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JUL 12 1954

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WESTERN

CONSTRUCTION



This month . . .

the Dalles Dam: Three
obs rolled into one

•
rock bolts are better
for tunnel support

•
form design makes
nique roof feasible

ER . . . see page 4

JULY 1954

DUST CAN'T GET IN BEARINGS



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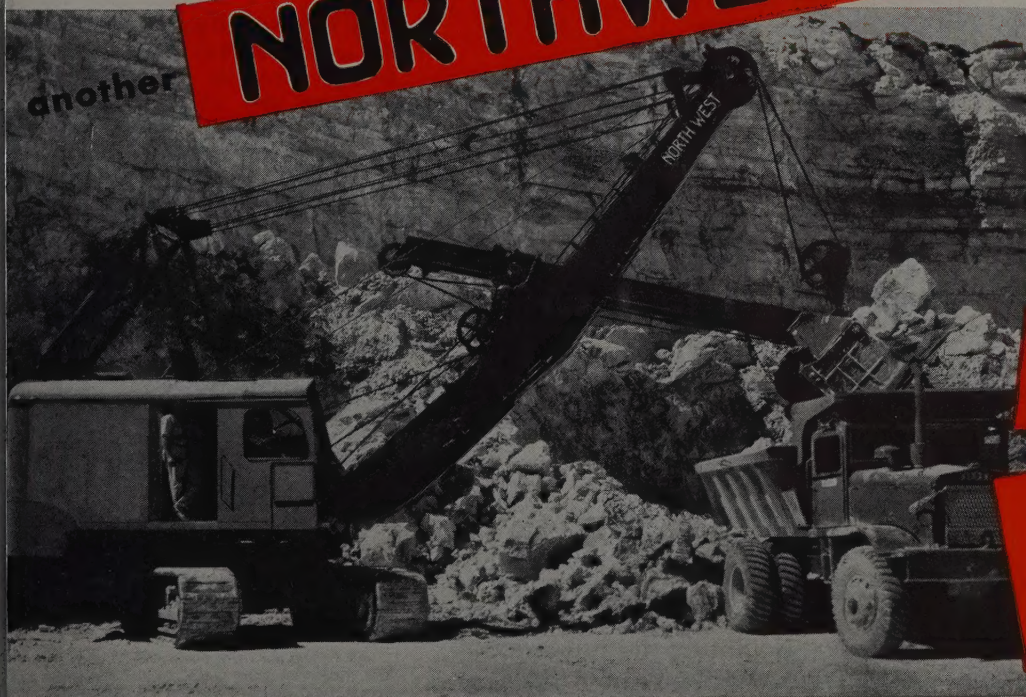
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FRONT COVER

CONCRETING OPERATIONS on the spillway of The Dalles multi-purpose dam on the Columbia River are well under way. This project, two years old with six years more to go, is one of the biggest in the West. For an up-to-date review of the major operations and methods being used see page 54.

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DAMS: A continuing record of Western achievement

Western thinking on the significance of water resources has recently been underwritten by two things. The first was President Eisenhower's appointment of a Cabinet Committee on Water Resources, announced with the statement that the country will soon look upon water as its greatest single resource. The second was the quiet publication by the American Society of Civil Engineers of a paper entitled "A Statistical Review of Dam Construction."

The news from Washington is welcome, but the opinion has long been held in the West. This is a characteristically arid region, though marked as well by climatic extremes. The importance of water is illustrated by the fact that the Western states contain 80% of the nation's total irrigated acreage. Water in the West is a seasonal resource that must be carefully husbanded and artificially regulated to fill Western needs.

The statistical review of dams, sponsored by the ASCE Power Division and compiled by Robert M. Sutherland, adds emphasis. The paper tabulates all known dams in the world, existing and proposed, that stand over 100 ft. in height. The total is about 1,460. The tangible "share" of the Western United States is impressive: 280 built or under construction. This alone is nearly half the national total of 566. Adding the 49 more proposed for the West brings the regional total to 329—well over half.

"Popularity trends" are also apparent from the tabulation, which for the Western states is reproduced on this page. Sutherland points out that arch and multiple arch dams increased rapidly in number until about 1930. "Thereafter, good arch dam sites have been

harder to find." Feasibility, the basis of "popularity," caused about one-third of all arch dams (both types) to be built in this region; the world total is 218.

This observation leads to another: that topography has permitted construction of a greater percentage of high concrete dams in the West than elsewhere. Over half the dams listed below are of concrete construction.

But it is apparent that continuing exploitation of Western water resources has necessitated resort to dam sites that are far from ideal in the traditional sense. For the most part, a larger volume of construction is now required to achieve a given storage capacity. Unit costs are up, and this fact (as well as the increase in water needs) has paradoxically called for the building of bigger dams—so that greater saleable functional benefits can be realized to cover costs. Under these conditions the pendulum has swung from all-concrete construction. Simple economics coupled with developments in earthmoving machinery and soil technology have greatly extended the use of earthfill and rockfill dams.

Regardless of construction medium, the West is a principal laboratory of dam design and construction for the world. Among the four major types of dam (gravity, arch, earthfill, rockfill), there have been a total of 33 successive height records established during the past century. Nineteen of these records have been held by Western dams. Similarly with records of volume: 12 out of 24 are assignable to the West.

All these records must be laid to the mind and hand of man. The achievement belongs to the engineers and contractors of the West.

DAMS OF THE WESTERN UNITED STATES

(Over 100-ft. height, built or under construction)

State	Earthfill	Rockfill	Earth-and-Rock	Arch	Gravity*	Buttress	Multiple Arch	Multiple Dome	Total
Arizona			1	4	1		3	1	10
California	50	13	3	36	34	2	8		146
Colorado	19	2		1	3				25
Idaho	6		1	3	4				14
Montana	3			4	6				13
Nevada	2		1	1					4
New Mexico	3	2		2	2				9
Oregon	3			3	10				16
Utah	5			1			2		8
Washington	4		2	8	5				19
Wyoming	4		1	3	1	1			10
Ore.-Wash.					3				3
Nev.-Ariz.			1		1				2
Ariz.-Calif.				1					1
	99	17	10	67	70	3	13	1	280

* Includes arched gravity dams and dams combining gravity and earth sections.



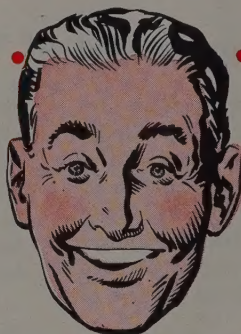
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It's the *machine* behind the *man* behind the *boom* behind the *hook* that counts. Put them all together in a way never done before, and you get performance never seen before. That, in a nutshell, is the story of "the crane designed with you in mind."

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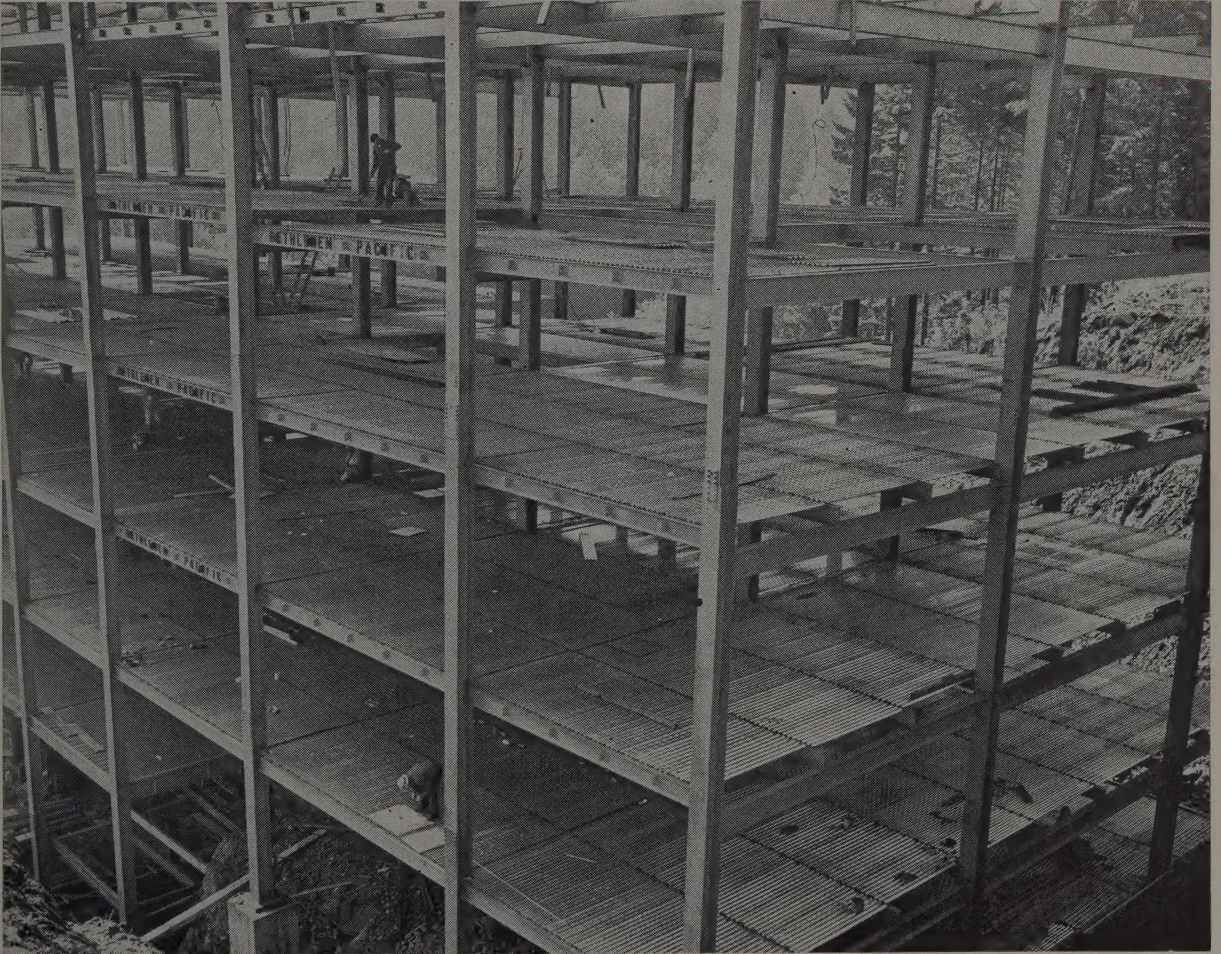
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JULY 1954

High tensile bolted, semi-continuous framing for . . .



. . . cheaper steel buildings

By **ROWLAND S. ROSE'**

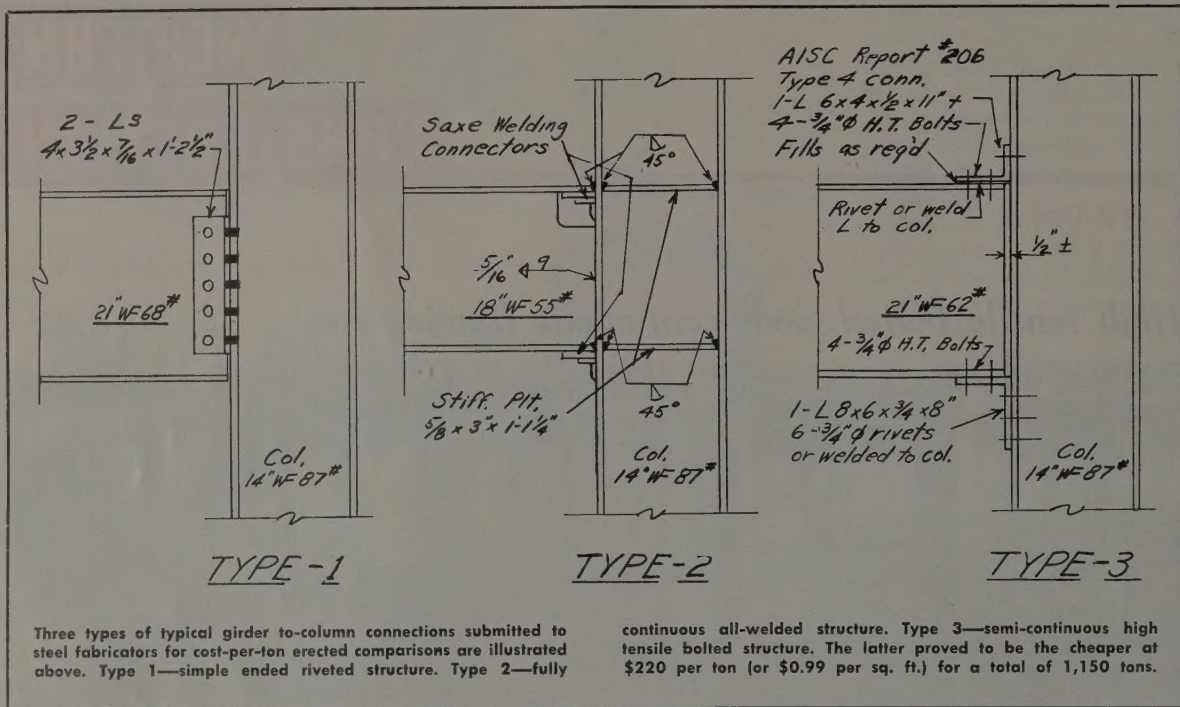
Structural Engineer
Cooper & Rose'
Portland, Oregon

IN AN EFFORT to obtain maximum structural efficiency in the new General Hospital for the University of Oregon in Portland, Ore., both concrete and steel frames were originally considered. Early in the design, it became apparent that a steel frame was most desirable be-

cause of ease of future alteration and reduction of column dimension. Once the basic decision was made, the most economical type of steel frame was of primary concern.

To determine the most economical type of steel frame, a typical bay design was prepared for (1) a simple ended riveted structure, (2) a fully continuous all-welded structure, and (3) a semi-continuous high tensile bolted structure. This analysis

was submitted to several qualified major steel fabricators for estimated cost per ton erected. Results of this analysis showed that Type (1) framing would cost \$222 per ton for a total of 1,230 tons or \$1.07 per sq. ft. for the 254,555-sq. ft. building. Type (2) framing would cost \$252 per ton for a total of 1,070 tons or \$1.06 per sq. ft. Type (3) framing would cost \$220 per ton for a total of 1,150 tons or \$0.99 per sq. ft. Stated differently,



Type (1) framing weighs 9.65 lb. per sq. ft., Type (2) framing weighs 8.5 lb. per sq. ft., and Type (3) framing weighs 9.1 lb. per sq. ft.

It should be pointed out that the greatest saving in cost is due to the partial continuity used rather than the use of bolts. The method used in analyzing the frame is one developed by the A.I.S.C. in its Report No. 206. This report summarizes a series of tests made on test specimens of various combinations of beams and columns with flange type connections between beam and column. From the results of these tests a method of design involving the relative stiffness of the adjacent members was evolved. Up to 47% of full continuity can thus be attained. Load ability of this joint is achieved by the friction developed by the high bolting stresses rather than direct shear as in a riveted connection.

In the design of the hospital steel frame, only those beams and girders framing directly into columns were designed on this basis. Intermediate or secondary beams were attached to girders by standard web connections with regular machine bolts and lock washers. As an interesting sidelight, the cost of a fully continuous end connection for these intermediate beams more than offsets the extra weight of the steel involved if a regular simple span beam was used.

Low basic cost per ton of steel erected is also governed by certain other factors. One of these is the elimination of butt plates at column splices. This is possible only if the

column section remains the same basic size; e.g., 14 in. in the case of the hospital. By maintaining this same basic size, all spandrel beams remain the same distance from the building line. Another factor is the placement of column flanges the narrow way of the building. This minimizes the growth of tolerances which are much more flange to flange than through the web. Incidentally, it also provides the strong axis of the column across the narrowest part of the building.

Wrench calibration

Considering the technique used in calibrating the wrenches, an auxiliary air receiver was attached to an air compressor of proper size by a 2-in. diameter hose. Each wrench has a ¾-in. take-off, with pressure regulator, and a ¾-in. hose of constant length. The wrench is then calibrated to a master gauge so that it will stall at a tension value of 27,600 lb. for the ¾-in. diameter bolts used throughout the job. This value is approximately 15% greater than the required tension value of 90% of yield value of the bolt and allows for variation found by experience. Variation in the torquing ability of the wrench is governed by varying the pressure regulator at the receiver for each wrench.

The bolts themselves are semi-finished high carbon steel fully heat treated, quenched, and tempered in accordance with A.S.T.M. specification A325. Washers which are placed under both the head and nut are carburized. Ultimate tensile strength

of the bolts is 120,000 lb. per sq. in. with a proof load of 85,000 lb. per sq. in.

Inspection for the job consists of actually calibrating all wrenches every morning before the shift starts and at any other time should there be any reason to doubt the ability of the wrench. Approximately 10% of all bolts installed are actually tested with a manual torque wrench.

The total of 1,150 tons of steel was erected in a record-breaking 38 working days on a site that prevented any stockpiling. As a consequence, all steel for a day's erection had to be scheduled location-wise as well as time-wise in order that a delivery could be made and the steel immediately hoisted to its proper spot by one of two erection cranes.

Bethlehem Pacific Coast Steel Corp. fabricated and erected the steel and found that a two-man bolting crew could install 20 bolts per hr. as an average, while an experienced four-man rivet crew can install an average of 27 rivets per hr. They also found that the cost difference between a bolt and a rivet was 21 cents per unit favoring the bolt exclusive of blocking out the paint at the contact surfaces. Of equal importance is the fact that a two-man bolting-up crew can be trained in a very few hours, while a good four-man rivet crew takes years to develop.

The technique used in installing the bolts is quite simple varying from a standard bolt installation only in the tightening method. For

this, an air-driven torque wrench is used. Since only a two-man crew is needed, considerably less staging is required, thus reflecting on the erection cost.

Experience with this job has brought out several points worth mentioning concerning high tensile bolting:

- 1—Erection time is definitely shortened.
- 2—Erection cost is definitely reduced.
- 3—Erection noise is noticeably reduced.
- 4—Skilled erection crews are easier to obtain.
- 5—Erection crew enthusiasm for the entire procedure used in bolting up the building.

Future increased use of high tensile bolted construction depends upon a number of factors.

1—Some simple system of machine torquing for use in the field should be developed, especially for jobs involving small tonnage. This system could be developed from the present wrench by adapting it to read torque directly from a reaction arm integral with the wrench.

2—Cost per bolt should be reduced. This most certainly can be accomplished if the demand increases and they are more generally stocked.

3—Research should be undertaken to determine if the present requirement of Bulletin No. 206 that the contact surfaces be left unpainted can-

not be changed to allow paint on these surfaces. Masking out these areas during the painting adds needless expense and it is the opinion of the writer that the high surface pressure developed during the bolting-up provides adequate friction. In addition, it should be borne in mind that should the joint slip, the bolts will still act in shear as a rivet and at a greater unit load.

4—Incorporation into the design of more semi-continuous framing as a cost saver. In conjunction with this, some thought should be given to the design of the joint to utilize more fully the inherent advantages of the higher strength bolt rather than to use them as a direct substitute for rivets.

Large-size beam forms economically lifted



BUILDING, raising, and hanging forms up to 40 ft. long and 4 ft. high for fireproofing steel beams on the Columbia Broadcasting Studios in Los Angeles proved to be simple.

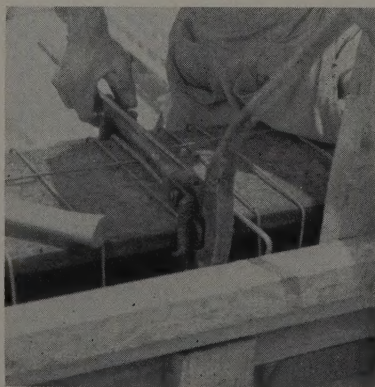
In a typical case, pre-drilled, bench-made, beam soffits are placed on horses beneath the beam to be fireproofed. Pencil rods are pushed through the soffit and nailed to prevent their falling out. Next, the two rod ends are bent 90 deg. with a small bender which is set to the beam depth plus 2 in. for fireproofing; no spreaders are required. Beam sides and kickers are then added.

A raising crew sits astride the steel beam, clamps on Little Giant winches, and lowers lifting cables to be attached to slings under the beam forms. When the form has been lifted, one pair of rods is turned across the beam at each winch and clinched. Winches are released and moved to the next form while a followup man finishes clinching the rods to the steel beam. The clinched pencil rods entirely supported the beam forms, decking, and concrete except at spandrel beams where shoring is used.

The Columbia studios consist of

two adjacent structures. The Craft building is 150 x 400 ft., three stories high, and the Studio building is 250 x 400 ft., two stories high.

The Little Giant winches, pencil rod bender and clincher were invented and patented by F. W. Bittner, a foreman. General contractor was The William Simpson Construction Co. Top personnel on the job were Jack Ogden, general superintendent; H. C. Linn, detailer; H. A. Baines, general carpenter foreman; Frank Martinez, general labor foreman.



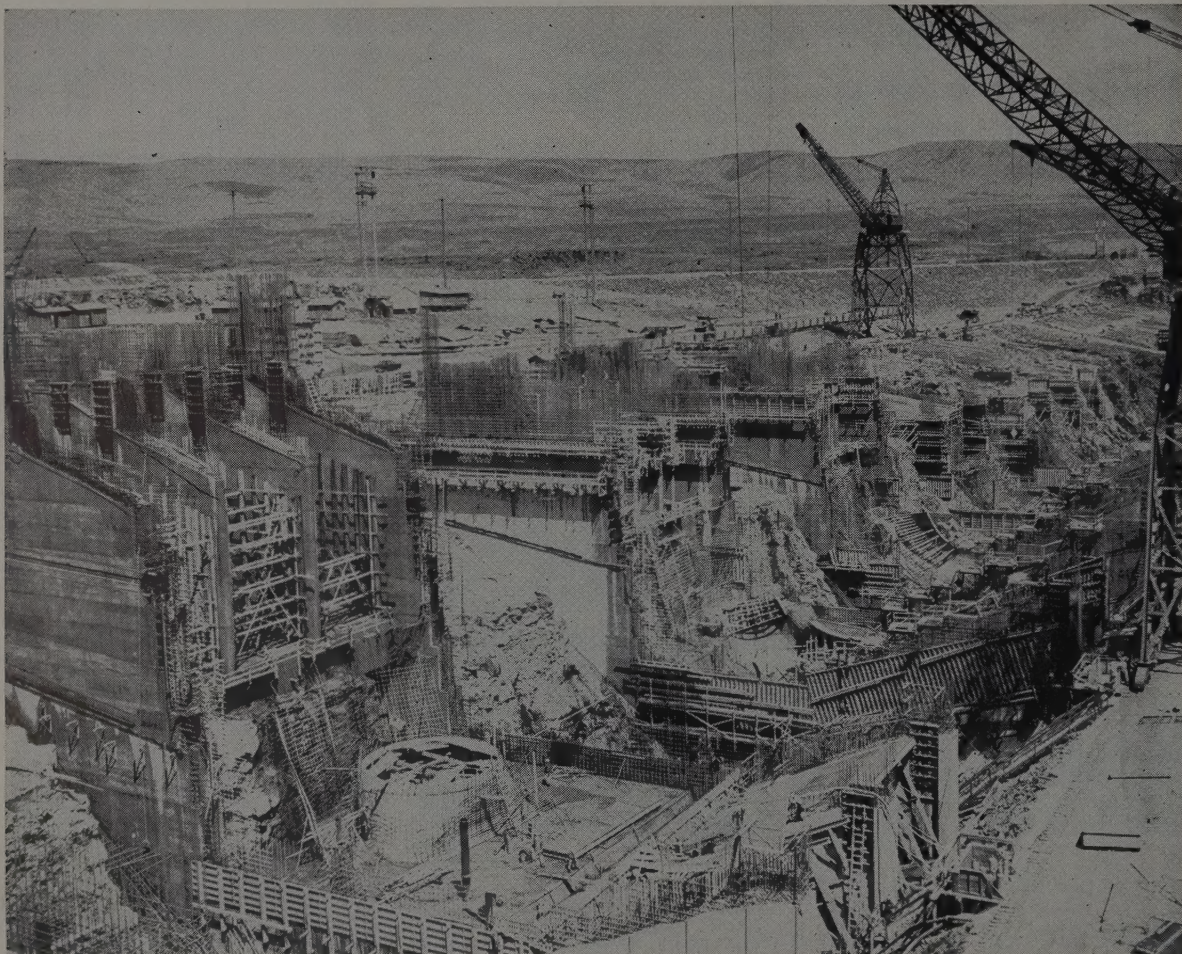
TOP RIGHT—Bender puts 90-degree kink in pencil rods.

BELOW RIGHT—One man easily operates hand winch.

BELOW LEFT—Rod clincher clamps rods to steel beam.



The Dalles Project - 2 yr. old



This is one of the largest projects under way in the West—New and efficient methods in handling excavation and concreting are being used

IT'S A BIG JOB! How else can you describe the current work of 1,600 men working around the clock on contracts adding up to \$63,000,000. These efforts are but one step in the many to be taken over the next six year period in harnessing the Columbia River at The Dalles.

Perhaps the most unusual feature of this project is the series of cofferdams which allows all of the construction work to be done without diverting the river from its original channel. Small-scale, model tests were conducted by the Engineers at Bonneville which simulated the present construction and stream flows. From these tests, the cofferdam heights and the final rock-fill dam closure methods were determined.

These studies were important be-

cause of the variable flow of the Columbia. The famous "1894 flood" had an estimated peak of 1,170,000 cfs. as compared to the average spring flood flow of approximately 585,000 cfs. In June 1953, the river had a flow of 606,000 cfs. and an elevation at the dam site of 98.5 ft. This was about 3 ft. higher than the existing cellular cofferdams. The latter have since been raised to el. 102.5 and a flood of over 700,000 cfs. would be required to top this and inundate work. A heavier than normal snow pack in the headwaters of the Columbia this spring will bear watching.

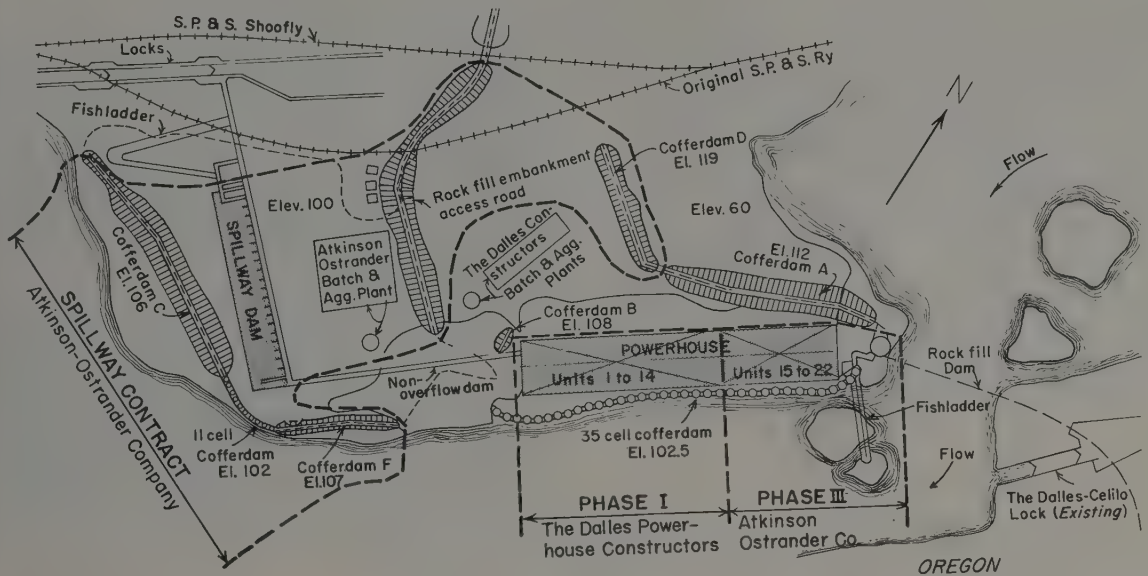
Atkinson Ostrander Co.

This joint venture has two contracts under way on the dam project, but under coordinated central di-

rection and use of equipment.

The spillway contract involves the construction of three earthen cofferdams, C, D, and F, and a sheet-steel, cellular cofferdam connecting two of them. The latter was used bordering on a dropoff into deeper water where earthen cofferdams were impractical. The earthen cofferdams were constructed as impervious dams having compacted silt cores.

The 649,000 cu. yd. of excavation involved in the spillway dam and spilling basin foundation represented well-controlled blasting under difficult conditions. The Columbia River basalt here lies generally in horizontal layers approximately 65 ft. thick. From top to bottom of each layer, as many as five different types of basalt can be found. D. E. Laughren, resi-



MAIN CONTRACT AWARDS ON THE DALLES DAM

Contractor	Amount	Bids Opened	% Completion on April 30, 1954	Principal Items of Contract Work
1. S. A. Healy Co.	\$4,888,600	Jan. 22, 1952	100	Cofferdams A and B Cellular cofferdam along river Excavation to el. 38 in powerhouse site
2. Guy F. Atkinson Co. and Ostrander Con- struction Co.	\$14,437,978	Oct. 7, 1952	37	Cofferdams C, D, and F Cellular cofferdam Rockfill excess embankment Concrete spillway dam Spillway tainter gates Excavation of tailrace and approach channels
3. The Dalles Power- house Constructors	\$29,820,997	May 19, 1953	14	PHASE I Completion of excavation for and con- struction of the substructure for the first 14 main unit bays of the powerhouse Station service bay Fishway turbine bay Assembly bay
4. Guy F. Atkinson Co. and Ostrander Con- struction Co.	\$18,886,007	Dec. 22, 1953	2	PHASE III Completion of excavation for and con- struction of the substructure for main unit bays 15 to 22 of the powerhouse East fish ladder East concrete non-overflow dam Furnish and install weirs and gates in the powerhouse fish collection system

FUTURE MAIN CONTRACTS

- | | | |
|--|---|--------------------------------|
| <p>1. PHASE II
Superstructure of powerhouse
Non-overflow concrete section be-
tween the spillway and powerhouse
Middle fishway</p> | <p>2. Navigation lock
Non-overflow concrete section be-
tween spillway and navigation lock
North fishladder</p> | <p>3. Rockfill dam closure</p> |
|--|---|--------------------------------|

dent geologist for the Engineers, has done the classification work noting in general that types 1 and 2 are close grained, tight, and easy to blast to cut lines. Types 3, 4, and 5 were frac-

tured and difficult to control.

Without core samples of the entire area, the drill and shoot foremen had to use good judgment on the amount of charge and depth of drill-

ing. The drill pattern averaged 5- to 8-ft. centers, and 12- to 18-ft. steel was used. About 20 wagon drills were used at one time on this operation, all being Gardner-Denver with



ABOVE—Concreting operations are well under way on the stilling basin of the spillway. Two Clyde whirleys handle all materials.



RIGHT—Metal forms are used for 5-ft. lifts on the spillway.

the exception of four Joy drills. Compressed air for this large operation was supplied by three stationary Ingersoll-Rand compressors with a combined output of 4,200 cfm.

The excavation area was approximately 200 x 1,300 ft., allowing good equipment mobility. A fleet of 16 Euclid end dump trucks, 16-cu. yd. capacity, were loaded by 3 Bucyrus-Erie shovels, a 120-B, an 88-B, and a 54-B.

Another 1,500,000 cu. yd. of excavation was necessary for the tail race and approach channels. The material was all wasted to designated disposal areas, some of which may be later used in completion of the rock-fill closure under another contract.

The concrete aggregate pit is located about 3 mi. from the project. Here a Bucyrus 54-B shovel is kept busy loading four 25-cu. yd. Peterbilt-Southwest bottom dump trucks. Since the aggregate plant will handle only 18-in. diameter and smaller rock, the shovel must do a sorting job at the pit.

The aggregate plant is mostly a reassemble of equipment used by Atkinson Ostrander at the McNary Dam in Oregon and is providing the same efficient operation for them here. Stock-piled aggregates are in the size ranges of - 6 + 3 in., - 3 + 1½ in., - 1½ + ¾ in., - ¾ + #4 and # 4 minus.

Concrete for the spillway is based on three different mix designs. Mass interior concrete (6-in. max. aggregate) has a .74 water-cement ratio or about 2½ bags of cement per cu. yd. The spillway face mix (also 6-in. max. aggregate) has a .44 water-cement ratio or about 4 bags of cement per cu. yd. The balance of

the spillway and the powerhouse mix designs for the 3-, 1½-, and ¾-in. maximum size aggregates will use a .49 water-cement ratio by weight.

All concrete batched has an air entrainment additive. A maximum of 7% air by volume is allowed by contract specifications with 4 to 6% being obtained in field practice. Portex additive is being used by all contractors on The Dalles project for this purpose.

The batch plant is a fully automatic Johnson. It is equipped with two 5,000-bbl. and one 7,500-bbl. silos. Concrete is taken from the batch plant by diesel electric dinkeys and flat cars that carry four 4-cu. yd. Gar-Bro air-dump buckets. Transfer to pouring position is handled by two Clyde whirley cranes.

Forming and pouring on the spillway is progressing rapidly. Over 1,000,000 sq. ft. of contact form work will be required here. However, the basic forming units for the spillway dam, the ogee surface, the baffles, and other items lend themselves to repeated form usage. Many metal forms from previous projects are in use here. Whenever possible, the forms are made into large units to provide economical handling by the whirleys.

Form erection and stripping is done by the day shift. This allows all concrete to be poured by the swing and graveyard shifts with a minimum of interference in functions. Another factor for night pouring is that no cooling of the concrete is required at any stage. The mass pours are generally limited to a 5-ft. thickness. Over 330,000 cu. yd. of concrete will be required in all.

A tremendous amount of water is required for the standard 14-day

concrete water cure, site cleaning, and batching operations. This job water is furnished by three 10-in. Byron Jackson turbine pumps. When the water has accumulated in sumps, dewatering is handled by one 14-in. and one 20-in. Fairbanks turbine pump.

Powerhouse excavation

Work on Atkinson Ostrander's \$19,000,000 contract for excavation work on the main units 15 to 22, inclusive, of the powerhouse was not started until middle March of this year. In the short period of 2½ months since then, a tremendous amount of controlled drilling and shooting has been accomplished in a confined area.

Beginning at el. plus 38, where the S. A. Healy contract left off, over 210,000 cu. yd. of basalt has been removed down to el. -20, for the powerhouse substructure foundation. A total of 260,000 cu. yd. will have to be removed under this particular item. An additional 6,000 cu. yd. has been drilled and shot for the east fish ladder sheet-steel cells. This material will be moved after the spring flood, now in progress. For the east concrete, non-overflow dam approximately 20,000 cu. yd. of basalt has been drilled, shot, and removed. The handling of all the above excavation represents a very efficient 2½ months operation. Any well informed observer on the job site will tell you, "If you want to see dirt moved, watch Atkinson."

Drilling and shooting for the powerhouse substructure is similar to that recently done for the spillway foundation. Drill holes are at 5- to 7-ft. centers with 8- to 18-ft. steel

being used. Columbia 40% powder in $1\frac{1}{2}$ x 12-in sticks is being used.

The $\frac{3}{4}$:1 slopes required on the north embankment presented a difficult problem in control blasting, much of the basalt here being type 3, 4 or 5.

Two shifts of 30 men (20 drillers and 10 chucktenders) are required for this operation. About 10 Gardner-Denver wagon drills are being used, supplied by three stationary compressors mounted on a nearby rise. The latter consist of two Ingersoll-Rands of 1,100- and 2,400-cfm. capacity and one Sullivan of 3,000-cfm. capacity. A desirable 90 psi. is thus delivered to all drills.

Following the blasting at a very short distance is the earth moving lineup of 8 Euclid end dump trucks, 16-cu. yd. capacity, and a Bucyrus Erie 88-B shovel, a Bucyrus Erie 54-B dragline, and a Northwest 80-D backhoe. The 88-B shovel with a 4-yd. dipper has been able to handle up to 250 truck loads in one 8-hour period. The haul is approximately 2 mi. round trip, of which a portion is over a 20% access road from the excavation area.

Care is being taken to hold blasting above el. -25. A contact zone between two of the Columbia River basalt layers has free running water under 38-psi. pressure. The Engineers have a separate contract extending a grout curtain down to this elevation to cut off the flow. A large amount of dewatering would be necessary if this contact zone were fractured before the grout curtain is effectively in place.

The total manpower lineup for Atkinson Ostrander on both the spillway and excavation of the powerhouse totals about 515 men. These are split up with 400 men on the day shift, 100 men on the swing shift, and 15 men on the graveyard shift.

Key personnel for the Atkinson-Ostrander Co. are John J. Morton, project manager; Guy H. Heimsoth, assistant manager; Joe McNabb, project engineer; Vern R. Bradley, general superintendent, spillway; Louis L. Sheddy, acting superintendent, powerhouse; C. F. Throckmorton, master mechanic; R. T. Gabrielson, electrical superintendent; Dick Byers, office engineer; George Terry, carpenter superintendent; Ted McDaniels, drill or shoot foreman; Ed Swanson, concrete superintendent; Bill Rushing, plant superintendent; Art Mayers, re-steel; Charles Mason, rigger superintendent.

Phase 1 contract

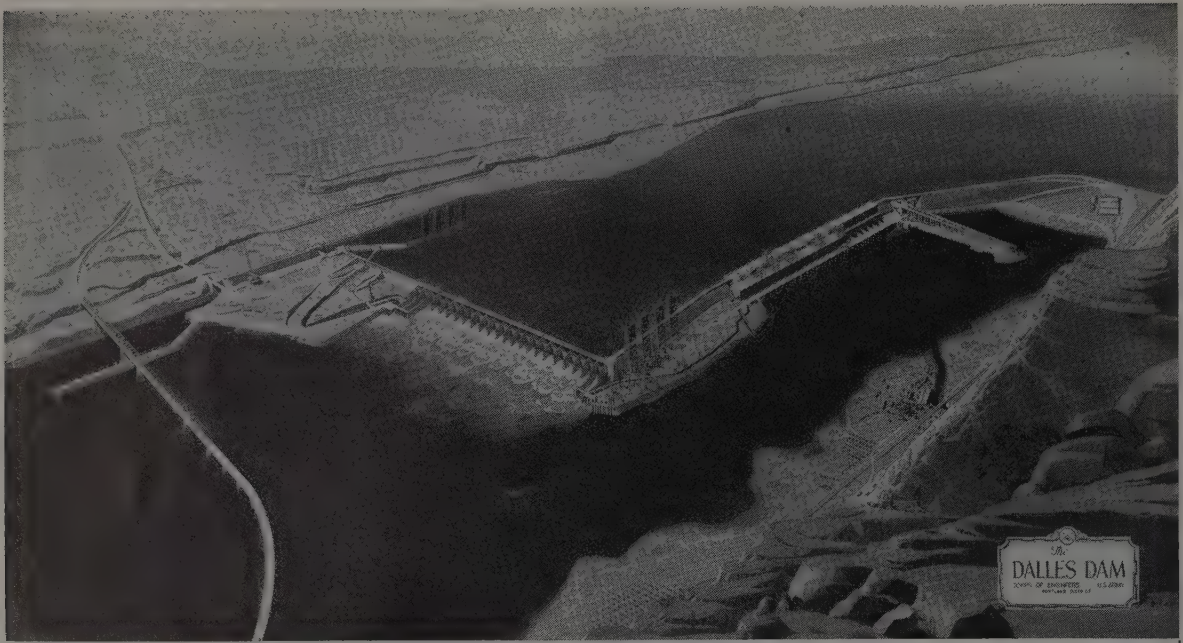
The \$30,000,000 Phase 1 contract for The Dalles powerhouse covers the assembly bay, the fish turbine bay, the station service bay, and 14 main unit bays. An additional important contract function is the maintenance of the 35-cell cofferdam facing on the Columbia River.

Excavation work here was similar



ABOVE—A Bucyrus Erie shovel, with 4-yd. dipper, has loaded up to 250 Euclid 16-cu. yd. truck-loads in one 8-hr. shift, while Cat D8 bulldozer keeps working area level. BELOW—Same area, drilling and shooting to 18-ft. depth is well ahead of excavation.





In 1960, The Dalles Project will look like this

This project provides for a dam, powerplant, navigation lock and appurtenant facilities. The improvement will provide for navigation and hydroelectric power generation. The dam is designed for a normal pool at elevation 160 mean sea level. The normal pool will create a reservoir extending upstream about 31 mi. providing slackwater to the John Day Dam site. The total length of The Dalles Dam will be approximately 8,600 ft. and will consist of a rock, gravel, and sand closure section from the Oregon shore connecting to the powerhouse, then concrete nonoverflow sections connecting the spillway with the powerhouse and the spillway with the navigation lock located at the right abutment on the Washington shore. Fish passing facilities including two ladders will be provided. The 2,150-ft. powerhouse will be constructed for 16 units with 14 units installed initially and substructure will be constructed for 6

additional units, an ultimate total of 22 units. The rated capacity of each unit is to be 78,000 kw. and the initial installation is to be 1,092,000 kw. The spillway dam will be 1,370 ft. long and located near the right abutment. The overflow crest at elevation 121 mean sea level will be surmounted with 23 radial gates 50 ft. wide by 43 ft. high which will provide capacity to pass a spillway design flood of 2,290,000 cfs. The deck will be at elevation 185.5 mean sea level and will provide a service road and track for two gantry cranes. The navigation lock will have clear plan dimensions of 86 ft. by 675 ft. and a single lift of about 87.5 ft. with minimum depth over the sill 15 ft. and normally 20 ft. The lock will include upstream and downstream guard and guide walls to protect boats and tows from adverse currents. The structures will be founded on Columbia River basalt.

to that being carried on now by Atkinson Ostrander. Over 500,000 cu. yd. of basalt rock excavation was required, most of this being between el. +38 and down to as low as el. -34. This portion of the work has been completed and the contractor is well along on forming and pouring of the various bays.

Aggregates are being furnished under a subcontract by the Curtis Gravel Co. from its plant at the government pit about 4 mi. from the batch plant. This operation differs from that being conducted by Atkinson Ostrander in that aggregate production is carried on at the pit site. All rock over 6 in. in diameter, the maximum size aggregate, is wasted, rather than running it through jaw crushers. From the Curtis plant the aggregate is hauled by Caterpillar DW20 wagons to the batch plant on

the powerhouse site. The batch plant consists of a fully automatic Noble concrete plant with three 4-cu. yd. Smith mixers. The nominal capacity of the plant is 200 cu. yd. per hour with a maximum capacity of 240 cu. yd. per hour.

A unique feature of this job is the method of transporting concrete—a first on any Corps of Engineers project. Concrete is discharged in 4-yd. batches from the plant into job modified Koehring Dumptrons. The dumptrons, in turn, discharge from ramps into 4-cu. yd. Blaw-Knox buckets. Before operations began, it was feared there would be segregation in this method of handling concrete. However, instantaneous dumping action of the dumptron has prevented any injurious segregation and no other special steps are required. This operation has proved quite suc-

cessful with two dumptrons being assigned per whirley crane. Eight of these dumptrons are being used on the job, the actual number in operation depending upon the size of the concrete pour.

All cement for the batch plant is hauled up the Columbia River on Tidewater-Shever barges. The barges have a nominal capacity of 4,700 bbl. which is measured by the barge's water displacement. All cement is Type 2, three-fourths of it being furnished by Permanente and one-quarter by the Oregon Portland Cement Co. The cement passes through an 8-in. pump line to two 5,000-bbl. silos. Over 615,000 cu. yd. of concrete will be required under this contract. In addition, 66,700,000 lb. of reinforcing steel will be required. The last item becomes interesting when converted to cubic yards

—5,000 is the amazing quantity.

The 14 main unit bays of this project are substantially the same. This makes it possible for reuse of form work to a much greater degree than can ordinarily be done on powerhouse jobs. The plan of construction is to place the main units in successive operations with the same lift being placed in each unit at about three week intervals. This plan led to the decision to use, wherever possible, steel forms which are being furnished by the Blaw-Knox Co.

Placing of concrete and handling of material is being accomplished with four whirleys. These units, with 165-ft. booms, have a capacity of 11 tons with a flat boom. Because of the height of the structure—and to keep above potential flood water—each whirley is mounted on an 85-ft. gantry. They were furnished by the Washington Iron Works of Seattle.

Much of the reinforcing steel is in 40-ft. lengths, and in the vertical parts of the structure presents concrete placing difficulties when considered in the light of 5- to 10-ft. concrete lifts. The amount of reinforcing steel mentioned earlier would have been greater yet had not the Corps of Engineers' design utilized this long steel. The contractor has been able to lick this pour situation by building scaffolds attached to the top of the reinforcing steel and from which elephant trunks are suspended to the pour below.

The rate and amount of concrete pours vary considerably on different parts of the structure. The largest pour was 3,500 cu. yd. placed continuously over 20 hours. The rate of pour varies from 170 cu. yd. an hour in open pours down to as low as 35 cu. yd. per hour in structural walls that are difficult to get at.

One important feature of The Dalles Powerhouse Constructors contract is the maintenance of cofferdams. The problem centers about the 35 sheet-steel cells facing on the Columbia River. This cofferdam was built under an original contract by the S. A. Healy Co. Nine Johnson turbine pumps are mounted at various points along the cofferdam to handle infiltration into a concrete water-collection flume built by The Dalles Powerhouse Constructors. Normal leakage is about 20,000 gpm. and utilizes but four of the pumps.

Recently, one of the cells developed a leak allowing about 20,000 gpm. additional water into the flume. This required the operation of all nine pumps to keep the water level down. In addition, about 1,000 cu. yd. of fill material was dumped on the river side of the cofferdam to plug up the leak. This operation was successfully concluded and the danger removed.

Reinforcing steel is being furnished and installed by Steel Construction Co. and Rutherford & Skoubye under a subcontract, and



JOB-MODIFIED Koehring Dumptors, 4-cu. yd.-capacity, have quick dumping action. This method of transporting concrete is a first for any Corps of Engineers project. Dumptors normally haul rock, but eight of them are used to deliver 240 cu. yd. of concrete per hour.



CONCRETE water collection flume catches infiltration through cofferdam and is a place to pump water from excavation area. Nine Johnson 5,000-gpm. pumps lift it back to river.

a majority of other steel items are being purchased from Pacific Car & Foundry Co. of Seattle. All electrical work is being done by the Donovan Construction Co. under a subcontract.

The general contractor is The Dalles Powerhouse Constructors, a joint venture of nine contracting companies. The key personnel are as follows: A. R. Bacon, project manager; J. D. Heckart, general superintendent, and Bill Money, assistant general superintendent. Other superintendents are: Joe Heckart, carpenter shop; Sid Stewart, field carpenters; Wince Bingham, ironworkers; Jack Tucker, master mechanic; Ed Bookman, electrical; Dutch Peters, labor. During the excavation Roy Ginrich was excavation superintendent with Joe Spencer as assistant. Concrete superintendent is Gil Dubey and the batch plant superintendent is Gus Larson. The office manager is George Carlson and Bill Bopp is purchasing agent.

Engineering, which includes all field layout, is under C. F. Palmetier, project engineer, with Floyd Mahoney, field engineer; Lee Fredrick, office engineer; Howard Lathem, safety engineer.

Corps of Engineers

The general coordination of the activities of the contractors and the necessary inspection are being capably handled under Corps of Engineers administration. Around-the-clock operation by the contractors necessitates many hours of diligent work on the part of the resident engineer organization. Key personnel in the latter organization are as follows: H. B. Elder, resident engineer; Leonard G. Estey, assistant resident engineer; Roy M. Cami, chief engineer branch; Joe R. Huey, chief administration branch; Kenneth F. Ramsey, project engineer, spillway; Fred Drager, project engineer, powerhouse; Ivan C. Bechtold, chief construction section.

Colorado puts rubber roads to the test



PLACING ASPHALT-RUBBER mixture utilizes the same equipment spread that is used on conventional asphaltic-concrete mixes. Latex rubber (2%) was added to asphalt at the refinery.

By A. H. BUNTE

Staff Materials Engineer
Colorado Department of Highways
Denver, Colorado

TWO 1-MI. SECTIONS of state highway, on U. S. 85-87, are being watched intently by the Colorado Department of Highways for wear, resiliency, riding qualities and resistance to weather. These two sections—one north of Castle Rock and the other south of Pueblo—are Colorado's "rubber roads," believed to be the first of their kind in the Rocky Mountain area. Neither experimental section is apparent to the eye of the tourist or trucker on this well-traveled north-south highway, unless he notices a slight darkening of the road surface as he reaches the asphalt-rubber miles.

The experimental "rubber miles" were placed during September and October of 1953 by the Colorado Department of Highways. For each section, two percent of basic rubber

was blended into 100-120 penetration asphalt at the refinery. This percentage of basic rubber was contained in a four percent latex mixture.

Both of the experimental sections were included in projects designed for the resurfacing of old portland cement concrete pavements. There will, therefore, be ample opportunity for the Department of Highways to observe whether or not cracking will occur in the asphalt-rubber surface laid over the joints and cracks in the concrete pavement.

Near Castle Rock

The northern section is on U.S. 85, between Blakeland and the junction with U.S. 87, north of Castle Rock. The whole improvement consisted essentially of widening the pavement from 18 to 24 ft. by 3 ft. shoulders, then placing a 2-in. plant-mixed asphaltic leveling course, followed by a 2-in. plant-mixed asphaltic surface course. The contractor for the entire 15-mi. project

was the Northwestern Engineering Co. of Denver.

The other experimental section was included in an 8.4-mi. project on U.S. 85-87 just south of Pueblo. On this project, the pavement was widened from 20 ft. to 24 ft.; a 1-in. plant-mixed asphaltic leveling course was placed in some areas; and a 1½-in. plant-mixed asphaltic surface course was placed for the full 24-ft. width. The contractor was Broderick-Gibbons, Inc. of Pueblo.

Identical equipment

No particular difficulty was experienced in mixing or placing the asphalt-rubber mixture on either project. On each experimental project identical equipment and procedure was used for experimental and untreated sections.

The latex rubber was well dispersed through the asphalt-rubber mixtures. In any minute portion of the mix, fine threads of rubber could be detected.

Less brittle

In general, the addition of rubber to asphalt cement decreases the cement's susceptibility to temperature changes, so that the asphalt cement with rubber added will tend to be less brittle at low temperatures and more stable at high temperatures. Thus, under service conditions, an asphalt and rubber surface will have less tendency to become brittle and crack during the winter months and will be more stable during summer months.

Previous experiments in Minnesota, Ohio and Virginia have indicated that this kind of surfacing may be both practicable and economical. Observations in these states have given us reason to hope that on this new type of road, there may be less wear and tear on both vehicles and pavements, with greater resistance to skidding and more riding comfort. Reports from Virginia do point to the possibility that latex-mixed roads "may be no better than asphalt surfaces." Virginia's observations are now in the last two years of a six-year experiment.

Yet to be drawn

Colorado's conclusions are yet to be drawn. It is expected that three to five years, or even more, will elapse before the Department of Highways can make a definite judgment regarding the comparative service performance of the untreated and the rubber-added mixtures.

ROCK BOLTS

*... theory
and practice
in tunnel
construction
and rock
excavation*

FIRST of two articles

By **SETH D. WOODRUFF**

Civil Engineering Assistant
Los Angeles Department of Public Works

IN THE WESTERN United States most rock excavation incident to construction, tunneling and metal mining takes place in rock which does not meet ideal conditions. Rocks may dip at various angles, may be massive (unstratified), and/or may be folded, faulted and fractured at random angles. Such conditions create an expensive problem of providing adequate support for the rock. Bolting is the latest development for meeting this recurring construction problem.

Until now, literature on bolting has pertained mostly to practice in coal mines, where bolts are used to strengthen fairly regular roof strata. Since this application consumes more than 90% of rock bolts manufactured, the term "roof bolting" has dominated the literature. In fact, it seems to have created the misconception that bolts are suitable only in stratified rock and only for overhead support. In actuality, rock bolts have been used in all types of rock, stratified and unstratified, and as successfully for stabilizing ribs and walls as for roofs.

This discussion outlines the theory and practice of rock bolting in civil



DRILLING AND BOLTING are fast operations, light on manpower and economical of materials. This is the outlet tunnel for Keyhole Dam in Wyoming, work done in September 1950.

engineering applications. Causes of structural failure of rock are reviewed on these pages, together with an explanation of the action of rock bolts and descriptions of bolts and their accessories. A later article will cover installation techniques, costs, and examples of rock bolting.

Causes of structural failure of rocks

The most obvious causes of structural failure of rock are decomposition and fracturing which exist prior to excavation. However, other forces are also at work tending to destroy the strength of rock around an excavation. Each of these will be described in order to explain how rock bolts counteract them.

Blasting

In any opening excavated by blasting the shattering effect of the blast loosens rock around the perimeter of the opening. Slabs which are in immediate danger of falling are "barred down" before the crew begins to muck out the round. But the rock may contain additional fracture planes, created by the blast, which will allow slabs to loosen progressively and fall of their own weight. Rock bolts, installed as soon as practicable after blasting, will pin the slabs into place and prevent further sloughing. In this case rock bolts need only be long enough to reach through loosened slabs into firm rock.

Differential elastic expansion

Much rock below the surface contains inherent stresses which were created in it by temperatures, pressures, and deformation to which it was subjected during its geologic history. The general effect of these stresses is to cause rock to expand

The need for this article

THIS ARTICLE is an outgrowth of the author's recent experience in assisting with the design and specifications for a sewer tunnel to be driven for the city of Los Angeles. Mr. Woodruff comments, "I discovered that most of the literature on suspension rock support deals with applications in coal mines, where bolts are used to strengthen fairly regular roof strata.

"There have been isolated instances of the use of rock bolts as long ago as the 1920's. But a description of rock bolting procedures in the mines of the St. Joseph Lead Co. (Engineering & Mining Journal, May 1943) aroused the first general interest, and the use of bolts increased rapidly after World War II.

"Bolts have been adopted more slowly in Western metal mining and tunneling use because of more varying rock conditions which, in turn, have required more experimentation to determine safe standards of installation."

Seth Woodruff is a graduate in mining engineering from the University of Idaho School of Mines. During his undergraduate days he worked briefly on construction of



Grand Coulee Dam, and later on he gained a "speaking acquaintance" with rocks during 16 months as a miner in Idaho. Before the war he worked as a mine safety inspector and as a shift boss. Subsequently senior mining engineer for Day Mines, Inc., of Wallace, Idaho, he is now with the sewer design division, Bureau of Engineering, Los Angeles Department of Public Works—Editor.

slightly toward any opening. A smooth flat rock surface free on all sides could expand without fracturing. However, the rock around a tunnel perimeter is confined and cannot expand freely at all points. Also the inherent stresses are not equal in all directions. Therefore the rock expands by different amounts at different points on the perimeter.

If the rock is unfractured and com-

petent (rigid and brittle), then this differential elastic expansion of the rock surface may cause "rock bursts" or "strain bursts," with violent spalling of fragments from the roof (back) or walls (ribs) or newly made openings. Generally, however, the effect of differential expansion is to create fractures which allow fragments and slabs to fall. Usually the amount of elastic expansion is slight

and exerts no pressure on supports. Its most important effect is to create new fractures in the rocks, including minute partings and cracks which permit moisture and air to penetrate.

Chemical action

Certain minerals absorb water, while others react chemically with water or oxygen to weaken the rock along cracks and seams and cause slabs and fragments to slough from the sides and roof. Rock bolts are very effective in preventing this type of rock failure because they are stressed, when installed, to exert a pressure against the rock surface. This restores some of the compressive stress which originally existed in the rock and closes cracks and seams which had begun to open. The pressure against the rock surface then prevents the progressive chemical breakdown of the rock along fractures and partings. For stabilizing rock under these conditions bolts need only be long enough to reach through the zone in which partings and cracks have begun to expand. The sooner bolts are installed after blasting the less chance will the zone of deterioration have to penetrate into the rock, and the more satisfactory will be the effect of bolting.

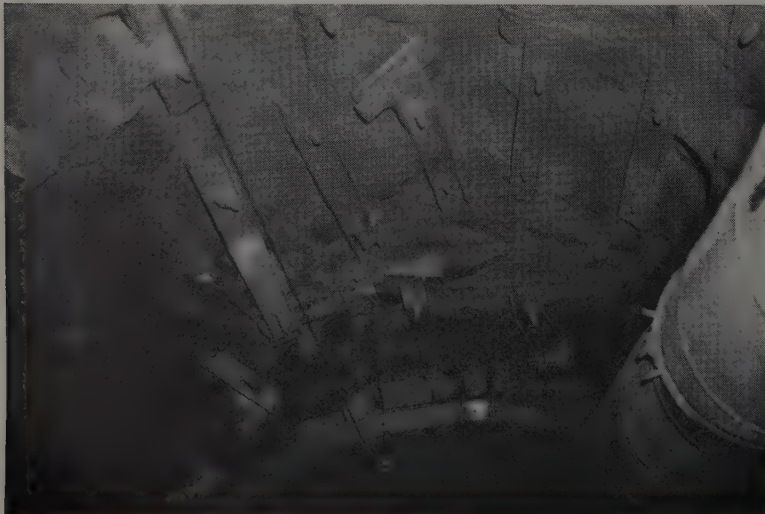
Swelling rock

"Swelling ground" is a type of failure also caused by chemical action as described above. The result in this case, however, is that the rock expands and exerts great pressure on supports. This can sometimes be controlled by guniting the rock surface to protect it from contact with air and moisture. However, such rock usually contains structural defects such as fractures, bedding planes, etc., which require support. In this situation rock bolts should be particularly useful since they furnish structural support but do not interfere with guniting.

Weight of overlying rocks

This section deals with forces which are important in causing rock failure at greater depths, that is, the stresses created around the perimeter of a tunnel by the weight of the rock which lies between the roof of the tunnel and the surface of the ground. These stresses may give visible evidence of their presence, as when rock fails. But if the rock is strong enough to resist them, then they will be invisible. In either case they are always present.

Extensive photoelastic tests on models of underground openings have been conducted by the U. S. Bureau of Mines as well as a number of other experimenters. These tests



SLAKING IS A PROBLEM when some rock is exposed to air and moisture. If the tunnel must stand for a long time before concreting, it may be desirable to gunite the rock with $\frac{1}{2}$ to $\frac{3}{4}$ in. of cement mortar.

have shown that, in the case of a circular opening, stress at the sides of the opening is compressive, equal to about 3 times the applied load. Stress at the top and bottom of the opening is tensile.

Figure 1 shows a mass of rock at depth and the effect of a circular tunnel through the rock. The weight of the block of rock directly above the tunnel must now be supported by the rock at the sides of the tunnel with the result that the pressure on rock at tunnel sides is greatly increased.

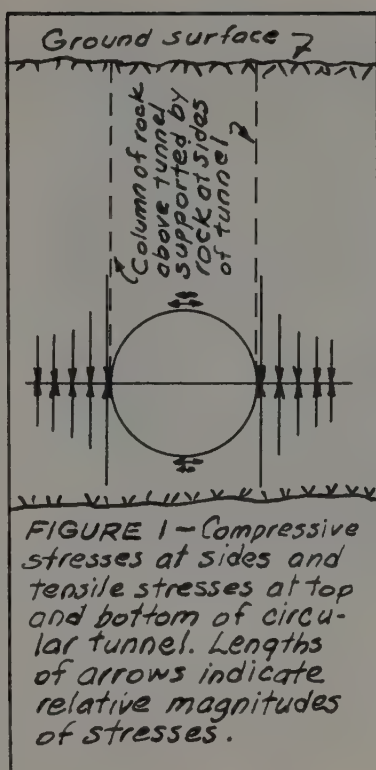
R. P. Schoemaker has interpreted Fenner's analysis of stresses around underground openings. ("A Review of Rock Pressure Problems," *Mining Technology*, November 1948.) He concludes that, for the average rock, the tensile stress in the rock at the top and the bottom of a circular tunnel will be 25%, and the vertical compressive stress at the sides of a circular tunnel will be 275%, of the average vertical compressive stress existing in the rock at that depth.

These conditions are illustrated in Figure 2 with a rock section taken at a depth of about 800 to 900 ft. in a homogenous rock and assuming that no residual horizontal stresses are present. After a tunnel is driven the vertical stress compressing the rock at sides of tunnel will be about 2,750 psi. The tensile stress tending to pull the rock apart at the top and bottom of the tunnel will be about 250 psi. The compressive strength of most common rocks is nearly always greater than 5,000 psi. and may range up to 50,000 psi. Therefore, compressive failure of rock at the walls is not common.

Tensile failure

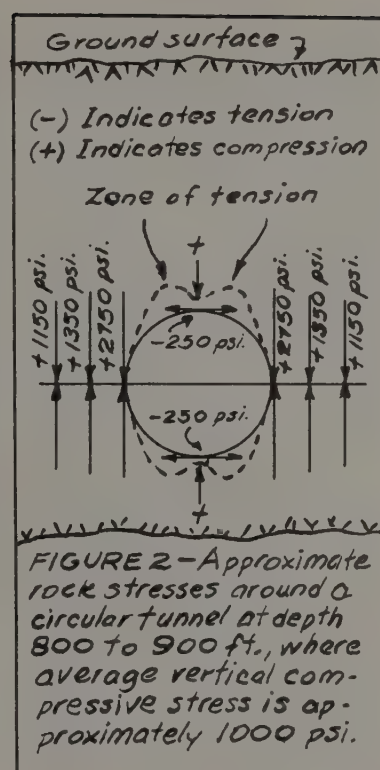
If failure occurs, the rock ordinarily fails in tension at the top and bottom of the opening, because the tensile strength of most rocks is only a small fraction of their crushing strength. A badly fractured rock may have a tensile strength of zero. Tensile strengths generally range from 2% to 10% of crushing strengths and average about 3% to 4%. The weaker sedimentary rocks, such as sandstone and shale, may have tensile strengths ranging from 100 psi. to 800 psi. Metamorphic and igneous rocks generally have higher tensile strengths, which may range up to 1,500 psi. and above.

When tensile failure occurs, rock dropping from the roof causes the "caved arch" common to all underground openings which are at such depth that tensile stresses created exceed tensile strength of the rock. According to Schoemaker, the height of the zone in which tensile



stresses exist at the top and bottom of a tunnel depends only on Poisson's ratio (ratio of lateral deformation to vertical deformation under stress) and is independent of the depth below surface. Under average conditions the tension zone extends a distance equal to about $\frac{1}{4}$ the tunnel diameter above the top of a circular tunnel and the same distance below the bottom.

In a tunnel 8 ft. in diameter a zone extending about 2 ft. above the top and 2 ft. below the bottom would be under tensile stress. If rock is strong no evidence of stress will show. If



rock is weak it will pull apart along planes of weakness at top and bottom of the tunnel. Tensile failure of this kind cannot be prevented with supports. However, failed rock in the arch should be pinned into place with rock bolts to prevent progressive sloughing of more rock from other causes.

In the rock directly above center of tunnel there also exists a narrow zone under vertical compressive stress which tends to shear out a narrow wedge of rock and force it down through the center of tunnel roof. When this type of rock failure



LAMINATED BEAM supporting extremely wide roof spans is formed when rock strata can be tied together by bolting. This haulage-way installation represents a common bolt application in coal mines.

occurs the bolts used for roof support should be more closely spaced near the top of the arch and at least as long as the tunnel radius. In an 8-ft. tunnel bolts 5 or 6 ft. long would be desirable at the top of the arch. Other bolts need only be long enough to penetrate through the zone of tension.

Squeezing rock

Occasionally soft shales, fault clays, decomposed gneisses or schists and other soft rocks (with low shear strength) are encountered which are somewhat "plastic" and, under the pressure of overlying rock, squeeze slowly into the tunnel. This plastic flow cannot be controlled with rock bolts.

In this connection it should be noted that the types of failure described in the previous sections are typical of rock which behaves as an elastic material. Most "utility" tunnels have no more than 1,500 to 2,000 ft. of cover, and at these relatively shallow depths, most rocks are governed by the laws of elasticity. At greater depths, such as those encountered in mining, shearing stresses will begin to exceed shearing strength of the weaker rocks and they will tend to behave somewhat as a plastic material.

Weathering of surface rock

In quarries, road cuts, and other rock excavations on the surface inherent weaknesses will be accentuated by weathering. The rock will separate easily along planes of weakness such as joints, bedding planes, shearing, and cleavage. Rock bolts offer opportunities for stabilizing slopes along railroad or highway right-of-way. Best opportunity for bolting is offered by rock whose planes of weakness parallel the slope of the bank. Bolts installed approximately normal to the rock surface will anchor outer layers to firmer rock underneath. Rock which breaks into large blocks and slabs may also be pinned to firmer foundation rock. Bolts are particularly useful in stabilizing slopes when blasting and removal of the loose rock would obstruct highway or rail lines or when blasting would endanger residences or other property. Also rock slopes may be stabilized at steeper angles with rock bolts, thus reducing amount of excavation required.

Theories explaining action of rock bolts

Laminated beam

In thin to medium bedded rock, two or more strata are bolted together, forming a laminated beam strong enough to support itself as well as overlying rock. The principle is similar to that used by the carpenter who bolts together several layers of boards to make a stiff beam.



FRACTURED GRANITE has been tied into competent blocks by bolts installed radially in mine tunnel. Bolts also extend into competent rock outside tunnel perimeter. This 2-yr.-old installation shows no deterioration despite stresses at 4,400-ft. depth, demonstrates successful stabilization of non-stratified rock.

Rock in this condition offers the most favorable opportunity for support by rock bolts and, when strata are not broken by cross-fracturing, rock bolts spaced 4 to 5 ft. apart will furnish enough support for roof or walls.

Suspension from stronger strata

In some coal mines weak shale strata are overlain by stronger sandstone. By using bolts long enough to penetrate into the stronger rock, the weak shale can be suspended. Similar conditions are occasionally encountered in tunneling when soft rock on the perimeter of the tunnel can be tied to stronger strata located a few feet in the walls or roof.

Suspension outside the caving arch

In tunnel work the roof or "back" is ordinarily rounded, in contrast to the flat roofs of coal mine openings. There is no opportunity to create a laminated beam spanning the tunnel. As explained in a previous section, a zone of tension exists at the top of a circular tunnel in which rock tends to pull apart and drop out, thus forming an arch. However, this zone of tension will not ordinarily extend above the tunnel for a distance more than $\frac{1}{4}$ the tunnel diameter. Outside the zone of tension the rock is under compression and tends to support itself. Rock bolts used in supporting the roof under these conditions should be at least as long as the tunnel radius, although longer bolts or closer spacing may be re-

quired near the top of the arch to support the compressive zone directly above center of roof.

Consolidation of fragments

Rock may be broken into numerous slabs, blocks, or irregular interlocking fragments, but without voids or open fractures. In such cases (jointed granite, jointed sandstone, brecciated argillite or quartzite, etc.), each rock bolt has the effect of clamping or squeezing together the rock fragments in a circular zone around it so that they tend to cohere as a solid mass. A number of these competent (rigid) blocks or "key-stones" around the perimeter of a tunnel will act as a masonry arch and will support themselves.

The size of the zone compressed into a competent mass by a rock bolt depends on many variable factors and for each situation may be determined by experimental installations. Some factors are the following characteristics of the fragments: size, shape, strength, rigidity, and roughness of surfaces. Rock bolts which depend upon this principle for supporting fractured rock around a tunnel should, for moderately jointed rock, be about as long as the tunnel radius. For supporting rock fractured into smaller pieces it may be necessary to use bolts as long as $\frac{2}{3}$ the tunnel diameter. Shorter bolts may be used in haunches and walls.

In the foregoing examples the primary effect of the bolts is a strengthening of the rock structure. However, in each case the bolts also perform the important function of compressing the rock surface and limiting the effects of elastic rock expansion by preventing the opening of partings, cracks, and joints which would be subject to chemical attack by air and moisture.

The failure of conventional supports to hold the surface of roof rock tightly in place is often responsible for the development of excessive vertical pressures. If exposed rock is allowed to settle, or move down, then the rock above it loosens and settles also. The process continues until broken rock has expanded enough to fill the available space above the supports, which then must support the entire column of failed rock. Success in stabilizing rock around underground excavations can be summarized in the slogan (used by a paint company!), "Save the surface and you save all."

Types of rock bolts and accessories

Steel bolts

Bolts are usually made of mild steel which has a yield strength of about 40,000 psi. and a breaking strength of 60,000 to 65,000 psi.

Rock bolts 1 in. in diameter, with slot and wedge anchorage, are the

most common. These bolts are most often used in lengths from 4 to 6 ft. but are available commercially in lengths from 2 to 10 ft. Couplings and extensions are available for bolts so that any length desired can be assembled and installed. Breaking strength of bolts furnished by commercial manufacturers is about 35,000 to 40,000 lb.

Bolts $\frac{3}{4}$ in. in diameter are frequently used. This size bolt is equipped with a fixed square head on one end and is threaded on the other end for an expansion-shell anchor. It is available in lengths from 2 to 8 ft. Couplings and extensions can be attached to bolts to make any length desired. Breaking strength of bolts furnished by commercial manufacturers is about 20,000 lb.

Rock bolts $\frac{5}{8}$ in. in diameter have recently been placed on the market. They are made of special high-strength steel and have the same physical characteristics as the $\frac{3}{4}$ -in. bolts. They are designed for use with special expansion shells which have a large expansion capacity and which expand uniformly along the entire length to give stronger anchorage in softer rocks.

Bolt design

The points of weakness of a rock bolt are at the base of the slot and at the roots of the threads. A bolt 1 in. in diameter will have a cross-section area of 0.78 sq. in. With a $\frac{1}{8}$ -in. slot in the end it will have a net area of 0.66 sq. in. at the base of the slot. At the roots of the threads the cross-section area is only about 0.60 sq. in. Therefore, when bolts are pull-tested to failure, breakage usually occurs in the threads. The same is true for bolts of $\frac{3}{4}$ -in. diameter used with expansion shell anchorage. The weak point is at the base of the threads where the cross-section area is about 0.33 sq. in. as compared with an area of 0.44 sq. in. for the remainder of the bolt.

Types of anchorage

Slot-and-wedge anchorage is the cheapest and simplest to make. A slot $1/16$ to $1/8$ in. wide and about 6 in. long is sawed, or burned with a cutting torch, in the end of the bolt to receive a steel wedge. Anchor wedges are about $5\frac{1}{2}$ in. long, $\frac{3}{4}$ in. wide and from $\frac{1}{2}$ to 1 in. thick; the thickness used may vary with the type of rock. The bolt wings, when driven over the wedge, will cut a mortise in the rock for anchorage. In firm strata, such as sandstone, limestone, granite, and some hard shales the slot-and-wedge anchorage is good enough that the bolt, when pull-tested to failure, will usually break before the anchorage fails. Slot-and-wedge anchorage is commonly used with bolts which have a diameter of at least 1 in. Slotting a rod of smaller diameter than this leaves wings with too small an area for safe bearing and resisting tensile stresses. Also, rigidity is required in a bolt which is to be driven

over a wedge for anchorage, and diameters smaller than 1 in. tend to bend or buckle in the hole if driven with a pneumatic drill.

Expansion shell anchors are used almost exclusively with bolts $\frac{3}{4}$ in. in diameter. Many types are on the market. They consist essentially of a split sleeve, serrated on the outside. The threaded end of the rock bolt screws through a wedge-shaped nut which forces the segments of the sleeve against the walls of the hole. They are usually installed in holes of $1\frac{1}{8}$ -in. dia. Expansion-shell anchors give anchorage in rock too soft to anchor the slot-and-wedge type. They also have the advantage that they can be anchored at any depth in the hole and, therefore, the hole need not be drilled to exact depth. Also, under certain conditions, the bolts can be recovered for re-use.

Bethlehem Steel Co. gives the following values, as determined by field tests, for anchorage by expansion shells on $\frac{3}{4}$ -in bolts: Anchorage in hard shale, sandstone, limestone, is equal to or greater than the breaking strength of bolt; in medium shale 14,000 to 22,000 lb.; in soft wet shale 6,000 to 13,000 lb. The manufacturer recommends that bolts be tightened to torque of at least 150 to 200 lb. for maximum anchorage.

Types of header

Headers are the headboards, lagging, steel plates, or channels which bear against the rock and transmit stress from the rock bolt to the rock surface. In very hard rock a 6 x 6 x $\frac{3}{8}$ -in. or an 8 x 8 x $\frac{3}{8}$ -in. steel plate on each bolt may furnish enough bearing area. If more bearing area is required headboards up to 3 in. thick and 12 x 30 in. in area are sometimes used. If the rock is fractured to the extent that continuous support is needed then lagging may be used, with bolts spaced at intervals along the lagging.

The most satisfactory and permanent support is obtained by bolting

steel channels or steel mine ties against the rock. Structural steel channels 4 in. wide and weighing 5.4 lb. per ft., or steel mine ties $5\frac{1}{2}$ in. wide and weighing 5 lb. per ft. are ordinarily strong enough for continuous support if bolts are spaced not more than 4 ft. apart. When properly installed the channels are bent around projections and held tightly against the rock. The two end bolts in each length of channel should be angled out so that, when tightened, they tend to stretch the steel channel and place it under tension. Thus, any movement of the rock will be resisted by increased tension in the channel.

Other types of headers, which have been used successfully in mining work, are steel strips, steel landing mat, and heavy steel wire mesh. The $\frac{3}{4}$ x 6-in. steel strips are laced across the roof in a rectangular pattern and pinned with bolts at frequent intervals. One installation employed war surplus airfield landing mat with rock bolts around the perimeter of a tunnel to hold badly fractured ground for several months until it could be concreted. Heavy steel screen or wire mesh has also been used with rock bolts. The screen does not furnish rigid support to the rock between bolts but it prevents loose fragments from dropping.

NEXT MONTH . . .

The practical side of rock bolting:

INSTALLATION — Drilling, driving and tightening methods and equipment.

COSTS—Equipment, materials and labor estimated and compared to rib support.

EXAMPLES—A review of bolt jobs in excavations and in mine and utility tunnels.

Flow meter for relief wells

THE CORPS OF ENGINEERS' Waterways Experiment Station at Vicksburg, Miss., has recently developed an improved meter for measuring flow in pressure relief wells. These wells, installed at the toe of earth dams or behind levees, intercept seepage and provide relief for excess hydrostatic pressures in pervious strata beneath the structures. Measurements of seepage flow into the wells from various strata as well as total flow are obtainable with the meter.

The flow meter, essentially a vertically operating current meter, is used to measure flow by observing (electrically) the rate of revolution of an 8-bladed aluminum impeller mounted in a guard ring. Basic concepts of this design and construction were tested several years ago

when an earlier version of a relief well meter was developed under the Civil Works Investigation program sponsored by the Office, Chief of Engineers. Use of commercially-available bearings and an electrical contact assembly for detecting impeller revolutions results in ease of maintenance and replacement of all operating parts. The meter has a spring-leaf adapter, adjustable to various well diameters, which centers the meter in operating position. The meter is lowered into the well on a cable to measure flow.

Meters constructed for St. Louis District and for use by Waterways Experiment Station field parties have been calibrated in 6- and 8-in. pipes and show linear operation accurate to better than 3% of flow over a range from 10 to 1,000 gpm.



Folded plate roof construction

Repeat usage of formwork, designed by the engineer, makes a low cost building possible

By **MILO S. KETCHUM**

Consulting Engineer
Denver, Colorado

THE H. W. MOORE Equipment Co. building, a reinforced concrete structure under construction in Denver, utilizes two types of folded plate shells. One is a discontinuous Z-shaped shell arranged to provide a north light clerestory, and the other a continuous series of inverted V shapes. The latter shell is designed to carry two 15-ton cranes on the roof system.

The building consists of three parts: (1) an office and parts area, (2) a shop area for repair of construction equipment, and (3) a display and utility area. These three areas required different roof treatments, but esthetics demanded that the structures be integrated in architectural design.

Framing for the roof over the shop area is a series of inverted V-shaped folded plates of 80-ft. span and 36-ft. width from ridge to ridge. There are five structural bays, giving a total area of 180 ft. by 80 ft. The height above the floor is 20 ft.

except in a high crane bay where it is 26 ft. The thickness of the plates is 6 in. except at the supports, where it is increased slightly for shear. Natural light is provided with plastic domes in each shell.

The office and parts area is covered by another folded plate roof of Z-shape with a 75-ft. span and 22-ft. cantilever overhangs on each end. There are 11 bays on 18-ft. centers. These shells are arranged so that a north light clerestory is provided between the roof units. The plates, which are 4 in. thick, are stiffened by concrete end walls and columns.

The roof of the display area is similar to that of the shop area except that the span is 40 ft. Carrying concentrated loads directly on the

shell was taken advantage of in this area by suspending a mezzanine from the roof.

The construction of the foundations for this building was more or less routine. The bearing strata are about 25 ft. below the floor level. Caisson piles were used in the office and parts area and wood piles in the shop area. Grade beams were used to support outside walls.

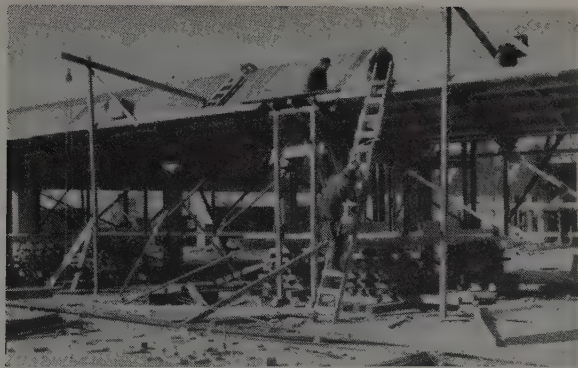
The problems in forming the roof with movable forms are believed unfamiliar to most engineers and contractors, so this phase of construction will be given the most attention in this article. Plans for this project were sent out for competitive bids. Usually in such a case, construction details such as formwork are left to the contractor. However, because of the unusual nature of the construction, complete designs for movable forms were made and incorporated in the plans, to be used at the option of the contractor.

The forms, consisting of steel trusses carrying wooden joists, were designed to be supported at four places and jacked into place. Removal and resetting of the forms

IN THE interests of keeping Western engineers informed of new methods in building design, this article is abstracted from the author's recent speech before the American Concrete Institute in Denver.—Editor.



VIBRATING 2-in. slump concrete out of the bucket was required. This enabled concrete to remain on steep slopes.



ERECTION of steel forms in 75-ft. span includes two movable units and a small center section. The latter is left in place for 28 days after the pour.



COMPLETED Z slab with forms removed except for supports at center and ends of cantilevered section.

was to be performed by moving them sideways rather than moving them out of the building and back again. Down the center of each span a permanent timber form was provided which could be left in place for a full 28 days. Forms were planned to be moved at the end of seven days, the number of forms being arranged so that jobs were provided continuously for each crew.

The contractor is using the forms designed by the engineer except that the south end of the office and parts area is being formed with conventional wood forms. Also, some of the trusses have been redesigned to be of constant depth so they would have a better salvage value or could be used for other shell structures of different spans.

In the engineer's design, the columns were cast in place, but most of the walls were arranged to be precast flat on the ground and lifted into place. Because of scheduling and the uncertainty of lifting methods, the contractor elected to form and cast these walls in place with the exception of some of the tie beams. These were cast in vertical forms rather than flat.

The design cylinder strength of the concrete used in the roof plates is 3,750 psi. The slump is about 2 in. maximum for the steepest part of the plate. There is no danger of

getting the mix too wet because it does not stay on the slope unless it is at the optimum water content. A check on the strength of the concrete was to be made by tests for deflection on small reinforced concrete beams in the field.

Concreting methods

On the Z shells, the concreting was started from the top and continued downward. Even though the slope of the middle of the Z is quite steep, close spacing of the reinforcing holds the wet concrete in place against sliding. However, it was decided later that it is better to place the concrete from the bottom upwards. The biggest problem is voids, caused by the concrete hanging up at the continuous bar supports. On certain portions of the roof, reinforcing steel was spaced at 2 in. center to center. During construction it was necessary to space every fourth or fifth bar slightly greater to get the concrete vibrator through the plane of reinforcement.

Concrete is delivered to the forms by a crane and a hopper bucket with a gate. The stiff consistency of concrete is such that there is difficulty in getting it through the gate, and it must be vibrated out. This hopper bucket was evidently designed for concrete with more mixing water.

When the plans were sent out for

bids, it was expected that there would be a very large variation in the bids because of unusual construction. It was a surprise to both architect and engineer that for the four bids received, the highest and lowest were within 2.16% of each other, and the three lowest bids were within .9 of 1% of each other.

Considerable changing of the plans was necessary to bring the cost down to the owner's requirements and an accurate breakdown of cost of the structure as built is not possible at this time. Cost of the entire building as originally bid was about \$9.00 per sq. ft. of total roof area plus area of the mezzanine floor. The work included considerable office finish as well as radiant heating and cooling in the floor. Subsequent estimates for this type of construction used in warehouse buildings has been \$4.50 per sq. ft., complete with heating and plumbing.

All our studies indicate that for large buildings, where considerable repetition in formwork is permissible, this type of construction can be built for less than exposed steel. This is particularly true if allowances are made for savings in insurance rates, which can be as much as 600% greater for steel.

Architect for the structure was Tom Moore of Denver. Contractor is N. G. Petry Construction Co.



BELOW—Falsework tower rests on four capped piling. Double pin connection at bottom allows complete freedom for alignment.

ABOVE—Towers are shown located under one of two parallel steel bridge spans at the main panel points.



Telescoping falsework

A UNIQUE construction method is being employed for the steel erection of the new Cowlitz River bridge located south of Toledo, Wash., on relocated primary state highway No. 1.

The falsework consists of four sets of twin steel telescoping towers placed at the major panel points. The leg of each tower raises or lowers by means of a 100-ton hydraulic jack permanently installed in the tower leg. The tower legs are connected on the top by two 16-in. I-beams. The lower portions of the legs are connected by means of a steel strut consisting of angles and lacing bars. Steel rods and turnbuckles provide the transverse bracing. The base of the tower legs consists of a series of small I-beams forming a grillage supported by four timber piles driven into the bed of the river. The tower legs are pin-connected in both the transverse and longitudinal axis, providing perfect adjustment to the panel points.

In order to provide longitudinal anchorage until the bottom chord and bottom lateral bracing is erected, steel cables are strung between the main piers of the bridge just outside the line of the main trusses. The tops of the towers are clamped along the cables at their proper locations and the steel erection is started. At such time as the main panel points of the steel span are riveted, the tower can be quickly dismantled and erected for the next spans.

The Cowlitz River at the bridge site is susceptible to flash floods and heavy drift. This type of erection has proven very satisfactory since it has been unnecessary to block the streamflow with large amounts of piling and bracing members which might be carried away during high water.

Beasley Construction Co. of Muskogee, Okla., is the subcontractor for the steel erection under the prime contractor Peter Kiewit Sons' Co. Resident engineer for the state of Washington is J. C. Tucker. The twin structures will be completed this summer.

Small size riprap is best

Erosion of the upstream gravel blanket surfacing on the Fort Peck Dam was becoming serious. Experimental work was undertaken to determine how economically in-place, oversize riprap could be reduced in size to check further damage

RPAIR of a test section of the Rock riprap material on the upstream face of the Fort Peck Dam in northeastern Montana was completed during the past fall and winter by the Cass Company, Ogallala, Neb. This was an experimental contract for the Fort Peck District of the Corps of Engineers.

Purpose of the work was to develop feasible and economical methods for treatment of the rock facing materials to provide protection of the underlying gravel blanket against wave erosion. This, in turn, would prevent the possibility of the sand fill material leaching through the gravel cover during any unprecedented windstorm that would produce high and continued wave action. Corps of Engineers maintenance forces had noted erosion occurring where portions of the gravel blanket had been washed down the slope. This was apparently the result of wave action in the voids between large pieces of protective quarry stone that ranged in weight from 2,000 to 20,000 lb.

The area selected for the test comprised a strip of rock facing approximately 60 ft. wide and 1,460 ft. long on the upstream side of the 4-mi. long earthfill dam. Three methods were tried during the experimental work, all of which involved equal sections of the test area. Each method with variations included placement of approximately 4 in. of gravel in passageways between rocks and in areas deficient of gravel cover, production and placement of spalls and small rocks in the voids, reduction in size of the larger rocks by blasting, rearrangement as necessary of the facing stone to provide uniform spacing, and keying in the space filling material by rock pieces weighing a minimum of 500 lb. each. The contractor was also required to keep detailed cost records for all phases of the work performed under the three methods. This was to



BEFORE blasting, wide gaps between rocks permitted waves to wash out gravel blanket underneath.



AFTER blasting, similar pieces were produced in the same location to hold a new 4-in. gravel blanket in place.

provide factual data for future repairs that may be undertaken under similar conditions.

After placement of gravel in the voids between large rocks in all areas where gravel cover was deficient, the methods varied.

The first method consisted of placing spalls and small rocks to cover completely all gravel in the gaps between the large pieces of facing stone. These small pieces of rock were to be produced by blasting certain excess or very large rocks in the immediate area, or, they were to be obtained by blasting rocks in a nearby stockpile. After this first step, other previously designated rocks over 6,000 lb. in weight (about 40 cu. ft.) were reduced in size by blasting. The resulting rocks were then rearranged to produce a reasonably uniform surface in which the small rocks and spalls in the passageways between larger rocks were keyed in place by rock weighing a minimum of 500 lb.

A second method involved drilling and blasting the corners and sides of designated rocks larger than 4,000 lb., this to produce enough spalls and small rock in place to fill the passageways and cover over the gravel blanket between the rocks sufficiently. Then the larger rocks, which were not seated on the gravel, were drilled to such depth that a blast would blow the bottoms off and produce spalls and small rocks in place under the large stones. After these two steps, designated rocks over 6,000 lb. were drilled and blasted.

The resulting rocks were then rearranged as in the first method. The third method was roughly a reversal

of the first. Designated rocks over 6,000 lb. were blasted in place. Resulting spalls and small rock were then rearranged, the smaller spalls being placed directly upon the gravel in the passageways. Additional spalls, as necessary, were obtained from the nearby stockpile, and the remaining larger pieces of rock, weighing a minimum of 500 lb. were rearranged as necessary to hold down the spalls and smaller pieces of rock.

To the degree possible, and depending upon the method used, the spalls and small pieces of rock were hand placed, Rearrangement of the larger 500-lb. minimum size stones was accomplished by the use of a crawler crane equipped with a 30-ft. boom and orange peel bucket.

All three experimental methods proved successful with unit costs being approximately the same for each. Payment to the Cass Company was \$34,325 for 9,730 sq. yd. It is believed that the resulting rock riprap covering in the repaired area will prevent any further erosion of the gravel down the face of the dam. Also, that the rock riprap cover will successfully resist movement by wave action. The results of this test are being analyzed by the Corps of Engineers. Guide specifications are to be prepared to govern any future repairs of a similar nature that may be necessary at other locations on the upstream face of the Fort Peck Dam.

The foregoing work on the experimental contract was performed under the direction of Lt. Col. Erland A. Tillman, District Engineer, Fort Peck District, Corps of Engineers, U. S. Army, Fort Peck, Mont.

REPORTS from the COURTS

By HOWARD S. BURNSIDE, Attorney and Registered Engineer

Liability for improper power line clearance

IT HAS BEEN recently determined in the California courts that the owner of property where a building is being constructed has a duty to act affirmatively to protect employees of a construction contractor from an existing power line that would violate the general order regulating vertical clearance from the finished structure.¹

This decision came about in this way. The plaintiff, an iron worker, was employed by an independent contractor. The contractor was constructing a building addition for an oil company which owned the property. Over the area where the building was located there were some 16,000-volt uninsulated power lines that were owned and maintained by a power company. When working on the roof of the new building, the plaintiff manipulated a piece of metal sheeting, contacted the power line and was knocked to the ground, the fall resulting in injuries to him.

Before the building was constructed the lines were sufficiently high off the ground but after the building was completed the distance between the roof of the building where the plaintiff was working and the power lines was less than required by the State Public Utilities Code as set forth therein by a general order. The plaintiff sued the owner of the property and the power company and obtained a judgment against the owner.

On appeal the reviewing court said "Although appellant (the owner) had nothing to do with the installation or maintenance of the power line, it brought itself within the requirement of the general order when it undertook to erect a building beneath the power line which would render the continuance of the line within less than 13 feet from the roof of the building a violation of the general order. Until the building was being constructed the location of the power line was not violative of the order; it was the combination of the two that constituted the violation. Upon demand by appellant of the Edison Company, the latter would have been required to change the location of the line. Appellant had a duty to act affirmatively to remedy the condition. By

its inaction it could not evade responsibility for the creation and maintenance of a condition which was a violation of law. It is inconceivable that the Edison Company would have refused to comply with the safety order by changing the location of the wires if appellant had requested it to do so.

"It is well settled that such violation of law constitutes negligence as a matter of law."

Thus, although the owner of the building did not maintain the wires and had no authority to move them, the owner had a duty to provide a reasonably safe place to work and to see that they were moved or otherwise made safe. To this extent therefore, the owner is included within the requirements of the general order regulating vertical clearance of power lines.

(1) *Bickham vs. So. Cal. Ed. Co.*, 263 Pac. 2d 32.

Proceeding under arbitration clause

THIS REPORT concerns a case which started out as an arbitration proceeding. Every effort has been made to reproduce an accurate "miniature" of the matter, which is worthy of attention because it refutes the conception that arbitration clauses in contracts are a cure-all. Note the arbitration costs involved.

A machine shop owner and a contractor agreed on a price of \$14,876 for an alteration job. The contract contained an arbitration clause requiring the parties to arbitrate questions of right and obligations.

A dispute arose. It was arbitrated and an award of \$1,332 made to the contractor less \$50 for unperformed work, plus \$2,323 for extras. The owner was awarded \$500 for work improperly done—namely an un-leveled concrete floor. The arbitrators fixed their own compensation for the arbitration at \$1,020, owner and contractor each to pay half. This award required the contractor to finish certain items, some of which were never done.

Later a supplemental award was filed by which the arbitrators awarded \$64 to the owner for the uncompleted work. The cost of the second arbitration was fixed at \$340 and charged entirely to the owner.

The superior court had confirmed the first award, but this was set aside later for the failure of the contractor to complete the work. Following this the second arbitration was had and the court confirmed it. The owner then appealed the order confirming the award which brought the case to the District Court of Appeal in California.

The owner argued among other things that the contractor did not furnish receipted bills as required by the contract and that without them the arbitrators acted in excess of their authority. To this the court said "it must be presumed that the arbitrators included in their award any damage resulting from (contractors) breach of this portion of the contract."

The owner, who operated a machine shop, apparently removed and replaced the unlevel floor and complained to the court on appeal that this delay in completion caused damages. To this the court said "Presumptively the arbitrators found that the delay was not caused by (the contractor), and this conclusion is not open for consideration on appeal."

Regardless of which party was right or wrong it is clear that this particular piece of arbitration cost a lot of time and money and finally required court action. An arbitration award is not necessarily the last step and costs may go on as they did here.

It is equally clear that this owner, right or wrong, had no record of the arbitration proceedings to put before the reviewing court to show that the arbitrators acted in excess of their authority, if they actually did. Thus, the court had no alternative but to "presume" that the arbitrators acted properly. It has taken a thousand years to develop our laws with a view to eliciting the truth and proving facts; and the advantages of this development is of no avail in an informal proceeding.

Sampson Motors vs. Roland 263 P. 2d 445.

Notes

AN EMPLOYEE who falls from a height on his employer's premises or against some object in the course of his employment, is eligible for workmen's compensation even if the fall was due to an idiopathic seizure not connected with his employment. In the case at hand the employee was walking down the aisle returning from the employer's dispensary where he got an aspirin to relieve a headache.

The Supreme Court of California affirmed this award.¹ Some may be interested to know there was a dissenting opinion.

1. *Employers Mut. Liability Ins. Co. vs. Ind. Acc. Comm.* 263 P. 2d 4.



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ARIZONA

PERMANENT TYPE CONSTRUCTION in the amount of at least \$10,000,000 is either now under way or being planned at Luke Air Force Base near Phoenix. Work now in progress includes an \$8,500,000 job of runway extension, a \$500,000 hangar (now 70% complete), and a number of miscellaneous buildings. Projects being planned for the 1955-56 program are headed by \$1,675,000 worth of improvements at both Luke and Gila Bend gunnery ranges. Fisher Contracting Co. and Mardian Construction Co. hold most of the prime contracts at present.

HIGHWAY FUND DIVERSION—The Maricopa County Board of Supervisors plans to divert \$450,000 in matching federal-county funds from street paving projects in Phoenix to construction of an 8-mi. stretch of the Beeline Highway, according to James T. O'Neil, vice

chairman of the Board. The reason given was because \$293,000 in federal funds would be lost due to the prohibitive cost of purchasing rights-of-way in the city in order to meet federal requirements for use of the money. The Beeline Highway is 84 mi. long. When this 8-mi. section is completed, there will be 26.1 mi. left to build.

ORDNANCE DEPOT MAINTENANCE SHOP—An ammunition maintenance shop measuring 60 x 300 ft. will probably be built at the Navajo Ordnance Depot this summer at a cost of \$500,000, according to Col. Oscar Ramnes, commanding officer. The structure will be built with concrete block.

RECENT MAJOR CONTRACT AWARDS and low bids in Arizona include an award of \$2,727,160 to Kitchell-Phillips Construction Co., Inc., and Utah Construction Co., of Phoenix for construction of a 71,000-sq. ft. test facility building adjacent to Sky Harbor airport in Phoenix. United Contractors, Inc., of Phoenix

submitted a low bid of \$124,555 for 4.4 miles of grading and draining on US 6 near Springville.

CALIFORNIA

FOLSOM DAM PROGRESS REPORT—More than two-thirds of the concrete pouring at Folsom Dam on the American River has been finished, with about 400,000 cu. yd. remaining, according to Charles F. Beatie, resident engineer for the Corps of Engineers. The project is ahead of schedule despite a series of storm-caused setbacks during the last two winters (*Western Construction*—August 1953, p. 97; June 1953, p. 141; March 1953, p. 96; February 1953, p. 92.).

Continuing progress was assured when the Senate Appropriations Committee approved \$15,000,000 for the project in the fiscal year starting July 1. Since the House had already allocated \$14,000,000, a conference between the two groups must arrive at a compromise figure, which will probably be somewhere between the two.

NAPA'S SCHOOL-BUILDING program, expected to provide about \$1,750,000 worth of new facilities for the community's children, is scheduled for completion in time for start of the fall semester in September. A school system official estimated that four new classrooms would have to be built each year to keep up with the increasing population in the area.

COLORADO RIVER AQUE-DUCT EXPANSION—Four new contracts, reaching a total of more than \$6,000,000, were awarded by the Metropolitan Water District as part of its \$52,000,000 Colorado River Aqueduct expansion program. The jobs include a 4-mi. pipeline from the Cajalco Tunnel to Corona, awarded to the ABC Construction Company, Inc., for \$2,330,346; a 4.5-mi. pipeline through Corona, awarded to the American Pipe Construction Co. for \$2,057,955; the San Juan Tunnel, a 10-ft. diameter, concrete-lined bore, awarded to the Walsh Construction Co. for \$1,533,720; and valve fabrication for pipelines under construction, awarded to the Pelton Water Wheel Co. for \$171,307. When completed, this pipe-

STEEL SHEET PILING PROTECTS SEA TRENCH EXCAVATION

Sea trench excavation for construction of new steam plant at Redondo Beach, Calif., for Southern California Edison Co. was protected by steel sheet piling rented from L. B. Foster Co. The trench required 15,000 cu. yd. of excavation. The station will cost \$25,200,000 eventually and will generate 312,000 kw.



HOW TO SET LOADING RECORDS



THis Caterpillar HT4 Shovel feeds a 1500-lb. hot batch asphalt plant and loads trucks for Ideal Asphalt Paving Co., Inc., near Las Vegas, Nev. Plant production averages 500 tons per eight-hour day. This HT4 has loaded as much as 1300 tons of gravel in the same period of time!

The versatile CAT* HT4 Shovel can earn its keep at many tasks: bulk material handling, grading, excavating, light bulldozing, cleaning up. It's compact and maneuverable for work in tight places. Hydraulic controls are precise and fast-acting, and permit simultaneous raising and dumping of the 1¼-yd. bucket. Because it's designed as a unit, with the weight of the bucket evenly distributed along the full length of the tracks, it will not "dance," even with a full load.

Rugged construction is an important reason for the HT4's high work output. It's built to withstand extreme stresses and stay on the job year after year without costly down time. Carefully designed filters and seals protect the machine's Caterpillar-built precision. They keep oil and lubricants *in*, and harmful grit *out* of the engine and hydraulic system.

Ideal Asphalt is predominantly equipped with Caterpillar-built machines. They own two HT4 Shovels, a D7 and two

big D8 Tractors, and three Caterpillar Diesel Engines. "We think we can make more money with the big yellow machines," says Mark C. Whiting, company treasurer. "They're dependable, and we can get parts and service when we need them. Our dealer service is the way we like it."

Your Caterpillar Dealer can give *you* the same kind of service. Ask him for black and white *proof* that the Caterpillar HT4 Shovel will do *more* work at *less* cost on *your* job than any other shovel of its size.

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

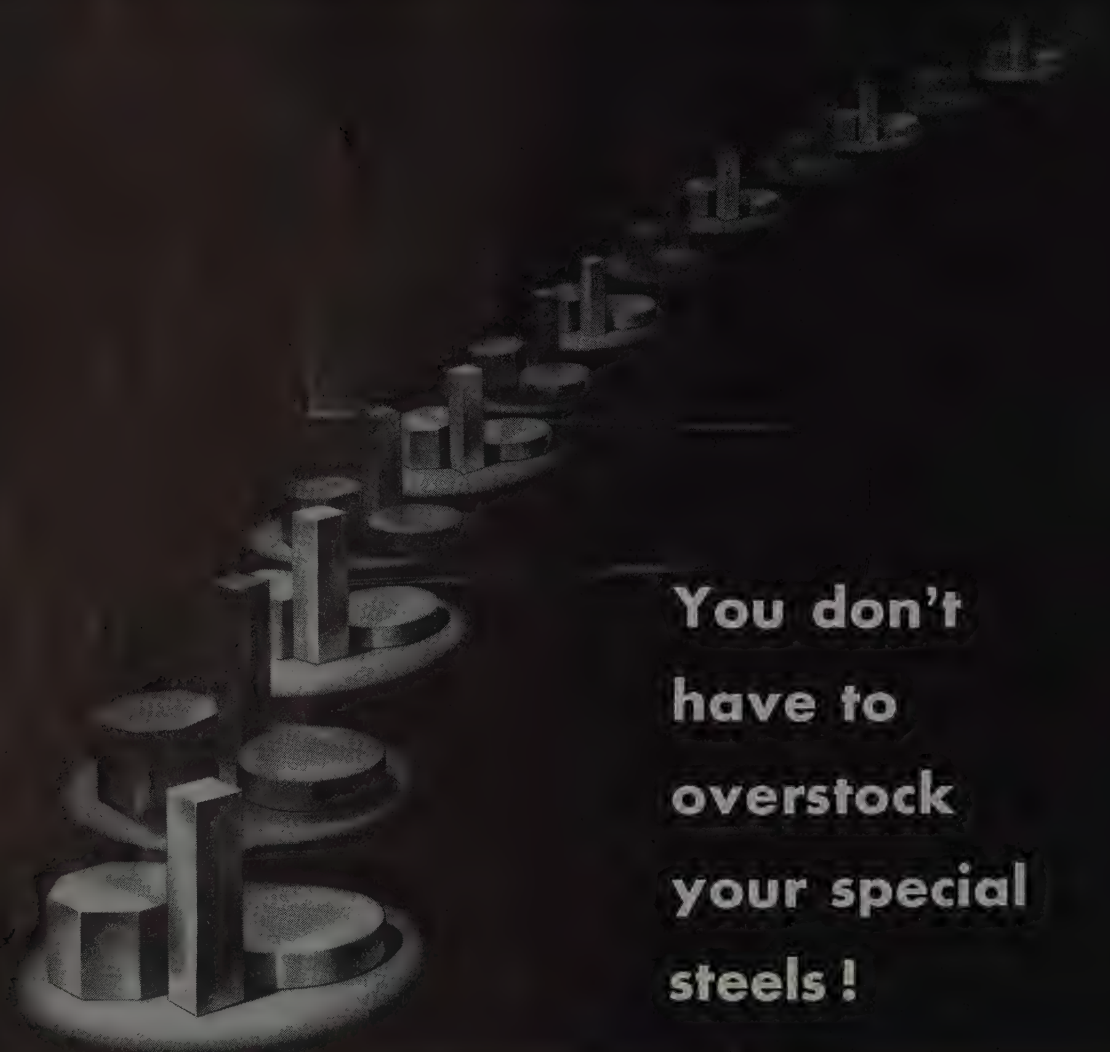


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line will carry 500,000,000 gal. of water daily from Lake Mathews, the District's principal storage reservoir near Riverside, into Orange County.

HOSPITAL ENLARGEMENT—

The City of Hope National Medical Center in Duarte is planning a \$5,000,000 expansion and modernization program over the next 41 months, according to Victor Carter, the institution's president. Facilities included are a research building, employees' quarters, maintenance shops, and a cardiovascular building for patients with heart and allied ailments.

GOOD WORK REWARDED—

The contracting firm of Ukropina, Polich, and Kral of San Gabriel received a miniature golden roller trophy from R. M. Gillis, deputy state highway engineer, for the best highway contract completed in District VII during the calendar year of 1953. Haig Ayanian, resident engineer on the project for the state, received a similar trophy. The presentation was made at the Third Annual "Bonneroo," given by the State's construction department for 500 Highway Division employees, contractors, equipment company representatives, material suppliers, and reporters.

NEW ENGINEERS' OPERATIONS OFFICE—

The Sacramento District, Corps of Engineers, has set up a San Joaquin Valley Operations Office to handle Pine Flat and Big Dry Creek dams near Fresno and Isabella Dam near Bakersfield, according to Col. W. J. Ely, Sacramento district engineer. H. J. Dickinson, former project engineer at Isabella Dam, is in charge, with offices at Pine Flat Dam. He will be aided by two dam superintendents—Al E. Plummer for Pine Flat and Harold Cate for Isabella.

Planned projects which will come under this office when they are finished include Bear Dam on Bear Creek, to be started this year, Terminus Dam on Kaweah River, and Success Dam on Tule River.

UNUSUAL TILT-UP JOB—

Lindgren & Swinerton, Inc., has a \$3,000,000 job building two electronics plants and an office building for Grayson Controls Division of the Robertshaw Fulton Controls Co. in Long Beach. Plants 1 and 2 will be of tilt-up construction, precast concrete panels, metal roof, and structural steel construction.

F. C. Harp, general superintendent on the job, explained that all walls, which are 6-in. precast panels, are being cast on 1½-in.-thick casting pads outside, 25 ft. clear of the building, where they will be more accessible. This also will speed up erection and cut costs. At the same time

the precast panels are being poured, concrete floors are being poured in the building areas and structural steel is being erected. The roof consists of steel decking with 1-in.-thick fiberglass insulation and built-up roofing.

Bethlehem Pacific Coast Steel Corp. fabricated the structural steel framing and Case Foundation Co. provided caisson drilling machines.

TRUCK-PASSING LANES —

The State Division of Highways plans to spend \$30,000 in constructing five truck-passing lanes on U.S. 101 in Humboldt County where the heavy trucks ordinarily slow down and hold up passenger automobiles, according to George T. McCoy, state highway engineer. The lanes will be 10 ft. wide and will run from 800 to 1,200 ft. in length. They will permit slowly-moving trucks to pull off the main highway and allow other traffic to pass while the trucks keep moving. The movement of traffic will be checked at the lanes, and if they alleviate traffic jams on the grades others will be built, McCoy said.

A MOVABLE traffic lane divider, which can divide a 6-lane highway according to the flow of traffic in either direction, makes it possible to accommodate heavy traffic in one direction in four lanes, while the lighter flow occupies only two lanes. The separator, developed by Grant Wiswell of Burlingame, is made up of interlocking units with a grid design in each unit which reflects headlight beams to light the double line. The grid design also creates a vibration in the steering column and an audible warning hum if the wheels mount the Centerline, which is what he calls his contraption.

WHOPPING BUDGET—

The Board of Commissioners of the Los Angeles Department of Water and Power have submitted a tentative budget figure of \$181,126,000 for the next fiscal year to Mayor Poulson. This amount will be raised by more than \$100,000,000 worth of water and power sales, proceeds from other operations, and sale of revenue bonds.

Samuel B. Morris, general manager and chief engineer, and Ben P. Griffith, president of the Board, reported that the Department expects to contribute more than \$4,365,000 to the City's general fund during the year.

DE LUZ DAM—

The Senate has passed a compromise bill which should lead, in the not too distant future, to construction of a \$22,635,000 dam and reservoir on the Santa Margarita River in Southern California, since the House has already passed a similar bill. The two bills differ, however, in many legal and

technical provisions, so a conference committee from both branches must get together and come to an agreement before the bill can go to the president for signature.

Local water users near Fallbrook had been fighting for years to get a larger share of the water in the district. The government had been moving to preempt the water for use at Camp Pendleton, a U. S. Marine Corps training base. The dispute was resolved in the bill by giving 60% of the water to the Marines and 40% to the Fallbrook Public Utility District.

RECENT MAJOR CONTRACT

AWARDS and low bids in California include a low bid of \$152,667 by Baker & Pollock of Ventura for 6.8 mi. of grading in San Luis Obispo. Ball & Simpson & Erickson and Phillips & Weisberg of Berkeley submitted a low bid of \$2,670,871 for 2.9 mi. of grading, surfacing and structures in Alameda county. Gordon H. Ball & San Ramon Valley Land Co. & Clements & Co. of Danville submitted a low bid of \$923,692 for 8.4 mi. of surfacing in Alameda and San Joaquin counties. John Burman & Sons of Eureka submitted a low bid of \$503,135 for 0.8 mi. of grading and surfacing in Mendocino county.

Clements Construction Co. of Centerville submitted low bids of \$175,517 for 12.5 mi. of plantmix surfacing in Nevada and Placer counties; \$115,275 for 12.7 mi. of surfacing on US 40 in Butte and Plumas counties; \$125,135 for 10.8 mi. of resurfacing in Siskiyou county; \$131,693 for grading and surfacing Grant Line road near Stockton. G. W. Ellis Construction Co. of North Hollywood submitted a low bid of \$188,875 for 10.0 mi. of widening and surfacing in Mono county. Fredrickson & Watson Construction Co. of Oakland submitted a low bid of \$1,655,393 for 6 mi. of grading, surfacing and construction of five bridges in Ventura county. George E. France of Visalia submitted a low bid of \$143,917 for 7.9 mi. of grading and surfacing near Keeler, Inyo county.

Granite Construction Co. of Watsonville submitted low bids of \$157,844 for 4.2 mi. of grading and surfacing west of Planada, Merced county; \$245,832 for 19.8 mi. of widening and surfacing in San Bernardino county; \$193,342 for 3 mi. of grading and surfacing near Mariposa; and received an award of \$518,437 for 4.9 mi. of surfacing on US 101 in Mendocino county. J. E. Haddock, Ltd. of Pasadena submitted a low bid of \$3,135,122 for 1.4 mi. of the Harbor Freeway between 42nd and 23rd streets in Los Angeles. Harm Bros. of Sacramento submitted a low bid of \$139,784 for 13.2 mi. of surfacing in Lassen and Modoc counties. Huntington Bros. of Napa submitted a low bid of \$233,814 for 6.1 mi. of grading and surfacing south of Ukiah, Mendocino county. Lee J. Immel of San Pablo submitted



NEW HEADQUARTERS FOR COLORADO HIGHWAY DEPARTMENT

Scheduled for completion August 1955 is the 524-ft.-long by 221-ft.-deep headquarters building for the Colorado Highway Department in Denver by C. H. Leavell & Co. of El Paso, Tex., under a \$1,895,000 contract. Construction started April 22, 1954. The garage will cost another \$315,000 under separate contract.

a low bid of \$184,918 for 18.8 mi. of surfacing in Contra Costa, Alameda and Santa Clara counties.

Kenworthy & Patterson of Stockton submitted a low bid of \$442,867 for 2.8 mi. of grading, surfacing and a steel girder bridge in Tuolumne county. Peter Kiewit Sons' Co. of Arcadia submitted a low bid of \$814,259 for construction of the Manhattan Beach storm drain in Los Angeles county. Vido Kovacevich of Rosemead submitted a low bid of \$1,575,167 for 2.2 mi. of grading, surfacing and 2 welded girder bridges in Los Angeles county. Madonna Construction Co. of San Luis Obispo submitted a low bid of \$287,070 for 3.3 mi. of grading and surfacing and a reinforced concrete bridge in Santa Barbara county. McCammon-Wunderlich Co. and C. K. Moseman of Palo Alto submitted a low bid of \$2,251,599 for 14.4 mi. of grading, surfacing and six reinforced concrete bridges in Riverside county. Millemann-Sooy & Jackson of Redlands submitted a low bid of \$135,983 for construction of a steel beam bridge and approaches near Winterhaven, Imperial county. Munn & Perkins of Modesto submitted a low bid of \$190,258 for 1.3 mi. of grading and surfacing west of Loyalton and 12.3 mi. of surfacing north of Truckee.

Oilfields Trucking Co. and Phoenix Construction Co. of Bakersfield submitted a low bid of \$158,146 for 3.9 mi. of grading and surfacing on US 6 in Kern county. Parish Bros. of Benicia submitted low bids of \$3,425,225 for 8.6 mi. of grading, paving and structures near Petaluma; \$122,898 for 0.7 mi. of widening and surfacing near Vallejo. M. J. Ruddy & Son of Modesto submitted a low bid of \$234,655 for 1.6 mi. of grading and surfacing near San Andreas. Sheets Construction Co. of Gardena submitted a low bid of \$496,160 for 1.4 mi. of grading, paving and one bridge, in Los Angeles county. Ralph

B. Slaughter of Julian submitted a low bid of \$138,921 for 20.8 mi. of surfacing in Riverside county.

Stewart & Nuss Inc. of Fresno submitted a low bid of \$178,509 for 1.3 mi. of grading and surfacing near Los Banos. B. J. Ukropina, T. P. Polich, Steve Kral & John Ukropina of San Gabriel submitted a low bid of \$106,429 for construction of two reinforced concrete bridges in Stanislaus county. United Concrete Pipe Corp. of Baldwin Park submitted a low bid of \$2,298,483 for construction of various works for the Delano-Earlwart Irrigation District. Vernon Paving Co. and Dana Company, Inc. of Los Angeles submitted a low bid of \$118,493 for 22 mi. of surfacing in San Bernardino and Riverside counties.

COLORADO

FOOTING TESTS for the 14-story, \$3,500,000 Petroleum Club Building in Denver are being made before construction of the reinforced concrete structure gets under way. N. R. Petry of the N. G. Petry Construction Co., which has the contract, said that the foundation will have to go down 60 ft. to reach shale.

BIGGER COLORADO HIGHWAY BUDGET—The Colorado Highway Commission expects to have a budget of \$21,000,000 for the fiscal year starting July 1, about \$2,000,000 more than was available this last year. Additional funds will be available because the Department has paid off a note to the State treasury, owed since 1937, and this will free funds budgeted to repay that debt in the past, according to Mark U. Watrous, state highway engineer. Another source of added

funds is that the Department is receiving more money under the new highway users' act, which splits up revenues among state, counties, and cities.

STAPLETON AIRPORT EXPANSION—The last unit in a \$1,750,000 expansion program at Stapleton Airport in Denver is now under construction. The unit, a \$540,000 central lobby and baggage section of the terminal, is scheduled for completion in February 1955.

BOULDER'S \$2,000,000 waterworks expansion program has gotten a good start with completion of a 325-mi. pipeline section. It will deliver 16,000,000 gal. of water per day according to C. M. Dixon, director of water development. Work has started on a storage and a regulating reservoir on the city's outskirts.

AURORA has engaged Ken White, a consulting engineer, to make a survey of the Delmar drainage area in an effort to solve the city's perennial flood control problem, according to Earl P. Sandquist, the city manager.

IDAHO

CONSTRUCTION HAS STARTED on Sandpoint Bridge across Pend Oreille Lake (*Western Construction*—June 1954, pp. 65-67) with clearing of rights-of-way to the approaches. A joint venture of Peter Kiewit Sons' Co. and LeBoeuf Dougherty was awarded the prime contract on a low bid of \$1,135,332 for construction of the 5,897-ft.-long structure. Calvin Dougherty is scheduled to supervise the job.

PRIEST RIVER POWER PROJECT—Northern Lights, Inc., has received a 3-yr. preliminary permit from the Federal Power Commission for a proposed hydroelectric project on Priest River and Priest Lake in Bonner County. Included are plans for two dams, one 3 mi. below Priest Lake with a 4,400-hp. capacity powerhouse and one 8 mi. below the lake with a 4,600-hp. capacity powerhouse.

BOISE BANK BUILDING—Construction of a 6-story, \$1,500,000 bank building in Boise has begun, with completion date scheduled for about December 1, 1955. C. B. Lauch Construction Co. of Boise holds the contract. The building will be an L-shaped structure measuring 50 x 100 ft. on one wing and 50 x 122 ft. on the other. It will be of reinforced concrete construction faced with red granite and brick with cast stone trim.

RECENT MAJOR CONTRACT AWARDS and low bids in Idaho include an award of \$274,947 to the

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Arrington Construction Co., Inc., of Idaho Falls for construction of a reactor test facility building at Idaho Falls. **Germer, Abbott & Waldron** of Tremonton received a \$212,985 award for 11.7 mi. of grading, surfacing and one concrete bridge in Owyhee county. **LeGrand Johnson** of Logan received a \$736,831 award for 19.3 mi. of surfacing on US 20 and 20.5 mi. of surfacing on US 26 in Bingham and Butte counties. **Carl E. Nelson Construction Co.**, of Logan submitted a low bid of \$123,553 for 13.0 mi. of surfacing at the National Reactor Testing Station. **Nelson & Deppe** of Boise received a \$207,334 award for 12.1 mi. of grading and surfacing in Owyhee county. **Duffy Reed Construction Co.** of Twin Falls received a \$253,384 award for 8.4 mi. of grading and surfacing state highway 25 in Jerome county. **Western Construction Co.** of Pocatello received a \$173,336 award for 10.6 mi. of grading and surfacing in Lemhi county. **Karl Woodall** of Boise received a \$146,920 award for 8.2 mi. of grading and surfacing in Owyhee county.

MONTANA

COMO DAM—Rehabilitation work at Como Dam, south of Hamilton on the Bitterroot River, is being planned for this summer by the U. S. Bureau of Reclamation. The job will consist of placing 2,700 cu. yd. of additional fill on the dam's crest and 6,000 cu. yd. of dumped riprap on the upstream face, according to Russell Unrue, manager of the Bitter Root Irrigation District.

GAS LINE EXPANSION—The Federal Power Commission is hearing a proposal by Treasure State Pipe Line Co. of Great Falls to increase its present authorized exports of natural gas to Canada by 40,000,000 cu. ft. a year. Permission to do this must be granted before the Petroleum and Natural Gas Conservation Board of Alberta will allow the company to install a gas system to supply the Milk River in Alberta.

HELENA is planning a \$500,000 business district paving project, including removal of streetcar tracks and installation of new pavement and curbs, for next year, according to Henry Rolfes, Jr., city manager.

RECENT MAJOR CONTRACT AWARDS and low bids in Montana include an award of \$109,488 to **S. Birch & Sons Construction Co.** of Great Falls for 9.3 mi. of roadmix surfacing on the Jordan-Circle road in Garfield county. **Inland Construction Co.** of Miles City received two awards; \$128,063 for 12.6 mi. of roadmix surfacing on the Jordan-Circle road in Garfield county; \$144,496 for

15.2 mi. of roadmix surfacing on the Colstrip-Forsyth road in Rosebud county. **Peter Kiewit Sons' Co.** of Lewistown received two awards; \$128,621 for 13.8 mi. of roadmix surfacing on the Jordan-Circle road in McCone county; \$311,533 for 14.9 mi. of grading on the Fairview-Girard road in Richland county. **Nilson-Smith Construction Co.** of Great Falls received an award of \$172,437 for 12.0 mi. of grading and plantmix surfacing on the Crow Agency-Broadus road in Big Horn county. **Lou Richardson** of Miles City received two awards of \$198,530 and \$170,239 for grading and plantmix surfacing of two stretches of 12.7 mi. and 14.2 mi. on the Crow Agency-Broadus road in Big Horn county.

NEVADA

RENO AIRPORT—A financial and legal mixup, caused by condemnation negotiations with property owners, has been settled, and the way has been cleared for Isbell Construction Company, Inc. to proceed with its \$1,263,725 contract for runway extension, taxiways, roads, aprons, field lighting, and the like. The improvements are being made at Reno Airport for the Nevada Air National Guard.

ADDED HIGHWAY FUNDS—Congressional action which recently increased federal aid highway construction funds for Nevada will result in a stepped-up construction program beginning July 1, 1955, according to Huston D. Mills, state Highway engineer. The money, totaling \$8,696,000, breaks down into \$4,066,000 for primary, \$2,718,000 for secondary, \$132,000 for urban, and \$1,780,000 for interstate highway construction.

BELL TELEPHONE CO. of Nevada has spent more than \$2,000,000 on construction jobs in 1953, according to the company's annual report. Included were building additions, dial conversions, extension of system, and new installations.

RECENT MAJOR CONTRACT AWARDS and low bids in Nevada include an award of \$416,389 to **Silver State Construction Co.** of Fallon for 24.2 mi. of grading near Dayton, Lyon county.

NEW MEXICO

FIRST PHASE of a \$10,000,000 improvement program at the New Mexico State Hospital at Las Vegas, a \$2,000,000 contract to build four new buildings and remodel two others, is scheduled for completion

by the end of the year. **McKee Construction Co.** holds the contract. **John Messer** is job superintendent.

MIDDLE RIO GRANDE PROJECT—W. A. Dexheimer, commissioner of reclamation, said that an appropriation of more than \$2,600,000 for next year is needed to keep the Middle Rio Grande reclamation project in New Mexico on its established schedule, due for completion at the present rate in three years. The addition of more money would speed up construction, he added. The budget appropriation for the fiscal year which began July 1 is around \$1,500,000.

SENECA CREEK DAM—Construction of a small dam on Seneca Creek, near Clayton, has been approved by the Canadian River Compact Commission. It would impound 4,000 acre-feet of water into a 160-ac. lake for recreational purposes.

COUNTY-INDIAN HOSPITAL—The 5-story, \$3,500,000 County-Indian Hospital in Albuquerque is nearing completion. **Lembke-Clough & King Construction Company, Inc.**, erected the structure.

RECENT MAJOR CONTRACT AWARDS and low bids in New Mexico include an award of \$105,564 to **Skousen Construction Co. & D. D. Skousen & Son** of Albuquerque for 9.5 mi. of grading and drainage on state route 156 in Guadalupe county. **D. D. Skousen & Son** received two awards; \$307,000 for 5.5 mi. of grading and surfacing in the Apache National Forest, Catron county; \$150,087 for 7.4 mi. of grading and plantmix surfacing on state route 12, Catron county. **Henry Thygesen & Co.** of Albuquerque received an award of \$598,735 for 22.1 of grading and plantmix surfacing on US 84 in Rio Arriba county.

OREGON

CONSTRUCTION WILL START September 1 on a 160,000-sq. ft., \$8,000,000 department store in Salem. Plans, which contemplate parking space for 700 cars, are being drawn by **Welton Becket & Associates** of Los Angeles. **James L. Payne** of Salem is associate architect.

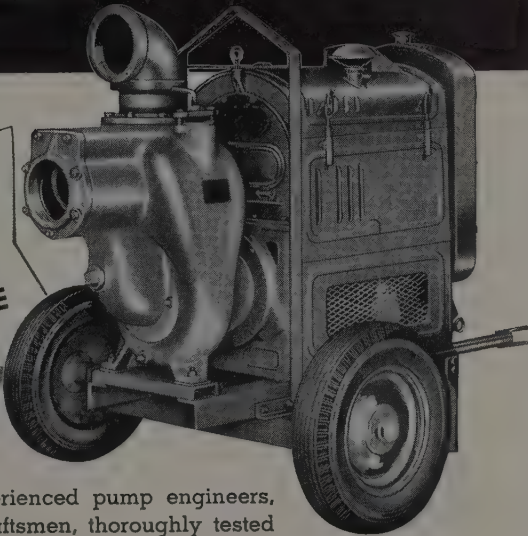
A 175-FT. CUT through Roberts Mountain in Western Oregon is the largest single part of a 2,200,000-cu. yd. earthmoving project now under way on U. S. 99 near Dillard. The project includes straightening and modernization of 6.66 mi. of the highway. It is being done by **D & H Construction Co.** and **M. H. Hasler Construction Co.** of Sacramento,

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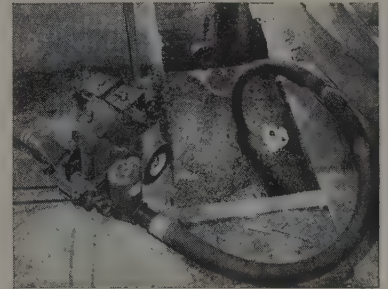
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FIELD NOTES ON THE GORMAN-RUPP DIAPHRAGM PUMP IN A SLAUGHTER HOUSE

Before the men at a Berlin Heights slaughter house heard about the Gorman-Rupp diaphragm pump, they used to flip a coin to decide which unfortunate individual got the repulsive job of cleaning out the pit into which all of the blood and other waste matter of the slaughter house drained.

The pit was about 8 feet square and 10 feet deep. The liquid was to be pumped into a storage tank which at the time the pump was installed was in the construction stage. This tank would be placed about 30 feet from the pit. The Gorman-Rupp 3D-8R6 diaphragm pump was placed at the side of the pit, making a 10 foot suction lift and a 30 foot discharge.

In order to prove the Gorman-Rupp diaphragm pump's ability to pump the liquid, the discharge hose was curled around and back into the pit. The diaphragm pump handled the liquid and waste materials smoothly, easily, and quickly.

The unit is self-priming and required no attention except supplying of fuel and starting or stopping.

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

Calit., under a joint venture contract of \$1,359,785.

Equipment on the job includes four Cat DW20 wagons, six D8 tractors, and a motor grader. J. O. Etheridge, representing the Weaver Tractor Co., supervised unloading and initial servicing of the equipment.

Contractors' personnel include George Renaud, project manager; George Coons, project superintendent; Ed Trick, office manager; and Richard (Dick) Smith, project engineer. Key foremen are Dan J. Eagen, M. H. Hasler, Jr., and Ray Livingston. C. A. Seaton is master mechanic. William Hallas is Highway Department resident engineer.

ALKI SEWAGE TREATMENT PLANT—John W. Cunningham, of the Portland consulting engineer firm of John W. Cunningham & Associates, has been retained to prepare a report on the Alki Sewage Treatment Plant and sewage collection system.

TALENT DAM—The U. S. Bureau of Reclamation has submitted its plan for the proposed \$19,900,000 Talent Dam on Jenny Creek near Ashland to interested state and federal agencies for comment preliminary to a report to the Budget Bureau and submission to Congress. The project would add a new power plant, capable of developing 10,000 kw., to the Columbia River power system. The report also calls for construction of the Howard Prairie Dam and 60,500 acre-foot reservoir, increasing the Emigrant Dam reservoir from 8,300 to 45,000 acre-feet, and construction of major new

water collection and delivery canals and a tunnel.

TUALATIN DAM—Construction of an \$11,000,000 dam across the Tualatin River at Gaston southwest of Portland has been recommended by the Corps of Engineers. The reservoir would store 55,000 acre-feet of water for flood control, irrigation, and domestic water supply purposes. Ultimate storage capacity would reach 70,000 acre-feet.

RECENT MAJOR CONTRACT AWARDS and low bids in Oregon include a low bid of \$165,015 by Berke Bros. & C. R. O'Neil of Cresswell for 1.9 mi. of grading in Douglas county. Birkemeier & Saremal of Portland submitted a low bid of \$218,140 for construction of eight reinforced concrete grade separation structures on the Portland-Salem Expressway. J. W. Briggs of Bend submitted a low bid of \$693,998 for 8.5 mi. of grading, paving and one concrete bridge near Madras. Hallett Construction Co. and Continental Co. of Madras submitted a low bid of \$248,229 for construction of 30 mi. of the Detroit-Albany 230-kv. line for the Bonneville Power Administration. C. E. Lesebery of Nyssa submitted a low bid of \$139,557 for 7.1 mi. of grading and oiling near Ontario, Malheur county.

Rogers Construction Co., Inc., of Portland submitted three low bids; \$544,349 for 12.8 mi. of grading and paving near Chemult, Klamath county; \$365,311 for 16.1 mi. of rock-base and oiling near The Dalles; \$289,179 for 7.1 mi. of paving near Clatskanie, Columbia county. Schrader Construction Co. of Port-

land submitted a low bid of \$125,800 for construction of a 210-ft. concrete deck girder viaduct over the Banfield Expressway in Portland. Strong & McDonald, Inc., of Tacoma submitted a low bid of \$198,500 for repair of the south jetty at the entrance to the Coquille River. Wall, Bartram & Sanford of Junction City received an award of \$120,465 for construction of a 374-ft. concrete deck girder viaduct south of Port Orford.

UTAH

ECHO-CASTLE ROCK ROAD—Completion of the \$1,700,000 road improvement program on U. S. 30 between Echo Junction and Castle Rock is scheduled for fall. The project is separated into an overpass, 6 mi. of widening and realignment below Emery, and 8 mi. of improvement and new construction from Emery to Castle Rock.

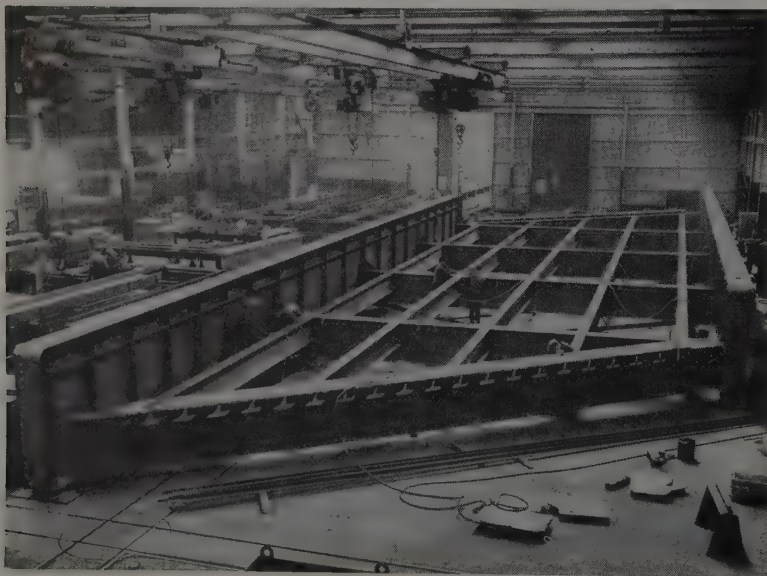
ANOTHER DELAY in construction of the University of Utah's long delayed student union building (Western Construction—April 1954, p. 96) came from that old bugaboo, lack of funds. R. C. Culp, chairman of the Board of Regents Building Committee, said that the lowest of 14 bids received on constructing the building was \$2,035,000, which is about \$250,000 above the amount that will be available. In an effort to finally get the project under way, the Board of Regents has authorized the Building Committee to eliminate any unnecessary features in the plan so that it can be erected with the funds that will be available. The committee scheduled meetings with the architect and representatives of the student body in an effort to come to a final solution.

HOUSING PROJECT—Cannon Papanikolas Construction Co. has announced the start of a \$2,500,000 residential housing project on a 70-acre tract in a suburb of Salt Lake City. Plans exist for building a modern shopping center as construction progresses.

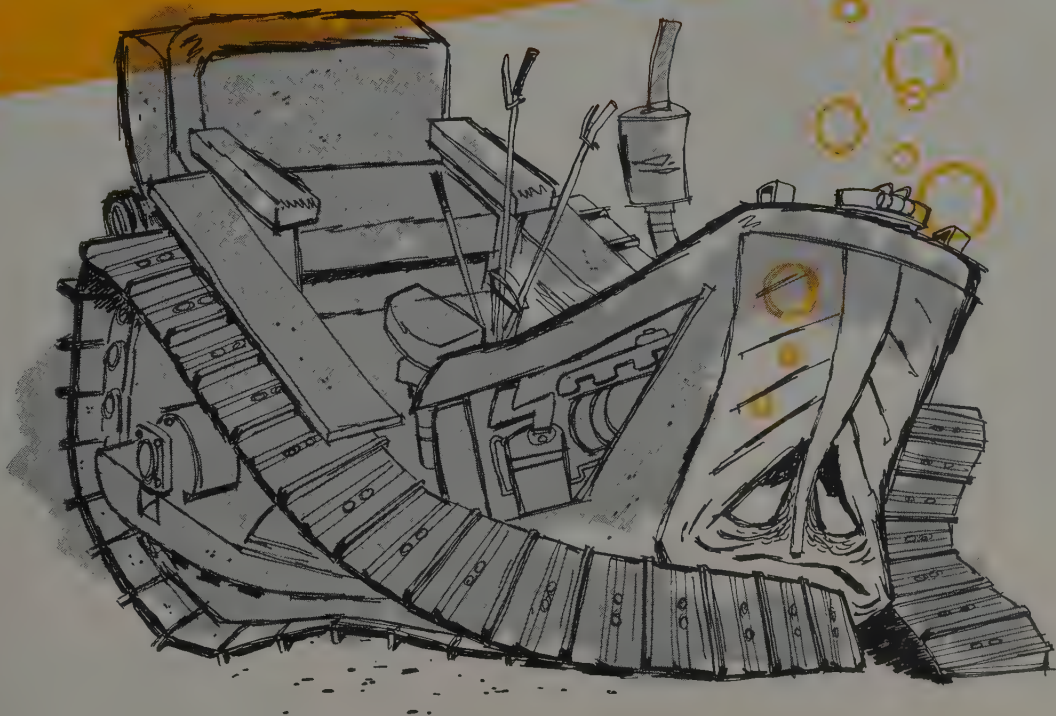
RECENT MAJOR CONTRACT AWARDS and low bids in Utah include three low bids submitted by W. W. Clyde & Co. of Springville; \$110,265 for 2.1 mi. of plantmix surfacing on state route 106 in Davis county; \$148,820 for 1.7 mi. of plantmix surfacing and one concrete bridge in Utah county; \$212,671 for 4.6 mi. of roadmix surfacing and one concrete bridge in Salt Lake county. Olaf Nelson Construction Co. of Logan submitted a low bid of \$156,281 for 4.6 mi. of plantmix surfacing on US 91, Cache county. Ross Construction Co. of Provo submitted a low bid of \$270,776 for 8.3 mi. of roadmix surfacing of the Colton-Scofield

HALF OF CHEHALIS BRIDGE

Largest structure ever assembled in Bethlehem Pacific's Seattle Works is this half section of a railroad overcrossing to be erected in Chehalis, Wash., as part of US 99. Girder span will be 92 ft. long, four lanes wide, and weigh 84 tons.



Can a tractor have "ACID STOMACH"?



The answer is yes! And (as in people) it can lead to a serious breakdown — and a costly repair job for you! Here's an easy way to prevent this needless expense:

Did you know that all diesel fuels create quantities of harmful acid in your tractor's engine? How *much* acid is determined by the quality of the fuel and the way you run your tractor.

Tests show these acids corrode pistons, rings and cylinder walls at an alarming rate — actually destroying your engine *faster than friction!*

To neutralize these acids (present in every engine) Shell scientists created Shell Rimula Oil — an amazing *alkaline* oil with excellent cleansing and lubricating properties.

So effective is Shell Rimula Oil, it actually *stops* acid action — eliminating this major cause of engine wear!

So isn't it just good common sense to start using Shell Rimula Oil right away? The savings you'll make on maintenance can really add up!

for longer useful engine life between overhauls —
SHELL RIMULA OIL



road in Utah county. **L. A. Young Construction Co.** of Richfield submitted low bids of \$121,833 for 8.1 mi. of roadmix surfacing in Duchesne county, and \$121,923 for 2.9 mi. of roadmix surfacing and one concrete bridge on state route 149, Uinta county.

WASHINGTON

INTERNATIONAL DISPUTE—

The International Joint Commission has been asked to settle a dispute between Seattle and British Columbia on whether Ross Lake behind Ross Dam on the Skagit River could be backed into Canada and on what terms. Seattle contends that an agreement was made last year whereby British Columbia would accept a lump sum settlement of \$255,500. The Canadians say they didn't agree and want annual payments instead. Both sides submitted their testimony to the Commission, which meets in Washington, D. C. Meanwhile a fourth generator has been authorized at Ross Power House and will go on the line in 1956, giving the plant a capacity of 440,000 kw.

APPROVAL of Secretary of the Army Robert T. Stevens of a plan to provide a channel 48 ft. deep and $\frac{1}{2}$ mi. wide at mean low water at the mouth of the Columbia River was reported by Sen. Warren G. Magnuson, who said that the project would cost \$8,500,000.

SEATTLE CITY LIGHT has advertised for bids on a \$17,000,000 project to build the 150-ft.-high Gorge Dam at Newhalem with a crest length of 670 ft. and 4.5 mi. of road between Newhalem and Diablo, including construction of a 670- and a 350-ft.-long highway tunnel and a 240-ft. steel bridge across Gorge Creek.

An unusual feature in the construction will be the freezing of a cut-off wall to form part of the cofferdam. The cut-off wall will be constructed in two stages to permit diverting of water first on one side of the river and then on the other. It will be formed by sinking refrigeration pipes through the rock and gravel of the river bed to depths of up to 150 ft. to bedrock. The first section will reach about 260 ft. from river bank to cofferdam in the middle of the stream.

After the portion of the Gorge Dam on that side of the river is complete, a similar wall, about 325 ft. long, will be frozen to block the other side. Reason for this construction is the porous character of the river bed. With regular cofferdam construction, there would be a large amount of water leakage and continuous pumping might remove enough of the fine material to en-

danger the present Gorge Diversion Dam, about 500 ft. upstream from the new dam site.

Plans and specifications were prepared by Dr. J. L. Savage, Denver consulting engineer, and the City Light Skagit Project Division under the direction of Charles E. Shevling. Other key engineers on the project are C. Ray Hoidal and E. R. Schindler, design engineers; Robert E. Brown, resident engineer; H. M. Lees, concrete engineer; E. J. Drob-nack and A. L. Gustanoff, assistant design engineers; and Roy Halvorson, field office engineer.

SCHOOL FUNDS—Emergency construction funds totaling \$2,660,000 have been tentatively allocated by the State to 11 school districts for construction of or additions to 13 school buildings. These funds must be matched by local money before they will be distributed.

BREMERTON BRIDGE—A proposed continuous plate girder design bridge at Bremerton would cost over \$4,000,000, according to the Tudor Engineering Co. of San Francisco, which prepared the estimate. The bridge would have four traffic lanes, each 12 ft. wide, with $3\frac{1}{2}$ -ft. sidewalks on either side. It would be on a continuous 4% grade rising from the south end.

MERCER ISLAND PIPELINE—Roy W. Morse, superintendent of water, has recommended that the Seattle City Council appropriate \$1,400,000 for an 11-mi., 36-in. water pipeline from the Cedar River watershed to Mercer Island.

WALLA WALLA'S PORT COMMISSION has set aside \$200,000 to develop port facilities in the Wallula, Attalia, and Burbank areas on the Columbia River waterfront, according to W. D. Day, commission chairman. Long range plans of the group include the building of more than \$1,500,000 in port facilities and development of industrial and shipping facilities in western Walla Walla.

MORE COWLITZ NEWS — Tacoma City Light is presently revising cost estimates for its Cowlitz River projects (*Western Construction*—May 1954, p. 92; April 1954, p. 97; January 1954, p. 81). Previous estimates made in 1950 and 1951 are to be reviewed and brought in line with current prices. Work has also been initiated to consider the feasibility of developing additional power at other sites, including the South Fork of the Skokomish River. In connection with this work, the city has selected two consultants. They are Dr. Howard A. Coombs, professor of geology at the University of Washington, and J. V. Gongwer, former chief engineer with Tacoma City Light.

RECENT MAJOR CONTRACT AWARDS and low bids in Washington include an award of \$113,374 to **Asphalt Paving & Engineering Co.** of Tacoma for 9.1 mi. of roadwork on state highway 9 in Grays Harbor county. **Bocek Bros.** of Hoquiam received an award of \$488,623 for 3.8 mi. of roadwork on state highway 13 in Grays Harbor county. **F. R. Hewett Co.** of Spokane received an award of \$138,619 for 12.6 mi. of roadwork in Grant county. **Paul Jarvis, Inc.**, of Seattle received a \$450,424 award for construction of the Wenatchee River bridge and approaches on state highway 2 in Chelan county. **Herman Kathman** of Seattle received a \$166,753 award for 2.3 mi. of grading on state highway 13-A, Pacific county. **Lewis Construction Co.** of Seattle received a \$1,974,898 award for construction of a three story, reinforced concrete hospital at Fairchild A.F.B. near Spokane. **Neukirk Bros.** of Seattle received a \$239,597 award for construction of the Blakeslee Junction over-crossing in Lewis county.

WYOMING

STREET IMPROVEMENTS in Sheridan totaling \$636,000 are now under way. The largest job is a \$400,000 contract to provide a 4-lane thoroughfare entering the city from the north.

GEOLOGY BUILDING—A new \$500,000 geology building at the University of Wyoming will soon be under construction if the plans for the 3-story building are approved. F. H. Porter is the architect.

EVANSTON WATER PLANT—A proposed water treatment plant and repairs to the existing water system at Evanston would cost about \$325,000, according to city officials. Before construction can start, however, the funds must be approved in a city election.

RECENT MAJOR CONTRACT AWARDS and low bids in Wyoming include an award of \$256,419 to **Stanley H. Arkwright, Inc.**, of Billings for 5.1 mi. of grading and plantmix surfacing on the Lander-Hudson road, Fremont county. **Carl V. Hill** of Greeley received a \$105,307 award for 6.1 mi. of grading and roadmix surfacing on the Laramie-Centennial road, Albany county. **Inland Construction Co.** of Omaha received a \$262,688 award for 1.4 mi. of grading and plantmix surfacing in Fremont county. **Read Construction Co.** of Cheyenne received a \$193,303 award for 9.5 mi. of grading and surfacing on Iron Mountain road in Laramie county. **Woodward Construction Co.** of Rock Springs received a \$367,977 award for 11.7 mi. of grading and surfacing near Rock Springs.

OPERATION: **Blue Jay** at Thule, Greenland



Three years ago the Army Corps of Engineers was ordered to rush construction of a giant air base at Thule in the Arctic region of northern Greenland. Architects, engineers and contractors were faced with tremendous new problems in this land of continual ice and snow where winds blow up to 150 miles an hour and temperatures drop to 30 or 40 below.

It was a big job with 12,368,000 cu. yds. of heavy excavation and fill. Because of its importance to our national defense, it had to be completed on schedule. The selection of earth moving equipment for Thule had to be made carefully for men and machines would work under the most adverse conditions . . . and they had to keep working round the clock until the project was completed.

Rear-Dump Euclids—67 of them in all—played a leading part in this record breaking earth moving project. They moved big loads of rock from quarries to crushing plants on long and short hauls. Asphalt for runways was hauled by "Eucls" with heated bodies that kept the material from freezing in spite of the

bitter cold. Their rugged strength and dependable performance kept these Rear-Dumps on the job under the toughest working conditions imaginable . . . with mighty little down time for repairs.

Many of these "Eucls" have now been given another tough assignment by the East Ocean Division of the Army Corps of Engineers . . . they are being transferred to Iceland for more heavy service. On every one of the many defense installations being built by the East Ocean Division in Canada, Iceland and Greenland, "Eucls" are on duty taking the toughest jobs in stride.

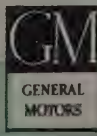
When you need earth moving equipment that you can depend on for performance and profits, get in touch with your nearby Euclid distributor.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio



Euclid Equipment

FOR MOVING EARTH ROCK COAL AND GROUND



ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

FULL SPEED AHEAD—The stops have been pulled on Alaska's construction with removal of the main bottleneck preventing optimum operations—the plumbers' wage dispute. This dispute, which had choked off a number of projects completely and slowed still others virtually to a standstill, now is settled. Plumbers have agreed to a new work contract granting them a 15-cent hourly wage increase, effective May 18, for the period of one year. About 250 plumbers went to work in the Anchorage area alone—after being off for over two months in the prolonged wage dispute.

WHAT SETTLEMENT MEANS

—Settlement of the plumbers' dispute means that cost of labor in at least one important construction craft shows no sign of leveling off. Plumbers now will get a new scale of \$4.25 an hour plus substantially the same working conditions they enjoyed last year. Overtime rates will bring plumbers' wages to a new high in the history of Alaska construction, making them the "elite" in the construction crafts. One element of the settlement cannot be overlooked. Labor unions traditionally watch carefully to determine "what the other fellow is getting." Danger now is that the whole structure of wage rates, all the way from grease monkey to straw boss, will be threatened. Most of these difficulties may not become apparent until the 1955 construction season.

CONTRACTOR'S PREDICAMENT

—Mounting costs, such as those just mentioned, are leading some contractors to reassess their estimates, substantially increase their bid quotations. Unfortunately, in Alaska at least, this is no way out of the difficulty, or at least wasn't in one important recent instance, the Whittier dock bids. This substantial project carried a government estimate of \$3,812,161. However, lowest bid submitted—by the combine of Scheumann, Johnson, Manson and Osberg—was \$5,442,861 or \$1,630,800 over the government's estimate. Other bids were substantially higher. After analysis of the figures, the Corps of Engineers announced that all the bids on the dock had been rejected because they were "considerably above the 15% allowed."

NEW BID CALL ISSUED—Quotations were substantially reduced following the second bid call. Low bidder, again, was the joint venture

firm of Scheumann, Johnson, Manson and Osberg of Seattle. This time their bid was \$4,473,162, still nearly 18% above the government estimate. Final decision on the matter was pending. Of interest is the very low difference in bids between the number one and number two low bidders. The Manson joint low bid of \$4,473,162 was only \$3,669 lower than the Patti-MacDonald (Anchorage) bid of \$4,476,831.94.

THOUSANDS AFFECTED

—Future unemployment compensation benefits of thousands of Alaska construction workers are affected by a ruling handed down recently by Federal Judge George W. Folta. Folta ruled that the construction industry in Alaska was a "seasonal" industry, and because of this construction workers unemployed at other times of the year than the actual construction season were not eligible for unemployment compensation payments. The ruling was followed by a comment from the judge that "the failure to classify the construction industry as seasonal is undoubtedly the largest contributing factor in the depletion of Alaska's unemployment compensation fund."

UNDER FIRE—Judge Folta's ruling immediately came under fire from various Alaska labor groups who contended that in the event construction work in the territory is deemed seasonal, large numbers of construction workers would become ineligible for the unemployment benefits, thus dealing a blow to the economy of Alaskan cities. Answering the criticism that some construction workers made a practice of "taking it easy" in the states on unemployment compensation funds sent from Alaska, one labor leader—R. E. McFarland of Anchorage—said statistics published by the Employment Security Commission show that the number and amount of payments being made to those living in the states in the winter is steadily decreasing.

HEARINGS HELD—Four employment security commissioners held a hearing on the matter late in May and failed to sustain Judge Folta's ruling that construction workers are "seasonal." This means that, as a construction worker in Alaska, regardless of your previous residence, you will still be eligible for unemployment compensation payments. It also means, coincidentally, (ac-

cording to official estimates) that the unemployment fund, now estimated at approximately \$4,000,000, will be exhausted within the next five or six months. (About \$1,000,000 monthly is paid out in unemployment compensation checks.) Territorial officials fear the time is at hand when there will be no funds left for paying out to unemployed workers, whether or not they are "seasonal."

ANOTHER VIEWPOINT

—Larry Moore, Alaska manager of the Associated General Contractors, described the unemployment compensation act passed by the 1953 Alaska legislature as an "administrative monstrosity." Moore said: "Construction is not a seasonal industry and its historical standard practices are to sell its services at all times for all types of construction in all places where a purchaser of construction offers a project at a fair profit." Moore said that the status of the compensation fund—the fact that it was dwindling alarmingly—was an "important but irrelevant matter."

PIPELINE PROJECT

—The major part of the right-of-way, with the exception of one strip of about 40 mi. has now been cleared and the first pipe welded on the Fairbanks end. Eighty miles of pipe has been stockpiled and more than 26 mi., near Fairbanks, has been laid.

CONSTRUCTION NEWS CAPSULES . . .

A report issued by the District Engineer recommends dredging of small-boat harbors and construction of jetties at Juneau and Douglas at an estimated first cost of \$1,171,000 . . . Cadastral surveys in Alaska will be increased by more than \$100,000 over last year's allocation if funds requested by the President for the purpose are granted by Congress . . . Government officials are studying a plan envisioning 12 major dams and 11 power installations along the Susitna River. Annual firm energy output from the dams would be 6,180,000,000 kilowatt-hours. A preliminary report on the proposed construction has been sent to the Governor of Alaska and to interested federal agencies . . . Bids are being called for construction of an additional 16-mi. section of the Copper River Highway to connect Cordova with the Alaska highway system. Road is being constructed along the route of the old Copper River and Northwestern Railroad, immortalized as the "Iron Trail" by Rex Beach . . . Municipal leaders in Ketchikan are actively planning construction of the proposed Swan Lake power project in Southeastern Alaska. Project would cost approximately \$15,000,000, however no authorization or allocation of funds has yet been made.

ENGINEERS on the move

Samuel B. Morris, general manager and chief engineer of the Los Angeles Department of Water and Power, has been honored with the distinguished award of the American Public Power Association for his "long and outstanding service to his community, the nation, and the American Public Power Association."

* * *

John Tacke, resident manager for Kaiser Engineers at Hanford plutonium works, has been transferred to Australia to head Kaiser Engi-



John Tacke
to head Snowy
Mountain Project
in Australia



Fulton

Kimball

neers' joint-venture Snowy Mountains Project. **Stanley Kimball** succeeds to the position left vacant by Tacke, and **M. L. Fulton** becomes assistant resident manager.

* * *

Dunlap D. Smalley, vice president and assistant general manager of Pacific Gas and Electric Co., retired June 1 under the provisions of the company's retirement plan, and immediately became vice president and operating manager of the Southern Nevada Power Co. at Las Vegas. The Nevada company plans to build the first steam-electric generating station in Nevada, a 44,000-kw. plant. Smalley will direct the project as well as the operation of the utility system.

* * *

Lowell J. Stephenson was recently transferred from the San Francisco office of the consulting engineering

firm of Porter, Urquhart and Beavin to Fremont, Ohio, and assigned as resident engineer for Porter-Urquhart Associated on Contracts 41 and 42 of the Ohio Turnpike.

* * *

Allan C. Johnson has been appointed manager of the U. S. Atomic Energy Commission's Idaho Operations Office. Johnson, who has been director of the division of engineering and construction of the Idaho office since July 1949, succeeds **L. E. Johnston**, resigned.

* * *

Jean E. Hittle was recently appointed assistant engineer of research of The Asphalt Institute, a new position authorized as part of the Institute's expanding engineering-development program. Hittle at one time served with the Bureau of Reclamation and with the Colorado State Highway Department, and for the past three years he has held the position of materials engineer with the New Mexico State Highway Department. He will make his headquarters at the national offices of the Institute in New York City.

* * *

Col. W. L. Wingar, for the past year executive officer of the Alaska District, Corps of Engineers, has assumed the post of assistant district engineer, succeeding **Col. Carl Y. Farrell** who recently stepped up to Alaska district engineer.

* * *

Daniel J. Evans has joined the office staff of Mountain Pacific Chapter, Associated General Contractors, Seattle. A graduate civil engineer, Evans has had design and field experience in structures with the City of Seattle. He succeeds **Bill Nichols** as assistant manager of the chapter.

* * *

Col. S. M. Lutz, Jr., who has been the Air Force installations representative, South Pacific Division, in San Francisco, for the past two and a half years, has been assigned to Washington, D. C., as director of Architectural-Engineering Division.

* * *

Changes in the Los Angeles District of the Corps of Engineers involve the assignment of the following project engineers. **Leonard G. Hogue** is assigned as project engineer of the Upper Los Angeles River Project, Unit No. 6. **Bill Smiddy**

relieves **Ralph E. Fergason** as project engineer of March AFB, Norton AFB, and San Bernardino ORC Armory Projects. Fergason is assigned as project engineer of San Antonio Dam Project, vice **Colvin S. Maxwell**, who becomes assistant until reassigned. In addition to their other duties, **Carl W. Yockers** is assigned as project engineer of the Los Angeles River Spring Street Project, and **James W. Hamilton** as project engineer of Camp Irwin. **Thomas Bates**, formerly project engineer of Camp Irwin, is assigned in the same capacity to the Los Angeles Defense Area Sites 32, 43 and 55, vice **Albert J. Curry**, relieved. **James G. Morgan**, in addition to his other duties, is assigned as project engineer of Defense Area Site 14, vice **Albert J. Curry**.



Lutz



Buchanan

Jesse E. Buchanan, president of the University of Idaho, was elected to the presidency of The Asphalt Institute, effective July 1, according to announcement by **Raymond Harsch**, chairman of the executive committee. He succeeds **Bernard E. Gray**. At one time, from 1936 to 1938, Buchanan was research engineer with the Pacific Coast Division of the Institute, with headquarters at San Francisco. He is a licensed engineer both in California and Idaho and numbers among his professional memberships the American Society of Civil Engineers and the American Society for Engineering Education. He is relinquishing his post at the university to accept his new position.

Gray joined the staff of The Asphalt Institute in 1930, where he has been successively highway engineer, chief engineer, general manager and president. He is the author of a great number of technical articles and co-author with **Prevost Hubbard** of the Asphalt Pocket Reference, which has been expanded to become The Asphalt Handbook.

* * *

Rush T. Sill, partner in the engineering and management firm of Ruscardon Engineers, Los Angeles, has been appointed to the National Panel of Arbitrators of the American Arbitration Association. As a member of the National Panel he will be available for selection by parties submitting disputes to arbi-



KEY MEN AT THE DALLES—Here are (front row, from left) *Frederick E. Drager*, project engineer, powerhouse; *Joe R. Huey*, chief, administrative branch; *Roy M. Cami*, chief, engineering branch; *Leonard C. Estey*, assistant resident engineer; (second row) *D. B. Deberton*, chief, office service branch; *Sheridan M. Everett*, project engineer, miscellaneous construction; (back row) *Ivan C. Bechtold*, chief, concrete section; *Vincent D. Kemp*, chief, office engineering section; and *Thomas B. Sears*, chief, electrical and mechanical section. Story on page 54. These men represent the Corps of Engineers.

tration. The panel consists of over 13,000 experts in all fields of industry, the professions and the arts who volunteer their services in the interests of peaceful settlement of business controversies.

Finley B. Laverty, chief hydraulic-engineer of the Los Angeles County Flood Control District, also was named to the national panel of arbitrators of the American Arbitration Association. Laverty is a member of the American Society of Civil Engineers, the American Water Works Association and other organizations of professional engineers.

Avery Batson, former Director of Region 7 of the Bureau of Reclamation in Denver, has accepted an assignment for the Ford Foundation in Pakistan as a member of an 8-man team of expert advisors. He will advise the Pakistan government concerning water control and use, irrigation and hydroelectric power.

James R. Halverson, acting chief traffic engineer of the Utah State Road Commission, has replaced **Frank S. Sherer**, recently resigned.

Edgar C. Metcalf has been appointed as power supply chief of Chelan County Public Utility District No. 1 in Washington. Having completed his work as project engineer for Rock Island Dam and power plant expansion, Metcalf will have charge of preliminary work on the proposed Rocky Reach Dam and Wenatchee-Chiwawa River projects.

Brig. General O. E. Walsh, former Portland district and North Pacific division engineer, has retired from an army post in Paris, France, to accept a vice presidency with Portland General Electric Co., effective

immediately. His work with PGE will deal primarily with the power supply situation.

George F. Ferris, president of Raymond Concrete Pile Co. was elected president of The Moles, an association of tunneling and heavy construction men, at their annual meeting May 5, succeeding **Richard E. Dougherty**, consulting engineer.

John M. Robinson has been appointed general sales manager of the Macco Corporation, according to recent announcement by **Edw. A. Pelegrin**, executive vice president of the construction firm. Robinson has been associated with Macco for the past eight years as manager of the drilling fluid division, and in his new capacity he will work in close cooperation with Pelegrin in directing the sales efforts of all Macco divisions.

Effective August 2, **Col. James U. Moorhead**, executive officer of the district office of the Corps of Engineers at Portland, Ore., becomes district engineer, succeeding **Col. Thomas H. Lipscomb** who has been assigned to the Office of the Chief of Engineers.

W. J. Murphy, Jr., engineer of Aberdeen, Wash., has been named consulting engineer for the Port of Willapa Harbor, working in cooperation with **T. P. McCutchan**, manager.

C. O. Erwin, state highway engineer of New Mexico, recently presented awards in connection with the highway department's year-old safety program. In the statewide competition among the shops, District 5 at Santa Fe was first. The best field safety record award went to a

Harold W. (Rich) Richardson, 53, chief editor of **Construction Methods and Equipment**, and an engineering construction man and writer for more than 30 years, died May 12. During World War II, he was an accredited war correspondent covering Alaska, the Aleutians and the western Pacific. Richardson was also credited with being the first man to travel the full length of the Alcan Highway.

Paul Newman, Jr., 49, Pierce County (Wash.) commissioner, was killed instantly at Tacoma, Wash., May 5 when an automobile he was driving crashed against a parked tractor-trailer.

Fred M. Carter, 68, assistant traffic engineer for the California Division of Highways, died May 1 at his home in Ashland, Ore. He was a director of the Institute of Traffic Engineers and was regarded as one of the pioneers in developing traffic lighting systems for highways.

John A. Sharp, Sr., 62, vice president and assistant general manager of Sharp Engineering Co., Salt Lake City, Utah, died April 19.

Harry L. Reinfeld, 65, an engineer for the city of San Francisco died April 29. Reinfeld served the city officially for 42 years and retired due to illness six months before his death.

Mark H. Lindeke, 53, resident engineer for the Washington Department of Highways, died May 25 in a Seattle hospital.

crew at Deming. The best record for a district was held by Roswell No. 2 which was awarded a plaque, with **Ralph Smith**, safety supervisor, receiving a wrist watch.

Earl Barnwell, Snohomish (Wash.) county engineer, is the new president of the Washington State Association of County Engineers. **B. L. Smith**, Walla Walla county engineer was elected vice president, and **C. D. Kinder**, Clark county engineer, was named secretary-treasurer.

James W. Huston has been appointed director of Alaska Public Works, with headquarters in Juneau. Huston has held positions with the Corps of Engineers for about 30 years, a major portion of the time in Alaska. He has been a licensed civil engineer in Alaska since 1944 and is a member of the American Society of Civil Engineers and the Society of American Military En-

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gineers. The directorship of APW had been temporarily filled by **Lester M. Marx**, deputy public works adviser, who replaced **Don R. Wilson**, resigned.

* * *

Mark U. Watrous, state highway engineer of Colorado recently flew to Washington, D. C., to accept an award won by Colorado in the first annual national competition conducted by the National Highway Users Conference for "doing an excellent job in keeping the people abreast of problems, progress and accomplishments in the highway field." Colorado's award was based on the Department's 1953 highway sufficiency rating study.

* * *

Kelly W. Thurston won first place among engineering students from 17 universities for his design of a special combustion chamber for internal combustion engines. Thurston is majoring in engineering at the University of Utah.

* * *

Oliver A. Lewis, chief of the investigation and survey reports section for the Walla Walla District of the Corps of Engineers, has been named chief of the construction division. He replaces **Sam Neff** who recently left Washington to become head of the construction branch for the North Pacific Division in Portland, Ore.

* * *

Robert J. Newell, Boise, Idaho, was recently appointed to the Upper Colorado River Commission, succeeding **Harry W. Bashore**, resigned. Newell was with the Bureau of Reclamation for many years and has been one of its consultants since he retired in 1949.

* * *

R. E. Hensel has been named to the post of supervisory general engineer in the planning department of Puget Sound Navy Yard, Bremerton, Wash., succeeding **L. B. Wallace**, resigned due to illness.

* * *

B. J. Garnett has been appointed city engineer of Spokane, Wash., succeeding **Charles E. Davis**, retired. Garnett had been assistant to Davis. **Phil G. Holgren** has been named principal assistant to Garnett.

* * *

Michael C. Hinderlider, Colorado state engineer since 1923, is retiring from state service July 13. He is regarded as one of the state's foremost authorities on water and water compacts, many of which he helped formulate, and on irrigation rights and policies.

* * *

Walter D. Lawrence, Jr., a member of the Bureau of Reclamation staff at Casper, Wyo., since 1948, has been assigned as an electrical engineer to the U. S. operations mission in Calcutta, India.

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SUPERVISING the jobs

Frank C. Metler, job superintendent, and Wilson D. Covey, concrete superintendent, and Banks Bourgeois, master mechanic, are top personnel for M. M. Sundt Construction Co. doing a \$285,682 job of grading and plant-mix surfacing on 8.9 mi. of new alignment on U.S. 80-89, north of Tucson, Ariz.

* * *

D. M. Kelly, general superintendent, and Lane E. Day, job superintendent, along with Bud Barrett, concrete foreman, are top men for Sam Xavier Rock & Sand Co., building a 4-span steel girder bridge over Cienega Creek on new alignment of U.S. 80, Tucson-Benson highway, Ariz., a \$124,703 contract. Allison Steel Co., Phoenix, will furnish and erect structural steel.

* * *

Nick Kohler is superintending the construction of Twin Lakes reservoir being built for the City of Boulder, Colo., by Colorado Constructors, Inc., which recently was awarded the contract on a \$773,861 bid. Other key men are Louis Chinn, grading foreman; Allen Rogers, engineer, and Henry Morrison, office manager.

* * *

Rance Hennewinkle is supervising a \$128,621 job for Peter Kiewit Sons' Co., consisting of 13.8 mi. of repairing, reshaping and road-mix surfacing on the Jordan-Circle road, McCone County, Mont. Lyman Tippetts is foreman and Alex Kraft is lead mechanic. John Siebart is in charge of the job office. All Kiewit contracts in the Montana area are under the direction of M. H. Archibald, district engineer.

* * *

Nick Evans as superintendent heads the supervisory personnel working on a contract for a road job in Montana which recently went to Peter Kiewit Sons' Co. on a low bid of \$311,533. Work consists of 14.9 mi. of grading, draining, and gravel surfacing on the Fairview-Girard West road in Richland County. Other key men are Leo Larson, grading foreman, William Frazer, pipe foreman; Emile Ruffier, foreman; Don Armstrong, master mechanic, and Ted Bekken, office manager.

* * *

Bert Norris, superintendent, and his assistant Merlyn Marks are di-

recting a \$384,537 job for Peter Kiewit Sons' Co. comprising 7.2 mi. of grading and plant-mix surfacing between Canby and Chamber's Ranch in Modoc County, Calif. Master mechanic is George Lotz. Jim Hills manages the job office.

* * *

Lonnie L. Lawler, superintendent; Robert E. Carlson, project engineer; Zelmo Mullican, structure superintendent, and Jack Randall, job office manager, comprise the top personnel working for Peter Kiewit Sons' Co. on a \$906,235 contract for 1 mi. of grading and paving, and 3 reinforced concrete bridges on Colorado Freeway between Los Angeles and Pasadena, Calif.

* * *

Don Boots is superintendent for Peter Kiewit Sons' Co. on a 2.4-mi. grading and surfacing job extending from Moffett Creek to Forest Mountain Summit in Siskiyou County, Calif. Aiding Boots are Art Olson and Harry Bosler, assistant superintendents. Mike O'Rourke holds the master mechanic spot, and John Hailey manages the job office. This is a \$362,360 contract which is expected to be completed in 170 working days.

* * *

C. G. Morris, project manager; W. O. Richey, superintendent, and J. A. Trujillo, engineer, head the construction crew of C. H. Leavell & Co., contractor on the new state highway department administration building being erected in Denver, Colo., at a contract price of \$1,895,000.

* * *

George R. Scott, William (Bill) Stecker and Les Croft are supervising a joint venture contract which they recently won at a cost of \$262,314, for 8.2 mi. of grading, base material and penetration treatment, from Bridgeport, Calif., to the Nevada state line.

* * *

Harold Fredrickson, general superintendent, and Dana Palmer, master mechanic, are key men under the general direction of Parker Erickson, president of Ace Construction Co., which recently received a \$628,950 contract for extension of runway and taxiways at Air National Guard Airport, Cheyenne, Wyo. Contractor is using Model A Tournapulls, Caterpillar 20 scrapers, and In-

ternational TD24 tractors with Bucyrus and Wooldridge scrapers and International TD24 tractor push cats. Cat 12 graders are also at work on the job.

* * *

R. H. McPherson, chief engineer; John Gremer, general manager, and Joe Cantrall, job superintendent, are top personnel for J. R. Cantrall Co. on erection of steel framework structure (\$248,000) part of the new San Fernando Valley steam plant in California, contract for which is held by Bufnel Corporation.

* * *

Roy Poffenberger, gravel superintendent, and Les Peak, oiling superintendent, head the construction of a \$164,000 job recently awarded to Lou Richardson for 21.6 mi. of plant-mix surfacing on the Hulett-Aladdin road, Crook County, Wyo. For the same contractor, Les Peak as plant superintendent and Ed Oftedal as gravel superintendent, are supervising two road jobs in Montana. Both are in Big Horn County on the Crow Agency-Broadus road. One is for 12.7 mi. of grading and plant-mix surfacing (\$170,239), and the other for 12.7 mi. (\$198,530).

* * *

Earlon Fisher, superintendent, with the assistance of James Janssen, crusher foreman, and Henry Dinal, mechanic, is directing the work of Inland Construction Co. which has the \$144,496 contract for 15.2 mi. of grading and road-mix surfacing on the Colstrip-Forsyth road, Rosebud County, Mont.

* * *

Cliff Earsley, superintendent, and his assistant Earl Shannon, head the construction crew on Henry Thygesen & Co.'s \$598,735 contract for 22.1 mi. of grading and plant-mix surfacing on U.S. 84, Cebolla-Chama road, Rio Arriba County, New Mex.

* * *

Eddie Givens of Givens Construction Co. is superintending a \$109,453 contract recently awarded his company for 3.1 mi. of grading and road-mix surfacing on East Flagstaff-Flagstaff highway in Arizona. Other key personnel are Pete Baker, foreman; K. Knight, mechanic, and L. R. Flint, in charge of purchasing.

* * *

Roger Wilson is superintending a \$138,619 job for F. R. Hewett Co., covering construction of 12.6 mi. of county roads in Grant County, Wash. Among the other key men are Chris Finnemann, grading foreman; Keith Cunningham, pipe foreman; Harold Haneke, crushing superintendent, and Dick Ward, truck superintendent.

* * *

W. I. Shanahan is job superintendent under Cliff Schiel and Andrew Cronkrite of Cisco Construction Co., which is erecting a reactor test facility building in the EBR area at the National Reactor Testing Sta-

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KEY MEN on the \$400,000 contract held by Arthur Bros. for additions to sewage treatment plant in San Mateo, Calif., are (top, from left) **Lou Earnest**, inspector for San Mateo; and four members of the contractor's force: **Elmer Lambert**, engineer; **A. E. Hilberg**, superintendent; **Kent Hopkirk**, foreman; and **Geno Gandolfi**, foreman. To see how Hilberg solved a major job problem, turn to page 102. Digester tank (bottom) is a major item in the contract. Photo taken in April shows interior columns formed and poured, with tubular scaffold in place for setting wall forms 26 ft. high and 70 ft. in diameter.

tion, Idaho Falls, Idaho, a \$274,947 contract. **Frank W. Hooton**, formerly chief of engineering and construction for AEC at the Hanford Works, is operations manager at the station.

* * *

Max E. Dickerson is superintending a \$120,465 contract under the direction of **John C. Sandford**, partner in the firm of Wall, Bartram & Sandford, contractor who recently got the award. Work consists of constructing a reinforced concrete deck girder viaduct on the Rocky Point-Brush Creek unit of Oregon Coast Highway south of Port Orford. The viaduct will be 373 ft. 6 in. long and work is expected to be finished in a year's time.

E. R. Peterson, project superintendent; **C. E. Morris**, field superintendent, and **J. C. Beck**, office manager, are key personnel for Kitchell-Phillips Construction Co. and Utah Construction Co., joint venturers, erecting a 71,000-sq. ft. test facility building adjoining Sky Harbor Airport, Phoenix, Ariz. This is a \$2,727,000 construction expected to be completed within the year.

* * *

James P. Cagle, general superintendent, and his assistants **Berle E. Grounds** and **Arthur V. Towler**, are heading the construction of the west embankment and outlet work on the Whittier Narrows flood control basin in Southern California for A. Teichert & Son, Inc. and M. J. Bev-

anda, joint venture which recently won the award on a bid of \$3,088,946. Other key men on this large project, scheduled to be completed the middle of December, 1955, are **Lowell J. Wright**, job engineer; **Maurice P. Brotherton**, master mechanic, and **Mark F. Lund**, office manager.

* * *

Wesley Mays, carpenter superintendent, and **Webb T. Shaddy**, **Henry E. Clark** and **Lyle J. Nugent**, pile buck foremen, are in the employ of **Paul Jarvis, Inc.**, contractor on a \$450,424 contract in Chelan County, Wash., consisting of 0.4 mi. of P.S.H. 2, Wenatchee River bridge and approaches. Chief engineer is **Paul Jarvis, Jr.** American Bridge Co. will furnish and erect the steel girders.

* * *

John W. Ingram, project manager; **Lloyd Knochenhauer**, general superintendent, and **Kenneth Hill**, job superintendent, are key personnel in charge of construction of the Rancho High School, Las Vegas, Nev., for T. G. K. Construction Co., Inc., which is doing the work at a cost of \$2,227,700.

* * *

Ray Smith is project manager, and **C. A. Peterson**, superintendent, for **Robert E. McKee, Inc.**, contractor on a \$2,514,400 hospital structure being built at Bakersfield, Kern County, Calif. Building covers 97,780 sq. ft. and is of 5-story design; scheduled to be completed in May 1956.

* * *

C. E. Wooster, president and general manager of **George E. France, Inc.**, contractor, and **Walter Reed**, working at Lone Pine, Calif., as general superintendent, head the job contract recently awarded the France company for 7.9 mi. of grading and surfacing between junction of Route 23 and northwest of Keeler, Inyo County, Calif., a \$143,917 award.

* * *

B. H. Henry, superintendent, has retired from the California Division of Highways, where he served for 41 years. It is his intention now to do considerable traveling.

* * *

H. A. Bohue is superintendent and **Sam D. Blevins** is equipment foreman for **Robert E. McKee**, general contractor on the California Medical Facility at Vacaville.

* * *

Bush (Chris) Christian, superintendent, is now located in Chile, South America, where he is in charge of construction for **Bethlehem Chile Iron Mines Co.**, (subsidiary of Bethlehem Steel Corp.) on its El Romeral Project at La Serena. He is assisted by **Thomas Barnett**, project engineer; **Wallace Taylor**, electrical superintendent; **William Stone**, electrical foreman; **Joseph Guathier**, carpenter superintendent; **James**

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Duncan, carpenter foreman; **John Bergin**, structural superintendent; **J. P. Sauaz**, concrete foreman, and **Oscar Jonsson**, on power plant installation.

In charge of all development at the El Romeral Project is **R. R. Krumm**. **E. Leach** is vice president and general manager of Bethlehem Chile Iron Mines Co.

* * *

A. H. Cranmer is superintending the work of grading roadway and erecting a 172-ft. concrete bridge in the Escalante-Henrieville area in Garfield County, Utah, for **Whiting & Haymond**, who got the award on a bid of \$174,048.

* * *

Nicolas Marsch, Jr., has been working for **S. A. Healy Co.** at The Dalles Dam, Ore., where this contractor did the cofferdam construction and powerhouse excavation at a cost of nearly \$5,000,000. **Robert J. Jenks** and **Leo W. Miller** were assistant project managers on the same job.

* * *

George J. Renauld, project manager; **George Coons**, project superintendent; and **Ed J. Trick**, office manager, are top supervisory personnel for **D & H Construction Co.** and **M. H. Hasler Construction Co.** which are doing 6.7 mi. of grading and furnishing 1,500 cu. yd. crushed material in stockpiles for the Shady-Canyonville section of Pacific Highway, Calif.

* * *

Kelley Magnasen is job superintendent for **Poston Construction Co.** on a \$434,000 contract for restoration of service buildings at the Washington State Reformatory.

* * *

Bruce Shumway, superintendent; **Don Wolf**, project engineer, and **Hamlin M. Hines**, office manager, are top men for **Morrison-Knudsen Co., Inc.**, contractor on the job of reshaping and applying bituminous surfacing on 17.2 mi. of Richardson Highway, north of Rapids, Alaska. Award went to **M-K** at a cost of \$212,076.

* * *

Charles R. McKinney is superintending the construction of a 400-ft. reinforced concrete fishway in Deschutes River, Tumwater, Wash., for **Pettijohn Engineering Co.** which received the contract on a \$118,302 bid.

* * *

Don Gillis, superintendent for **John H. Sellen Construction Co.**, is supervising the erection of a steel blast fence at Boeing Field for local **B-52** test facilities in Washington; a \$131,595 job.

* * *

Jack Corbett, superintendent, and **Charley Noel**, master mechanic, are key men for **C. V. Kenworthy** on this contractor's \$154,808 contract for 2.3 mi. of road grading and

paving with plant-mixed surfacing on untreated rock base, 7 mi. southwest of Ione, Calif.

* * *

Mell Johnson is superintending the construction of a new city hall and police station for the city of **Whittier, Calif.**, a \$726,700 contract which is held by **Kemp Brothers**. **Johnson** is assisted by **Al Touey**, carpenter foreman.

* * *

Sam Len is acting as superintendent on a \$1,087,700 award which recently went to his company, the **Len Construction Co., Inc.**, for the construction of **Imperial Court**, a low-rent housing development in Los Angeles, Calif. **Lynn Hardeman** is in the assistant superintendent spot, and **Otto Gaastra** and **Sam Connors** are carpenter foremen.

* * *

C. S. Muir, general superintendent, **Charles Ptacek**, construction superintendent, and **W. C. Sederholm**, office manager, comprise the top men on the construction of an aircraft apron, roads and parking areas at **Gore Field**, Great Falls, Mont. This is a \$164,741 contract recently awarded to **McLaughlin, Inc.**

* * *

Charles F. Moore, job superintendent, and **Al McCann**, job office manager and job engineer, are occupying key positions on the construction of a 210-ft. steel truss bridge on the south fork of the **Stillaguamish River** highway, 15 mi. east of **Robe**, Wash. **Peter Kiewit Sons' Co.** is contractor on the \$130,733 job.

* * *

Robert Good, superintendent, has the assistance of **James Van Ness**, carpenter foreman; **Rudy Mackey**, labor foreman; and **Oscar Fraser**, engineer, on the \$1,346,963 construction of a 4-story addition to the **Swedish Hospital**, Seattle, Wash., contract for which was awarded to **Howard S. Wright & Co., Inc.** Job started early in May and is expected to run 540 days.

* * *

Fred Pankratz is the heavy equipment superintendent and is also in charge of the work of constructing 12 ammunition magazines for the Air Force and 15 for the Army at **Ladd AFB, Alaska**. Also working for **B-E-C-K Constructors** (joint venture of **Koon, Boen, Inc.** and **Cummins, Egge, Inc.**) which recently won the \$937,072 contract are: **Walt Johnson**, building superintendent; **Alex Stewart**, office and field engineer in charge of surveys, plans, etc.; and **Bob Frolick**, office manager. Along with this contract the same personnel are handling \$3,000,000 worth of contracts at **Ladd** and at **Eielson AFB**.

* * *

E. B. Potter, project manager, **R. A. Healey**, general superintendent, and **W. C. Perkins, Jr.**, assistant superintendent, head the construc-

tion crew of **Morrison-Knudsen Co., Inc.**, working on highway and railroad relocation at **The Dalles Dam**, Wasco County, Ore., a \$775,105 job. **G. W. Peacock** is general foreman and **LeRoy Byers** is master mechanic.

* * *

Harold Carpenter, general superintendent for **Guinn Brothers & Robbins**, is in charge of a \$197,045 contract recently awarded this firm for construction of 3.53 mi., grading, surfacing and bituminous mat on **John Day Highway** in **Grant County, Ore.** **Ray Richey** is crusher foreman and **Virgil Woldberg** is office manager.

* * *

Jack V. Haggstrom is superintending the construction of **Marcus Whitman elementary school** in **Portland, Ore.** for **C. M. Corkum Co.** Other key men working on this \$663,880 job are **Arvid Moline**, carpenter foreman, and **Marcel De Groote**, lead man.

* * *

Jim Goodfellow, Jr. is supervising a \$344,289 contract of **Goodfellow Bros., Inc.**, for grading and surfacing 9.8 mi. of **S.R. 2**, **Moses Coulee** to **Coulee City, Wash.** **C. D. Corle**, foreman, and **C. Y. Hotchkiss**, mechanic, are in key spots on the job, which is going along on schedule.

* * *

George Ongman, job superintendent; **M. J. Clark**, manager, **Alaskan operations**; and **B. M. Whitmore**, office manager, are three of the top men for **Valle-Sommers Construction Co.** which is constructing a steel warehouse and seawall at **Seward Terminal** for **Standard Oil Co.** in **Alaska**. This project is being erected at a cost of \$400,000.

* * *

George Morrison is manager for **E. M. Peterson** who has the contract at a cost of \$539,944 for construction of an airmen's dormitory at **Elmendorf AFB, Anchorage, Alaska**. Exterior of building will be of precast concrete. First story will be tilt-up and second and third story panels will be hoisted in place.

* * *

Rolf Enquist holds the general superintendent spot on the construction of an overpass and an underpass on the **Columbia River Highway** at **The Dalles, Ore.**, a \$57,585 contract recently awarded to **Erick A. Enquist**. **Robert Enquist** is carpenter foreman.

* * *

Cletis Wright, project manager, and **F. B. McEntee**, general superintendent, are in charge of roadway construction and plant-mix surfacing on 1.05 mi. near **Payette, Idaho**, for the **State Department of Highways**, a \$142,590 contract held by **Asphalt Paving & Construction Co.**

* * *

James R. Kennaday, superintendent, heads the job of reconditioning

the existing highway between Rigby and Roberts in Jefferson County, Idaho, for Carl E. Nelson Co., Inc., which is doing the work at a cost of \$37,189 for the State Highway Department. Lloyd R. Brown is foreman. Reid E. Lewis is office manager.

* * *

Floyd Garret, general superintendent; Leonard Berg, job superintendent, and his assistant Ray Ross, are top supervisors working for Sound Construction & Engineering Co. on transportation facilities being installed at North Richland, Wash. for AEC. Al Root is carpenter foreman, and John Gage is labor foreman. On steel, Gene Willmann is assistant superintendent, with Lee McIntosh, foreman.

On the plumbing, heating and ventilation sub-contract, a \$376,000 job, Harry Birdsell is general superintendent for the contractor, C. F. Frilot. General foreman is "Bud" Arit, with "Chuck" Abby foreman on pipe and E. R. Kelly on plumbing.

E. W. Bullard, who for the past three years has been United States sponsor of the Turtle Club, has been appointed international sponsor by C. W. Rustmeyer, founder of the organization and safety director of Forest Products Limited, Vancouver, B. C.

The Turtle Club is an organization made up exclusively of men whose lives were saved because they had on proper head protection at the time of an accident. Applications for membership may be secured by writing the Editor, Western Construction, 609 Mission St., San Francisco 5, or to E. D. Bullard Co., 275 Eighth St., San Francisco 3.

Louis V. Richter, marine superintendent; Tony Ferlet, quarry superintendent, and Joe Barnett, engineer, are among the top personnel on jetty construction at Alamitos Bay Marina small yacht harbor, Long Beach, Calif. Other key men for Connolly Pacific Co. on this \$1,769,349 job are Leonard Schinda, timekeeper, and Al Sanders, bookkeeper.

* * *

Leonard Patzer is general superintendent on the erection of a parochial school and convent at Richland, Wash., a \$900,000 contract in the hands of Malarkey & Moore. Art Anderson and Clarence Robins are carpenter foremen and Bill Bossert is foreman on labor. Russ Wilson is in charge of the office.

* * *

"Whitey" Groat, assisted by Ed Patzer, are heading the construction of an addition to Columbia High School under construction by School District 400 at Richland, Wash. This job is being pushed to completion



Rock Ripper



Boosts Yardage, Saves Your Scrapers, Multiplies Workpower of Your D8 Tractor!

REALLY SHATTERS ROCK FOR EASY LOADING... underground "quiver" of special curved standards with their replaceable rock-splitting points reduces rock, shale, cemented gravel and other tough materials to easy-loading conditions, fast!

WORKS ANYWHERE TRACTOR CAN GO... compact, tractor-mounted; easy to handle in corners, tight spots. Swivel-mounted standards pivot on turns for effortless steering.

MULTIPLIES WORKPOWER OF YOUR D8... with an ATECO ripper behind, Cat dozer in front, your D8 is ready to rip, push load or bulldoze any time, anywhere. Ripper balances dozer weight for easier handling, better traction.

8,800 LBS.* OF RUGGED STRENGTH... takes full power of the new D8 and either rips rock or stalls tractor; drawbar takes the pull, no strain on tractor case.

*with 3 standards; 7,500 lbs. with two

Get bigger loads faster, save wear and tear on your scrapers... equip your D8 now with an ATECO Rock Ripper. Call your Caterpillar distributor today, or write:

24

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1



5



8



2



6



9



3



7



10



4

AMONG the people running the Chief Joseph Dam construction project for Columbia River Constructors are (all listed from left) (1) Lou Derrick, Fred Jiles, Al Berry, Ted Jones, Fred Zevart, Murray Aarestad, Jim Tillman, field engineers, and Lee True, chief field engineer. (2) Russ Martin, materials engineer; Stanley Stearns, office engineer; E. B. Hamlin and John Heasley, design engineers; and Leon Sasser, draftsman. (3) J. C. Wendle, W. E. Brown, and Walt Caster, carpenters; Jim Napper, superintendent; and Roger Thomas, shop superintendent. (4) C. F. Culp, J. B. Gram, G. W. Trisdale, Ray Vaughn, H. Corpe (swing shift foreman), Marion Hogen and C. W. Boyer, electricians; and Bill Haggerty, superintendent. (5) Tom Boyd, safety engineer; George Piedmont, project manager; and Ed Gore, excavation superintendent. (6) Fred Bader, Paul Kemp, Bill Smith (paymaster), Nan St. Cloud, Loise Harris, Fay Stone, office force; and P. A. Campbell, office manager. (7) Bob Lucas, Dick Enos (superintendent), Fred Waldorf, and Fay Kuney, warehouse crew. (8) Tony Zaversnik, master mechanic; Cecil Auby, Louie Eylar, Bill Hays, Frank Brice, Henry Payant, and Ronald Smith, mechanics. (9) Russ Hutchinson, F. M. Nash, Joe Luco, and Russ Cargill, carpenter foremen. (10) Fred Kaden, Cliff West, Frank McManis, and Bill Lawless, pipe fitters; and Joe Ray, superintendent.

by Waale-Camplan Co. at a cost of about \$750,000.

* * *

David E. Stinson, project manager, and "Bino" Brovelli, general superintendent, are among the top men working at Folsom Dam, Calif., for Merritt-Savin, prime contractor on the \$29,000,000 construction. Other important personnel on this large dam job are: Les Sumner, project engineer; James R. Blinn, assistant

project engineer; Charles Henning, office manager; Bob Davis, purchasing agent, and John Hellerud, Fred Arp and Fred Lichenstern, who are carpenter, excavation and iceplant superintendents respectively. Also superintendents: Arthur Bartlett (concrete); Owen Taylor (ironworker); "Chic" Alexander (aggregate plant), and "Blackie" Scriven (electrical). Afel Johnson is master mechanic and B. E. Woods

is safety engineer. Larry Kelsy is accountant and Ed. Rapp, timekeeper. George Blessis is office engineer.

Foremen on the job are: Carpenter—Fred Binkerd, James Alvis, Bob Nartze, Jack Boyle, Don Anderson and Ed. Bruins. Concrete—"Jiggs" Carney, Mike Krumpotic and C. Alexander. Embankment—Paul Holt, Art Root and Frank Partain. Batch plant, Bob Fowler; shop, C.

E. Carter; truck, John Souza; labor, Walt Stoltenberg and Steve Krumptotic; drill, R. Skellenger; resteel, W. Irvine; and "Doc" Tarr, first aid man.

* * *

Working under the direction of John J. Morton, project manager for Atkinson Ostrander Co., contractor on the spillway and powerhouse under construction at The Dalles Dam, Ore., at a cost of about \$33,324,000, (see p. 54) are the following key men: Concrete superintendent E. H. Swanson; walkers E. F. Snyder, F. F. Jordan and S. B. Cordell; labor foremen Dean Flora, E. J. Anderson, J. T. Fitzgerald, H. R. Gentry and M. B. Kennedy. Power tool operator foremen H. A. Schaefer, L. E. Montgomery, D. D. Clark, W. E. Hitchcock, W. Shields, E. J. Sweet and C. W. Spoon. Cement finisher walker J. H. Kelley, and foremen C. E. Fowler, V. I. May and C. Achziger. Master mechanic C. F. Throckmorton, and mechanical foremen Claud Hamlin and W. J. Hill. Carpenter superintendent G. L. Terry, and foremen D. P. Shupe, V. J. Davis, G. C. Chambers, G. E. Ward, J. C. Bowman and H. J. Holt.

Steel superintendent C. P. Mason, and rigger foremen W. A. Bobo, Walter Dodd and G. R. Black. Re-steel assistant superintendent A. K. Mayers, assisted by W. A. Brice,

foreman. Excavation foremen E. J. Dechaud and S. E. Brooks. Drilling superintendent Ted McDaniels, and foremen F. Denogon, William Anderson, J. H. Bell and F. C. Falbo. Powder foreman is Lloyd McCall.

On the aggregate and batch plants W. N. Rushing is general foreman, with Andy Duray and A. E. Stillwell aggregate plant foremen, and W. L. Rose, batch plant foreman. G. R. Miller is piledriver superintendent and the general pipefitter foreman is Steven Edens.

Office manager is Paul Pulley; paymaster, J. A. Pedneault; chief office engineer, D. Byers; and contracts manager, W. K. Wilson.

* * *

Under the general direction of A. R. Bacon, project manager for The Dalles Powerhouse Constructors, joint venture firm on a \$29,821,000 powerhouse contract at The Dalles Dam in Oregon, (see p. 54) are the following key personnel. Day shift—Carpenter foremen H. Cox, J. McManus, R. Davis, J. Stalmaker, W. Williams, V. Herhert, T. Peck, H. Ross, A. Sanders, B. Hawkins, W. Brown, and carpenter walkers A. Peterson and J. Fernold. Labor foremen B. Whetsler, W. Graham, D. Westberg, D. Morris, B. Mundy, J. Nesbitt and W. Myers. Mechanic foremen N. Mills and C. Noel; rigger foremen L. Lang and O.

Melton; shovel foreman J. O'Donnell; service truck foreman M. Clemmons; concrete cure foreman T. Litchfield; powder foreman M. Halverson; pipefitter foreman W. McCoy; cement finisher foreman R. Gay; pile butt foreman E. Dunn; drill foreman E. Hunt; and carpenter shop foreman C. S. Trygg.

Swing shift—Carpenter foreman P. Dollarhide, J. Bryson, H. Green, and carpenter walker F. Godsey. Concrete pour foremen J. Fox, J. Fehr, L. Pederson and P. Darby. Labor foreman V. Bazin; cement finisher foreman Z. Hendricks; mechanic foreman J. McDonald; rigger foreman J. Duvall; pipefitter foreman B. Watson; carpenter shop foreman R. Joseph, and assistant superintendent J. Douglas.

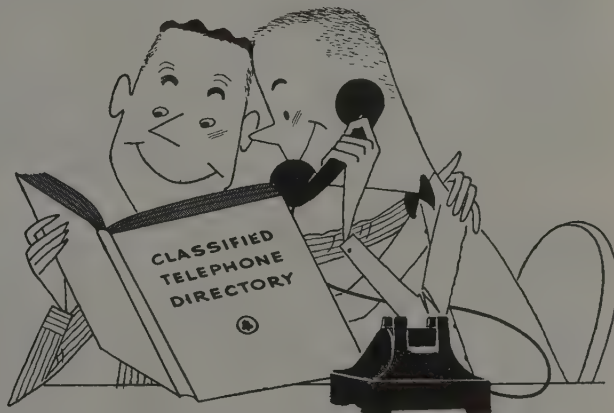
Graveyard shift—Carpenter foremen R. Hutchens and C. Chifton. Concrete pour foremen B. Beumer, T. Burt and F. Houle. General pour foreman E. Sherman. Labor foremen R. Lansing and J. Carrico; cement finisher foreman H. Benson; batch plant foreman O. Hill; rigger foreman R. Roskowsky, and assistant superintendent Otto Hansen.

Reinforcing steel construction is subcontracted to Rutherford & Skoubye, for whom J. W. Anderson is general superintendent, assisted by general foremen George Thompson, Elwood Collins, Moe Taylor, Carl Palmer, Les Ellis and W. S. Davies.

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Pacific Telephone

TRICKS of the TRADES

Does it pay to buy used equipment?

By **JOE SALVADOR**

Used Equipment Manager
Peterson Tractor & Equipment Co.
San Leandro, California

BUYING "UNUSED Performance" in second-hand equipment can be a profitable venture on one job and a costly mistake on another. But careful attention all around, including conscientious action by operating and maintenance men, can lessen the risk. It's largely a matter of how well the equipment can be fitted to the requirements of your job.

Usually you can expect more downtime with used equipment. So if the machine you are going to buy will be a key item on the job, you're better off spending more money for a new machine or the best rebuilt rig available. A second-hand machine would be too likely to make many men and other machines idle in costly delays while down.

Generally, older model machines won't perform as efficiently, and they can't stand long, hard work as well as new ones. So, if you have a

lot of yardage, on an earthmoving job, or a schedule that calls for fast work under rough conditions, new machines should be your better buys.

Lots of jobs for old tractors

This still leaves a long list of jobs on which used equipment can be used effectively. Here are some ideal uses for used crawler tractors:

(1) "Non-critical" drawbar work—pulling tampers, rollers, discs, rippers, water wagons, etc. Usually such jobs are intermittent, can be delayed for reasonable periods in case of breakdown, and do not require full tractor performance and efficiency.

(2) Bulldozing for clean-up work around shovels, in borrow pits, making fills on garbage and refuse dumps, etc.

(3) Scraper work and push loading on smaller earth-moving jobs.

(4) Specialty work: equipped with winches, booms, cranes, pumps, compressors, generators, air drills, earth augers, and other accessories for special-purpose work.

(5) Standby use on larger jobs, to take over while major tractors are down for maintenance or service.

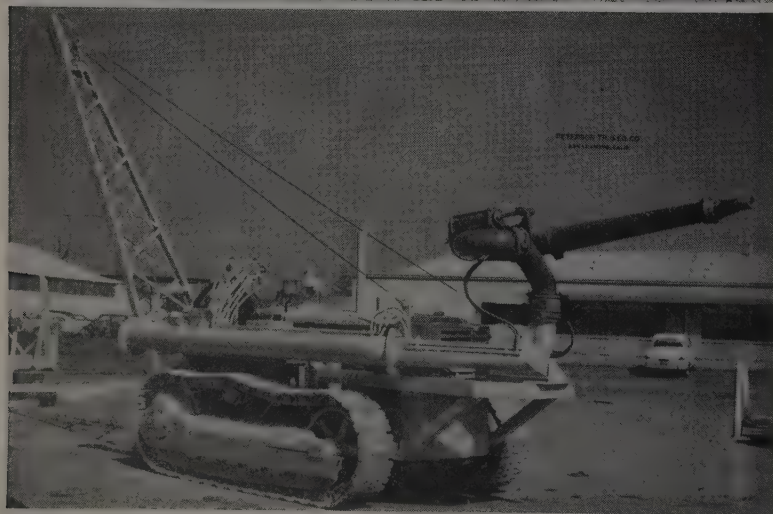
(6) Salvage for parts. Several contractors have found they can profitably salvage usable parts provided the machine is standard with the rest of their "fleet." They rebuild the engine, tracks, sprockets, idlers, and rollers and keep them as replacement spares, save all good final drive gears, shafts, bearings, etc. Often the total value of salvaged parts will be greater than the trade-in or resale value of the machine.

Low investment, low depreciation

Generally, new machine depreciation is heaviest during the first few thousand hours of operation. The used equipment buyer gets the benefit of this. His initial investment is much lower, and the hourly depreciation charge-off on his used machine is far lower.

This is not always net gain, how-

Concluded on page 104



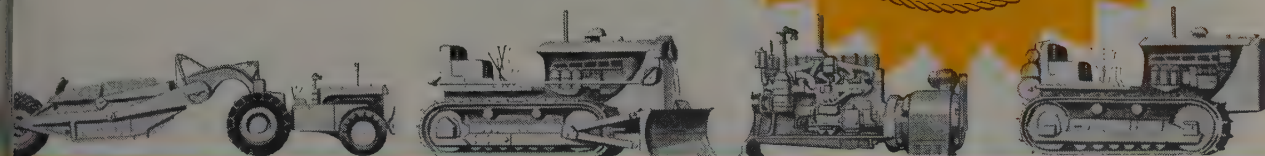
TWO OLD TRACTORS come to life for specialty uses. Peterson Tractor did these alterations. **TOP:** An old Tracton T4 cable loader has been converted to a "wind machine" for burning brush. An 8-ft., four-bladed prop (same as used in orchards) has been mounted on the old loader frame and is driven from the loader power take-off. This machine was adapted for use by J. A. Thompson & Son on a big estate clearing job near San Francisco. **BOTTOM:** This retired Cat carries a hydraulically controlled Intelligent monitor for wetting down fill on Cherry Valley Dam, a Guy F. Atkinson Co. job for the City of San Francisco. Hyster winch and frame on the rear is used to handle heavy 9-in. hose bringing water to monitor. Operator controls horizontal and vertical nozzle movement from valves alongside his seat.

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a **\$10,000 GUARANTEE** on used
Caterpillar-built construction equipment.
Other big values in units of any make.

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BUY**



WHETHER your construction outfit is large, medium-sized or small—or even if you're planning to start a contracting business—your Caterpillar Dealer has the best used buys for you.

Here's why! Whatever your needs, cost-wise or work-wise, he meets them with an across-the-board selection of used equipment in three clear-cut classes.

Best buy is the "BONDED BUY" on used Caterpillar-built equipment. This is backed by a bond of \$10,000 issued by The Travelers Indemnity Company. Your Caterpillar Dealer gives you this protection when you purchase a "BONDED BUY" machine.

Next best buys are "Certified Buy" and "Buy and Try." These cover used units of any make.

No blindfolded buying on your part. Every used engine, tractor, motor grader, earthmoving tool or other piece of machinery on his lot is honestly tagged and backed in writing. You know what you're getting.

Save yourself time, trouble and money. See your Caterpillar Dealer, headquarters for the best buys in new and used equipment!

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

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Only your Caterpillar Dealer offers you these three clear-cut classes of used construction equipment. He backs them in writing. See him for the best values on the market!

(1) "BONDED BUY." Only the best in used Caterpillar-built equipment. Each "BONDED BUY" machine is backed by a Dealer's Guarantee Bond equal to the purchase price of the machine up to a maximum of \$10,000. This provides a guarantee for thirty days against unsatisfactory performance due to defective parts. If a part should prove defective within the guarantee period under the normal conditions of your job and with proper maintenance, your dealer will put your machine back into operating condition with no charge to you for parts and labor up to the amount of the bond. This bond is backed by The Travelers Indemnity Company. Your Caterpillar Dealer gives it to you, at no extra cost, with your purchase of a "BONDED BUY" machine. Look for the "BONDED BUY" symbol—it's your assurance of the best in used equipment.

(2) "CERTIFIED BUY." The second classification of used equipment. "Certified Buy" covers machines of any make in good condition. Your performance guarantee is in writing backed by your Caterpillar Dealer.

(3) "BUY AND TRY." Bargains in used machines of any make. Buy and try them for a period mutually agreed upon by you and your Caterpillar Dealer. "Buy and Try" machines carry his written "money-back" agreement.

"BONDED BUY" assurance effective in the United States and Canada

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DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

How a superintendent licked problems of mud, high watertable on pit job



THIS PICTURE shows you how Arthur Bros., contractors of San Mateo, Calif., recently cut a job down to size at the bidding stage. A wet excavation 30 ft. deep promised to be a big part of the chore, but the solution devised by A. E.

Hillberg, job superintendent, gave Arthur Bros. the contract and made the work itself a lot easier.

The problem was bay mud and a high watertable under the job, where additions to the San Mateo sewage treatment and pumping plant

required building a new pump pit, 20x30 ft. and 30 ft. deep. The solution was to ring the pit site with steel piles, driven on a line about 5 ft. outside the pit perimeter. Sixteen 8-in. I-beams were used for the installation, spaced at 10-ft. centers and driven 35 ft. deep.

Excavation was done with an HD-5 loader, for the first 6 ft. of depth, with 4x6-in. lagging laid between pile webs, and restrained by the flanges, to hold out the surrounding ground. Timber shoring braced the whole system. A 3/4-yd. P&H clam took over from the HD-5 to do the deeper work, taking the excavation down to full 30-ft. depth.

The \$400,000 contract held by Arthur Bros. includes two major structures: a primary clarifier 95 ft. in diameter and 10 ft. high. This tank is of reinforced concrete, open at the top. A primary digester, also of reinforced concrete with a closed top, is 70 ft. in diameter and 26 ft. high. (Forms for this work and a picture of job personnel are on page 102.)

Installation of 680 lin. ft. of concrete pipe, alterations to existing facilities, and installation of some new machinery are also included in the work. The new pump pit will house a 16-in. sewage pump at this time, with provisions being made for two more in the future.

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And PRIMACORD requires no caps in the hole, is insensitive to stray currents, is easy to hook up, and it's doubly safe . . . especially in presence of electrical storms. PRIMACORD will solve many of your blasting problems.

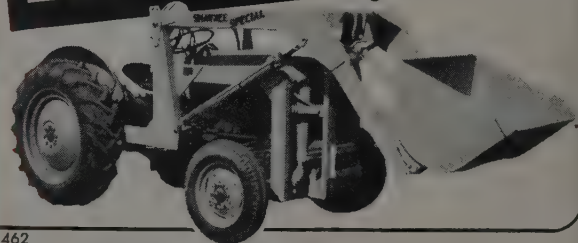
*Four Types Available
PLAIN, REINFORCED
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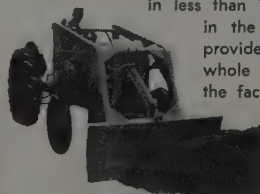
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The new Shawnee Loader is an extra heavy-duty industrial loader, all welded construction. Bucket capacity 12 cu. ft. It is installed or removed in less than 10 minutes; it is designed without bolts in the loader frame and bucket roll back is provided for handling loose material. For the whole story, see your nearest dealer or write the factory.



66" x 24" BULLDOZER ATTACHMENT

Interchangeable with bucket in a few minutes time. Box plate construction.

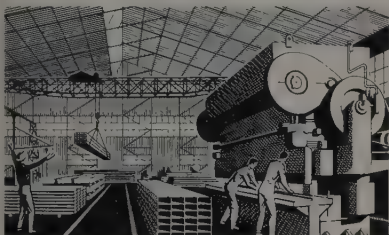
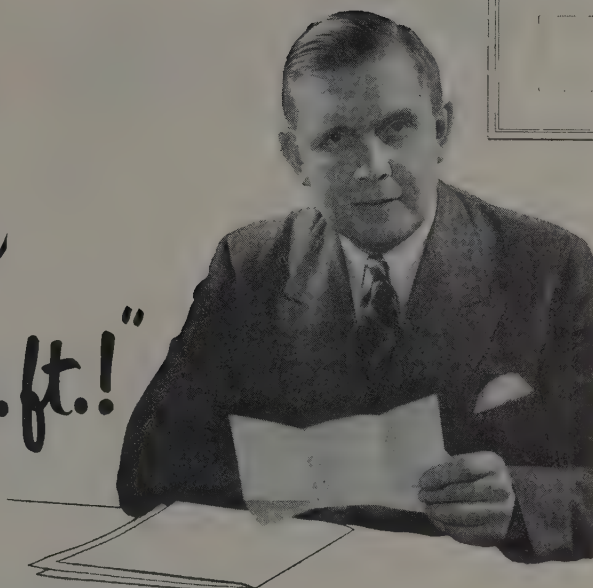
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2. The minute your foundation is ready, Soulé trucks arrive with every part of your building. Soulé crews, superbly equipped, begin erection immediately. Coordinated building goes ahead without delays you expect with conventional construction.



3. Now the big, rigid, clear-span frame is finished, and fast-moving Soulé craftsmen are placing end frames, windows and doors exactly as you have specified. (There's no limit to window and door setups.) Wide choice of floor plans, lengths, widths and heights, too.



4. Almost finished, Soulé crews install corrugated sides and roof, fit translucent panels to admit glare-free natural light. Soulé engineers make final inspection, to be sure your building is snug, tight, ready for years of trouble-free service. (If necessary, Soulé buildings can be removed and re-erected at a new site.)



5. Look what \$1.25 per square foot has bought! Every inch of inside space usable, thanks to Soulé's clear-span design. Big service doors where you want them; plus ventilators and insulation at slight extra cost. And remember—Soulé buildings never need painting—maintenance is the lowest ever!



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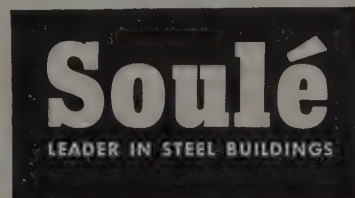
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ever. The lower investment may be offset by a heavy cash outlay for new tires, major repairs or complete overhaul early in the operation of the used machine. Also the lowered depreciation charge, which can bring hourly ownership and operation costs below those of a new machine, can be offset by lowered production. The reduced work capacity and efficiency of the used machine and its more frequent downtime naturally reduce overall output. Thus despite a lower hourly cost rate, per-unit production costs may be considerably higher than with a new machine. Again, the overall "economics" depend on the intended use of the equipment. On some jobs a used machine may equal or beat new machine production costs.

Rebuilt vs. "as-is"

The higher repair expense and lower efficiency of really old equipment do not apply to late-model machines with very little use, or to those that have been completely rebuilt. They can be considered almost in the category of new machines. Whether they are profitable buys depends upon (1) a price that reflects proper depreciation for the hours of previous use, and (2) the ability and integrity of the rebuilder.

The rebuilder's experience, ability, and integrity are of utmost importance. He decides what parts should be replaced, what standards of workmanship must be maintained. When he's through and the machine stands in the yard in its new coat of paint, there is absolutely no way to tell in advance of actual use how good a job has been done where it counts—inside.

You lose!

If the rebuilder decides to save money or add to his profit by taking a chance that doubtful parts will at least outlast the guarantee period, the chances are excellent that he'll win and you'll lose. If he uses "gyppo" instead of factory standard parts, you probably won't know it until an earlier-than-expected overhaul comes up.

Your only real protection is the integrity of the rebuilder. If you aren't well acquainted with his facilities and his reputation, investigate!

To get back to our original question: "Does it pay to buy used equipment?"—it is pretty obvious that the answer depends upon the equipment's intended use. If new-machine reliability, work capacity and performance aren't vital to the job, the answer in my book is "yes." Find the right used machine at the right price, and you can save on both first cost and overall hourly operating cost. Just be darned sure you get the "unused performance" you pay for!

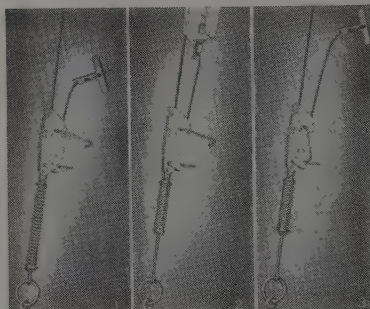
Use the coupon on page 111 for free information on any of these items

1

"AIR FOR YOUR ENGINE" is the name of a 12-page bulletin published by **Cummins Engine Co., Inc.**, in the interest of better maintenance among engine owners and operators. The booklet spells out, in easy-to-understand language, big type, and lots of cartoons, just how important the amount, cleanliness, and temperature of the air taken into your engine is. Recommended reading for truck drivers and maintenance mechanics.

2

CABLE SECURING RIG—Eastern Rotocraft Corp. has introduced a new securing rig which it says will permit quick and easy anchoring of guy wires and cables. Known as Tyzem (R), it is said to insure uniform cable tightness by providing automatic control of ten-



sion. Recommended on installation towers, trestles, and stages. Standard units provide a cable tension of 100 lb. and are available for any size cable up to and including 7/32 in. of an inch.

Here's how it works: (1) The tension handle is rigged on the free end of the cable wherever convenient with locking handle in unlocked position. (2) Pull up on the free end of the cable until the spring bottoms, then release spring about 3/4 in. (3) Snap the locking lever into the keeper as shown.

3

AN ELECTRIC counting device for concrete mix trucks has been announced by **Micro Switch**, a division of **Minneapolis-Honeywell Regulator Co.** It features a counting indicator located on the truck's dashboard. This enables the driver to keep an accurate account of the revolutions of the mixing drum and to control the mixing operation accordingly. The device consists of a precision-sealed, snap-action switch, a connecting and sealing device, and an electric counter for use with either 6 or 12-volt DC circuits.

4

STEWART'S ELECTRIC LEVEL is an angle measuring instrument which indicates the position of the machine being operated by means of a light panel, mounted in full view of the operator, which records instantly any change in elevation so the operator

can make any adjustment at the precise moment it is required for grading accuracy. It is manufactured by **Electro-Level Corp.** for use on motor graders, land levelers, trench machines, rail and form setting machines, material spreaders, and screening machines. It can be set to angles from 0 to 180 deg. or from 0 to 40% grade.

5

CYCLONE PORTABLE SAND-BLASTER—A lightweight, portable, trigger-controlled sandblaster which allows one-man blast cleaning of any surface with any abrasive material has been announced by **Safetee Products Co.** Designed to permit blasting of hard-to-reach corners and recesses, it can be used to remove rust, paint, and welding scale. It also is used to prepare metals for painting, rubber bonding, metalizing, plating, galvanizing, welding, soldering, and the like. Literature and engineering data available on request.

6

CORRECTION

Due to a misunderstanding, Item 503 which appeared on page 126 of the May 1954 issue of *Western Construction*, was in error. It described a 180-page manual on the maintenance and operation of automotive electrical systems which was published by **The Electric Auto-Lite Co.** This manual and its accompanying specifications book are not free. The manual costs \$1.50 and the specifications book costs 50c, making a total of \$2 for both books. They may be obtained by writing the Parts & Service Division, **The Electric Auto-Lite Co.**, Toledo 1, Ohio.

7

A SPROCKET PULLER and installer to fit **Allis-Chalmers**, **International-Harvester**, and **Caterpillar** tractors has been announced by **Owatonna Tool Co.** The OTC 50-ton, power-twin hydraulic ram furnishes power for this one-man portable unit. A single-speed hand pump, a three-speed hand pump, and an electrically-driven pump, all of which operate at 10,000 psi., are available to activate the ram.

8

PIPE VISE—The **Ridge Tool Co.** has announced two new models of its **Ridgid** pipe vise. No. 40A **Yoke Tristand** ranges from 3/8- to 2 1/2-in. capacity and No. 45A chain vise ranges from 1/4- to 4-in. capacity. Its tool tray pushes down flat to hold the vise stand rigid and pushes up to fold in and chain the legs for easy carrying to the job. It is equipped with three pipe benders, ceiling brace screw, pipe rest, and many tool hanging slots. Rubber grommets on the feet prevent travel in use.

Eight steps to better maintenance

SOME WORDS to the wise on tractor maintenance were passed on recently by L. W. Davis of Allis-Chalmers, speaking before the Utah Highway Conference. Two words characterized Davis' theme: preventative maintenance. Here is some of what he had to say:

"I have read somewhere that the difference between just another fighter and a world champion is the champion's ability to give and take just 5% more than his opponent.

"In the job competition of 1954 this same factor of difference may dictate the difference between failure and success. It is a recognized practice to calculate a productive hour of 50 min., with an additional 10% safety factor against downtime because of mechanical failure. This simply estimates that 90% of the equipment is available at any given time. If an improved preventative maintenance program will keep more machines operating by reducing the causes of downtime, so that 95% of the equipment is operable at any given time, the time has been cut in half that machines are idle for mechanical reasons. That championship 5% can really show a profit, or take up a tremendous slack traceable to errors and contingencies. It can keep machines earning; it can reduce maintenance costs; it can prevent waste in wages and in rental rates; it is a profit insurance and contract security."

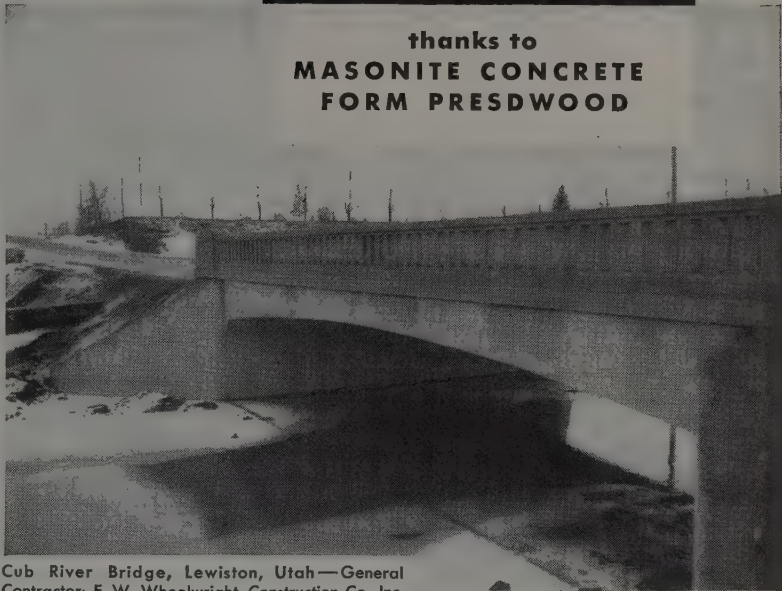
Tailored programs

Davis said preventive maintenance programs can be tailored to fit any kind and size of operation—and dealers and manufacturers are glad to help out. Here are 8 steps named by Davis for organizing a good program:

- (1) Make one person responsible for preventive maintenance.
- (2) Give him authority to designate his helpers.
- (3) Make up and use check charts faithfully for all periodic maintenance.
- (4) Set up a periodic inspection program for checking adjustments, with automatic follow-through.
- (5) Use the manufacturers' recommendations.
- (6) Arrange procurement and proper storage for the right amounts of the right types and grades of lubricants. Keep storage area and dispensing equipment clean—it encourages good housekeeping right on down the line.
- (7) Arrange procurement and stocking of an adequate operating supply of spare parts.
- (8) Use the training programs and technical assistance available from the machinery dealer and his manufacturer.

"Stoning Time
Cut in Half!"
—says F. W. WHEELWRIGHT,
of Wheelwright Construction Company, Inc.

thanks to
MASONITE CONCRETE
FORM PRESDWOOD



Cub River Bridge, Lewiston, Utah—General Contractor: F. W. Wheelwright Construction Co., Inc.

"By using the screen side of your board, stoning time on this bridge was cut in half, and was accomplished with unskilled labor."

Mr. Wheelwright further reports that Presdply® box forms for bridge handrail posts are simpler to build, and strip out a great deal easier than lumber frames, thereby causing less damage to the delicate edges of the concrete.

Once you discover the substantial savings that these strong, all wood hardboard panels offer for making smooth-surface concrete, you won't be satisfied with ordinary materials. Send the coupon now for full and free information.

Save Two Ways with Masonite Presdply!

Try Presdply on your next job and get both these money-saving advantages: (1) No backing needed, for Presdply has the structural strength of plywood and the smooth, texture-free surface of Presdwood. (2) Smooth concrete will need minimum rubbing, will quickly be ready for painting. Send for your free sample.

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County.....State.....

"Masonite" signifies that Masonite Corporation is the source of the product

NEW LITERATURE

Free copies of any of the items in this section may be obtained by using coupon on page 111.

9

"Fabricated Steel Construction"

"Fabricated Steel Construction" is the title of a 6-page folder published by **Bethlehem Pacific Coast Steel Corp.** It contains construction pictures of various structural steel erection projects throughout the West on which Bethlehem steel was used and which the company erected.

10

Sump pump selector

"BJ Sumpmaster" is the title of a 20-page bulletin which is reported to contain all the answers to selecting any of 4,000 or more sump pump models. This catalog, Bulletin No. 54-3-1420, was published by **Byron Jackson Co.** Capacity of pumps listed ranges from 10 to 2,600 gpm. with heads from 20 to 300 ft. In order to use the chart to find the individual model number you desire, determine desired gpm. and total head, then use the charts to find the individual model number. A simple coding system allows orders to be placed without detailed description. This bulletin is recommended as a time-saving technical aid for contractors, engineers, equipment dealers, or other users of sump pumps.

11

Osgood-General Model 250 described

Osgood-General has published Specification No. 5421, a 4-page folder loaded with specifications, charts, and pictures of the company's new $\frac{3}{4}$ -yd. Model 250, combination shovel, dragline, clamshell, crane, hoe, and piledriver in action. The specification covers superstructure and crawler dimensions, weights, working range, and lifting capacity.

12

Timber Engineering booklet

A 12-page illustrated booklet describing the engineering and research facilities being applied by the lumber industries service organization has been published by **Timber Engineering Co.** The booklet, "For Users of Wood and Forest Products," outlines the industry's research activities in engineered timber designing and testing, wood research services and facilities, including specialized equipment used at **TECO** laboratory in improving wood products and uses and in developing new ones. The laboratory's courses for training production personnel in applying the

latest developments in gluing and wood utilization and the course in timber engineering offered to colleges and universities are also explained.

13

Side-loading lift truck

An 8-page bulletin in color describing and illustrating the **Traveloader** has been published by **The Baker-Raulang Co.** It contains complete dimensions and specifications on available models and explains the machine system of handling. Photographs show the machine handling steel stock, pipe, and other materials on the job.

14

Rock bolting procedures

A 12-page booklet describing the application of rock bolting to the roof and sides of rock excavations has been published by **Ingersoll-Rand.** It is intended as a general guide for rock bolting techniques. It deals with the theory of rock bolting, and by means of simple, clear illustrations explains how rock bolting works. It also outlines the advantages and disadvantages of the procedure. Included are sections on procedure, types of bolts, size of holes, and making of bearing plate. Other sections describe torquing the nuts, types of drills used, and size of impact wrenches recommended for rock bolting jobs. The last three pages in the booklet describe stoppers, impact wrenches, and jackbits made by **Ingersoll-Rand.** Specially recommended for all mine operators and drilling contractors. Ask for your free copy of Form 4155.

15

Hose coupling bulletin

Titeflex, Inc. has published a 16-page booklet describing a quick connect-disconnect hose coupling for water, oil, steam, gas, and chemical lines. The booklet contains a list of industries in which the coupling has been applied, tables of pressures at which it can be used, tables of the materials and sizes in which the coupling is manufactured, and in-

structions for ordering. The sealing and swiveling actions are also described.

16

New Cat D8 tractor

A 4-page booklet describing the new Caterpillar D8 tractor has been published by **Caterpillar Tractor Co.** It contains color pictures of the Cat at work, a cut-away picture of a recently developed oil clutch, and descriptions of the new D8 engine. Ask for Form 31081. Available in English, Spanish, Portuguese, and French.

17

Automatic spray curing of concrete

An 8-page, color booklet, Bulletin P-100, describing how automatic spray curing reduces curing costs and assures complete, uniform slab sealing with a minimum of labor, has been published by **The Flexible Road Joint Machine Co.** It contains pictures of the Flex-Plane curing machine in action, including pictures and descriptions of its various attachments.

18

Metal lath booklet

A 4-page booklet published by the **Metal Lath Manufacturers Association** describes the three basic types of metal lath, flat expanded, expanded rib, and sheet. A simple chart gives widths per square yard, maximum spacing of supports, and type of lath. Each type is illustrated and recommended uses for each type are described.

19

Portable 5½-yd. batch plant

The Conveyor Co. has published a 12-page bulletin describing its **Conveyco 5½-yd. batch plant.** Folder is crammed with pictures and drawings describing erection and operation.

20

Gurley current meters

Bulletin 700 is a 16-page, illustrated booklet which describes various types of **Gurley** current meters, including photographs, recommended uses, and various accessories. Published by **W. & L. E. Gurley.**

21

Steel slide chart

Columbia-Geneva Steel Division is offering a slide-chart which reveals the dimensions and weight of both

How to Judge Value in a Shovel-Crane

You can't compare the quality of two pieces of equipment by simply comparing their so-called "features." For instance, one shovel-crane manufacturer may "sell" the idea that he has a 25 ft. hoe boom as compared with a competitor's 23 ft. boom, leaving the inference that it would dig deeper. Actually, the stick used with the 23 ft. boom might be longer than the one on the 25 ft. boom and, therefore, would dig as deep or deeper. One manufacturer might "feature" anti-friction bearings as proof that his machine excelled while actually the high speeds at which he runs his shafts might mean that he couldn't use anything else.

Sometimes highly touted "features" are ballyhoo to cover up inherent weaknesses elsewhere. After all, being different isn't necessarily better.

Design features cannot just be imposed on a machine—they must be integrated into all parts and functions. Design features as such are not what users really buy. They buy only what the features will do for them in the way of low end cost, ease of use and, primarily, the profits they will produce.

Instead of features, we at Thew believe in what we call "Balanced Quality." We don't claim to "out-feature" every one else; to be faster, more powerful, to have more of "everything." But we do offer "Balanced Quality" in which all the components, and functions, are quality-engineered into a completely integrated unit.

In many respects, we do better than others . . . in others, we come close to the top. But all-in-all, the combination results in a machine in which quality has been distributed evenly throughout the machine rather than concentrated in a few sales features. A machine in which power has been "balanced" properly between all operations, in which the speeds of various functions have been balanced for integrated, synchronized operations, in which the controls have been balanced to produce quick starts and rapid acceleration, in which the weight of the machine has been balanced for maximum stability.

Any one of these results in itself, or the design by which it is achieved, may not be sensational but, added all together, they will do that one thing we believe you really want more than anything else—and that is: *put more dirt in the wagons, faster, at lower cost—and to do it longer!*

WANT "FULL MEASURE" IN A 1-YARD SHOVEL?

SEE THE

THE W LORAIN[®] "50"



Want to be sure of getting the "full measure" of value from your next shovel in the 1-yd. class? Want high output? Low maintenance? More work hours on the job? Then, investigate the values in the Lorain-50! Investigate the many advantages of the Hydraulic (fluid drive) Coupling... plus the "balanced quality" throughout this stand-out performer in the 1-yd. class. Your nearby Thew-Lorain Distributor can show you how the "50" values measure up in action on the job.

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P. L. CROOKS & CO., INC.
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LEE REDMAN EQUIPMENT CO.
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SOUTHERN IDAHO EQUIPMENT CO.
Idaho Falls, Boise and Twin Falls, Idaho

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

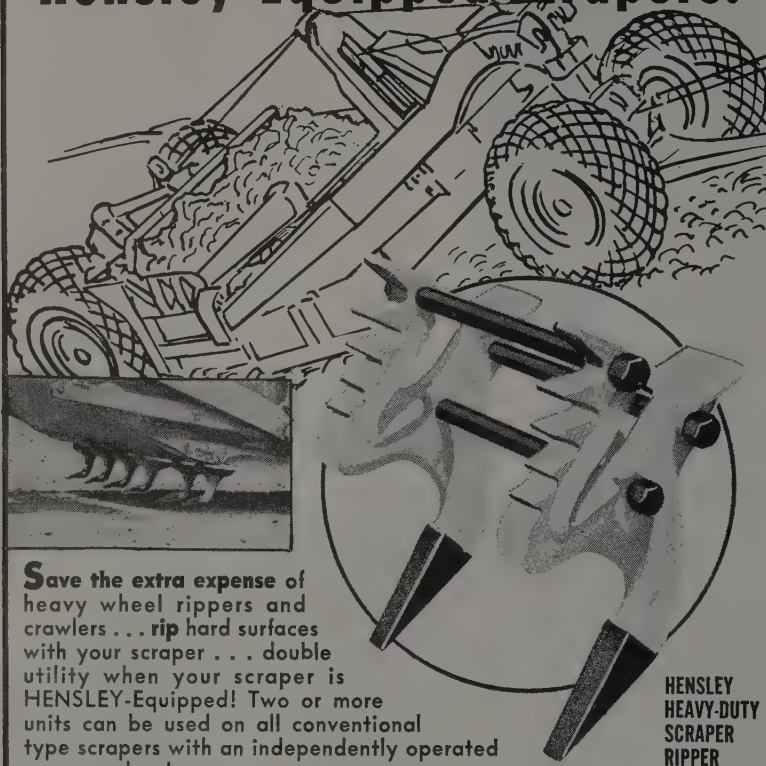
WESTERN EQUIPMENT CO.
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WC 8

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SCRAPER
RIPPER**

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Los Angeles
Farmers Hardware & Equip-
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Harrison Motor Parts,
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Hudson Equipment Co.,
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Hust Bros., Marysville
Lowry Equipment, Redding
McGaraghan Supply Co.,
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Oroville and Chico
Stockton Iron Works,
Stockton
Wible Equipment Co.,
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Joe Smith Machinery,
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Inc., Boise

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Reno

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Medford
Western Equipment Co.,
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TEXAS:

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Houston
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Dallas and San Antonio
Lively Equipment Co.,
El Paso

UTAH:

J. T. Holland Co.,
Salt Lake City

WASHINGTON:

Western Machinery Co.,
Spokane
Western Tractor & Equip.,
Seattle, Tacoma,
Chehalis, Everett

WYOMING:

Wilson Equip. & Supply,
Cheyenne and Casper

ALASKA:

Western Tractor & Equip.,
Anchorage & Fairbanks

galvanized and uncoated sheets ranging from 8 to 30 gage. This makes it easy to tell exactly what you are ordering. Send for your free slide-chart.

22

Pre-sealed insulating pipe

Catalog No. 35 is a 54-page booklet, describing Durant pre-sealed insulated pipe, which was published by Durant Insulated Pipe Co. Handy side tabs tell you where to find sections about product data, engineering and design data, specifications, installation, and how to order.

23

Cone pilot bit

Pengo, Jr., cone pilot bits are described in a 4-page, color folder published by Petersen Engineering Co. These bits are described in picture and story. Factory price list is included.

24

Lubrication booklet

Fiske Brothers Refining Co. has published a 36-page, color booklet containing data on Lubriplate lubricants. The booklet goes into the necessity of proper lubrication and then it describes Lubriplate lubricants. There are numerous tables giving the specifications of each type of oil and the principal uses for which each is recommended. Also contains instructions on applying the various products mentioned.

25

Joy portable air compressors

Joy Manufacturing Co. has published a 24-page bulletin on its line of portable air compressors. It describes the Joy 75 and 125 CFM portable machines. This booklet called Bulletin A-55, contains detailed descriptions, specifications, and illustrations.

26

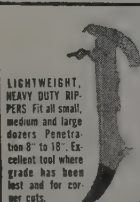
"Terratracs and their Equipment"

This is an 8-page, full color booklet describing various types of Terratracs, each one pictured in color, as well as each piece of equipment shown and described. A specification page is on the back. Published by American Tractor Corp.

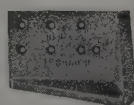
27

Euclid bulletins

Euclid Division of General Motors Corp. has published two new bulletins describing TDT 17 bottom dump Euclid and the twin-power scraper. Both booklets contain 8



**LIGHTWEIGHT,
HEAVY DUTY RIP-
PERS** Fit all small,
medium and large
dozers. Penetra-
tion 8" to 18". Ex-
cellent tool where
grade has been
lost and for cor-
ner cuts.



**HEAVY DUTY ROCK
END BITS** for D-6,
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gineered for pene-
tration and lasting
wear



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TOM TRACK ROL-
LERS** and roller
parts—machined
to roll true with a
minimum of wear



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ER RIPPER**. When
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3 to 5 units they
give you coverage
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blade for ripping
concrete, hardpan,
blacktop, red rock
and other hard
surface



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HEAVY DUTY
GROUSER SHOES**.
Tapered bar de-
sign for even
wear with maxi-
mum traction and
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pages of specifications, pictures of the equipment and parts in action, and lots of words of explanation on how they work.

28

Safety-pull, ratchet-lever hoists

Coffing Hoist Co. has published a new 8-page bulletin on safety-pull, ratchet-lever hoists. It describes the entire line of ratchet-lever hoists, including both roller and coil-chain models. It contains specifications, drawings, and photographs illustrating each model of hoist as well as a series of pictures of the hoists in action on the job.

29

Pioneer portable aggregate plant

A 24-page, color booklet has been published by Pioneer Engineering Works to explain how a portable plant can be used to produce aggregates to meet gradation requirements. The booklet, called "An Idea That Sparked a Million Miles of Highway," contains a complete page of specifications on each of the model plants along with a picture of each plant in action. One section of the booklet explains the difference between different portable plants, with drawings showing the inner workings. Numbered cutaways in color show how the various types of material go through the plants. Other photographs show various accessories to the plant. The remainder of the booklet is made up of short construction stories relating the experiences of contractors in the field. Each story is accompanied by one or more photographs of one of these plants at work.

30

Multi-purpose Gradall

A 20-page brochure in color has been published by the Gradall Division, Warner Swasey Co. to explain why and how the multi-purpose Gradall machine provides a cost-cutting, labor-saving approach to a variety of earth-moving and construction operations. It contains specifications, cross-sectional and cutaway drawings, photos of the machine in operation, descriptions and illustrations of various boom attachments, and photos and descriptions of the machine in action on various recommended job applications.

31

Pressure-treated timber

Simplified guidance and information for users and specifiers of pressure-treated timber is offered in a booklet entitled "Wood Preservation," published by Western Wood-Preserving Operators' Association. It contains specification tables, descriptions of various types of preser-



"... it's the 'Master' of the situation."

"Our Master Turn-a-Trowel knocks down every hump on the floor slab." "I've used others that ride right over the uneven spots."

Contractors can make those statements because the Turn-a-Trowel has rigid—not flexible—blades. Bumps in the floor *have* to come off, so Master-finished floors are flat.

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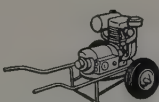
☐ Concrete Vibrator. 9,000 rpm vibration, yet lightweight; rugged, gives long service; gas and elec.; wheel mounting available; accessory tools; 1½ to 6 hp power units.



☐ Remote Power Vibrator. This "Hycycle" runs 2 high-speed vibrators (10,300 rpm) as far as 300' from power unit, mounted on wheelbarrow, wt. only 172 lbs.; 6.6 hp engine.



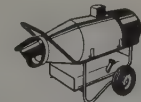
☐ Midget Trowel. New. Lightweight, one man carries; gets into tight spots; only 24" across yet does top trowel job 6 times as fast as by hand. 70 lbs.; 1.6 hp engine



☐ Portable Generator Plants. AC or DC; gas, diesel, natural gas engines, ½ KW to 12.5 KW; portable mountings. Also continuous duty plants up to 20 KW Floodlights.



☐ Vibrating and Finishing Sread. Produces better quality slab than any other method we know, by superior deep vibration. Mixers can't keep up with high speed strike-off, compaction and finish (follow up with broom, bull float or Turn-A-Trowel). Handles low slumps, 3½" down to zero. Gas or elec. (any voltage, phase or cycle); 6' to 30' lengths



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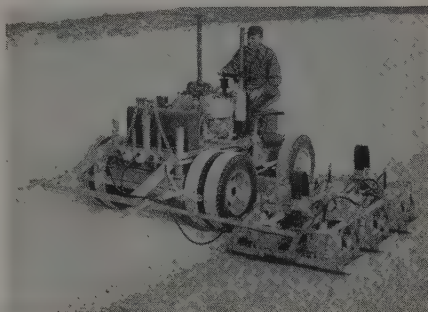


The JACKSON VIBRATORY COMPACTOR FAST • EFFICIENT • VERSATILE

ON MACADAM CONSTRUCTION . . . In one pass it will sufficiently compact 12" of rock to support smooth rollers. In four passes it achieves final density. And when sufficient fines are spread, one pass suffices to fill all voids. In GRAVEL SUB-BASES (blanket course) 7" thick, this machine has achieved 98% Standard Proctor in one pass. Standard width is 13', 3". Working speeds: 0-60 F.P.M. Reverse travel speed: 5½ MPH.

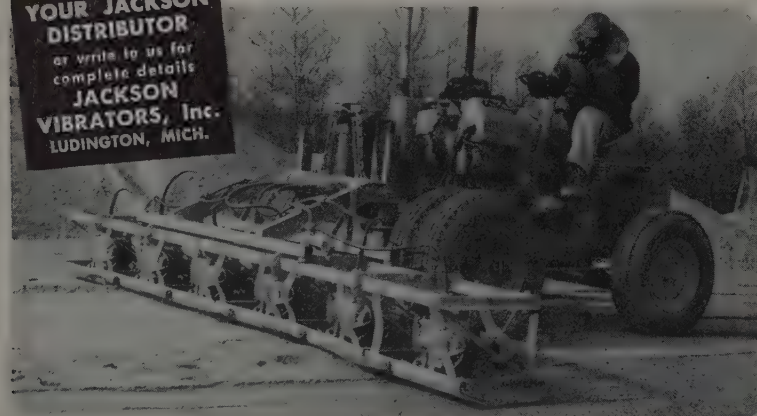
COMPACTS WIDENING STRIPS IN ONE PASS . . .

IN ANY GRANULAR MATERIAL used in flexible base-course widening. For this purpose compacting units are assembled in tandem, (3 deep, single or double row) and towed at side of tractor. Compactor bases of 12" and up may be substituted for standard 26" bases to suit requirements.



SAND FILLS, SUCH AS BRIDGE APPROACHES . . . another spot in which this machine shines. It's rapid and gets into places inaccessible to larger equipment. For the really tight spots one or more of the compacting units may be fitted with operating handles and used as self-propelling, manually guided compactors.

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complete details
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vatives, design and fabrication practices, recommended procedures, and an explanation of the pressure and treatment processes.

32

First aid catalog

E. D. Bullard Co. has published a new first aid catalog containing photographs and descriptions of the various types of first aid kits made by the company. Enclosed is a data sheet containing suggested kits for various types of activities.

33

Concrete volume computer

Stow Manufacturing Co. has announced that it is willing to give its handy concrete volume computer free to any or all contractors who are interested. It is a celluloid slide rule type of thing which enables any construction man to find the volume of concrete needed to be poured if he knows the dimensions of the slab or wall which is going up.

34

Allis-Chalmers booklets

Allis-Chalmers Manufacturing Co. has published two catalogs describing in detail mechanical and performance features of Allis-Chalmers models TS-200 and TS-300 motor scrapers and TR-200 and TW-300 motor wagons. Each catalog is 22 pages long and contains lots of specifications, pictures of the equipment in action, and closeups of the various vital parts and accessories.

35

Lubrication recommendation folder

Fuller Manufacturing Co. has published a 4-page folder on lubrication recommendations for Fuller transmissions. Illustrated with cartoon-type drawings, it takes up the need for proper lubrication to promote profitable operation. It has a table of lubrication capacity of the various Fuller models and a chart listing recommended oil weights in various operating temperatures.

36

Vibrating conveyor line

Hewitt-Robins, Inc. has published Bulletin No. 135-A, a 12-page booklet describing the company's line of vibrating conveyors. It contains drawings, specifications of the various types of conveyors, pictures of typical installations, and shows the conveyors handling such material as hot steel castings, scrap metal, sand, shredded wood bark, and crushed limestone.

37

Block-lift catalog sheet

Waco Manufacturing Co. has published a 2-page catalog sheet describ-

ing design of the Waco Block-lift for carrying cement building blocks. The sheet shows both single and tandem Block-lifts in operation and describes their uses and advantages.

38

Power rollers

Consolidated Industries, Inc., has published a 4-page folder describing its line of Con-Sol power rollers. It contains specification tables, recommended uses, and action photographs and drawings.

39

Rubber hose catalog

Carlyle Rubber Co. has published a 24-page illustrated catalog which gives information and prices of many types of rubber hose and belting. Each page has a specification table listing price by size, recommended uses, and photographs of accessories. Department C-21.

40

Loose-fill building insulation

Vermiculite Institute has published two bulletins describing Vermiculite insulation in action. "Vermiculite loose-fill building insulation" is an 8-page folder containing drawings of various types of building joints and tables of recommended amounts of fill to insert in each case. Also contains formulae for determining the amount of fuel saving. "Versatile

Vermiculite in Modern Industry" is a 16-page booklet describing the four sizes of this material, listing its specifications, and picturing 37 recommended uses.

Literature briefs . . .

41

TILT-UP ACCESSORIES — Superior Concrete Accessories, Inc., has published Bulletin TU-2, which gives details on the various types of accessories manufactured and engineering services offered by the company.

42

FRONT-END LOADER—Catalog 104, published by Drott Manufacturing Corp., contains information on Drott Skid-Shovels, made exclusively for use with certain International crawler tractors.

43

JAEGER COMPRESSORS are described in Catalog JC-1, published by The Jaeger Machine Co.

44

BIG YARDAGE CUTS are described as good reasons for using Marion 111-M shovels in Bulletin 402-A, published by Marion Power Shovel Co.

45

50-TON CRANE—Lima Type 703-SC 50-ton crane, including specifica-

tions, operating capacities, and the like, are described in Bulletin No. 73, SC-A, published by Baldwin-Lima-Hamilton Corp.

46

WIRE ROPE BOOKLET — "The Flattened Strand Story," is a booklet published by Leschen Wire Rope Division. It tells what kind of problems flattened strand was designed to solve.

47

INFORMATION ON how to get "Longer Life From Your Wire Rope" is contained in a booklet of that name published by Columbia-Geneva Steel Division.

48

CONVERSION from rotary to percussion drilling on the same machine is described in Bulletin No. 4153, published by Ingersoll-Rand.

49

CONCRETE FORMS — Symons Clamp & Manufacturing Co. has published Catalog F-9, which describes the company's line of prefab plywood panels.

50

SAND DRAIN EQUIPMENT — McKiernan-Terry Corp. has published Bulletin 61, which tells how to reduce cost and speed production in settling marshy ground by use of sand drains.

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Organization JULY 1954 ISSUE

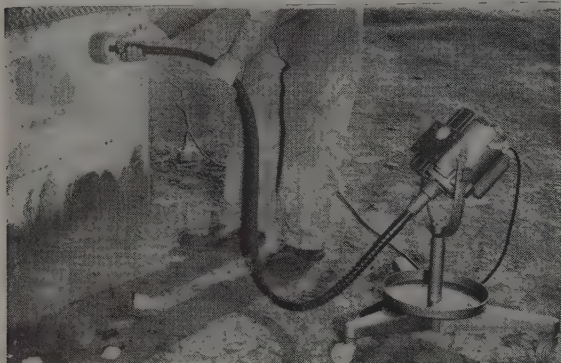
NEW EQUIPMENT

More information on any of the items in this section may be obtained by using coupon on page 111.

51

Concrete pedestal grinder is highly portable

Stow Manufacturing Co. has announced a new portable, flexible-shaft grinding machine, the G40-C. Mounted on three legs with casters, this machine can be moved around easily on the job. It is powered by a



$\frac{1}{2}$ -hp. motor, either open type or totally enclosed. A 12-ft. flexible shaft with a $\frac{3}{8}$ -in. core is used. Length of the shaft makes it easy to use on ceilings or walls. It comes complete with the handpiece and either dry or wet angleheads may be obtained.

52

Shovel-crane designed for both portability and output

Link-Belt Speeder Corp. has announced its new LS-98 shovel-crane. This 1-yd. machine was designed to bridge the gap between the portability of machines up to $\frac{3}{4}$ -yd. size and still keep the output advantage of larger, heavier sizes. Weighing about 53,000 lb. as a shovel, the LS-98 falls within the highway load limits prescribed by many states without major dismantling when loaded on a flat-bed trailer. Other features of the



machine are power steering, two-speed travel gear, self-cleaning track system, digging brakes, 14-in. ground clearance, enclosed travel and deck gears running in oil, independent chain crowd for shovel operation, and independent swing and travel offered as optional equipment. The manufacturer claims this is the only shovel-

crane on the market which offers power load-lowering reversing clutches for either or both front and rear drums. The variable pressure control on the clutch is said to eliminate any jerk, jump, or lag. The standard lower is 12 ft. 4 in. in overall length, 10 ft. 4 in. wide and there is a choice between 24, 30, or 36 in. wide track shoes. Literature is available.

53

All-aluminum conveyor handles concrete, soggy sand

The L. S. Farner Co. has announced the Farnco C-C all-aluminum conveyor for handling concrete and soggy sand. The length of the belt has been flashed with rubber to lick the leakage and loss of material problem. A deep hopper catches the material and conveys it directly to the job. The bent bar inside construction was designed to eliminate twisting on long hauls and take more than normal pounding. The wheel assembly can be removed for reaching into narrow or small openings. This unit can be powered with gasoline, air, or an electric motor with a belt width of 16 in.

54

New joint sealer averages 1,250 ft. per hour

Clipper Mfg. Co. has announced its new Clipper joint sealer, designed primarily to fill $\frac{1}{8}$ -in. wide sawed contraction joints from "kettle to crack" in one opera-



tion. It will seal about 2 mi. of sawed joints (an average of 1,250 ft. per hr.) in a normal working day. Its heating unit is an oil-jacketed, tube-fired double boiler kettle using bottled propane gas for fuel. The kettle, designed to handle all types of hot poured rubber asphalt joint sealing compounds, has a capacity of 165 gal. Melting production rate is 40 gal. per hr.

Another feature of the trailer-type unit, mounted on heavy-duty automatic axle assembly for towing and maneuverability, is a newly-developed applicator bar, tipped with special alloy heat-treated steel nozzles in various widths for use in contraction joints $\frac{1}{8}$ in. and wider. An added feature is an after-heater, used when necessary to thaw the sealer tip orifice. The unit's pump

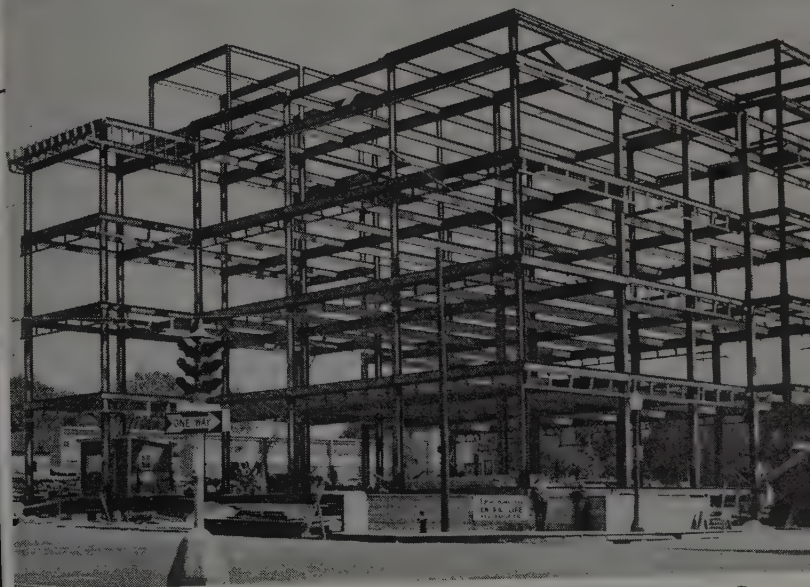
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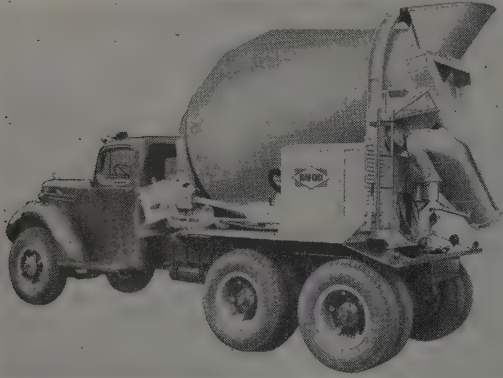
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and agitator are powered by a 9.2-hp. Wisconsin air-cooled engine.

55

New truck mixer available in 5½- and 6½-cu. yd. sizes

Blaw-Knox Company's Construction Equipment Department has announced a new truck mixer that is available in 5½ and 6½-cu. yd. sizes. It was designed with the mixer engine in the rear and the mixer trans-



mission on the side of the combination flush water tank and front pedestal, reducing the distance from the front of the mixer to the center of gravity by 20 in. The truck cab to axle requirement is reduced a like amount, permitting the use of a shorter wheelbase truck while retaining load distribution and conformation with existing weight laws. The combination of flush water tank

and front drum support pedestal reduces the weight about 1,000 lb. and substantially lowers the center of gravity of the load mixer. Available either as a closed-end drum with revolving hopper or open-end drum with stationary charging hopper. Ask for Bulletin 2455 for more information.

56

Cat D6 rollers available

Hensley Equipment Co. announces the availability of Caterpillar D-6 Bottom Track Rollers which are interchangeable with standard factory rollers. They are precision-machined to fit standard track rails and allow equal load distribution among all rollers.

57

Lightweight piling has high strength

L. B. Foster Co. has announced development of a lightweight interlocking steel sheet piling which makes use of a high-strength, box-type section. It is available in 8- and 10-gage steel and in 12- and 15-in. laying widths in any length up to 36 ft.

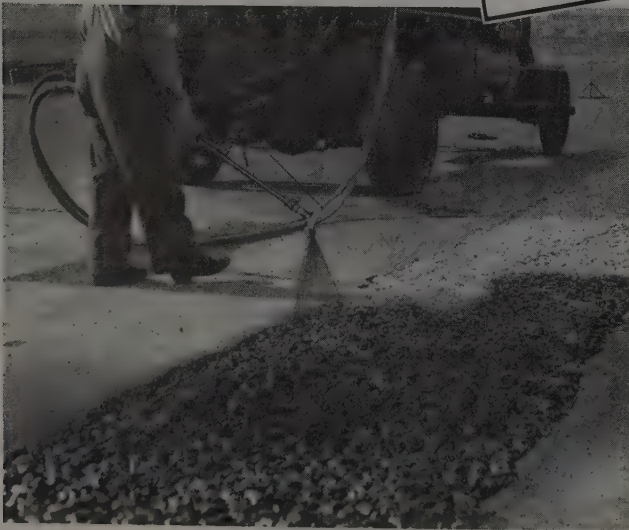
The piling, to be called L. B. Foster H. S. Lightweight Piling, is recommended for such installations as shore protection, pier protection, sewer trenches, building excavations, abutments, bulkheads, cut-off walls, and cofferdams. It offers the advantages of being easily handled in the field and easily stored between uses.

The interlock is a new design which permits two sheets to be lapped together to form a watertight joint. The box-type corrugation simplifies use of bracers, walers, and other types of reinforcement. In many instances, this piling can be pounded in place by a maul or small air or steam hammer. Recommended especially for use on smaller excavation jobs which do not justify a contractor's moving in a rig.

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maintenance!**

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BITUMULS is asphaltic binder in emulsion form.

Applied cold, it bonds well with every type of clean surface; it thoroughly coats all types of aggregates, wet or dry. It can be used in damp weather and even at relatively low temperatures. For the deep penetration required on trench repair (shown in the photo), Bitumuls has no equal.

These features add up to real savings on any maintenance program: you save the time and expense of heating; you eliminate the need of a special prime or tack coat; you work with local aggregate of all kinds, lowering the expense of importing material; you save time lost due to showers; and you can start work-season earlier, keep going later in the year.

There are Bitumuls Engineers who work out of offices near you. Call on them whenever you feel that they can assist on maintenance problems.

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The last word in Asphalt THE BLAW-KNOX Pavers BITUMINOUS PAVER!

On demonstration the performance of the Blaw-Knox Bituminous Paver has been little short of remarkable. The machine has laid between 150 tons and 200 tons an hour. It has unloaded a 20-ton truck in 2½ minutes. It has laid 140 ft. of 3½" course, 12-ft. wide in an hour.

You will be amazed at the smoothness and finish of the course that slips out like a ribbon behind it. Hand work is practically eliminated.

You will be impressed by the ease of handling and the simplicity with which extensions in width up to 13 ft. are made.

You will appreciate being free from the maintenance and rebuilding—characteristic of light crawlers. You will see something new in wheel mobility, ease and accuracy in steering, tire absorption of vibration caused by tamping, better compaction and reduced power consumption.

There is a new bulletin on the Blaw-Knox Bituminous Paver. Why not ask for it?

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H-S HIGH-STRENGTH
LIGHT-WEIGHT PILING

Foster H-S (High Strength) Lightweight Piling, in 8 and 10 gauge sections, offers the greatest strength, pound-for-pound and gauge-for-gauge of any lightweight piling. It gains exceptionally high section modulus from its "High Strength" box-type corrugations, an exclusive L. B. Foster design. You will gain real job economies by using this new low-cost H-S Lightweight Piling — it can be handled by hand, can be driven with small hammers, and it requires less bracing. Unlike wood, you can use this High Strength Lightweight Piling in a variety of applications *and re-use it indefinitely*, and at a great savings in cost and labor.

SAVE BY RENTING:

Rent all your Lightweight Piling needs on Foster's low-cost Rental Plan—get the exact length and section your job needs. Also all sections of Standard Heavy-Duty Steel-Sheet Piling available from L. B. Foster Co. warehouse or field stocks nearest you. Write for Standard Steel-Sheet Piling catalog.



Send for our descriptive bulletin with drawings of available sections. You'll see how our new design Interlock gives a watertight wall, permits simple folding together of two sheets without having to slide one into the other the entire length. Additional economies. More reason to write today for our Bulletin W7

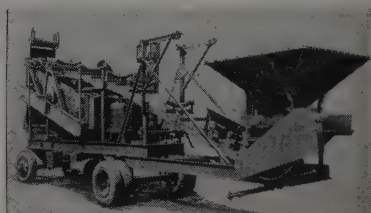
L.B. FOSTER co.

3460 WILSHIRE BLVD., LOS ANGELES 5,
Pittsburgh 30, New York 7, Houston 2, Chicago 4,

58

Portable screening-loading plant

Pioneer Engineering Works, Inc., has announced its No. 310 plant, a portable screening and loading plant designed specifically for production of screening sand and gravel on jobs



where moves are frequent and little auxiliary equipment is necessary. On sand, output attains 50 to 75 cu. yd. per hr. Power requirement is 25 hp. continuous. Specifications include a 16-ft. wheelbase, 9-ft. feed height, and operating length of 43 ft. 3 in. Moving dimensions are overall length of 26 ft. 6 in., width of 8 ft., and height of 12 ft. 1 in. Total weight is about 20,000 lb., 14,000 lb. on the rear axle and 6,000 lb. on the front.

59

Grader engine stepped up

The Galion Iron Works & Manufacturing Co. has announced that its heavy-duty Model 104 motor grader has been made more powerful with the addition of a GM diesel engine of 93 hp. at 1,800 rpm. This is reported to make the model one of the most powerful graders of its weight, which ranges from 21,785 lb. up, depending on accessories.

60

Four-in-one tractor attachment

International Harvester Co. announces a "Four-in-One," hydraulic-controlled attachment for International TD-6 crawler tractors. Merely by a flick of the "shovel-selector"



lever, this Drott attachment can be converted into a bullclam shovel, a bulldozer, a front-end loader, or a clamshell. The unit may also be used as a backhoe. Overall width of the attachment is 68 in. Height is 40 in. Shovel capacity is $\frac{3}{4}$ yd. with lifting capacity of 3,000 lb. Break-out force

is in excess of 8,500 lb. Overall weight of attachment and tractor is less than 9,000 lb.

61

Pull stumper digs deep

Fleco Corp. has announced its new Pull Stumper for use with track-type tractors in the D8, D7, and D6 classes. It consists of a single steel



tooth connected to a tractor drawbar by a one-piece cast steel frame. It is operated by cable, working through an A-frame, from one drum of a cable control. Forward pull of the tractor sucks the curved tooth into the ground to any desired depth (maximum 36 in.) to cut lateral roots. This unit can work efficiently in tight places.

62

Mack adds four new tractors

Mack Trucks, Inc., has added four new tractors to its Model B line. They are four- and six-wheelers, powered by both gasoline and diesel engines. Models B-70T and B-70ST are powered by engine EN707B, a 707-cu. in. unit which delivers 206 hp. at 2,100 rpm. Maximum torque output is 560 lb. ft. at 1,100 rpm. Models B-71T and B-71ST are powered by a 743-cu. in. diesel engine delivering 200 hp. at 2,100 rpm. and 537 lb. ft. maximum torque at 1,200 rpm. Other features mentioned are advanced spring and suspension design, Houdaille hydraulic shock absorbers, and unitized cab structure in which radiator, fenders, and cab are mounted as an integral unit in a 4-point diamond pattern on rubber cushions.

63

Wrist-action added to Hydrohoe

Bucyrus-Erie Co. has added a wrist-action dipper attachment to increase the utility and speed of the H-3 Hydrohoe. This attachment in-



"... the Master goes faster than the mixers."

"Our Master Screed is a one-man-gang. It does everything at once, faster than we've done it before. We've upped our schedules and really cut our costs."

General contractors and road builders say that, because *in one time over*, the Master Vibrating and Finishing Screed strikes off, vibrates and compacts—from top to bottom—even the lowest slump concrete, making a denser, stronger slab than any other way we know of.

It eliminates honeycomb and form work on bridge decks, molds the concrete in crowns, arcs or flat for roadways and *cuts 'way down on finishing time for any slab*. This cost-cutting, top-quality screed is inexpensive and economical to operate. Available with arc or flat. Send the coupon below for more information, no obligation.



☐ **Turn-A-Trowel.** Floats and finishes, rigid blade mounting gives precision finish; float and finish blades in single unit, can't get lost; gas and elec.; 34", 48" sizes.



☐ **Concrete Vibrator.** 9,000 rpm vibration, yet lightweight; rugged, gives long service; gas and elec.; wheel mounting available; accessory tools; 1½ to 6 hp power units.



☐ **Remote Power Vibrator.** This "Hy-cycle" runs 2 high-speed vibrators (10,300 rpm) as far as 300' from power unit; mounted on wheelbarrow, wt. only 172 lbs.; 6.6 hp engine.



☐ **Midget Trowel.** New. Lightweight, one man carries; gets into tight spots; only 24" across yet does top trowel job 6 times as fast as by hand. 70 lbs., 1.6 hp engine.



☐ **Portable Generator Plants.** AC or DC; gas, diesel, natural gas engines, ½ KW to 12.5 KW; portable mountings. Also continuous duty plants up to 20 KW Floodlights.



☐ **Vibrating and Finishing Screed.** Produces better quality slab than any other method we know, by superior deep vibration. Mixers can't keep up with high speed strike-off, compaction and finish (follow up with broom, bull float or Turn-A-Trowel). Handles low slumps, 3½" down to zero. Gas or elec. (any voltage, phase or cycle); 6' to 30' lengths.



☐ **Portable Space Heater.** Clean, instant, odorless heat blown where you want it; rugged, longlasting, trouble-free; uses kerosene or fuel oil; 160,000 to 400,000 BTU.

MASTER

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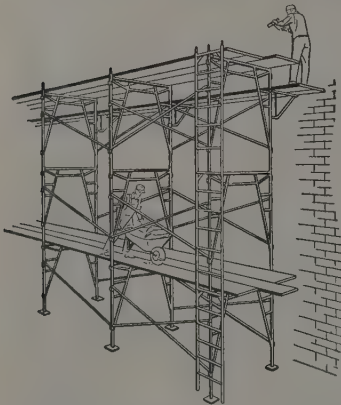
NAME _____ COMPANY _____

STREET _____ CITY _____

Watch Every Buck . . . Carefully!

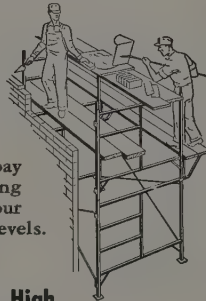
Actually it's not how many bucks you shell out on original costs that count—it's *how much do you save* in erection time and in on-the-job performance. Here are the kind of *savings that count*: can you scaffold higher with fewer panels and parts? can you position plank-bearing brackets at intermediate levels? can you place material at hip-level where your mason can work easier and faster? There's one answer . . . you *can* with Universal Ezebilt Mason Panels, and we don't just make the claim—we show you how in the diagrams below. You'll have a time-saver, a buck-saver and a life-saver with

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SU PANELS

Provide open bay for easy handling of planks and four plank bearing levels.



SH PANELS—6½ ft. High

Provide through passage-way at every lift, and rests for plank-bearing brackets at 3' 3", 4' 6" or 6' heights.

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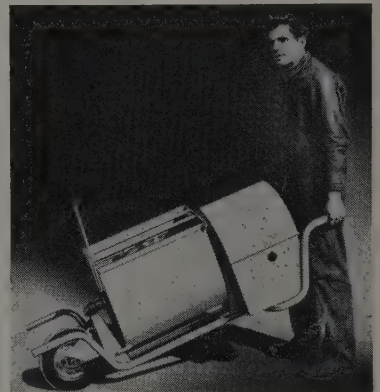
PHONE: CAPITOL 2136

roduces a new additional digging force through a dipper that rotates in a vertical plane through an arc of 65 deg. from 25 deg. ahead of the handle to 40 deg. behind it and also lessens spillage and improves ranges for clean dumping into trucks. It enables the operator to undercut walls and trenches deeper than they are long, pry out rocks, or expose pipe with less danger of damage. When the dipper is rotated simultaneously while the digging ram is extended, the combined effort produces about 38 hp. at the dipper teeth and a 50% increase in digging power (up to 6 tons of tooth force) may be obtained. The wrist-action dipper is arranged for automatic ejection. If desired to convert to wrist-action Hydrohoe, earlier models may be modified to incorporate recommended engineering changes.

64

Portable plaster and mortar mixer has 2-cu. ft. capacity

Chain Belt Co. has announced its new Rex plaster mixer which has a capacity of 2 cu. ft. of mixed mate-



rial. Designed for small contractors, the unit has carrying handles for ease in moving on the job and in transit. The handles are so placed that two men can carry the mixer with ease. Addition of an optional wheel makes it possible for one man to move the mixer in wheelbarrow fashion. Weight is 234 lb., overall length is 62¾ in., overall width is 21⅞ in., and overall height to top of handle is 33½ in. A 1.87-hp. Briggs & Stratton engine provides power.

65

New step filler form

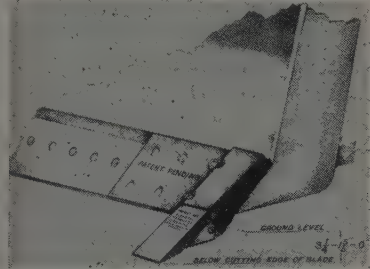
Universal Form Clamp Co. has announced its new dual-purpose Step Filler form, a prefabricated form that members with Uni-Form Concrete forms and can be used as a regular or step filler. It allows continuous forming regardless of footing condition. With it, walls can be formed on step footers without the necessity of breaking forms. It also allows for unevenness in footings

without breaking up the continuity of forming and greatly eliminates the amount of fillers formerly needed with loose angles and job-ripped plywood.

66

Bulldozer corner adapters

H & L Tooth Co. has announced a new line of bulldozer corner adapters with replaceable corner points. Made of high-alloy, rolled, heat-



treated steel, they are designed to fit in standard bulldozer end bit bolt holes and eliminate rounded corners. The point pilots ahead of blade, thereby keeping the tractor in line and making possible accurate slopes in cuts. Points are replaced using only hammer and oval punch and are made in different types for different cuts below ground level. Available for all makes of bulldozers.

67

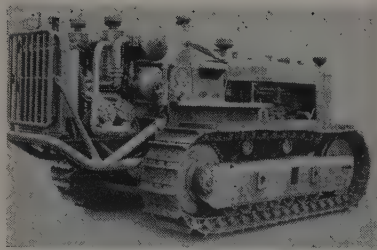
Model 450 motor grader

The Galion Iron Works & Manufacturing Co. has announced its Model 450 all-gear tandem-drive motor grader in the medium heavy-duty class. It weighs, without scarifier, 20,630 lb. and up, depending on extra equipment. It is powered by a 75-hp. IHC diesel engine and has six forward and two reverse speeds. Maximum forward speed is 20.1 mph. The two-piece rear axle drives only, it carries none of the grader weight. It has a full turn (360 deg.) circle reverse, and a 90-deg. bank cutting angle. With standard 12-ft. blade, reach outside rear tires is 72 in. A 12-ft. hydraulic shiftable moldboard, which permits a maximum extension of the blade 97 in. beyond the rear tires, is available as extra equipment.

68

Tractor-mounted compressor

Le Roi Co. has announced its new 600 CTM tractor-mounted compressor which is especially recommended for pipeline and heavy construction contractors. The manufacturer recommends mounting this compressor on old tractors incapable of producing enough traction for dozing or scraping, but which still have good sound engines, thus relieving a newer crawler of the slow and expensive job of towing a



portable compressor. This model can be readily mounted on the International Harvester ID24 or Caterpillar D8 crawler tractors. Standard equipment includes an indepen-

dent clutch to disengage compressor from power take-off shaft, deep crankcase for operation at 30-deg. angle, complete compressor controls, heavy undercarriage and inter-cooler guards, air receivers, and heavy-duty oil bath air cleaners.

69

New loader bucket dumps to both side and front

The Isaksen side dump bucket, manufactured by The Baker-Lull Corp., makes it possible to load out windrowed materials to the side as well as do straight-line loading in

TIGHT JOINTS ARE EASY With Armco Subdrainage Pipe



There's never a worry about clogged subdrainage lines when you use Armco Perforated Pipe to protect surface installations from wet, unstable subgrades.

Tight, positive joints made with simple coupling bands prevent misalignment and disjoining. Water enters the pipe through scientifically-placed perforations that exclude filter material and guard against silting.

Long, 20-foot lengths of Armco Perforated Pipe speed installation. There are fewer sections to handle, fewer joints to make. Corrugated metal design provides strength with light weight and freedom from breakage.

Wherever you have unwanted ground water, Armco Pipe will provide the economical, efficient answer. Write for complete data.

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ARMCO PERFORATED PIPE



Construction Idea saves 70 tons of steel



Welding Column Bars Saves \$18,000 in Hospital Construction at Burlingame, California.

SAVINGS of at least \$18,000 and 70 tons of steel resulted when column bars were welded in construction of the new 165 bed Peninsula Hospital at Burlingame, California.

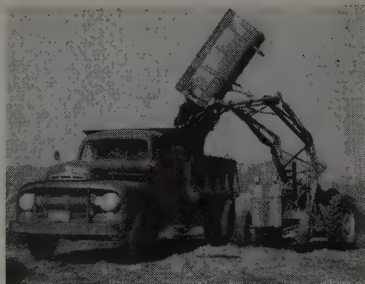
In addition to saving 21 pounds of metal per splice, a saving of at least \$7,000 resulted from a reduction in column size. A smaller column size due to compactness of welded splices has increased the floor area at corridors. In construction, reinforcing bars are simply butt welded with Lincoln "Fleetweld 7" electrode providing a solid, continuous member throughout the column.

Learn how welded designs can save you steel and lower your construction costs. Send for studies in structural arc welding free on request. Designers and engineers write on your letterhead to Dept. 4303.



SPEEDS CONSTRUCTION. Welding of column bars is done at low cost with Lincoln "Fleetweld 7" using light, portable 250 amp "Lincwelder" powered by air cooled engine. Hospital was designed by the architectural firm of Stone and Molloy and S. P. Marraconi, all of San Francisco. Structural engineers were Adrian, Graham and Hayes. Cecco Steel Company erected reinforcing steel.

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio
**THE WORLD'S LARGEST MANUFACTURER OF
ARC WELDING EQUIPMENT**



cramped work areas because the bucket also dumps forward. It can do this because the tractor remains in parallel position with the vehicle receiving the load. The bucket interchanges with $\frac{3}{4}$ - and $1\frac{1}{4}$ -yd. buckets now in use on Case, Minneapolis-Moline, and Oliver wheel tractors.

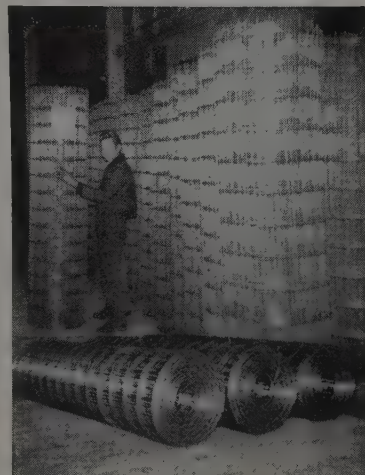
70

Portable aggregate washing plant

Universal Engineering Corp., a subsidiary of Pettibone Mulliken Corp., has announced the Universal Washmaster, an all-electric, push-button-controlled plant designed for washing aggregate. It delivers up to four sizes of finished material at a capacity of 150 to 200 tons per hr. It includes a 4 x 12-ft., 3-deck, inclined gyrating screen equipped with spray bars and piping combined with a 22-in.-diameter by 25-ft.-long double fine-material screw

electric welded

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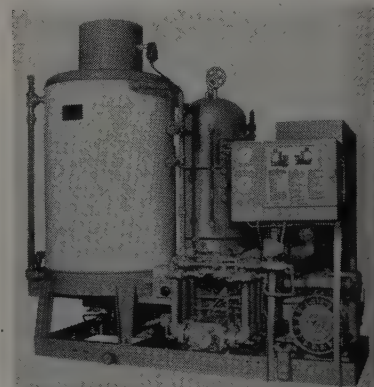
706 Folger Ave. • Thornwall 3-3123
BERKELEY 10, CALIFORNIA

washer. Its feed conveyor is a 24-in. channel frame type with basket hopper. A 36-in. horizontal side delivery conveyor which travels slowly permits hand rejection of unwanted material. An 18-in. horizontal side delivery conveyor discharges material from the third screen deck. Both delivery conveyors may be folded for traveling. This unit may be used as a complete washing plant or may be combined with a portable rock or gravel plant as a complete crushing and washing setup.

71

Steam generator designed for pile hammers

McKiernan-Terry Corp. has announced the McKiernan-Clayton steam generator, engineered especially for supplying power to pile hammers. The unit, which operates automatically, delivers full



pressure steam of less than 1% moisture in 3 min. from a cold start. The generator is rated at 110 hp. It was designed to reduce fuel costs by use of an automatic steam cycling control which assures that fuel is consumed only when steam is demanded by the load. It was also designed to cut repair costs. It weighs about 2 tons and is unaffected by vibrations and motion, so it may be used for both mobile and marine installations. By delivering quality steam of low moisture, the generator lowers the damaging accumulation of water in the valve and cylinder bores of the hammers. Also, less precipitate from the water is left to plug the coils, since high-temperature water is carried through the coils without substantially vaporizing into steam until it reaches the accumulator.

72

Bigger Moto-Bug joins line

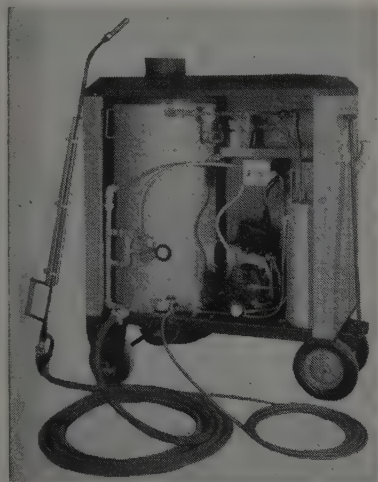
Kwik-Mix Co. has announced the R-15, a newly designed, heavier, and more powerful Moto-Bug. Hopper capacity is 2,000 lb. with 15 cu. ft. of space available for the load. As a flatbed platform truck, it has a load

area of 34 by 54 in. A Wisconsin single-cylinder, air-cooled gasoline engine with 3.4 to 1 reduction develops 8.3 hp. at 3,400 rpm. Maximum speed is 6 mph., forward or reverse. Weight of the entire unit with hopper is 1,100 lb.

73

**Portable steam cleaner
operates automatically**

Quick Charge, Inc., has announced its Model QSI portable, oil-fired steam cleaner which is operated

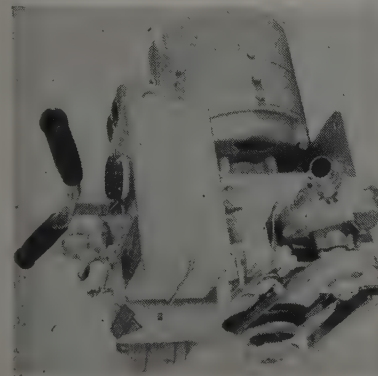


completely automatically. It offers increased cleaning power of 120-lb. pressure and 120 gal. per hr. Higher capacity models are also available.

74

**Combination generator, pump,
battery charging set**

Universal Motor Co. has announced the Handi-Plant, a combination electric generator, battery charging set, and portable pump. It is powered by a 1-cylinder, 1.7-hp., air-cooled, 4-cycle gasoline engine. The direct-connected generator supplies 110 volts, single-phase, 60-cycle alternating current and has a capacity of 600 watts. Capacity of the centrifugal pump is 1,500 gal. per hr. When the unit is pumping water and generating electricity at the same



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| ☐ Dragline Buckets | ☐ Log Grabs |

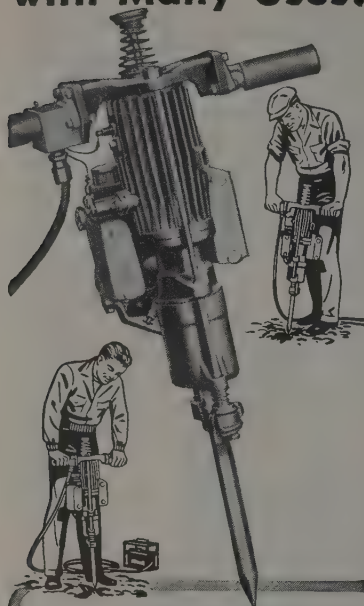
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A Profitable Tool with Many Uses!



BARCO Gasoline HAMMER

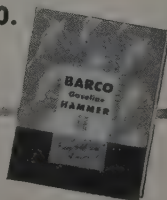
■ HERE'S why owners of the improved Barco Gasoline Hammer are enthusiastically acclaiming it as "A Profitable Tool With Many Uses!"

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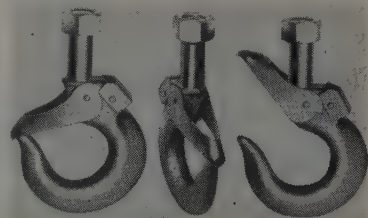
Ask For
This New
BULLETIN 613

time, its capacity is 1,500 gal. of water and 300 watts of electricity. The pump is capable of high suction lift to 15 ft. The plant also furnishes 80 to 100 watts direct current for charging 6-volt batteries. Specifications include a weight of 84 lb., overall length of 18 $\frac{1}{4}$ in. and height of 13 $\frac{3}{4}$ in. without carrying handle. More information contained in Bulletin DYE-1. Reference No. 836.

75

Safety hook announced

Coffing Hoist Co. has announced a new safety hook designed to offer greater safety to both men and equipment during lifting operations. A stamped steel latch swings down and is securely held in place by a



lock that is under spring tension once the hook is engaged. It eliminates sideways movement of the latch, which is designed to allow full and unobstructed use of the hook's large throat opening. It is designed to shed wires and other objects rather than snag them. The hook is made of drop-forged, heat-treated alloy steel and is claimed to have a high tensile strength. Cadmium plating prevents rusting or corrosion. Optional on new hoists, the hook may also be placed on Coffing hoists now in service.

76

Portable power saw features reciprocating blade

Wright Power Saw and Tool Corp. has announced a new portable gasoline power saw which consists of a reciprocating blade directly con-



nected to a gasoline engine and combines the versatility of hand sawing with the speed of power sawing. It will follow a chalk line, cuts a kerf of 3/16 in., and leaves a mill surface on the wood. The machine weighs less than 25 lb. and has an 18-in. reciprocating blade. A special floating-type carburetor allows operation of the saw in all positions. The throttle is of the trigger variety and includes an automatic shut-off feature for safety. Blades can be changed in 30 sec. and no tools are required. Sharpening is done by hand. The saw can cut 18 in. to an unlimited depth and fells trees up to 36 in. in dia. Blade speed is up to 150 strokes per sec. Overall length is 38 in. Fuel capacity of the engine is 1 $\frac{1}{2}$ qt.

77

Tandem-drawn earth mover

The Gledhill Road Machinery Co. has announced a tandem-drawn earth mover designed to move more dirt with greater speed and efficiency. By loading each unit separately, two, three, or more machines can be handled with little more power than is required to load one machine. All units are controlled hydraulically by



the operator. A rod and hand lever has been added on the rear mover to maintain a level fill so that additional leveling equipment is not required. Tractors in the 40-drawbar-hp. pull will handle two or more 2 $\frac{1}{2}$ -yd. earth movers.

78

New type conveyor belt increases hauling distance

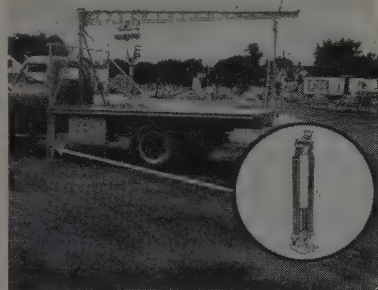
United States Rubber Co. has announced Super Ustex-Nylon, a new super strength conveyor belt made out of a new type cellulosic yarn treated chemically to give it an exceptional strength. It is recommended for dam construction and several types of mining. In dam construction, the new belt makes possible over 3-mi. center distances in systems carrying aggregates from supply points to the dam site. The longest belt system used in dam construction to date is the installation at Shasta Dam in California, made in 1940. This system used 26 flights for a 9.6-mi. haul. With the Super Ustex-Nylon belt, the number of flights could be reduced from 26 to 3. The longer center distance eliminates transfer points, thereby

reducing the number of necessary drives and the manpower needed to control and maintain the belt system. Fewer transfer points also mean less damage to the belt. Also recommended for bringing material from the bottom of open pits to the washing or processing plants.

79

Hydraulic jack stabilizes truck beds

The Wm. Bros Boiler & Mfg. Co. announces its power-operated, hydraulic jack out-riggers to assure quick and easy stabilization of truck beds. The jacks are positioned on each side or at forward corners of the truck bed, depending upon loca-



tion of the Magic Muscle concrete block handler boom and mast. Power is supplied by a hydraulic power pack located in the electric generating plant compartment of the unit. This permits one man to handle 700-lb. block loads easily. The unit fits all truck beds from 12 to 27 ft. long and weighs about 1,000 lb. Ask for brochure No. RE-130.

80

25-ton truck crane

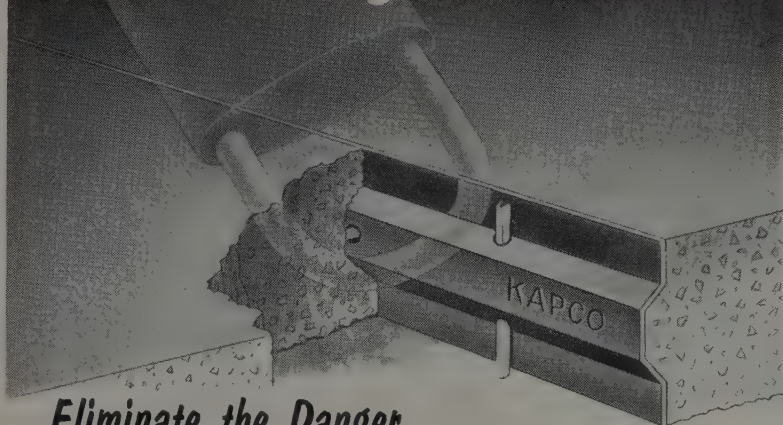
Osgood-General has announced its new Model 322, 25-ton truck crane for use in the contracting, rigging, and materials-handling fields. The superstructure is secured to the chassis by a gudgeon built into the truck frame and stabilized by four large-diameter, hook-swing rollers. Engine and deck machinery are at the rear of the deck for added stability and lifting capacity without use of a large amount of dead counterweight. A load-lowering device makes it possible to hold the load exactly where the operator wants it. An independent boom hoist has a worm shaft carried in anti-friction bearings and may be reeved for four, six, or eight parts of line. Separate clutches raise and lower the boom. Chassis has a 178-in. wheelbase with a turning radius of 40 ft.

81

Power hoist lifts 500 lb.

Reimann & Georger has developed a 500-lb. capacity power hoist to lift loaded wheelbarrows, pallets of roof-

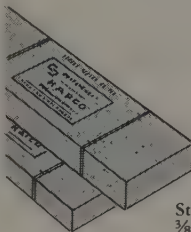
Lock 'Em Together!



*Eliminate the Danger
of Tilting and Spalling*

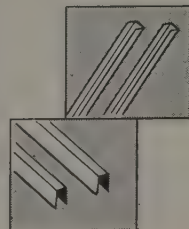
with **KAPCO** TONGUE and GROOVE JOINT

Pre-formed Kapco Tongue and Groove Joint provides the keyed action essential to maximum load transmission. This non-extruding joint is extensively used as either center strip or contraction joint and is especially suitable for the "lane-at-a-time" method of construction for highways, airports and industrial floors. Rigid control of the quality of asphalt and other ingredients provides added rigidity, ease of handling and absolute uniformity.



Kapco Tongue and Groove comes neatly packed in steel strapped cartons which provide easy transportation and storage as well as protection on the job site. The joint is constructed of $\frac{3}{8}$ " asphalt mastic board in standard lengths of 10'1". Widths vary to accommodate standard practice of using joint which is $\frac{1}{2}$ " narrower than the depth of the concrete slab. Standard punch is 2'6" on centers for $\frac{1}{2}$ " dowel bars and 24" on centers for stakes.

Stake pins for Kapco Tongue and Groove are $\frac{3}{8}$ " channel type, 15" long, 300 pins to a bag. 12 gauge installing cap plate is available in standard 5 or 10' lengths.



Order separately or in combination with other Kapco products which include famous Kapco Asphalt, Fibre or Fibreglas Expansion Joint, Kapco Rubber Asphalt Joint Sealer, Kapco Concrete Curing Compound, etc., etc., etc.

For your convenience why not order *all* of your expansion joints, joint sealers and curing compounds from *one* source!

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just nail 'em in...
pour your concrete



AND FORGET ABOUT SEEPAGE
WITH LABYRINTH
WATERSTOPS

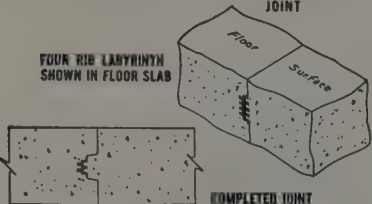
• Concrete shrinkage can't cause leakage between pours when you're protected by ribbed and grooved polyvinyl plastic Labyrinth Waterstops in the joints.

Economical? You bet . . . No special forms, no metal fins to bend or tear . . . no maintenance cost, AND . . .

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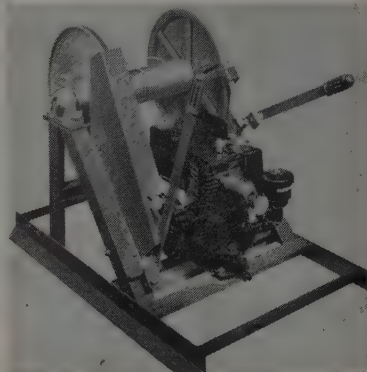
Name _____

Company _____

Address _____

City _____ Zone _____ State _____

ing materials, brick, cement blocks, and equipment. The drive and clutch consist of a heavy-duty V-belt directly connecting the geared gaso-



line engine with the drum. An idler pulley, which tightens the V-belt to raise the load, acts as a clutch. The only wearing part is the V-belt, which is a standard size. The braking mechanism uses nylon rope around the brake drum. The unit, which includes a drum equipped with 200 ft. of steel cable, weighs 155 lb. and has a lifting capacity of 500 lb. at about 100 ft. per minute. It is powered by a 2½-hp., 4-cylinder gasoline engine. Sells for \$219.

82

Medium weight dragline bucket

A medium weight bucket (¾ to 3-cu. yd. capacity) has been added to the Page Engineering Co.'s line of automatic dragline buckets. Designed the RM class, these buckets have a knife-edged lip and replaceable teeth cast of high manganese steel to withstand shock and abrasion.

83

Bucket-type earth drill swings automatically

California Welding and Blacksmith Shop, Inc., has developed a



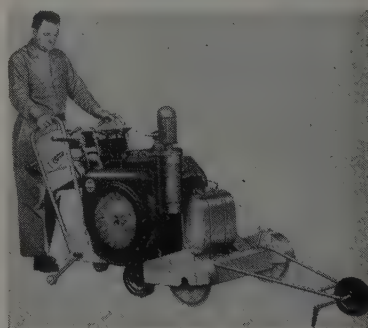
special bucket positioning arm which swings the bucket-type earth drill

mechanically to the desired dumping position. It is operated from the control panel and powered by a winch hoist. It will come as standard equipment on all models of Calweld earth-boring machines for drilling holes 100 to 200 ft. deep and 16 to 34 in. in dia. The new arm is also available for installation on older models.

84

Operator has complete control on new concrete saws

Robert G. Evans Co. has announced four new hydraulically operated Target concrete saws ranging from 15 to 36 hp. The operator maintains complete control at all times since the blade is lowered into a cut by pump action. When the cut is completed, the blade is raised by Bleed-Action. Two rigid 8-in. wheels mounted forward close to

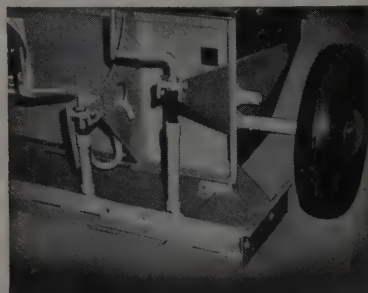


the blade protect against deflection and hold the blade squarely in the cut. The Target pivot wheel provides 3-point suspension to eliminate twisting leverage on the blade from rear frame movement over rough surfaces. This adds to the saw's maneuverability. All models are equipped with a dual arbor shaft to permit mounting the blade for either right or left hand cutting. Both Model 360 and 150 are available with either manual or electric starter systems.

85

Paver accessories provide adjustable width

Doug-Lynn Manufacturing Co. announces a right and left screed with



stub axle extensions as accessories for the True-Lay Paver to increase the standard width of 8 ft. up to 10 ft. The width may be cut to 4 ft. by insertion of baffle plates. A second axle anchor has been added so the wheel will ride on the curb when it is desired to pave close to the curbing. Ask for Bulletin 103, describing these accessories.

86

Cold applied method of highway joint sealing

Lincoln Engineering Co. has announced its cold applied method of highway joint sealing with power-



operated pumping systems. This method is said to cut costs 75% compared with hot-mix methods and assures sealing of the greatest number of lineal feet of joint at the lowest cost per manhour. The complete pumping system, plus air compressor, can be mounted on a light truck. This system dispenses ready-mixed, cold-sealing compounds directly from 55-gal. drums with on need for intermediate handling.

87

Bulk cement bins for trolley operation

Construction Machinery Co. has announced its new bulk cement bins for trolley operation available in 25, 150, 200, and 300-bbl. capacity. All bins are 8 by 8 ft. in size. Automatic controls are available. A separate cement compartment can be built into the aggregate weigher and regular scale furnished with cement-sensitive master beam. Bucket elevator is standard heavy-duty unit. It will unload a 150-bbl. cement truck in about 35 min.

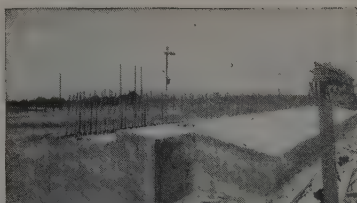
88

Mast type crane gantry for Model 6 machines

Northwest Engineering Co. announces a new mast type crane gantry for its Model 6 cranes and draglines. It has section boom hoist rigging with pendant lines. Owners of old Model 6 machines can replace the rearward type gantry on these rigs with the new unit.

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UNIT PRICES

Selected abstracts for Western projects

SEWERAGE—Ocean outfall sewer at Santa Cruz, California

California—Santa Cruz—City. Healy Tibbitts Construction Co., San Francisco, Calif., was awarded a contract for installation of an ocean outfall sewer by the City of Santa Cruz. The contract was for \$206,000 on combination low bids of \$188,000 for Item 1, alternate A; \$6,000 for Item 2 and \$12,000 for Item 3, alternate. Unit prices were as follows: (all items were lump sum bids):

(1) Healy Tibbitts Construction Co.	\$ 206,000	
(2) Paris Brothers	344,702	
	(1)	(2)
1,200 lin. ft. 36-in. I.D. centrifugally spun reinforced concrete pressure pipe	\$187,000	\$256,909
1,200 lin. ft. 36-in. I.D. lock-joint steel cylinder pipe with concrete lining and jacket	188,000	256,249
1,200 lin. ft. 30-in. I.D. centrifugally spun reinforced concrete pressure pipe	185,000	238,765
1,200 lin. ft. 30-in. I.D. lock-joint steel cylinder pipe with concrete lining and jacket	186,000	238,238
30 lin. ft. 24-in. steel pipe connection	6,000	8,953
1 ea. 18-in. steel pipe elbow attachment	2,500	9,588
300 lin. ft. 18-in. steel pipeline	12,000	79,500

MISCELLANEOUS—Stone revetment and drift barrier on McKenzie River

Oregon—McKenzie River—C. of E.—Floyd Graham Construction Co. of Lebanon submitted a low bid of \$61,084 before the Corps of Engineers for construction of stone revetment and a drift barrier along the left bank of the McKenzie River at the Morris location, about 7 mi. east of Springfield. Unit prices were as follows:

(1) Floyd Graham Construction Co.	\$61,084	
(2) Inter City Sand & Gravel Co., Inc.	64,006	
C. J. Montag & Sons	65,023	
S. W. Groesbeck	67,803	
Jeske Bros. Constr. Co. and Coast Construction & Excavating Co.	71,530	
C. T. Malcolm & Co.	72,751	
Larson Construction Co.	73,886	
W. H. Shields Construction Co.	79,209	
General Construction Co.	85,945	
	(1)	(2)
8,600 cu. yd. bank excavation	.60	.58
5,980 cu. yd. toe-trench excavation	.90	.60
5,690 cu. yd. dumped stone revetment	3.00	3.30
3,430 cu. yd. derrick stone, in place	3.00	3.30
6,942 lin. ft. treated piling, in place	2.10	2.20
305 ea. pile shoe, in place	3.00	5.00
2,828 lin. ft. treated wales, in place	2.10	2.40
5,000 lb. hardware, in place	.35	.35

MISCELLANEOUS—Survey parties for The Dalles Dam relocations in Oregon

Oregon—The Dalles Dam—C. of E. E. A. Messer & Associates Inc., of Portland submitted a low bid of \$7,020 for furnishing two five-man survey parties for relocation work (60-day job) at The Dalles Dam in Washington and Oregon. Unit Prices were as follows:

(1) E. A. Messer & Associates, Inc.	\$ 7,020	
(2) Wall and Tenneson	14,520	
Western Engineering Consultants and Adrian W. Valler	16,680	
Elmo E. Robnett	16,800	
Pettijohn Engineering Co.	18,600	
J. H. Clabby, Civil Engineer	19,800	
	(1)	(2)
Lump Sum	\$117.00	\$242.00

HIGHWAY—Bituminous surfacing in Idaho

Idaho—Bingham and Butte Counties—State. LeGrand Johnson of Logan, Utah, was awarded a contract for building 19.3 mi. of plant-mix bituminous surfacing on U. S. 20 easterly from Midway Junction and 20.5 mi. of U. S. 26 southeasterly from Midway Junction on a low bid of \$736,830. Unit Prices were as follows:

(1) LeGrand Johnson	\$736,830	
(2) Carl E. Nelson Construction Co.	741,075	
Peter Kiewit Sons' Co.	790,077	
Pickett & Nelson	792,541	
Kiely Construction Co. and Union Construction Co.	921,198	
McNutt Bros.	928,656	
	(1)	(2)
9,670,000 mi. Water. Base & Surf. Course	\$ 2.40	\$ 2.25
570 hr. Roll. Power Roller	7.00	6.00
350 hr. Roll. Tamp. Roller	5.00	6.00
2,920 hr. Roll. Pneu. Tired Roller	5.50	5.50
20,116 mi. Recond. Exist. Rbed Cl. "A"	200.00	125.00
20,505 mi. Recond. Exist. Rbed Cl. "A"	200.00	200.00
8,750 ton Cr. Gr. Surf. Course 1/2" Max.	1.53	1.35
112,700 ton Cr. Gr. Surf. Course 1/2" Max.	1.53	1.35
5,000 ton Cr. Gr. in Stockpile	.90	.75
36,000 gal. MC-1 Asph. Rd. Mat for Prime	.14	.14 1/2
500 ton Blotter Mat. Cl. "C"	3.00	2.00
14,400 gal. RC-1 Asph. Rd. Mat for Tack	.15	.15 1/2
	"C" Surf. Tr.	

155,000 gal. MC-2 Asph. Rd. Mat. for Type	.14	.14 1/2
"C" Surf. Tr.		
132,900 gal. MC-4 Asph. Rd. Mat. for Type	.14	.14 1/2
"C" Surf. Tr.		
6,650 ton Cov. Coat Mat. Cl. 6 for Type	2.50	2.75
"C" Surf. Tr.		
6,650 ton Cov. Coat Mat. Cl. 3 for Type	2.50	3.00
Plant Mix		
2,530 ton 120-150 Asph. Rd. Mat. for	28.50	30.00
50,600 ton Pl. Mix. Bit. Surf. Cl. "D"	2.65	2.85
60 ea. Guide Posts Type "4"	5.00	7.00
1,400 lin. ft. Precast Concrete Curb	3.00	3.50
2" Max.		
165,000 ton Cr. Rk. and/or Cinder Base	1.20	1.27

BRIDGE—Lewis Springs Bridge and approaches across San Pedro River in Arizona

Arizona—Cochise County—State. M. M. Sundt Construction Co. of Tucson submitted a low bid of \$71,732 for construction of a steel girder bridge and approaches across the San Pedro River at State 90, 17 mi. northwest of Bisbee. Unit Prices were as follows:

(1) M. M. Sundt Construction Co.	\$71,732	
(2) Ashton Building Co.	83,861	
Western Constructors, Inc.	83,891	
Fisher Contracting Co.	86,699	
	(1)	(2)
920 cu. yd. Roadway Excavation	\$.60	\$.50
28,500 cu. yd. Drainage Excavation	.34	.40
170 cu. yd. Structural Excavation	3.75	2.50
200,000 gal. Watering (CIP)	6.50	2.00
35 hr. Rolling	10.00	10.00
2,100 ton Select Material (CIP)	1.00	.50
1,250 ton Aggregate Base (CIP)	1.80	1.50
55 ton Blotter mat. for bit. surf. treat. (CIP)	4.00	4.00
11 ton Liquid Asph. for bit. surf. treat. (Gr. MC-1 or MC-2) (CIP)	55.00	55.00
6 ton Liquid Asph. for bit. surf. treat. (Gr. SC-6) (CIP)	63.00	65.00
554 lin. ft. Structural steel handrail (CIP)	5.75	5.00
126 cu. yd. Class "A" concrete (including cement)	70.00	66.00
188 cu. yd. Class "D" concrete (including cement)	70.00	68.00
56,220 lb. Reinforcing steel (bars) (CIP)	.13	.12
320 lin. ft. Furn. & driv. steel H-col. piles (10"x42 lb.)	7.25	10.00
720 lin. ft. Furn. & driv. steel H-col. piles (12"x53 lb.)	8.80	11.00
230 lin. ft. Steel sheet wall (furn. & driv.) (CIP)	30.00	85.00
7,000 lb. Cutoff (of steel H-col. & steel sheet piling)	.10	.10
10 ea. Splicing piles (steel H-column)	35.00	30.00
400 cu. yd. Plain riprap (std. C-23) (type E) (CIP)	7.80	6.00

HIGHWAY—Bituminous surfacing in New Mexico

New Mexico—Catron County—BPR. D. D. Skousen & Son of Albuquerque submitted a low bid of \$274,053 for 5.3 mi. of bituminous surfacing on the Datil-Reserve-Dry Creek road in Apache National Forest. Unit Prices were as follows:

(1) D. D. Skousen & Son	\$274,053	
(2) Hinman Brothers Construction Co.	276,740	
O. D. Cowart	294,647	
Lowdermilk Bros.	306,727	
Armstrong & Armstrong	319,953	
Brown Contracting Co.	330,477	
Allison & Haney	340,041	
Sharp & Fellows Contracting Co.	340,121	
Floyd Haake	378,756	
	(1)	(2)
Lump Sum	\$5,000.00	\$4,000.00
11,500 cu. yd. Stripping and storing topsoil	.25	.20
224,000 cu. yd. Unclassified excavation	.58	.61
810 cu. yd. Uncl. excav. for structures	2.00	1.45
15,000 cu. yd. Uncl. excav. for borrow, case 1	.25	.26
250,000 sta. yd. Overhaul	.04	.015
2,000 c.y. mi. Overhaul	.40	.14
6,800 cu. yd. Replacing topsoil	.75	.59
Contingent sum	C.S.	C.S.
2,020,000 gal. Watering of embankment	1.00	1.00
510,000 gal. Watering of base course	1.00	1.00
Lump sum		
Prov. & maint. water plant or plants	1,000.00	570.00

MASTER DISTRIBUTORS

for
CONTINENTAL — WISCONSIN ENGINES
ROCKFORD CLUTCHES

ENGINES — CLUTCHES — PARTS AND SERVICE

for
TRANSPORTATION — INDUSTRIAL
AGRICULTURAL PURPOSES
ENGINE REBUILDING AND OVERHAUL

Courteous reliable service at reasonable cost

CONTINENTAL SALES & SERVICE CO.

POWER SPECIALISTS

3817 Santa Fe Avenue, Los Angeles 58

LOgen 5-6381

FOR HIGHWAY CONSTRUCTION...



CLINTON WELDED WIRE FABRIC

Concrete pavements and concrete base courses for asphalt and brick surfaces are best reinforced with welded wire fabric. Clinton Welded Wire Fabric is available in a wide variety of wire gauges and spacings for all heavy reinforcing requirements. Clinton Fabric meets all A.S.T.M. specifications.

THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION—New York, New York

2006.

CLINTON
WELDED WIRE FABRIC
THE COLORADO FUEL AND IRON CORPORATION

1,010 hr.	Rolling of embankment.....	5.00	9.20
140 hr.	Rolling of base course.....	5.00	8.00
17,500 ton	Cr. gravel or cr. stone base course, class 2, grading D-1..	.98	1.10
74,000 sq. yd.	Processing bituminized base...	.08	.06
78,000 gal.	MC Cutback asphalt, gr. 2 or 3	.19	.20
330 cu. yd.	Concrete class A, (air-entrained concrete, low alkali cement)...	65.00	75.00
31,200 lb.	Reinforcing steel.....	.13	.17
18 lin. ft.	18-inch CGSM culvert pipe....	5.00	4.00
2,036 lin. ft.	24-inch CGSM culvert pipe....	6.50	5.50
180 lin. ft.	30-inch CGSM culvert pipe....	8.00	7.25
70 lin. ft.	36-inch CGSM culvert pipe....	12.00	12.00
68 lin. ft.	48-inch CGSM culvert pipe....	15.00	17.00
29 ea.	24-inch metal pipe end sections	50.00	66.00
4 ea.	30-inch metal pipe end sections	100.00	112.00
30 ea.	Concrete maint. marker posts..	10.00	19.70
1 ea.	Cattle guard (26-foot).....	3,000.00	2,600.00
4 ea.	Assembled cattle guards.....	1,000.00	1,200.00
48,000 lin. ft.	Barbed wire fence, Type 3.....	.26	.20
10 ea.	Gates (12-foot).....	40.00	40.00
270 ea.	Timber guide posts w/warn. refl. (Tr.).....	8.00	5.20

MISCELLANEOUS—Repair of south jetty at entrance to Coquille River in Oregon

Oregon—Coquille River—C. of E. Stoen, Stoen and Frazier of Seattle submitted a low bid of \$112,000 for repair of the south jetty at the entrance to the Coquille River in Oregon. Unit Prices were as follows:

(1) Stoen, Stoen and Frazier.....	\$112,000
(2) Somers & Stacy.....	198,050
Strong & MacDonald, Inc.....	198,500
Coos Bay Dredging Company, Inc.....	233,750
S. W. Groesbeck.....	1,000.00
Carl M. Halvorson, Inc.....	242,500
Larson Construction Co.....	275,350
Pacific Bridge Co.....	297,330
Morrison-Knudsen Company, Inc.....	297,920
Macco Corp.....	299,500

30,000 ton	Jetty Stone, in place.....	(1) \$ 2.60	(2) \$ 4.20
10,000 ton	Jetty stone, in place (in excess of 30,000 ton)	2.00	4.20
Lump Sum	Move and install truck scale.....	1,500.00	1,000.00
Lump Sum	Dismantle and return truck scale.....	500.00	500.00
Lump Sum	Scale house, complete.....	1,000.00	500.00
Lump Sum	Dismantle, salvage and store a portion of the abandoned ship "OLIVER OLSON"	7,000.00	26,750.00
Lump Sum	Dismantle, salvage and store propeller (opt.)	1,000.00	150.00
Lump Sum	Dismantle, salvage and store boilers (opt'l.)	1,000.00	500.00
Lump Sum	Dismantle, salvage and store cast iron engine base (optional).....	1,000.00	150.00
Lump Sum	Dismantle, salvage and, store copper pipe (optional).....	1,000.00	500.00

"I wonder whatever happened to Joe Clapshaw"



... asked pretty Mali Vargas the other day.

Joe's last 2 copies of WESTERN CONSTRUCTION were returned to us by the post office as undeliverable.

We had to stop his subscription because WE DON'T KNOW WHERE JOE IS.

IF he had used the easy-change-of-address-card now bound into each copy of WC to send us his new address, he'd still be receiving his magazine each month.

DON'T BE ANOTHER MR. CLAPSHAW—WHEN YOU CALL THE MOVERS, BE SURE TO ALSO RIP OUT THE CHANGE OF ADDRESS CARD IN YOUR CURRENT COPY AND SEND IT TO US (NO POSTAGE NEEDED)!

WESTERN CONSTRUCTION

609 Mission Street

San Francisco 5, Calif.

flatten
cost curves
with **UNIVERSAL**
Flat-base pipe

News of DISTRIBUTORS

Philpott gains two new distributorships

George M. Philpott Co., San Francisco, has been appointed a new dealer for Pioneer Engineering Works, Inc., for the northwestern and west central parts of California. Philpott was also recently named distributor for Champion Manufacturing Co., manufacturer of concrete cutting saws. Besides these two lines, the Philpott company represents such well known manufacturers as Euclid Road Machinery Co., Gardner-Denver Co., Marlow Pumps, and others.

New Champion distributor

Western Traction Co., San Francisco, has been appointed distributor for Champion Manufacturing Co., St. Louis, Mo., manufacturer of concrete cutting saws.

Seattle AED officers

New officers of the Associated Equipment Distributors of Seattle, Wash., a part of the national AED organization, are Conrad Creim, president (Bow Lake Equipment Co.); John P. Studebaker, vice president (Washington Machinery & Storage Co.); and Jack Sahlberg, secretary-treasurer (Jack Sahlberg Equipment Co.) Creim succeeds Larry Wick of A. H. Cox & Co. in the presidency.

Star elevates Bert McNae

Bert J. McNae has been appointed manager of the construction equipment division of Star Machinery Co., Seattle, replacing Jack T. Hatten who has left the firm. McNae has been associated with Star for nine years in the construction equipment sales department.

Clark Equipment appoints two more Western reps

Western Tractor & Equipment Co., Seattle, Wash., has been appointed by Clark Equipment Co. to handle the Michigan Line of shovels in the whole of Alaska; in the entire state of Washington except the southernmost counties; a portion of Idaho; and Lincoln, Sanders and Mineral counties in Montana.

Foulger Equipment Co., Salt Lake City, received the distributorship of

the Michigan Line for all of Utah; for Bear Lake and Franklin counties in Idaho; and in Wyoming for Lincoln, Sublette, Uinta and Sweetwater counties.

Davey appoints Northwest mgr.

W. J. McClure, well known construction equipment man, has been appointed as Northwestern district manager of the Davey Compressor Co., with headquarters at Seattle, Wash. In his new post, McClure will be in charge of Davey's compressor and air tool sales in the Pacific Northwest.



McClure



Shirley

Link-Belt names Seattle district sales manager

Link-Belt Co. recently appointed Donald L. Shirley as district sales manager for the territory around Seattle, Wash., with headquarters at the company plant in Seattle. He was recently manager at Portland, Ore. J. F. Strott is general manager of the Northwest Pacific division, which includes sales offices in Spokane and Portland in addition to Seattle.

Baker-Lull names new Southwest manager

Walter L. Reed has been appointed to represent the Baker-Lull Corp. as Southwest district manager for Shovel loader materials handling equipment. In this capacity, Reed will handle sales promotion and contact work with distributors for the company, and will handle new appointments for 4-wheel drive Shovel loader distributors.

Pioneer appoints new Nevada dealer

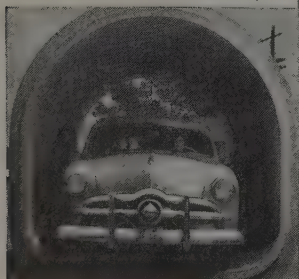
A new dealer in the state of Nevada has been announced by Pioneer Engineering Works, Inc. Pioneer Equip-



conduits



highways



industry

Pre-cast concrete pipe saves up to 30% over built-in-place methods. Easy installation. Up to 100 feet of UNIVERSAL Flat-base pipe can be laid and covered in one day!

Built for heavy duty, low maintenance. Flatten your cost curves . . . specify UNIVERSAL Flat-base concrete pipe. Write . . . we'll tell you more.

THE UNIVERSAL CONCRETE PIPE COMPANY

297 SOUTH HIGH STREET
COLUMBUS 15, OHIO

A subsidiary of the American-Marietta Co.

ment Co., Reno, will carry the complete line of Continuflo equipment in that state and several eastern counties in California. Complete sales and service to contractors and aggregate producers is assured on Pioneer crushers, screens, feeders, conveyors, gravel plants, rock plants, center-mix-type asphalt plants, etc.

Link-Belt sales mgrs.

Link-Belt Co. has appointed two new West Coast sales managers. Rodney F. Coltart is the new sales manager of the Central Pacific division, with headquarters at the company's San Francisco plant, and Benjamin M. Prestholt is the new sales manager of the Southern Pacific



Prestholt



Coltart

division, with headquarters at the Los Angeles plant. Coltart, a graduate civil engineer, started with Link-Belt in 1935, and served recently as a sales engineer at the company plant at Colmar, Pa. Prestholt, also a graduate civil engineer, started in the engineering department of the Caldwell plant in Chicago in 1936, where he has recently been sales engineer.

Garlinghouse handles Kue-Ken crushers

Appointment of Garlinghouse Brothers, Los Angeles, as exclusive Southern California distributor of Kue-Ken crushers has been announced by the manufacturer, Straub Manufacturing Co. Garlinghouse will distribute the entire Kue-Ken line from single crushers to complete crushing plants.

Executive promotions

Ken Wernsing has been made sales and advertising manager and Don Koeneke has been appointed plant superintendent of Skookum Co., Inc. Wernsing has been chief sales engineer for the past five years. Koeneke, son of Skookum's executive vice president, Joe Koeneke, has been with the company 15 years, for for the past few years serving as assistant plant superintendent.

New Western sales mgr. for Galion

Leo M. Brown is the new Western sales manager of The Galion Allsteel Body Co., in charge of sales west of the Mississippi, which he will direct from his headquarters at

the company plant in Galion, Ohio. Before joining Galion, Brown was sales manager of the St. Paul Hydraulic Hoist Division of Gar Wood Industries, Inc.

Thor transfers

R. J. Horrocks, manager of the Salt Lake City sales and service branch of Thor Power Tool Co., was recently appointed manager of the company's branch in Seattle, Wash. Horrocks has been located in the Northwest and Mountain area since he joined Thor as a service engineer in 1948. W. R. Walinski, former service engineer in the Salt Lake territory, has been transferred to Spokane, Wash., covering that new area under direction of the Seattle branch.

Paul LaFrance gets L. A. managership

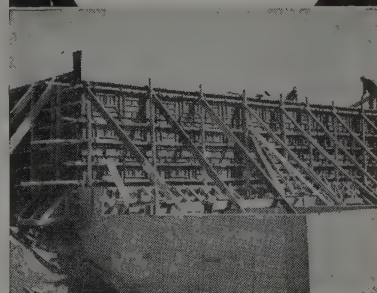
Baldwin-Lima-Hamilton Corp. recently announced the appointment of Paul E. LaFrance as manager of the Los Angeles office of the company. In his new position LaFrance will supervise the handling of all products of Baldwin-Lima-Hamilton in the Los Angeles territory.

Skookum opens new branch

A new sales office and warehouse has recently been opened in Eugene,

Reduce costs and INCREASE PROFITS

by renting these metal forms for concrete



Economy Metal Forms save time, labor and material. They quickly lock together with a simple twist of a clamp. Standard units fit most jobs. Where needed, special forms can be fabricated to specification.

ECONOMY FORMS CORP.

Home Office: Des Moines, Iowa

DISTRICT SALES OFFICES: Kansas City, Mo. • Omaha, Neb. • Minneapolis, Minn. • Fort Wayne, Ind. • Cincinnati, Ohio • Cleveland, Ohio • Metuchen, N.J. • Springfield, Mass. • Decatur, Ga. • Memphis, Tenn. • Dallas, Texas • Los Angeles, Calif. • Oakland, Calif. • Denver, Colorado.

ECONOMY FORMS

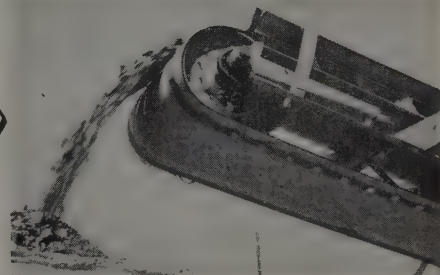
metal forms for concrete construction

YUBA-SCHROCK MOTORIZED HEAD PULLEY

For Belt Conveyors and Bucket Elevators

"PULLEY WITH THE DRIVE INSIDE"

Safe, compact, simple
—no chains, no belts,
no sprockets, no
exposed motors.



Built by YUBA for sale in Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington.

Built and sold in other states by Iowa Manufacturing Company, Cedar Rapids, Iowa.

Pulley shell of this revolutionary head pulley rotates around electric motor and reduction gears, which are held stationary by torque arm attached to conveyor frame. Quickly in-

stalled — requires no more room than idler pulley. All moving parts protected against weather, grit, dirt. Diameters 10 1/2" to 56". 1/3 to 125 hp. for voltages to 2300. Job proved.

Write TODAY for folder and name of nearest distributor.



YUBA MANUFACTURING CO.

Pulley and Sprocket Dept.

Phone 628

Benicia, Calif.

70



PIONEER EQUIPMENT CO. of Nevada becomes a distributor for LeTourneau-Westinghouse Co. as *Wayne F. Watts* signs agreement. LeTourneau-Westinghouse officials are (seated) *W. E. Hendricks* (left), domestic sales manager, and *John W. Schoen* (right), vice president and general sales manager. Standing (from left) are *Lee Jorgensen*, district sales representative, and *F. W. Duke*, Western sales manager.

Ore., by The Skookum Co., Inc., Portland. Warehouse manager for the new branch is Duane E. (Pete) Koeneke. The Eugene office will service the area south of Lebanon to Redding, Calif., and from Bend to the coast.

Hercules Motors expansion

To better serve the West Coast area, Hercules Motors Corp. has opened a new and greatly expanded branch at 2336 South Garfield Ave., Los Angeles. Facilities of the new factory branch include a large salesroom, modern offices, a complete parts department and a fully equipped machine shop. West Coast operations are under the supervision of William Brumback.

Madsen appoints new Western distributors

Madsen Iron Works, Inc., has appointed four new distributors in the Western states for the handling of Madsen asphalt plants and asphalt plant equipment. Foulger Equipment Co., Salt Lake City, will cover the entire state of Utah, four eastern counties of Nevada, and three western counties of Wyoming. McCoy Company, Denver, will service the entire state of Colorado. Studer Tractor & Equipment Co., Casper, Wyo., will cover all of Wyoming except Teton, Lincoln and Uinta counties serviced by Foulger, Treasure State Equipment Co., Kalispell, Mont. will represent Madsen in the western part of Montana.

Schield appoints Northwest distributor

Modern Machinery Co., Inc., Spokane and Seattle, Wash., has been appointed exclusive distributor for Schield Bantam Co. in south-central, central and northern Washington, in the northern section of Idaho, and the extreme northwestern part of Oregon. Prompt field service on all Schield Bantam equipment is offered by the new distributor, as well as field engineering assistance to all construction machinery users in the area.

Vickers opens No. Calif. office

Vickers Incorporated recently opened a branch office at Berkeley, Calif., to take care of the increasing demand for its line of industrial and mobile hydraulic equipment in Northern California. Two application engineers, Samuel L. Wilson and Gordon Lindberg, are headquartered at the Berkeley office to render technical assistance together with the handling of sales.

Republic Supply ups Deshon

Robert E. Deshon has been promoted to the assistant managership of the northern division of Republic Supply Co., located at the firm's northern headquarters at San Leandro, Calif. He will assist E. E. (Dave) Davison, northern division manager.

ESCO appoints division head

Electric Steel Foundry Co., Portland, Ore., recently announced the appointment of Jack R. Campbell to the position of manager of its stainless cast specialties division, replacing Don L. Shirley, who has left the company. In his new position Campbell will coordinate his activities under the direct supervision of Jack Wilcox, who is also manager of ESCO's process equipment division.

Wellman Engineering buys locomotive crane business

Acquisition of the locomotive crane division and plant of The Browning Crane & Shovel Co. was recently announced by The Wellman Engineering Co., one of the world's leading manufacturers of heavy-duty materials handling equipment. Browning had been in the locomotive crane business since 1899, serving such fields as general construction, logging, steel mill, railway, shipbuilding and quarry.

Worthington ups two exec's

Two Worthington Corporation executives have been promoted recently. William H. Wheeler, former vertical air compressor division manager at the Holyoke Works, has been made sales manager and placed in charge of sales pertaining to air cooled compressors, portable air compressors and contractors air tools at Holyoke. A. C. Nolder, who was Wheeler's assistant, now assumes Wheeler's former post.

Clark Equipment Co. forms new subsidiary

Clark Equipment Co., manufacturer of bulk-handling equipment and industrial trucks, announces the formation of a new subsidiary, Clark Leasing Corp., to finance leasing of its equipment on a national basis. Establishment of the subsidiary followed a six-month test program and, according to W. E. Schirmer, vice president, was "so successful that it has become necessary for us to readjust our thinking on a long-range basis."

Calsteel officer

The appointment of Harold W. Dornsife as vice president and general manager of California Steel Products Co., Richmond, Calif., is announced by J. L. McGara, executive vice president and general manager of American District Steam Co., Inc., which recently acquired the Richmond firm. Dornsife was project manager at C. F. Braun &

Co., for seven years before joining Calsteel.

Davey acquires drill line

Davey Compressor Co. recently purchased all manufacturing rights to the complete line of portable rotary drilling units previously produced by Engineering Laboratories, Inc. Addition of the new line to the list of Davey products is expected to result in substantial sales volume increases, according to J. T. Myers, Davey vice president.

Two promotions at Wisconsin Motor Corp.

Ray J. Fellows has been appointed sales manager, and J. W. Perschbacher, assistant sales manager, for Wisconsin Motor Corp. Fellows, who has been with the company since 1938, has been assistant sales manager during the past six years. Perschbacher has represented Wisconsin Motor in various territories since 1947.

Eutectic appoints natl. sales supervisor

L. D. Richardson has been named sales and service supervisor by Eutectic Welding Alloys Corp. His new duties will include supervision of sales, sales training and service in the U.S. and Canada. Richardson has been with the corporation for the past nine years. His new appointment ties in with the company's 1954 expansion program.

New Ramset field sales mgr.

Ramset Fasteners, Inc., a division of Olin Industries, through Clarke Tryon, sales manager, announces the appointment of Charles H. Schminke as field sales manager. Schminke brings to Ramset 14 years of experience in sales work, nearly half of which were in executive positions.

Hammermills, Inc.

Hammermills, Inc., subsidiary of Pettibone Mulliken Corp., Chicago, announces the transfer of sales, engineering and manufacturing of the complete line of Bulldog hammermills to Cedar Rapids, Iowa, where these operations will be carried on with Universal Engineering Corp. This move concentrates all crushing and pulverizing equipment activities of Pettibone Mulliken subsidiaries under one roof at 625 C Ave., N. W., Cedar Rapids. The Bulldog line will be offered to the construction industry through Universal distributors. Charles M. Bindner and Ted A. Oberhellmann continue as president and vice president of Hammermills.

Edgar Schaefer dies

Edgar F. Schaefer, 58, president of Gardner-Denver Co., died unexpected-

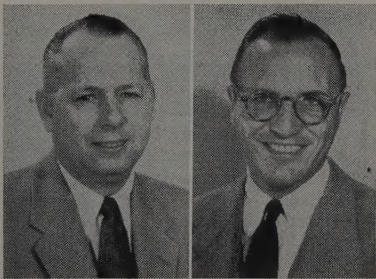


PAYLOAD BOTH WAYS—This truck and trailer hauls a payload of 46,000 lb. of bulk cement from the Oro Grande plant of Riverside Cement Co. to Los Angeles area. An equivalent load of fuel oil is hauled on the return trip. Utility Trailer Manufacturing Co. of Los Angeles designed and engineered the unit in cooperation with Thos. F. Tugwell, Riverside Cement's director of transportation.

ly at his home in Quincy, Ill., recently. Schaefer first joined the Gardner-Denver Co., manufacturer of compressors, pumps and rock drills, in 1919. He rose from cost clerk through a succession of rapid promotions, to become president of the firm in 1947.

Basalt Rock Co. forms new division

Basalt Rock Co., Inc., Napa, Calif., producer of lightweight expanded shale aggregate, masonry units, precast concrete buildings and materials and steel products, recently announced the formation of a new division and the advancement of execu-



Price

Streblow

tive personnel. Harold A. Price has been named manager and Jack A. Streblow sales manager of the newly formed structural concrete products division. At the same time it was announced that Ross Rudolph will be technical representative of this division, with headquarters at the Napa offices.

Morrison-Knudsen forms new company

Morrison-Knudsen Co., Inc., in conjunction with Raymond Concrete Pile Co., and George R. Jessen, Salt Lake City, has formed a new company to manufacture specialized rubber gasket-joint pipe. Known as Cen-Vi-Ro Pipe Corp., the company was acquired and reorganized from the former Cen-Vi-Ro Manufactur-

ing Corp. Utah Concrete Pipe Co., Salt Lake City, which also makes Cen-Vi-Ro pipe under an arrangement with Jessen, inventor of the process, is not affected by the new combine.

FWD to sell brush control equipment

The Four Wheel Drive Auto Co. recently acquired exclusive sales rights for all products manufactured by the Hall Machine & Iron Works of Sedro Woolley, Wash., according to announcement by G. F. DeCoursein, general sales manager of FWD. The Washington firm manufactures a heavy duty brush cutter, brush hog and a tailgate spreader.

Management changes at Pacific Coast Eng. Co.

Pacific Coast Engineering Co., engineers and builders of custom equipment for the construction industry, announces the election of C. H. Ramsden to the office of chairman of the board. He has been president of the company since 1939. Will C. Hall, previously vice president and general manager, has been elected president and general manager to succeed Ramsden. He has been associated with the firm since 1936. C. D. Ramsden was named vice president and chief engineer. He joined the company shortly after World War II as chief engineer.

J. V. Ball heads Vibro-Tamper sales

Appointment of J. V. Ball to head Vibro-Tamper sales is announced by International Vibration Co., producer of vibrating-type compaction equipment for highway and airport runway construction. As sales manager, Ball will have the function of broadening the company's present distributor sales program, and in conjunction will continue the policy of working with state highway departments to further expand the number of states approving the Vibro-Tamper in specifications.

Space is sold as advertisers' inches. All advertisements in this section are 1/4 in. short of contracted space to allow for borders and composition.

CLASSIFIED

Rates are 8.50 a column inch. Copy should be sent in by the 20th of preceding month if proofs are required; by the 23rd if no proofs are required.

FOR SALE

FOR SALE

- 1201 Lima Crane combination shovel, Drag-line and Clamshell, 3 1/2 cy Esco Bucket.
- 2 Euclid Mod 27FD End Dumps, 12 cy cap 165 HP Cummins, late transmissions.
- 3 Euclid Mod 2FD End Dumps, 12 cy cap 165 HP Cummins, late transmissions.
- 1 500 CFM Chicago V type 100 HP Compressor.
- 1 450 CFM Chicago PB-8 100 HP Compressor.
- 1 500 CFM LeRoi Rex Portable Compressor.
- 4 Johnson Turbine Pumps 200 HP 14" OD.
- 2 Fairbank-Morse Propeller Pumps 20" OD.
- 1 D-4 Traxcavator.
- 1 Portable 3" Homelite Pump Mod 24.
- 2 Portable 2" Homelite Pump Mod 23.
- 4 Blaw Knox 4 cy Concrete Buckets.
- Ledger wood Type Cable Unit.

ALBENI CONSTRUCTORS

Newport, Washington

Phone 275

PO Box 764

FOR SALE

STEEL SHEET PILING

NEAR BREWSTER, WASHINGTON

Shipped New — Used Only One Job			
Carnegie	MP-101	MP-102	Tees
Length	Pcs.	Pcs.	Pcs.
72-65 ft.	105	100	2
65-60 ft.	210	50	9
60-50 ft.	210	5	18
50-45 ft.	290	2	7
45-40 ft.	120	1	13

Also quantity 35 ft. and shorter—Quick Shipment Regardless of job, location, Write, Wire or Phone.

MISSISSIPPI VALLEY EQUIPMENT CO.

511 Locust St., St. Louis 1, Mo., CHestnut 4474

MORE MANUFACTURERS

New Caterpillar subsidiary

Caterpillar Tractor Co. announces the formation of Caterpillar Credit Corp., a wholly-owned subsidiary which will assist the company's domestic and Canadian dealers in financing time payment sales. The parent company is a major manufacturer of diesel engines, tractors, motor graders and earthmoving equipment, with the principal manufacturing plant at Peoria, Ill., which will also be the credit corporation's headquarters.

Athey's new officers

Several new executive positions were recently announced by B. F. Lease, president of Athey Products Corp., and the following new officers chosen. W. D. Lease was elected vice president in charge of sales; R. W. Kling, vice president, engineering; C. E. Matthews, vice president, service and parts; and R. S. Hinds, treasurer and assistant secretary. Re-elected to office were W. L. Kubic, vice president, manufacturing; and A. E. Saidl, secretary.

FOR SALE

SAVE \$40,000.00

On a slightly used NEW Barber-Greene 848 Black Top Plant Complete, All Pipes, Tank, Hot Oil Heater and Finishing Machine.

If interested, contact:

Allied Construction Equipment

4015 Forest Park Avenue

St. Louis 8, Missouri

Telephone: Franklin 1-1818

DIRT HANDLING SCOOP

Southwest Model TW-705H. 8 cu. yd. Hyd. back dump. Excellent cond. \$2500 F.O.D. car, Cloverdale, Calif. BeeGee Hyd. D-8 Pump also available.

Call: John Sloss, 3035 Redwood Highway
So. Santa Rosa, Calif. Tel.: 4218

FOR SALE OR RENT

#250 Parsons Trenchliner used only 500 hours. New in late 1952. Digs 12 1/2' deep, 30" to 64" wide. Weller Brothers, N. 633 Madelia, Spokane, Washington. KEstone—9341.

FOR RENT

RENT STEEL SHEET PILING

Get the exact lengths and sections you need from Foster—all standard makes, delivered on time—and at Foster's standard low rental rates. Also Rental Pile Hammers & Extractors.

L.B. FOSTER co.
PITTSBURGH 30 • NEW YORK 7 • CHICAGO 4
HOUSTON 2 • LOS ANGELES 5

BRIDGES

Bailey bridges for rent.
Falsework trusses for rent.
Used steel truss bridges for sale.

BAILEY BRIDGE EQUIPMENT CO.

206 Bank of America Bldg., San Luis Obispo, Calif.

POSITION WANTED

FOR RENT PERMANENT BASIS

Human machine, personable enough to sell profitably.
Qualified Pilot, Secretary, Sales Manager, Accountant, Inventor, Advertising, Welder, Machinist.

Successfully sold steel, construction, logging equipment, manganese and alloy castings to dealer and consumer from Alaska to Argentina. Thirty-one, self-employed at present. Reply Western Construction, P. O. Box 7A 709 Mission Street, San Francisco, Calif.

FOR SALE

FOR SALE

Bucyrus-Erie 120-B electric dragline, mounted on caterpillars; 100 foot boom; 4 1/4 cubic yard bucket. Has recently been reconditioned and in excellent condition, has been used mostly for rehandle. Reason for Sale: Less rehandle in new coal pits and have two other machines. Specifications and photographs sent on request.

Northwestern Improvement Company
Colstrip, Montana

Used Machinery for Sale

Gyratory crusher, Kennedy No. 4, two 9x35 openings, 22 to 42 tons per hour. Full specifications and drawings on request.

S. B. ANDERSON

805 E. Central Ave.
Albuquerque, New Mexico

NORTHWEST POWER SHOVEL

3/4 yd. with dipper stick and boom

Good Condition

\$5,500

Rt. 5, Box 520D

San Jose, Calif.

Phone San Jose GL. 8-3562

STOP that WATER

With FORMULA No. 640, a clear liquid which penetrates 1" plus in concrete, brick, stucco, plaster, etc. Seals out water, dirt Holds 20' head. Use outside and in. Preserves all absorbent materials. Sold 14 years. Quick, economical, sure. \$3 in 55's. Free sample. See Sweet's.

HAYNES PRODUCTS CO., OMAHA 3, NEBR.

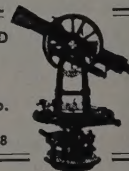
FOR RENT

SOLD RENTED REPAIRED

Transits • Levels
Steel Tapes • Compasses

Portland Instrument Co.

334 S.W. 5th nr. Stark
PORTLAND 4, ORE., AT 3598



SURVEYING EQUIPMENT

Precise Optical Instruments

RENT — REPAIR — SALE

OGDEN SURVEYING EQUIPMENT CO.

520 56th St. Sacramento, Calif.

SERVICES

Engineers—Foremen—Office Men

Learn latest methods to organize and run work. Prepare for the top jobs. Send post card for details.

Geo. E. Deatherage & Son

CONSTRUCTION CONSULTANTS
411 So. 5th Ave. Lake Worth, Florida

LEARN ESTIMATING

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BACKFILL, uncompacted

Contingency allowance: How many \$64 questions?

We heard it again recently: state highway departments should name the resident engineer for a job when the work is advertised. Accepted theory is that a contractor figures his contingency allowance against such things as weather possibilities and the state of labor and materials markets. Not so, say some contractors. These items don't call for nearly the "insurance" commonly supposed. Instead, the question is how much latitude the specs leave to the resident engineer's discretion.

The way things are, a contractor tends to assume the worst at every point in the specs where the resident could make it tough. Now on the other hand, the story goes, if the engineer were known before the bidding, a contractor could base his contingency on what he knows of the way the particular resident runs a job.

But there's the rub. The whole system of competitive bidding is based on giving all bidders equal footing. What about the poor guy who has

never run into this resident engineer before? The whole subject is a good one for argument. And it's curious to note this new way in which "every man has his price!"

Oh! Oh! Oh!

A few extra ciphers crept onto the keyboard of one editor's typewriter last month, and California "picked up" some 14,000 sq. mi. as a result. On page 100 we reported purchase of 36 sq. mi. by Omart Investment Co. Development plans for this piece were described: "1,000,000 acres for industry, 8,000,000 acres for agriculture, . . . 5,000,000 homes!" The figures, in order, should have been 1,000, 8,000, and 5,000.

This grand string of errors has been caught by at least two readers, including Homer Hadley, Seattle consulting engineer, who twists the knife like this: "Your reporter must have caught the Southern California spirit of lavish millions. The only discordant figure was that of the area involved, 36 sq. mi. which at 640 acres per sq. mi. yields only a pitiful 23,040 acres! There was a mountain that

groaned and was in travail—and brought forth a mouse."

The guy who wrote the item isn't bothered at all. After all, he says, zeros mean nothing!

Marion shovels built to outstrip each other

History in the field of power shovel manufacture repeated itself last month. **Western Construction** for July 1929 published news of the new Marion 5600, a 20-yd. electric shovel built for the Illinois coal fields that was by 75% the largest rig of its type.

This time it's a 60-yd. Marion, 50% bigger than any existing equipment of its kind. Design of the new machine isn't final yet, so close comparison is difficult. But here are some of the facts:

The 1929 Marion weighed a total of 1,700 tons. The 1954 model tips the beam at 2,500. Both machines were designed for stripping overburden from coal deposits. But the new shovel cuts to a 90-ft. depth where the 1929 model stopped at 70 ft. The old shovel was equipped with 6 electric motors totaling 1,500 hp. The new one has 16 motors that add up to 4,500 hp. This includes power for a 3-man elevator placed in the hollow center pin.

There's a truly "light touch" about the new shovel. Riding on 8 crawler treads 22 ft. long and 4½ ft. wide, its great weight amounts to less than 44 psi. bearing pressure.

Were we early this month?

You probably got this copy of **Western Construction** a little earlier than usual. In coming months, the margin ahead of your old delivery date should be easy to spot. The reason—a new printing arrangement.

We used to have contracts with separate firms for (1) setting type, (2) making illustrations, (3) printing the pages, (4) binding the pages into magazine form, and (5) mailing the magazine to you. Now, most of the work is housed in one integrated plant. Only the mailing is handled separately.

All this means faster production—less time from our editorial deadlines to your reading the magazine. This in turn means more up-to-date reporting of men and their jobs. The construction West moves fast, and the new **Western Construction** printing schedule is designed to keep up with developments in the field.

Twenty-five years ago in *Western Construction*

"The construction day labor forces of the city of San Francisco are making good progress in driving the 29-mi. **Coast Range Tunnel**. A total of 4 mi. has been excavated since work was begun in earnest last February. There are 14 headings; 2 in each of five shafts; 1 at the east portal near Tesla; 1 at the west portal near Irvington; and 2 at the Alameda Creek crossing."

* * *

"On June 26 a shot put off at **San Gabriel** damsite loosened up the fractured material overlying the sound rock on the entire east abutment, covering a base width of 400 ft. and a height of 400 ft. above streambed.

"For the past two months the contractors, **Fisher, Ross, McDonald & Kahn, Inc.**, have been planning for this shot, on which 180,000 lb. of black powder was exploded at one time to loosen up 150,000 cu. yd. of rock."

"K. L. Parker, who was superintendent for **Bent Bros. Inc.**, on the recently completed **Bull Run Dam** for the water supply of Portland, Oregon, is now superintendent of construction for Bent Bros. on the **Calaveras Dam**, 40 mi. east of Stockton, Calif."

* * *

"One of the most interesting jobs in Colorado is the **Big Tooth Dam**, under construction on the Pikes Peak watershed to augment the water supply of Colorado Springs. Its location, 9,370 ft. above sea level, and close to the timber line, and the fact that all supplies had to be shipped over the famous Pikes Peak cog road and then hauled by wagon to the site, were the deciding factors in building the dam by day labor. The dam is of the rockfill type, faced with gunite, and will be 100 ft. high, 600 ft. long on crest, with a base thickness of 285 ft. and a crest width of 15 ft."

... The Editors