204
300	8,800 lbs.	—	204
400	15,000 lbs.	26,000 lbs.	197
500	18,000 lbs.	32,000 lbs.	197
600	21,000 lbs.	35,000 lbs.	197
700	23,000 lbs.	45,000 lbs.	216
800	25,000 lbs.	55,000 lbs.	222
900	30,000 lbs.	65,000 lbs.	232
Forward-Control Models			
P300	9,000 lbs.	—	204
P500	15,000 lbs.	—	204
C.O.E. Models			
C500	18,000 lbs.	32,000 lbs.	197
C600	21,000 lbs.	35,000 lbs.	197
C700	22,500 lbs.	45,000 lbs.	216
Tandem Models			
T700	32,000 lbs.	45,000 lbs.	216
T800	36,000 lbs.	55,000 lbs.	222
T900	46,000 lbs.	65,000 lbs.	232

W. F. "Doc" Sims is supervising a \$293,938 job covering rebuilding and oiling of 13.7 mi. of county road in Box Elder County, Utah. Work started early in November and will probably be finished about July 1, according to the contractor, Wheelwright Construction Co.

* * *

Harold Carpenter, excavating superintendent, and Cecil Adamson, concrete foreman, are key men working on pumping plant extension adding one pumping unit to present plant of the Payette Division, Boise Project, Idaho. Quinn Bros. & Robbins, Inc., has the contract at \$114,489 and has scheduled the work for completion about June 1.

W. C. Eckhardt is superintendent for G. E. Marshall on this contractor's recent award to grade, drain, and gravel 10.4 mi. of the Opheim-Canadian line road, Valley County, Mont., a \$340,384 project on which the foremen are Roy Armstrong, Earl R. Christian and J. E. Baker. The work has been under way since October and according to Marshall should end this May.

* * *

Charles Prose, superintendent for Arizona Sand & Rock Co., currently heads a 2-mi. grading, draining and paving job in Maricopa County, Ariz. Sam Carter is foreman on the \$197,371 contract, and the field office is in charge of Charles Oyler. Scheduled

for completion in February, the construction has been under way since last October.

* * *

C. M. Fournier is superintending a \$277,890 recent award to Natt McDougall Co. for 2.3 mi. of grading and surfacing from Dodge to Kuhl Ridge road in Garfield County, Wash. Foreman is P. L. McDowell. Project which has been under way since October 29 is scheduled to end in June.

* * *

J. B. Tipton is superintending a \$104,044 contract for construction of two bridges across Plum Creek and South Platte River in Douglas and Jefferson Counties, Colo. Gardner Construction Co. is the contractor. Carpenter foreman on this job is Harold Hasse, and steel foreman is Lawrence Rovedo. Edward Burnside is timekeeper.

* * *

Ted Adams, project manager, Dave Morse, general superintendent, and Dave Pearson, engineer, are top men on construction of a tunnel at Dillon, Colo., for the Water Board of the City and County of Denver. This is a \$38,000,000 project awarded to Blue River Constructors, a joint venture comprised of S. A. Healy, J. A. Jones, Tomkins, A. S. Horner, Mid-Valley and Colorado Constructors. Under construction since last July, the job is expected to be complete by mid-June 1961.

* * *

Don Baker, superintendent, aided by Everett Hollinsworth, foreman, is in charge of grading, surfacing and miscellaneous work on 10.1 mi. of the Fort Laramie-Lingle road in Goshen County, Wyo. The contractor, Northwestern Engineering Co., is doing the work at a cost of \$507,551.

* * *

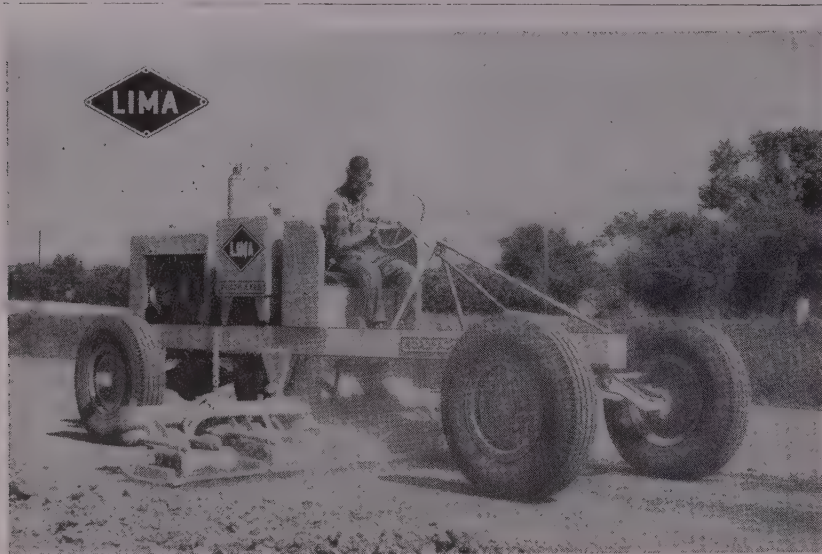
Charles McInroe is general superintendent on a recent \$1,050,840 award to Rogers Construction, Inc., for grading the Emigrant Hill area on the Old Oregon Trail, Umatilla County, Ore. Foremen are Robert VanderBoegh, grading; Clarence Blakley, carpenter, and John Strom, drill.

* * *

R. C. Blossom, superintendent for Hilde Construction Co., Inc., is in charge of a \$403,161 project covering 11.5 mi. of grading and surfacing on Hardin-Custer highway in Big Horn and Yellowstone counties, Mont. Master mechanic on this 6-month job, which starts next month, is John Kanta.

* * *

D. H. Bunge, superintendent, and K. D. Bunge, project engineer, head the list of personnel working on the \$1,580,000 award to Paul Hardeman, Inc., for construction of SPERT III (Special Power Excursion Reactor Test) facility at AEC's National Reactor Testing Station in Idaho. Hardeman started on the project Nov. 26.



The LIMA ROADPACKER ... faster high-density compaction at lower cost

The penetrating vibration of six heavy vibrating shoes compacts macadam bases and gravel sub-bases to specified densities.

Course aggregate for macadam bases up to 12" thick can be spread in a single layer, then uniformly compacted to final density over a 13'1" width with the LIMA Roadpacker.

Single spread, which is permissible only with the vibratory method, reduces material handling by one-half or more—it

eliminates backtracking of spreading equipment and contour shaping is needed only once.

The action of the vibration "runs in" screenings to full depth of macadam with only three operations. Much of the labor formerly required to spread, broom and roll is eliminated.

The versatile LIMA Roadpacker performs with equal efficiency on both full-width and widening jobs.

Here's how the LIMA Roadpacker speeds up paving operations.

- Drives to job at 30 MPH.
- Compacts equally well traveling forward or reverse—no deadheading or turning around when two passes are required.
- Covers a 13-ft., 1-in. width, one half of a two lane road.
- Operator can easily fold end shoes for

narrower working widths or for highway travel. Shoes are raised and lowered hydraulically.

- Low maintenance—all working parts are completely enclosed, can even operate under water or dirt. Shoes are driven hydraulically and are pressure-lubricated.

A fact-filled 4-page folder tells how the new LIMA Roadpacker will help you make more paving profits. Write for your copy today.

LIMA

SHOVELS • CRANES
DRAGLINES • PULLSHOVELS



BALDWIN-LIMA-HAMILTON
Construction Equipment Division—LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation
Hamilton • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works



Engineered Rubber Products



A Long Drink of Water... for San Diego

For some 70 miles, the San Jacinto-San Vicente Aqueduct climbs and plunges in its southward course to San Diego, carrying the city's water.

This liquid life-line uses over 28 miles of 48 and 54-inch reinforced concrete pressure pipe equipped with steel joint rings.

These steel joint rings—about 8,500 in all—are sealed with U. S. Rubber round gaskets, made by the unique process of *continuous molding*. This process is exclusive with U. S. Rubber. Continuous molding produces the only seals that provide minimum compression set, precise tolerances (down to .008 if needed), and long life—all at reasonable cost.

This continuous molded gasket is only one of thousands of examples of how "U. S." experts engineer rubber and plastic parts in mass-production—yet at exacting tolerances. For your next construction job, contact any of the 28 "U. S." District Offices or write us at Rockefeller Center, New York 20, N. Y. In Canada, contact Dominion Rubber Co., Ltd.



Mechanical Goods Division

United States Rubber

Water Plan

(Continued from page 53)

logical advances of the future. Therefore, the Plan is necessarily based on today's estimates of future uses of land and water and on the accepted technology of these times. Shifting growth patterns, technological advances, and possible climatological changes, may alter the picture in ways that cannot be estimated now. For these reasons, investigations and planning for water development must be a continuing process.

Necessity for the Plan

Necessity for the Plan should be self-evident. Studies have established the fact that there is enough water within the state for all future needs (maintaining proper entitlement to Colorado River waters), but only if we control, conserve, distribute, and use the resource wisely. On some streams there is insufficient remaining natural flow to maintain the fishery resource. Most important, we are dangerously overdrawing our immensely valuable ground water basins and seriously damaging many of these basins by saline-water intrusion.

It appears to be obvious that we have passed the point where we can, with any reasonable degree of discretion, continue without a master plan for water development. The California Water Plan provides the facts showing that the problems of mal-distribution and of meeting the requirements of all areas can be solved physically, and it provides a plan whereby this can be accomplished.

Without such a master plan outlining our available water supplies there will be no solution to the true problems involved, either by the state, the Federal Government, or by local entities.

Future water development by all interests must be carefully planned, coordinated, and integrated, both in design and operation. It is imperative that legal sanction be given to this master plan for water development into which future projects by all agencies, Federal, state, local, and private, must be fitted, within reasonable limits. Any other course would produce less than maximum over-all benefits from water development, and might well result in costly overlap and duplication of facilities. An uncoordinated and unplanned approach might well deprive some portions of the state of the water which they will need in the future, a situation which already faces certain areas.

The role of water developer must be played by an ever-increasing number of local agencies. In the past, many strictly local projects were planned and constructed with but a single purpose and a single area in mind. Today, we no longer can proceed in this fashion. One of the limiting factors now is a scarcity of dam and reservoir sites which can be developed economically. To compensate for increased costs, it will be necessary that these sites be utilized for more than a single purpose and to serve more than a single area. Local projects must be fitted into the master framework, and must be planned with the objective of accomplishing the greatest good for the greatest number.

Construction of certain projects in such a manner will require many works beyond the specific need or capability of the local agency involved. To bring about construction of such projects, it may be necessary for the state to participate financially, to the extent of the state's interest.

Citizens' conference

A number of resolutions were submitted at the citizens' conference, convened by Governor Knight, Nov. 19, 1956. These resolutions, submitted by interests representing both areas of surplus and of deficiency, were approved by those present. One of the resolutions proposed that the governor request the legislature to appropriate \$25,200,000 during the fiscal year 1956-57 to begin construction and relocation of the highway and railroad at Oroville Dam and Reservoir.

It was further resolved that \$25,800,000 be appropriated for 1957-58 to complete that work and accomplish relocation of other facilities. It was further requested that \$12,200,000 be appropriated for continuation of preparation of contract plans and completion of the acquisition of lands and rights-of-way for Oroville Dam, and San Luis Dam, together with completion of the current aqueduct route studies.

The conference requested that the legislature be asked to submit, in the 1958 election, a constitutional amendment to provide for the protection of areas of origin and areas of deficiency to which water would be exported.

Another resolution proposed, that in order to solve the administrative problem of the county-of-origin law, that the water code be amended to provide procedures whereby needs of

the county of origin can be definitely determined and releases of surplus waters to the areas of deficiency can be made.

A resolution was adopted requesting the legislature to enact a program wherein the state may lend its financial assistance to local projects found by the Department of Water Resources to be in conformity with the Plan.

The conference proposed that the legislature be requested to accept The California Water Plan and approve it as an expression of the general intent for an orderly development of the state's water resources for the benefit of all the people of California.

Recommended legislation

The legislature should accept The California Water Plan for the orderly and coordinated development of the water resources. Carrying out the intent of the legislature, the following section should be added to the water code: In determining how the waters of the state should be allocated and used and how such waters should be controlled and developed for the greatest public benefit, the State Water Rights Board shall take cognizance of The California Water Plan including such amendments, supplements and additions thereto as may be adopted from time to time.

Also, a new section should be added to the water code to read: The plan for the orderly and coordinated development of the water resources of the state which is set forth in Bulletins No. 1, No. 2 and No. 3 of the Department of Water Resources, with such modifications, amendments and additions as may be later necessary, shall be known as "The California Water Plan." The Department of Water Resources shall report to the legislature, from time to time, such modifications, amendments and additions to the Plan as are found necessary and desirable.

Another new section would read: It is hereby declared that the people of the state have a primary interest in the orderly and coordinated control, protection, development and utilization of the water resources of the state by all entities and it is the policy of the state that The California Water Plan, with such modifications, amendments and additions thereto as may be necessary from time to time, is accepted as the guide for the orderly and coordinated control, protection, conservation, development and utilization of the water resources of the state.

How contractor solved "impossible" excavating job with **AUTOMATIC BUCKET**

Estimates saving of 3 weeks by using PAGE AUTOMATIC

Soon after excavation for the sewage disposal system at the Chrysler Corporation's Kokomo, Indiana plant began, the contractor, Thompson Construction Company of Indianapolis ran into a problem that threatened to stall the job and cost it money.

In digging a 20 ft. wide x 34 ft. deep x 2800 ft. long trench, hard, blue clay — interlaced with fine gravel to give it the density and consistency of cement — was encountered at the 10 ft. level. The dragline bucket on their machine would not penetrate the clay, no matter how the operator maneuvered it. Valuable time was being lost in the effort to solve the problem.

A well known bucket manufacturer who was called in turned "thumbs down" on the idea of even attempting to build a bucket that would dig this material.

Faced with this situation, and unable to use a backhoe because of the depth and a shifting layer of sand and gravel 6 ft. below the surface, the contractor resorted to emergency measures.

A four man crew, equipped with air spades was assigned to cut a 6 inch deep trough across the trench. By placing the bucket's teeth in this trough, the bucket was able to dig in and get a load. In this way, excavation could be done, but it was a slow, tedious and costly method because the trough had to be cut after each bucket load.

At this point, a Page Automatic Bucket Distributor, learning of the difficulty, came on the job and after studying the situation, advised the contractor that a Page Automatic Bucket could handle the material without any help from the spading crew.



Automatic Bucket gets maximum yardage each cycle — speeds excavation for sewage disposal system at Chrysler Corp., Kokomo, Indiana plant.

Even in toughest digging, Page Automatic fills completely in 1 to 1½ bucket lengths.

Shortly, a 1 yd. RH Page Automatic was delivered, and to quote Glenn "Bud" Crane, Superintendent of the Thompson Construction Company, *"The fur began to fly."*

Mounting the Automatic on their Koehring Model 605 — a 1½ yd. machine, Carmel Faucett, operator, set it down 26 feet below into a particularly tough section of clay. At the first pull on the load line, the Automatic assumed its digging position *and filled completely in one length!* Astonished, they tried it again and again with the same results — the Page Automatic dug in and filled completely every time in 1 to 1½ bucket lengths . . . removing at least 1½ yards of material that other buckets wouldn't even scratch.

After watching the Page Automatic Work, Harry Tousley of H. D. Tousley Co., Inc. General Contractor on the job, said *"If someone had told me two weeks ago that there was such a big difference in dragline buckets, I wouldn't have believed them."*

Production zoomed and the job began rolling. Lost time was made up and

the situation looked a lot brighter. Minor delays were encountered however, because the tremendous abrasiveness of the material forced the contractor to turn over the Automatic's reversible teeth every four hours to present a sharp, clean cutting edge. After eight hours use, a set of teeth had to be completely built up and hard surfaced.

A conservative estimate by Glenn Crane indicates that the Page Automatic saved approximately 3 weeks time over the method being used previously.

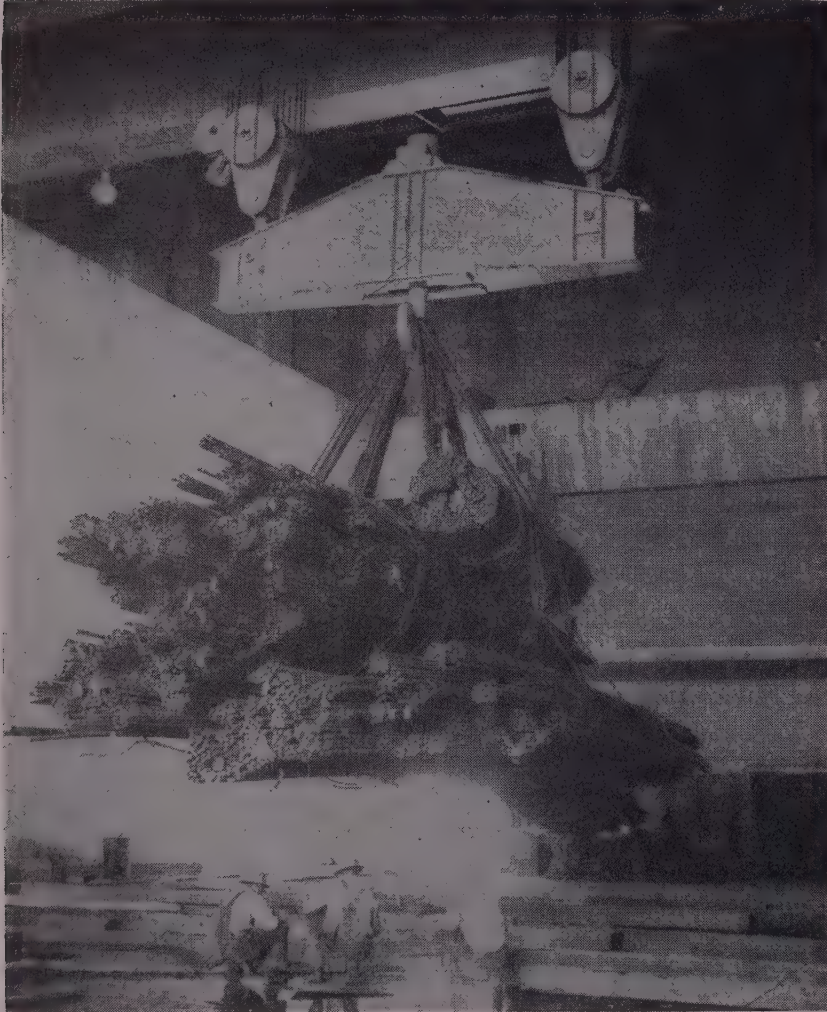
Page Automatics are outperforming ordinary old style buckets in every type of job. There's a Page Automatic made in a type and size to meet your requirements. Write for catalog sheets and complete details.

PAGE ENGINEERING COMPANY
Dept. 241
CLEARING POST OFFICE, CHICAGO, ILLINOIS

Page
Walking Draglines
Automatic Dragline Buckets

B-310P

TRICKS of the TRADES



The Dalles Dam crane can lift 655 tons

FINAL PHASE of erecting and testing of the two 370-ton Moffett overhead bridge cranes for the handling of turbine parts at The Dalles Dam was recently completed by the Holman Erection Company of Minneapolis, Minnesota, subcontractor for Montag-Halvorson-Cascade-Austin combine.

The four bridge crane girders used in the bridge cranes have a span of 74 ft. from rail to rail and weighed approximately 50 tons each. Over 500 tons of material went into the assembly of the combined units.

These cranes are the largest to be fabricated on the West coast and are believed to be the largest cranes of their type in existence. Each crane has two auxiliary hoists with a lifting capacity of 30 tons, and two main hoists with a lifting capacity of 185 tons each. By combining two main hoists with a lifting beam weighing 15 tons, each crane has a lifting capacity of 370 tons. By combining the two 370-ton lifting beams (1 each crane) with a third lifting beam weighing 35 tons and combining the operation of the four main hoists, the

combined unit is designed to handle turbine loads up to and including 655 tons.

After erection of the bridge cranes, each hoist and combination of hoists was tested by the Holman Erection Company under the various load conditions with each crane being tested under actual load handling conditions up to and including 462½ tons or 125% of rated load. Test loads were made up of reinforcing steel.

The erectors, Holman Erection Company, are also erecting structural steel, reinforcing steel, stoplogs, trash racks, 100-ton gantry crane, whirleys, main unit intake gates, and miscellaneous items for Montag-Halvorson-Cascade-Austin at The Dalles Dam.

Valuable building book

EVERYONE engaged in building construction and maintenance activities will be interested in the second edition of the National Bureau of Standards "Selected Bibliography on Building Construction and Maintenance" just issued and made available from the San Francisco Office of the U. S. Department of Commerce. The first edition of this report, in May 1954, was one of the most sought for National Bureau of Standards publications.

This report contains selected references on building materials, equipment, good construction practices for new construction, and the modernization and maintenance of buildings. Included are titles to papers dealing with the practical aspects of building construction and some publications of a more technical nature. Government, trade associations, universities and colleges, and other non-government sources are represented. Some standards of the American Standards Association and American Society for Testing Materials have been listed.

Most subjects in the building and construction field are covered such as air conditioning, chimneys and fireplaces, concrete, floors and flooring, insulation, kitchens, painting, plumbing, roofing, wiring, etc. A list of state agricultural colleges and experiment stations, as well as government and non-government issuing agencies are included, and the report is thoroughly indexed by subject.

Copies may be obtained from the U. S. Department of Commerce Field Office, 419 Custom House, 555 Battery St., San Francisco. Price 30c.

How to put limestone and gumbo in their place



THIS is heavy going on a new section of four-lane U. S. 80 just east of Ranger, Texas. Collins Construction Co. of Austin put in 7.8 miles here and they handled 395,000 yards of material doing it. A lot of that was rock. And a lot was limestone and gumbo.

For this sort of heavy grading, Collins called in their CAT* No. 12 Motor Grader. "Finest all-around grader I ever saw," says veteran operator V. W. Nichols.

Notice that operator Nichols sits down to handle his No. 12, even in rough stretches like this. If an operator has to stand to see his work, he tires much quicker, no matter how good he is. The operator of a No. 12 enjoys the convenience of in-cab starting, too, and power steering, and the exclusive Caterpillar accelerator-decelerator. Most of all, he enjoys the assurance he's at the controls of a tough, reliable machine that's *built to do the hard work.*

Backbone of the No. 12 is the strongest frame in any motor grader now on the market. Special channels make it that way. Box section circles increase its durability, as do its box-type drawbars. And the engine is of the same hardy breed—clutch, transmission, final drive are built to take heavy motor grader service.

Other features help explain the No. 12's popularity with operators and owners, too. Fast, accurate mechanical controls. Anti-creep brakes. Blade maneuverability that lets you swing from ditch cut to bank cut in less than a minute without adjusting links. Your Caterpillar Dealer will give you full details—and a demonstration, any time. He's ready with expert service, also—and parts you can trust.

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

CATERPILLAR*

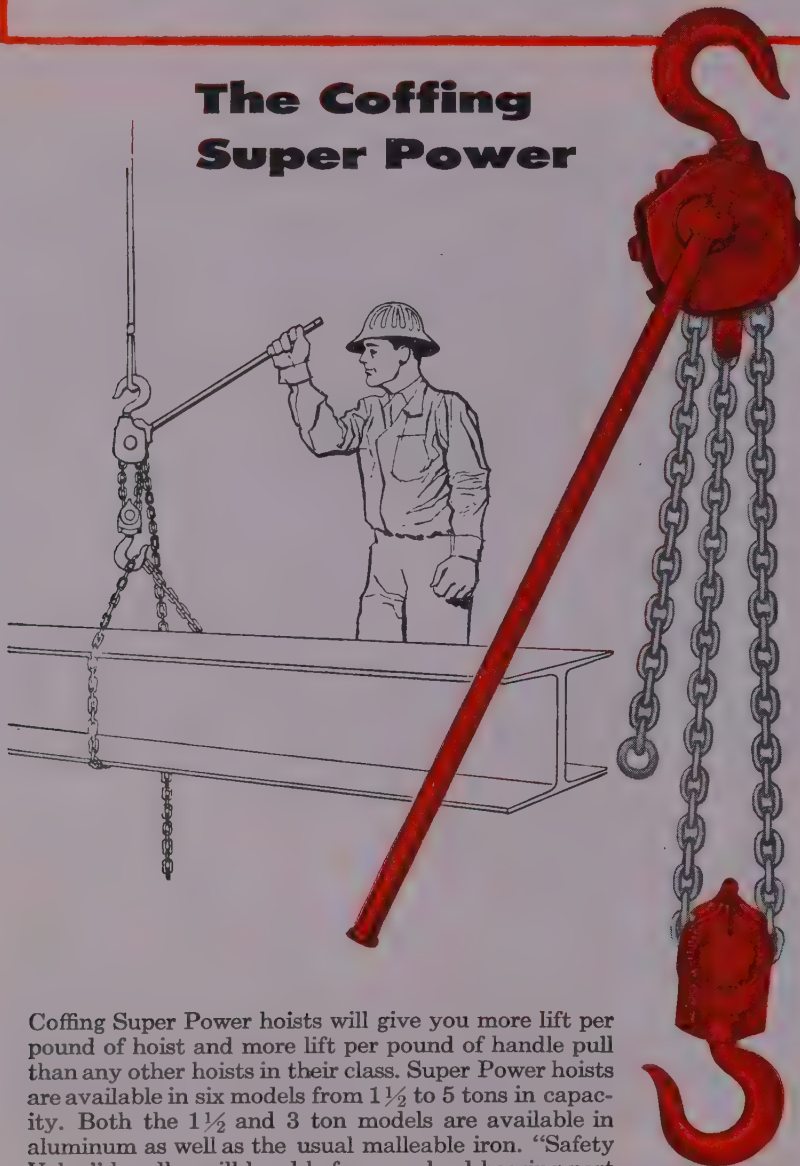
*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Diesel Engines • Tractors • Motor Graders • Earthmoving Equipment

**WANTED—
THE HARD WORK**

**This hoist is the most efficient
lightest, safest hoist in its
capacity class available today!**

The Coffing Super Power



Coffing Super Power hoists will give you more lift per pound of hoist and more lift per pound of handle pull than any other hoists in their class. Super Power hoists are available in six models from 1½ to 5 tons in capacity. Both the 1½ and 3 ton models are available in aluminum as well as the usual malleable iron. "Safety Valve" handles will bend before any load-bearing part can fail, and all hoists are tested at 100% overload.

Weight and bulk have been saved through the use of patented compound levers, rather than the conventional gears. These levers also give the hoists an increased efficiency of 85%. The operating handles may be adjusted for length and operated from either side of the hoists, and they cannot spin out of control.

For complete details write for Bulletin SP, Coffing Hoist Division, Duff-Norton Company, 811 Walter Street, Danville, Ill.

COFFING HOIST

Division of Duff-Norton Company

Branch Office: 1016 Howard Street, San Francisco, Calif.

TOOLS of the TRADES

A NEW TRIO of Salsbury diesel engine reconditioning kits developed especially for repairing cracked Cummins and GMC diesel cylinder heads, is now available from **Salsbury Corp.**, 1161 E. Florence Ave., Los Angeles 1, Calif. The kits are designed to recondition all Cummins NH and HB, and GMC series 71 and 110 diesel heads. Salsbury Corp. offers a complete line of motor block and head repair tools and materials for all types of water-cooled engines.

A POCKET SIZE, all aluminum controller, weighing 1 oz. is being distributed by **Silver Bells, Ltd.**, 600 16th St., Oakland, Calif. The controller, which is 3 in. in diameter, gives the



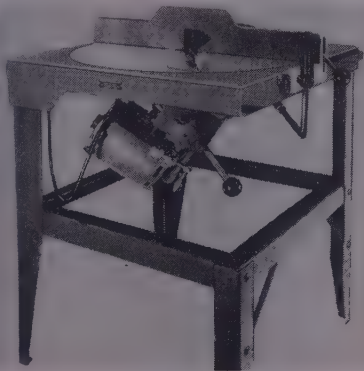
performance of a 10-in. slide rule and can be used for all commercial and technical calculations. Cost of the calculator is \$7.95, including a Vinyl carrying case and detailed 16-page instruction booklet.

A VALVE for instrument piping and general use which acts as a block valve, as well as greatly reducing the number of threaded connections required, is being introduced by **Jerguson Gage & Valve Co.**, 80 Fellsway, Somerville 45, Mass. This new valve, the Jerguson No. 66U-VG, is an offset valve with a vertical rising ball check on the downstream side of the seat and with a solid shank connection to the vessel which makes it acceptable as a block or root valve, and makes it possible to eliminate the usual block valve. These valves combine unions, nipples, reducers, elbows, tees, valve and rain valve into one space saving unit. They have a double seating stem for repacking under pressure and a pressure bleeder valve and test gage connection.

A NEW LINE of taper-socket type Brunner & Lay Rok-Bits has been announced by **Brunner & Lay of Los Angeles, Inc.**, 2425 E. 37th St., Los Angeles 58, Calif. These taper-socket Rok-Bits are available in the following gage sizes: for ⅝-in. drill steel, 1¼ in.; 1⅝ in.; 1½ in.—No. 7 Class A Taper and for 1-in. drill steel, 1⅝ in.; 1¾ in.—No. 8 Class B Taper. Bronze shims supplied with each bit. There are no threads to strip; no body distortion from lock-on, it is said; and bit is easily removed from drill rod.

THE SWANSON RIPPER is a new tool designed to cut the time and cost factor when it is necessary or advantageous to rip outside of the width of the wheels or outside the cutting width of the blade of a motor grader. The Swanson ripper is actually a specially designed attachment support boot which holds a standard make of ripper shank while the work is being performed. This new tool, designed and built by the **Swanson Manufacturing Co.**, will effectively rip asphalt, hard pan, stratified rock, shale, adobe and concrete of a reasonable thickness to a depth of 10 in. It is being manufactured in two models for use with the No. 12 Caterpillar motor grader. Full information available from the manufacturer, 515 63rd St., San Diego 14, Calif.

A NEW SAW, distinguished for its flexibility and rapid switching from "rip" to "cut-off," is being manufactured by **Horton Manufacturing Co.**, P. O. Box 747, Goldtwaihe, Tex. The Universal Underbench Saw uses the same



guide for rip and cut-off, which is adjustable or completely detachable, in a single motion. The entire saw unit is housed in a table 28 x 28 in. square, permitting it to be moved through any standard door.

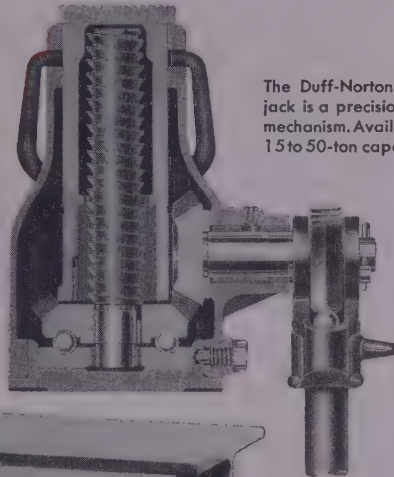
A SIGHT FEED LINE lubricator which automatically feeds and mixes the proper amount of oil to lubricate all air and steam tools from a small air spade to the largest pile hammer is being marketed by **Murray Equipment Co.**, Box, 14, River Forest, Ill. An adjustable valve on the sight feed mechanism controls the rate of oil feed so that a drop at a time or a steady stream is pressure-fed into the line in the form of an atomized spray. Having no moving parts, the Murray sight feed lubricator will not jam. A built-in screen prevents clogging and it operates only when tools are in use, so that flooding is impossible. Available in sizes to handle air and steam tools using from 60 to 1,000 cfm.

A NEW "MIDGET" model four-blade cement finishing machine is announced by **Superior Cement Tool Corp.**, 11616 Wright Road, Lynwood, Calif. The Superior Midget weighs only 75 lb. and is small enough to pass through narrow doorways and light enough for one man to carry up and down stairs. A crank adjustment permits the trowel's operator to switch blade pitch while the unit is in motion—thereby floating and troweling concrete in one non-stop operation.

Duff-Norton

**Ball Bearing Screw Jacks
can't creep or drop—
will hold loads indefinitely**

Standard of the world for over 70 years



The Duff-Norton screw jack is a precision built mechanism. Available in 15 to 50-ton capacities.



Can be used upright or on side with equal efficiency—no fluids to leak, no air to "lock."

Duff-Norton Ball Bearing Screw Jacks, employing the basic inverted nut and screw principle, are locked in position when under tension, can't move up or down unless you insert the jack handle and apply hand power to ball bearing actuated gears in base that turn the nut. They are safe, foolproof, dependable, fully enclosed, rugged—seldom need lubrication or servicing.

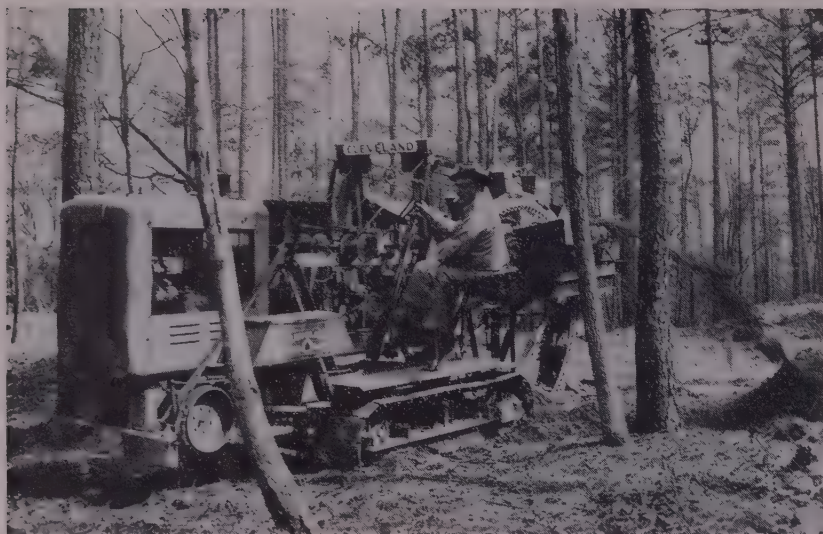
Ask your Duff-Norton distributor or write the world's oldest and largest manufacturer of lifting jacks, the Duff-Norton Co., P. O. Box 1889, Pittsburgh 30, Pa. Ask for bulletin AD-12-A.

Branch Office: 1016 Howard Street, San Francisco, Calif.

DUFF-NORTON

"Giving Industry A Lift Since 1883"

house footings ...*HERE?*



**Right! – in spite of all the trees
this Cleveland 110 is doing a fast job
trenching for housing unit foundations**

A highly maneuverable trencher is an absolute requirement for economical production to the accuracy required for building foundation trenches in conditions like these experienced by Algernon-Blair, Inc. of Montgomery, Ala. on this 127-unit housing project at Fort Eustis, Va. for the Corps of Engineers.

Here's what J. B. Snipes, Project Manager for Algernon-Blair, says about his Clevelands: "We are using Clevelands exclusively on the Fort Eustis project because of their excellent performance and dependability. We chose Clevelands originally because we consider them faster—and their superior maneuverability is a feature we particularly like on a project like this."

At the Road Show • Cleveland Trenchers and Backfillers • Exhibit 417

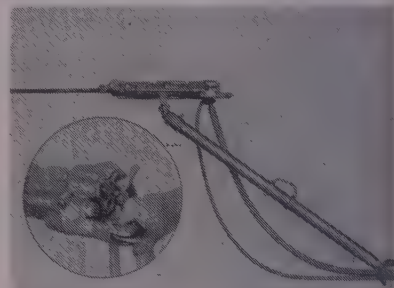
THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO



TOOLS of the TRADES

A ROCK DRILL with automatic retraction of its integral pusher leg and all controls concentrated on the backhead for single-hand drilling operation is now available from Atlas Copco, Inc. Up to 30% increases in drill footage per hour are claimed to result from the design advancements of the new drill,



designated the Lion. In actual operation, the driller exerts moderate pressure on the hand grip to release his feed pressure, and further depresses the control to retract the "stinger" in the leg. Releasing hand pressure automatically stops retraction and restores full feed pressure. A pair of levers on the backhead provide adjustable feed pressure and extra-strong blowing. Illustrated literature on the new driller is available from Atlas Copco Pacific Inc., 930 Brittan Ave., San Carlos, Calif.

A SINGLE PLUNGER, self-centering stud driver is being manufactured by Fastening Devices Inc., 369 50th St., Brooklyn 20, N. Y. A hand tool of simple, rugged design, it sets any size



stud or drive-pin up to 4 in. long in concrete, brick, or steel with the aid of a hammer. The tool performs at low cost because it completely eliminates drilling holes, when applying anchors. All that is needed for any light fastening job is the stud driver, stud or drive-pin, and a 2½-lb. hammer.

A VERSATILE tool for applying Alligator V-belt fasteners to open-end V-belt has been announced by the Flexible Steel Lacing Co., 4607 Lexington St., Chicago 44, Ill. This pocket size V-fastener tool enables the user to quickly make up V-belts of any length, and its low cost will enable small users of V-belts to keep a few feet of open-end V-belt plus the tool on hand to make fast emergency replacements. The holder is made for B and C section V-belts. Literature is available from the manufacturer.

This photo of the excavated trench shows the nearly vertical walls, made possible by the STANG Wellpoint System. At the right of the picture is a portion of the 8-inch diameter header including a series of STANG Wellpoints and the intake lines.



Like water off a duck's back...

In the Pacific Northwest where rainfall is heavy and drainage slow, STANG Wellpoint Systems have proved the profitable and efficient answer to the unwatering of many construction projects.

At Puyallup, Washington, a particularly tough assignment was completed by STANG. Unwatering this sewer trench at Puyallup proved to be no easy job... quicksand and mud presented a real problem. STANG engineered and installed a Wellpoint System, enabling the contractor to lay 200 feet of 48-inch pipe per day in a completely dry, 6½-foot by 9-foot trench without danger of uplift, "boils" or sloughing.

Call on STANG equipment, experience and engineering services to solve your water handling problems—any size, any type, *anywhere*. STANG engineers are always available for consultation.

GENERAL PUMPING
including High Pressure Jet
Pumps, Large Capacity Sump
Pumps (vertical or horizon-
tal), Hydraulic and Sluic-
ing Systems and Sprinkler
Irrigation Equipment.

Putting water
in its place



JOHN W. STANG CORPORATION

Engineers and Manufacturers of Dewatering Equipment, Wellpoint and Pumping Systems
Dewatering Planning—Equipment—Service

BELL, CALIFORNIA
8221 Atlantic Avenue
Telephone: LUdlow 2-7421

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

TACOMA, WASHINGTON
2339 Lincoln Avenue
Telephone: Broadway 4362

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

ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

BIG QUESTION MARK—The big enigma in the construction, as well as other industries, is: What will the new year bring? Gazing into a crystal ball is one way of arriving at an answer. Giving careful analysis to the predictions of experts in the construction and contracting field is another. Using the latter method, your Alaska reporter has come up with a few answers to the questions concerning construction in Alaska. They may not be borne out by the months ahead—yet I feel confident after looking at my previous year-end reports in **Western Construction** that they won't be far wrong. In compiling the information for this month's column I talked with contractors, military men, budget directors, union leaders and even a few construction stiffies. The information, I believe, throws more than a little light on the year 1957 and what it will mean to construction in Alaska.

CONSTRUCTION VOLUME — Not too much guesswork is required to determine that the volume of construction in Alaska will be as high or higher during 1957 than it was in the past year. Definite figures as to the scope of Northern construction have been issued by the office of the Alaska District Corps of Engineers which office handles the bulk of military construction in Alaska. The good news this year is that more than \$125,000,000 in construction supervised by the Alaska District for the Army and Air Force is contemplated throughout the territory. The figure includes about \$86,000,000 in new construction scheduled during the first six months of 1957.

CIVIL WORKS PROJECTS — Added to the construction being planned for the Army and Air Force, seven new civil works projects costing an estimated \$7,000,000 will get under way in 1957. The civil works projects scheduled include \$5,500,000 on harbor improvements and flood control work.

SCOPE OF PROGRAM — Construction for the Air Force will include projects at huge bases such as Elmendorf, near Anchorage, and Ladd and Eielson in the Fairbanks area. Work also will be carried out in isolated stations throughout the territory. New construction for the U. S. Army will total more than \$47,800,000 in 1957, according to Engineer estimates. Hold-over projects for the next season are valued at \$12,448,000. Also, there is \$25,200,000 in projects

on the boards (being designed) for which appropriations have not yet been determined.

NON-MILITARY CONSTRUCTION—Construction of a non-military nature is expected to remain at a high level during 1957. A study of the needs of schools, municipalities and commercial enterprises in Alaska indicates that expansion is continually going on, forcing new construction at an accelerated rate. One architect who handles a sizable percentage of the newly-planned Alaska commercial construction told me that 1957 would be a banner year in the non-military building field. Particularly in the big cities of Anchorage, Fairbanks, Ketchikan and Juneau a total of no less than \$15,000,000 in new buildings is forecast. Construction of new housing is expected to continue at a good clip, occasioned by the steady growth of population and living standards in the territory.

LABOR OUTLOOK—The supply of construction labor for the gigantic 1957 Alaska program is expected to be ample—just as it was in 1956. Last year around this time, there was considerable apprehension about labor-management negotiations in the Alaska construction field. Nowhere did I find the same apprehension this year. The general feeling is that wage negotiations will proceed smoothly, and no work stoppages or interruptions seem in the cards. Both labor leaders and contractors are getting around to tackling the touchy question of the 1957 schedules—but every indication I have is that rates and scales won't be appreciably different from what was found to be satisfactory to both parties last year.

EMPLOYMENT — The territorial employment service in Anchorage predicts a decline in employment until March at which time construction activity will begin to get under way after the winter's "deep freeze." At the present time, hiring in the construction industry is virtually nil. Government hiring is rated as static right now. It, too, will pick up in the springtime. As of January 1957, the Alaska job picture is extremely bleak. It will get better, however, as each month passes and hit the traditional peak in July, August and September.

LABOR ELITE — In this age of electronics, the "elite" workers in Alaska these days are the electronics technicians. Completion of Far North radar and communications sites has

brought about a demand for electronics workers which appears to be far from the saturation point. Because of the remoteness of the sites, one of the inducements being used to attract electronics men to Alaskan jobs is a better-than-average wage scale. On January 3, for example, a job listing in the **Fairbanks News-Miner** called for experienced electronics technicians to work a 54-hour-week at the remote sites. The wage rate quoted "after training and assignment to duty station" is \$263.93 per week plus room and board. This is equivalent to more than \$300 a week.

ALASKA LIVING COSTS—Of interest to the construction worker and contractor alike is a recent survey of Alaska living costs. The study showed that it costs from 21 to 53% more to live in Alaska than it does in the U. S. Anchorage and Fairbanks were considered the "highest cost" cities and they are also the territory's largest centers. Many contractors with projects in Alaska have long been cognizant of the big difference in living costs between the U. S. and Alaska. Many set up their own bunk houses and mess halls to meet the problem of "expensive" living in Alaska.

TRANSPORTATION BOON — Delivery of construction equipment and supplies to jobsites in Alaska's interior will be facilitated with completion of the new dock at Seward, Alaska, before the onset of the 1957 construction season. The dock, being completed by Mannix-Stolte, will have two berths, with one of the two expected to be in operation this season. Delays in receipt of freight at Anchorage and Fairbanks are expected to be reduced because of streamlined cargo handling procedures which will go into effect at the new dock. New transit sheds being built will permit better sorting and consolidation of shipments bound for interior points. Irving P. Cook, Alaska Railroad chief engineer, said the dock, warehouses and other projects at the south end of the 470-mi. Alaska Railroad represent the final phases of a rehabilitation program started by the railroad shortly after World War II.

CONSTRUCTION NEWS NUGGETS — "Fly-by-night contractors" will be discussed at a meeting January 19 of the Alaska Territorial Federation of Labor, a group which considers such individuals a real problem. The Federation will also wage a campaign to improve the Alaska Workmen's Compensation Act and strengthen laws concerning the payment of wages when due . . . More than 906 laborers are now unemployed in the territory. . . . Federally-employed white collar workers in Alaska are hoping for a substantial increase in salaries.

REPORTS from the COURTS

By HOWARD S. BURNSIDE, Low and Burnside
Attorneys at Law, San Francisco—Menlo Park

Contract fails for lack of mutual consent

"The plaintiff is a general contractor engaged in road construction. The defendants are pipe laying contractors. The State called for bids for the construction . . . to be submitted by September 10, 1952. Plaintiff desired to bid on that project. Before submitting its bid, plaintiff approached several subcontractors, including defendants, to secure bids from them on certain items of the work that plaintiff intended to subcontract. Among other items, the plaintiff intended to subcontract items 1, 4, 5, 21-32 of the general contract relating to the excavation and placement of reinforced concrete pipes and storm drains."¹

At the first meeting between plaintiff and defendant, plaintiff indicated that defendant could look at the job. About a week later they did visit the site and discussed the work. Plaintiff wanted a quotation on a storm drain. The defendant testified he told plaintiff he could not give a bid because the plans were not clear to him. He felt that jetting would not be allowed on state jobs. It was defendant's experience that tamping or back-filling with selected material was usually necessary. Defendant further testified that plaintiff insisted on a figure and that plaintiff copied figures from defendant's work sheets which bore the statement "Flooding with the same excavated material." Defendant at all times denied making a firm bid or offering to do the job at a quoted figure. Plaintiff's testimony was contrary in many respects and he put in evidence a memorandum from defendant containing a complete itemization of all items of the contract.

Plaintiff secured the job and defendant refused to undertake the work, the specifications for which required tamping. The work was performed by others and plaintiff sued defendants for breach of contract. The trial court found that defendants had not made an offer to contract with plaintiff and that the parties had never entered into a contract. The judgment was affirmed on appeal.¹

"For a valid contract to exist the consent of the parties must be free, mutual, and communicated by each to the other, . . . consent is not mutual unless all the parties agree upon the

same thing in the same sense . . . (In determining whether there has been a mutual consent to contract the courts are not interested in the subjective intent of the parties, but only in their objective intent—that is, what would a reasonable man believe from the outward manifestations of consent.)"

1. *Leo Piazza Paving Co. v. Bebek and Brkich* 296 P. 2d 368.

Public lands boundaries are created by survey

"The original government surveys; whether they are mathematically correct or grossly erroneous, control the location and length of boundaries of section and parts thereof and the shape and size of tracts granted to patentees¹ . . . A survey of public lands does not ascertain boundaries; it creates them. (Citing numerous authorities.)"

"A section of a township is that which is laid out on the ground, and a patentee takes only such land as is included within the survey of the plot conveyed and he cannot later question the survey as erroneous, although in fact the line in question should have been placed elsewhere.²

"A government township lies just where the government surveyor lines it out on the face of the earth. These lines are to be determined by the monuments in the field."³

1. *Verdi Devel. Co. v. Dono-Han Mining Co.* 296 P. 2d 429.

2. *Phelps v. P. G. and E. Co.* 84 C.A. 2d 243, 247.

3. *Harrington v. Boehmer* 134 Cal. 196, 199.

Rule of substantial compliance reaffirmed

"The law is settled in this state, that in the case of building contracts, especially where the owner has taken possession of the building and is enjoying the fruits of the contractor's work, no literal compliance with the contract in all details and no absence of all defects and imperfections is required to entitle the contractor to recover on the contract, but that he can have such recovery after substantial performance in good faith, if the deviations and imperfections do not substantially affect the usefulness of the building for the purposes for

(Continued on Page 106)

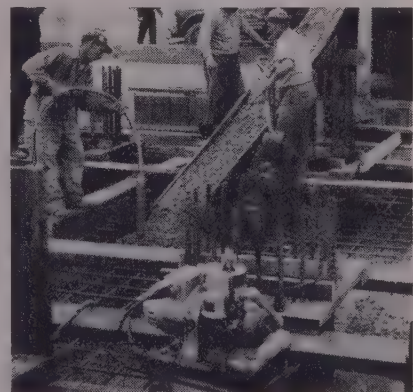
Full Line of Carryable Construction Equipment Now Offered by Homelite



Carryable Diaphragm Pump . . . This self-priming, 120 pound diaphragm pump will handle water in the thickest sand, muck, or mud. Capacity: 5,000 g.p.h. Size: 3". Complete line of centrifugal pumps are also available in sizes from 1½" to 3".



Chain Saws For Every Job . . . Now you can choose from a full line of lightweight, powerful Homelite chain saws. From 3½ to 7 horsepower . . . 19 to 29 pounds. Brush cutting and clearing attachments are available to handle all your cutting jobs.



One-Man Electric Vibrator . . . It takes only one man to place concrete with powerful, Homelite high-cycle or universal electric concrete vibrators. Carryable Homelite generator provides power for high-cycle vibrators and 110 volt DC for all universal vibrators, tools and floodlights.

HOMELITE

a division of Textron Inc.
PORT CHESTER, NEW YORK

NEW LITERATURE

For your convenience in obtaining free copies of literature described, the company address is provided with each review.

Toro literature

Toro power mowers, frames and tractors are described in various pieces of literature published by the **Toro Manufacturing Co.**, Minneapolis 6, Minn. Illustrated specification sheets are available describing the 80-in. Whirlwind mower, Park Special with 5.25-hp. engine, 24- and 31-in. Whirlwind, and 76-in. Professional mower with 8-hp. engine. A four-page brochure describes in detail the Spartan Gang Mower and frames. Another folder covers the Toro line of tractors including the Toro bullet tractor and Toro general tractor. Complete specifications and working data are provided along with parts and job photographs of the units.

White Diesel engine folders

A bulletin, No. 108, featuring the new Superior Model 40, stationary diesel engines, developed by White Diesel Engine Division of the **White Motor Co.**, is available from the company's Springfield, Ohio, plant. The bulletin describes the new four cycle,

six and eight cylinder engines which are naturally aspirated or supercharged, 215 to 1,025 continuous. Dimensions, specifications and engine designations are incorporated. Supplemental bulletins include Bulletin 1081 which features the 6 and 8 cylinder naturally aspirated engines and bulletin 1082 which describes the 6 and 8 cylinder supercharged engines. Photographs illustrate exterior design. Performance curves, specifications, horsepower and kw. ratings are also given.

1957 fir plywood catalog

The Douglas Fir Plywood Association announces a new 12-page two-part illustrated catalog for 1957 that covers fir plywood grades, specialty products and application data in condensed tabular form. The booklet for the first time includes three pages of structural drawings that describe recommended fir plywood uses for floor construction, wall sheathing, roof sheathing and various soffit applications. Information in the catalog covers essential data needed

in the construction field: type-use recommendations, standard stock sizes of both exterior and interior types of fir plywood most commonly available, engineering data for the best results with plywood for concrete forms, minimum FHA requirements, fundamentals of finishing and detailed information on specialty products and their application. Sample copies will be supplied without charge from **Douglas Fir Plywood Association**, Tacoma 2, Wash. (Quantity orders, for sales or educational use are priced at: \$4.00 per hundred for the 8-page general section and \$2.00 per hundred for the 4-page specialty products section.)

Cummins Turbodiesels

A colorful, six-page folder gives concise information on the new Cummins Turbodiesel engines which use the normally wasted energy of exhaust gases by means of a turbo-charger to develop additional horsepower. Working features and characteristics are described alongside illustrations of the various engines in-



*at your service
in Washington*

If you're interested in bidding on government projects, you'll be glad to know that the Washington Service Bureau of National Surety Corporation issues regular bulletins on just such projects.

They tell you *who* is issuing the invitations, *where* and *when* bids will be received and opened.

These bulletins are available to you without obligation. Simply write to either of the Central Bonding Offices listed below, or to any of our Branch or Services Offices.



**NATIONAL SURETY
CORPORATION
CONTRACT BONDS**

A MEMBER OF
**Fireman's Fund
INSURANCE GROUP**

Fireman's Fund Insurance Company
National Surety Corporation
Fireman's Fund Indemnity Company
Home Fire & Marine Insurance Company

Central Bonding Offices | 401 CALIFORNIA STREET, SAN FRANCISCO
4 ALBANY STREET, NEW YORK
Branch Offices in Principal Cities Throughout America

operator Luis Moody blades good-sized load up to 1 slope to levee. Boundary commission uses Tournatractor extensively for fast, regular maintenance of levees on 256-mile border system.



The Rio Grande valley is a rich agricultural area, growing citrus fruits, cotton, and vegetables. Subject to flood-producing downpours in spring, and infrequent rain the rest of the year, the district depends on the levee system to provide flood protection. The IB&WC — a joint agency of the U.S. and Mexican governments — maintains levees on either side of the river. The present system of earthworks, built 15 years ago, has proved adequate to hold the Rio Grande within bounds. The Harlingen district maintains a 256-mile section, shown by slant-line area below, from the Gulf of Mexico to Lopeno.



Tournatractor speeds maintenance on Rio Grande levee system

In the fertile Rio Grande valley in southeast Texas, the U.S. section of the International Boundary and Water Commission is responsible for the upkeep of 256 miles of earth-levees. These levees, mostly 9' to 12' high (some as high as 20'), need constant attention. Their 3-to-1 slopes must be dozed on a regular schedule to insure protection against Rio Grande floods.

The general supervisor for the International Boundary and Water Commission at Harlingen, Texas, says the IB&WC finds their LeTourneau-Westinghouse tractor a valuable general maintenance machine. It works efficiently in all workable materials.

"Gets around fast"

A spokesman for the IB&WC stated: "The Tournatractor will

get around fast. Its ability to go from place to place under its own power is important on these scattered maintenance jobs."

40 sec. cycle on 3-to-1 slope

In light dozing work on a typical 3-to-1 slope, Tournatractor completed 120' push-and-return cycles in an average of 40 sec. each — 20 sec. forward and 20 to return and reposition for the next pass. The dozing distance was 60' — 20' on level ground and 40' on slope.

Moves fast in emergencies

The commission depends on Tournatractor's speed in any work emergency. After heavy rains, for example, the rubber-tired dozer hurries to the site of eroded levees or washed-out access roads at high speed. On arrival, rig efficiently

performs necessary repairs, reshapes eroded slopes.

Tournatractor power, speed, and maneuverability can be put to work profitably on *your* job, too. Ask us for complete specifications and other owner-verified reports on Tournatractor operation.



Tournatractor clears sand-drifts from base of old irrigation dam. The dam, part of an older flood-control system, now obsolete, will eventually be buried under a new levee bank.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-1053-A-b



This sure beats workin'

ALL-NEW MASTER TURN-A-TROWEL HAS POWER BLADE ADJUSTMENT

"This sure beats workin'", said one operator after he'd tried the all-new Master "Powermatic" 34" trowel. "I've never had it so easy in my life . . . or done a better job."

No wonder he likes it. He pushes or pulls a knob and *engine power* tilts the combination blades to float or finish.

Know what that means? He gets exactly the job he wants, faster and easier.

He doesn't have to "fight" this trowel, either. The Master's only 14" from the slab to the *top* of the engine . . . has the *lowest center of gravity* of any power trowel. Wobble's a thing of the past. And the direct drive puts *all* the engine's power to work.

You'll like the all-new Master, too. The *automatic* clutch that let's the Briggs & Stratton engine get to operating speed before engaging the blades. The "dead man" control that *idles* the engine when you let go the handle. The stationary guard ring. They all make troweling easier and better.

The all-new Master in 34" gasoline-drive is now ready. Three or four blades, whichever you prefer. *Power blade-adjustment, direct drive, lowest center of gravity* and other new features make it your best buy. You'll like it. See it at your distributors or write us for full details.

MASTER

MASTER VIBRATOR COMPANY
1752 Stanley Avenue, Dayton 1, Ohio

DISTRIBUTORS

ANDREWS EQUIPMENT COMPANY Spokane, Washington
ANDREWS MACHINERY OF WASHINGTON, INC. Seattle, Washington
NEW MEXICO EQUIPMENT COMPANY Albuquerque, New Mexico
OREGON RENTAL & EQUIPMENT SALES CO. Portland, Oregon
POWER EQUIPMENT COMPANY Denver, Colorado
SHRIVER MACHINERY COMPANY Phoenix, Arizona
SIERRA MACHINERY COMPANY Reno, Nevada
WEST COAST MASTER, INC. Los Angeles, California
WORTHAM MACHINERY COMPANY Casper, Cheyenne, Newcastle,
Riverton, Rock Springs and Sheridan, Wyoming

cluding the 176-hp. JT-6, the NTO-6 with 262 hp. and the VT-12 with 600 hp. Copies of the brochure are available from the Cummins Engine Co., Columbus, Ind.

Baughman bulk transport bodies described in new catalog

A new eight-page catalog, describing and illustrating the Baughman line of Bulk Transport Bodies, is now available. Included in the present catalog are the following automatic, self-unloading bodies: Bulk-Mobile Transport Body, New-Matic Transport Body, Auger Bulk Feed Transport, Bulk Feed Transport Body, Bulk Cement Body, Hopper Type Bottom Dump, Side Dump Transport Body, Hopper Type Auger Unloader, Refuse Transport Body, and Material Thrower. Detailed descriptions and illustrations of features are included in the new bulletin, available on request to the Baughman Manufacturing Co., Jerseyville, Ill.

Products data from A. C. Horn

A series of 50 brochures describing A. C. Horn construction and building maintenance materials are now being printed, and some are already in process of distribution. Each folder is designed for quick and easy reference. Headlines and copy tell in simple terms what the products are and what they will do. Special advantages of the products are covered by more detailed information. Line illustrations, diagrams and photos dramatize where the products can be used and methods of application. Ranging from two to four pages, each folder is standard file size and is coded to the appropriate A.I.A. category file number. Individual copies are available upon request to A. C. Horn Co., Inc., subsidiary of Sun Chemical Corp., 10-10 44th Ave., Long Island City 1, N. Y.

Controlling wire rope costs

The Service-Score System for controlling wire rope costs is the subject of a new illustrated folder offered by Leschen Wire Rope Division, H. K. Porter Co., Inc., 2727 Hamilton Ave., St. Louis 12, Mo. Described is an easy method of fact-finding to increase wire rope operating efficiency and help to reduce supply and maintenance costs. A sample set of Service-Score stickers is sent with the folder.

AMSCO bulletins available

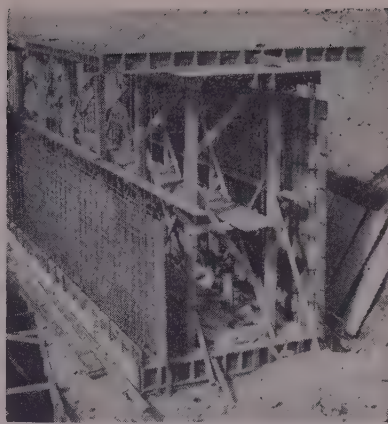
A new two-color six-page brochure on the AMSCO Semi-Automatic Welder for hardfacing is now available. The new brochure includes cross-sectional and cutaway drawings of the AMSCO "MF" Welder and its component parts and explains in some detail how the machine operates. Along with details on the welder, this brochure includes a section on the new AMSCO Tubular Electrodes for semi-automatic manganese steel build-up and hardfacing.



RESIDENCE FOUNDATION—Erects fast . . . two liners only on inside; no liners on outside.



LARGE THEATRE in Alaska—Note minimum alignment and bracing.



CONCRETE CULVERT—All Ply panels used 11 times in covering the 336 ft. length.

SUPERIOR ALL-PLY FRAMELESS PANELS CUT FORMING TIME

Unique Combination Clamp and One Blow of a Hammer Does Three Separate Jobs

In all types of concrete form work, from residential to large industrial projects, contractors have reported the versatility and substantial labor saving of Superior All-Ply panels.

The panels are of 1½" plywood, without a metal or wooden frame, yet providing great strength and rigidity.

A unique 3-way Combination Clamp (*the only working part*) is the secret of All-Ply's superiority . . . It does 3 separate jobs with one blow of a hammer: (1) Locks the panels; (2) Secures snap tie head, which acts as both spreader and tie; (3) Secures and

draws up liners, which generally are required on one side only.

Weighing less than 5 lbs. per sq. ft., standard ALL-PLY panels come ready for use with Superior Snap Ties.

Panels come in standard sizes of 2 x 4, 2 x 6, and 2 x 8 ft. . . Also special corners and fillers as required.

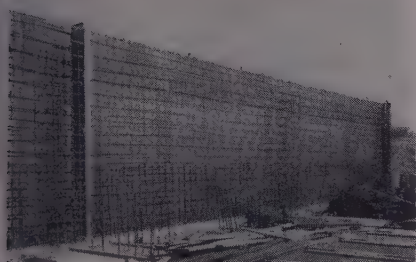
On your next forming job, discover the convenience and labor saving of All-Ply panels . . . *for complete details request a copy of our 12-page catalog.*

SUPERIOR CONCRETE ACCESSORIES, INC.

9301 King St., Franklin Park, Ill.
(A Suburb of Chicago)

PACIFIC COAST PLANT
2100 Williams St., San Leandro, Calif.

NEW YORK OFFICE
1775 Broadway, New York 19, N.Y.



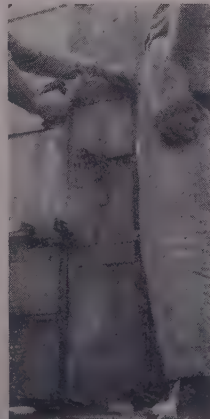
FLUSH DESIGN—Simplifies stacking the forms at job site. All Ply's weigh less than 5 psf.



MOVING—Absence of wooden or metal frames permits stacking up to 7500 sq. ft. of panels on one truck.



\$3 Million ELEMENTARY SCHOOL—Plywood face and rigid locking of forms by Combination Clamp insure clean, true surfaces.



ONE BLOW of hammer locks panel, secures snap tie, holds liner.



ALL PLY PANELS come in 3 standard sizes: 2 x 4, 2 x 6 and 2 x 8 ft.

plus a list of their applications in different industries. For a copy of this bulletin, No. 6-56, write to **American Manganese Steel Division**, Dept. A., Chicago Heights, Ill.

Oliver rotary filter

Dorr Oliver Inc. announces the availability of a new four-page, two-color bulletin, "The Oliver Horizontal Rotary Filter." This bulletin describes the outstanding features, design, operation, sizes and capacities of this continuous vacuum-type horizontal filter. Also included are a typical two-stage washing flowsheet and photographs illustrating the filter and its component parts. Copies available from **Dorr-Oliver Inc.**, Barry Place, Stamford, Conn.

Marion power shovel

The new Marion 35-M $\frac{3}{4}$ -yd. shovel and 18-ton crane is described and illustrated in a four-page flyer issued recently by **Marion Shovel Co.**, Marion, Ohio. Features of this heavy-duty power shovel include air control, self-cleaning crawlers and independent boomhoist. A specification and rating chart is included.

Petromatic couplers

A four-page brochure describing Petromatic all-aluminum couplers is now available from the manufacturer, **Industrial Coupler Co.**, P. O. Box 1751, E. 4218 Boone Ave., Spokane, Wash. The brochure is illustrated with job photographs and a cross-section view of the coupler as well as pictures of standard couplers, adapters, take-off, elbows and flanging tool. Specification data are included.

Lippmann portable crushing plant

Available for distribution is a brochure on one of Lippmann Engineering Works' latest developments—the "Comanche," a new portable dual crushing plant, having a range of four sizes, "Comanche Cub," "Comanche Scout," "Comanche Warrior," and "Comanche Chief." Details and specifications concerning these plants are contained in the bulletin. Write **Lippmann Engineering Works, Inc.**, 4603 West Mitchell St., Milwaukee 14, Wis.

Tubular parts in equipment design

Of interest to engineers involved in the design and construction of equipment employing tubular parts and fittings is a six-page brochure recently published by the Tubular Products Division of the **Babcock & Wilcox Co.** This folder on B & W Croloy 5 alloy steel includes technical information on pipe, tubes, and welding fittings. Copies of the folder, TDC-146A, may be obtained from the sales office of the company, Beaver Falls, Pa.

REPORTS

(Continued from Page 101)

which it was intended, subject to an allowance for damages if the owner has suffered any by reason of the failure to perform strictly. Whether, in any case, defects and omissions are substantial or unimportant is generally a question of fact."¹

The foregoing rule is one of long standing in California and is based on equitable principles, recognition being accorded the fact that a good workmanlike job does not mean a perfect job done to the owner's complete satisfaction.

The Appellate Court recited the above rule in reviewing a contractor's suit against the owner involving construction of a concrete warehouse. Changes were made from the plans in pouring floor slabs and columns and in the installation of roof purlins. There was conflicting evidence on the effect of the deviations but the trial court concluded that there was substantial compliance with plans and specifications and no impairment to the value of the building. There was a "strict compliance" clause in the contract which the Court said is only part of a system intended to obtain a good and workmanlike job and is not intended to make the plans and specifications inviolable.

1. Martin v. Karsh 298 P. 2d 635.

Personal check accepted with bid

"The presentation of a bidders personal check in the sum of 10 per cent of the bid and the substitution of a certified check. . . the following day, by consent of the City Council, and before the bids were formally declared and accepted, was not a jurisdictional defect or invalidity (to complain about) particularly where the contract has been let and the required undertaking has been given under it."

"The object of the requirement of a ten per cent check accompanying a bid is . . . to avoid possible loss in the event that the successful bidder should refuse to enter into the contract; and where the contract is entered into the purpose of the requirement is at an end."

Cameron vs. City of Escondido 292 P. 2d. 60

Barber-Greene windrow loader

An eight-page folder published by **Barber-Greene Co.** opens out to a full-length picture of the Barber-Greene Model 550 windrow loader. The brochure is fully illustrated as well with photographs of the unit in its various applications and is supplemented by descriptive text. Data about the unit's capacities, standard and optional features are given. Copies available from Barber-Greene Co., 400 No. Highland Ave., Aurora, Ill.

THE NEW LORAIN® HEADQUARTERS

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

**ATLAS
EQUIPMENT COMPANY**
Salt Lake City, Utah

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

COAST EQUIPMENT CO.
San Francisco 3, California

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

GENERAL EQUIPMENT CO.
Reno, Nevada

**INTERSTATE
TRACTOR & EQUIPMENT CO.**
Portland and Eugene, Ore.

MCCOY COMPANY
Denver 17, Durango, Grand Junction,
Pueblo and Sterling, Colo.

**MOUNTAIN
TRACTOR CO.**
Missoula and Kalispell, Mont.

**NASH-DAVIS
MACHINERY CO.**
Billings and Bozeman, Mont., Greybull, Wyo.

**NEW MEXICO
EQUIPMENT CO.**
Albuquerque, New Mexico

**LEE REDMAN
EQUIPMENT CO.**
Phoenix, Arizona

**SANTA FE
EQUIPMENT CO., INC.**
Los Angeles and San Bernardino, Calif.

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

**TRACTOR
& EQUIPMENT CO.**
Sidney, Miles City and Glasgow, Mont.

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

**YUKON
EQUIPMENT INC. (for Alaska)**
Seattle, Wash., Fairbanks and Anchorage, Alaska

WC-1

☆ **SALES** ☆ **PARTS**
☆ **SERVICE**

HERE'S EVERY
**MONEY
MAKER...**

YOU
EVER
WANTED...

IN A
HEAVY-DUTY
**3/4 yd.
SHOVEL-
CRANE**

All of these
LORAIN-26
features help you
boost profits!

NEW "JOY STICK" CONTROLS

Now — "Full-Metered" hydraulic power controls available to operate all friction clutches. Now, only 2 simplified hand levers to manipulate—yet operator retains all "feel" of his machine.

TORQUE CONVERTER

"No-Shock, No-Stall" ... with this huge "shock absorber" coupling. Relieves machinery, cables and engines of shocks, impacts and stresses. Digging power "hangs on" ... engine cannot stall.

2 CRAWLER SIZES

General purpose crawler is a generous 12-ft. 6-in. long, 10-ft. 5-in. wide, providing 15-ton lifting capacity as a crane. 12-ft. 6-in. long, 11-ft. 1-in. wide crawler provides maximum capacity of 17½ tons. 29 in. treads are standard.

HYDRA-EASE" CRAWLER CONTROL

For crawler operations — (1) steering, (2) locking pawls, (3) swing lock and (4) selection and shifting of swing or travel clutches—are operated by hydraulic power, by finger flip levers in cab.

BIG, 18-INCH CLUTCHES

Five big diameter, wide-faced, shoe-type clutches, interchangeable in all major operating parts. Faster, smoother—more operating cycles. More clutch area—longer life, fewer adjustments.

"FREE-SPIN" DRAGLINE

When Dragline equipment is installed, a split idler is included—mounted on sealed, life-time lubricated, anti-friction bearings. Drag-in drum can spin freely when casting out bucket.

HI-VISIBILITY CAB

New, large overhead window of tinted safety glass makes it easy to see and control high booms. Glass is protected by 3-position metal cover. Additional and larger windows at sides further increase visibility.

Hoist Drums On Anti-Friction Bearings

Now, main hoist and secondary hoist drums are mounted on anti-friction bearings. They reduce friction—improve dragline, hoe operation, power load lowering and boom derricking and lowering

5 FRONT ENDS

For many jobs, many bids, and many profit possibilities, the Lorain-26 offers full front-end convertibility and interchangeability. Shovel, crane, dragline, clamshell and hoe are available.

This new 24-page booklet gives many additional reasons why the Lorain-26 is such a good buy. Get one from your Thew-Lorain Distributor or write direct.

THE W
LORAIN

ARBA Road Show of 1957

At Chicago, the manufacturers of construction equipment displayed their lines and newest models. These pages describe and illustrate some of the exhibits.

Clark Equipment Co.

Clark Equipment Co.'s new line of Tractor Scrapers and Tractor Dozers was shown for the first time at the Road Show. In addition, two new Michigan Tractor Shovels were introduced. The new items of equipment utilize the same basic design of matched power shift transmission, torque converters and planetary-wheel axles developed for the Michigan Tractor Shovel. Power shift transmission in all sizes is offered on the Michigan Tractor Scraper which is available in three models, Model 110, with 8 to 10½-yd. capacity, Model 220, 12.7 to 18 yd. and Model 310, 20 to 27 yd. Engines are 165, 210, and 335 hp., respectively. Two new rubber-tire tractor dozers were added to the Michigan line, making a total of three



Model 110 Tractor Scraper

machines in capacities matched to the line of tractor scrapers. The new models are the Model 280, a 38,000-lb. vehicle with 11 ft. 3-in. blade; and Model 380, a 55,000-lb. machine with 13 ft. 3-in. blade. A new 6-cu. yd. capacity Michigan Tractor Shovel, known as the Model 375A, was shown along with another new tractor shovel, the Model 275A, which has a 4-cu. yd. capacity. Shown above is the new Model 110 Michigan Tractor Scraper and a Michigan 180 Tractor Dozer teamed up on a push-loading job. Matched for size, the two machines have interchangeable Clark power trains and engines.

Euclid Division, General Motors Corp.

Several completely new machines and other models with major improvements were shown publicly for the first time at the Road Show by Euclid Division of General Motors Corp. The 20,000-sq. ft. display included scrapers, crawler tractors, rear dumps and bottom-dumps. Two new scrapers of 24-cu. yd. struck capacity headed the group of new products, the Twin Power, all-wheel drive TS-24 Model which is equipped with two engine (518 total hp.), each driving an axle through a separate Allison Torqmatic Drive and a new six-wheel, single engine scraper with 300 hp. designated Model SS-24. Two new 18-yd. scrapers, the Model SS-18 and Model S-18 were also shown. Two different crawler trac-

tors were included in the exhibit, the improved TC-12 Twin Power model which has two 218-hp. engines and the smaller Model C-6 Crawler which is equipped with a single engine of 218 hp. and Torqmatic Drive. Included in the five rear dump hauling units was a 22-ton model with 250-hp. Rolls Royce diesel engine and a new 40-ton rear dump, the Model R-40, a Twin Power hauler with

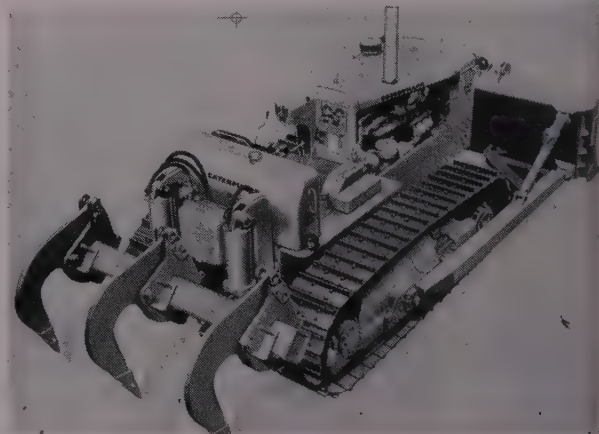


Model SS-24 Scraper

436 total hp. and two Torqmatic Drives. Two bottom dump units completed the Euclid exhibit, one of them a new model, the S-12, which has 13-cu. yd. struck capacity and is interchangeable with the bowl of the 218-hp. S-12 overhung engine scraper.

Caterpillar Tractor Co.

Among Caterpillar's big display, covering more than 24,000 sq. ft., were nine crawler tractors, six rubber-tired tractors, three Traxcavators, two motor graders and ten engines. Cutaways of a No. 470 Lowbowl Scraper, the 8A and 8S Bulldozers and four of the engine models were shown. Two direct drive models of the Cat D9 Tractor were fully equipped, one with the 9S Bulldozer, hydraulically tilted from the operator's seat, the other with a 9U Bulldozer and a Hyster D9A Winch. A torque converter model bore a push cup mounted in a C frame and



D9 Tractor and Ripper

the new No. 9 Ripper. The new Gyro Dozer, a bulldozer which can be both tilted and pitched hydraulically from the operator's seat, was shown on a D7. Geared for pioneering work was a D7 mounted with a Fleco D7 pull stumper and a 7S tree cutter. Among the utility machines

**"BUCKEYES Dig
Faster, Cleaner,
Years Longer...
I've proved it
with 20 years
of ditching!"**

— says Decatur, Illinois contractor
Lynn Ankrom



Lynn Ankrom is another experienced contractor who has tried them all and still prefers dependable Gar Wood-Buckeye ditchers. He reports, "After 20 years of ditching I'm convinced there just isn't another ditcher made that digs as much low-cost ditch for as many years."

Since 1946 Ankrom has bought six new Buckeyes, both wheel and ladder type. His newest is a Buckeye 308 and already it has dug well over 55,000 feet. "It's the most amazing ditcher I've ever used," says Ankrom. "We've had no major repairs, no service problems, and no downtime to speak of at all." Buckeye ditchers are designed for lower maintenance costs. Stronger, more rugged construction, more anti-friction bearings and heavy-duty tractor-type crawlers

are some of the reasons why Buckeyes outlast competitive makes.

If you've watched a Buckeye dig you know why this contractor says, "I'm sold on Buckeyes being best for top production!" Simple, grouped controls, hydraulic conveyor drive and digging wheel hoist, high-low traction speeds, and more power at the digging wheel result in far greater productivity. For additional facts contact your Gar Wood-Buckeye dealer. Or, write direct to: Customer Service Dept., Gar Wood Industries, Inc., Wayne, Michigan.

GAR WOOD INDUSTRIES, INC.

Wayne, Michigan • Findlay, Ohio

SEE YOUR GAR WOOD-BUCKEYE DEALER

A-D MACHINERY CO., INC. Elko, Nevada
BURAN EQUIPMENT CO. Oakland, California
FERRIS EQUIPMENT CO. Spokane, Washington
CRAMER MACHINERY COMPANY Portland, Oregon
INDUSTRIAL TRACTOR SALES. North Sacramento, California
EQUIPMENT SALES COMPANY. Phoenix, Arizona
STUDER TRACTOR & EQUIP. CO. Casper, Wyoming

SEITZ MACHINERY CO., INC. Billings and Great Falls, Montana
SOUTHERN IDAHO EQUIPMENT CO. Idaho Falls and Boise, Idaho
WARNOCK-BANCROFT EQUIPMENT CO. El Monte, California
RENO EQUIPMENT SALES CO. Reno, Nevada
SHASTA TRUCK AND EQUIPMENT SALES. Redding, California
WESTERN MACHINERY CO. Salt Lake City, Utah
SMITH MACHINERY CO., INC. Roswell, New Mexico
WESTERN MACHINERY COMPANY. Denver and Grand Junction, Colorado

were a D7 with a 7S Bulldozer and a D7 Hystaway, and 93-flywheel hp. equipped with a 6A hydraulically-controlled Bulldozer. The versatility of Caterpillar's line of Traxcavators was shown by 50-flywheel hp. No. 955 Traxcavator, with a 1-yd. bucket; a 70-flywheel hp. No. 955 Traxcavator with a side dump bucket; a 100-flywheel hp. No. 977 Traxcavator with a Fleco rock rake and a Hyster D6N towing winch. Rounding out the high-speed earth-moving line were a 186-maximum output hp. DW15 with a No. 15 Scrapper and another DW15 with an Athey rear-dump wagon. One of the greatest advancements in controlled grading was demonstrated by the new Preco automatic blade control, mounted on a Cat No. 12 Motor Grader. The complete line of ten basic Caterpillar Diesel Engines was shown, ranging up to 650 hp. on the 12-cylinder, V-type D397.

Baldwin-Lima-Hamilton Corp.

A Type 1250 3-yd. shovel and a Type 54 truck mounted crane were on display at the booth of the Baldwin-Lima-Hamilton Corp., Construction Equipment Division. In addition to the shovel units the Company also displayed the Austin-Western 101-SE closed circuit diesel electric portable crushing and screening plant and the Lima



Model 1250 3-yd. Shovel

Roadpacker. The crusher plant and Roadpacker were on display at the Austin-Western booth. Illustrated here is the Model 1250 standard 3-yd. shovel which is equipped with a 28-ft. boom, 22-ft. handle and 3-cu. yd. dipper; as a high lift shovel it is equipped with a 45-ft. boom, 32-ft. handle and 2½-cu. yd. dipper. An outstanding feature is the design which permits a knock-down for haulage into units of less than 60,000 lb. Counterweight segments are readily removable. The gantry may be folded to a height of 12 ft. 7¼ in.

Huber-Warco Co.

First public showing of a completely new line of 3-wheel rollers with torque converter, two-speed transmission, and several features never before offered on 3-wheel units was held at the Huber-Warco exhibit. This new line is comprised of five basic models for all general purpose, finishing and variable-weight compression jobs. The 10, 12, and 14-ton models can be supplied with either standard-sized cast rolls for general purpose compaction or wider cast rolls for finishing work. For variable compression, Huber-Warco offers the 10-12 and 12-14-ton models with fabricated, water-tight rolls. Among the new features of the units are (1) removable tire design of all standard weight models, (2) Extra-large "flying bridge" control deck with a protective steel rail, (3) full hydraulic steering and (4) two completely independent braking

"Superior" Electric Carpullers



CAPSTAN TYPE, DRUM TYPE AND SPECIAL TYPES

Model SC
Superior Capstan
Carpuller

One man can move hundreds of tons of rolling load with practically no effort. Economical, efficient, Carpullers are available for your specialized requirements.

Model EP
Drum Type
Carpuller



Write for New 24 page Bulletin C-616

"Carpullers for Easy Moving of Rolling Loads"

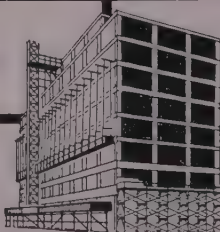
SUPERIOR-LIDGERWOOD-MUNDY CORPORATION

Main Office and Works: SUPERIOR, WISCONSIN, U.S.A.

New York Office, 7 Dey Street, New York 7, N. Y.

SCAFFOLDING

SALES-RENTALS



SHORING

SIDEWALK BRIDGES HOIST TOWERS

FOR GREATER SAFETY...EFFICIENCY...ECONOMY



THE PATENT SCAFFOLDING CO., Inc.

Dept. WC 6931 Stanford Avenue, Los Angeles 1, California

Phone: PLeasant 2-2571

420 Eighth Avenue N., Seattle, Washington Phone: SeNeCa 7142

Ray Wayne 1869 Hedges St., Fresno, Calif.

Capitol Scaffolding & Equipment Co. North Sacramento, Calif.

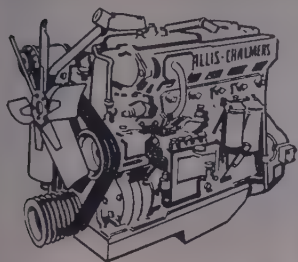
Borchers Brothers 342 N. Second St., San Jose, Calif.

The United Materials 814 West 14th Ave., Denver, Colo.

Look at the **EXTRA WORK OUTPUT**

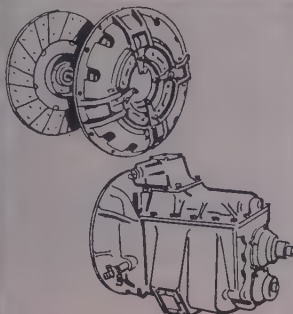
the Allis-Chalmers TS-360 Motor Scraper gives you

Here are some of the design features that put the TS-360 way out in front in steady performance, dependability and length of service life.

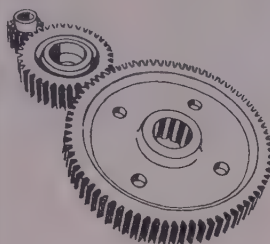


MORE USABLE HORSEPOWER.

Allis-Chalmers diesel engine delivers 280 hp — 18.66 hp for each struck yard. This power gets the TS-360 away from the pusher fast... gives you speedier cycles, more trips per hour. In this engine, follow-through combustion holds effective working pressures to take advantage of better crankshaft leverage.



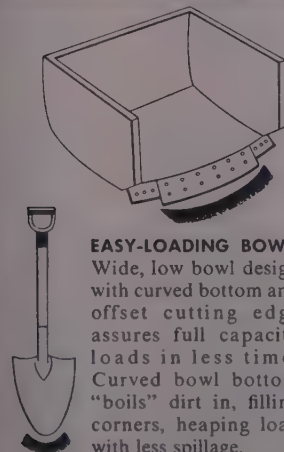
BIG-CAPACITY CLUTCH AND TRANSMISSION give fast, smooth operation under all job conditions. Clutch has air-actuated booster to reduce clutching effort and increase shifting efficiency. The heavy-duty transmission gives unmatched torque output in each gear range.



EXTRA-HEAVY FINAL DRIVES feature rugged differential assembly, carrier-housed drive shafts, final drive gears supported by large roller bearings and heat-treated drive axles. This long-life power train transmits maximum engine output for extra work volume, extra profit.

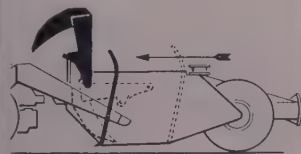


EXTRA TRACTION. The TS-360 motor scraper provides greater tractive effort, loading or traveling. Two-thirds of the empty weight is carried on drive wheels. Loaded weight is distributed equally between tractor and scraper wheels for better balance, increased flotation, safer hauling.

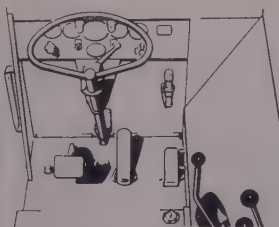


EASY-LOADING BOWL.

Wide, low bowl design with curved bottom and offset cutting edge assures full capacity loads in less time. Curved bowl bottom "boils" dirt in, filling corners, heaping load with less spillage.



CONTROLLED DUMPING ACTION. Forward movement of ejector forces out load. High apron lift prevents material from jamming. This combination provides a continuous flow of material for a smooth, even spread.



POSITIVE STEERING. Two-stage selective power steering makes the operator's job easy... provides safe, feather-touch response and full maneuverability whether traveling at high speeds or in cut or fill.



OPERATOR CONVENIENCES add to production, too. Easy-to-reach controls, full visibility, four-wheel air brakes, roomy platform, comfortable air-foam seat are some of the features that help operator get maximum output from the TS-360.

See your **ALLIS-CHALMERS** construction machinery dealer

ARIZONA
B. McGinnis Equipment Company—Phoenix

NORTHERN CALIFORNIA
Industrial Tractor Sales—Sacramento
Costa Truck & Equipment Sales—Redding
Kins Tractor Co.—Eureka & Willits

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

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

MONTANA
Mountain Tractor Company—Missoula
Richland Machinery Company—Sidney
Seitz Machinery Company, Inc.—Billings and Great Falls

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

OREGON
Haupter Tractor Company—Medford and Klamath Falls
Wood Tractor Company—Portland
Timber Tractor Company—Springfield

UTAH
Cale Equipment Company, Inc.—Salt Lake City

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

WYOMING
Studer Tractor & Equipment Company—Casper

systems (a disc-type service brake and contracting-type parking brake). There is a choice of General Motors or Caterpillar diesel or Hercules gasoline power units for all models.

R. G. LeTourneau, Inc.

A radically new type of vehicle for transporting freight over rough open country, without benefit of highways or railroads, was introduced at the Road Show by R. G. LeTourneau, Inc. Major design feature of the new 35-ton Transporters is the installation of a DC electric motor



Off-Road Transporter

geared directly to each of the six wheels, making each individual wheel an independent drive unit. Should one wheel lose traction, its share of the machine's total horsepower is automatically transferred to other wheels which are taking hold. Also utilized is a unique braking system which actually has no parts to wear out or replace. This is made possible by a regenerative action of the electric motors in the wheels. When the machine travel-speed becomes greater than the driving speed of the motor, they begin acting as generators, and, in effect, create power to stop themselves. Additional traction is provided by the use of low-pressure tubeless tires which measure more than six feet tall and have treads 2½ ft. wide.

J. I. Case Co.

Headlining the J. I. Case exhibit was the all-new Case Utility Wheel Tractor with front-end loader and backhoe. A wrap-around mounting frame is a feature of the



Utility Wheel Tractor

loader, and a heavy-duty hydraulic tank which is a structural part of the unit. The backhoe has a full 180-deg. boom swing, 18-ft. 2-in. reach, and 12½-ft. digging depth. Other Case equipment on display were a 310 Utility Tractor with a Model 30-Hydraulic mower; and three engine units, a Model A-125 air-cooled unit, a Model 419 water-cooled engine, and a Model 509 Diesel.

International Harvester Co.

Eight International Truck models especially adapted for highway construction work were displayed by International Harvester Co. at the Road Show. The IH display pointed up the wide range of International models, with emphasis on truck-to-job specialization in the road building field. Also featured were an elaborate "live" cutaway of the company's new V-8 engine, an exposed six-wheel-drive chassis, a moving six-wheeler "bogie-action" unit, and a diesel engine cutaway. Trucks on display included four and six-wheel models for highway and off-highway service, 4x4 and 6x6 models; six-cylinder and V-8 gasoline and diesel-engine-powered trucks. Models ranged from a light-duty pickup truck to heavy-duty



Model VF-192 Dump Truck

six-wheeler with rock dump body. In addition, International Harvester's Construction Equipment Division displayed its line of road building equipment with units ranging from the T-6 crawler up through the giant off-highway haulers. Featured were International's new models 65 and 95 Payhauler and Model 12 Payloader. The company's full complement of Bonus-Powered crawler tractors, topped by the TD-24 were shown as were blades, shovels and other attachments for earthmoving. The rubber-tired line was represented by Models 55 and 75 two-wheel, high-speed earthmovers.

Athey Products Corp.

On display at the Athey booth were the Athey PR20 Rear Dump Trailer, the PR15 Rear Dump Trailer and the 125 HiLoader. The PR21 is a 22.5-cu. yd. rear dump trailer of flexible design to permit unrestricted maneu-



PR20 Rear Dump Trailer

verability. Behind a Caterpillar DW21 Tractor, it can turn non-stop in a 27-ft. circle with body up, and in a 34-ft. circle with body down. Built for shovel loading and for high-speed operation over rough haul roads, it has an all-welded premium steel body. The 15.6-cu. yd. Athey PR15 is a matched companion to the 4-wheel Cat DW15



The 101-SE is a highly portable plant. The frame is extra strong to hold rigid alignment of all equipment and drives. A rocker beam with full width axles supports most plant weight. Four wheels, each with dual tires, oscillate separately to compensate for rough terrain.

Big Production at your Fingertips with the New AUSTIN-WESTERN push-button controlled Diesel-Electric 101-SE

Here's a high output, mobile gravel plant that combines top efficiency with modern ease of operations and low maintenance. It is DIESEL-ELECTRIFIED, PUSH-BUTTON OPERATED—a triumph in crusher engineering.

All plant components except jaw and roll crushers are electrically operated in this closed circuit plant. All operations are powered with individual electric motors through short coupled V-belt drives, instantly controlled from the operator's platform. Chains, idlers, sprockets and clutches, normal cost items on mechanical plants, are eliminated.

Regardless of load, all components operate at peak efficiency at all times, delivering top production and

accurately sized aggregates. A single convenient push-button station controls the plant.

See your nearby Austin-Western distributor . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio, for illustrated booklet.

COMPARE . . . then you'll specify AUSTIN-WESTERN

Welded steel plate crusher frame for high strength without weight of cast steel frame.

Inclined positive-throw type vibrating screen.

All bearings are anti-friction type.

Machined steel toggle plate for absolute protection of crusher.

Edward R. Bacon Company San Francisco, California
Columbia Equipment Company
Portland, Oregon; Seattle, Spokane, Washington
N. C. Ribble Company Albuquerque, New Mexico
C. D. Roeder Equipment Company Reno, Nevada
Shriver Machinery Company Phoenix, Arizona
Smith Booth Usher Company Los Angeles, California

Western Machinery Company Salt Lake City 15, Utah
Western Machinery Company San Francisco 7, California
Keremi Tractor and Equipment Company, Cheyenne, Casper, Wyoming
Hall-Perry Machinery Company
Billings, Butte, Great Falls, Missoula, Montana
Engineering Sales Service, Inc. Boise, Idaho
Macdonald Equipment Company Denver 16, Colorado

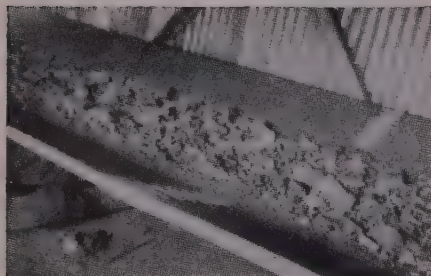
AUSTIN-WESTERN
CRUSHING, SCREENING AND WASHING EQUIPMENT



BALDWIN-LIMA-HAMILTON
Construction Equipment Division — LIMA WORKS

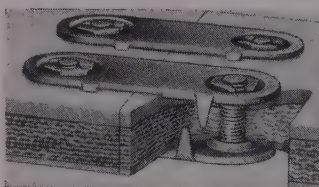


BELT FASTENERS and RIP PLATES



**FOR HEAVY
CONVEYOR
AND
ELEVATOR
BELTS OF
ANY WIDTH**

- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
- ★ Distribute pull or tension uniformly.
- ★ Made of Steel, Monel, Stainless, Everdur.
- ★ Also Promal top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-112

FLEXIBLE STEEL LACING CO.

4704 Lexington St., Chicago 44, Ill.

Low Maintenance Costs with NEW PENNZOIL LUBRICANTS

Question asked by a contractor—

What lubricant is the best for chassis, water pump, universal joints and springs? What lubricant is low in cost but provides best protection?

ANSWER - PENNZOIL 811

Question asked by a lubricationist—

What commercial motor oil improves performance and assures longer engine life? What motor oil will give us additive protection for the entire life of the drain?

ANSWER - ZOILDEEZ

NO QUESTION ABOUT



QUALITY

Tractor which has a top speed of 31.3 mph., and can make 90-deg. non-stop turns in a 37-ft. diameter. The third machine at the Athey exhibit was the Athey 125 Hi-Loader, a self-propelled, belt-conveyor loader which has a capacity of up to 10 cu. yd. per min. in loading stock-piled or windrowed construction materials.

Seaman-Gunnison Corp.

Several new developments in low-cost equipment for grading, earth-moving and soil compaction were introduced at the Road Show by Seaman-Gunnison Corp. In addition to the Duo-Pactor, introduced in mid-1956,

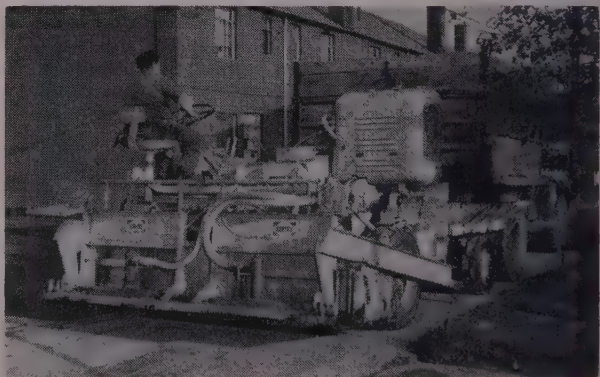


Duo-Pactor

the Seaman-Gunnison exhibit featured the newly developed Duo-Grader and Duo-Scraper. All these units are of self-propelled design with interchangeable prime mover. The Seaman-Gunnison Duo line will be available with International prime movers in the 40, 50 and 60-hp. classes. All units are equipped with 180-deg. hydraulic steering.

Blaw-Knox Co.

Fourteen pieces of equipment were shown by Blaw-Knox Co.'s Construction Equipment Division. Top attraction of the B-K exhibit was the new Black Topper, Model PF-45. Rubber-tired, this unit is specifically designed for the small and medium sized jobs, and has a



Model PF-45 Black Topper

capacity of four tons. A Continental F-162 gas engine provides power for six working speeds and a high travel of approximately 8 mph. Control of the screed, which has a vertical tamping action of 1,000 rpm. at 1,300 engine rpm., is hydraulic. A special package of equipment designed for widening existing roads was also displayed. The package consists of a new dual drum trench roller, a road widener for spreading stone, asphalt or concrete in a trench, and bituminous pavers for re-surfacing. Two



"loading . . . hauling . . . dumping . . . you can't beat 'em!"

That's what Mr. Arnold R. Lyon of Harry Berry, Inc. says about their Mack LHX dumpers. As general manager of their operation in Hopkinsville, Kentucky, Mr. Lyon appreciates the dollar-and-sense value of Mack trucks.

"Since ours is mostly short hauling, the strain from loading, dumping, and steep grades really gives our trucks a tough workout. Moreover, we find that we are able to produce more work with our Macks because their balance, short turning radius, and maneuverability

speed up spotting under the shovel and dumping.

"Our Macks haul 16- to 17-ton loads day in and day out . . . averaging 2 gallons of fuel per hour. In 3½ months, outside of routine servicing, we have not had a single second of downtime. But aside from the economy and performance, our drivers like them better than other makes . . . easier to handle . . . better riding . . . greater sense of confidence. Certainly, it's been our experience that you can't buy a better truck than a Mack."

Mr. Lyon has learned about Macks from experience. If you have a hauling job, especially a tough one, why not let your Mack dealer or representative tell you about all the satisfied Mack users in your area. Mack Trucks, Inc., Los Angeles, Denver, San Francisco, Seattle, Portland, Salt Lake City, Albuquerque.

MACK
first name for
TRUCKS

new buckets were shown as well—a new clamshell, specifically designed for shaft mucking, that is pneumatically operated, and a hydraulically controlled 4-yd. concrete bucket which has been adapted for electronic control. Also on display were the Blaw-Knox Concrete Spreader with vibratory attachment, a Model M-65 Truckmixer, an automatic Aggregate Batch Plant, universal forms, a Model P-150 Base Paver, and three sizes of clamshells.

Bucyrus-Erie Co.

Both crawler mounted and Transit Crane models of a completely new crane-excavator in the 1-yd. class were on exhibit by Bucyrus-Erie Co. Named the model 30-B, it is a readily convertible shovel, dragline, clamshell,



Model 30-B Crane Excavator

crane, or dragshovel. Main operating functions of the machine are air controlled. According to the manufacturer, proper graduation of air pressure gives the operator full-feel over his control levers. The new 30-B crawler machine is available with diesel engine with either direct drive or torque converter drive, gasoline engine with direct drive, or electric motor. The Transit Crane is offered with gasoline engine with direct drive as standard equipment. Simple in design, 30-B has a strong, rigid cast steel revolving frame. As a crane, the 30-B crawler handles booms up to 100 ft. long plus 10, 20 or 30-ft. jibs. The Transit Crane handles booms up to 130 ft. long or a 110-ft. boom with a 30-ft. jib.

Littleford Bros., Inc.

Seven items of black-top equipment were displayed by Littleford Bros., Inc. They were the Model 700 Trail-O-Patcher, the Model 160 Portable Roller, the Littleford-



Model 101 Spray Master Distributor

Clarkmoore Heater-Planer, the True-Lay Paver Spreader, the Model 84HD Asphalt Kettle, the Model 101 Spray Master Distributor, and the new Model 25T Port-

able Trail-O-Dryer, and the Model 5T25 Dual Feeder Bin. The Littleford Spray Master, shown here, has a two-section spray bar which can be heated to spraying temperature in the morning a full 15 min. quicker than any other unit, according to the manufacturer. It provides full width instantaneous starting and all nozzles shut off instantly. Any of the valves may be easily blanked off by removing the quick-pull pins. The bar is raised hydraulically.

Deere & Co.

Among the major units of construction equipment shown by John Deere was the John Deere 820 Diesel Tractor shown here pulling a Hancock 8-yd. elevating scraper on a new roadbed. The 820 Diesel develops 67.74 belt hp. A direct engine-driven power take-off shaft delivers full engine power to the driven equipment. Also shown was the H20 crawler, a 4- or 5-roller track-type tractor with approximately 30 engine hp. The 420 can be

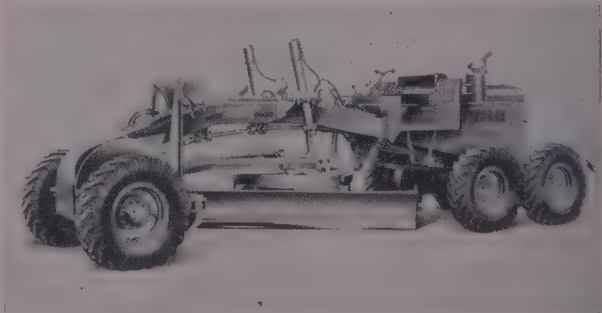


Model 820 Diesel Tractor

furnished with either four or five speeds forward and one speed reverse. A new optional direction reverser permits operation forward or backward in the same speeds without shifting gears. An animated display of this direction reverser was shown at the John Deere exhibit which included a heavy-duty crawler-loader and scarifier, dozers, cutter bar mower, rotary mower and a wide variety of allied equipment.

Austin-Western Works

A complete, newly-designed line of construction equipment was displayed by Austin-Western Works, Construction Equipment Division, Baldwin-Lima-Hamilton Corp. Redesigned and engineered over the past 18 months, the units are reputed to provide more power, larger work capacity and faster operation. Featured was the completely new Super 99 Power Grader with the ex-



Super 99 Power Grader

clusive six-wheel drive and six-wheel steer and the optional torque converter (shown here). Largest and most powerful of the firm's four graders, the Super 99 incor-

NEW

K & M Asbestos-Cement SEWER PIPE

with
"Fluid-Tite" Coupling

THE EXCLUSIVE
K & M "FLUID-TITE" COUPLING
which eliminates infiltration
at the joint.



TWO SIMPLE STEPS
FOR PERMANENT, WATERTIGHT JOINTS.

ONE... lubricate rubber rings.
TWO... Slide pipe in. That's all!

*It's made of mineral asbestos fibers
and portland cement. NON-CORRODING,
NON-ELECTROLYTIC, STRONG, LIGHT
IN WEIGHT, EXCEPTIONALLY SMOOTH BORE.*

These proven factors mean 3-way savings to your community:

YOU SAVE IN PLANNING . . .

Flatter grades
Fewer lift stations
Higher-level filtration plants
Smaller pipe diameters

YOU SAVE IN INSTALLATION . . .

No stopping for unfavorable weather or
ground conditions
Fewer workers, quicker installation
Unskilled labor—no heavy machinery required
Economical transportation and handling
Permanent watertight joints—immediately,
simply

YOU SAVE IN OPERATION . . .

Infiltration eliminated through the joint
Roots can't enter
Bore remains smooth
Fewer inspections . . . fewer periodic
cleanings

Write for complete information on K & M Asbestos-Cement Sewer Pipe.

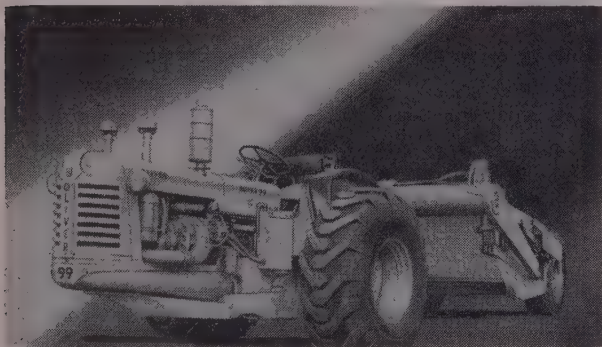


KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

porates such features as precision sideshift, high-lift blade, extreme blade reach, completely reversible blade, and hydraulic controls. Particular attention is focused on controlled traction which is attained through directional control (through the all-wheel steer) and the "push-pull-power" of all-wheel drive. Also shown were the 88-L Power Grader with four-wheel drive and four-wheel steer, the Super 88 and 99-L power graders and the Austin-Western Hydraulic Crane. Two of the company's three road rollers, the Tandem and the Three-Wheel were on hand as well as the new Model 60 Motor Sweeper with a 4-cu. yd. hopper.

The Oliver Corp.

Heading the Oliver line of construction machines and attachments at the Road Show was a new Oliver Self-Powered Scraper of 6.7-cu. yd. heaped capacity. Powered by a 3-cylinder, 83.4-hp. GM diesel, the unit is all hydraulically operated. Featured among the seven Oliver crawler tractors shown was the new OC-4 tractor pow-



Self-Powered Scraper

ered with a 21.8-brake hp. gasoline engine, and a special loader model of the OC-4 with 46-in. inside center-to-center tracks. Another crawler tractor, the OC-12, demonstrated the new double planetary reduction gear system, named Power-Turn, designed for sharper turning and greater maneuverability while still offering the advantage of power on both tracks at all times. Two of Oliver's largest crawlers, the OC-18, were shown; one with a cable dozer, the other with a hydraulic dozer. This machine also features Power-Turn. On display also were the largest and smallest of the Oliver line of wheel tractors, the Super 55 and the Super 88.

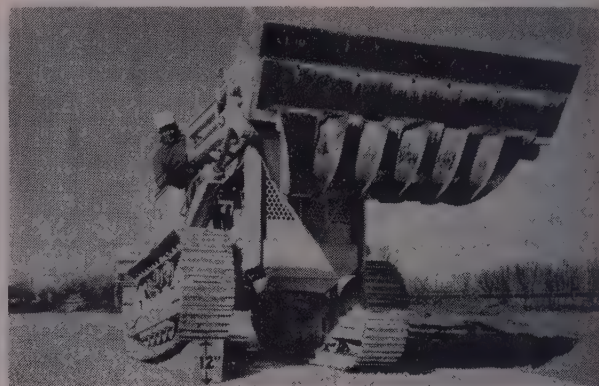
Cummins Engine Co., Inc.

Eight Cummins Diesels, including three new models, were shown at the Cummins exhibit. The new models were an eight-cylinder, vee-type 5 x 5, 375-hp. naturally aspirated engine with a 783-cu. in. displacement; a four-cylinder 4½ x 5, 60-hp., naturally aspirated engine of the Cummins "J" series, with a displacement of 267 cu. in.; and a 375-hp. NFT-6 Cummins Turbodiesel engine, with a 5½ x 6 bore and stroke and 743-cu. in. displacement. Cut-away models of the 335-hp. NRTO-6 and the 600-hp. VT-12 Cummins Turbodiesel engines were displayed. All Cummins Turbodiesel engines feature turbo-chargers designed and manufactured by Cummins. Other engines shown included an NRT-6 powered 100-kw. generator set; a JIPS-600 torque converter unit; and a JN-6-IP pumping unit.

American Tractor Corp.

Two new TerraTrac crawler-loaders, in the 1½- to 2-cu. yd. range were shown for the first time at the Road Show. Major engineering advances on the two units include a new power-shifting Terramatic transmission,

which provides completely independent power control of each track, both as to speed and direction. Non-stop shifting from forward to reverse and from one travel speed to another is also provided. New torsion bar track

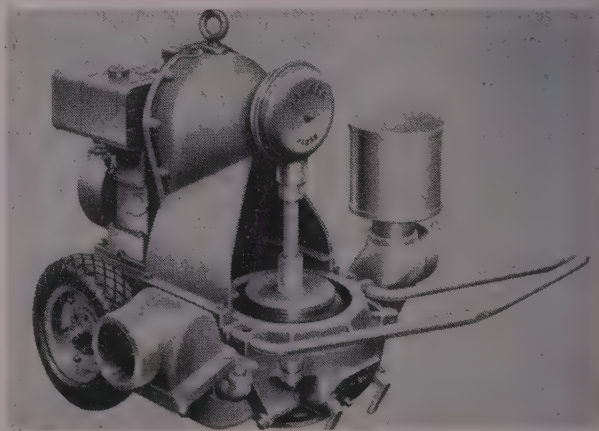


TerraTrac Crawler-Loader

suspension, designed to insure complete equalization and cushioning of loads, enables the new TerraTrac loaders to maintain a level cut with full traction on both tracks, regardless of irregularities in the ground surface. As shown in the illustration, the front end of one crawler track can be raised 12 in. above ground and still keep the bucket cutting edge level and the other track flat on the ground. Both loaders have a dumping clearance of over 9 ft. with bucket full dumped, plus exclusive "knock-out" action for discharging sticky materials at all heights, from 31 in. up to maximum dumping height.

Jaeger Machine Co.

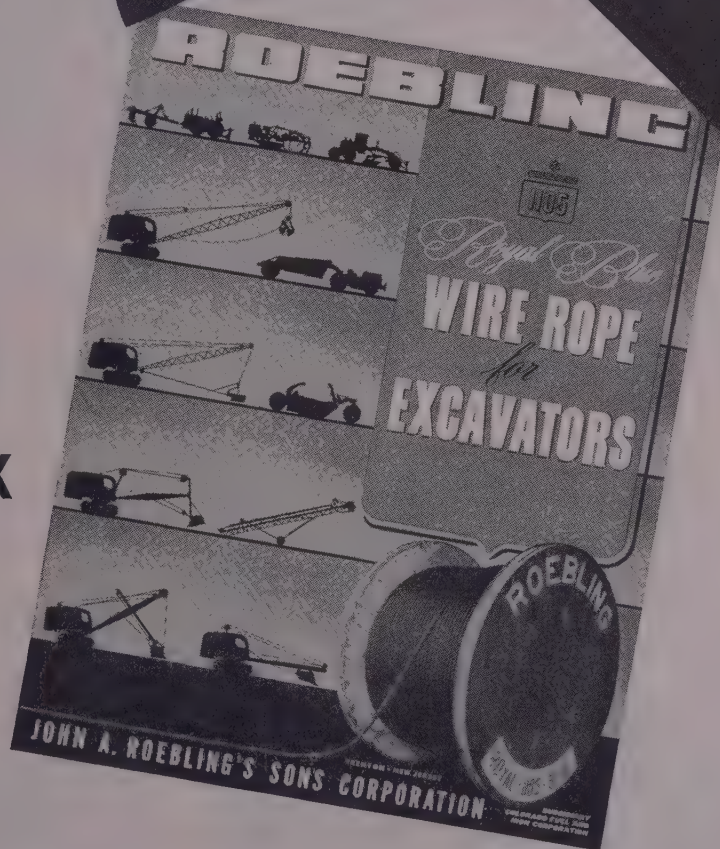
An improved version of the widely used diaphragm pump, featuring a self-cleaning, shock absorbing spring-bottom bow, was among items of road builders equipment exhibited by The Jaeger Machine Co. It is 4-in.



Diaphragm Pump

pump which can handle up to 7,000 gal. at 10-ft. lift and up to 4,000 gal. at 25-ft. suction lift. Also on display were a new self-widening Type J Finishing Machine, a Model CSS Concrete Spreader equipped with reversible screw and metering screed, the new Model SPS-3 Aggregate Spreader with agitator bar for uniformly spreading materials up to 13-ft. and 12-ft. thickness, new Model SPS-6 Spreader with oscillating screed and agitator bar for widths to 16 ft. and up to 16-in. thickness of spread, a 1957 model truck mixer incorporating many new features and latest models of the Jaeger line of rotary air compressors now being offered in 125-, 250-, 365- and 600-cfm. sizes.

Ask for Your Copy of This Code Book That Holds No Secrets!



If you operate excavating equipment, Roebling's new booklet, "Wire Rope for Excavators," is a must. It's chock-full of sound recommendations on where to use Royal Blue Wire Rope—the rope that's built to be stronger than the finest grade previously available.

The easy-to-follow coding system assures that you get the right rope every time. It covers hoist ropes, dragline ropes, ropes for shovels, skimmers, scraper wagons, trench

hoes, clamshell cranes, slacklines, derricks, drag scrapers and bulldozers. The recommendations are for the rugged conditions you meet every day.

You'll also find supplementary data on wire rope constructions, diameters, weights and breaking strengths.

There is a copy of this 12-page booklet waiting for you. Communicate with John A. Roebling's Sons Corporation, Trenton 2, New Jersey. Your copy will be sent promptly.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation



Chain Belt Co.

The full picture of the entire concrete road building operation, from forming to paving on through finishing and during, was presented at the Chain Belt Co. Booth. For the first time construction men saw the complete

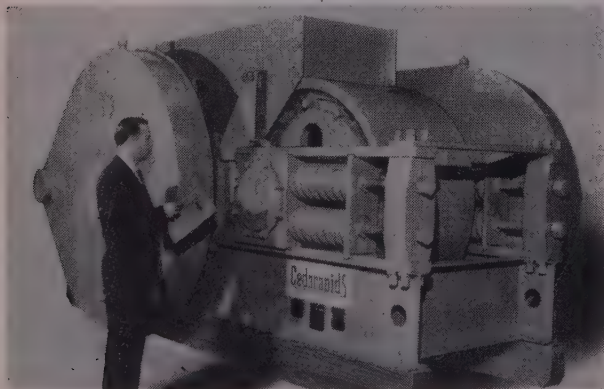


1957 Rex Paver

Rex Road Builders Package which was formed by Chain Belt Co.'s recent acquisition of General Road Machines, Inc. To show how this package performs "assembly line" road building operations, all equipment was arranged in sequence in the booth. Leading off was the 1957 Model Rex Paver complete with new refinements. An electrical hookup provided a graphic demonstration of this high-production, double-drum paver's Hydrocycle control, and visitors were able to work the actual controls used on the paver to see how one lever movement handles the complete paver cycle automatically and quickly. Other Chain Belt equipment on the "Assembly line" included the Rex Spreading, Finishing and Curing Machines mounted on Rex Road Forms. For curing of the finished mix, the Rex Automatic Curing Machine was shown.

Iowa Manufacturing Co.

A portable batch type bituminous mixing plant, the H-15, was shown at the Road Show by Iowa Manufacturing Co. The H-15 has a capacity range of 35 to 65 tons per hr. The pugmill mixer has a capacity of 15 cu. ft. Also on display was a big new 55 x 30-in. roller bearing roll crusher which can be used for any secondary crushing operation where a roll crusher can be used. With 20% wider roll shells, capacities of the Model 5530 range up



Model 5530 Roll Crusher

to 520 tons per hr. The new Cedarapids Stabilized Base Mixer was shown for the first time at the Show. The new unit consists of a Cedarapids volumetric proportioning continuous-mix type pugmill, aggregate hopper, and can be equipped with a delivery conveyor, and water meter

and water pump as optional equipment. Other equipment on display included a new Cedarapids portable primary crushing unit, Model 4A-GR that incorporates a vibrating grizzly to act as a bypass for materials under crushing size; and a completely new Bituminous Paver reputed to give a high density mat with a minimum of rolling.

Tractomotive Corporation

A completely new 2-cu. yd. front-end loader, the TL-20 was shown for the first time at the Tractomotive booth. Among the features of this new unit are a complete Power Shift Transmission with Torque Converter Drive



Model TL-20 Tracto-Loader

which will multiply engine torque up to 350%, and Planetary Axles which will provide more rim pull with less strain on the axles, transmission, U-joints, and differential. The axles are pin connected to the frame and are equipped with a high traction differential. Power for the TL-20 is provided by an Allis-Chalmers diesel engine having a 344-cu. in. displacement and developing 95½ hp. at 2,000 rpm. It has a 24-volt electrical system with an electric starter and an ether dispenser for starting in cold weather. Also on display in the Tractomotive area were the 1½-cu. yd. four-wheel drive TL-12 Tracto-Loader and the 1-cu. yd. two-wheel drive TL-10. Cutaway models of the T:-20 planetary axle and TL-12 Transmission were exhibited.

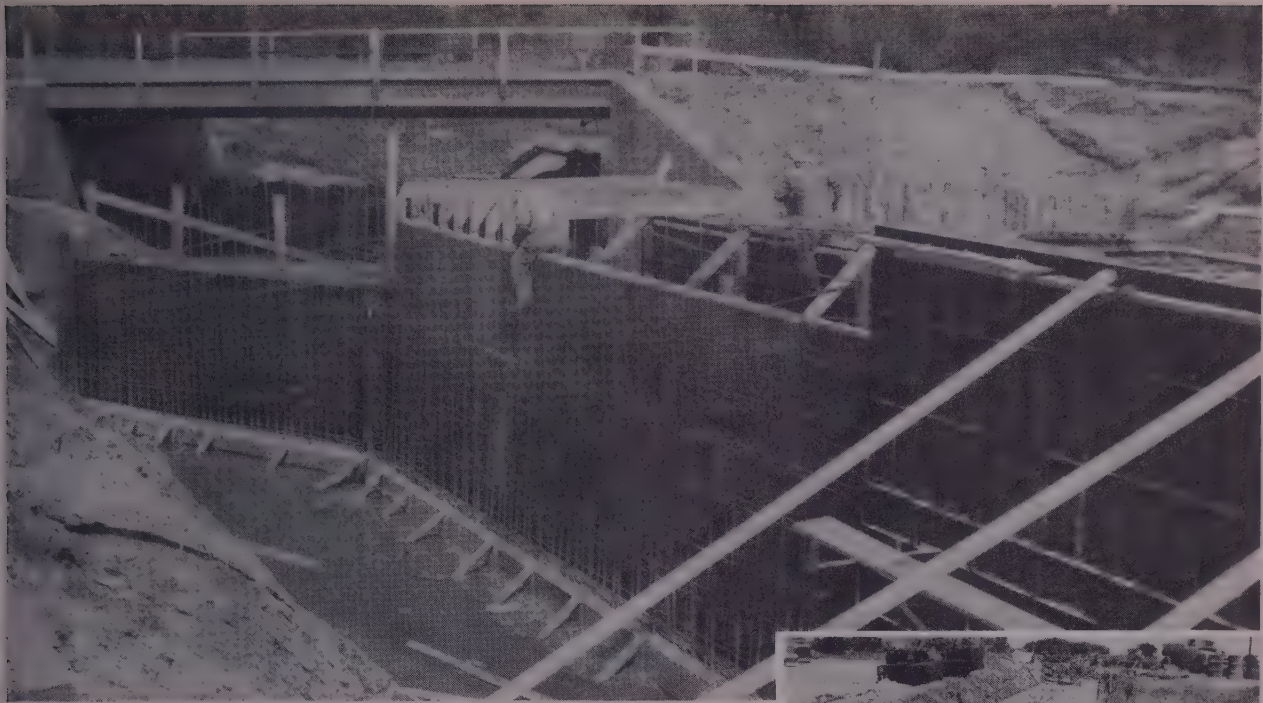
Link-Belt Speeder Corp.

Four exhibits represented latest developments in shovel-crane design from Link-Belt Speeder Corp. Shown were a complete HC-98 truck crane (30-ton capac-



Model HC-98 Truck Crane

ity) mounted on a heavier new four-axle carrier with an alloy steel frame, the upper machinery (with cab re-



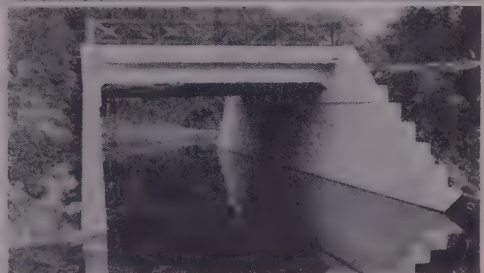
forming Bridges, Culverts, Piers?

UNI-FORM PANELS

Save LABOR, MATERIAL, TIME!

Simple mechanical assembly and pre-engineered techniques for handling virtually any forming condition make UNI-FORM Panels your best bet for fast, low cost forming. Successful contractors everywhere are using the UNI-FORM system to form bridges, overpasses, culverts, piers and abutments, because their experience has shown that UNI-FORM Panels give them the speed, flexibility and economy required to handle this complex type of forming at the lowest possible cost.

Let us prove our point. Send a set of plans for detailed forming specifications, recommendations and cost analysis. There's no obligation, of course.



Here Are The Basic Elements:

1. Steel framed, plywood faced UNI-FORM Panel
2. UNI-FORM Tie
3. UNI-FORM Tie Key

UNIVERSAL FORM CLAMP CO.

Concrete Form Specialists Since 1912

1238 North Kostner Avenue, Chicago 51, Illinois

BRANCH OFFICES AND WAREHOUSES

SAN LEANDRO, CAL.
2051-9 Williams Street
CLEVELAND, OHIO
24901 Lakeland Blvd.

LOS ANGELES, CAL.
13210 So. Figueroa Ave.
BALTIMORE MD.
1020 N. Kresson St.

HOUSTON, TEX.
2314 Preston Ave.
ATLANTA, GEORGIA
1401 Howell Mill Rd., N.W.

moved) for the "98" Series shovel-cranes, the crawler base for a 1-yd. model LS-98, and a cutaway working model of the exclusive Speed-o-Matic power hydraulic control system which is standard on all models. Typical of the company's six new truck-crane models (10 to 35-ton capacities), the HC-98 features along with the four-axle carrier optional extra turntable hook rollers, and a large diameter ring gear positioned to provide improved balance and a more favorable center of gravity. The machine is available with any of three newly designed jibs available in 20-, 30-, and 40-ft. lengths with maximum capacities of 6, 5, and 4 tons respectively.

Ingersoll-Rand Co.

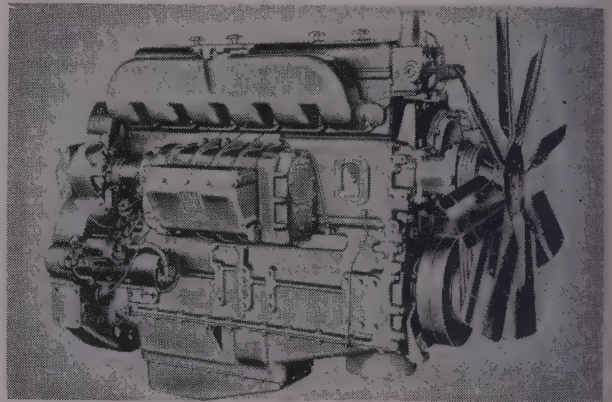
Ingersoll-Rand displayed its complete line of allied construction equipment at the Road Show. The Rock Drill portion of the exhibit included the Crawl-IR drill, the Drillmaster, a size FM-4 wagon drill and hydraulically-operated booms. The Crawl-IR drill is a completely new crawler-mounted drill with hydraulic-operated boom, and powered dump and swing. The line of Gyro-Flo rotary compressors was represented by the 85, 315 and 900-cfm. machines, from their complete line which also includes 125, 210 and 600 cfm. sizes. Carset Jackbits, Jackbit Grinders and the complete line of hand-held tools and accessories were also featured.

Wooldridge Manufacturing Division

Feature representation of the Wooldridge complete scraper line was an advanced model of the "Corbrette" self-propelled scraper in the 7.5 to 10-yd. class. Other Wooldridge exhibits included the "Cobra Quad" 3-axle scraper in the 20 to 26-yd. class, 35-ton "Cobrahaul" dumper, tractor-drawn scrapers from 8 to 41-yd. capacities, rippers, cable control units, all produced by Wooldridge Manufacturing Division, Continental Copper & Steel Industries.

Detroit Diesel Engine Division, General Motors Corp.

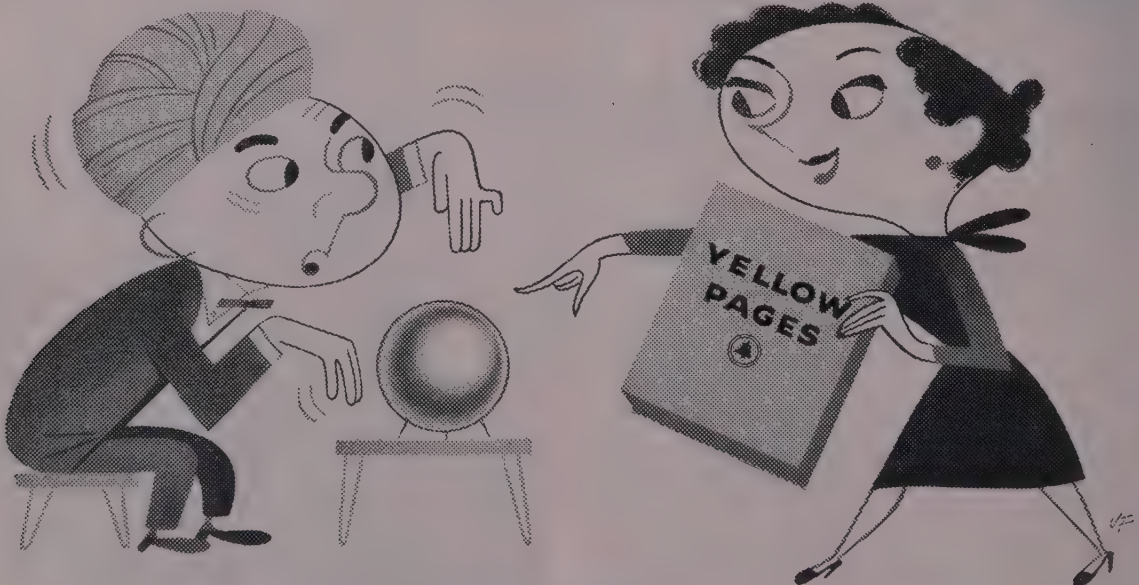
Two-cycle diesel engines for practically every type of road building equipment were displayed by the Detroit Engine Division of General Motors. Shown for the first time were two new Series 71 Turbopower units and the newly-designed 6-110 Roots blower engine. Eight models ranging from 95 to 300 basic horsepower were shown, in-



Engine Model 6-110

cluding General Motors torque converter and Hydro-starter models and a 125-kw. Diesel-Electric set. The new Turbopower engines are four- and six-cylinder units which utilize exhaust-driven turbines and air impellers to supplement the air supply to the cylinders. The result is an engine increased efficiency with approximately a 17% increase in horsepower or a 15% decrease in fuel consumption over corresponding Series 71 models. The

(Continued on Page 125)



Cover up your crystal ball

You won't need it. For whatever you need—from abrasives to zippers—the Yellow Pages will tell you where to call.

Look in the Yellow Pages whenever any business problem comes up. The chances are you'll find a complete list of qualified people eager to help you.

You'll find it fast in the YELLOW PAGES



engines are rated at 171 and 236 basic horsepower respectively. The 6-110 engine shown here has a high capacity Roots blower which provides a more compact unit, more space for accessory drives and higher air input for improved performance in low-speed ranges. This engine has a basic rating of 300 hp. Activated cutaway models demonstrating the two-cycle operation of all Detroit Diesel units and the Division's carousel of construction equipment were also displayed.

Fruehauf Trailer Co.

Three new pieces of equipment were exhibited by The Fruehauf Trailer Co. They were a 35-ton carryall with removable gooseneck, a 20-ft. tandem axle Fruehauf-Schonrock cable-dump unit, and a bulk cement trailer, 18 ft. long, which features the "Airslide" principle of un-



Fruehauf-Schonrock Dump Trailer

loading. The 20-ft. Fruehauf-Schonrock volume dump trailer shown here is a tandem axle model available in lengths up to 35 ft. This dump trailer is actuated by cable instead of the usual costly and heavy hydraulic hoist mechanism. As a result the number of moving parts has been reduced and considerable weight is saved, thus contributing to payload and profit. Dumping, with the tractor jackknifed up to 90 deg., is possible while keeping all wheels on the ground throughout the dumping period.

Owen Bucket Co.

The principal Owen Bucket on display was the entirely new SCL wide material handling model. This bucket features a closing line lead straight through the center plane of the bucket to the first lower sheave. This eliminates the bending of the closing line around the guide sheaves as in conventional block and tackle and lever arm buckets. All sheaves are of larger diameter and closing line sheaves are grooved for size of rope used. Also on display at the Owen Booth was the $\frac{3}{4}$ -yd. Type M Round Nose and the Type D heavy duty buckets.

Wisconsin Motor Corp.

An extensive line of heavy-duty, industrial type air-cooled engines was exhibited at the Road Show by Wisconsin Motor Corp. The entire line was shown, representing fourteen different models, covering a horsepower range from 3 to 60 hp. Featured in this exhibit were two new 4-cylinder "Vee" engines—the Models VH4 and VR4D. According to the manufacturer, the VH4 went into production in October 1956 and is already being specified as "original equipment" power on various types of equipment. Visitors at the show were among the first to view the new Model VR4D 4-cylinder "Vee" engine which extends the manufacturer's line to a 3- to 60-hp. range. Models of the rugged single and two-

cylinder models were also shown and a new hydraulic pump accessory drive was featured for the 4-cylinder models. The smaller 4-cycle single cylinder engines showed both rewind and electric starting systems.

Hyster Company

Highlighting Hyster Co.'s display at the Road Show was the Hyster tri-purpose "Grid" Roller which is used for rock crushing, fill compaction and bituminous pavement salvage; and the new Hyster D4 Hydraulic Backhoe which provides full track-type tractor maneuverability and stability with simultaneous swing and hoist for trenching, ditching and digging jobs. Hyster also showed their Caterpillar tractor-mounted Model D9A Winch, which develops a line pull of 76,000 lb., their D7 "Hyst-away" excavator crane, the D6N Towing Winch and the D7D Winch, which were exhibited on a special display stand.

Worthington Corporation

Featured at the Worthington exhibit was the complete line of Worthington Blue Brute Rotary Compressors and contractors tools, a new Portatrac, self-propelled wagon drill, and a full size working model of a 125-ft. rotary compressor. Completing the Worthington exhibit was a $5\frac{1}{2}$ -cu. yd. Hi-Up truck mixer as a representative unit of the company's complete line of sizes.

Galion Iron Works & Manufacturing Co.

The Galion exhibit featured their latest models of motor graders and rollers, which included the Galion T-700 Grado-O-Matic motor grader and the Galion Roll-O-Matic 14-20 ton 3-axle tandem roller. Other Galion equipment on display were models T-600 Grade-O-Matic, 118, and 503 motor graders; and their 8-12 ton tandem, 12-16 ton "Chief" 3-wheel Roll-O-Matic rollers, and the 4-6 ton portable tandem roller with retractable wheels.

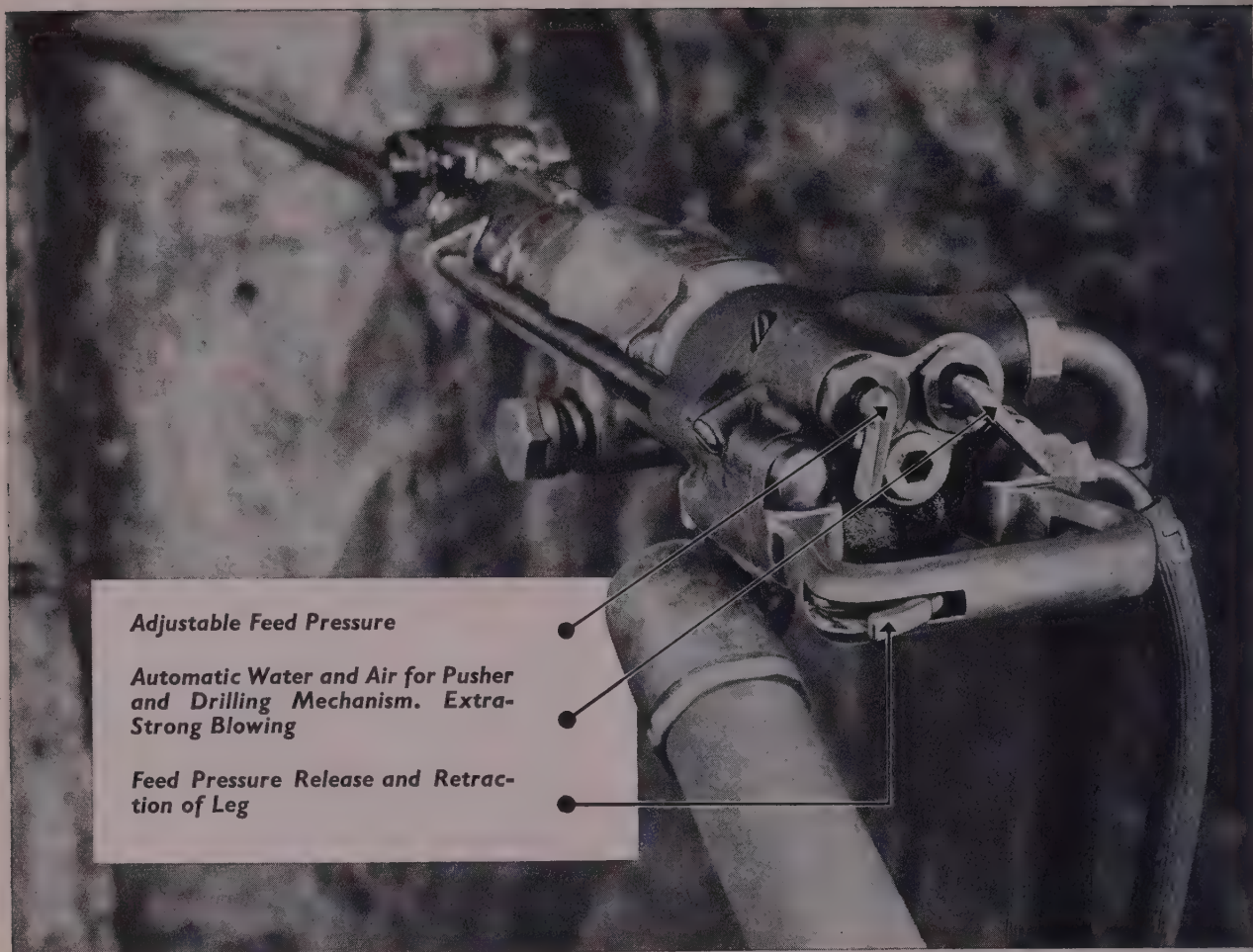
Harnischfeger Corp.

Introduced at the Road Show was Harnischfeger Corp.'s new Model P&H 575A Truck Crane. The machine, completely designed and built by P&H, including carrier, is a 40-ton capacity crane which accomplishes extra flexibility through better distribution of weight with load being spread over four axles. Other features of the new unit include hydraulic control, independent



Model P&H 1055 Excavator

planetary lowering, triple-safe boom hoist, and live roller circle. Also on display was the P&H Model 1055 $3\frac{1}{2}$ -cu. yd. capacity excavator-crane which features the exclusive magnetorque electric swing, hydraulic control along with all welded, rolled steel construction.



Adjustable Feed Pressure

Automatic Water and Air for Pusher and Drilling Mechanism. Extra-Strong Blowing

Feed Pressure Release and Retraction of Leg

RETRACTABLE LEG AND ONE-HAND GRIP-CONTROLS SPEED DRILLING TIME

For years Atlas Copco have been the world's largest manufacturers of pusher leg drills. Since 1937 when Atlas Copco, far ahead of any other manufacturer, introduced their first pusher leg drills, they have continuously improved the design of these drills. Their latest development, the Atlas Copco 'Lion', combines an unequalled ease of operation together with a high drilling rate—both contributing to a higher footage per manshift.

All controls under one hand

The Atlas Copco Lion is the first drill to have all the valves which operate the drill under the control of one hand. *Full control without having to move the hand from the backhead!*

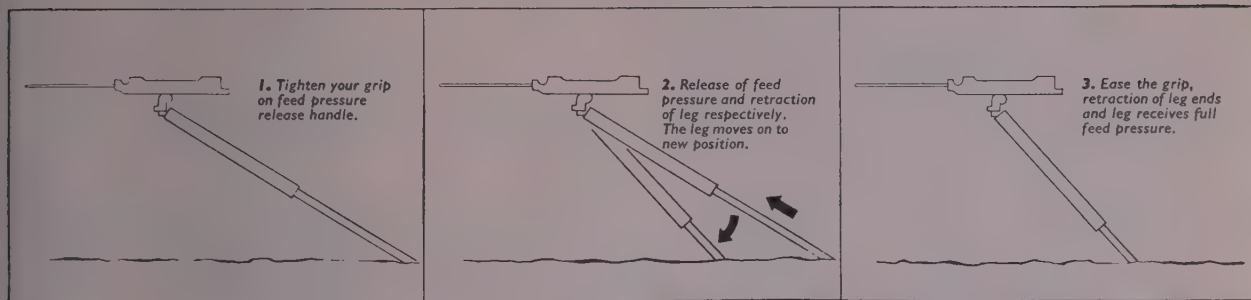
The valves are all easy to operate. By the use of only the fingertips the drill can be started or shut off, the feed can be adjusted to the pressure required, or retracted for an advance, and the extra air-blowing can be brought on to clean the holes.

All the control handles have been designed in such a way that they are well protected. While using them the operator's hand is never near the wall or roof of the drift. The Lion is the first pusher leg drill with controls placed for drifting.

Retractable leg saves time

When the leg has to be moved the feed pressure is easily released by squeezing the hand grip. By further pressure on the grip the leg retracts automatically.

Pusher leg moves forward with drill in full action



When the leg is in the new position suitable for continuous drilling, retraction stops and the feed pressure comes back by loosening the grip of the hand. *All this can be done while the drill is still running.*

This new idea of a retractable leg enables quicker repositioning of the leg and reduces the number of steel changes, thereby increasing footage per manshift. When drilling high holes it is now far easier to alter the position of the leg more frequently in order to maintain an optimal feed angle and feed pressure.

Packed with power for deep holes

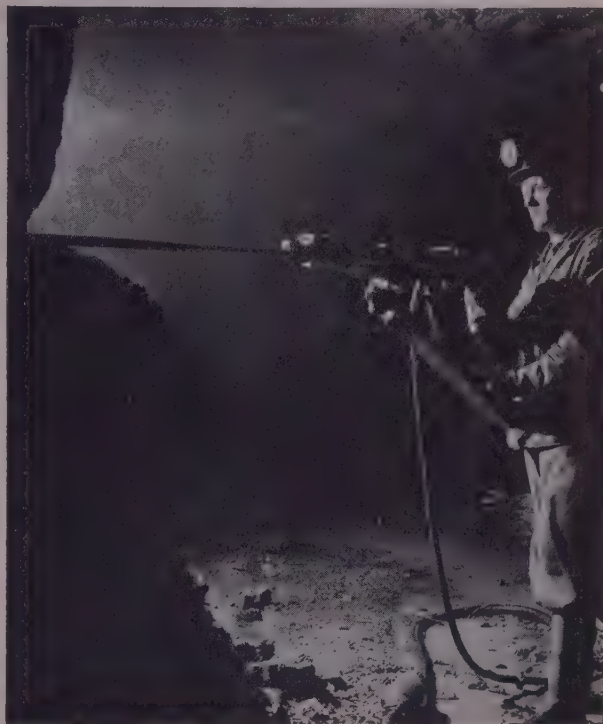
The Lion has a drilling rate at least 30% higher than other rock drills of the same weight. Furthermore, it is designed so that it can maintain its high speed *even when drilling deep holes*. This means quickly drilled deep hole rounds and a faster, steadier advance. You'll also find that the Lion reduces to a *minimum* the gauge wear of the bits in abrasive rock. And owing to the ease with which the feed pressure is released and brought back into action, the Lion is a *handier* drill to work with in fissured rock.

Sandvik Coromant —the right steel for the Lion

All Atlas Copco drills—and this goes for the Lion—have been developed from the earliest stages with Sandvik Coromant tungsten-carbide-tipped integral steels and detachable bits. No drill or steel developed separately could ever give such equivalently high performances as this drilling combination. It is today the most widely used in the world, responsible for drilling more than one billion feet per year.

Free Demonstration! Wire, 'phone or write today to any one of these offices and see the Atlas Copco Lion in action for yourself.

U.S., Atlas Copco Pacific, Inc., 930 Brittan Avenue, San



Without changing the grip of the hand the driller can easily position and control the machine, saving time and reducing fatigue.

Carlos, California. Atlas Copco Eastern, Inc, P.O. Box 2568, Paterson 25, N.J.

CANADA, Atlas Copco Canada Ltd., Montreal Airport, P.Q.

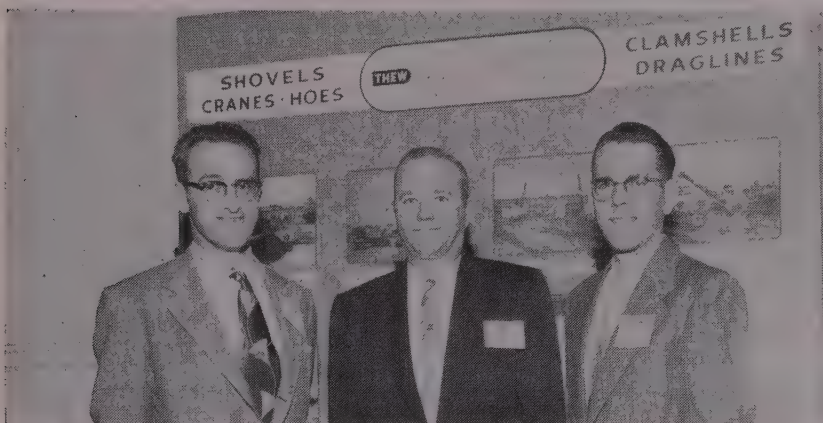
MEXICO, Atlas Copco Mexicana S.A., Apartado 56, Torreón, Coahuila.

The ATLAS COPCO GROUP puts compressed air to work for the world. It is the largest group of companies specializing solely in the development and manufacture of compressed air equipment. It embraces Atlas Copco companies or agents manufacturing or selling and servicing Atlas Copco equipment in ninety countries throughout the world.

Atlas Copco

Manufacturers of Stationary and Portable Compressors, Rock-Drilling Equipment, Loaders, Pneumatic Tools and Paint-Spraying Equipment

News of DISTRIBUTORS



THREE WELL KNOWN parts managers from construction equipment distributors in this Western area recently attended a 3-day Thew-Lorain Distributor Parts Managers Conference held at the Thew Shovel Co. in Lorain, Ohio. From left to right: *Sherwood A. Chappel*, Santa Fe Equipment Co., Inc., of Los Angeles; *John R. Morris*, Interstate Tractor & Equipment Co., Portland, Ore., and *J. J. Cawley*, Southern Idaho Equipment Co., Idaho Falls, Idaho.

Interstate adds sales reps

Interstate Tractor & Equipment Co., newly appointed Oregon distributor for Thew-Lorain shovels, Euclid earthmoving machinery, and Chicago Pneumatic air compressors and equipment, has added several sales representatives to its Portland staff. Ray Kizer rejoins Interstate as special representative for the Euclid Division; William J. Mitchell of Eugene will be special representative for the Lorian line; Robert C. Rose, Salem, joins Interstate with a two-year background of Lorain shovel sales and ten years in construction work, to become territory manager and to assist in machine installations; Ted Henry, Portland, will head up the firm's new air-equipment sales and rental division as representative for the Chicago-Pneumatic line.

Bacon named No. Calif. distributor

Edward R. Bacon Co. announces that it has been appointed exclusive Northern California distributor for Mixermobile Manufacturers, Inc., of Portland, Ore. Parts and service on the full line of Scoopmobiles and Mixermobiles will be available from the Edward R. Bacon Co. establishments at San Francisco, Oakland, Sacramento, and Fresno, Calif.

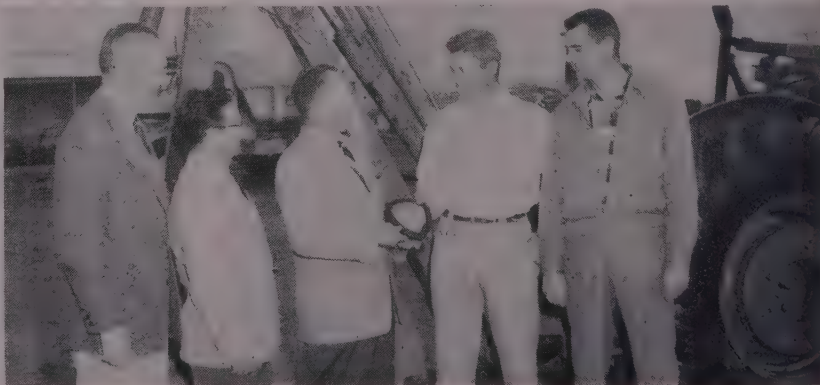
Columbia Equipment remodels

The building housing offices and repair facilities of Columbia Equipment Co., 1240 S. E. 12th Ave., Portland, Ore., recently underwent a complete remodeling, providing a new

equipment display room, conference room, and other extended facilities. The remodeling, which includes more than 6,000 sq. ft. of the interior floor area, also provides additional office space for Jerry Jerome, president; James B. Wahoskey, executive vice president, Harold Foster, vice president in charge of Portland branch operations and Floyd Morris, secretary-treasurer, as well as for John Moore, service manager, and Hugh Munro, parts manager.

Ford Tractor dealer honored

Dome Tractor Co., dealer serving the Sacramento, Calif., area, was presented with a special plaque for distinguished record in sales and service by Sherman Products, Inc., manufacturer of the Sherman power diggers for Ford and Fordson Major diesel tractors. Shown here, l. to r.: Tilton Newell, sales manager, and



Rocket distribution in Arizona

Concrete Transport Mixer Co., St. Louis, Mo., recently appointed two new distributors for merchandising the "Rocket" mixer in the Arizona territory; Jost Concrete Products of Prescott; and Superior Coach Sales & Service of Phoenix.

Further expansion by Foulger

Foulger Equipment Co., 1361 South 2nd West, Salt Lake City, Utah, announces the opening of new enlarged parts and shop departments to enable them to provide customers with more factory made parts faster and to facilitate repairs in their own shop.

New office opens at San Diego

Garlinghouse, Fremont & Co. announces the opening of an office in San Diego, Calif. Manager of the San Diego operation is Ed Meyers who has been associated with the construction equipment industry for several years. This new operation, located at 533 Third Ave., is equipped to serve San Diego and Imperial counties with the products of the parent organization. Lines carried by Garlinghouse, Fremont include Construction Machinery Co., Engineered Equipment, Gar Bro, Heltzel, Hewitt-Robins, Jay, Kue-Ken, McKiernan-Terry, Novo, Sanstorm, Unit, Viber, and Terratrak.

Peterson appointments

Peterson Tractor & Equipment Co., Northern California dealer for Caterpillar and John Deere tractors, has expanded its sales organization. R. P. Nichols has been appointed heavy industrial sales manager, and Tom Hopkins has been moved from that position to the new post of sales promotion manager in charge of advertising, market study, and sales training.

Bill Prather, industrial sales representative of Pacific Tractor & Implement Co., Richmond, distributor of Sherman products in Northern California and western Nevada; Jack Greenis, Sherman zone manager, presenting plaque to Jay Barbeau, general manager, and Chuck Stephan, industrial sales manager of Dome Tractor Co.

NOW!

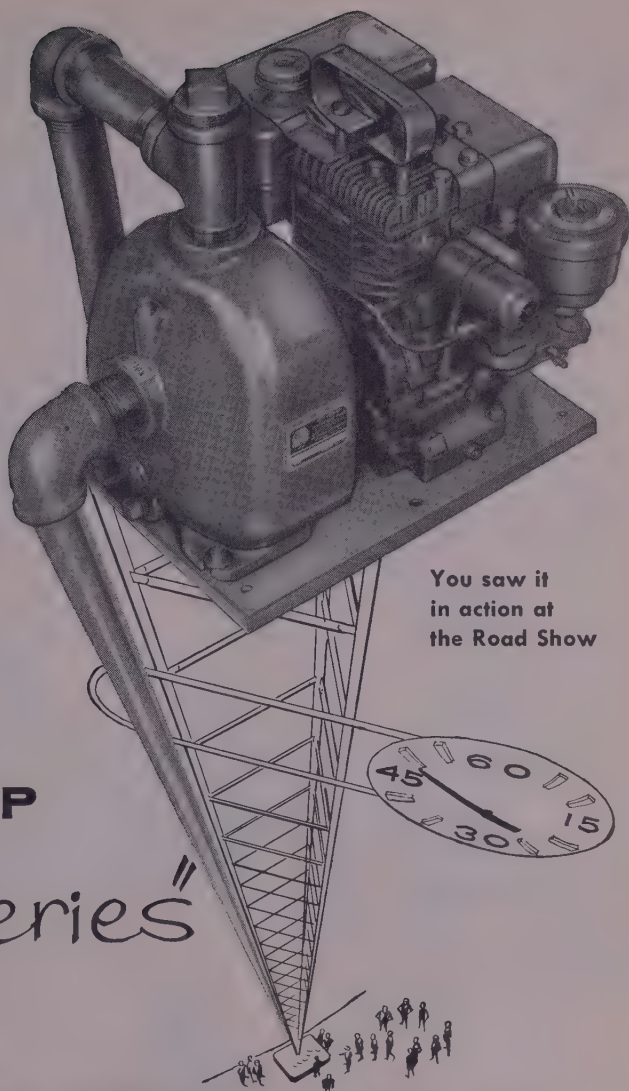
Freedom from pumping failure!

SELF-PRIMING

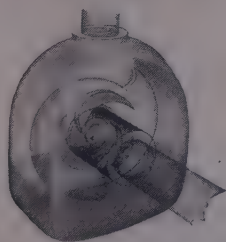
Important announcement to pump users! Here is a pump that never fails, never quits. Solids do not foul this pump. This new Gorman-Rupp design has *straight-in* suction. Pumped liquid enters direct to the eye of the impeller—increased capacity, higher efficiency, higher lift. Simpler. Fewer parts. Now available in sizes 1½", 2" and 3".

GORMAN-RUPP

New "80 Series" Pumps

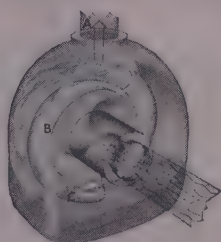


You saw it
in action at
the Road Show



PUMP AT REST

Captured liquid retained for priming. Note the absence of the usual check valve.



PRIMING ACTION

Entrained air (B) escapes at (A) to be discharged. Priming liquid returns (C) to entrain more air.



PUMPING ACTION

Straight-in suction voids entrance restrictions. Water enters direct to eye of impeller.

ASK FOR THEM

at your nearby

Gorman-Rupp Distributor

Andrews Equipment Service of
Washington, Inc.
Spokane

Bay Cities Equipment, Inc.
Oakland, San Jose, Sacramento

Delta Tractor Co.
Stockton

Elliott Equipment Co.
Wenatchee

Flaherty Equipment Company
Pocatello

Harron, Rickard and McCone of Southern
California
Los Angeles

Industrial Tractor Sales
North Sacramento

Logger's and Mill Supply Co.
Arcata, Calif.

Pacific Hoist and Derrick Company
Seattle

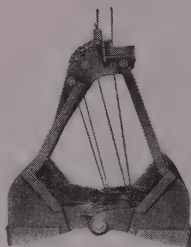
Shastra Truck & Equipment Sales
Redding

Studer Tractor and Equipment Co.
Casper

Now

ERIE CLAMSHELL BUCKETS OFFER YOU 7 COMPLETE GROUPS

WHATEVER
YOUR
REQUIREMENT
THERE'S
AN
ERIE
CLAMSHELL
BUCKET
ENGINEERED
ESPECIALLY
FOR
THE
JOB



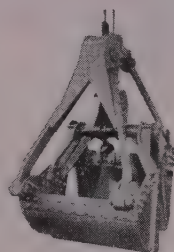
XLR, Extra Light Rehandler



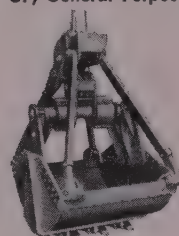
WR, Wide Rehandler



GP, General Purpose



LR, Light Rehandler



HD, Heavy Duty



SR, Standard Rehandler



XHD, Extra Heavy Duty

Of all the buckets made, only Erie gives you this combination of sound engineering features:

1. Top closing power from block and tackle, plus lever arm construction, plus precision balancing.
2. Manganese steel teeth and high carbon steel lips that bite up full payloads of even toughest clay and gumbo.
3. Rigid, one-piece, welded head that shrugs off bumps, and jars. No shimmy. No wobble.
4. Two-line, continuous reeving. Adds up to 50% to cable life. Less down-time for reeving.
5. Low headroom for fast work in tight quarters; low center of gravity for easy positioning.

For catalogs, write Dept. WC27

ERIE STRAYER Co.

3727 GEIST ROAD

ERIE, PENNSYLVANIA

Makers of Extra Light, Light, Standard and Wide Rehandlers, General Purpose, Heavy Duty, Extra Heavy Duty, Electric and Mechanical Hook-On Clamshells.



MANUFACTURERS

Standard Steel buys Midwest plant

Standard Steel Corp. has purchased the Leader Iron Works, Decatur, Ill., in a move that gives the 55-yr.-old Los Angeles firm a modern midwest factory where Road-Master



asphalt paving plants will be an important product. Shown here negotiating the contract are: (l. to r.) R. S. Burns, president of Standard Steel; E. Donald Peters, president of Leader Iron Works, and William Barnes, III, executive vice president of Citizens National Bank of Decatur.

A-C Operation Know-How

"Operation Know-How" is the designation given by the Construction Machinery Division of Allis-Chalmers Manufacturing Co. to a project on which various A-C units were operated by dealer sales personnel to complete a construction project and at the same time acquaint themselves with more of the aspects of field operation. The project involved the leveling of camping areas and building sites, building of roads, and excavation, at the 3,100-ac. Firestone Scout Reservation in Southern California.

Allis-Chalmers dealers taking part in the program were Shaw Sales & Service Co., Los Angeles and San Diego; San Joaquin Tractor Co., Bakersfield, Calif., and Neil B. McGinnis Equipment Co., Phoenix, Ariz.

New Bucyrus-Erie drill plant

Bucyrus-Erie Co. will soon start construction of a \$12,000,000 drill manufacturing plant near Richmond, Ind., according to announcement from the company's home offices in South Milwaukee, Wis.

Rucker Seattle expansion

The Rucker Co., Western distributor of hydraulic equipment and manufacturer of fluid power systems, has recently completed two significant steps in their expansion program aimed at offering better service and greater facilities to their customers in the Pacific Northwest. They have moved their Seattle operation

haul 15,000,000 cu. yds. of rock to build tunnel under Havana Bay

**Predict 80% of city growth on
newly-opened land across the Bay**

Since the days when pirates roamed the Caribbean, Havana Bay has effectively divided northern Cuba into east and west. Over the years, Havana has become more and more congested, while the extensive lands just across the narrow bay inlet have remained undeveloped, due to their inaccessibility.

To open this vital eastern area to the growing city's needs, a 4-lane auto tunnel is being built under the harbor entrance channel. It will cut automobile travel time between the new suburb east of the city and the downtown section of the capital, to only two minutes. City officials predict that, with the new access highway, the area east of the harbor will absorb 80% of the city's growth.

Move vast quantities of rock

To dig this important 30-acre tunnel under the Bay, the contracting firm Societe des Grands Travaux de Marseille must move 15,000,000 cubic yards of blasted rock. Outstand-



Tournapull Rear-Dump is shovel-loaded with 15 cu. yds. of blasted rock, excavated for the eastern approach to the "Tunnel of Havana". Tournapulls traveled around the Bay from the dock in the city, to this work site at tunnel entrance, under their own power. The 8-mile trip took about an hour.

Finance, construction and operation of the \$28,500,000 tunnel under the Bay of Havana is directed by a private corporation, Cia. de Fomento del Tunel de la Habana. Tunnel is being laid deep enough to allow the largest ships to float over it without difficulty as they enter the harbor. Tunnel will connect with newly-constructed major highways leading to Cuba's five eastern provinces. According to estimates made by a reliable firm of traffic analysts, more than 5,800,000 vehicles will pass through the great clover-shaped eastern gateway of the tunnel during the first year. And the traffic flow is expected to increase annually in the projected future!



Tournapull dumps a load of rocky spoil blasted from the tunnel. Across the Bay can be seen the tall commercial buildings of downtown Havana.

ing in the fleet moving this material are six Model C Tournapull Rear-Dumps, of 22-ton capacity.

Traveling typical .6-mile cycles, each of these Rear-Dumps hauls out 15 cubic yards of blasted rock from the tunnel site every 16 minutes.

Haul up 12% grades, across rock, through mud

These 208 hp Rear-Dumps must constantly travel over sharp, uneven, newly-blasted rocky footing. Haul is up and down grades ranging to 12%. Rainy weather presents a further obstacle to fast hauling. Rain water collects in scattered pockets of earth, and in the rock floor of the tunnel approaches. This water forms slick, slippery patches

of mud that slow down the haulers. But despite the rocky, hilly, sometimes slippery route, the earthmoving fleet on tunnel excavation has moved 60% of the rock in about 50% of the scheduled time.

Investigate Tournapull advantages

On the biggest, most demanding earthmoving projects all over the world, you will find modern LeTourneau-Westinghouse equipment at work. The next time you have earth to move, it will pay you to investigate the advantages offered by heavy-duty Tournapull Rear-Dumps. There are three sizes to fit your requirements with 11, 22- and 35-ton capacities. Write us for complete information.

Tournapull—Trademark Reg. U.S. Pat. Off. CR-1172-H-b



LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

to new headquarters at 1000 Fourth Ave. South, and in conjunction with this move, Leonard E. Peters has joined the Seattle staff as field engineer.

Pacific Southwest district manager

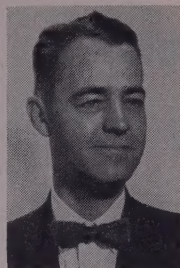
Smith Engineering Works, Milwaukee, Wis., manufacturer of Tel-smith crushers and other equipment for contractors, quarries, gravel plants, etc., announces the appointment of Robert G. Morton as Pacific Southwest district manager. His territory will include California, Arizona, New Mexico, Colorado, Utah and Nevada, with headquarters at 1950 Santa Fe Ave., Los Angeles 21 Calif.

Waco buys Midwest Concrete

Waco Manufacturing Co., Minneapolis, Minn., announces the purchase of the assets of Midwest Concrete Form Co. of Forest Park, Ill. The merger provides a new line of forming panels to complete a full line of heavy and light pressure pouring panels for light and heavy construction. The new company will be known as the Waco Concrete Form Manufacturing Co.

Sinclair heads Cargo sales division

Robert J. Sinclair has been named general manager of the Tractor



Robert J. Sinclair

Equipment Division of Pacific Car & Foundry Co., Renton, Wash. Sinclair in his new post will be responsible for sales efforts on Cargo winches and allied tractor equipment lines, working out of the Chicago sales headquarters.

Changes in IH sales personnel

Ralph G. Greer has been appointed assistant manager of the Construction Equipment Division of International Harvester Co., succeeding C. E. Jones, who has been named supervisor of national contractors' sales. Greer first joined IH in 1933 in one of its district offices and has held

various positions in sales until his appointment in October 1954 to manager of the Washington, D. C., office, in which capacity he has served until the present time. He is being succeeded in the Washington office by Thomas E. Aughinbaugh.

PCA to build two lab buildings

When the two new laboratory buildings at the Research and Development Laboratories of the Portland Cement Association in Skokie, Ill., are completed the Association expects to have the largest and most completely equipped cement and concrete laboratories in the world, according to announcement by President G. Donald Kennedy of the awarding of the construction contract.

Bay City Shovels names sales mgr.

The appointment of George Frank as sales manager was recently announced by Bay City Shovels, Inc., Bay City, Mich. A veteran of 18 years



George Frank

service with the company, Frank had been a sales representative for the past four years. His broad experience both in contracting and in sales and service of excavating and material handling equipment provides an ideal background in working with users and operators. D. E. Hawkins, president, said the appointment fills an administrative vacancy and that Frank A. Phillips continues as vice president in charge of sales.

PREFERRED by CONTRACTORS

Less initial cost—Lower upkeep

MARVEL CONCRETE VIBRATORS

GV-1, GV-2 & GV-3 Models Now Equipped
with Automatic Centrifugal Clutch as
Standard Equipment.
Interchangeable Flexible Shafts.

Write for full information

1 1/2 HP to
5 HP



MARVEL EQUIPMENT CORPORATION

215-217 EAGLE ST. • B'KLYN 22, N. Y.

Notice to publisher of CHANGE OF ADDRESS

NAME _____ Date _____

FROM
(Old address)

Street or P. O. Box Number

City

Zone

State

TO
(New address)

Street or P. O. Box Number

City

Zone

State

Company _____

Position _____

Mail to: **WESTERN CONSTRUCTION**
609 Mission St.
San Francisco 5, California
Attn: Circulation Department

"GAR WOOD-ST. PAUL SEES US THROUGH"

...say Buffalo contractors
George Schreiber and Albert Winkelman



More profits are earned by contractors with the right kind of equipment . . . equipment that tackles and stays with the toughest jobs until completion. Buffalo, N. Y., contracting partners George Schreiber and Albert Winkelman have found that their three Gar Wood-St. Paul dump body and hoist units are the "right" kind of equipment. Here's why . . .

"Take my word for it," says Schreiber, "these are top-flight units. In 50,000 work-miles we haven't had a single stoppage for repair!" Dependable operation like this is the result of advanced design

that insures maximum strength at key points, yet effectively eliminates excess weight.

Famous Strong-Arm hoist design eliminates one-sided lifting strains. "No matter how big the load is," reports Winkelman, "we can dump fast and sure anywhere . . . even on slopes." Servicing is easy too, and can be carried out with ordinary truck tools. Find out more about the truck equipment that can see *you* through. Call your Gar Wood - St. Paul distributor, or write direct to Customer Service Dept., Gar Wood Industries, Inc., Wayne, Michigan.

GAR WOOD INDUSTRIES, INC.
Wayne, Michigan

See Your Gar Wood-St. Paul Distributor

ERWIN H. JOHNSON, INC. Great Falls, Montana
THE SAWTOOTH COMPANY Boise, Idaho
STUDER TRACTOR & EQUIP. CO. Casper, Wyoming
WOEBER AUTO BODY & MFG. CO. Denver, Colorado
S. & M. SUPPLY CO., INC. Grand Junction, Colorado
CONSTRUCTION MACHINERY CO. Albuquerque, New Mexico
ALLISON STEEL MANUFACTURING CO. Phoenix, Arizona
TRAILMOBILE, INC. Salt Lake City, Utah

SIERRA MACHINERY CO., INC. Reno, Nevada
FRUEHAUF TRAILER COMPANY Seattle & Spokane, Washington
FRUEHAUF TRAILER COMPANY Portland, Oregon
CALIFORNIA TRUCK & IND. EQUIP. CO. Bakersfield, California
RUCKSTELL CALIFORNIA SALES CO. Fresno, California
WIN WARD COMPANY Pomona, California
GAR WOOD INDUSTRIES, INC. Richmond & Vernal, California
UTILITY TRAILER SALES CO. San Diego, California

UNIT PRICES

Selected abstracts for Western projects

HIGHWAY—Access roads to Glen Canyon Dam.

Arizona, Utah—Colorado River Storage Project—Bureau of Reclamation. A low bid of \$1,156,244 was submitted by Strong Co. for earthwork, culverts and access highway to Glen Canyon Dam.

(1) Strong Construction Co.	\$1,156,244
(2) Morrison-Knudsen Co., Inc.	1,232,189
Rogers Construction Co.	1,300,198
Mountain States Construction Co.	1,363,685
Fisher Contracting Co.	1,406,459
Peter Kiewit Sons' Co.	1,649,006

	(1)	(2)
890,000 cu. yd. Excavation for roadway	\$ 1.10	\$ 1.13
6,800 lin. ft. Crown ditches	.65	1.00
3,400 lin. ft. Crown dikes	.65	.70
20,800 M gal. Watering	2.50	4.25
2,220 roller hr. Rolling embankments	12.00	14.75
1,100 cu. yd. Excavation for culverts	5.00	4.00
1,530 cu. yd. Compacted backfill	3.00	4.25
1,070 cu. yd. Riprap	8.00	4.00
304 lin. ft. Furnishing and laying 24-in. dia., No. 16-gage, corrugated metal pipe	7.25	9.00
412 lin. ft. Furnishing and laying 30-in. dia., No. 14-gage, corrugated-metal pipe	10.50	12.00
188 lin. ft. Furnishing and laying 30-in. dia., No. 12-gage, corrugated-metal pipe	13.00	16.00
384 lin. ft. Furnishing and laying 36-in. dia., No. 14-gage, corrugated-metal pipe	13.00	15.00
136 lin. ft. Furnishing and laying 36-in. dia., No. 12-gage, corrugated-metal pipe	16.00	20.00
184 lin. ft. Furnishing and laying 36-in. dia., No. 10-gage, corrugated-metal pipe	20.00	23.00
306 lin. ft. Furnishing and laying 42-in. dia., No. 12-gage, corrugated-metal pipe	20.00	21.00
374 lin. ft. Furnishing and laying 48-in. dia., No. 12-gage, corrugated-metal pipe	25.00	24.00
664 lin. ft. Furnishing and laying 60-in. dia., No. 10-gage, corrugated-metal pipe	38.00	40.00
122 lin. ft. Furnishing and laying 66-in. dia., No. 10-gage, corrugated-metal pipe	40.00	45.00
6 end sections Furn. & install. No. 14-gage, corr-metal, flared-end sect. for 24-in. diameter pipe	65.00	100.00
10 end sections Furn. & install. No. 14-gage, corr-metal, flared-end sect. for 30-in. diameter pipe	95.00	135.00
12 end sections Furn. & install. No. 12-gage, corr-metal, flared-end sect. for 36-in. diameter pipe	150.00	190.00
8 end sections Furn. & install. No. 12-gage, corr-metal, flared-end sect. for 42-in. diameter pipe	235.00	300.00
10 end sections Furn. & install. No. 12-gage, corr-metal, flared-end sect. for 48-in. diameter pipe	290.00	350.00

HIGHWAY—Construction of 6 miles of highway in Colorado.

Colorado—Routt and Rio Blanco Counties—Bureau of Public Roads. Schmidt Construction, Inc., received a \$557,705 award for construction of 6.9 mi. of highway in Routt National Forest, Colo.

(1) Schmidt Construction, Inc.	\$557,705
(2) Herren-Strong	571,517
C. L. Hubner Co.	580,237
E. J. Rippey & Sons	584,304

	(1)	(2)
Cont. sum	\$3,200.00	\$3,200.00
79 ac. Clearing and grubbing	500.00	633.00
10,800 cu. yd. Stripping and storing topsoil	.40	.50
410,000 cu. yd. Unclassified excavation	.66	.60
2,100 cu. yd. Unclassified excavation for structures	4.00	3.00
22,000 cu. yd. Unclassified excava. for borrow, Case 1	.60	.56
500,000 sta. yd. Overhaul (1,000 ft. free haul)	.02	.02
12,000 cu. yd. mi. Special overhaul of borrow (1,000 ft. free haul)	.20	.15
6,200 cu. yd. Replacing topsoil	.70	.50
10,000 lin. ft. Furrow ditches	.20	.50
Cont. sum Obliteration of old roadways to be paid for as earned	500.00	500.00
3,870 units Watering of embankment	.50	2.00
Lump sum Providing and maintaining water plant	2,500.00	5,000.00
1,950 hr. Rolling of embankment	8.00	15.00
52,300 ton Subbase material	1.65	1.84
114 cu. yd. Concrete Class "A" (air-entrained concrete, low-alkali cement)	80.00	80.00
1,500 lb. Reinforcing steel	.25	.20
20 lin. ft. 18 in. C.G.S.M. culvert pipe	5.00	5.00
4,542 lin. ft. 24 in. C.G.S.M. culvert pipe	7.00	6.50
90 lin. ft. 36 in. C.G.S.M. culvert pipe	12.00	12.00
242 lin. ft. 48 in. C.G.S.M. culvert pipe	17.00	15.50
96 lin. ft. 60 in. C.G.S.M. culvert pipe	30.00	30.00
244 lin. ft. 29 in. x 18 in. arch culvert pipe	6.00	5.00
52 lin. ft. 43 in. x 27 in. arch culvert pipe	14.00	12.00
80 lin. ft. 144 in. struct. plate pipe (7- and 5-ga.)	105.00	100.00
72 lin. ft. 144 in. struct. plate pipe (10- and 8-ga.)	90.00	90.00
3,000 lin. ft. 6 in. perf. C.G.S.M. pipe underdrain	6.50	6.00
38 ea. Concrete maintenance marker posts	20.00	25.00
9,200 lin. ft. Barbed wire fence, Type 2	.25	.35
2 ea. Gates (12-ft.)	20.00	50.00
540 ea. Timber guide posts with reflector strips (treated), Type 2	7.00	8.00

HIGHWAY—4-mi. gravel surfacing and bituminous surface treatment in Montana.

Montana—Madison County—State. A low bid of \$211,197 was submitted by Billings Construction Co. for 4.104 mi. of grading, gravel surfacing and bituminous surface treatment in Montana.

(1) Billings Construction Co.	\$211,197
(2) Kiely Construction Co.	220,543
Peter Kiewit Sons' Co.	220,838
Stanley H. Arkwright, Inc.	223,228

	(1)	(2)
210,262 cu. yd. Unclassified excavation & borrow	\$.38	\$.39
1,341 cu. yd. Culvert excavation	3.00	2.50
133 cu. yd. Gravel backfill	4.00	3.00
22,428 mi. yd. Overhaul	.24	.25
31,378 ton Sel. borrow base course (unclassified)	.79	.90
18,130 ton Sel. borrow base course (crushed)	1.12	1.00
7,032 ton Type "A" top course	1.42	1.40
1,700 ton Cover material	6.00	5.00
23,799 gal. 1st application MC-2 liquid asphalt	.20	.18
23,799 gal. 2nd application RS-2 emulsion asphalt	.21	.17
4,320 M gal. Watering	1.50	1.50
420 unit Rolling embankment	9.00	8.00
400 unit Rolling surface courses	8.00	8.00
380 lin. ft. Re. conc. pipe culvert, 18 in. dia.	6.00	5.00
436 lin. ft. Re. conc. pipe culvert, 24 in. dia.	9.50	8.00
468 lin. ft. Re. conc. pipe culvert, 36 in. dia.	17.00	17.00
76 lin. ft. Re. conc. pipe culvert, 48 in. dia.	30.00	25.00
130 lin. ft. Corrugated metal syp. pipe culvert, 18 in. dia.	9.00	7.00
472 lin. ft. Corrugated metal syp. pipe culvert, 24 in. dia.	12.00	12.00
532 lin. ft. Corrugated metal syp. pipe culvert, 30 in. dia.	17.00	16.00
138 lin. ft. Strip. p. p. ell. culv., 108 in. dia. 1-gage metal	90.00	76.00
100 lin. ft. Relay pipe culverts	3.00	2.00
20 cu. yd. Type "A" random riprap	10.00	6.00
200 lin. ft. Steel guard rail	6.00	6.00
2 ea. Concrete project markers	25.00	25.00
80 ea. Concrete roadway monuments	10.00	8.00
50 ton Stockpiled type "A" top course	1.50	1.40

HIGHWAY—Bituminous surfacing of 25 mi. in Utah.

Utah—San Juan County—State. A \$329,395 contract was awarded Germer, Abbott & Waldron for construction of 25.597 mi. of road-mix bituminous surface road.

(1) Germer, Abbott & Waldron	\$329,395
(2) J. M. Sumison & Sons	342,875
W. W. Clyde & Co.	346,649

	(1)	(2)
2,200 ton Bituminous material, Type MC-3	\$ 41.00	\$ 41.00
425 ton Bituminous mat., Type MC-1 or MC-2	41.00	41.00
280 ton Bituminous material, Type RC-4	43.00	43.00
600 gal. Bituminous additive	2.75	2.50
3,200 ton Cover material, Type A (in stockpile)	4.25	4.25
25,597 mi. Scarifying and mixing	850.00	800.00
92,000 ton Gravel surface, Type B	1.37	1.58
1,000 M gal. Watering	4.00	4.60
225 hr. Rolling, pneumatic tire or power roller	10.00	9.00
42 lin. ft. 15-in. cement pipe	3.15	3.50
197 lin. ft. 18-in. cement pipe	4.00	4.20
463 lin. ft. 24-in. cement pipe	6.50	6.00
162 lin. ft. 30-in. cement pipe	7.50	7.30
220 lin. ft. 36-in. cement pipe	12.00	11.25
66 lin. ft. 42-in. cement pipe	14.00	14.50
71 lin. ft. 48-in. cement pipe	19.00	16.50
120 lin. ft. 60-in. cement pipe	27.00	23.00
190 lin. ft. 72-in. cement pipe	36.00	27.50
100 ea. Cement pipe arches 22 in. x 13 in.	4.25	4.25
600 cu. yd. Excavate posts	7.50	7.50
200 hr. Excavation for structures, unclassified	3.25	2.50
150 hr. 4 cubic yard dump truck	7.50	7.50
100 hr. Motor grader	14.00	12.00
100 H.P. crawlertractor with angle dozer (or ripper)	17.00	17.00
75 hr. Crawler tractor with 12 cu. yd. scraper	18.00	18.00
75 hr. 1 cu. yd. crawler type front loader	12.00	12.00
Lump sum Furnishing water equipment	3,000.00	1,000.00
Lump sum Furnishing construction signs	2,000.00	1,000.00