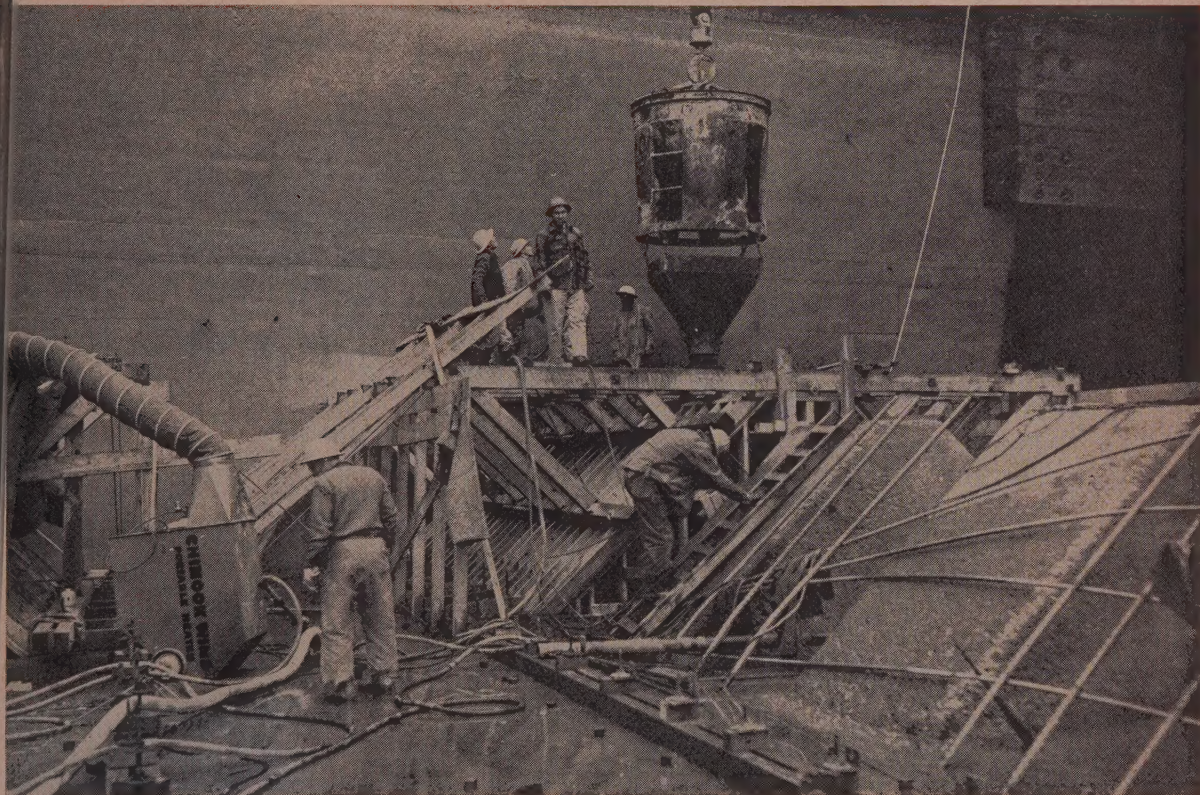


MAY 1955



Rebuilding baffles at Bonneville

Corps of Engineers goes after highest quality concrete — 0.32 water-cement ratio — Absorbent form liners keep surface concrete dry — Steel-troweled and stone-ground finishes

By W. R. JOHNSON

Chief, Concrete Control Section
Portland District, Corps of Engineers

REJECTING a portable caisson as too slow and too costly, the Corps of Engineers has just finished wholesale repair of eroded and cavitated concrete in 9 bays of the spillway and stilling basin at Bonneville Dam. The work was done by Larson Construction Co. during the past winter season, behind a cofferdam of pile cells that permitted unwatering the entire work area.

An advantage of this method was that it put all the work out in the open, where positive control was possible. This being the case, and with

expectations of uncovering severe and extensive damage, close attention was paid to the design of concrete mixes and the specifications for conduct of the work. At every stage the emphasis was on the highest quality concrete.

Several months beforehand, tests were started to determine which aggregates, concrete mixes, and surface finishes would be most resistant to cavitation and erosion. The mix finally adopted contained 1½-in. maximum size aggregates from Steila-coom, Wash., with 9 bags of cement per cu. yd. It had a water-cement ratio of .32 by weight and a slump of 2 to 3 in. This is prob-

ably one of the lowest water ratios ever used for construction work.

Test cylinders later taken on the job gave strengths of 6,700 psi. at 28 days and should give strengths of 9,000 to 10,000 psi. at 6 months with the type and brand of cement used. Tests indicate that the concrete will be considerably more resistant to cavitation than was the original.

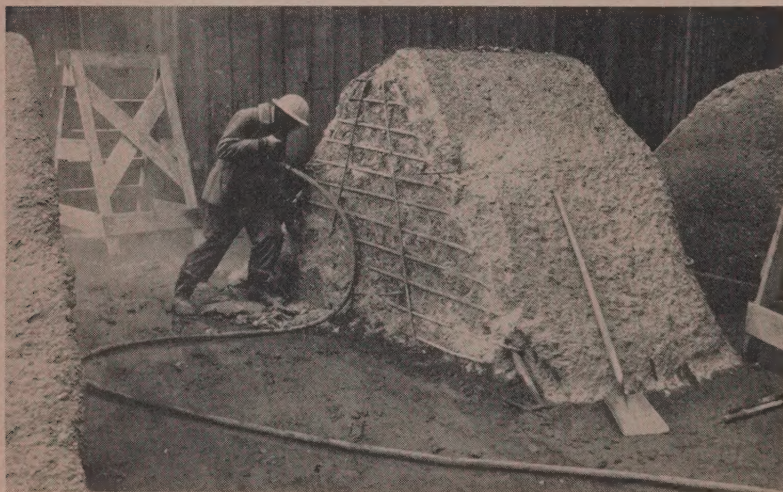
Scope of work

When the stilling basin was finally unwatered late last year, damage was found to be less severe than indicated by earlier diver inspection. But plans for repairs were unaffected. Scope of the work still included:

- (1) Complete restoration of concrete in upstream row of baffles,
- (2) Conversion of the downstream row of baffles to a continuous end sill, to reduce undercutting below the apron downstream, and
- (3) Restoration of the baffle deck



EROSION AND CAVITATION damage had attacked pier noses, baffle deck and baffles. Deck was cut back as shown below ogee to insure good bond for new concrete.



CHIPPED clear back to expose re-steel, baffles were readied for new concrete. This row of "teeth" was re-formed as one continuous end sill for better hydraulic performance.



FANCY FORMWORK included absorbent liners to assure very dry concrete at surface of new end sill. Applications like this are laboratory for concrete durability.

surface with a minimum of 12 in. of new concrete.

Additional tremie concrete and revetment work below the apron edge was also done. But the methods used were not significantly affected by the presence of the cofferdam.

Before repairs to the stilling basin could be started, it was necessary to clean muck and sand off the existing surface. This was done by sluicing the debris going off the downstream end of the baffle deck inside the cofferdam. While cleanup was in progress, work was also started in removing the old concrete from the sides of the upstream row of baffles as far back as the reinforcing steel. This work was accomplished with jackhammers.

Removal of concrete

After the old concrete had been removed, holes were drilled in the sides of the baffles to a minimum depth of 2 ft. and hooked anchor bars grouted into place. Hooked anchor bars were also grouted 3 ft. into the deck slab.

To provide a smooth joint between the new 12-in. slab and the existing ogee, a saw cut was made in the old concrete 13 ft. upstream from the end of the ogee and parallel to the axis of the dam. The cut was 3 in. deep. Existing concrete was then removed with jackhammers to a minimum depth of 12 in. at the saw cut and down to whatever depths necessary over the remainder of the slab. The minimum thickness of the new concrete slab was 12 in.

All old concrete surfaces to be covered with new concrete and gunite mortar were then sandblasted and cleaned with an air-water jet before placing operations started.

Forming and pouring

The concrete forms were constructed of wood. They were sheathed with $\frac{5}{8}$ -in. plywood with $\frac{1}{2}$ -in. absorptive Firtex form liner nailed to the inside face. The Firtex was used to reduce the water-cement ratio of the concrete at the surface and to eliminate bug holes, or air voids, in the concrete surfaces. The upstream corners of the baffles were elliptical in shape, and the Firtex was bent to the required curvature by scoring it on the back with several cuts.

Concrete materials were weighed in 2-yd. batches and discharged into transit-mix trucks under the plant, a mile downstream. Mixing was started immediately and continued after arrival on the job until mixed the required number of revolutions. Two transit mixers (2-yd. and 5-yd.) were used for the work.

Mixing water was heated in order to maintain a placing temperature of between 50 and 60 deg. F. The water-cement ratio was controlled by frequent moisture tests of the aggregate and slump tests of the concrete. The addition or subtraction of 0.1 gal. of water per bag of cement would

ary the slump by 1 in. in the 9-bag mix used.

The concrete was hauled to the south end of the dam adjacent to the work and then discharged through a 14-in. pipe about 25 ft. long into a 2-yd. bucket on a truck operating on the cofferdam. Moved to a point near the form being poured, the bucket was removed by a crane, lowered to the form and then discharged through a short elephant trunk. Flexible shaft vibrators were used for working the concrete into place in the forms. Due to the richness of the mix, the concrete did not segregate in any of the handling operations.

Good record for gunite

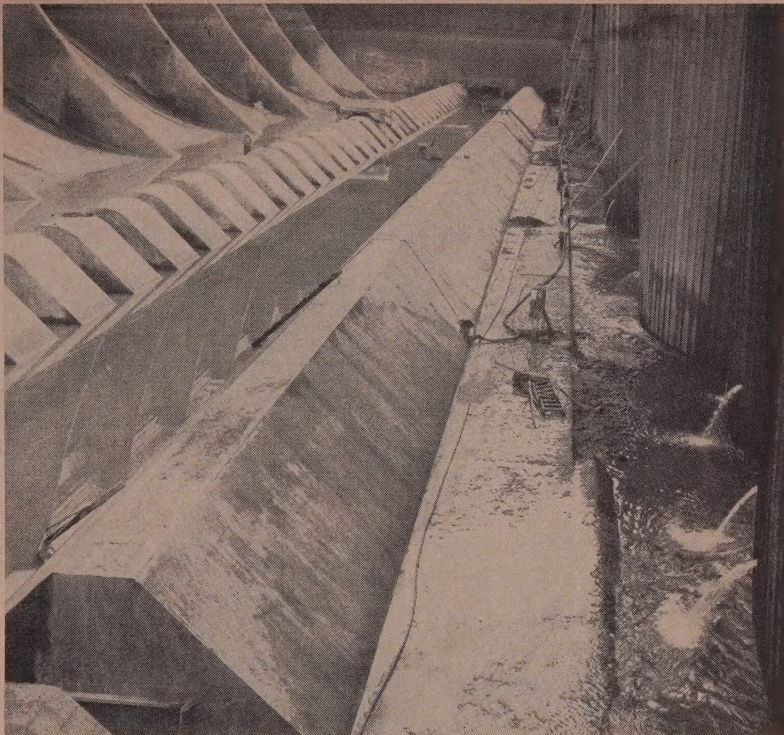
Due to the excellent condition of 75% of the old gunite still in place, it was decided not to disturb this area, but merely to replace the 25% which had been eroded. (The original gunite had been applied during third-step construction at Bonneville as repair work on concrete surfaces which were eroded during the river diversion through bays 11 through 17.) The new mix consisted of 1/3 mortar using concrete, sand and high early-strength portland cement. After deducting the sand lost in the rebound, it was estimated that the final mix was about 1/2 by volume. After applying the gunite, the surface was lightly floated. The use of high early-strength cement cut the curing period to 7 days and reduced the danger from freezing on the relatively thin sections repaired. After curing, the gunited surfaces were ground.

After the deck slabs had been screened to grade, the entire pour was covered by a frame roofed with aluminum sheets and fitted with canvas tarpaulin sides to protect it from the weather during the finishing process. Similar smaller frames were used to protect the top of the baffles and end sill during finishing operations. The deck was given a wood float finish and, after the final set had taken place, was covered with wet burlap for several days. Then the area was flooded with water.

Extra care for durability

The tops of the baffles and end sill were steel-troweled. A mixture of iron and cement graded to a No. 4 maximum size was applied to the baffle deck directly downstream from the baffles over an area 6 ft. wide and 500 ft. long. The mixture was dusted on in two coats according to the manufacturer's directions and then given a steel-trowel finish.

Concrete forms, including the absorptive linings, were removed 16 to 24 hr. after the concrete was placed. The form liner did not adhere to the concrete. Immediately after removal of the Firtex the concrete was covered with burlap and kept thoroughly wet during the entire 14-day curing period. Due to the heat generated by



FINISHED PROJECT is ready for another 17 years—or more—of operation. End sill should halt undercutting of stilling basin apron at right. Contract included placed rock and tremie concrete in pockets already created.

the rich concrete, it was not always necessary to apply additional curing heat to the baffles and end sill in order to maintain the minimum 50-deg F. curing temperature called for in the specifications.

The specifications called for wet grinding all new baffle deck and spillway ogee surfaces including the gunited areas. In general, this was started immediately after the curing was completed. It was done with rotary grinders using No. 24 stones. The surface was ground until the coarse aggregate was exposed. Along the joints on the deck, grinding was in places deeper than average due to one slab being slightly higher than the

adjoining slab. Most of the area was ground three times to obtain an acceptable surface. The iron-treated surface was not ground.

Personnel

This entire job, \$677,000 of maintenance in one piece, was accomplished under the jurisdiction of the Portland District. P. J. Leonti and Virgil Brown were project engineers. J. L. Kemple is chief, construction division; O. C. Hartman, supervision and inspection branch.

For Larson Construction Co. the job superintendent was Gordon Chrudimsky. Job engineer was R. C. Larson, owner of the firm.

If you don't watch out—

You won't get the equipment you bought

THE RELIABILITY of name brand equipment and parts was emphasized during the past year by a number of court actions involving counterfeit claims. Bendix-Westinghouse Automotive Air Brake Co. was awarded a judgment of \$50,000 against Brakes, Inc. and Lawrence H. Johnson, Long Island City, N. Y., in settlement of its suit which charged counterfeiting of parts and trademark infringement. The action charged Brakes, Inc., and Johnson with manufacturing and selling counterfeit brake chamber diaphragms and other air brake parts. This action and others were instituted following an investigation of a number of com-

plaints of diaphragm failure. The investigation revealed that the faulty parts were counterfeits.

More than one imitation

A subsequent investigation revealed the existence on the open market of a multitude of other counterfeit repair units and parts for Bendix-Westinghouse automotive air brake systems. All the counterfeit items were marked with the Bendix-Westinghouse trade mark or simulations of it.

The company was also granted permanent injunctions against distributors of truck equipment in several cities.



Palisades shops:

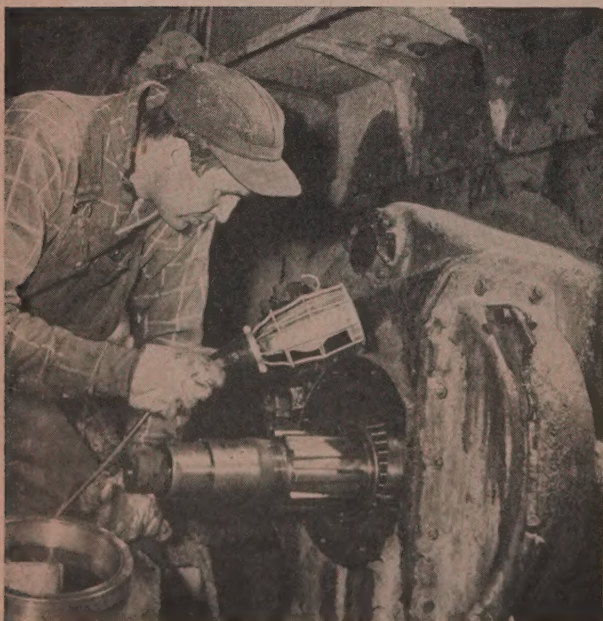
*Winter at a damsite
means equipment repair,
the inside work of
an outside job*

FROM APRIL to November Palisades Dam in Idaho is a beehive. That's the construction season for the Bureau of Reclamation's 13,000,000-yd. earthfill project on the Snake River.

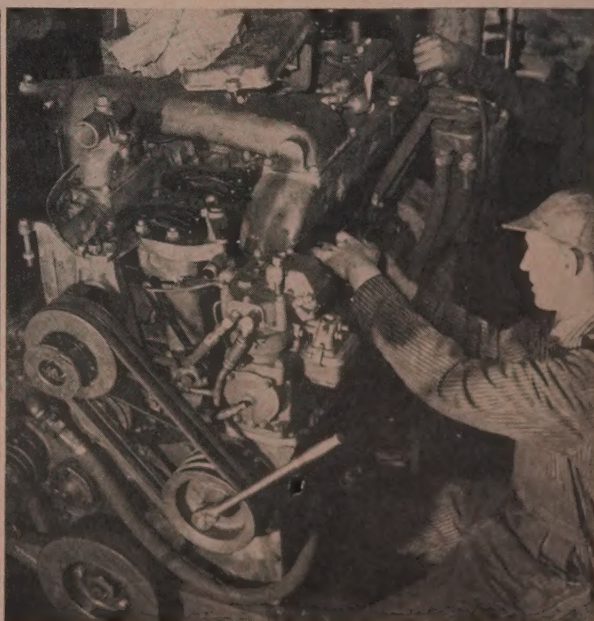
The 1955 season should be the best one yet. The contractor is free of two past headaches: there'll be no further diversion of the river, and the excavations for upstream and main cutoffs are complete.

Preparation for this season, as for the two that preceded it, took place in the off months from November to April. The month of November usually brings winter to Palisades—freezing temperatures that shut down the pits, and snow that hampers everything else. So that is when the equipment comes off the job, wheels into the contractor's yard below the dam, and is parked.

In the center of the yard is a big sheet metal shed decorated with icicles. There is snow all around it except at the north end. Here the ground is well cleared in front of a pair of sliding doors that open and shut all winter. The business is equipment repair and maintenance.



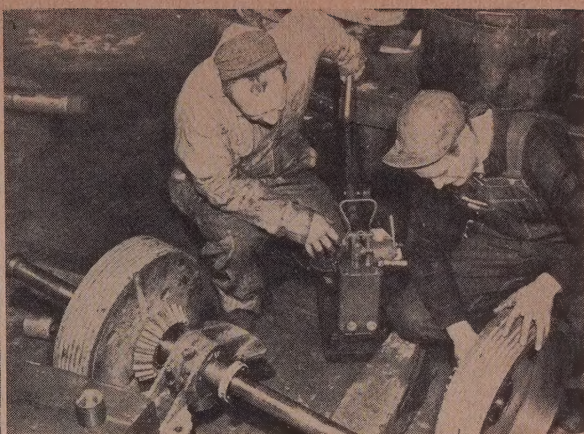
TRACTOR MAINTENANCE: Art Debroux puts the spotlight on an HD-20, taking up the bearings and placing final drive seals.



ENGINE REPAIR: Andy Christensen handles the overhaul of a 275-hp. Cummins diesel from one of the 17-yd. Euclids.



TRACK REPAIR: Art Debroux again, this time replacing a top carrier roller on an HD-20—one of 16 on the job.



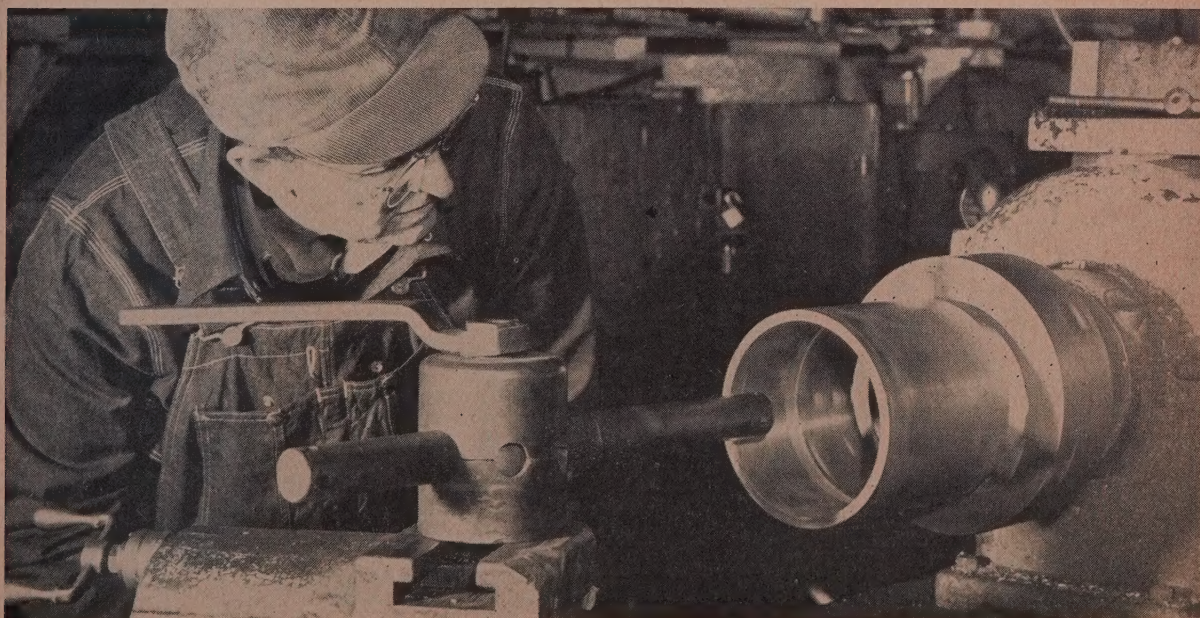
CRANE REPAIR: Jim Schrimmer and Bernard Rolls tackle the job of rebuilding swing bearings from a P&H Model 255A truck crane.

Pictures on these pages show what work is involved, and some of the people who do it. All in all the shop force headed by Jim Brown and Joe Hamby includes 6 mechanics, 1 machinist, and 2 welders. Here's a list of last winter's work:

- 1—5½-yd. Manitowoc 4500 shovel.
- 1—6½-yd. Manitowoc dragline.
- 1—60-ton Manitowoc 3500 crane.
- 1—2½-yd. Bucyrus-Erie 54-B shovel.
- 1—2½-yd. Bucyrus-Erie 54-B dragline.
- 1—4½-yd. Marion 1100 dragline.
- 1—3½-yd. P&H 1055 shovel.
- 5—25-yd. Euclid bottom-dump wagons.
- 27—17-yd. Euclid bottom-dump wagons.
- 12—15-yd. Euclid end-dump wagons.
- 4—Caterpillar DW21 tractor-scrappers.
- 16—Allis-Chalmers HD-20 tractors.
- 1—Allis-Chalmers HD-9 tractor.
- 1—Allis-Chalmers HD-5 tractor.



HEAD MEN for Palisades Contractors in the shop operation are Jim Brown (left), master mechanic, and Joe Hamby, shop foreman.



SHOVEL REPAIR: Mac Campbell, machinist, gets up close when turning a bronze tumbler bushing for the Marion 111 shovel. Machine shop tools include radial press, shaper, 16-in. lathe, 100-ton press, and bench lathe. (All photos by Bureau of Reclamation.)

What contractors should know about glued laminated lumber construction

TWO INTERESTING construction jobs using laminated wood structures have been covered by **Western Construction** in the past six months. One of these is pictured here and described. The other case involved use of heavy girders (up to 12 x 45½ in. by 60 ft. long) by Hindry Construction Co. in providing an overpass for their earthmoving equipment over a busy 4-lane highway in California.

Here are some pointers for construction men that have been made available by Verne Ketchum, chief engineer of Timber Structures, Inc. There may be some facts here that will be of use in planning your next job.

Did you know that—

1. Glued timbers are 90% stronger than structural steel, pound for pound. Common sawn timbers are but 25% stronger than steel. Glued timbers of all combinations have an average strength in bending of 2,500 psi. as against 1,625 psi. for Douglas Fir sawn timbers.

2. Well made glue lines withstand fatigue and vibrations as well as the wood pieces they join. Glued timbers can be subjected to an infinite number (50,000,000 in tests) of repeated or reverse loadings.

3. Cold temperatures do not affect the glue lines. Test results conducted by the Forest Products Laboratory at minus 70 deg. F. have shown the modern adhesives to withstand extreme low temperatures as well or better than the wood.

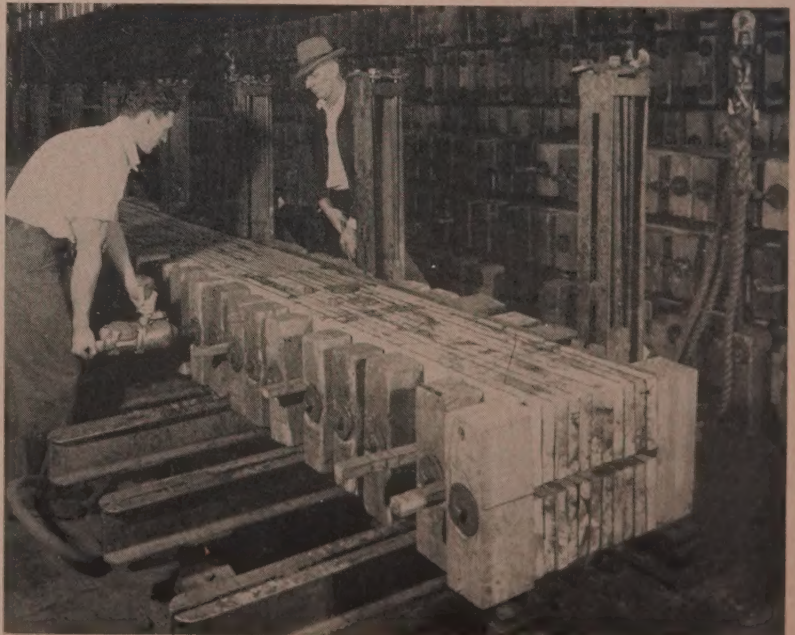
4. Glued timbers are extra strong because of the restrictions to one lamination in depth of all strength reducing characteristics, the wide distribution of knots, and because of the increased strength for dryness.

5. Water resistant glues and waterproof glues are used for varying types of glued timber weather exposure. Water resistant glues, such as casein, can be used where moisture content will be less than 15% in use—usually for untreated wood which is not subject to decay hazard. Waterproof glues, such as resorcinol, are used on timbers which are to be given pressure treatments, or in direct contact with earth, rain, steam, condensation, or continuous high humidities.

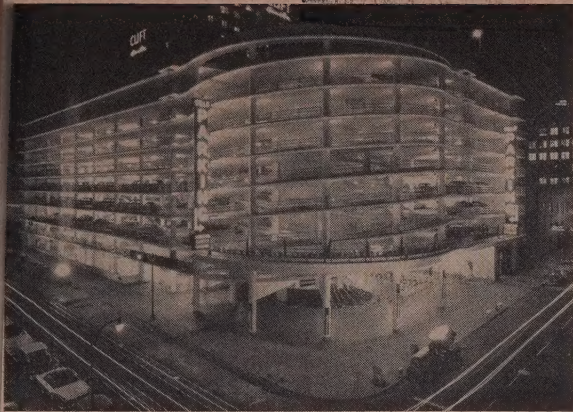
6. Glued timbers for structural purposes are confined to laminations of 2-in. nominal thickness or less. Thinner laminations than 2 in. may be used for sharp radius bends, but most glued timbers can be made with the 2-in. stock. Experience shows that lamination thickness should not exceed 1/120 of the radius of curvature.



BOWSTRING TRUSSES, in which the upper curved chords were glued laminated timbers, were used by Charles MacClosky Co. on the Dunsmuir bridge in place of ordinary falsework. Clear spans of 102, 180, and 114 ft. were involved. Two trusses hinged at the top completed one span.



PRESSURE FOR GLUING is at least 100 psi., applied here by an air wrench to a two-package unit. Lumber moisture content is not less than 7% nor more than 16% at this time. Continuous inspection and quality control by an independent inspection agency is typical for this work.



PYLON IS IN CENTER of circular ramp, is 37 ft. wide, and extends full height of building. Only the lower 40 ft. of the pylon is prestressed to handle section having maximum bending moment.

Prestressed pylon to resist earthquake in 10-story garage

A NOVEL APPLICATION of prestressed concrete is exemplified in the construction of a pylon 100 ft. high to resist earthquake forces in a 10-story garage recently completed. The 1,200-car garage is located in the heart of downtown San Francisco.

It occupies a rectangular area of 137 ft. 6 in. by 275 ft. Story heights are generally 8 ft. 6 in. floor to floor. Round columns in the body of the building are spaced 26½ ft. on centers east and west and 25 ft. on centers north and south.

Solid reinforced concrete bearing walls occur full length of interior north and west lot lines, full height from foundation to roof. Excepting three fireproofed steel girders carrying columns over the ramps in the entrance, the building is entirely of reinforced concrete construction.

Savings in formwork

Suspended floors are flat slab PRE-SAN type with tapered haunches in place of the usual drop panels and column caps. The use of PRESAN construction reduced each story height by at least 12 in. and also produced considerable savings in concrete and formwork.

Walls along one side and one end only of a rectangular building do not form a stable structure under earthquake action and such a building would be subjected to enormous torsional moments, which if not resisted by some additional elements, could produce serious results. The situation

was further accentuated by the fact that the rear and side walls of the building are in contact with adjacent buildings so that any serious movement might damage these structures in addition to the garage itself.

First thoughts were turned toward utilization of the columns as resisting elements. However, shear in the columns would induce serious moments, which in turn must be carried by the adjacent slab, thus requiring heavy additional reinforcing for both columns and slabs. Furthermore, the flexibility of the columns for such a high building would result in serious lateral deflections under earthquake action. Some other solution had to be devised.

Several ideas were investigated and abandoned as being either impractical, too costly, or too cumbersome. Finally, a pylon on the north-south axis of the ramp, extending the full diameter between inner lines of the inner ramp and full height of the building was adopted as being a simple, practical solution, and one that did not necessitate the loss of any car stalls.

Pylon dimensions

The pylon as built has an I-beam plan with the following dimensions:

Overall north-south—36 ft. 9 in.; flanges 6 ft. by 6 ft; web thickness—2 ft.

Stressteel reinforcement in prestressed portion (foundation to 3rd floor) 49 bars 1½-in. diameter in each flange; in web—48 bars 1½-in. diameter.

Intermediate grade reinforcement above 3rd floor: flanges—varies from 49 #11 bars



TENSIONING CREW in action. Elongation is taken up with pin wrench after hydraulic jacking. Split washers are at hand to slip into place when proper elongation has been obtained.

in 3rd story to 16 #11 bars in top story; web—varies from 24 #9 bars in 3rd story to 24 #7 bars in top story.

Pylon foundation dimensions—40 ft. with an average thickness of 7 ft; contains 750 cu. yd. of concrete placed and consolidated in 6 working hours.

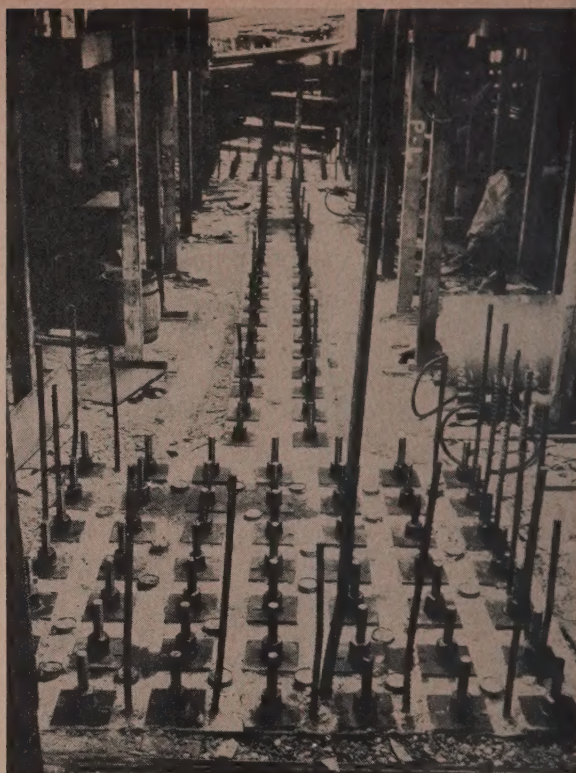
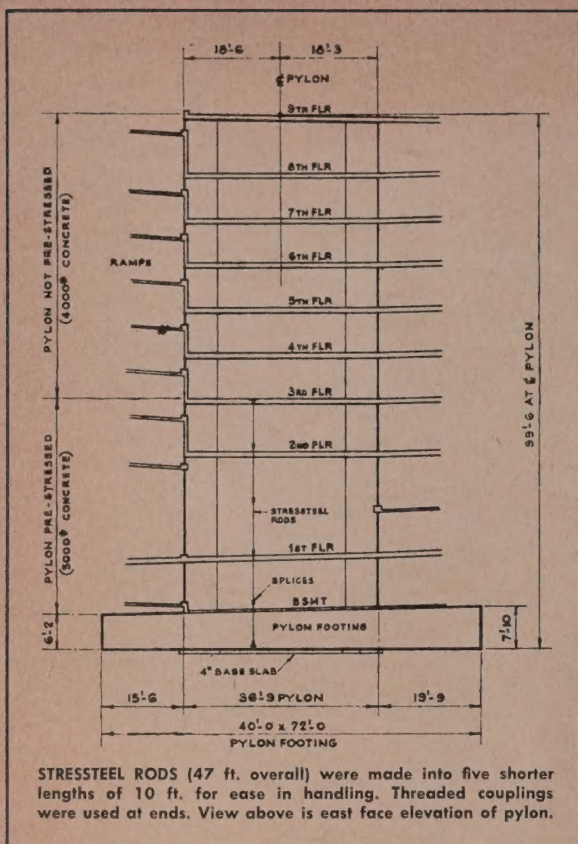
Pylon foundation reinforcement—37 tons of intermediate grade bars in top and bottom and in both directions, of size and spacing to accommodate the bending moments.

Pylon design problems

Pylon calculations were based on the use of 4,000-lb. concrete in the prestressed portion from foundation to 3rd floor, but actually 5,000-lb. concrete was poured in this portion of the work. Above the 3rd floor, 4,000-lb. concrete was used and this type was also used in main building columns up to the 5th floor. All other concrete in the structure was of the 2,500-lb. variety. All concrete contained an admixture of Tricosal.

When an earthquake occurs at an angle of about 26 deg. with the north-south axis, the maximum lateral force will be exerted on the pylon. This amounts to as much as 68% of the total earthquake force being carried by the pylon in that case. Thus the pylon is designed for a lateral force of 68% x 3,600 or approximately 2,400 kips applied to it at the floors. The pylon is actually a vertical cantilever of 100-ft. span carrying the horizontal loading above mentioned.

In view of the importance of the pylon design, several alternatives were considered. The first was a vertical steel truss which necessitated



LARGE I-BEAM shape of the pylon is shown here at the third floor level. A total of 146 Stressteel bars, $1\frac{1}{8}$ -in. diameter, were used, each bar being stressed to 110,000 psi. Bars are not grouted in.

members up to 200 sq. in. in cross section. Such a truss would have to be fireproofed with concrete and was not only too expensive, but would result in excessive horizontal deflection at the upper floors.

The second alternate was a reinforced concrete truss. This would be somewhat more rigid and less expensive, but secondary stresses could not be handled economically and the design was abandoned.

The third alternate was a reinforced concrete pylon, not prestressed. This required a steel area of 430 sq. in. at the base diminishing toward the top. The computed deflection of the pylon, unfortunately, was still too high. The maximum deflection at the top of the pylon would be about $1\frac{1}{2}$ in. And would have necessitated a large amount of additional reinforcements in the columns and adjacent slabs.

Reasons for prestressing

To further reduce the pylon deflection the possibility of prestressing was then investigated. By prestressing vertically, the concrete can be put under compression at all times so that the entire section of the pylon concrete can be effective in resisting deflection. The major part of the deflection was caused by the bending in the lower portion of the vertical cantilever. Hence, by prestressing only the lower 40 ft. of the pylon, the de-

flection at the top can be reduced to $\frac{1}{2}$ in. With this amount of total deflection in 10 stories, the moments induced in the columns can be carried without additional steel reinforcement, thus resulting in a worthwhile economy not otherwise possible. The cost of the pylon itself was not reduced by prestressing.

Sectional Stressteel bars

In order to resist lateral forces without tension in concrete it is necessary to prestress the entire concrete area to 769 psi. This requires a total force of 13,300 kips which can be supplied by either high tensile wires, strands, or bars. Since the steel has to be erected vertically, the use of either wires or strands would require additional scaffolding. Hence, Stressteel bars were selected for use. To further simplify the erection, the 47-ft. bars were ordered in five lengths with bars spliced at each pour height of about 10 ft.

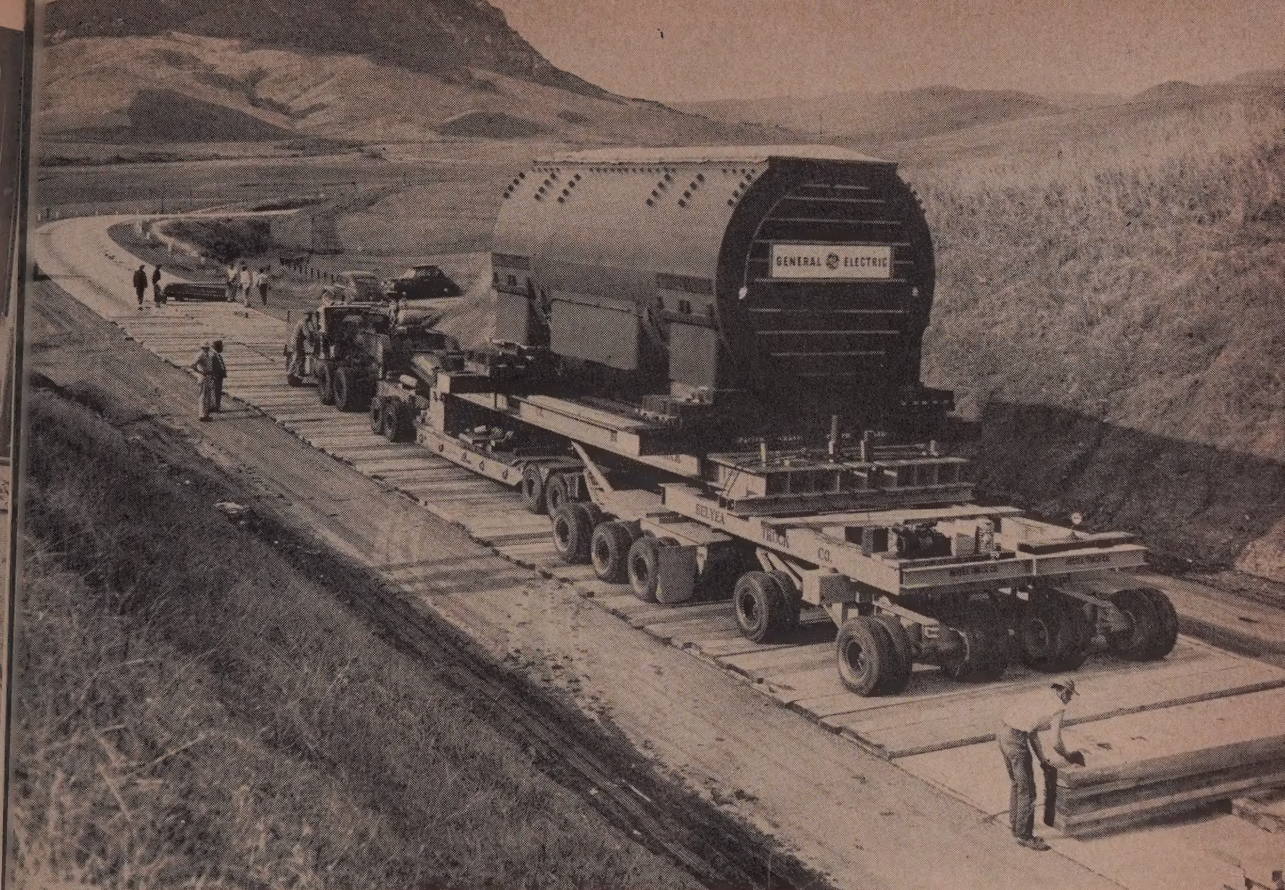
These bars are manufactured with tapered threads so as to develop approximately 98% of their full strength at splices and end anchorages. With $1\frac{1}{8}$ -in. bars stressed to an initial value of 110 ksi, a final effective prestress of 95 ksi. can be attained. A total of 146 bars was employed in the pylon section.

Owner of the garage is the Downtown Center Corp., Dr. Ferd W. Callison, president. Architect was

George A. Applegarth. Consulting structural engineers were Ellison and King with design and supervision in charge of John K. Rode and John Chernow. Consultant on earthquake forces and prestress design was professor T. Y. Lin of the University of California. Soil technologists were Dames & Moore. General contractor was Cahill Construction Co., for whom John Nelson was superintendent. Stressteel bars were supplied, installed, and stressed by the Truscon Steel Division of Republic Steel Corp. Flat slab analysis was by Presan Corp.

Culverts vs. bridges

USE OF THE LARGEST culvert cross-sectional area yet to be used in road construction will save an estimated \$300,000 on a road to cross Salt Creek, 30 mi. southeast of Globe on Highway 70 around the north end of Coolidge Lake. Instead of a bridge estimated to cost \$450,000, 180-in. diameter Armco Multiplate galvanized corrugated metal culvert will be used including necessary fill to bring the roadway up to proper grade. The new cost of this section will be only about \$150,000. A large water run-off will result in water velocities up to 20 fps. through the culvert. Scour at the downstream end of the culvert will be handled by suitably placed rip-rap.



WEIGHT OF STATOR (224 tons) plus weight of truck-trailers (52 tons) made this one of the heaviest loads ever trucked over a state highway.

Planking 550 ft. at a time helped to distribute the load of the 82 wheels sufficiently so that no road damage resulted.

9 miles of plank road

MOVING A MASSIVE General Electric generator to a rugged California coast-side location for Pacific Gas and Electric Company's new power plant taxed a lot of minds, muscles, and a collection of machines. The most difficult problem of the entire shipment stemmed from the fact that the rail siding nearest the power station site was 9 mi. distant over Southern California foothills.

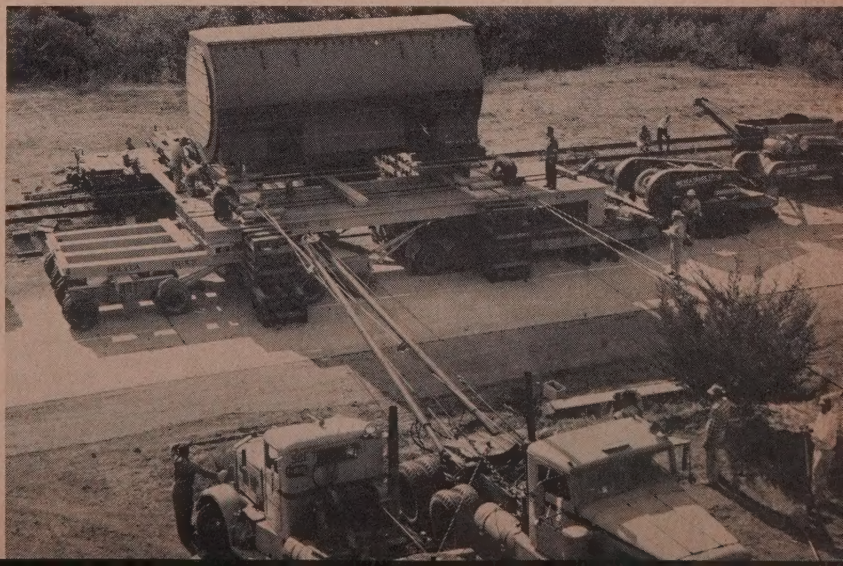
The 18-day continuous railroad trip terminated at Camp San Luis Obispo army base siding between San Luis Obispo and Morro Bay. There riggers began the transfer from the special 8-axle low bed flat car to an even more special 82-wheel highway type tractor-trailer combination, 17½ ft. wide and 89 ft. long.

To protect the pavement, every foot of state highway between the Army base and the plant site had to have 3-in. planks laid edge to edge across it. Even more protection was

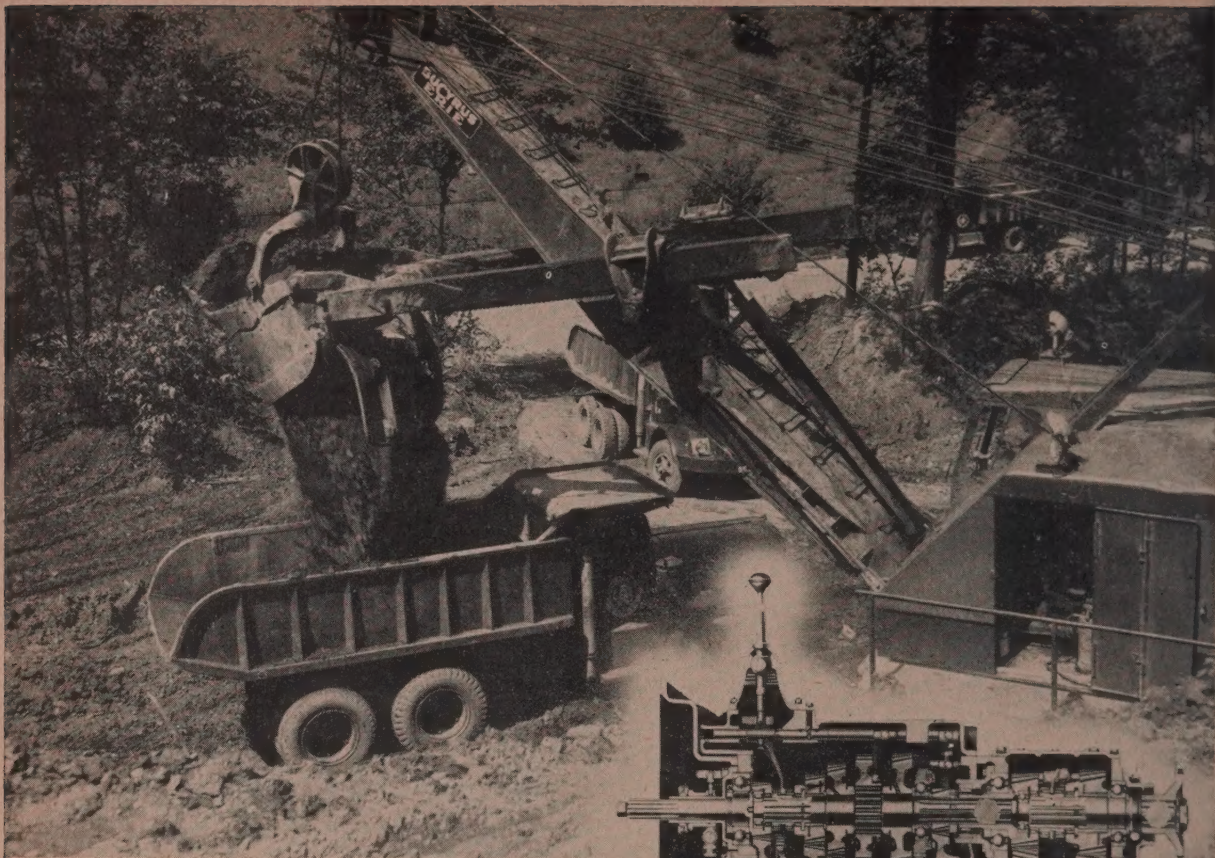
required for the larger culverts. Some 550 new planks, 3 x 12 in., each 20 ft. long, were purchased—enough board feet of lumber to build a 6-room house. A crew of 59 men working with crane trucks and a lumber carrier picked up and laid down these planks 86 times in traversing the 9-mi.

stretch. By the time the moving was completed the crushing pressure of the heavily laden wheels combined with the many handlings had reduced the planks to what was virtually kindling.

Eight days of continuous 24-hr. operation were required for the move. The unit just delivered will go into service during the spring of 1955 and the second unit during the summer of 1956.



WINCHES FROM TWO TRUCKS were used to pull the stator from the special railroad car to the waiting trailer. Wood rolls on cribbing eased the weight along.



With Fuller Model 10-A-1120 Transmissions in fleet of 23 Autocars, Allegheny Construction Equipment Company is getting more work time, less downtime through the right gear ratios to meet load and grade, with shorter, easier shifts that help provide faster work cycles.

300,000 miles . . . no transmission downtime

Allegheny Construction Equipment Company of Pittsburgh, Pa., select their trucks and truck components with profitable operation in mind.

Today, a fleet of 23 Autocar dump trucks is rounding out its fifth year for Allegheny Construction. The trucks are powered by 165 hp diesels working through Fuller 10-A-1120 Transmissions. Already, many of the trucks have topped the 300,000-mile mark . . . with no transmission downtime.

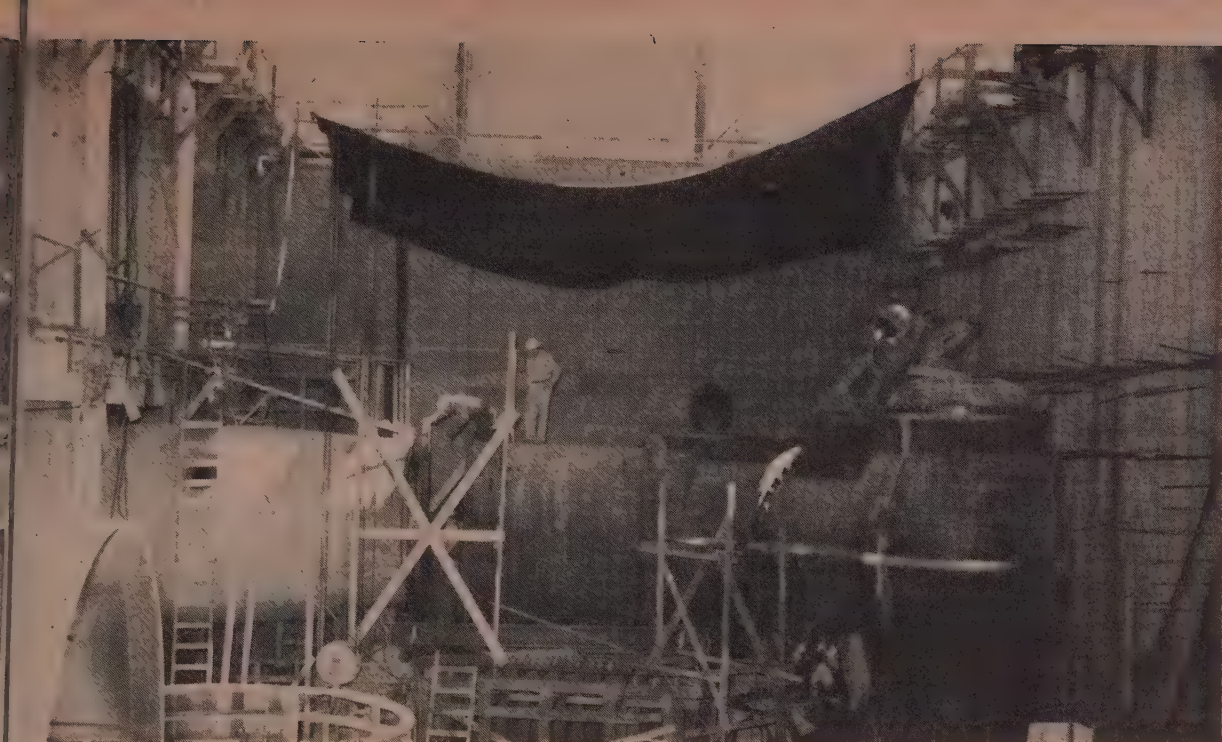
Allegheny, like other leading contractors in the construction industry, knows the critical importance of having *correct transmission ratios to meet heavy loads and adverse grades . . . under severe operating conditions . . . and controlled by short, quick, easy shifts.* They specified Fuller Transmissions to get correct ratios and long life in their Autocars. *That's why more equipment owners and users specify Fuller than any other transmission.*

And that's why with over 110 Fuller models to select from—both semi-automatic and full-manual control—you'll find a transmission designed to do your job . . . better . . . at less cost.



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO, MICHIGAN

Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.



Roadbuilding, rigging, and "reverse installation" are features of— Installing hydro machinery at Pit 4

By **DONALD K. HANSEN**
Engineer, Dalzell Rigging Co.
Emeryville, California

SINCE Western Construction's last visit to Pit 4 powerhouse in September 1954, work has progressed from general construction to the final phases of electrical and mechanical installation. Present activity centers in the erection of two 62,000-hp. 225-rpm. turbines and 50,000-kva. generators.

Stolte, Incorporated, of Oakland, prime contractor for this work, has subcontracted all plumbing and fitting to Monterey Plumbing Co. of Oakland; all wiring and electrical installation to Del Monte Electric Co. of Oakland; and the complete mechanical installation of the two turbo-generator units, pressure regulators, governors, and butterfly valves, to Dalzell Rigging Co. of Emeryville.

Problems big and small

There are many problems in the installation of heavy hydroelectric machinery. These begin with the typical business matters confronting all contractors—planning, scheduling, and coordination. Then there is construction itself. And finally, the special considerations involved in hauling machinery to a remote site, or the problems of final, precise adjustment of machinery whose characteristics may vary from one unit to the other.

Dalzell Rigging Co. was first confronted with a three-fold material problem: (1) where to store machinery at the railhead before scheduled delivery to the job, (2) how to haul excessive-weight loads over restricted state and county roads, and (3) where to store materials at the job to insure least rehandling.

From siding to site

There was an easy solution to the first problem. A rail siding and storage area in the P.G. & E. pole yard in Redding, the rail center 60 mi. from Pit 4, provided a place for manufacturer's shipments to be moved from freight cars directly to storage in the yard. Dalzell maintained a permanent crew in Redding to expedite materials by spotting them in the yard according to their anticipated delivery dates, and to haul materials to the job as required.

Moving some of the larger pieces posed more of a problem than storing them. On the road between Redding and Pit 4, load limits on several bridges restricted the vehicle-and-load gross weight to points far below the weights of some of the machinery components themselves. The 40-ton transformers, 40-ton pressure regulator bodies, and 50-ton butterfly valves could not be lightened. So an unusual plan was born.

Paul Dalzell contacted several farmers whose lands bordered the highway, and arranged to build sup-

plementary roads on their property which would skirt the areas of restricted highway loads. With some minor road-building and repairs to the existing roads on these lands, all heavy equipment was successfully detoured. Time and money were saved, that otherwise would have been spent strengthening or rebuilding the state route.

Then there were mountain grades. To beat this problem when hauling the heaviest machinery, a novel "push-pull" arrangement was utilized whose appearance and noisy power must have startled many backwoods residents. Behind the truck-trailer combination, Dalzell teamsters added another truck, usually one of equal power and often with a light load of its own. In front of the main combination was a guide truck of lesser power. This awkward but powerful push-pull unit made all the mountain grades with none of the labor or equipment damage that would normally result from such heavy loads.

Weatherproofing machinery

Storage at the job was the third early problem. Space was limited to four main areas: a small warehouse for small materials subject to weather damage if exposed, the powerhouse itself, the roadway outside the powerhouse, and a yard for non-critical materials. But all of these spaces were used to their fullest



SCROLL CASE is just about ready for the big lift into position. At this early stage of installation, there was plenty of room to work.



BUTTERFLY VALVE, a late arrival on the job, goes down the hatch in a tight squeeze maneuver that required special planning and care.

extent when anticipated winter delivery delays speeded up material delivery in the fall.

An example of one solution to the problem is the special treatment that was given to the stator sections. These sections, three to a complete 20-ft. diameter, 10-ft. high generator stator, were individually shipped in large protective housings that resembled garages. They were first left in the Redding yard, but with winter approaching it was felt that they should be brought in, because the roads could become impassable later on. Besides, weather protection of the intricate stator windings could be better maintained at the job.

So the sections for both generators, contained in their six "garages," were hauled to the job and stored in the only available space, the roadway outside the powerhouse. With the joint efforts of Dalzell and Del Monte Electric, they were made weatherproof by papering and tarring. Electricians connected strip heaters inside the covered housings, and the stators remained high, dry, and warm (and of course, available), right up to the moment when they were uncrated for installation.

Paperwork can be a help

The powerhouse itself was filled with packing crates and machinery awaiting installation. Only the efficient and detailed packing lists provided by manufacturers kept the installation work from being a difficult jig-saw puzzle. For instance, New-

port News Shipbuilding & Drydock Co., manufacturer of the turbine and regulator machinery, and General Electric Co., generator manufacturer, supplied lists by which the contractor could schedule parts delivery and storage according to the logical order of erection. The material and packing lists also provided an excellent cross-check with the blueprints to insure against errors in shipment and construction.

Consultants speed decisions

Manufacturers' assistance did not extend merely to printed forms. They also provided the personal advice of experienced erection engineers who worked with the contractor in the field during machinery installation activity. F. K. "Dick" Massie of Newport News, and Arch Haynes of General Electric, working as manufacturers consultants to both P. G. & E. and Dalzell, supplied the personal liaison necessary among all the companies.

Massie and Haynes were frequently called upon to interpret difficult procedures outlined in the specifications and manufacturer's prints, or to plan installation procedures. They even suggested short-cuts, or more efficient construction methods they had learned in prior installations of similar equipment. They suggested the working tolerances. And with P.G. & E. and the contractor, they advised on the best way to incorporate field changes.

Moving equipment into the power-

house, and then to prepared foundations, was no small part of the job. For this work, J. A. "Sandy" D'Amboise, Dalzell rigger foreman, his riggers and their experienced crane operator, Earl Vanderhoff, should be given special credit. Among the more interesting rigging operations at Pit 4 was the moving of the previously mentioned stator sections. D'Amboise and his crew stripped the housings from the three sections comprising Unit 1, rolled them onto a truck, and lifted them from the truck to their sole plates in the powerhouse—all in one day!

Butterflies installed last

The most difficult rigging problem of all, however, was encountered in lowering the two 144-in. butterfly valves into position. These 50-ton valves arrived after the penstocks had been placed and the distance pieces made up to the scroll cases. This meant reversing the usual installation procedure of connecting the pipes to the valves.

First, the only opening left through which the valves could be lowered was a narrow section of purposely uncompleted floor. Then, the valves would barely fit between the floor columns in the valve room below decks. Finally, once on the valve room floor, they had limited overhead clearance, about 35 ft. to travel horizontally, and required lifting over a small obstacle near their final positions. Foreman D'Amboise and his

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ILLUMINATED TARGET makes scroll case leveling easier. So does independently supported instrument at dead center of circle.



BATTERY-OPERATED micrometer checks vertical alignment of turbine shaft. Millwright hears clicks that enable settings within 0.0005 in.

crew solved these problems, but only after a lot of hard work.

Their general procedure was as follows: the valves were turned on the main floor to approximate their final position, rigged and hooked onto the overhead crane, balanced and leveled, and carefully lowered through the narrow passage onto cribbing below. Then they were jacked up on rollers, come-alongs were attached, and the slow job of moving them along the valve room floor was begun. Near their final position, it was necessary to raise the valves to clear reinforcing steel, then raise them even higher so carpenters could build pier forms and set anchor bolts underneath them. When the piers were completed, the riggers jacked the valves into place on their anchor bolts and the millwrights took over the job of the final precise placement of valves and actuators.

Distance pieces cut first

Before the valves had even arrived on the job penstocks and distance pieces had already been aligned and leveled. Allowance had been made for the size of the valves, and the distance pieces, connecting the valves to the scroll cases, had been cut-off, or "made-up," to their proper length as determined by the valve manufacturer's dimensions. Needless to say, so that perfect fit of the valves could be assured, close tolerances were maintained on all of the leveling, aligning, and cutting prior to the "reversed" valve placement. This preliminary work and the final setting of the butterfly valves was done under the direction of Dalzell's millwright foreman, Andy Gallego.

Working to close tolerances—a major concern in all precision machinery installation—was greatly helped at Pit 4 by special devices. Since the accurate setting of turbine and generator machinery depended largely on the precise elevation of foundation rings and scroll cases, a great deal of attention was given the foundation setting processes.

The foundation rings, which were placed on top of the imbedded draft tube liners, were first clamped in place with tie-downs, and temporary turnbuckles were welded on the draft tube and ring. These turnbuckles were rigidly made so as to provide solid support for the foundation rings, yet were designed to permit close adjustment of ring elevation. After the ring was brought to correct elevation, a precision leveling instrument was used in combination with a micrometer-mounted target so that final precise position of the ring could be determined in thousandths of an inch.

Once level, the ring and draft tube liner were drilled for rivets. Bolts were then inserted in the rivet holes and cinched tight to hold the ring on the liner, and another level check was made to see if any drift had resulted from the drilling or bolting. This check proved the value of the turnbuckles, for there was no movement in any of the foundation rings.

Next, the tie-downs and turnbuckles were removed to make working space, and riveting was begun. During the riveting—more precisely, immediately before each rivet was placed—every other bolt was removed from the rivet holes and the rivet was driven. When the complete circle had been riveted, the remain-

ing bolts were removed and rivets driven in their place. By this method, settings were maintained close and almost drift-free despite the stresses and strains of the riveting work.

The next important machinery component, requiring an extremely accurate setting, was the assembled 72-ton scroll case. (The scroll case for each unit was shipped in three sections which were assembled on the sub-basement floor of the powerhouse.) The assembly completed and the bolts elongated at each joint, the entire unit was lifted and landed on its foundation piece, supported at the extremities of the spiral by steel beams and screw jacks. Millwrights attached tie-downs and turnbuckles to the scroll case similar to the type used on the foundation rings, but of course much larger.

Special instruments

The scroll case machined crown ring was then brought to proper elevation by means of screw jacks. Next, for precise leveling of the crown ring, a special instrument stand was erected in the center of the ring but not attached to the scroll case in order to avoid movement of the instrument when the case was adjusted. Further measures were taken by Dalzell's superintendent, Jack Burgman, to overcome some wearisome and time-consuming problems encountered in this type of operation:

(1) The instrument was placed in the exact center of the scroll case crown ring so as to lessen refocusing time between shots around the ring, and thus diminish instrumentman fatigue in this tedious process.

(Continued on page 65)

Idaho AED blames rules for high rail cost to send machinery West

Purchasers of construction equipment throughout the entire West will realize benefits from a study carried out by a committee of the Southern Idaho Equipment Dealers Association on freight rules and regulations—age of such rules indicated by a tariff now on the books which allows a contractor to include a mixed carload of equipment “Up to 6 oxen without penalty”!

IN THE West the item of “freight” has always been important in the delivered price of construction equipment, affecting the business of distributors, the costs to contractors and the estimates of engineers. At the root of the problem lie the tariff rules and regulations for railroad hauls from the East to distributing points all over the entire West. Although highway trucking of smaller items of construction equipment—and some not so small—has been increasing recently the backbone of these East to West shipments is still by railroad.

Realizing that a review of existing freight tariffs and rules could be a starting point for a profitable study of the broader subject the Southern Idaho Equipment Dealers Association appointed a committee last year to investigate the subject and to propose changes which might be applicable and advantageous to the construction industry. The committee functioned under the chairmanship of H. W. Hurd, vice president, Engineering Sales Service of Boise. Other members of the committee were Orval Peet of Intermountain Equipment Co. and Pete Cohn, manager of Starline Equipment Co., and Joe Patterson, sales manager of Western Equipment Co., all of Boise.

Results of the study and some of the conclusions reached by the committee were first reported to other equipment distributors of the West

during the tri-regional meeting of the Associated Equipment Distributors held in Colorado Springs last November. Essentials of the report are presented in the following:

Formation of the committee had its origin at a regular meeting of the Association to which representatives of the Union Pacific Railway were invited to attend for a general discussion of the freight problem. Members of the Association had previously expressed the opinion amongst themselves that certain inequities were being imposed on the construction equipment industry because of old and antiquated tariffs under which railroads are now operating.

As the result of the discussion at the meeting, the railway officials suggested that a committee be appointed to study this problem. They agreed to meet with this committee and learn about specific complaints which would help to get the subject from a general discussion down to more definite problems.

Specific recommendations

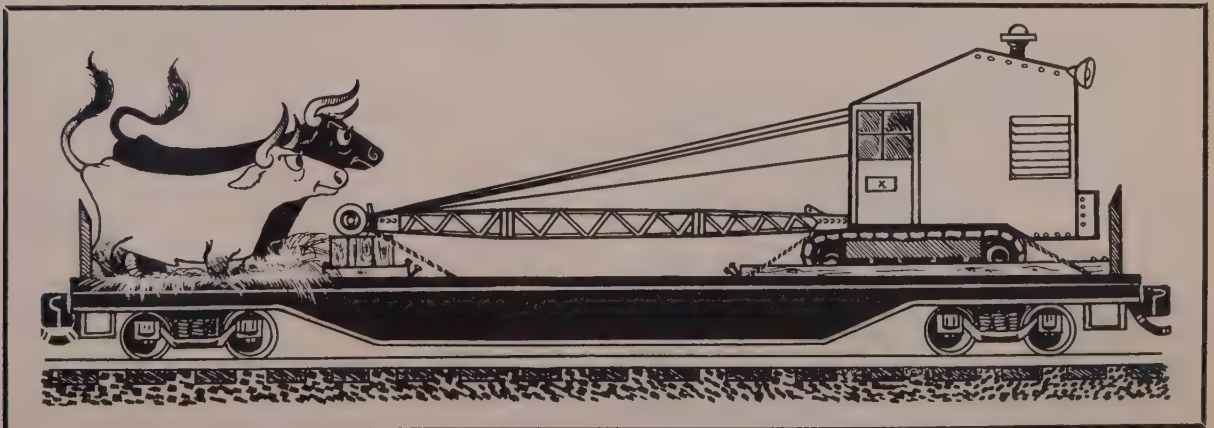
The committee was formed and after several meetings presented to the railroad officials four specific conditions which in the opinion of the committee represented inequities that might be corrected by a change in the regulations without, in any way, changing actual freight rates.

1—The present tariff which applies

to the shipping of concrete mixers requires a 20,000-lb. load for the lowest minimum car, with more favorable rates based on a 30,000-lb. minimum. The committee was able to present proof that with modern lightweight concrete mixers as they are known throughout the industry today, it is almost impossible to load 20,000 lb. of these machines in one car. As a result the committee requested that the minimum be reduced to 16,000 lb. 2—A similar tariff situation exists in connection with the shipping of air compressors where the lowest minimum according to railroad freight regulations is a 30,000-lb. car. With the modern type of lightweight portable compressors it would be almost impossible to get 15 tons of compressors on or in a car. As a result the committee asked for a 20,000-lb. minimum for the shipment of air compressors.

(Progress note — In connection with the foregoing requests the railroad agreed to file for these changes in the tariff regulation. Subsequently the committee was advised that this request had been turned down at the first hearing. However, the railroad agreed that they would refile the request provided the Association membership would help provide proof that relief was needed.)

3—As a result of the committee study a little known fact was developed indicating that construction equipment



distributors could secure benefits and privileges that have normally been considered as applying only to forwarding companies. This relates to the advantage of loading mixed loads with as many as three stopover loading privileges, and these stopover loading privileges do not affect permission to stop as many as three times for unloading the shipment. In other words, one dealer himself or two or more dealers, could double up car loads with the cooperation of two or more factories and thereby take advantage of heavy car loadings, and function as though these distributors themselves were forwarding companies at considerable savings in freight. Incidentally, the mixing of the commodities in such a carload does not result in a penalty, since each commodity will take its own respective carload freight rate. However, the entire carload enjoys the advantage of the heavy minimum.

Progress made

4—Committee discussion also reviewed the subject of "storage in transit." Dealers in the Boise area have for some time enjoyed this privilege which permitted equipment that was received from the East to be declared as "storage in transit" and then moved on West at a later date for a low transit charge. However, this advantage was denied in the case of

back-hauling toward the East within the distributor's own area. The committee requested the railroad to ask for a change in this inequity to place construction equipment on the same basis as that now enjoyed by steel fabricators. Progress was definite on this request and the change was effected promptly. As a result, construction machinery can now be unloaded in Boise, stored in transit, and then hauled back by the railroad to eastern points in Idaho, and as far as Butte, Mont., at a fair and equitable freight charge.

These are four of the items discussed by the committee and developed to the point where specific recommendations could be advanced. Although actual progress toward the desired goal has been small up to the present time, the committee believes that some real gains can be made by the construction industry and particularly groups of organized equipment distributors. As an aid to any local group desiring to organize a committee for the study of this particular problem, the committee would like to pass along the following recommendations and suggestions as a result of their findings.

In the first place, do not anticipate any change in freight rates. At the present time there would appear to be no rate relief in sight, but important benefits can be obtained by a

study of existing tariffs and recommendations for changes in these tariffs as outlined in the two specific cases already discussed.

Cooperative action required

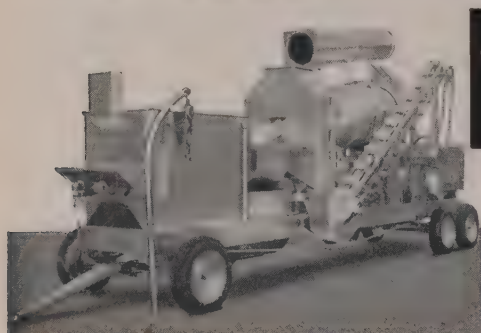
The position of any committee undertaking such a study will be improved with the railroads when it is pointed out that the results are actually beneficial to the railroads themselves. Naturally, much effort on the part of the railroads is concentrated on big tonnage they receive from agriculture, mining, and logging with little attention paid to the relative small segment of tonnage relating to construction equipment. As a result it will be difficult to secure active cooperation on the part of the railroads by any one committee. On the other hand, cooperative action by membership groups throughout the entire West can bring the matter to the attention of carriers and develop figures to prove that the industry does represent the shipment of a sizeable tonnage of freight.

An important part of such a campaign is to provide specific information to indicate that construction machinery is moving West by highway truck because of the high car minimums established by the railroads. As already mentioned, the original request for lower minimum cars for mixers and compressors was turned down. However, the committee believes that if this request had been backed by actual proof that this type of freight was being diverted from the rails to trucks, the request might have received a different decision.

If local committees throughout the entire West could prepare similar requests and support them by bills indicating construction machinery moving by truck, this concerted action, in the opinion of the committee, will bring definite and positive action on such glaring inequities as present carload minimums.

Need to remove antiquity

The committee has expressed its willingness to cooperate with other committees which may be formed in exchanging ideas and outlining procedures which have been found advantageous. Others are warned against becoming discouraged in any initial study of the problem because the subject is extremely complicated and railroad experts have lived with these rules and regulations for years. In fact, they have lived for years with some very old ones and these illustrate the need for study and concerted actions. To illustrate the antiquity in the railroad freight regulations on contractors equipment the committee found one still existing on the books which permits the extreme privilege of permitting a mixed carload of contractors machinery to include the shipping of up to six oxen without penalty.



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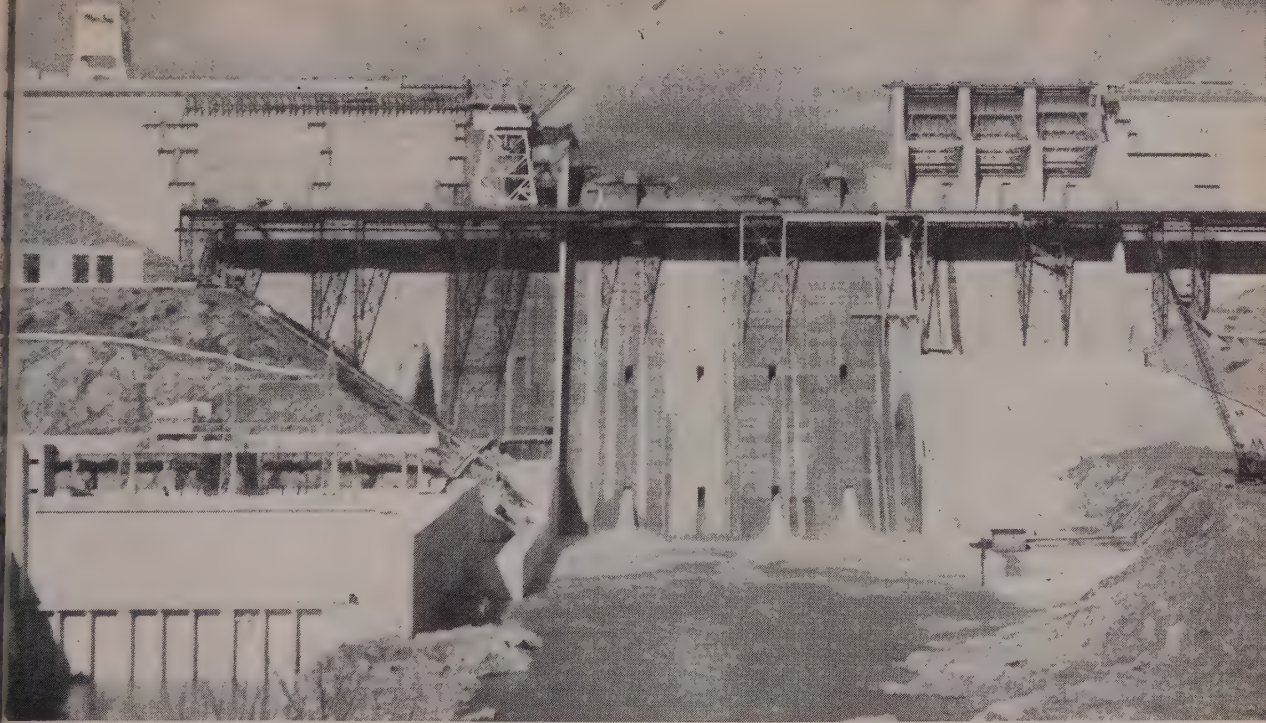
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On the American River a dam rises . . . and a gate falls, as— **Folsom goes to work**

FEBRUARY 25 was a red-letter day for the Corps of Engineers at Folsom Dam. And it was an occasion for Merritt-Savin, the prime contractor, too, although their work isn't finished yet. That was the day the diversion tunnel was finally gated off and water began to pass through the main dam.

Bids on Folsom were taken in October 1951. Now, after four short winters—that seemed plenty long when cofferdams and construction schedules were lost—the dam spans its site, and American River floods should be a thing of the past.

Switching the river from its diversion tunnel to the outlet conduits was a neat operational chore. It was supposed to last about 12 hours. But the river didn't cooperate, and a full 24 hours were required before clear water flowing through the breached cofferdam signaled success.

The diversion had to be handled slowly for two reasons. One was to maintain some river flow downstream for the benefit of fish life and other uses. The second reason was to avoid scouring of the cofferdam that might result in the suspension of erosive materials in the water passing through the dam.

Delay in the diversion was blamed on a quick cold spell in the American River watershed. This freeze cut the river flow to an unexpectedly low volume. And this low flow had to be split between the rising pool behind the dam and the continuing flow required downstream. Nimbus Dam, the Bureau of Reclamation's afterbay structure downstream, helped in the regulation function at this point.

Oddly enough, Folsom Dam itself does not completely remove the threat of flood between its site and the city of Sacramento 16 miles away. In times of flood the Sacramento River can "back" the American up to dangerous stages near the confluence of the two streams.

Though incomplete, the project was slated to begin power production last month, in a Reclamation powerhouse built by Guy F. Atkinson Co.





Saves 6 men, 4 tampers, 2 compressors and small dozer with one-man-operated "80-W"

VAN DOREN BROTHERS of Richmond, Virginia recently backfilled and compacted approximately two miles of trench, 2 feet wide and 4 feet deep, for a 6-inch gas line with just one man and one machine, a Cleveland "80-W" backfiller.

Before the Van Dorens purchased their "80-W" they used 7 men, a rubber-tired dozer, 2 compressors and 4 air-driven tampers for backfilling and compacting on jobs of similar size and type. The one-man-operated "80-W" did the complete job in less time than the 7-man crew formerly required on comparable jobs. "It's a great time saver," was F. M. Van Doren's comment on its performance.

On a previous job their Cleveland backfiller had saved them considerable time and money on a 12-inch water line trench, averaging approx-

imately 6 feet deep, by its unique ability to backfill spoil deposited on a down slope on the far side of the trench, while simultaneously tamping it to the state of Virginia's rigid compaction specifications.

The "80-W" also does an outstanding job of side-crane work, lays pipe, pulls crossings, sets hydrants and valves, pulls sheathing, loads and unloads pipe, etc. Despite its ability to perform all these operations—and do an outstanding job on *each* of them—the "80-W" is easy to operate. The Van Dorens' operator learned to operate it with high efficiency after only two days training on the job.

Investigate this remarkable time, labor and machinery saving tool now—so that you, too, can realize its outstanding benefits on your next job

See your local distributor for the full Cleveland story or write direct to:

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CLEVELAND

How to get the most economical production out of your Caterpillar

MATCHING CRAWLER SPEEDS to tractor needs is an important matter for the owner who wants to get the most efficient and lowest cost operation. An example of how this matching can be effected lies in the operational characteristics of the Caterpillar D8 tractor. The D8 is available with either a standard transmission or with one of two optional transmissions.

The standard transmission, widely used in many applications, has five forward speeds from 1.9 to 5.8 mph., and three reverse speeds from 1.9 to 5.8 mph. The tractor speeds are greater due to the increased engine rpm. in the 150-hp. D8. Bulldozing, log hauling, and push loading scrapers are some of the duties this transmission will handle efficiently.

The first optional transmission has five forward speeds from 1.4 to 5.0 mph., and three speeds in reverse from 1.9 to 5.2 mph. A tractor installed with this transmission can exert 39,800 lb. of pushing effort at 1.4 mph. for loading wheel tractor drawn scrapers. When lugged down to 1.0 mph., the tractor can exert up to 44,840 lb. of pushing effort (depending on weight and traction). Pump loading sand into the scraper is readily accomplished in second gear with this transmission. Matched ground speeds also make easy push loading of 4-wheeled scrapers drawn by tractors with the same transmission.

Production bulldozing with a straight or angle bulldozer is applicable with this transmission in second gear, and ample reserve power is available in first gear when tough loads are encountered. The first gear speed is good for production bulldozing with a W-type bulldozer, while the third gear speed of 3.1 mph. is excellent for materials handling, coal moving, etc.

This transmission has the speed and power for drawbar work, such as ripping and land clearing operations, involving heavy tools that require high drawbar pounds pull.

The second optional transmission is basically the standard transmission except that different gears have been substituted for fourth and fifth speeds forward and third speed reverse is increased from 5.8 to 7.2 mph. In logging operations this transmission has been successfully used where there are downhill haul grades of enough degree that the higher speed can be used.

This transmission is suitable for pusher applications for which the standard transmission is suited, and where the reverse grade is slight enough that the tractor can back up at high speed thereby increasing production.

NEW STANDARDS OF PERFORMANCE

for a wide range of heavy-duty work

Set your sights on an HD-16! This big new tractor not only brings you *more* power for bigger jobs . . . it makes more effective use of horsepower, with a brand new Allis-Chalmers diesel engine and your choice of two new drives — the job-proved torque converter or the easy-shift standard transmission. Either way, the HD-16 brings you a new high in tractor-operator efficiency . . . a new high in work done under even the toughest conditions.



NEW STANDARDS OF DEPENDABILITY AND LONG LIFE

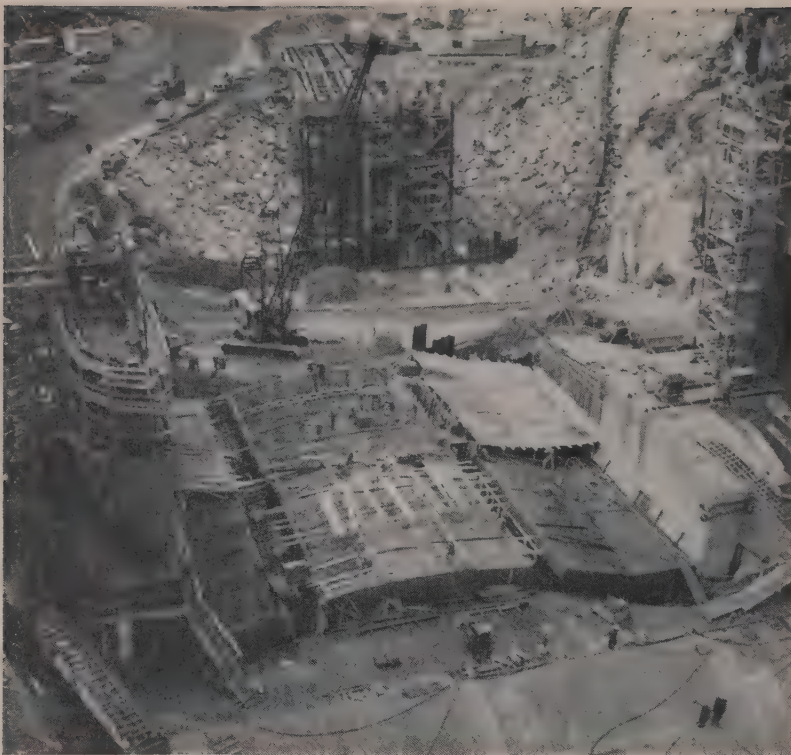
under all conditions!

The HD-16 follows the Allis-Chalmers *advanced basic design*, with such important features as its all-steel, Box-A main frame and one-piece steering clutch and final drive case . . . straddle-mounted final-drive gears with tapered roller bearings . . . unit construction . . . simplified lubrication and service designed with *better* maintenance in mind. What's more, it is newly engineered throughout to provide big safety factors in all components . . . plus outstanding new features like the new Allis-Chalmers heavy-duty diesel engine, new "wrap-around" radiator guard, husky new transmissions, new true-dimension track, and many others.



All in all, the new Allis-Chalmers HD-16 brings you an outstanding combination of performance and long life with both mounted and drawn equipment . . . a higher rate of production, more working time, more work done, **LOWERED JOB COSTS**. You OWE it to yourself to get all the facts now from your nearby Allis-Chalmers dealer.

SEE YOUR **ALLIS-CHALMERS** DEALER



HORIZONTAL ARCH section is unique, but this December pour at Box Canyon Dam reveals a bigger concern for Morrison-Knudsen: the tarps and sheds that hold heat for—

Pouring concrete all winter

THE WEEK of March 7 brought Morrison-Knudsen its first relief from the pressure of winter schedules for placing concrete in Box Canyon Dam. Night temperatures that same week still dropped to 5 below. But the last large spillway pour was under way on March 10 and Fred Reif, the project engineer, was able to comment about the job in a positive and conclusive manner:

"Our operations during the winter were such that not once was any difficulty encountered due to cold weather."

How it was done

Some of the explanation for this success lies in the plant arrangement, some in the nature of the dam structure, and of course some in the crews that did the job. The dam itself is small, and the constricted plant area is close by. This meant small placements to heat, and short haul distances for "warm", freshly batched concrete. But with these fixed conditions, there were plenty of other decisions to make. Taking first things first, Fred Reif described it this way:

"Winter concrete operations start with proper heating of the aggregate stockpiles. The method employed here was to cover them with tarps placed tightly together, prior to the first fall freeze. Steam jets were

placed along the working face to pre-heat the rock before batching. Steam was supplied by two Cleaver Brooks boilers, each with a capacity of 2,760 lb. per hr. One of these was sufficient for the stockpiles. The other supplied all necessary heat in the batch plant—that is, the 1-in. pipe radiator casing the batching bins, plus radiator heat for the plant itself.

"Aggregate from stockpile was loaded by a ¾-yd. shovel into 8-yd. trucks shuttling an average of 800 ft. to the receiving hopper. This was the only time aggregate was exposed."

"Specifications by Harza Engineering Co. required that concrete enter the forms at temperatures ranging from 60 to 90 deg. Also, that it must be kept heated above 50 deg. for 72 hr. and water-cured with outside temperatures above 50 deg. for seven days.

"The batch and mix plant was supplied with hot water for mixing, thus making the average concrete temperature at the plant 69 deg. The concrete was then shuttled to the pour in 2-yd. air-dump buckets placed in dump trucks. When the temperature was below 10 deg., tarps were placed over the buckets to encase their heat during transportation."

Several points in this description indicate that uniformity of temperature was the goal, instead of high

heat at any one place along the process. This makes good sense when a contractor is paying for every BTU. The rate of heat exchange between hot and cold materials is greater if the initial temperatures are very far apart. M-K couldn't control the weather (cold), so they held the concrete (hot) uniformly at a temperature fairly close to the lower limit of the specifications.

At the forms the trick was to apply heat well in advance of pouring. This not only meant an even application of heat, but it gave the workmen a definite advantage. According to Reif, tarps were rigged around the initial placing area within a set of forms right after construction of the forms. Then, from two to six portable gas heaters were installed.

"Alignment of the forms, placing of re-steel and final cleanup were accomplished under the tarps. By covering early, many man-hours were saved by preventing icing, and for what icing did exist ample time was allowed for thawing. Temperatures in the forms ranged from 50 to 70.

"Placing was accomplished by removing just enough tarp, directly over the desired location, for bucket release. No lost time was experienced by this operation. Our placing rate averaged 30 yd. per hr."

A "sure cure"

This method used by M-K allowed the seven-day water cure to begin immediately, and the temperature required for this operation also automatically fulfilled the specification for 72 hr. at 50 deg. Horizontal surfaces were covered with burlap and soaked for curing. Vertical surfaces, where forms were raised before curing was completed, were enclosed in tarpaulins and heaters inserted. Curing here was done by sprinkling.

Summarizing the whole operation, Reif attributes their success "to the fact that materials and placing areas were never exposed to freezing conditions." The job involved some 30,000 cu. yd. of concrete, placed between October 13 of last year and the middle of March. Equipment provided to handle this winter-long heating job included the two Cleaver Brooks boilers, six Herman Nelson heaters of 240,000-BTU capacity, 26 Master heaters of 140,000-BTU capacity—and enough tarps to go around, on stockpiles and work areas.

Personnel

Built for Public Utility District No. 1 of Pend Oreille County, Washington, the project has been engineered by Harza Engineering Co. C. K. Willey is resident engineer. Consulting engineers to the utility district are H. A. Sewell and J. A. Sewell of Newport. The latter is also assistant resident engineer.

Morrison-Knudsen's boss on the job is Simon Piedmont, project manager.

One bridge: three erection methods

Low and high elevation trusses over fast tidal currents and long cantilever spans were erected by the ingenious contractor by using truss flotation, aluminum truss falsework, and the balance method. Here's how they did it.

JUDSON PACIFIC - MURPHY-KIEWIT bid \$21,099,319 in early 1953 for the superstructure of the Richmond-San Rafael bridge located in north San Francisco Bay—almost \$7,000,000 below the nearest competitor—and knew what they were doing. The manner in which the work has progressed on schedule (to be open for traffic in 1956) is due to good planning on the erection problems.

Trusses spanning 289 ft. were to be erected in 36 locations. Two additional cantilever spans with 1,070-ft. clear spans and 537½-ft. anchor arms were also required. Here is a discussion on each of the three major erection methods used.

1. Truss flotation method

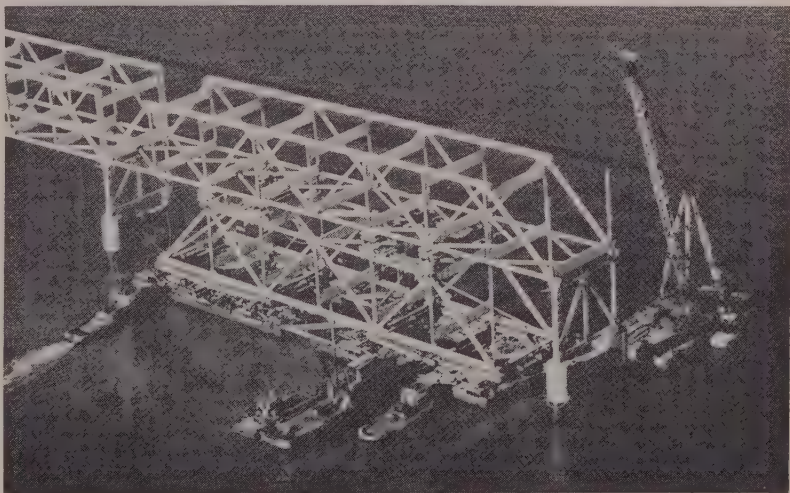
Seven trusses on the Richmond side and two trusses on the San Rafael side were floated into place. Due to the low height of the first seven truss spans on the Richmond side the flotation method was used because the aluminum falsework truss would have been partially submerged in water creating an electrolysis. Also, the flotation method was used because the supports for the aluminum truss on these low spans would have been impractical as the piers in question did not have steel towers with which to tie the wood supports required to support the aluminum. It would have been expensive to notch and revamp the concrete piers to put in a type of falsework to support the aluminum. The first two spans of the San Rafael side were floated in for the same reasons as the spans on the Richmond side. The remaining twenty-seven truss spans were too high to be floated into position.

Falsework on barges

Truss flotation procedure was as follows: four Army-type BK barges were secured together and falsework erected upon them. The falsework for the lower spans was composed of stringer beams built up like cribbing. The falsework for the higher spans



RICHMOND-SAN RAFAEL BRIDGE (4 mi. long) had low trusses in the foreground placed by floating in. Erection is underway in center section using aluminum falsework trusses. Cantilever span nearest the far shore is also underway using the balance method of erection.

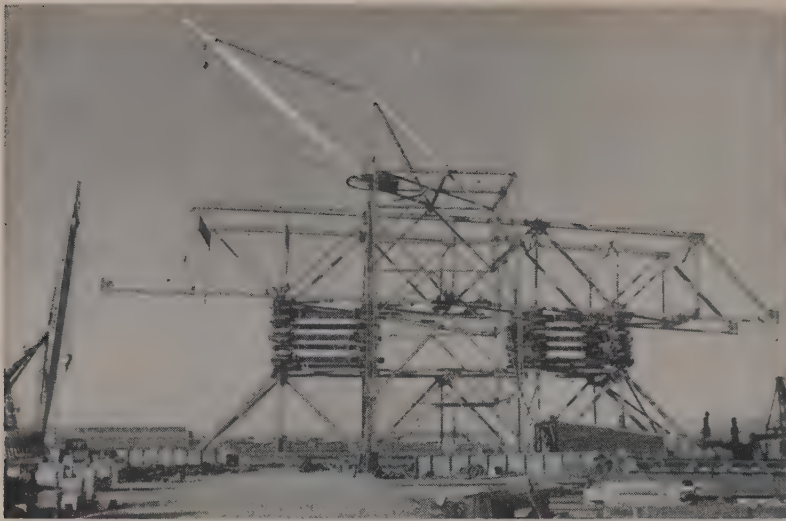


FLOATING IN a 400-ton truss requires skill. Temporary use of inverted truss mounted on four Army BK barges provides falsework. Water pumped into barges lowered permanent truss into position. As the tide went out, the barges then would float free.

was an inverted permanent truss which was later disassembled. Upon the top of both types of falsework, the steel truss was erected at the joint venture Richmond yard dock by use of a large derrick barge, the "Judy Ann", which has a 128-ft. tower, and upon the tower, a 100-ton capacity derrick. These trusses were erected almost complete except that 80% of the stringer beams and all of the side-walks were left out. The truss was then towed out in the Bay with the four pins tied to it.

The truss was floated into position between two piers at high tide and

as the tide went out, the barges were pumped full of water. The truss then settled down into position upon the truss shoes on the piers. As soon as the holes on the truss and shoes were in alignment the large 9¼-in. diameter pins were driven into place. As the tide proceeded out, the falsework was then floated free and towed back to the Richmond yard so that another truss could be erected. The entire procedure took approximately six to nine working days. The truss spans are 289 ft. long and weigh approximately 400 tons at floatation and 630 tons when complete.



YARD ASSEMBLY for floated-in trusses utilized the 128-ft. tower and 100-ton lifting capacity of the floating derrick "Judy Ann." A total of 9 of the 36 spans of this type were floated in.



FIRST ALUMINUM FALSEWORK TRUSS going into position. Temporary timber bents setting on the piers support the truss. Total length of truss is 280 ft. and it weighs 120 tons.



DOUBLE-BOOM TRAVELING DERRICK erects steel panel truss parts in continuing operation on top of the two aluminum trusses. Falswork trusses are leapfrogged ahead. Judy Ann is to the right placing secondary steel truss sections.

2. Aluminum truss falsework

For 27 locations, aluminum falsework trusses served as platforms for erection of the steel trusses. The aluminum structures represent the first such use of their kind in construction history.

Each truss measures 280 ft. long, 36 ft. wide, and 42 ft. deep. Some of the largest structural aluminum sections ever required were made at the Aluminum Co. of America's Massena, N. Y. works. Angles up to 6x4x 3/4 in. by 72 ft. 6 in. long and channels up to 12 in. deep with 1/2-in. thick webs, 47 ft. 8 in. long were required. About 76 tons of 3/4-in. thick plate was used. The particular aluminum alloy used had a tensile working stress of 20,000 psi. Each truss weighs 120 tons, of which 15 tons is the weight of steel rivets—used because of availability and ease of installation.

The aluminum shapes were fabricated in the Judson Pacific-Murphy Corp. plant at Emeryville and then riveted and assembled at the joint venture Richmond yard. A completed truss was then loaded on to two Army surplus BK barges and floated to position between two piers. It was raised to position and rested on vertical piling bents attached to the earlier erected steel towers.

Traveler rides aluminum

A double boom traveler rides on top of the aluminum and erects the individual steel truss sections. With completion of a steel span assembly, the latter is connected to the piers by use of toggles on the aluminum truss that can move the steel tower tops, and by the use of jacks to provide vertical movement for the steel span. The aluminum truss can then be lowered on to barges, moved to the next location, and be raised again—using the double boom traveler at one end and a derrick at the other end.

Advantages of aluminum

Each aluminum truss cost \$150,000 and offered the following erection advantages: (1) It eliminated use of conventional falsework piling which would have been expensive in the deep mud deposits of the bay; (2) Floating spans into place weighing 400 tons and up to 150 ft. in the air would have been dangerous in the heavy tides; (3) The safety net covering the aluminum truss made it one of the safest possible means of steel span erection for the workmen.

3. Cantilever span erection method

The Richmond-San Rafael Bridge has two identical cantilever spans. The cantilever span on the Richmond side of the Bay over the secondary navigation channel is 137 ft. from the bottom chord of the steel to the high tide. The clearance span between the

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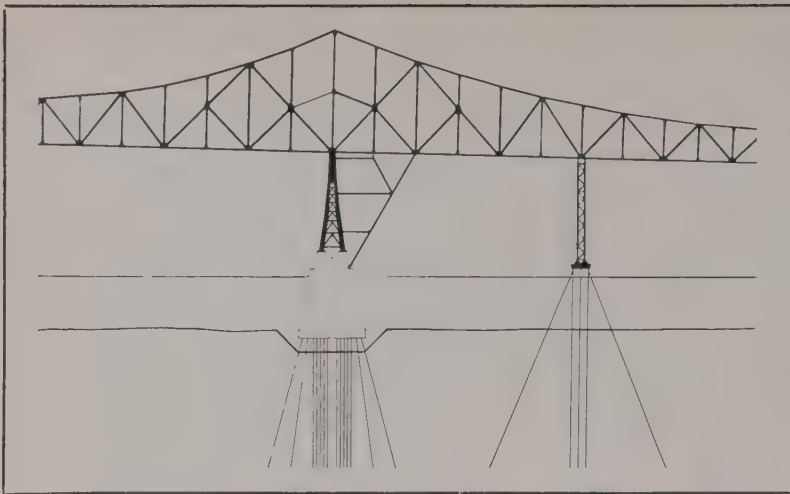
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FALSEWORK FOR ERECTION of cantilever spans consists of an inclined strut attached to the main pier tower, and a temporary steel tower to support the anchor arm as a safety factor.



JUDY ANN AGAIN. Here the derrick barge places the inclined strut and tie-in pieces to tower No. 47. Relative size of tower can be seen by comparison to men standing on horizontal members. This view shows all the falsework indicated in the upper diagram.

towers is 1,070 ft. while the two anchor arms are 537.5 ft. each. The cantilever span on the San Rafael side of the Bay over the main navigational channel is the same dimension as the aforementioned span, except that it is 50 ft. higher or 187 ft. from the bottom chord to the high tide.

Temporary structures

Here is the procedure for erection of the cantilever spans. The cantilever span on the Richmond side is to be erected first. The two cantilever towers are erected and then the west tower (No. 47) has an inclined steel shoring strut attached to it. This shoring strut is necessary to support the bottom chord section that runs from the tower towards the west. Once the inclined shoring strut is in place, the large derrick barge Judy

Ann moves into position and erects the bottom chord section which is approximately 94 ft. long and weighs 51 tons. After north and south bottom chord sections have been erected, the floor beams and the stringer beams are then erected. Next, the Judy Ann puts the cantilever traveler in place.

Two balancing travelers

The cantilever traveler is an American Hoist and Derrick Co. 55-ton stiff leg traveling derrick. This traveler, after being put into position on top of the two bottom chord sections, erects the anchor arm and one panel of the cantilever span. The next step would be to place another cantilever traveler on the first panel of the cantilever arm in order that the first traveler can proceed with the erection of the anchor arm while at the



A 55-TON stiff-leg derrick has been placed on the anchor arm of the cantilever span and will be accompanied soon by another traveling derrick working in an opposite direction.

same time the other traveler can proceed with the erection of the cantilever arm.

At the midway point of the anchor arm there is a falsework steel tower which is used to help support the anchor arm. This tower is not absolutely necessary, however the contractor felt that it would be better to be on the safe side. When the first traveler reaches the end of the anchor arm, the second traveler should have reached the end of the cantilever arm and both travelers are moved to the east cantilever tower (No. 48) and the same procedure is repeated. However, when the second traveler reaches the end of the anchor arm at tower 48, the first traveler is then moved back on to the cantilever arm of tower 47 so that both travelers can work towards each other in erecting the suspended span. This method is known as the balance method.

Personnel

The joint venture firm of Judson Pacific-Murphy—Kiewit is composed of the following companies: Peter Kiewit Sons' Co., Judson Pacific-Murphy Corp., Fred J. Early, Jr., Co., Inc., and Stolte, Inc. For them, Philip Murphy is project sponsor, Francis Murphy is project manager, Bill Ziegler is job superintendent, Rod Chisholm is yard superintendent, and William Dreusike is office manager. The project is under the supervision of the Division of San Francisco Bay Toll Crossings.

WESTERN RUNOFF FORECAST

This map tells the story: Prospect of less than average total runoff means little likelihood of flooded construction. It also points to need for conservation development.

By HOMER J. STOCKWELL

Hydraulic Engineer
and

GREGORY L. PEARSON

Hydraulic Engineer
Soil Conservation Service

STEAMFLOW from snowmelt will be less than average in the major river systems of the Western states during 1955. Barely normal runoff is expected in the extreme North and Northwest. The decline in water supply outlook is gradual toward the south. In Arizona, New Mexico, southern Utah, large parts of Nevada, and localized spots in California extremely short water supply is in prospect. This is the summary of water supply conditions as prepared by the U. S. Soil Conservation Service and is based on April 1, 1955 observations at some 1,200 snow courses in the high mountains of the West.¹

Short-term okay, long term poor

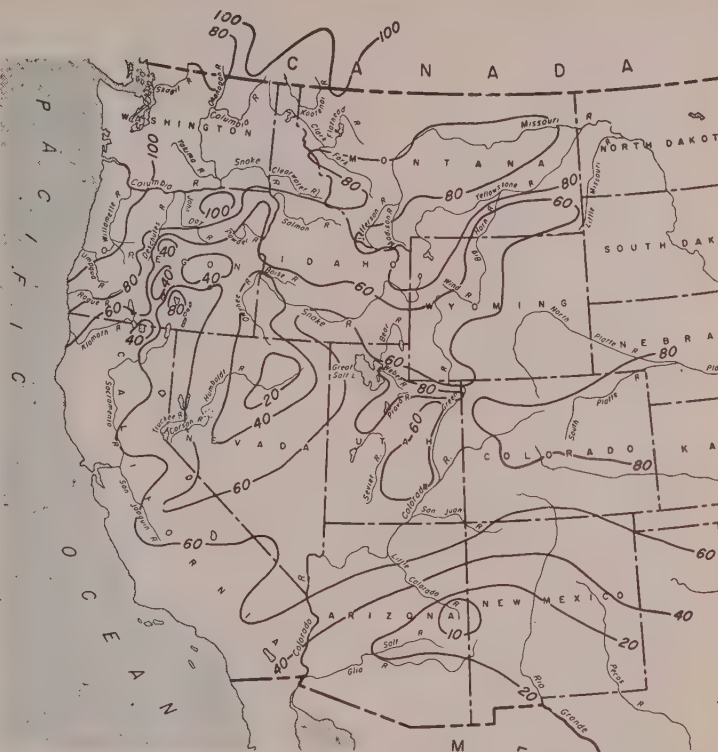
This analysis of April 1 snow surveys, soil moisture, and other factors affecting this year's runoff, again presented by **Western Construction** shows that runoff in prospect for irrigation, power generation, and municipal and industrial use will be adequate in some areas of the Northwest, but will result in mild to severe water shortages elsewhere in the Western states. There is no likelihood of troublesome and damaging high flows unless unusual weather conditions develop during the spring

on the significant snow-melt rivers.

For the past five years an interesting pattern of areal distribution of snow cover and runoff has persisted over the mountainous areas of the West. The Columbia Basin on the north and northwest has had consistently greater snow cover and resulting streamflow in relation to normal than the drought areas of the South and Southeast. This pattern has continued so long that the long-term water supply outlook in New Mexico, Arizona, and parts of Colorado, Utah, and Nevada has become increasingly poor.

¹The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Forest Service, other federal bureaus, various departments of the states, irrigation districts, power companies, and others. The California Division of Water Resources, which conducts snow surveys in that state, contributed the California figures appearing in this article. The Water Rights Branch, British Columbia Department of Lands and Forests has charge of the snow surveys in that province and likewise contributed the information here for British Columbia.

The U. S. Weather Bureau makes water supply forecasts at numerous gaging stations, such forecasts being estimated principally on the basis of measurement of precipitation. The Weather Bureau forecasts are for the water year (October-September inclusive), whereas snow survey forecasts are for the irrigation season only.



Prospective April-September stream flow (% of 1943-52 average)

Reservoir storage has continued to decline, pumping of underground supplies has been increased and where no other alternative was available, crop acreage has been reduced and municipal supplies have been rationed. In much of the southern portions of the West streamflow is as low and the general water supply outlook as poor as at any time in the past 50 years. In the meantime demands for water have multiplied several times.

Reservoirs are index

Storage in the irrigation reservoirs of the West as of April 1, 1955, is consistently below the 10-year average for the years 1943-52. Extreme shortage in reservoir storage exists in Arizona, New Mexico, Colorado, and Wyoming. In the other Western states material shortages are also reported, particularly in the smaller irrigation reservoirs. These shortages will have an adverse effect on total water supply this year in most irrigated districts, especially where less than normal streamflow is expected. With another year of heavy depletion of reservoir water supplies in prospect, it is evident that next year's snow pack must be very heavy if critical water shortages in many areas are to be avoided in 1956.

The water storage on the Rio Grande drainage continues to be critical with a combination of low reservoir storage and anticipated streamflow. Practically all 1955 water supply

Western runoff forecasts for 1955

	Runoff, thousand ac. ft.	April-Sept., incl. per cent of normal
RIO GRANDE		
South Fork at South Fork, Colo.....	75	58
Rio Grande at Del Norte, Colo.....	315	61
Conejos at Mogote, Colo.....	110	52
Rio Chama at Park View, New Mex.....	90	44
Rio Grande at Otowi Bridge, New Mex.....	250	37
Pecos River at Pecos, New Mex.....	21	49
PLATTE RIVER BASIN		
Poudre at Canon, Colo.....	170	78
Clear Creek at Golden, Colo.....	115	82
N. Platte at Saratoga, Wyo.....	550	77
ARKANSAS RIVER BASIN		
Arkansas at Pueblo, Colo.....	240	77
MISSOURI		
Yellowstone at Corwin Springs, Mont.....	1,714	85
Wind River at Riverton, Wyo.....	240	42
Madison nr. West Yellowstone, Mont.....	181	84
Jefferson at Sappington, Mont.....	849	73
Missouri at Toston, Mont.....	1,904	76
Clark Fork at Chance, Mont.....	527	84
COLUMBIA BASIN		
Clark Fork nr. Plains, Mont.....	9,693	80
Clark Fork at Cabinet Gorge, Mont.....	10,987	81
Clark Fork below Z-Canyon, Wash.....	13,367	81
Flathead nr. Polson, Mont.....	5,977	83
So. Fk. Flathead nr. Columbia Falls, Mont.....	1,850	82
Umatilla at Pendleton, Oregon.....	230	121
Powder at Salisbury, Oregon.....	39	59
Owyhee Res., net inflow, Oregon.....	184	38
Deschutes at Benham Falls, Oregon.....	498	89
McKenzie nr. Vida, Oregon.....	1,300	99
Willamette at Salem, Oregon.....	5,200	102
COLORADO BASIN		
Salt at Intake, Ariz.....	29	17*
Gila at Virden, Ariz.....	5	24*
Green at Linwood, Utah.....	850	57
Colorado at Glenwood Springs, Colo.....	1,400	87
Roaring Fk. at Glenwood Springs, Colo.....	725	86
San Juan at Rosa, New Mex.....	350	56
Animas at Durango, Colo.....	350	72
Dolores at Dolores, Colo.....	210	70
Colorado at Grand Canyon, Ariz.....	6,900	69
Duchesne nr. Tabiona, Utah.....	98	72
GREAT BASIN		
Carson nr. Carson City, Nev.....	100	53
Truckee at Farad, Calif.....	146**	56**
Bear at Harer, Idaho.....	175	51
Weber nr. Oakley, Utah.....	113	80
Provo at Vivian Park, Utah.....	146	78
OREGON and CALIFORNIA COASTAL		
Upper Klamath Lake, net infl., Oregon.....	427	77
Rogue R. abv. Prospect, Oregon.....	300	87
No. Umpqua at Toketee Falls, Oregon ¹	150	84
Sacramento R. (Shasta Res. infl.) Calif.....	1,670	74
Feather R. nr. Oroville, Calif.....	1,270	57
Yuba, R. nr. Smartville, Calif.....	740	60
American R. at Fair Oaks, Calif.....	880	61
Mokelumne R. nr. Mokelumne Hill, Calif.....	302	61
Stanislaus R. bel. Melones		
Power House, Calif.....	450	59
Tuolumne R. abv. La Grange Dam, Calif.....	760	62
Merced R. at Exchequer, Calif.....	355	58
San Joaquin R. bel. Friant, Calif.....	785	64
Kings River at Piedra, Calif.....	765	65
Kaweah River nr. Three Rivers, Calif.....	175	62
Tule River nr. Porterville, Calif.....	25	53
Kern River nr. Bakersfield, Calif.....	260	53

¹ Below Lake Creek

* April-June

** April-July

will be from underground sources. Spring runoff in the Salt River Valley of Arizona is nearly over with the lowest flow since 1904. The Salt River Project has less water in storage than a year ago but the amount now stored is adequate for demands this year. Elsewhere in Arizona the outlook is extremely poor with no improvement in prospect.

Snowmelt season runoff is expected to be near normal in northern Utah but deficient in the southern portion of the state. Storage is very low in the small irrigation reservoirs, but near average in the larger ones. Water supply in Nevada will be short this year with low snow cover and substantially below average reservoir storage. The snow pack in California is 40 to 60% of normal in the Cascade Mountains and Sierra Nevada and conservation reservoir storage is 60% of the past 10-yr. April 1 average.

Rocky Mountain area

In Colorado and Wyoming the 1955 streamflow will be generally near three-fourths normal. Storage in irrigation and power reservoirs is about one-half of the past 10-yr. average. Except for small irrigated areas which divert their water directly from the main streams of the Colorado River drainage, there will be some water shortages. In highly developed irrigated areas east of the Continental Divide these shortages will be severe.

Short water supplies will be general in eastern and southern Oregon and southern Idaho, especially on the smaller streams and where substantial storage is not available. Storage on the Boise and Payette rivers will provide sufficient water for irrigation this year. Streamflow in northern Idaho and northern Oregon, as well as in Washington and Montana, will be somewhat below normal but severe water shortages in this general area are not expected. Reservoir storage in the Columbia is down substantially from a year ago and is much below the past 10-yr. average.

The big streams

The following forecasts of streamflow for the major rivers of the West for April-September 1955 will indicate general watershed conditions at the start of the snowmelt season: for the Columbia River at The Dalles 82% of normal; Colorado River near Grand Canyon 69%; upper Missouri and its tributaries about 80%; Platte River and tributaries about 75%; the Rio Grande about 40% and California 60%.

In the accompanying table the forecast for runoff of some important Western rivers is tabulated in acre-feet and also as a per cent of the 10-yr. average. A chart showing the approximate runoff forecast for the West summarizes the status of stream discharge for the coming season.



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● **What This Means for You**—Using the hydraulic jack method requires fewer men in the erection crew and ribs are set into place faster—erection cost is less. Erection equipment takes up less space because these jacks telescope into such a low shut height in their closed

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WIRE ROPE TIPS—3

... A series of good ideas as laid out by L. C. Torrell, wire rope engineer for Bethlehem Steel Company.

WHEN CONSIDERING the removal from service of a used wire rope it must be understood that a single broken wire is in itself no great cause for alarm. Friction with adjacent wires holds that wire till it develops full strength within the length of one rope lay on either side of the break. The time to become wary is when single wire breaks begin to appear close together in the most badly-worn section of the rope, for this is usually a warning sign that "hardening of the arteries" has set in and the fatigue-life of the wire is nearing its useful end. A rapid multiplication of breakage can be expected shortly. When more than one broken wire appears in the same strand at the same location, it is time to take warning and watch the rope closely.

At one time a fairly accurate estimate of the remaining strength in a rope could be made by gaging the length of the worn oval on the outside crown wires, which in turn indicated the steel cross-section remaining in those wires. This was possible because the oval was formerly mostly the result of wearing away of metal. However, today's rope wire has a high capacity for plastic flow before embrittlement, and much of the oval is now the result of peening and comparatively little from metal loss. Hence rope strength evaluation on this basis may be falsely conservative.

What care should be taken of boom lines on shovels and cranes

It is commonly believed by many that where a shovel or crane is operated for a period of time without changing the angle of the boom there is little or no wear or deterioration of the boom line. This is not so. Remember that wire rope has a surprising amount of elasticity. Hence as the boom is repeatedly loaded and unloaded the stretch and recovery of the boom line results in a slight rotation or rocking of the sheaves and the length of rope in contact with the sheaves groove stretches and recovers. Both result in a concentrated fatiguing action on the wire and the latter also wears the crown wires somewhat so it is not uncommon to find broken wires at those locations in an otherwise practically unworn rope.

Under such conditions safe boom rope life can be materially lengthened by the simple expedient of periodically making slight changes in the angle of the boom—enough each time to move unworn rope onto the sheaves.

HYDRO MACHINERY

(Continued from page 34)

(2) The target, a special K&E precise model, was controlled by a micrometer, and was placed on a sturdy A-base stand to eliminate distracting movement. This assured almost consistent accuracy to one-thousandth of an inch.

(3) The target was designed by Burgman to be self-illuminated and thus visible under any powerhouse lighting conditions.

When taking a complete set of readings around the crown ring, the exact amount of turnbuckle adjustment was determined by maintaining one point of elevation and figuring the amount of difference of the other points. Excellent results were obtained in this manner, and the scroll case was kept under control at all times. Again, the problem of holding the precise elevation of machinery was solved by the jack-turnbuckle arrangement, which successfully secured the scroll case with a minimum of drift even during the stresses of concrete pouring.

A final neat trick

While the turbine was being assembled, crews under the direction of Otis Rainey, millwright foreman, began assembly of the rotors—the largest single job of all. Each rotor body, made up of a shaft and “spider” (support arms), holds 5,000 punched plates, or “punchings,” which form the core of the rotor. Weighing an average of 40 lb. apiece, these punchings had to be cleaned and placed one at a time!

At first, the cleaning was done entirely by hand, two men wiping the packing grease from the plates with solvent, two men filing burrs, giving a final wiping, and stacking the punchings. This process had its prob-



FIVE THOUSAND rotor punchings for each unit had to be cleaned and assembled. A steam cleaner, a roller conveyor, and an electric sander made it a production line job, and the millwrights had enough energy left to smile when doing the final hand stacking.

lems, however, not the least of which was the time-taking, expensive personal attention given to each greasy punching. To beat this situation a production-line process was evolved.

A steam-cleaning machine with crated dirty punchings alongside was placed at one end of a roller conveyor. An operator took punchings from the crates and fed them through the steam cleaner to a man who made a preliminary drying of the punchings (the heat they retained from the steam process would take care of remaining moisture). The next man at the conveyor used an electric disc sander to remove rough, raised edges, and another man removed the punchings and stacked them in weight-graded piles for eventual placement on the rotor spider. This system, with

the same number of men used in the less efficient method, easily doubled the daily output of cleaned punchings, besides giving them a more thorough cleaning.

Other problems, some foreseen and some totally unexpected, could be listed. In general, the problems of hydroelectric machinery installation at Pit 4 well illustrate the problems of similar work on any project. It is true there were special problems created by an unusual valve installation and by excessive weights to be hauled over difficult routes.

But the ingenuity of methods (efficient parts cleaning) and ingenuity of techniques (devices for precise installation) evolved at Pit 4 will probably be standard operating procedure on the next job.

Clay, sand, rock—what's the right tractor shoe?

HOW IMPORTANT is it for the earthmoving contractor to choose the right width of track shoes for his crawler tractors?

It may mean the difference between making five payload trips instead of four with a crawler-scraper unit—of being able to push load a 20-plus cu. yd. capacity scraper to a heaped load with one crawler instead of having to call upon another tractor for a helping boost—of staying on top of the ground surface and doing the job efficiently instead of sinking in and bogging down.

What causes the track shoe to have such an influence on work efficiency? Traction is the answer. Traction that has been described as being influenced by the strength of the soil more than any other soil characteristic. Here are some facts to remember about soils when considering what

type of shoe is best suited for the work a crawler will be doing.

Basically, there are two principal types of earth surfaces with which the contractor comes into contact. One is plastic soil, such as clay, which is composed of fine particles bound together into a cohesive mass under normal moisture conditions. The other is frictional soil, such as sand, which is composed of particles larger and less cohesive, even when wet.

Plastic soils tend to have sufficient shear strength, regardless of vertical load, to permit the use of wider tracks for better traction and improved flotation. On the other hand, the shear resistance of frictional soils increases as weight increases per unit of track area in contact with the ground.

Traction without good flotation is useless. Flotation depends not only

on ground pressure but also on the form and shape of the area under the tracks.

How does this affect the choice of track shoes? Remember that the shear area of the track can best be varied by changing the track width. Before allowing for the requirements of flotation and steering, the following general rules can be applied.

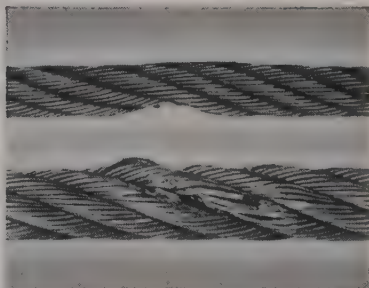
For all-purpose operation—standard track shoes;

For operation on plastic soils—wider shoes;

For operation on non-plastic soils—narrower shoes. In case of the latter, flotation rather than traction may often be the deciding factor.

Rock work is a place where maximum flotation would be considered a disadvantage. Narrower shoes tend to gain better penetration and provide a shear surface against which the grouser can pull.

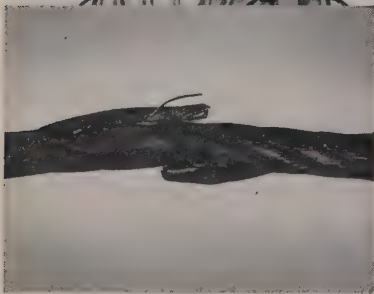
Tuffy tips on preventing



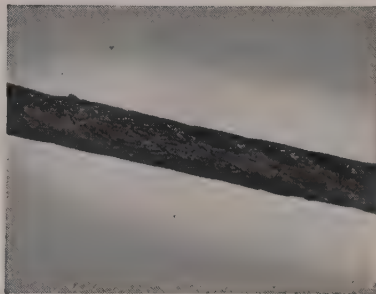
These two photos show what happens when rope is run over or struck by a hard object and crushed. The damage to the strands greatly reduces the service life so carefully built into the rope.



Sudden release rebound from an overstressed condition may often cause birdcaging. Throwing a loop into the rope is also a major cause of birdcaging. Lang Lay ropes in particular are vulnerable to this abuse.



Severe corrosive water conditions caused rust and corrosion to produce a one-strand break in this rope. Lubrication during the time the rope was in service would have retarded the damage . . . added greatly to the rope's life.



If broken in improperly, high strands like these may result. When installing, make sure that the fabricated relation between *strand with strand* and *strands with core* are not changed.



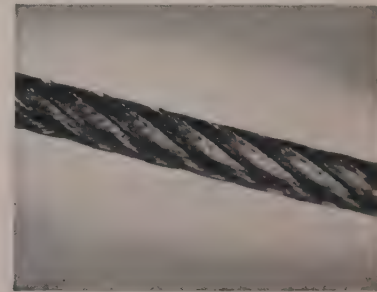
Nailing a wire rope through the core often causes many undesirable results. The wires and the core are badly damaged. A high strand may develop near the end or many feet away.



Here are three types of open kinks, all resulting from mishandling of wire rope. Guard against kinks by winding rope properly on the drum, and *never* pull a loop smaller, always enlarge it then straighten out the rope.



The start and finish of doglegs; the end being the point when all the wires on one side of the rope were worn through. Anything, such as a pulled loop, that causes a permanent bend or "set" will result in a dogleg.

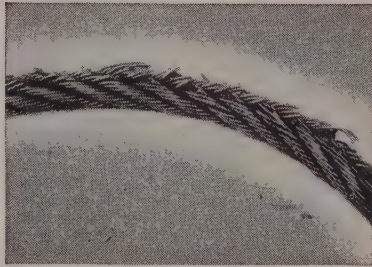


While different wire rope is constructed to resist abrasion to different degrees, improper use leads to injury. Watch for abrasion and when it begins to show locate the point where it is occurring and correct the cause.

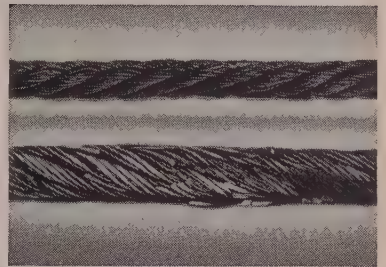
damage to Wire Rope



When a popped core occurs, continued use causes the rope lay to lengthen out considerably. This displacement of the core is usually caused by load tension being suddenly removed from the rope.



Here is an example of excessive pinching in the sheave grooves. This rope lasted through only 1½ hours of service. To prevent pinching, make sure grooves are not worn deep and that the bearing surface is sufficiently large.



Excessive drum crushing like this occurs at points of cross-over or when rope is wound unevenly. Check for even winding of each layer on the drum to prevent crushing of this type.

Put the Knowledge of Specialists to Work on Your Wire Rope Problems

Their years of field-testing experience and solutions arrived at and proved both in the field and in our outstanding wire rope laboratory are yours to make use of whenever a rope problem confronts you.

In addition to standard wire ropes, Union Wire Rope specialists have produced a family of wire ropes

for special purposes. Ropes that give you the construction, type of steel and characteristics best suited to each particular job for which each of the Tuffy Wire Ropes is especially designed and constructed.

The Tuffy Ropes they have developed make ordering easy and sure. Next time you want wire rope, just...

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Tuffy Scrapper Rope

Mount a reel on your scraper and move more yardage per foot. Flexible to resist sharp bends, stiff enough to resist looping and kinking.



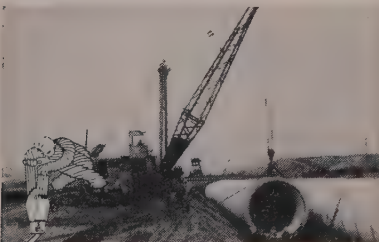
Tuffy Dragline

Rides smooth on drums and hugs the drum when casting. Extra flexible, yet constructed to give maximum abrasive resistance.



Tuffy Dozer Rope

Mounted on special 150' reel that lets you use rope you now throw away! Increases service life and reduces down-time. 1/2" and 9/16".



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A hoist line that gives you extra service life. Slings of 9-part machine-braided wire fabric fight kinking—a matched-team of balanced performers.



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Wire Rope Riddles. When you have a wire rope problem, give your Union Wire Rope distributor a call for hurry-up service. Chances are you'll find he has the correct answer at hand—because part of his job is figuring out how your equipment can give you the best operation, at the lowest operating cost! Feel free to call on him anytime.

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2-C

REPORTS from the COURTS

By HOWARD S. BURNSIDE, Attorney and Registered Engineer

Right to substitute subcontractor affirmed

A common practice of public authorities in many areas is to require a list of subcontractors to be included by the general contractor in his bid for a public work. In California, a statute¹ provides that the general contractor in such cases shall not substitute for a subcontractor so listed without the consent of the public authority which awards the work. The same statute also states that the awarding authority may consent to a substitution when a subcontractor refuses to execute a written contract presented by the contractor for the project involved. This latter provision was added after the original enactment. The interpretation of these two portions of the statute results in some interesting observations by the court in the present case².

It appears that in preparing and submitting his bid, the general contractor used the low figure submitted by one electrical subcontractor but listed the name of another in the bid. After being awarded the job he secured consent from the proper authority to substitute the electrical subcontractor that had given the low figure. A suit was brought to enforce a penalty provision against the contractor for this allegedly unlawful substitution. The theory of the plaintiff in seeking to enforce the penalty was that under this statute the public authority could only approve a substitution if the subcontractor listed in the bid later refused to execute a contract. The court did not adopt this interpretation of the statute and refused to penalize the contractor. On appeal, the higher court held that this was a proper interpretation.

"The basic public policy of the sections involved, and of the sections related to them, is not to grant rights to a subcontractor, but is to assure the reliability of the subcontractors by requiring an initial check by the awarding authority with the assistance of its technical staff, and then to be sure that no subcontractor will be substituted without the approval of the awarding authority, given, as it was in this case only after a reliability check by the technical staff."

"Petitioner's arguments are necessarily predicated upon the concept that a subcontractor, whose name is submitted with the bid of the general

contractor, in some undefined way, secures some legal rights when the general contractor's bid is accepted by the awarding authority. In the absence of statute that is not the law. No contractual relationship is created between the subcontractor and the general contractor even though the bid is used as a part of the general overall bid by the general contractor and accepted by the awarding authority.

"In order to uphold petitioner's interpretation of section 4104 (d) we would have to hold that the Legislature intended by that amendment to change the general law of contracts, and to confer on subcontractors the irrevocable right to perform the contract as soon as the awarding authority accepted the general contractor's bid except where the subcontractor refuses to execute a contract. We can find no such expressed or implied intent in the sections."

"There are . . . collected many cases, with but a few contra, establishing the rule that even without a mistake of the type that would permit reformation, and where the mistake is unilateral, the courts will grant to the general contractor the right of equitable rescission where his bid was based on an honest and not grossly negligent mistake. This rule obtains in California."

1. 4104 Govt. Code (Calif.)
2. *Klose v. Sequoia Union High School Dist.*
118 C. A. 2d. 636.

Contract beneficiaries recover for breach

The term "beneficiary" is used to refer to one intended to be benefited by a contract between two other persons. He is not a party to the contract but he can sue on it for a breach. This is an important phase of the law of contracts not often encountered.

Defendant contractor in 1946 applied for priority rating on building materials under Priority Regulation 33. He was required to submit plans and specifications to the F.H.A. as part of the application. The specifications set forth exterior wall sheathing of wood, two 30,000-B.T.U. floor furnaces and interior surfacing of lath and gypsum plaster.

The houses were built without exterior wood sheathing. In fact they were cement stucco over chicken

wire and construction paper. Only one furnace was installed and interior surfacing consisted of sheet rock.

When suit was brought by 12 sets of husband and wife as plaintiffs the contractor contended that whatever rights the plaintiffs had were under the Veterans Act, and that the Act provided grounds for such suit for failure to comply with the specifications. Plaintiffs contend that they have the right at law to sue for fraud or breach of contract. This was an important issue on the technical question of whether the plaintiffs' right to sue had expired since it was over a year since they had purchased the houses. This point was decided in favor of the plaintiffs. It is significant because it means that under such Acts as the Veterans Act people have all of their fundamental common law rights and in addition any rights conferred under the Act. In this case without the common law rights, the plaintiffs' right to sue would have expired no matter how bad the conduct of the defendant.

On the plaintiffs' action charging fraud, the reviewing court found in the majority of cases a basic element was lacking. There was no reliance by these plaintiffs on a misrepresentation. However on their alternate theory of breach of contract, the plaintiffs prevailed.

"The application for a permit and its granting subject to conditions resulted in a contract between (defendant-contractor) and the United States to the effect that (defendant) contracted and agreed to build houses in conformity with the plans and specifications in exchange for a permit to secure priority for building materials . . . veterans, who purchased the homes so built, were third party beneficiaries of this contract.

"Under . . . the Civil Code . . . a third party beneficiary may maintain an action directly on such a contract. . . . It is not required that the third party beneficiary be specifically named as a beneficiary.

"Where the contract is for the benefit of a class any member of the intended class may enforce it. The fact that the government is one of the contracting parties does not change the rule."¹

Thus under the third party beneficiary rules these veterans were able to recover on a breach of the contractor's agreement with the government, the agreement having been made long before the houses were purchased or the veterans came upon the scene. This principle of law applies generally to the entire field of contracts. This is a well reasoned opinion and also thoroughly discusses the procedural pitfalls encountered when suing in both fraud and contract where there exists a single right to recover.

1. *Shell v. Schmidt* 279 P. 2d 82 (Calif. 1954).



27-Ton Girders Placed at Folsom Dam Power House ... by Wilkins Draying Company With Lorain Moto-Cranes

The operators of these 2 Lorain Moto-Cranes, owned by Wilkins Draying Co., Sacramento, have complete control of the 27-ton steel girder they are putting in place during the construction of the Folsom Dam Power House. Smooth, accurate operation enable the 2 Lorains to team up to set steel—fast ... get the job done profitably.

Lorain Moto-Cranes are available in capacities from 6 to 45 tons ... have highway speeds up to 45 MPH, but have the soft-ground flotation and tractive effort to travel the toughest off-the-road terrain ... have features obtainable in no other make of rubber-mounted shovel-cranes. They are convertible, of course, to shovel, crane, dragline, clamshell, or hoe.

When your jobs call for real mobility either on the job or to the job, get the Lorain Moto-Crane story. It will pay off in profit—to you!

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Seattle, Wash. Branches at Fairbanks & Anchorage,
Alaska

ARIZONA

A NEW STEAM POWER plant for the Salt River Power District will soon be under way. An 80-ac. site has been purchased located about 2-mi. northwest of Glendale. The 100,000-kw. steam power plant, estimated to cost about \$13,000,000, will be similar to the District's kyrene power plant—just recently completed. Actual work on the new power plant will begin about August 1955 with a completion date slated for the spring of 1957.

SURVEYING for a pilot tunnel through the Bisbee Divide, in the southeastern part of Arizona is due to begin this month. The pilot tunnel will provide information as to the feasibility of a 1,200-ft. long, 34-ft. wide highway tunnel on U. S. Highway 80, which crosses the Divide over Mule Pass north of Bisbee. The proposed pilot tunnel will be about 8 ft. wide.

PEOPLE IN ARIZONA have been warned by the State Registrar of Contractors to beware of unlicensed and unqualified contractors. Under

state law, all contractors are required to be licensed and qualified. Persons entering into agreements with unlicensed contractors are liable for damages in the event of injury to workmen employed on the job.

PLANS ARE UNDER WAY for construction of a 9-story, \$2,000,000 office building in Tucson. Builder will be Lawrence D. Mayer. This structure will be the tallest erected in Tucson since an 11-story building was built there in 1929.

RECENT MAJOR CONTRACT AWARDS and low bids in Arizona include a low bid of \$258,238 by **Pioneer Constructors** of Tucson for 6.9 mi. of grading and surfacing on US 66 on the Holbrook-Lupton highway. **San Xavier Rock & Sand Co.** of Tucson submitted a low bid of \$362,184 for 3.7 mi. of grading, draining, and surfacing on US 80 on the Tucson-Benson highway near Tucson. **Tanner Bros. Contracting Co.** of Phoenix submitted a low bid of \$158,976 for 4.6 mi. of widening and surfacing the East McDowell road. **United Contractors, Inc.**, of Glendale submitted a low bid of \$166,731 for 6.6 mi. for grading and draining US 93 located 34 mi. southeast of Kingman.

CALIFORNIA

PACIFIC GAS AND ELECTRIC CO. ITEMS—The \$25,000,000 Pit Four powerhouse described in **Western Construction** for September 1954 will be producing power this June. Work at the head of the penstocks is awaiting completion of work at the tunnel portal.

Utah Construction Co. and Bates & Rogers Construction Corp. have received a contract award from the Pacific Gas & Electric Co. for construction of a 24-ft. diameter tunnel—6¾ mi. long. This is part of the \$35,000,000. Poe Project on the Feather River in Northern California. The intake structure will be located about 2 mi. downstream from P. G. & E's existing Cresta powerhouse. The powerhouse at the downstream end of the tunnel and penstock will be located east of Jarbo Gap at the upper end of the diversion reservoir for Big Bend powerhouse. Tunnel driving will begin downstream from the intake structure by early fall. Two adits will be required in addition to the tunnel driving upstream from the outlet portal. At peak of project construction between June 1956 and October 1957 as many as 1,000 men will be on the job at one time. Separate contracts are to be awarded for the powerhouse and the diversion dam immediately downstream from the tunnel intake.

Stolte, Inc., of Oakland is beginning construction of a bridge across the Feather to give access to the powerhouse site. Two and one-half miles of new road was completed in the first days of the project work.

In addition to the full project, the company has received a license from the Federal Power Commission for three additional powerhouses, the Butt Valley, Caribou the second, and Belden plants, with their tunnels and a diversion dam which will be built at a total cost of \$74,000,000. The projects are to be on the north fork of the Feather River and two of its tributaries in Plumas County. These three plants are to be completed by 1960. Trinity River development is covered in a new supplemental report by the Bureau of Reclamation which has been forwarded to the State of California and other interested agencies for comment. This project would

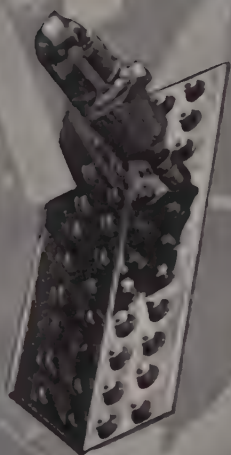


UNBELIEVABLY GOOD SAFETY RECORD

The Steel Construction Co. of Oregon and Rutherford & Skouby received a unique reward from the State of Washington for the outstanding record of working 441,225 man hours without a single lost time accident. Shown above is **Dave Haddon** (left), safety director of the state, presenting the award to **Jack Anderson**, job superintendent. This firm is working under The Dalles Powerhouse Constructors and Atkinson-Ostrander on steel erection on The Dalles Dam. This is only the second occasion since the award was established that a contractor has been able to qualify for the safety award. **Col. H. B. Elder** is resident engineer for the Corps of Engineers on this project.

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HIGH-STRENGTH BOLTING



More and more erectors are turning to high-strength steel bolting of structural joints. Bolted connections can be made faster, quieter and with far less man power. High-strength bolts afford greater clamping force and stronger joints than ever before possible.

Key to this successful new method is the Chicago Pneumatic Air Impact Wrench. Easy-to-handle CP Air Impact Wrenches are powerful, fast, and smooth. Safe . . . with no dangerous torsional thrusts. They're reversible . . . ideal for removing fitting-up bolts in pre-assembly work. Furnished with side, pistol grip or straight handles. Angle-head models for reaching awkward, hard-to-get-at spots. For more details write *Chicago Pneumatic Tool Co., 8 East 44th St., New York 17, N. Y.*



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GOOD DESIGN, GOOD ERECTION

Using the new lift-slab process, the Bayshore Construction Co. is erecting a \$1,000,000 office building in Berkeley, California. As usual with this method, the four concrete slabs were cast one on top of the other at ground level and then successively lifted to the proper story height using special lifting jacks. Square steel columns were used that did away with the need for any special blocking or guying of the slabs during erection (sometimes required under state law under special conditions). Steel columns were erected by National Iron Works of Alameda, with steel furnished by Kaiser Steel.

divert about 704,000 acre-feet of water annually from the Trinity River in northwestern California into the Central Valley Project system, a reversal of the stream flow direction. Estimated cost of the Trinity River diversion, including the power facilities, is \$219,282,000, all of which would be reimbursable except \$215,000 for recreation facilities and \$47,000 for fish protection facilities. This cost could be reduced about \$64,876,000 by private development of power facilities.

UNDER A \$37,598 contract, the Terminal Drilling Co. is drilling one of several exploratory holes that will be necessary to determine the final route of the aqueduct for the Feather River project. The current drilling contract is located easterly of Quail Lake and south of the Lancaster highway. The Feather River project is to bring northern California water to southern California.

GOVERNOR KNIGHT has announced his support of a compromised plan whereby the federal government would build the San Luis reservoir and then the State would operate it in conjunction with the Feather River project. The Governor is also in favor of the \$219,283,000 Federal river and diversion project for the Trinity River, whereby water will be taken from the Trinity River through a series of tunnels into the Sacramento Valley.

ONE OF CALIFORNIA'S more serious highway bottlenecks is currently being straightened out. Matich Bros. has begun work on their \$748,000 contract to make a four-lane expressway of U.S. 60 between Riverside and Beaumont. The existing two-lane highway is very narrow and winding.

THE CALIFORNIA State Water Project Authority has recommended that the legislature continue with further studies on the Biemond plan for a comprehensive plan of small barriers, master levees, and a 25-mi. fresh water canal in the Delta area of the Sacramento-San Joaquin Valley. The Biemond plan was submitted as a salt water barrier control proposal under a \$500,000 investigation authorized by the Abshire-Kelly Salinity Control Act of 1953. Further surveys of possible barriers may be made as a result of the authority's action. State engineer A. D. Edmonston has some ideas of his own on a possible barrier at the Chips Island site near the confluence of the Sacramento and San Joaquin rivers.

The water project authority has not taken a stand on two other items. One of these concerns the State purchase of the Central Valley Project, now under the operation of the Bureau of Reclamation. It is not known at the time how the federal government feels about the state purchase of this system. Concerning the Feather River development, recently submitted to the legislature, the author-

ity has not taken a stand for or against the plan.

THE LOS ANGELES Harbor Commission has asked the state legislature to enact a measure to enable construction of an underwater tube to connect San Pedro and Terminal Island. Better service than the present ferry system would be one of the prime reasons for its construction. Under the legislation asked for, the city would share the construction costs with the California Toll Bridge Authority—which is now prohibited.

AT MONTICELLO DAM (Western Construction-Sept. 1954, p. 73) the waters of Putah Creek are now running through the diversion tunnel. The upstream cofferdam, 40 ft. high and 150 ft. long, as well as the downstream cofferdam, will now allow foundation work on the main concrete dam itself to get under way.

LOS ANGELES will soon have work under way on another freeway. To be called the Golden State Freeway, this route begins near Boyle Ave. near Hollenbeck Park and ends near the Glendale city boundary at Riverside Drive. With recent approval by the city council to provide city maintenance for the freeway and the closing of necessary streets for construction, the State will be able to go ahead with its planning. The route was adopted in 1952. Millions of dollars have been spent on buying property already and \$20,000,000 is budgeted for this freeway in the next fiscal year.

BIDS SHOULD BE OUT soon for construction of an \$8,000,000 addition to the Long Beach Naval hospital to replace temporary buildings in use since World War II. The Veterans Administration will handle this work—which will replace 561 beds now in temporary buildings.

FIRST WORK on the \$10,000,000 yacht harbor at Alamitos Bay entrance channel began with the demolition of the Ocean Blvd. bridge which links Long Beach with Seal Beach.

MARE ISLAND Naval Shipyard's new \$6,000,000 electronics building was dedicated this month. The five-story structure, which measures 400 by 168 ft., is windowless throughout. An adjacent structure paralleling the 400-ft. long dimension houses two large gantry cranes for handling heavy equipment. By the elimination of windows it was possible to obtain absolute control of illumination, temperature control problems were simplified, better floor space utilization was possible, and there is greater safety in the event of explosions. Grove, Shepherd, Wilson & Kruege, Inc., and Fred J. Early, Jr., Co., Inc., were the prime contractors.

"That's Union Oil T5X going into the crankcase of this new Chev pickup"

"We use Union's T5X motor oil exclusively in about 75 pieces of gasoline-powered equipment here on our Ramona Freeway job... 3.96 miles of 8-lane highway with 19 bridges and clover leaves, the largest single contract of this kind ever let in the state of California.

"Our oil and filter change interval is 2,000 miles for vehicles and 200 hours for stationary engines. Yet every time we drain a crankcase, we can't help noticing that the color and body of T5X looks as good as when we put it in. I can't quote any figures on how much T5X is extending

our engine overhaul interval because in the past two years that we've been using T5X these engines have needed no appreciable amount of work for any reason whatsoever."

Like Mr. Brown of Peter Kiewit Sons' Co., maintenance men and master mechanics who've once tried T5X seldom permit any other oil to be used in the equipment which they service and maintain.

If you're not yet familiar with *amazing* purple T5X, we suggest you call your nearby Union Oil representative and place a sample order today.

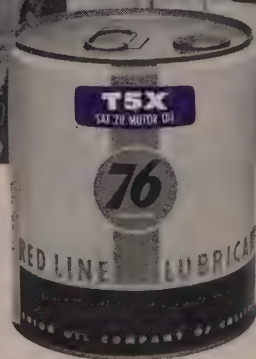
J. D. Brown, master mechanic,
Peter Kiewit Sons' Co.

B. A. Anderson,
heavy duty mechanic,
Peter Kiewit Sons' Co.



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The most advanced,
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STOW Roto-Trowel

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STURDY
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Model G-34 Gasoline

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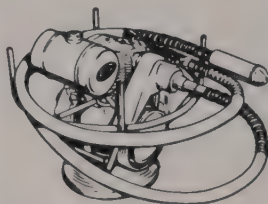
- Allows surface floating within one hour of removal of screed from job
- Roto-Trowel, with floating blades attached, drives air-pockets out—brings up moisture to produce an excellent surface
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Stow Roto-Trowel is:

Ruggedly constructed to do an excellent job on any concrete slab. Pitch Control provides exact adjustment of trowel pitch while machine is in motion. Dead-Man Control stops trowel blades the instant the operator lets go of lever. Equipped with rugged 34" dia. Stationary Guard Ring, does not rotate, permits close-to-wall work. Quick change blades reverse for double life. 2½ H. P. engine.



G40-C Flexible Shaft Concrete Grinder—an efficient, lightweight tool built on a wide wheel base for stability, caster fitted for easy mobility.



AG, AGW Vibrators—heavy-duty vibrators especially recommended for compacting thick floor slabs, walls, piles and foundations.



Stow Vibrating Screeds—strike off a smooth surface that is true to grade, at the same time thoroughly vibrating the concrete.

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56 Shear St., Binghamton, N. Y.

A REPORT on the Bureau of Reclamation's proposed development of urgently needed irrigation, municipal, and industrial water in the Ventura River basin, just north and west of Los Angeles, has been sent to interested state and federal agencies for review and comment. Contemplated structures include a 275-ft. high Casitas Dam, and an earth-fill structure about 2 mi. upstream on Coyote Creek from its junction with Ventura River; a rock-fill diversion dam to divert additional water into the reservoir; a main conduit system (including seven pumping plants) to take water to elevations higher than, the reservoir. Anticipated cost of the project is about \$27,700,000.

BIDS WILL BE ADVERTISED

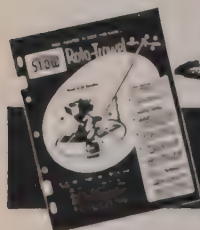
this summer, for which \$1,000,000 has been allocated by the California Highway Commission, for construction of a new separation structure and bridge on US 101 at Greenbrae in Marin County. The new project will be the initial start of a \$6,000,000 improvement which will eventually include construction of two major traffic interchanges and several miles of full freeway. Ultimate plans call for the construction of US 101 as an 8-lane full freeway from the Golden Gate Bridge to Greenbrae and 6-lane from Greenbrae north to San Rafael.

AN ENTERPRISING ENGINEER,

Joe Ells, city engineer of El Monte, Calif., has proposed a 100-mi. mountain-desert freeway directly connecting the Los Angeles metropolitan area with the Mojave desert. The route suggested by Ells would require three tunnels with lengths of 4¼, 2¾, and 1½ mi. The road's highest elevation would be 4,300 ft. above sea level and have no grades greater than 4%. The new route would cut the distance from Los Angeles to Barstow by 33 mi., and to Palmdale by 20 mi. Copies of Ells' report have been sent to parties that might be interested.

BIDS ARE TO BE RECEIVED in

May by the La Mesa, Lemon Grove, & Spring Valley Irrigation District on bonds, material, and construction for a \$2,000,000 project located at El Cajon, Calif. The project calls for 59,700 lin. ft. of 6-in. asbestos cement pipe, 95,300 lin. ft. of 8-in. asbestos cement or C. I. pipe, 19,900 lin. ft. of 10-in. asbestos cement or C. I. pipe, 89,700 lin. ft. of C. I. pipe, and 2,800 lin. ft. of 16-in. C. I. pipe. Also required are one 2,000,000-gal. steel tank—24x120 ft., one 2,000,000-gal. steel tank—32x105 ft., one 1,000,000-gal. steel tank—35x70 ft., and two pumping plants using submersible pumps. Construction plans were prepared by Byrl D. Phelps of San Diego. R. H. Wilken is project engineer and M. J. Shelton is general



U. S. GIANT® CONTRACTORS' HOSE GETS THE JOB DONE QUICKLY



Here are the facts about U. S. Giant's superior construction:

U. S. Giant has a *smooth* bore with a rubber tube of special quality, protecting the wire from rust, acid, or other deteriorating elements. Whether it's suction or discharge, it's all the same to U. S. Giant—the job gets done quickly and efficiently.

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You can depend on U. S. Giant Hose to do its part on *any* water suction or discharge job in any weather, under the worst working conditions.

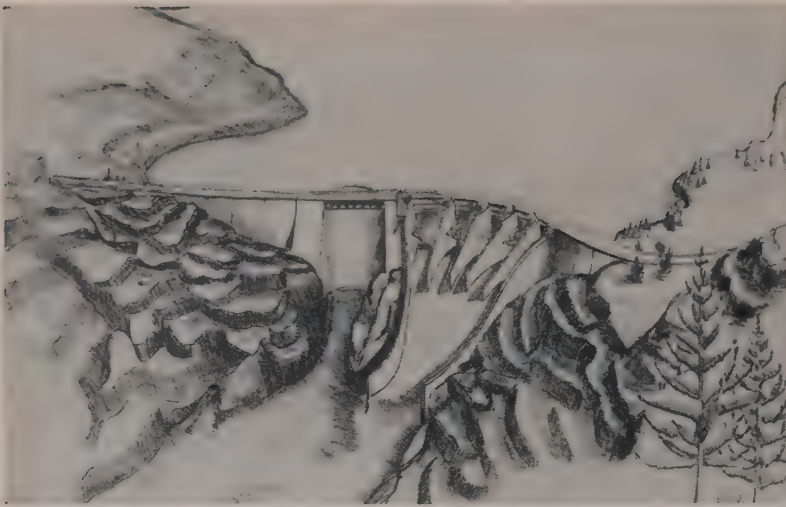
You can't save money by buying second-rate hose—buy the best, and *save*. U. S. Giant is obtainable at any of the 27 strategically located "U. S." District Sales Offices, at each of which there's an engineering staff ready to help you on *any* problem involving hose.



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ANOTHER BIG DAM TO BE BUILT SOON

Work on the access road to Tacoma City Light's Mayfield dam in eastern Lewis County is progressing according to schedule. A contract of \$23,427 was awarded to Helmer Gustafson Co., of Randle, Wash., to construct the 3,500-ft. road of crushed rock and gravel. This is the first contract with a direct bearing on actual Cowlitz construction. The \$146,000,000 Cowlitz development, including both Mayfield and Mossyrock dams, will have an ultimate generating capacity of 460,000 kw. The Mayfield dam will be a concrete arch structure with gravity wings and thrust blocks. It will have a height of 185 ft. and an overall length of 850 ft. The reservoir will have a total storage of 127,000 ac. ft. and will stretch 13½ mi. along the Cowlitz river. Bids are scheduled to be opened on May 23 for the general contract on Mayfield dam.

manager and chief engineer of the La Mesa District.

RECENT MAJOR CONTRACT AWARDS and low bids in California include a low bid of \$198,184 submitted by Basich Bros. Construction Co., R. L. Basich & N. L. Basich of San Gabriel for 6.3 mi. of grading and surfacing in Kern County. John F. Blakemore of El Monte submitted a low bid of \$784,361 for 1.9 mi. of grading and surfacing about 6 mi. north of Santa Barbara. M. W. Brown & R. E. Hertel of Redding submitted a low bid of \$197,039 for 1 mi. of grading and surfacing and construction of one steel girder bridge in Plumas County. Clements & Co. of Centerville submitted a low bid of \$678,174 for 11.7 mi of grading and surfacing in Tehama County.

John Delphia of Patterson submitted a low bid of \$358,595 for 8 mi. of roadwork in San Francisco and San Mateo counties. R. A. Farish Co. of Stockton submitted a low bid of \$175,350 for 2.1 mi. of grading and surfacing and construction of a reinforced concrete bridge in Yolo County. Fredrickson & Watson Construction Co. of Oakland submitted a low bid of \$531,606 for 2.2 mi. of grading and surfacing and construction of a concrete overcrossing bridge in Alameda and Contra Costa counties. J. E. Haddock, Ltd., of Pasadena submitted a low bid of \$4,484,517 for construction of 2.4 miles of 8-lane divided highway, 11 bridges, 4 pedestrian undercrossings, and 13 retain-

ing walls on the Harbor Freeway between 7th St. and Santa Barbara Ave. in Los Angeles.

George Herz & Co. of San Bernardino submitted a low bid of \$209,138 for 4.5 mi. of grading and surfacing near Adelanto in San Bernardino County. MacDonald & Kruse of Sun Valley received a \$1,508,227 award for improvement of the Arcadia Wash Channel, Huntington Place to Rio Hondo Channel in Los Angeles County and submitted a low bid of \$5,213,162 for construction of a separation structure and miscellaneous roadwork in San Francisco on the San Francisco-Oakland Bay Bridge. Mercer Fraser Co. & Mercer Fraser Gas Co., Inc., of Eureka submitted a low bid of \$370,982 for 0.7 mi. of grading and surfacing and construction of two concrete bridges near Arcata, Humboldt County and submitted another low bid of \$569,273 for 12.1 mi. of surfacing near Crescent City.

Morrison-Knudsen Co., Inc., and Stolte, Inc., of Los Angeles received a \$1,158,185 award for construction of a drain and interceptor at Long Beach. Parish Bros., Inc., & Parish Bros. and Carl N. Swenson Co., Inc., of Benicia submitted a low bid of \$2,138,968 for construction of 7.9 mi. of grading and paving and construction of three concrete bridges near Cotati, Sonoma County. Gene Richards, Inc., of Fresno submitted a low bid of \$262,713 for 1.5 mi. of grading and surfacing near Fresno. Schroeder & Co. of Sun Valley submitted a low bid of \$611,517 for 4.5 mi. of grad-

ing and surfacing of Foothill Blvd. in Los Angeles County. Thomas Construction Co. of Fresno submitted a low bid of \$126,874 for construction of steel girder and concrete deck bridge near Millville, Shasta County.

Valley Paving & Construction Co., Inc., of Pismo Beach submitted a low bid of \$137,385 for 0.6 mi. of grading and surfacing in Santa Barbara County. Vinnell Co. of Alhambra received a \$1,169,943 award for relocation of two hangars and construction of miscellaneous buildings at Edwards Air Force Base. Clyde W. Wood & Sons, Inc., of North Hollywood received a \$1,623,018 award for improvement of the Los Angeles River Channel, Wardlow Rd. to Wil-low St. in Los Angeles County.

COLORADO

THE COLORADO INTERSTATE GAS CO. has requested Federal Power Commission approval to change its 22-in. natural gas pipeline routing between Rock Springs and Denver to include Cheyenne. The present approved application calls for the line to pass southwest of Laramie. The entire line will tie in with the Pacific Northwest line going from the San Juan basin to the state of Washington.

THE U. S. SENATE interior committee has approved by 11 to 1 a long range bill for a \$1,658,460,100 program for storage reservoirs and dams in the upper Colorado basin. Authorized were six big storage units and 12 participating projects. The storage units involved—amounting to \$782,000,000—include Glen Canyon in Arizona and Utah, Echo Park in Colorado and Utah, Flaming Gorge in Utah and Wyoming, Juniper in Colorado, Curecanti in Colorado, and Navajo in New Mexico. This project still has to be approved by the full senate and by the house of representatives, however, before any construction will take place.

COLORADO'S HIGHWAY needs over the next 10 yr. were estimated at a record breaking \$1,450,000,000 by the Bureau of Public Roads recently. The state would have to nearly triple its present outlays for highways in order to bring its highways up to desirable standards. This would require vast increases in federal aid in the opinion of State Highway Engineer Watrous. As a comparison, the highway needs of other states in the next 10 yr. range from \$220,000,000 in Nevada to more than \$8,000,000,000 in California. The survey was made at the direction of Congress to provide an up-to-date picture of present and future road needs.



Model 8-C Austin Overshot Loader loading rock in Colorado quarry.

Load 12 cubic yards per minute with an Austin Overshot Loader

Austin Overshot Loaders move material overhead, from loading point to haulage units, in one fast, straight-line movement. Because they waste no time twisting or turning, Austins complete each loading cycle in just 20 seconds—make 3 full cycles every working minute!

A Model 8-C Austin Loader, mounted on a Caterpillar D8 Tractor, moves 4 cubic yards of material every cycle—12 cubic yards each minute!

Cut costs . . . boost your production . . . use Austins to load trucks, wagons, railcars—to mix or stockpile—to excavate. Or, use Austin job-tested attachments on your Loader to bulldoze, screen raw materials, or load logs and other items.

Austin Overshot Loaders are now available in five models, for installation on Caterpillar D2, D4, D6, D7 and D8 Tractors. Bucket capacities from 1 to 4 cubic yards.

AA-1403

AUSTIN DIVISION

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WORK IS UNDER WAY again on Denver's \$30,000,000 Valley highway. Progress has been held up since last December because of winter weather at the north and south ends of the project. The completion date of 1958 may be held up unless the federal government makes more money available. Much of the available state funds has gone into purchase of right-of-way.

ALTHOUGH THE ROUTE of a continental divide toll tunnel has not been chosen, the state house of representatives has approved a bill that would authorize the state highway

commission to issue \$16,000,000 in anticipation warrants to finance the construction of any tunnel. Four sites that have so far been studied are impractical and the cost of construction would not be justified by the resulting benefit. Another site has been proposed. It would require a 5½-mi. long tunnel at an elevation of 9,500 ft.—lower than any of the other tunnel sites now being studied. The tunnel would be located at Buchanan pass, almost directly west of Peaceful Valley resort on the Peak to Peak highway (state highway 160). It would terminate at Monarch Lake, northeast of Granby.

THE BUILDING BOOM in Denver is causing a brick shortage. Local brick yards are at least 90 days—and up to six months—behind in delivery. One contractor is importing brick from Eastern states at a cost of \$15 to \$20 per thousand over the locally manufactured brick price. First contracts for work at the new Air Force Academy site north of Colorado Springs should be awarded sometime in May. The first construction will be for the road system, excavation, and earth-moving in the airfield area, and the construction of some utilities. This phase of the work should be completed by the end of the year. Structural work will begin about a year from now. This year some 1,000 workers should be employed on the project, and 2 yr. from now, about 5,000. Scheduled completion of the Academy project is in 1957.

RECENT MAJOR CONTRACT AWARDS and low bids in Colorado include a low bid of \$71,955 submitted by Mazzocco Construction Co. of Boulder for earthwork and structures for the South Platte Supply Canal of the Colorado-Big Thompson Project.

IDAHO

UNDER A RECENTLY ENACTED bill, the state highway department will now have to conduct public hearings before relocating a road in a town. Under the provisions of the bill, parties not satisfied with a new road location can appeal bypass decisions to a district court. It is anticipated that there will be some delay in road construction because of this situation.

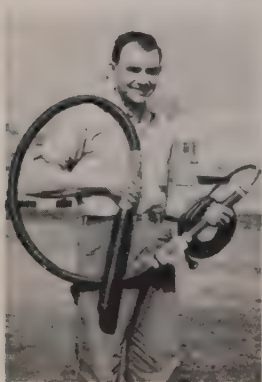
A NEW BRIDGE is scheduled to be built across the Boise River on Broadway Avenue in Boise with the recent approval of a plan by the Ada County board of commissioners. Estimated cost of the structure is about \$322,000. Designer of the span is the Boise engineering firm of Smith & Milhollin.

STATE HIGHWAY ENGINEER Earle V. Miller has stated that if the 1,450 mi. of presently obsolete roads in the state were rebuilt to today's standards, the savings to the traveling public would amount to \$220,000,000 in 10 yr. This would be almost enough to pay for the cost of reconstruction. Some of the older roads in Idaho cost motorists as much as \$0.02 per mile additional in travel compared to modern highway travel.

RECENT MAJOR CONTRACT AWARDS and low bids in Idaho include a \$507,279 award to Jack B. Clarson Construction Co. of Smithfield for 14 mi. of road construction



NEW MASTER "1-MAN" VIBRATOR CUTS VIBRATING COSTS IN HALF



Only 25 lbs. Easy to handle.

It weighs 25 pounds! It's all in one piece! It plugs into any regular 115 Volt AC or DC electric line . . . and with no heavy engine or motor to drag around, one man handles it easily.

The motor is sealed in the vibrating head, so there's no flexible shaft to get out of whack; no oiling or greasing problems; no kinking troubles.

No field maintenance is necessary: when motor head needs attention, snap it off and snap on a spare.

The vibration actually penetrates farther and leaves fewer voids in the concrete than old-style vibrators.

The price is low. The design has eliminated so much cost, and no special power source is required, but the big saving comes in use. Write for folder or ask your Master distributor for a free demonstration. You'll see exactly how the Master "1-Man" can cut your vibrating costs at least 50%.

MASTER VIBRATOR COMPANY
155 Stanley Ave., Dayton 1, Ohio

MASTER

state highway 39 between Spring-
ld and Riverside. **Germer, Abbott
Waldron** of Tremonton received a
1,188 award for 5.0 mi. of roadwork
Jefferson County. **Whitney Broth-**
s of Salt Lake City received a \$117,-
8 award for construction of a test
instrument cell and miscellaneous
uildings at the National Reactor
esting Station at Arco.

MONTANA

PRELIMINARY PERMITS have
een issued by the federal power
ommission authorizing the Montana
Power Co. to investigate two pro-
posed hydroelectric sites on the Flat-
head River in Lake and Sanders
counties in northwestern Montana.
The sites are located 10 mi. and 19
mi. southwest of Polson. One project,
Buffalo No. 2, would include a con-
crete dam forming a reservoir
extending 12 mi. upstream and a pow-
erhouse of 120,000-kw. capacity. The
other project, Damsite No. 4, would
be a concrete dam forming a reser-
voir extending to the tailrace of
Buffalo No. 2 and would also have a
powerhouse of 120,000-kw. capacity.
The permits do not authorize con-
struction, but merely priority for
investigation.

**RECENT MAJOR CONTRACT
AWARDS** and low bids in Montana
include a low bid of \$154,933 by **Long
Construction Co., Inc.**, of Billings for
construction of river channel im-
provements and bank protection at
the Hungry Horse project.

NEVADA

THE WATER LEVEL of Lake
Mead behind Hoover dam has
reached its lowest level since 1938
when the lake was forming. It will
probably drop another 5 ft. before
reaching its lowest point for the sea-
son. The results of snow surveys
made in the upper basin in February
and March indicated that the snow
pack was 85% of normal. Present
level of the lake is 125 ft. lower than
that of the peak year 1941.

NEW BUILDINGS should be con-
structed soon as a result of state leg-
islature action. A \$750,000 bond issue
has been approved for a new state
office building on the rear of the
Capitol grounds. Also, a \$200,000
bond issue for construction of a class-
room building on the University of
Nevada campus has been approved as
well as \$195,000 for Nevada state
prison construction.

THE STATE HIGHWAY Commis-
sion has forecast the completion of
paving on the Cascades Lakes high-
way—Bachelor Butte to Elk Lake—
this summer. About \$150,000 is avail-
able for the 12-mi. long project.

**RECENT MAJOR CONTRACT
AWARDS** and low bids in Nevada
include a \$645,294 award to **Dodge
Construction, Inc.**, of Fallon for 6.6
mi. of road construction near Fallon,
Churchill County. **Silver State Con-**
struction Co. of Fallon received a
\$312,817 award for 6 mi. of road con-
struction near Carson City.

NEW MEXICO

ROBERT E. McKEE of El Paso and
the Northwestern Engineering Co. of
Denver have recently completed the
\$2,200,000 east-west runway at Kirt-
land Air Force Base. The runway is
12,600 ft. long, 300 ft. wide, and large
enough for any plane now flying.

FUNDS FOR HIGHWAY con-
struction in New Mexico received a
boost when the legislature recently
authorized \$20,000,000 to be spent
over the 2-yr. period. No strings were

MAN-SIZE 36" Kolman 'a Brute for Production!



56"x36" KOLMAN Portable Conveyor-Screen
Plant with built-in feeder and wing walls

Loads Out 10-Yd. Trucks In Less Than a Minute

Here is the combination that is making new
records in the field of loading and screening
gravel, clay and aggregate, and on similar
rough jobs. A **MAN-SIZE KOLMAN 36-inch
Portable Belt Conveyor** that's a brute for taking
abuse. It's capable of carrying a vibrating
screen 8'x48" without additional support, and
the screen need not be removed for trans-
portation.

Even under wet, sticky conditions, it loads
out 10-yard trucks in less than a minute. That's
handling gravel at a rate of over 800 tons
per hour—that's **MAN-SIZE** production!

LOOK AT THESE FEATURES

Self-cleaning tail pulley, bar type self-lagged
head pulley, all anti-friction bearings, choice
of greaseless or regular ball-bearing idlers,
pneumatic tires, separate clutch for individual
operation of vibrating screen and conveyor
belt, motor-to-ground controls, hydraulic hoist

with "V" type carriage trucks for low road
clearance, and self-cleaning steel belt cover.

The steel dozer trap with built-in plate feed-
er, available as optional equipment, is an in-
tegral part of the conveyor and also fully
portable. Model 101 KOLMAN Portable Belt
Conveyor is available in 18 to 36 inch belt
widths and in lengths as desired.

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Quote price size or capacity

Name

Address

City

NEW Powerhouse on wheels!

Both the 5 and 10KW models are available with 2-wheel trailer, 4-wheel dolly, or skid-mounting.



Trailer-mounted 5 or 10KW ONAN Electric Plant goes anywhere!

Here's real mobility in high-capacity electric plants! Now you can use one unit (in place of several smaller portable plants) for floodlighting and operating motor-driven tools or electrical equipment. You can cut down the number of units on the job, reduce servicing time and maintenance costs!

You can tow a trailer-mounted Onan "CW" Electric Plant as fast as a car will travel . . . anywhere a tractor can go! Fully-protected by heavy-gauge steel housing; stays on the job in any weather.

Onan "CW" Electric Plants are unusually compact, quiet-running and economical to operate; weigh only half as much as water-cooled plants of the same capacity. Powered by Onan two-cylinder, suction-air-cooled gasoline engines built with massive, long-wearing parts for continuous, heavy-duty service.

Wide range of accessories make the "CW" more versatile.

You can equip "CW" Electric Plants for any type of portable service with a wide range of accessories including skid, battery rack, 9-gallon fuel tank, weather-proof housing, two-wheel trailer, or 4-wheel, rubber-tired dolly. Put one of these portable, high-capacity units on your job now!

Call your Onan distributor or write for folder A-362.

Onan builds electric plants for every need—400 to 75,000 watts.

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attached in the use of these funds by the state highway commission. The money can be used for construction and improvement of highways, the cost of obtaining right-of-way, and the cost of engineering.

AN 11-STORY STRUCTURE is scheduled for Grand Junction that will cost between 1½ and 2 million dollars. Flatow & Moore of Albuquerque are architects on the structure which is to be built on an 85-ft. square lot. Completion will be by January of next year.

THE BUREAU OF RECLAMATION'S Middle Rio Grande projects for this year are rapidly being completed. Work by D. D. Skousen & Son of Albuquerque, costing \$228,000, on the Isleta diversion dam rehabilitation was completed recently. To be completed by next November is the El Vado dam repair being handled by Korshoj Co. and Claussen, Olsen, & Venner at a cost of \$220,000.

EL PASO NATURAL GAS CO. will be spending \$40,000,000 in development of the San Juan basin project for additional compressor stations, pipelines, and other equipment soon. Recently completed by this company was a \$5,000,000, 18-story office building in El Paso as part of its expansion program.

RECENT MAJOR CONTRACT AWARDS and low bids in New Mexico include two awards to Alison & Haney of Albuquerque—one of \$111,313 for 1.9 mi. of grading and surfacing on highway 24 in Otero County, and another of \$122,214 for 2.8 mi. of grading and surfacing near there. J. W. Jones Construction Co. of Albuquerque received a \$316,909 award for 6.5 mi. of grading and surfacing in Ruidoso, Lincoln County. Logenbaugh & Coe, Inc., received a \$348,937 award for 2 mi. of grading and surfacing in Artesia, Eddy County.

OREGON

CONSTRUCTION at the Klamath Falls airport for its reactivation as a jet interceptor base should be getting under way this month. Projects for bidding purposes have been broken into individual packages of \$20,000 to \$1,000,000. Items for construction include runway and taxiway construction, jet fuel storage, modification of existing runways, lighting facilities, a multi-purpose recreation facility, and other miscellaneous structures.

THE STEEL SUPERSTRUCTURE of the Umatilla Bridge across the Columbia River just below McNary Dam has been recently completed by the U. S. Steel's American



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LIFE
UP**

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Freeway Engineers
Are Specifying
SOIL-CEMENT BASE
STABILIZATION**

The cost of constructing and maintaining today's modern freeways must and can be kept down! They must be designed to take a heavy beating from traffic!

That's why more and more engineers are specifying soil-cement base stabilization. The result: tougher roads are being built and taxpayers' dollars are going farther.

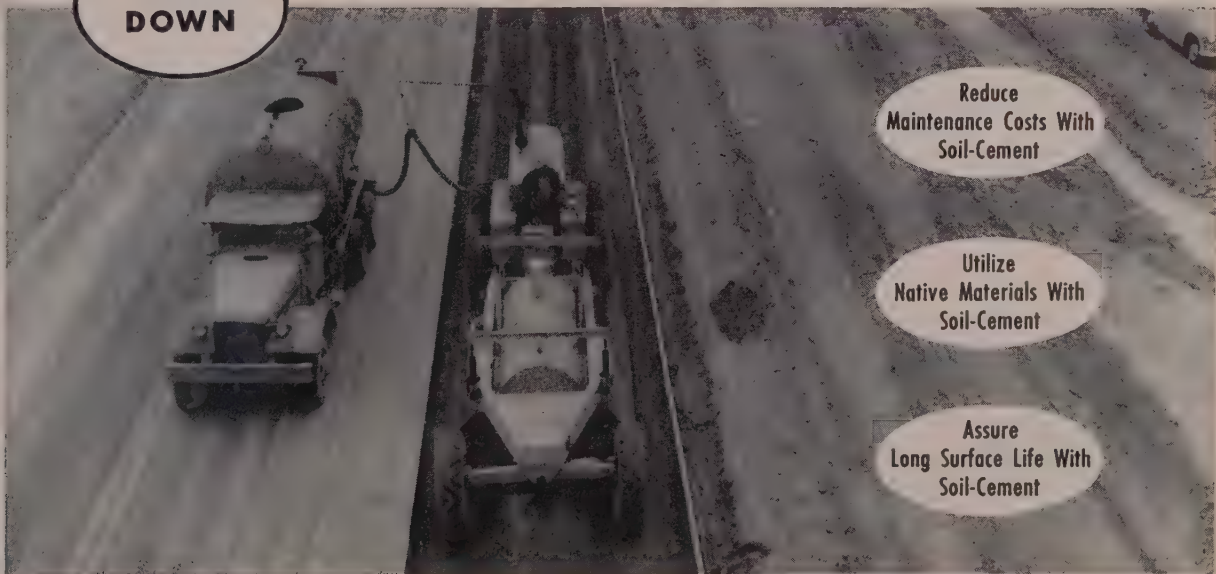
With soil-cement base stabilization, the base course can be made stronger—and often at a lower initial cost, since native minerals can be used.

Engineers are also looking to the future in their specifications. They know that soil-cement base stabilization will reduce normal maintenance and repair costs.

Let us send you case histories that demonstrate the advantages of specifying soil-cement base stabilization.

**COSTS
DOWN**

Most Soil-Cement Is Mixed With Pettibone Wood Mixers



**Reduce
Maintenance Costs With
Soil-Cement**

**Utilize
Native Materials With
Soil-Cement**

**Assure
Long Surface Life With
Soil-Cement**

The Model 42 Pettibone Wood, Single-Pass, Self-Propelled Road-mixer, shown here in actual construction work on the freeway pictured above, produces 250 tons per hour of uniformly mixed windrows up to 6 cu. ft. ready for spreading. Tandem drive assures positive traction. Also available is the Single-Pass Model 54, which is tractor drawn and powered, with capacities up to 350 tons per hour.

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— MFG. CO. —

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Bridge Division. A subcontract for pouring of the concrete deck will be handled by Parker-Johnson Co. of Portland. The bridge is 3,400 ft. long and has 3,500 tons of structural steel. It is of the double cantilever design with two 600-ft. center spans and girder type approach spans.

THE HOUSE PUBLIC works committee has approved a flood control study of the Malheur River and its tributaries. Flood protection is needed on the lower 14 mi. of the Malheur, the lower 24 mi. of Willow Creek, and the lower 12 mi. of Bully Creek.

THE 1,000,000TH CU. YD. of concrete for construction of The Dalles Dam on the Columbia River was recently poured. It could not be predicted which contractor would be responsible for the millionth yard—either Atkinson-Ostrander or The Dalles Powerhouse Constructors. The total project will require about 1,856,000 cu. yd. of concrete to be poured in the spillway, powerhouse, navigation lock, fishways, and non-overflow dam sections.

FINAL DESIGN on the Morrison Street bridge at Portland is pending a decision on the design of the spans

west side approaches. There is a question on whether the design should accommodate a future large parking structure in the 5-square block approach area. Bridge designers are the firm of Moffatt, Nichol & Taylor.

RECENT MAJOR CONTRACT AWARDS and low bids in Oregon include a \$239,591 award to **Cherveny Construction Co.** of Portland for construction separation structure on Halsey St. in Portland. **Edwin C. Gerber** of Oregon City received a \$152,986 award for 4.1 mi. of paving near Estacada, Clackamas County. **K. F. Jacobsen & Co., Inc.**, of Portland received a \$148,125 award for 3.8 mi. of grading and paving near Clackamas. **Max J. Kuney Co., Inc.**, of Spokane received a \$740,550 award for 13.7 mi. of paving on the Pacific highway in Lane County. **Stevenson Construction Co.** of Salem received a \$136,355 award for 0.3 mi. of grading and paving on the Pacific highway near Newberg.

THREE QUICK STEPS

to new bridge floors

Armco Steel Bridge Plank is specially designed for easy replacement of old bridge floors—or for new bridge floors. Planks are two feet wide, with 2-inch deep corrugations. Available in any lengths to fit bridge width.



- 1 Remove the old floor and make any necessary repairs on the bridge substructure.



- 2 Lay Armco Metal Bridge Planks across stringers and weld in place. (Lag screws are used with wood stringers.) Holes are pre-punched to match stringer spacing.



- 3 Two courses of asphaltic concrete pavement finish the job. The first course fills the corrugations; the second provides the smooth, silent wearing surface.

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ARMCO BRIDGE PLANK



UTAH

ONE OF THE LARGEST pipeline projects in the West will be getting under way this month. The \$163,000,000 Pacific Northwest Pipeline Corp. natural gas pipeline from the San Juan basin to the state of Washington will begin in the Ignacio, Colorado, area and expand northward to the Vernal-Rangely-Moab section. During the height of construction there will be 29 separate working crews composed of 200 to 250 men each. Prime contractor on the work is Fish Northwest Construction, Inc., which will probably have its main headquarters in Salt Lake City. About 240,000 tons of 26-in. diameter welded steel pipe will go into the main system. Steel for the Colorado-Utah section is being manufactured at the expanded works of the Geneva Works of U. S. Steel Corp. Kaiser Steel Corp. will produce the pipe for the Washington-Oregon service area.

CONSTRUCTION on the large water purification plant at Ogden will continue with the recent approval of \$550,000 of additional funds by the city. Construction of the plant began last fall by Davis & Butler Construction Co. of Salt Lake City. Total cost of the plant will be about \$950,000. It is located directly below Pine View Dam in Ogden Canyon.

PUBLIC HEARINGS will be held by the U. S. Corps of Engineers in Salt Lake City for flood control in that area. One project urgently wanted by that city would be construction of a concrete core, earthfill dam above Mountain Dell dam in Harleys Canyon. Estimated cost of this project would be 4 to 5 million dollars.

RECENT MAJOR CONTRACT AWARDS and low bids in Utah include a \$1,648,800 award to Witt Construction Co. of Provo for construction of a high school in Orem.

WASHINGTON

A BRIDGE REPRESENTING the new and the old is to be built at Aberdeen. The North Aberdeen bridge across the Wishkah River will consist in the utilization of an old 260-ft. truss span from the state bridge across the Chehalis River and the use of new prestressed concrete piling footings and an 80-ft. approach span. The 260-ft. truss span will be moved in by barge to the new location while the new construction will consist of two prestressed concrete piling footings and the prestressed 80-ft. approach span.

BOX CANYON DAM is now close to completion. The structure spans about 200 ft. across the channel of the Pend Oreille. Its upstream and downstream aprons rise to a sill about 30 ft. above the riverbed. And five gate piers stand 90 ft. above this elevation. Gate construction has gone forward, cofferdams have been removed, and the project is almost fully operable. The powerhouse structure has always been far ahead of the dam, and machinery installation has been the big item for some time. At this writing, power production was expected late in April. How the winter concreting was handled is reviewed on page 48 of this issue.

ONE LARGE SOURCE of funds for highway construction will be \$2,460,000 to be spent by the Bureau of Land Management in building access roads to salvage fallen and bug-infested timber in western Oregon. In the building of these roads, it will be possible to salvage about 400 million board feet of lumber. Most of the timber was felled in a storm of December 1951, and immediate salvage is necessary.

CONGRESS HAS GIVEN its approval to a \$2,800,000 flood control project to protect the Luke Air Force area. Bids should be advertised this month for the work which includes a system of levees and other protective structures to control flash floods originating in the Trilby Wash area of the White Tank mountains.

SPOKANE'S \$1,500,000 sewage disposal plant should be getting under way as soon as city commissioners approve the plans. Construction time will probably be about one year.

RALPH A. TUDOR, president of Tudor Engineering Co., states that



Rock Ripper



**Cuts loading time...
boosts yardage,
saves scrapers!**

Cat D8 with ATECO ripper and Cat dozer handles ripping, push-loading and dozing on Guy F. Atkinson Co.'s Waldo approach job, Marin County, Calif.

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 condition, fast!

Works anywhere tractor can go

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



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Extra heavy-duty construction; designed so drawbar takes the pull, no strain on tractor case. Rips to 24" depth with 9" head frame clearance.

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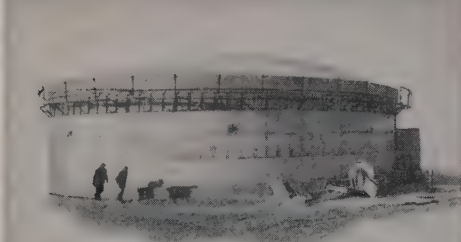
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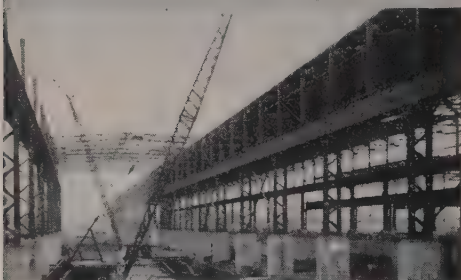
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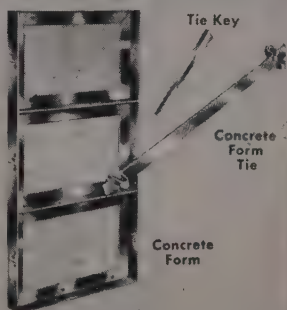
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for Mechanized Forming

the topographic survey has been completed for Spokane's \$4,610,000 Maple Street bridge. With rapid progress on the drawings for the main span and approaches it should be possible to call for foundation exploration bids shortly.

DIAMOND DRILLING at the two dam sites for the Columbia River development by the Grant County Public Utility District is nearly done. Known as the Priest Rapids development, the completion of field studies and the submission of a planning report in June will enable them to apply to the Federal Power Commission for permit to get construction under way in the summer of 1956. Originally, the U. S. Army Corps of Engineers proposed that there be one dam constructed at Priest Rapids. The District has found foundation conditions at the lower site and savings in railroad relocation costs favor a two dam plan as more economical. The upper dam would be located near Beverly, Wash., with a pool extending to a point above Vantage. The planning report takes into account such factors as the impact of large construction forces required to work on the project as related to schools, housing, and highway access.

RECENT MAJOR CONTRACT AWARDS and low bids in Washington include a \$396,987 award to P. J. Anderson & Sons of Seattle for construction on state highway, Mt. Vernon to Skagit River. **Associated Sand & Gravel Co.** of Everett submitted a low bid of \$356,526 for surfacing the north-south runway and extension of a taxiway at Paine Air Force Base. **Fiorito Brothers** of Seattle received a \$960,691 award for 6.3 mi. of grading and surfacing on state highway 1 in Cowlitz County. **Henry Hagman** of Spokane received a \$359,328 award for construction of the Greene Street bridge and approaches in Spokane. **George Pfeiffer & Arnold Pontius** of Othello submitted a low bid of \$235,180 for earthwork and structures for the east part of block 14 of the Columbia Basin Project.

WYOMING

TUNNEL DRIVING on the diversion tunnel for Glendo Dam, a Bureau of Reclamation Project, is well under way. The 2,100-ft. long tunnel, a 21-ft. horseshoe section, is being carried forward by Gates and Fox at the average rate of 35 ft. per day.

WYOMING'S SHARE of the transcontinental highway need study conducted by the Bureau of Public Roads amounts to \$831,000,000 over the next 10 yr. if its highways are to be brought up to good design standards. This is split up with \$280,000,000 on the interstate system,

LICKS 5 MILES OF TROUBLE



Chunks of rock had to be blasted loose. The high arch of the 22-B dipper enabled it to load and dump this rock without jamming or slowing the cycle.

ON DELAWARE SEWER TRENCHING JOB

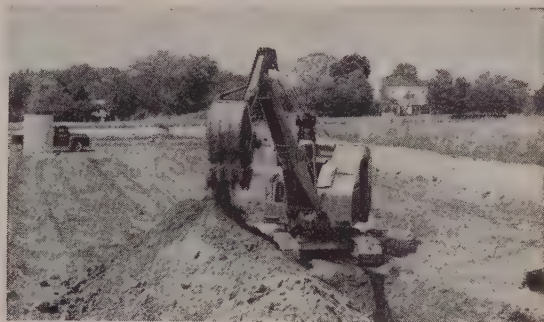
When the James Julian Construction Company contracted to dig five miles of sewer trench along state highway 141 near Wilmington, Delaware, Superintendent J. H. Hubbard figured he had trouble on his hands — and he did. The material turned out to be 40 per cent solid rock and 60 per cent hardpan clay. It had to be trenched 9 ft. deep for 30-in. mains and 12-in. secondary lines.

Superintendent Hubbard summed up his experience with Bucyrus-Erie 22-B's by remarking, "I didn't quite appreciate how tough these 22-B machines were until we started this job. In digging like this you soon learn to respect a machine for its ability."

There's a reason why there are more Bucyrus-Eries working in rock than any other machines. They have the extra stamina for rough going, as well as the extra production ability for any job. Let your Bucyrus-Erie distributor show you why.

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Front-to-rear taper of dipper speeds dumping, means extra clearance in wide trench work.



The box section boom and dipper handle eliminate dead-weight, yet are plenty strong for tough digging. The entire front end can be positioned below cab height for safe, easy clearance in traveling.

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Specified density of base courses of rock, slag, soil-bound macadam, gravel and sand up to 12" thick is achieved in jig-time with the JACKSON MULTIPLE VIBRATORY COMPACTOR. Frequently no more than one pass is required. Likewise, one pass suffices to solidly fill all voids from top to bottom when sufficient dry fines have been spread. With a standard width of 13', 3", working speeds up to 60 FPM and reverse travel of 5½ MPH, this machine offers single course compaction at its best — tremendous opportunity for time-and-money savings.

GRANULAR SOIL SUB-BASES — PAVEMENT WIDENING

It is equally advantageous in compacting granular soil sub-bases. And by towing the compacting units in tandem at the side of the tractor, any granular material used in flexible base course widening can be compacted to specified density in one pass.

LARGE AREA FILLS: Nothing approaches the efficiency and convenience of this machine in compacting granular soil fills such as bridge approaches, sub-bases for large concrete floors, parking lots, etc. It quickly achieves desired density and individual units may be sub-contracted and even fitted with operating handles to suit every condition and to get into the really tight places. Interchangeable bases 12" to 26" in width, are available.

IN TRENCHES — CLOSE TO FOOTINGS, ETC.

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\$222,000,000 on primary state highways, and \$105,000,000 on Wyoming secondary roads.

RECENT MAJOR CONTRACT AWARDS and low bids in Wyoming include a low bid of \$477,837 submitted by **Big Horn Construction Co.** of Sheridan for 4.5 mi. of grading, draining, and surfacing in Lincoln County. **Commercial Builders, Inc.**, of Moscow, Ida., submitted a low bid of \$403,337 for construction of canals and laterals on the Missouri River Basin Project. **Malcolm W. Larson Contracting Co.** of Denver submitted a low bid of \$1,442,937 for construction of the Alcova-Gehring and Lingle 115-kv. transmission lines for the Missouri River Basin project.

ALASKA

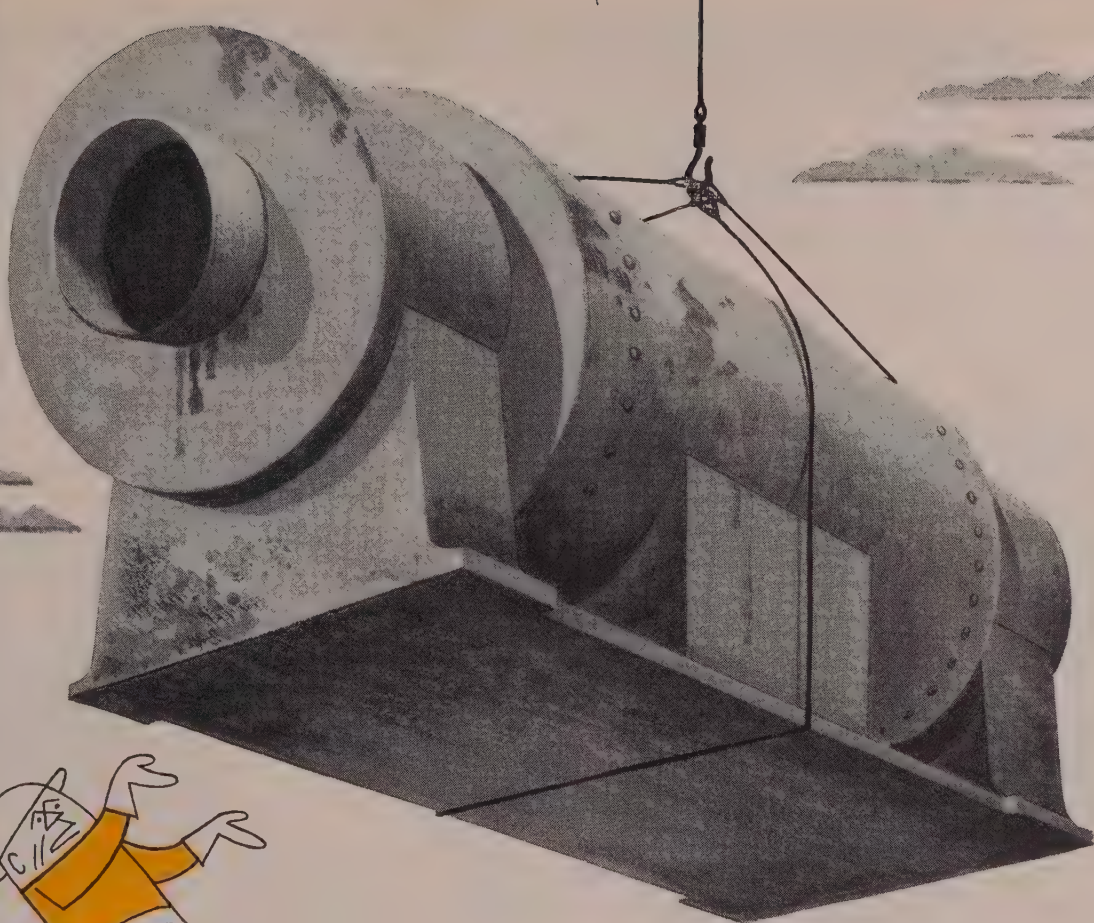
A CONTRACT for \$4,812,102 for construction of extensive additions to the U. S. Air Force installation at Galena Airport has been awarded to Peter Kiewit Sons' Co., the Alaska District Corps of Engineers announced recently. Kiewit's bid was the low among seven competitive bids which ran as high as \$7,000,000.

The big project, which will build Galena from a minor Air Force installation into a base of major importance in interior Alaska, is to be completed by September 1956. Galena is located on the Yukon River about halfway between Nome and Fairbanks.

To be constructed at Galena are an alert hangar, a bulk storage warehouse, airmen's dormitories and mess hall, officers quarters, a water treatment plant, electrical distribution system and utilities. The present runway, parking apron, and hardstands are to be completely rehabilitated. The new tar-rubber pavement with its increased resistance to jet-plane heat and pressures will be used.

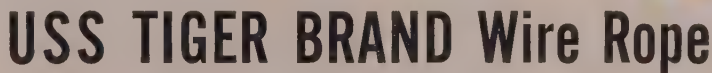
The work will start as rapidly as the spring break-up permits, probably within the next 30 days, according to Col. Carl Y. Farrell, Alaska District Engineer, and will be pushed with all possible speed during the coming construction season.

RECENT MAJOR CONTRACT AWARDS and low bids in Alaska include a low bid of \$130,327 submitted by **H. Flechsing & Sons** of Missoula, Montana, for construction of a bridge across MacLaren River on the Denali highway and another bridge over Rock Creek. **Kincaid & King Construction Co., Inc.**, of Spenard received a \$1,049,630 award for extensive paving, parking areas, and street improvements at Fort Richardson near Anchorage. **Kodiak Aleutian Salvage Co.** of Seattle submitted a low bid of \$195,788 for dredging and clearing Kodiak channel.



Overloads put a strain on profits, too!

adds up to unnecessary replacement costs and extra time spent in more frequent inspections...both of which reduce profits. You'll be money ahead if you keep within the working load limits recommended by the manufacturer.



UNITED STATES STEEL

ENGINEERS on the move

John C. Page, 68, former Commissioner of Reclamation, died at Denver, Colo., on March 23. He joined the Reclamation Service (now the Bureau of Reclamation) in 1909, advanced progressively to director of



the engineering division in Washington and was named commissioner in 1936, a post he held until 1943 when he asked to be relieved because of ill health. Then moving to Denver, he served as full-time engineering consultant to the Bureau until his retirement in 1947.

Harley J. Corleissen was recently appointed to the position of chairman of the State Road Commission of Utah, succeeding **D. H. Whittenburg**. He was formerly state road commissioner from March 1949 until January 1954, when he resigned to enter private business. **Lorenzo J. Bott**, former mayor of Brigham City, was also appointed as commissioner to fill Corleissen's unexpired term. **David L. Warner** was appointed executive secretary of the Commission, replacing **Mrs. Shirley P. Novak**.

Frank A. Graver, chief of operations division of the Albuquerque, New Mex., District, Corps of Engineers, recently retired after 31 years with the Corps.

Henry C. Helland was recently promoted from planning survey engineer in the Montana Highway Department to assistant state highway engineer, responsible for general administration of the planning survey department, in addition to conducting of interstate highway, traffic engineering and urban studies, as well as the preparation of factual data for

public information. Other recent changes in the Highway Department are that of **Fred Quinnell, Jr.**, who was made administrative engineer from his prior position of preconstruction and administrative engineer; **Charles S. King**, from assistant construction engineer to planning survey engineer; **Myron C. Lockey** from senior construction engineer to preconstruction engineer; and the appointment of **John F. Bullard** as assistant construction engineer.

Lyall A. Pardee, for the past 31 years a member of the Los Angeles city engineering staff, was recently made chief deputy city engineer.

Frank T. Koehler and **Marvin W. Runyan**, long time employees, and associates since 1952, in the consulting engineering firm of Stevens & Thompson, Portland, Ore., recently became partners in the organization. Three other employees, **Ronald E. Ries**, **Ervin A. Soot** and **Gordon E. Trapp** have been named associates. **J. C. Stevens**, who retired from active partnership a year ago, acts as a consultant.

I. Curtiss Parker has retired from the consulting engineering firm of Parker, Hill & Ingman of Seattle. The firm has announced the formation of a new partnership composed of **Allen E. Hill** and **Gordon G. Ingman**.

Myron D. Calkins was recently appointed city engineer of Tacoma, Wash. He will head the construction, engineering, maintenance and traffic divisions of the Department of Public Works. Until this present appointment under a new reorganization program, Calkins was assistant office engineer.

Leroy F. Wilson has been appointed road commissioner of Sierra County, Calif., to fill the vacancy occasioned by the recent sudden death of **Lloyd A. Scanland**. Wilson has had 18 years' experience in engineering, construction and maintenance with the Bureau of Public Roads and the California Division of Highways.

M. C. Zimmerman, with the Alaska Road Commission as district engineer at Fairbanks, Alaska, was recently transferred to Anchorage where he will fill the same post. Also, **John M. Cooley**, district engineer,

Nome, transferred to the same position at Valdez. **W. P. Cameron**, assistant district engineer at Fairbanks, has been appointed acting district engineer.

Hugh G. Silliman has been appointed to the position of chief electrical engineer of the Seattle Department of Lighting, replacing **Herbert V. Strandberg**, who was recently appointed chief engineer. **Charles M. Lubcke** has been appointed supervising senior engineer to replace Silliman.

L. D. Wilson is appointed to succeed **C. O. Erwin** as chief highway engineer of New Mexico. Wilson had been administrative engineer and until a replacement is named he and his assistant **Don R. Roser** will carry on the duties of that office. Wilson



L. D. Wilson

has announced reorganization plans which are subject to approval of the highway commission and involve a change-over in regard to construction, which has been at the state level and is expected to be changed to the district level as far as administration is concerned. **R. E. Miller**, construction engineer, has resigned to accept private employment.

Effective May 1, Erwin, who left the highway department post at the request of the commission, accepted a position as city manager of the city of Santa Fe at a salary of \$10,000 a year.

Ernest C. "Bob" White, a veteran of 28 years of service with the Corps of Engineers, has been named The Dalles-Celilo Canal project engineer by the Portland District, replacing **Wheeler H. Rucker**, recently named to a post in the operations division of the North Pacific Division, Portland. Also recently reported by the Portland District is the retirement of **Terrence F. Johnson** after more than 21 years with the Corps in Portland, Bonneville, and Walla Walla.

Edwin G. Nielsen, Bureau of Reclamation regional director at Boulder City, Nev., has been named assistant commissioner of reclamation for irrigation and power, attached to the commissioner's staff in Washington. He succeeds **Harvey F. McPhail**, retired. Named to succeed Nielsen as director of Region III at Boulder City is **John P. Jones**, who has been regional engineer there since 1951.

Standard Engineer's Report

CASE HISTORY

Standard Diesel Fuel and
PRODUCT *RPM DeLo Oil*

Kovick Bros. Construction Co.,
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Injectors clean after 4990 hours in shovel engine!



FIVE AND A HALF YEARS of tough excavation work caused no deposits on this injector. It was removed for the first time after 4990 hours in the D13000 diesel that powers this 1 1/2-yard shovel. This is typical of the results Kovick Bros. Construction Co. obtains with Standard Diesel Fuel and RPM DELO Oils in their 10 diesel engines. Ray Kepley, Master Mechanic, says, "I've never found a better combination for diesels than Standard Diesel Fuel and RPM DELO Oils. In seven years of using these products we've had absolutely no trouble with injectors or fuel pumps, and our engines have stayed very clean with little wear. Standard Diesel Fuel always comes to us clean and is always uniform."

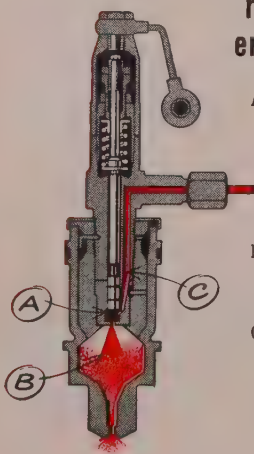
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Mac Silvert recently resigned as chief engineer with Ben C. Gerwick, Inc., to enter into private practice. As a consulting construction engineer, his office is located at 1845 Franklin St., San Francisco 9.

* * *

Charles W. Whitney, consulting engineer of New York and Milwaukee, was recently elected 1955 president of the American Concrete Institute, succeeding **Prof. Charles H. Scholer**. Elected for a 2-year term as vice president of the Institute is **Walter H. Price**, head of the Bureau of Reclamation's engineering laboratories at Denver.

* * *

J. Carl Jennings has been chosen as 1955 president of Sacramento Section, (Calif.) American Society of Civil Engineers. Other new officers are **Ralph W. Hutchinson** and **Francis G. Christian**, vice presidents; **Joseph I. Burns**, secretary; **Robert F. Fingado**, treasurer and **Conrad A. Ecklund**, junior past president.

* * *

Bert L. Snell, former Washington and Oregon construction executive, has been appointed vice president of Luria Construction Corp. During 1950-51 Snell was civilian chief of operations for the Corps of Engineers at McNary Dam, and in 1952 was project manager on Luria hangars at Fairchild AFB, Spokane, Wash. For the past two and a half years he has been assistant general sales manager for Luria Engineering in Bethlehem, Pa.

* * *

David I. Lloyd of Albuquerque was recently chosen president of New Mexico Society of Professional Engineers, succeeding **Thomas E. McCarty**. **Thomas T. Mann** and **W. Carlos Powell** were named vice-presidents; **A. Burton Metzger**, national director, and **T. T. Castonguay**, secretary-treasurer.

* * *

J. Donald Ahrendt recently became general superintendent for Peter J. Young & Son, general contracting firm of Spokane, Wash. For the past year and a half he has been employed as construction engineer for Continental Oil Co.'s construction program in the Northwest.

* * *

B. F. Hansen has been named to head the Washington State Department of Highways office recently established in Pomeroy, Wash., preparatory to extensive road work planned in Garfield County. **Charles Harvert**, instrumentman for the Highway Department, has also moved to Pomeroy.

* * *

M. John Loosly, for the past three years city engineer of Roseburg, Ore., recently resigned to accept a position with the Roseburg Paving Co. Loosly was assistant city engi-

neer at Astoria before going to Roseburg.

* * *

B. R. Rutledge of Agness, Ore., was recently hired by Lincoln County. A registered engineer, he will supervise road and bridge construction projects in the county.

* * *

Eugene W. Asselstine has accepted an appointment as city engineer of Clarkston, Wash.

* * *

J. Ray Heath, Sr., member of the engineering firm of Heath, Hammond & Collier, was recently chosen superintendent of water for the city of Seattle, Wash. Announcement of this appointment followed the mayor's withdrawal of his appointment of **William N. Hartford**, now head of the planning commission.

* * *

Jack Harrison of the Harrison Construction Co., Denver, is the new president of the Colorado Contractors Association, Inc. Serving with him during the year of 1955 are the



Jack Harrison

following officers: 1st vice president, **Edwin W. Vandervort**, Northwest Engineering Co., Denver; 2nd vice president, **James B. Kenney, Jr.**, James B. Kenney, Inc., Denver; secretary-treasurer, **Hoyle Lowdermilk**, Lowdermilk Brothers, Englewood, Colo. **Earle W. Devalon** is managing director of this AGC unit.

* * *

John H. Bliss has again been named to the position of state engineer of New Mexico, though he is not interested in the post permanently. **John Erickson**, former state engineer, resigned to enter private business. Erickson had been state engineer for the past year and a half, prior to which Bliss held the post, becoming consultant for the Interstate Streams Commission when Erickson took over the state engineer office.

* * *

W. M. Jaekle was recently made chief engineer of Southern Pacific Co.'s Pacific Lines, succeeding **E. E. Mayo**, whose appointment as vice president of the newly formed Southern Pacific Pipe Lines, Inc., was announced simultaneously. With headquarters in San Francisco, Jaekle will have supervision of engineering, maintenance, and construction of the lines in six Western states. **R. C. Nissen** was promoted to assistant chief engineer.

Harold B. Schultz, chief, design and construction division of the Alaska Road Commission, recently left the Commission to join the Wisconsin Highway Department. **R. J. DeLaHunt** is his replacement. He was formerly chief of the bridge design branch, which position is now filled by DeLaHunt's former assistant, **Donald F. Bolton**.

* * *

Stewart Mitchell, principal bridge engineer of the California Division of Highways, as of March 31, retired after 31 years' service with the bridge department. Coming from the Oregon highway department in 1924, his first position with the California Division of Highways was resident engineer on the Klamath River bridge. He moved to the headquarters office in Sacramento in 1927, where he served continuously until his retirement.

* * *

Huntley Grant has joined the office of the engineer of plans and contracts of the Washington State Department of Highways, where he will work as assistant to **Val G. Rinehart**.

* * *

Emil A. Shabatura of the Light Division of the City of Tacoma, Wash., was recently appointed assistant head civil engineer on the Cowlitz and Skokomish River projects.

* * *

Charles H. Wagner, the man who supervised construction of Chief Joseph Dam for the Corps of Engineers, has now been assigned to the Seattle District Office as chief of the construction division. Construction of Chief Joseph, planned to be one of the world's greatest producers of hydroelectric power, is now virtually complete. Progress has been consistently ahead of schedule under the direction of Wagner, who had been resident engineer at Bridgeport, Wash., since 1949. **Rufus Jackson**, Wagner's assistant during the construction days of the dam, has now taken over as resident engineer.

DEATHS

Thomas W. Harrison, 66, Cheyenne, Wyo., died there March 5. He had been principal designer for the Wyoming State Highway Department.

* * *

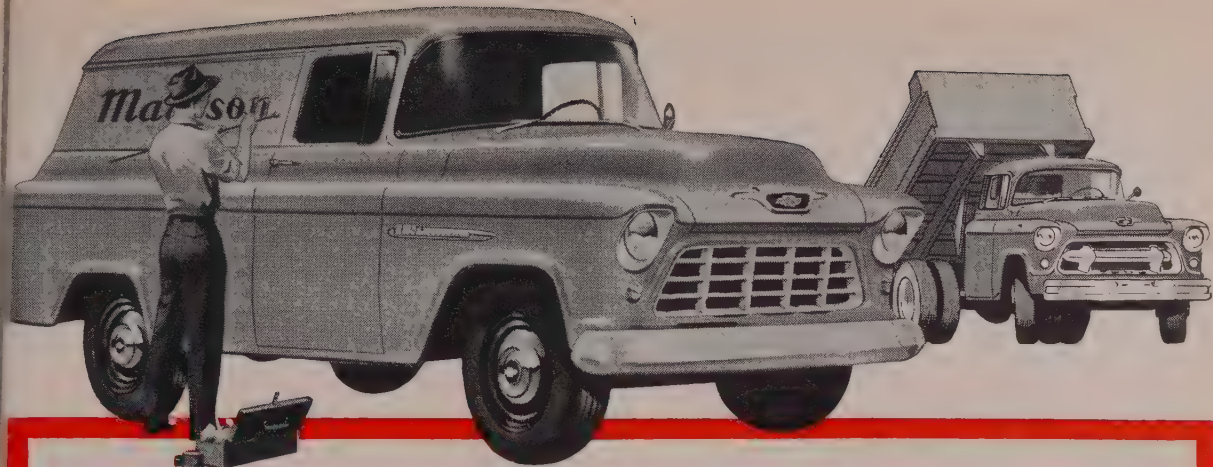
Harold N. Abelson, 47, a resident engineer on the Cowlitz Dam project of Tacoma, Wash., died March 26 at a local hospital.

* * *

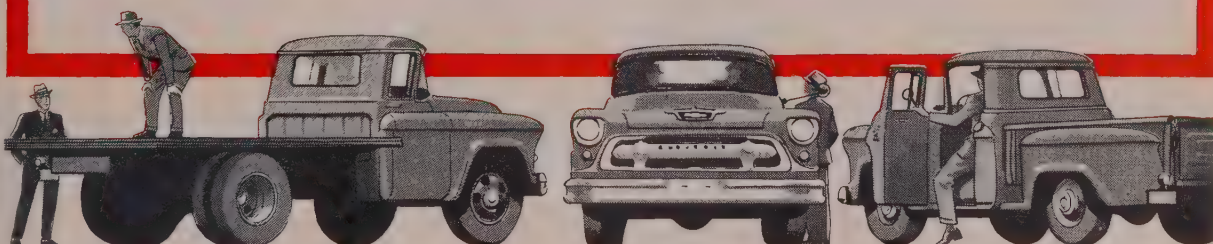
James H. McKay, retired civil engineer for Union Pacific Railway Co., died recently at Spokane, Wash.

* * *

William Todd, 48, contractor of Riverton, Wyo., died recently of carbon monoxide poisoning. The death was ruled accidental.



They're setting the pace for the whole industry! Take a good look at them here... in the showroom... on the road. It won't take you long to discover that these are the most modern trucks on any job.

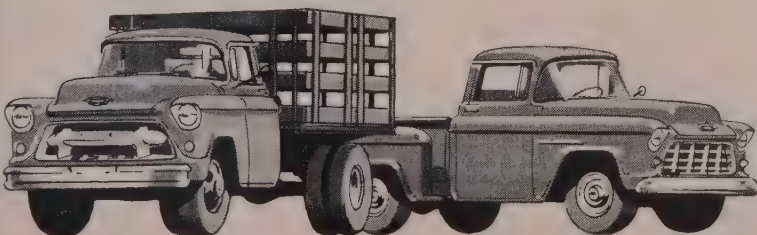


New 18,000-lb. G.V.W. capacity

The highest ever for Chevrolet! And that's good news for everyone with heavy hauling to do. For with this hefty hike to 18,000 pounds Gross Vehicle Weight, Chevrolet brings its famous economy and dependability to new heavy-duty fields.

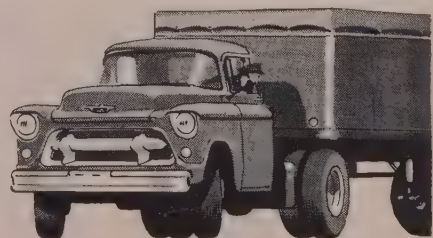
A cab as new as the view

New Sweep-Sight windshield—plus more glass all around—for a wider, safer view. New High-Level ventilation for greater driver comfort. New softer seats. New, more durable cab construction. New concealed Safety Steps that stay clear in all weather.



Power Brakes standard on 2-ton models

This great power helper increases driving safety... reduces driver effort. You stop with up to one-third less pedal pressure—and you do it right now! Chevrolet Power Brakes are standard equipment on 2-ton models—optional at extra cost on all others.



There's more to tell, a lot more

Stop in and let your Chevrolet dealer give you the complete "all-new" story. There are many more good things to discover about the New Chevrolet Task-Force Trucks!... Chevrolet Division of General Motors, Detroit 2, Michigan.

SUPERVISING the jobs

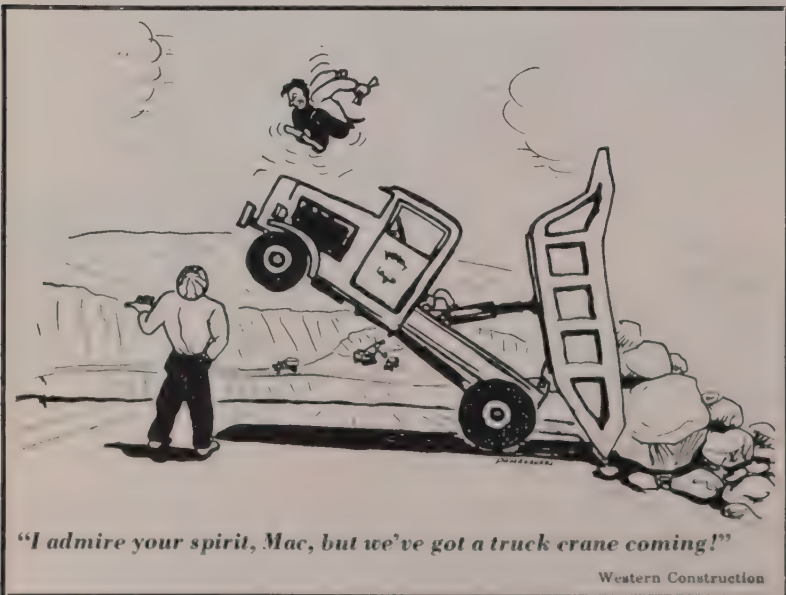


Fraser Neff Thompson Otti Kinsey Henningsgard
Roberts Schmidgal Soyster



Woodstock Hedlund
Lehmkuhl Broderson Frederickson
Fortune Walters Beck

Down-time By Domagalski



"I admire your spirit, Mac, but we've got a truck crane coming!"

Western Construction



Yale Mapes

Headed by M. J. Kinsey, project manager, here are some of the important men working for L. E. Dixon Co. on erection of a cement plant 9 mi. west of Mojave for the California Portland Cement Co. General superintendent: S. D. "Stan" Fraser; job engineer: Ed Brenizer; office engineer: Dick Soyster; office manager: H. L. "Jiggs" Schmidgal; purchasing agent: George Henningsgard; master mechanic: Tony Freitas; superintendents: Ed Koopman, excavation; Bob Roberts, mill; Ray Otti, "Whitey" Neff, and Jim Thompson, area. Foremen: Charles E. Peregoy, general concrete; B. E. Denny and Herman Black, concrete; Gabe Harris, concrete labor; J. C. Lanier and R. Quesnell, concrete finish; Lyle Dalton, Daniel Stone, M. R. Luke, Jess B. Watts, Oscar J. Fristad, William Harbin, and Paul Blalock, carpenter.

Working for Bigge Crane & Rigging Co. on a subcontract are Ed. A. Hedlund, general superintendent, and Cecil Woodstock, assistant superintendent. And Ray Lehmkuhl, expeditor; George Broderson, office manager, and the following foremen: Al Walters, general rigger; Lyle Woodside, general millwright; Fred Frederickson, Paul Beck, and Walt Fortune, rigger; Tim Webster, Bill Edwards, and Ray Green, millwright.

On a subcontract for silos held by MacDonald Engineering Co. of California here are some of the principal personnel: General superintendent: W. M. Reynolds; assistant superintendents: F. J. Granger and Paul Beach; office manager: C. G. Jolly; timekeeper: W. R. Daily; carpenter foremen: Al Dawson, F. E. Granger, Jim Ford, I. L. Brown, and C. C. Link; ironworker foremen: J. H. Dennison and S. C. Sanford; cement mason foremen: Gregory Contreras and F. I. Hatcher; labor foremen:



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S-A Traveling Stackers

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This "small" stacker, built by S-A for installation on the West Coast, stockpiles material along both sides of a long belt conveyor. A traveling hopper and feeder reclaims it, and the stacker then delivers it to hoppers for weighing and bagging. It does the whole job with smooth efficiency that reduces cost per ton handled. In this case the product is coal, but it could be *any* material from aggregate to phosphate rock.

An S-A pan feeder, receiving from a track hopper, loads 170 tons per hour onto a long belt conveyor running parallel to the storage pile. The S-A traveling stacker, moving back and forth along the belt, transfers the load to its own 80-foot, suspended boom. A 30" wide belt conveyor on the boom discharges to storage. The boom pivots to form storage piles on both sides of the belt, and can be raised or lowered to reduce breakage and dusting.

In recovering from storage, a tractor mounted scoop picks up from the pile and discharges into a traveling feed hopper, which also moves back and forth along the main conveyor belt. A 30-inch pan conveyor under the hopper feeds to the belt via a pivoting chute. The stacker discharges to steel hoppers that feed to weighing and bagging.



Filling portable reclaiming hopper. Pan conveyor under hopper delivers to the main belt conveyor.



Big fellow. This S-A traveling stacker piles phosphate rock 7 stories high, 635 TPH. Big or little, S-A stackers and integrated conveying systems keep stock piles up, handling costs down.

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M. H. Galloway and W. H. Winder.

Scott Co. has a subcontract for process piping, heating, plumbing, and ventilation. C. R. Manwaring is project manager; J. A. Yale, general superintendent; Frank Mapes, assistant superintendent; and Jess Yates, foreman-process.

Work started on this plant in early December last year and is expected to be completed this September.

* * *

Elmer G. Bergmann is general foreman for Western Electric Construction Co., prime contractor on the construction of a relay house, switchyard addition, tunnel, and spur track at McNary Dam, Umatilla, Ore. Others on this important work, which is being executed under the general direction of George B. Schetky, owner-manager of the contracting firm, are Kelly C. Wellington, engineer, and Foster O. Bither, foreman. To date, this is the largest substation job the Bonneville Power Administration has put out for contract.

* * *

A. J. Schwitters, superintendent, and W. L. Bergman, project engineer, are the top team on a \$815,944 contract held by S. S. Mullen, Inc., for construction of a 2-story, reinforced concrete-steel classroom and gymnasium addition to a high school in Kodiak, Alaska. This 420-day job got under way Mar. 15.

* * *

C. W. Ashworth is superintending for Pioneer Constructors a 9.4-mi. stretch of grading and surfacing on the Bush highway at Mesa, Ariz., a \$207,224 job estimated to take 90 days.

* * *

Edward C. Reiter, project manager; Vuril R. "Blackie" Golden, general superintendent, and D. "Tex" Williamson, carpenter foreman, are employed at Kenai, Alaska, by M. R. Smith who last Dec. 23 was awarded a contract for construction of family quarters costing \$1,082,589. Actual construction was scheduled to start as soon as weather permitted, probably the first of April. Completion date is put at Feb. 1, 1956.

* * *

Doyle Matthews is handling the excavation for George Pfeiffer and Arnold Pontius, who recently won a \$200,000 award for earthwork and structures on the west part of Block 14, Columbia Basin Project, Wash. At press time, names of all supervisors were not at hand. However, George Pfeiffer himself will superintend the pipe laying and structural excavation, while Arnold Pontius will superintend concrete and metal work.

* * *

United Contractors, Inc., headed by Guy Reid, president; Buck Newberry, vice president, and Ralph G. Reid, secretary-treasurer, recently received a \$166,731 award for grading and draining 6.6 mi. of roadway on Route 93 between Congress and Kingman, Ariz. Guy Reid doubles as general superintendent for the com-

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FRONT ROW—Sitting, l. to r.: **Milton Crane**, Euc skinner; **Elmer Finwick**, spotter; **Jake Coffee**, truck foreman; **J. R. Williams**, lube foreman; **Virgil Carpenter**, cat skinner; **"Blackie" Costner**, shovel foreman. **CENTER ROW**—**Bill Wilkerson**, shovel oiler; **Tommy Doffern**, Euc skinner; **Gene Wathen**, truck spotter; **Don Fulton**, Euc skinner; **Tommy Jenkins**, cat skinner; **Alex Bonderenko**, Euc skinner; **Jim Flory**, shovel operator; **George McBride**, spotter. **BACK ROW**—**C. E. Eisenhour**, monitor operator; **"Lucky" Rushing**, Euc skinner; **Bert Charlie**, shovel operator; **Vic Herde**, cat skinner; **George Keosky**, Euc skinner; **Elvin Rogers**, dumpman; **Tom Owens**, spotter; **Jack Churchill**, Euc skinner, and **Lee Kirkman**, lube superintendent.

Cherry Valley Dam operations will soon roll

Shown above are those working on the day shift quarry excavation crew at the dam. As for current progress, here is what **A. H. Steiner**, project manager for the **Guy F. Atkinson Co.**, has to say.

"Here at **Cherry Valley Dam** we have carried on all winter. On about November 15, 1954, the elements forced us to stop impervious fill operations, but we have been able to continue throughout the winter working the rock zones of the dam

with a small force of about 160 men.

"At this time the impervious section of the dam is 51% complete and the rock sections are about 56% complete. This means that the dam is 150 ft. high with 160 ft. to go this season. We have placed about 1,500,000 cu. yd. of impervious core and over 2,000,000 cu. yd. of rock fill. As soon as the weather allows, we will start operation in full force again on a fast schedule that will complete the project late this fall of 1955."

pany and is assisted on this job by the following foremen: **Roy E. Hale** and **Thomas J. Byrne**, road equipment; and **J. E. McGalliard**, cement.

* * *

Henry Flechsing, general manager, and **Jack D. Flechsing**, superintendent, of the contracting firm of **H. Flechsing & Sons**, are the key men who will put through the construction of a 7-span, 1-beam bridge across **MacLaren River** on **Denali Highway**, and a 60-ft. 1-beam bridge over **Rock Creek**, in **Alaska**. **George Hampton** is pile-driver foreman for this \$130,327 job. Work will actively get under way about May 15, and is expected to take 105 days.

* * *

Robert Phillips is superintending for **Jack Parson Construction Co.** a \$507,279 roadway job including a 30.5-ft. bridge on **S.H. 39**, between **Springfield** and **Riverside** in **Bingham County, Ida.** Foremen are: **Grant Collett**, grade; **W. J. Parson**, pipe; and **LaMar Jones**, fence. Contractor started work April 1; expects to finish the job in 200 days; has the fol-

lowing equipment working at the site: 8—DW20s, 5—D8 Cats, 1—TD24, 1—80D shovel; 1—500-ft. compressor; 2—wagon drills; 4—12 patrols; 12—trucks; 2—4,000-gal. water trucks; 1—46 VE Pioneer crusher; and several types of rolling equipment.

* * *

H. E. Schroeder, project manager; **J. Sawyer**, project superintendent, and **J. V. Hayden**, project engineer, comprise the key supervisors for **Schroeder & Co.'s** \$611,517 contract for 4.5 mi. of grading and surfacing and miscellaneous construction on **Foothill Blvd.** between **Tujunga Canyon Blvd.** and **Cypress Drive** in **Los Angeles County, Calif.** Work started April 11 and is expected to close this coming October.

* * *

Bernhard Tullinen, superintendent for **Einer M. Peterson**, is working on a recent contract award to this contractor for **Schedule C**, utilities to service **A10 buildings** at **Elmendorf AFB**, **Anchorage, Alaska**. **Tullinen** is being assisted by **Al Saulsbury**, labor

foreman; **Cliff Johnson**, construction foreman, and **Kenneth Braucht**, mechanical superintendent. Starting date was April 1; length of job 150 days.

* * *

Arne Gulbranson, gravel superintendent, and **Sidney E. Thorson**, asphalt superintendent, head the base course surfacing and miscellaneous work being done by **Summit Construction Co.** on 13.4 mi. of the **Up-ton-Hay Creek road** in **Weston County, Wyo.** This \$218,125, 100-day job started April 15.

* * *

Frank Kunze is superintending the construction of **Division 1** of the **Chandler main canal**, **Kennewick Division**, **Yakima Project**, **Wash.**, for **Lewis Hopkins Co.** which received the contract on a bid of \$773,312. **Charles Harmon** is job engineer. This is a 400-day job which started Feb. 25. Assisting as foremen are: **Leo Haines**, concrete; **Cliff Emmons**, excavation, and **"Red" Rogers**, carpenter.

* * *

Roy Win, project superintendent, and **R. A. Ralston**, project engineer, are top men for **Mead & Mount Construction Co.**, which is presently constructing a 3-story brick women's dormitory at the **University of Colorado, Boulder**. Bid price was \$633,000; starting date, March 5; job length 500 days.

* * *

Arnold Blair is superintending a grading-draining and base-mix surfacing job on three sections of **U. S. Route 60**, **Globe Show Highway**, about 43 mi. northeast of **Globe, Ariz.**, a \$283,148 contract which has been under way since Feb. 11 by **Isbell Construction Co.**, and scheduled for completion July 15. Other key men are **Joe Baxter**, foreman, and **James E. Evans**, timekeeper.

* * *

Thomas J. Collins, superintendent, and **Fred Sutter**, engineer, are key personnel for **Kitchell-Phillips Contractors, Inc.**, on a \$240,575 contract for installation of new water mains and fire hydrants in east side of **Phoenix, Ariz.** A 180-day contract, work has been under way since Mar. 14.

* * *

E. B. Potter, project manager; **George M. Schweizer**, project engineer; **William "Bill" Anderson**, general superintendent; **Jack Good**, drill and powder superintendent; **Mark Harris**, office manager; and **Jack Forslund**, master mechanic, are principal supervisory personnel working for **Morrison-Knudsen Co., Inc.**, on the job of relocating 14 mi. of **S.P.&S.** railroad line on the **Washington shore** of **The Dalles Dam Project**. This job, which went to **M-K** at a cost of \$2,407,076, involves 1,250,000 cu. yd. of rock excavation and 350,000 cu. yd. of common excavation. Job started Feb. 14, and is expected to take 540 days to complete.

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Johnson

Bill Silberberger

Muncey

Jones

Bill Silberberger and John Silberberger are acting as general superintendent and assistant superintendent respectively on a roadway and bridge project for the California Division of Highways. Work is located from Winterhaven to the Colorado River and was awarded to the joint venture of Silberberger Constructors and J. B. Stringfellow Co. at a cost of about \$387,000. Other important men for the contractor are F. J. Silber-

berger, carpenter foreman; Boyd Muncey, piledriver foreman; Bob Neeley, master mechanic, and Bob Wells, labor foreman. Carl Johnson and Glenn Jones are operators, Johnson on the compressor and Jones on the crane. Work started in mid-February and is expected to be finished the end of the year. For the state, resident engineer on the bridge is A. K. Gilbert, and on the highway Gene Cornelius.

Owen Jensen and Hans Wooye, foremen, are two key men for Read Construction Co. on a \$126,062 contract for surfacing, chip seal coat, and miscellaneous work on 19.1 mi. of Iron Mountain road in Laramie

County, Wyo. Work is just starting and is expected to be finished in 80 days. On another job in Goshen County, Robert Read is acting as foreman. This recent award in the amount of \$138,112 is for grading,

draining, and surfacing, 3 concrete culverts and miscellaneous work on 6.1 mi. of the Lingle-Torrington road. Work started Mar. 28 and 70 days are allotted for completion.

* * *

Ewell A. Smith is project manager; Erick Fredrikson, general superintendent; and I. M. Lagerquist, office manager, for Kincaid & King and Anchorage Builders, Inc., which have a \$248,183 contract for warehouse, administration building, and miscellaneous construction at Elmendorf AFB, Alaska. Work is expected to be finished about Aug. 1.

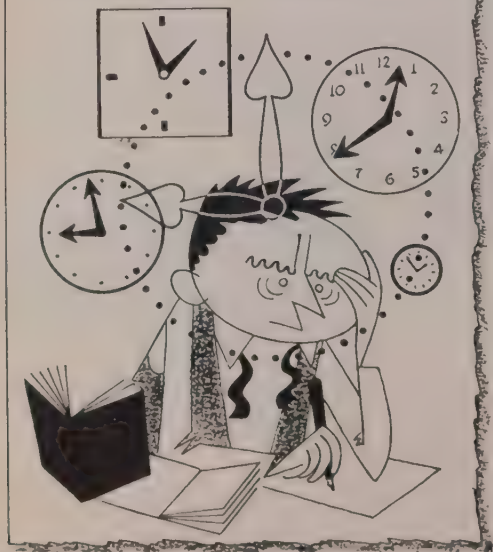
* * *

M. J. Ruddy, Jr., manager; Fred H. Sattler, engineer, and LeRoy Morse, superintendent, comprise the top men on a highway contract in Stanislaus County, Calif., which was awarded to M. J. Ruddy & Son at a \$213,111 cost. Job started the first of the year, and is expected to be finished the end of July. Work involves 3.5 mi. of grading and surfacing, and is located 1 mi. north of Oakdale.

* * *

Paul Nelson, superintendent — earthwork; and Hugo Peterson, superintendent — bridge, are key men for Rogers Construction Co. who in January started work on a \$309,388 contract covering a road job in Tonto National Forest, Gila County, Ariz. The completion date is set at mid-September.

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Pete Beall Bruce Beall Thompson Mains Paulson Lacey



Ware Kincaid Harper Van Landingham Daigh

On the \$3,000,000 construction of the irrigation canal system at Well-ton, Ariz., which Morrison-Knudsen Co., Inc., has been working on since 1952, the following men are employed

under the superintendency of James E. Ricker, project manager, and L. Neal Spencer, the assistant superintendent. Charles Kincaid, field engineer; Jack Martin, office engineer;

Cy D. Johnson, office manager; Don Smith, purchasing agent; A. E. Over-son, paymaster; K. B. Mains, time-keeper. Glen S. Van Landingham is master mechanic; Pete Beall is car-penter superintendent, assisted by Bruce Beall and C. E. Thompson, carpenter foremen. Max Ware is gen-eral foreman on excavation, assisted by Bud Snowball and L. E. Bishop, foremen. Other foremen are: Leroy Paulin, concrete; James Lacey, batch plant; R. W. Harper, pipe; Fred Scales, finishing; H. E. Daigh, fill; and William C. Burns, structures. As-sisting on this job is Paulson, oiler. It is expected work will continue into 1956.

* * *

W. J. Loomis, superintendent, is handling a grading and surfacing job for Floyd Haake. Located in McKin-ley County, New Mex., work consists of grading and surfacing 3 mi. of Highway 66, Gallup-Shiprock road. Haake got the job on a bid of \$167,-454, started working Mar. 7, and ex-pects to finish by June 30.

* * *

Irvin Longenbaugh is superintend-ent, and Ray Curtis is powder fore-man on a 7-mi. stretch of grading and surfacing on the Walnut Canyon en-trance road in Carlsbad Caverns National Park, New Mex., a \$155,500 contract of H. C. Logenbaugh. Work is expected to be finished by the end of May.

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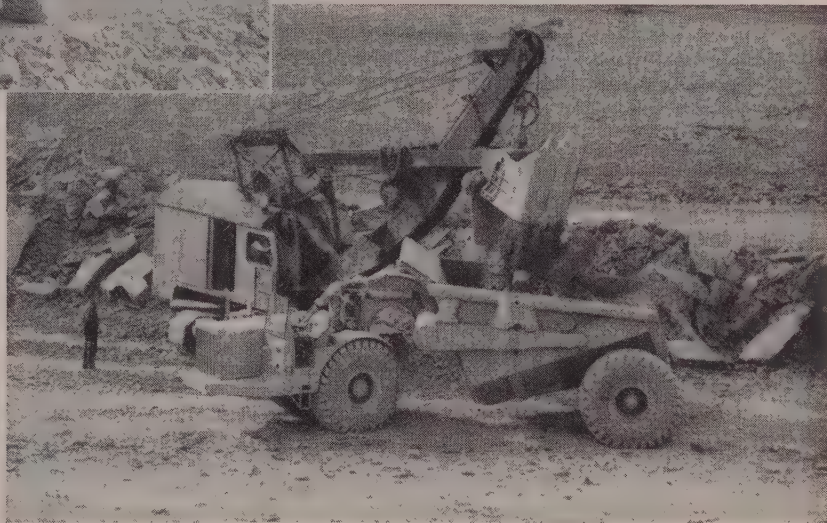
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tions which include some sections with grades up to 31%. Maintenance is reported at a new low.

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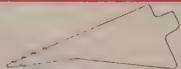




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C. F. Briggs, superintendent, is directing 0.2-mi of grading and surfacing on S.H. 8, Fisher overcrossing and approaches, an \$80,597 job located in Clark County, Wash., being executed by Natt McDougall Co., who started work Mar. 10 and expects to have the job finished in 150 days.

* * *

Clarence R. Webb, general superintendent, heads the construction personnel on the \$979,907 project which Duffy Reed Construction Co. has in Valley County, Ida. Contract is for construction of 13.7 mi. of highway and widening 2 bridges on S.H. 15, a stretch extending from Round Valley through Cascade. Other important men on the work are: R. H. Monprode, office manager; Don Turner, grading foreman, and George Kochis and J. S. Book, foremen. Scheduled for completion by mid-October, the work has been going since April 1.

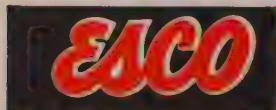


ON A MORRISON-KNUDSEN job at Winterhaven, Calif., for an access road, railroad, and gantry crane foundation excavation for a powerhouse being built for the Imperial Irrigation District, work is fast drawing to a close. Contractor personnel shown here are: l. to r.: Fred Bull, master mechanic; B. F. Schultis, job superintendent, and E. B. Thompson, carpenter foreman.

W. F. Dawes, superintendent, assisted by Talmadge Ray and Charles Edmonds, carpenter foremen, is handling the construction of a high school project in Grants, New Mex., for George Rutherford who got the award at a figure of \$647,000. Started December last year, the building is expected to be finished this coming November.

* * *

John L. Seawell, Jr., is superintendent and Mason J. Myers is master mechanic for Otis Williams & Co. which has a contract for construction

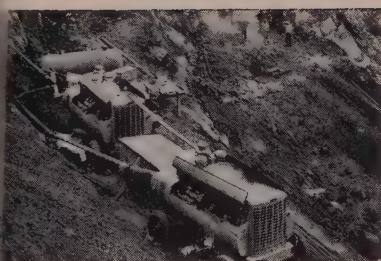


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Three "600" compressors used on the New York Thruway.



A "125" operating on roof of a Dallas skyscraper.

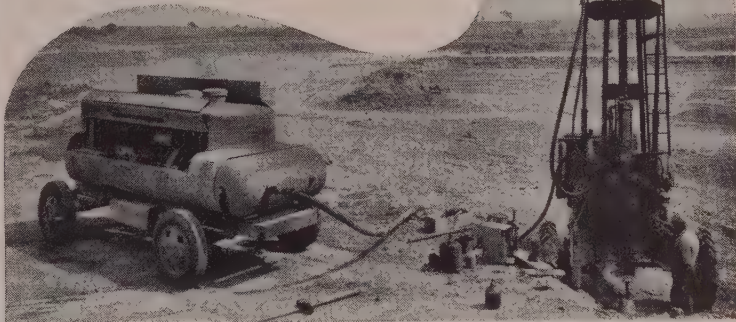


This "315" powers paving breakers on a Pittsburgh construction job.



A "600" with Joy Wagon Drills on a Philadelphia housing project.

Joy "600" compressor operating a Joy Challenger Hammer Drill in a New York crushed stone quarry.



JOY PORTABLE COMPRESSORS

...efficient, dependable
in all kinds of service

You'll find Joy Portable Compressors on a variety of jobs, in all parts of the world. Check the owners . . . you'll get reports of consistently fine performance and complete dependability from the tried and true design.

Joy's background of 45 years in the portable compressor field has paid off in the development of these many fine features found in all Joy portables:

FOR PERFORMANCE Low-lift, large port-area, "direct-concentric" valves. Efficient air cooling, cross-flow intercoolers, matched engines, full force-feed lubrication to every bearing and working surface.

FOR DEPENDABILITY Oversize receivers, main bearings and starting equipment. Three-point engine-compressor suspension, rifle-drilled connecting rods and lightweight pistons. Welded steel frames and "bulkhead" body construction.

Five sizes are available—from 75 to 600 cfm. For details on how you, too, can benefit from Joy's field-proved design, write for free bulletin #A-55, to Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario



Consult
a Joy
Engineer

JOY

CONSTRUCTION EQUIPMENT MANUFACTURERS
FOR OVER HALF A CENTURY

Servicised Products

for BRIDGE and GRADE
SEPARATION PROJECTS

Concrete bridge and grade separation structures are subject to unusual amounts of movement due to temperature change, traffic stresses, and settling simply because they have to be built "up in the air." The following are a few of the Servicised Products which you can specify or use which will take this movement and yet keep your job sealed against moisture and attractive in appearance.

CORK and SELF-EXPANDING CORK JOINT FILLERS

Both types are non-extruding resilient and compressible, inconspicuous in color. Cork recovers 95% original thickness after compression; Self-Expanding Cork is treated to expand 50% beyond original thickness to keep joint filled regardless of contraction movement.

SPONGE RUBBER "CEMENTONE" JOINT FILLER

Fully resilient high quality blown sponge rubber "Cementone" blends with color of concrete. Uniform thickness and density. Available in varying degrees of compressibility to meet your requirements.



MOLDED PARA-PLASTIC

For sealing keyed construction or contraction joints in vertical walls. Maintains bond with concrete at temperatures down to sub-zero. Simple installation insures a resilient, moisture-tight seal of the joint.



PARA-LATERAL STRIP

For sealing back-filled vertical construction or expansion joints in retaining walls, abutments, wing walls, foundations, tunnels, etc. against seepage to exposed side. Para-Plastic facing of strip insures permanent adhesion to concrete.



HOLLOW BULB RUBBER WATERSTOP
For permanent, watertight seals in expansion joints where a high degree of expansion and contraction is expected.



FLAT DUMBELL TYPE
Flexible, elastic rubber with very high tensile strength for sealing construction joints.



SPLIT DUMBELL TYPE

Faster to install . . . eliminates split forms (1) Nail to bulkhead in form of a "T" (2) Section is poured and bulkhead stripped. (3) Divided section is joined together by stapling or with rubber cement.

ASPHALT PLANK

Servicised Mineral Surfaced or Standard Plank is resilient, quiet, long-wearing. Widely used on bridges, underpasses and grade separations as a wearing surface or as a waterproofing protection course.



Write for details on these Servicised Products and your copy of the complete catalog.



Servicised Distributors

The Frank D. Gaus Company, Long Beach 6, Calif.
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Santa Fe Builders Supply Co., Albuquerque, N. M.
Santa Fe Builders Supply Co., Santa Fe, N. M.

of 9.4 mi. of main canal and structures on the Kennewick Division, Yakima Project, Washington. This \$526,731 job started Jan. 15 and will probably close the end of this year.

* * *

Dick Watson is general superintendent for Gem Construction Co. on 5.1 mi. of roadway and surface treatment work and 8 bridges on S. H. 46, in the vicinity of Camas, Ida. Foremen are Delos Bowman, grade, and Rex Pepper, pile. Job has been working since last December and will probably end Oct. 1 this year.

* * *

Ben Melcher, superintendent, and Milt Creager, foreman, are important men working for Rothschild-Raffin & Weirick on the erection of a building for the De Laval Steam Turbine Co. at Millbrae, Calif., at a cost of less than \$300,000. Completion date is July 1955.

* * *

Malvin Piombo, Raymond Piombo, and Arthur Bresnan have formed a new excavating contracting firm with headquarters at San Rafael, Calif. Under the name of Piombo & Bresnan, this new firm is a successor to Jensen & Pitts. The three firm members were all formerly connected with Piombo Construction Co.

SAFETY

Job accidents take their toll

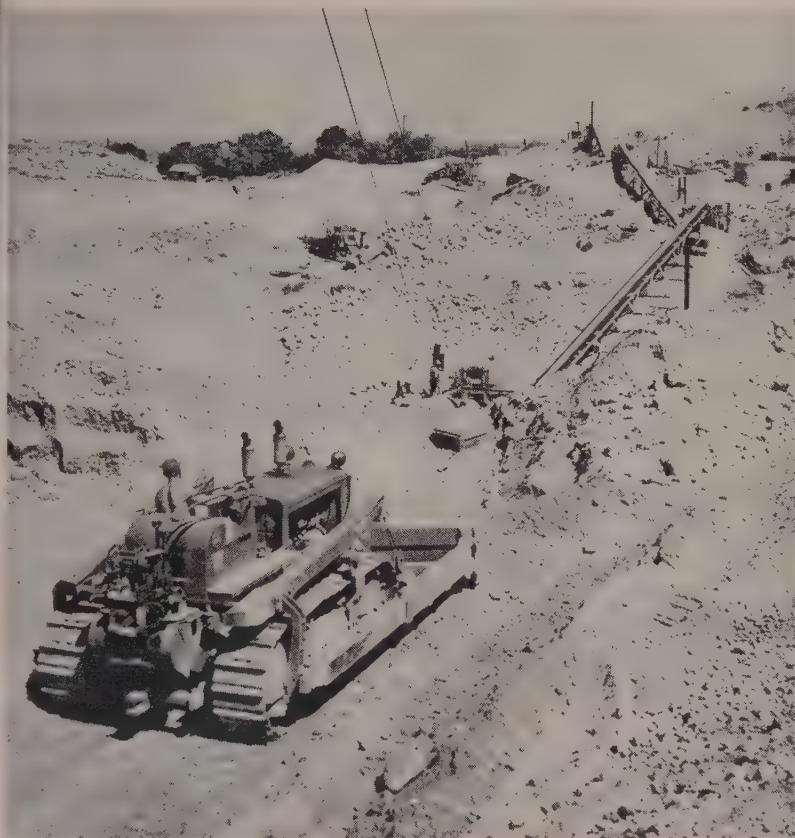
THESE were the accidents that resulted in death or serious injury on the West's construction jobs during the last reported month.

Fred G. "Pete" Tegtmeier, 68, was killed Mar. 7 in a highway construction accident at Everett, Wash. Tegtmeier, a state highway inspector, was crushed between the cab of a crane and its base. He was standing in a blind spot and was not seen by the operator. Tegtmeier was a former Snokomish County engineer and was at one time port commissioner at Everett.

Donald Webb, 30, Concord, Calif., employed by Judson-Pacific Murphy Steel Corp. on construction of the Richmond-San Rafael bridge, fell to his death from an 80-ft. tower. The weight of the 40 lb. of equipment he was wearing dragged him to the bottom of the bay.

William E. Keno was recently killed near Prescott, Ariz., when the earth-moving machine he was operating overturned and crushed him beneath, subsequently catching fire. The accident occurred at the new Hell Canyon bridge construction site.

TRICKS of the TRADES



HIGH PRODUCTION TEAMWORK PAYS OFF

Combination of a tower excavator and dozer means a production averaging over 1,000 cu. yd. daily for the A-1 Sand and Gravel of Salt Lake City. An International TD-18A crawler tractor cuts gravel from a bank 200 ft. away and pushes it to within range of the tower blade which then takes it to the hopper feeding the crusher plant conveyor system.

Goodyear tests promising new disc brake

GOODYEAR Tire & Rubber Co. is testing a new disc-type brake which shows great promise for the automobile industry. The brake is already being used on DC-7 airliners for emergency stops on takeoffs.

At 60 mph. a car can be stopped in 120 ft., about half the distance required with regulation drum brakes. There is no side-sway, squealing tires, or jolts. The brakes are skid resistant. Properly operated the

wheels will not lock and cause skidding even on wet or icy pavements.

How it works

Disc-type brakes are not new. This one was developed by Meadville Research Corp. Four metal discs are attached to the wheel hubs, parallel to each wheel. When the brake pedal is depressed, two to four buttons press against each disc and slow it to a stop. The buttons are made of an organic material which will withstand great heat and friction.

Automobile manufacturers are interested in the testing. If the brakes prove satisfactory it is possible that they would be substituted on present cars and trucks.

Dust-tight warehouse

A NEW AIRCRAFT WAREHOUSE was recently constructed in Palmdale, Calif., which was required to be completely dust tight. The building occupies 500,000 sq. ft. and is subjected to high winds and severe dust conditions. All roofing and the corrugated siding had to be securely sealed.

Engineers selected Presstite No. 579.6 sealing tape as the sealer, and, in all, 218,625 ft. of the material were used for the job. It was applied from rolls by hand, first to the lapping edge



running with the corrugation while the sheets were still on the ground. The sheets were then hoisted up to the roof and sides with the ribbons of sealer already in place. The sealer running horizontally across the corrugation was applied to already-erected siding before lapping sheets were fastened in place.

All sheets were then firmly secured by screws and rivets applied to penetrate the siding and go through the ribbon of sealer into the steel cross members.

Architects and engineers for the job were Daniel, Mann, Johnson, and Mendenhall; prime contractor was Vinnell Co.; and sheet metal subcontractor was George D. Widman, Inc., all of Los Angeles.

Take a breather on that uphill run

CRAWLER TRACTORS are designed to work in all kinds of terrain and in adverse conditions. Many times, however, unusual operating conditions will require special attention to transmission. Slightly different operating procedures are also necessary to keep the tractors performing at maximum capacity. Here's a trick from the Caterpillar people:

Many of the smaller machines have splash lubrication systems for the transmission and bevel gear compartment. When operating on extreme slopes, the top shaft bearings in a transmission do not receive as much lubricant as they would if operating

on level ground, and bearing life may be shortened.

When a tractor is to be operated for a long time under these conditions, extra oil should be added to the transmission to extend the bearing life. If extra lubricant is undesirable or is not immediately available, the operator should maneuver the tractor sideways occasionally to increase the lubrication. Experience with many machines which work on steep slopes indicates that such sidewise maneuvers performed every 500 to 1,000 ft. measurably extend transmission bearing life.

Crawlers that are equipped with force-fed lubrication systems in the transmissions will also benefit from added transmission oil or sidewise maneuvers when they are operated down slopes for extended periods of time.

With more attention to the tractor that has to be operated under abnormal conditions, an operator can add considerably to the life of his machine. This special care will shorten down-time and minimize operating costs.

"Hard-nosed" grinder rest



WHEN THIS TOOL maintenance man found the steady rest of his grinder wearing away—giving him a hard time in reproducing proper grinds on carbide chipping and finishing tools—he "fought" carbide with carbide. He licked the problem by brazing a standard Carboloy grade 883 carbide tool blank to the rest. Now, hundreds of tool grinds later, the wear resisting carbide "nose" is still as effective as the day it was joined to the standard rest.

Concrete sealer both pumped and troweled

ENGINEERS working on a channel lining in Johnstown, Pennsylvania, recently were faced with the problem of effectively sealing concrete paving



Movable light towers speed work on M-K job

MORRISON-KNUDSEN CO., INC., Boise, Ida., and Landers & Griffin Co., Portsmouth, N. H., recently were awarded the grading and paving contract for a \$46,000,000 air base and were faced with the job of moving 4,500,000 cu. yd. of excavation in a short period.

In addition to lining up a large spread of earthmoving equipment to do the mammoth job in the allotted time, the contractors had to find ways to keep as much manpower as possible assigned to available equipment. They solved the problem by improvising eight portable light towers and found they could keep 450 men at work in two 8-hr. shifts.

Each tower is mounted on four

wheels and houses a 10-kw. electric plant manufactured by Kohler Co., Kohler, Wis. There are eight 1,000-watt lamps surmounting each of the eight steel towers. A truck can be hitched to any of the towers and can easily pull the unit to a designated location in a matter of minutes. This is important considering that the main runway is two miles long, the four taxiways are 900 ft. long and about two thirds of a mile apart, and the parking apron 8,300 ft. long and 1,000 ft. wide.

The generators selected for the job have a capacity of 10,000 watts and operate at 115/230 volts. They use gasoline for fuel and operate at 1,200 rpm. Their net weight is 1,550 lb.

joints which lay at a 45-deg. angle.

The original sealer had deteriorated so that water through the expansion and contraction joints was becoming critical. The joints are $\frac{1}{4}$ to $\frac{3}{4}$ in. wide and 3 in. deep, and 50 to 84 ft. long on 25-ft. centers. Because the joints lay at a steep angle, engineers required a sealer that would not sag or flow during application or in high temperatures. To meet these requirements they selected Presstite No. 77 cold-applied sealing compound.

Slope was no problem

The sealing job began by routing out the old sealer and thoroughly cleaning the joints with an air hose. Then the rubber-base ready-mixed Presstite sealer was pumped directly from its shipping drums into the joints and through a material hose equipped with a nozzle. A special

troweling device attached to the nozzle made neat, smoothly-sealed joints. A compact truck unit towing all necessary equipment moved along the top of the channel lining.

Engineers for the job were U. S. Army Engineers. Contractor was Robel Construction Co.

125 shovel-crane tips

A NEW BOOKLET priced at 15¢ has been published by the Power Crane and Shovel Association, 74 Trinity Place, New York 6, N. Y. Entitled 125 Ways to Better Power Shovel-Crane Operation, the booklet is designed for operators of cranes, shovels, draglines, clamshells, and hoes. It is illustrated by cartoons and covers such topics as safety, cables, hauling equipment, crawler mountings, and techniques of efficient operation. Included is a page of suggested hand signals.



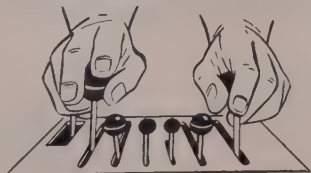
K-580 SHOVEL MOVES ROCK FASTER—operator works with greater speed and safety because of greater “live” weight built into every Link-Belt Speeder. All-welded, stress relieved

construction gives greater strength per pound. Alloy cast-iron clutch shells assure superior friction, longer lining life. Independent rapid boom hoist has power control up and down.

Now every Link-Belt Speeder shovel-crane has ***Speed-o-Matic***®

—no lag, no jerk,
no strain—

**IT'S FULL POWER
HYDRAULIC CONTROL**



Today Speed-o-Matic controls are *standard equipment* on every size rig in the entire Link-Belt Speeder line! Full power hydraulic control is your key to 25% extra production . . . more consistent profits in the ½ to 3-yard, 6 to 60-ton work range. Here's why:

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Join thousands of alert owners who are making more money with Link-Belt Speeders. Contact your Link-Belt Speeder distributor for details. LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa.

13,731

LINK-BELT SPEEDER

Builders of a complete line of crawler and rubber-tired shovel-cranes

Rolling power plant has two emergency purposes



WHEN THE Alameda County, Calif., Road Department recently purchased a diesel electric set to provide standby power at its corporation yard No. 1 in Niles, it converted the new set into a "double threat," making it mobile so that it stands ready to be rushed to any place designated by Civil Defense authorities in the event of an emergency in the San Francisco Bay.

The self-regulated set, consisting of a 53-hp. Caterpillar diesel engine and 21-kw. rated generator, is mounted on a John Deere wagon frame with spring bolster and six-ply rubber tires. The rig may be readily hitched to road department motorized equipment for moving to other locations with a minimum of delay.

The unit is normally housed at the No. 1 corporation yard in a corrugated metal building which also shelters the entrance facilities of purchased highline power. In the event of power failure the generator set can quickly take over the corporation yard's electrical load.

The electrical control and distribution panel was built by the Columbia Electric Manufacturing Co. of San Francisco and all metal work was by the F. H. Dailey Co. of Oakland. The complete unit was designed and assembled by Peterson Tractor & Equipment Co., Caterpillar dealer for the Bay Area.

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Tight schedules and rugged use of equipment have marked the construction work of Peter Kiewit Sons' Co. and Fredericksen & Kasler at Castle Air Force Base near Merced, Calif.

With but 400 days allotted to complete paving of runways, aprons and dispersal areas, the two general contractors are relying heavily upon Mobil products and service to keep their equipment in good working order.

A complete gravel plant with an output of nearly 500 tons per hour has been set up at the nearby Merced River to produce gravel of proper size for asphalt and concrete. Mobil lubricants have helped keep this and all other key equipment rolling every working day since the job was begun last November.

GENERAL
PETROLEUM
CORPORATION



2-1019

TOOLS of the TRADES

Use the addresses listed for further information on any of these items

A NEW FORGED brass swing joint is grooved for Victualic coupling to make installation of Hannay hose reels on fueling trucks and air compressors easier and more efficient. This groove in the swing joint will enable users to join the hub assembly of the hose reel and the source pipe end to end by the simple Victualic method, eliminating the space-taking extras used between pipe ends in installation with threaded or flanged couplings or other unions. The couplings can be connected or disconnected in seconds with a wrench. Write **Clifford B. Hannay & Son, Inc.**, 179 Main St., Westerlo, N. Y.

A POCKET-SIZED TOOL steel selector, weight calculator, and properties guide for tool steels has been released by **Bethlehem Pacific** and is now available to tool steel users in the Western states. Made in the form of a durable plastic envelope, with a slide which pulls out to indicate weights per foot according to different widths and thicknesses, the selector lists eight popular grades of Bethlehem tool steel in the tool and die group and special purpose tool steels. The selector may be obtained free from the San Francisco sales office at 20th & Illinois Streets, San Francisco, Calif.

A BALL AND ROLLER bearing ex-

tractor, Tracta, is now available from **Engineering Imports**, P. O. Box 557, Olean, N. Y. The new device is useful on maintenance applications where bearings are recessed or flush against housings or armatures. Since the bearing is gripped on the inner race, the possibility of bearing or shaft damage is reduced. Time and labor is saved because the bearing is pulled from the front and it is no longer necessary to strip a machine due to bearing failure.

SUBSTANTIAL SAVINGS in time and labor are possible with a portable 100-ton Power-Twin hydraulic tool built especially to remove and install pivot or dead shafts on International



industrial tractors T-6, TD-9, TD-6, T-9, T-14 and TD-18. The set includes a complete range of adapters to cover these models and provides a means of

bracing the tractor A-frame to avoid distortion. One man can do the complete job in a short time. For prices and complete details, write the **Owatonna Tool Co.**, 389 N. Cedar St., Owatonna, Minn.

A PIPE BAR CLAMP designed to hold bulky objects has been produced by **Grand Specialties Co.**, 3101 W. Grand Ave., Chicago 22, Ill. The clamp has a sliding jaw for adjustments and can be used either vertically or horizontally. It weighs 8 lb. and has a 15-in. opening capacity, but extensions of any length are obtainable. It has been tested to 4,500 lb. Write to the manufacturer, Dept. PC, for details.

LOADING PICK-UP TRUCKS is facilitated by the use of two devices now being made by **Hasco Manufacturing Co.**, 1111 Manzanita St., Seaside, Monterey County, Calif. The Speed-Binder secures the load, making a tighter tie and minimizing load shifting. It has a ratchet locking handle and sells for \$9.75. The Carry-All rack increases load capacity and simplifies the handling of awkward loads. Constructed of channel iron and pipe cross bars, it weighs 75 lb. and is priced at \$22.50.

"POSITIVE POWER" is the name of a pamphlet published by **M & K Manufacturing Co.**, 6069 Kearney St., Denver 16, Colo., describing its line of throttle assemblies and connectors. Specifications and pictures are given for lubricated roller-bearing throttle connectors, spring-loaded equalizer connectors, and lubricated roller bearing bell crank assemblies.

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BLAW-KNOX BATCHING PLANTS WITH AUTOMATIC EQUIPMENT

Produce more batches per hour! That's the way to make money on your batching operations. Blaw-Knox Batching Plants with automatic equipment step up the batching cycle, accurately and automatically meet exacting specifications.

Whether your job requires the speed and accuracy of automatic batching, or whether manual or semi-automatic operation is satisfactory, Blaw-Knox Batching Plants for both aggregate and cement are available in the size and type you need.

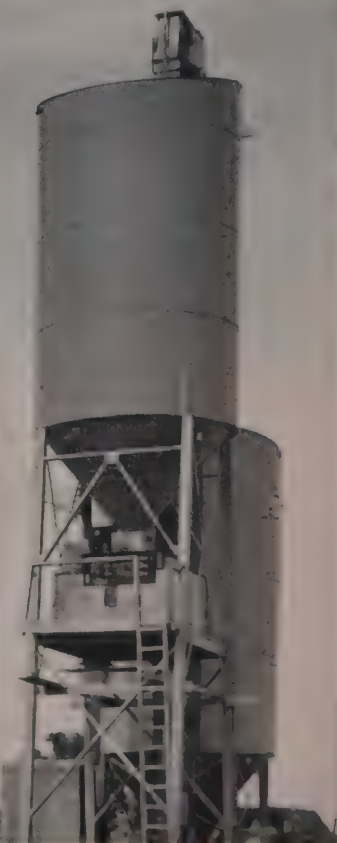
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MONT EQUIPMENT CO., Great Falls, Montana; STAR MACHIN-
ERY CO., Seattle, Wash.; Spokane, Wash.; SHAW SALES AND
SERVICE COMPANY, Los Angeles 22, Calif.—Branch: San Diego,
Calif.; TREASURE STATE EQUIPMENT CO., Kalispell, Montana;
Missoula, Montana



NEW EQUIPMENT

For your convenience in obtaining more information quickly, the manufacturer's address is provided with each review.

Superior markets simplified forms

A hammer is the only tool required to erect panel forms now being manufactured by **Superior Concrete Accessories, Inc.**, 4110 Wrightwood Ave., Chicago 39, Ill. The forms have only one working part which aligns and locks form, receives tie rod, and holds liner. The forms utilize plywood with a metal clamp rather than a steel or wooden frame. A truck can carry twice the area of forms compared with ordinary types since the new forms have an overall thickness of $1\frac{7}{8}$ in. Literature is available from the manufacturer.

335-hp. and 47,000-lb. drawbar

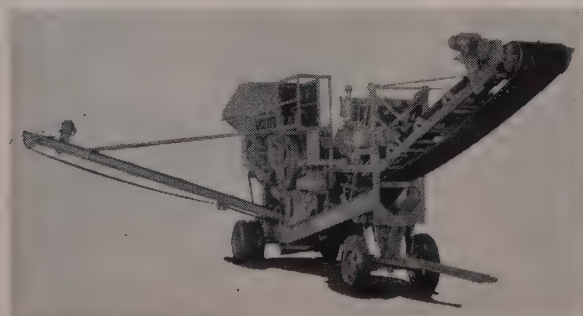
The M-R-S Model 200 tractor is designed for use with 30-yd. scrapers (push-loaded) or 18-yd. scrapers (self-loaded). It's a $19\frac{1}{2}$ -ton rubber-tired rig with 10 speeds forward up to 35 mph.



According to **M-R-S Manufacturing Co.**, Jackson, Mississippi, the big feature of the machine is a hydraulic weight transfer device incorporated in the towing hitch. This means up to 46,956-lb. drawbar effort, and a big boost in tractive effort, especially under push-loading conditions.

Portable crushing plant by Baldwin-Lima-Hamilton

A newly-designed Austin-Western, single-pass, diesel-electric portable crushing plant has been announced by **Baldwin-Lima-Hamilton Corp.**, Construction Equipment Division, Lima, Ohio. Capable of producing two sizes of



material, the plant has good application on jobs where high portability and ease of operation are required. All

components, except the crusher, are driven by individual electric motors, controlled by push button from the operator's platform.

The plant has no chains, idlers, sprockets, or clutches. It can be furnished with straight mechanical drive, if desired. The components are: a loading hopper with grizzly, mechanical feeder, double-decked inclined gyrating screen, 1024 roller bearing jaw crusher, 27-ft. delivery conveyor and a 20-ft. sand reject conveyor. The plant requires a 45-hp. engine and weighs 10 tons.

The Model B Tournapull—23 yards heaped

An old designation but a new machine. That's the Model B now offered by **LeTourneau-Westinghouse Co.**, Peoria, Illinois. It's the first entirely new rig produced by the company.

Functionally, the Model B shows attention all the way around. Here's what the manufacturer points out: 10 gear ratios for speeds from 2.4 to 28.4 mph., good for any kind of footing. Push block connects to scraper bottom as well as side sheets, for more direct pusher power where it's needed. A quick release control drops the bowl by gravity—noted to be handy for "pumping" loads of sand or other loose material. Apron lifts $6\frac{1}{2}$ ft. to assure ejection of anything. Scraper wheels track inside the cutting



edge. Drive wheels take 56% of loaded scraper weight, which means a progressive aid in self-loading the machine.

Operationally, the Model B follows the example of other machines in its line. The big item is electric controls: levers for control of bowl, apron, tailgate, throttle, shift, transfer case, and throttle. Pedals for accelerator, clutch, and brake. Steering wheel is conventional, but with power behind it. And the starter is a pushbutton.

The Model B can turn around non-stop in a 35-ft. width. It carries 18 yd. struck, and 23 yd. heaped (without sideboards). Length is $40\frac{1}{2}$ ft., width 11 ft. 8 in., height 12 ft. 7 in. The scraper is interchangeable with a 35-ton rear-dump unit. Cummins or GM diesel power is available.

Maintenance got special attention in the B design, according to the manufacturer. Major assemblies all come off separately—and fast. The transmission can be dropped in an hour. Drain and fill plugs are handy. Electric motors are out in the open for accessibility.

Highway vibrator attachment

A new side form vibrator attachment for use on concrete pavement construction has been announced by **Maginniss Power Tool Co.**, Mansfield, Ohio. The unit is designed for mounting directly on 12- or 24-ft. Jaeger or Blaw Knox concrete spreaders or Jaeger, Blaw Knox, or Heltzel finishers. It is also adaptable to telescoping type finishers. Vibrators can be mounted as much as 15 in. in from the side forms and still vibrate concrete effec-



tively at the forms. The vibrator heads are adjusted for depth, angularity, and side spacing by loosening two bolts. There are no flexible shafts or external drive units and spring mounting of the heads prevents transfer of vibration to the machine. Vibration frequency can be varied by adjusting engine speed. The attachment is supplied as a package, complete with generator, two vibrators, and all necessary mounting brackets, hardware and cables.

New diesel crawler by Allis-Chalmers

Now on the market is a crawler tractor with an 844-cu. in. engine which develops 150 hp. at 1,800 rpm. The maximum drawbar pull is 60,000 lb. New features of the tractor are a radiator guard which tilts forward and down



for easy accessibility, and a matched engine and torque converter. Comfort and visibility for the operator were of prime interest during the design. The manufacturer is **Allis-Chalmers Mfg. Co.**, Box 512, Milwaukee 1, Wis.

Rotary portable air compressor

A rotary air compressor, designed for compactness, has been released by **Gardner-Denver Co.**, Quincy, Ill. The machine will operate reliably over a temperature range of 40 deg. below zero to 115 deg. above zero. A clutch is provided between the engine and compressor so that the compressor or load may be disengaged for easier engine starting during cold weather. Field mechanics can remove all compressor vanes for inspection or replacement in less than half an hour. Weight of the compressor is 8,700 lb. It is 5 ft. 11 in. wide, 8 ft. high and 11 ft. 2 in. long. Further specifications are available from the manufacturer.

Mall markets versatile vibrator

A 6 hp. vibrator with 7,000 or 10,000 rpm. head speeds has been marketed by **Mall Tool Co.**, 7725 S. Chicago Ave., Chicago 19, Ill. No air compressor or generator is needed. Shafting is supplied in 7-ft. lengths and the ma-



chine will handle five lengths at once. The unit can be adapted to such uses as grinding, brushing, sanding, or drilling. By replacing the spindle with a sump pump, 4,500 gal. per hr. can be moved against a 25-ft. head. The price is \$440.

... the new separable FLEXCO HINGED BELT FASTENERS



U. S. Patent No. 2,477,855

- ✓ For joining grader, trencher, ditcher and other earth moving conveyor belts.
- ✓ For belts $\frac{3}{8}$ " to $\frac{1}{2}$ " thick.
- ✓ A FLEXCO fastener that is HINGED. Has removable hinge pin.
- ✓ Troughs naturally, operates through take-up pulleys.
- ✓ Strong, durable . . . pull or tension is distributed uniformly across joint.

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Light-weight, hydraulic-lift trailer

The Clement 500-H trailer is structurally designed for lighter weight and heavier payloads. With a unique arrangement of hydraulically-operated lifting arms, the unit can be used for spot, spread, and angle dumping. The dump body can be raised to the vertical position.

Dumping action is completely con-

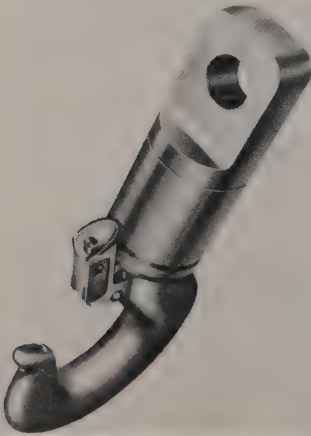


trolled from the cab, permitting the operator to combine hauling and dumping movement to get out of soft spots. This "measuring worm" principle has also been incorporated in off-highway hauling equipment.

For more information on the 500-H, contact **Clement-Braswell, Inc.**, 505 First National Bank Bldg., Shreveport, La.

It locks closed—or open

The Miller swivel line, manufactured by **General Machine & Welding Works**, 1100 East Second St., Pomona, Calif., now includes a positive



safety latch. A spring-operated bolt holds it closed. Or, if desired, the spring-operated hinge holds it open.

The latch is claimed to effect a 10% larger and more convenient opening. It is adaptable to existing swivel-hook assemblies by Miller. Latch prices range from \$2.85 to \$9.60, f.o.b. Pomona.

What's the gradient?

Structure heights and gradients are easily determined with a new hand instrument known as the Haga altimeter. It's an optical gadget, with



5 calibrated scales that do your computations for you. Small as it is, it comes with attachments: a small range finder is available.

Detailed information and descriptive literature are available from **William F. Wolff**, 3106 Champion St., Oakland, Calif.

Siding has shiplap joint

Shadowgroove, a panel siding of 5/16-in. tempered Presdwood has been announced by **Masonite Corp.**, 111 West Washington, Chicago 2, Ill. The grooves, spaced 4 in. on center, give the panels the appearance of vertical board construction. The panels may be nailed directly to studs, or over sheathing.

Challenge 1955 truck mixer line

The new Challenge "Pacemaker" truck mixer is guaranteed to mix one-half yard more concrete than the rated capacity. It comes in six sizes: 3-, 3½-, 4-, 5-, 5½-, 6-, 6½-, and 8-yd. capacity.

Among the features of the new truck mixer are: Shorter overall length, moving the center of gravity forward for shorter wheelbase truck.



Larger drum diameter. Heaviest drum in the industry made with 3/16-in. high-tensile abrasion- and corrosion-resistant steel plate. A 3/16-in. mixing blade of high tensile steel plate. A "Mixometer" that shows the number of drum revolutions per minute with recommended speeds for best charging, mixing and agitating. New "L shape" discharge blades to speed up pouring operations. Exclu-

sive secondary discharge fins that smooth out flow of concrete, eliminating surging. Two-speed operation with standard industrial transmission. For further detailed information write **Cook Bros. Equipment Co.**, 3334 San Fernando Road, Los Angeles, Calif.

Self-propelled wheelbarrow

The next thing will be a shovel with a built-in foot! Right now it's the **Worthington Workhorse**, a wheelbarrow with a 4-cycle, 2½-hp.



motor. And it will carry a 400-lb. load up a 16% grade.

The Workhorse has 2 drive wheels centered under the load, to prevent tipping. A rear caster wheel does the steering. The barrow tray is balanced and held down by a simple catch, so that dumping is easy.

Literature on the workhorse is available from **Worthington Mower Co.**, Stroudsburg, Penn.

Tractor winch has many features

Now in full production is a new "E" series model of the Carco tractor winch. From a control knob on the side of the winch an operator acting as his own winchline handler can control the free-spooling from the ground. Pulling out the single control knob disengages the cable drum, allowing it to run free of gears, turning by itself. For two-man operation the usual power reverse is operated by controls in easy reach of the seat. A semi-automatic braking system has also been designed, giving complete control of the lead at all times—eliminating the need for simultaneous operation of both clutch and brake by the driver. Other improvements include a larger cable drum and greater line capacity, closed brake for longer lining life, less over-all weight, and covered control cables.

Six operational line speeds are offered, with five forward speeds on the bare drum. Optional is the three-roller fairlead and combination coupler. **Pacific Car & Foundry Co.**, Renton, Wash.

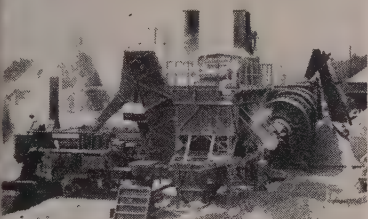
Change in Kohler engine line

A development in the Kohler air-cooled engine line is Model K160R. The engine is equipped with a reduction unit providing a 6:1 reduction

ear ratio for applications requiring low power-take-off speeds. Clockwise or counter-clockwise crankshaft rotations are available. The K160R weighs 88 lb., includes rotating grass screen, oil bath air cleaner, flyball governor, and dust-proof and moisture proof braker point assembly. Write to Kohler Co., Kohler, Wis.

200-ton per hr. portable plant

A twin-shaft pugmill mixer is the main spring of a 200-ton per hr., continuous-mix, portable asphalt plant now in production at Barber-Greene Co., 400 N. Highland Ave., Aurora,



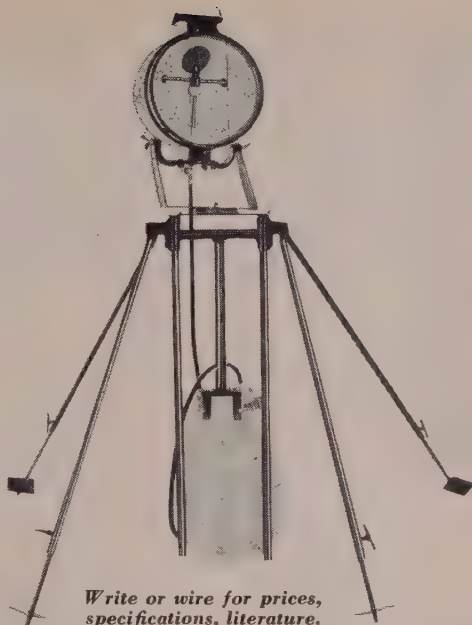
Ill. Both the dryer and mixer are rubber tire mounted and equipped for semi-trailer towing. Providing screening and separation of the aggregate after drying, for high-type mixes, is a gradation control unit utilizing a deck and flat screen. Four-bin separation is provided. A dust collector, also rubber-tired, completes the plant.

Williams compression brake system

Braking of heavy trucks by motor compression—the Williams system—has been developed by Power Brake Equipment Co., 1632 SE 11th Ave., Portland, Ore. Basically, the unit converts the truck engine into a low pressure air compressor which slows down and holds back the vehicle. The system enables trucks to roll up and down hills in the same gear, resulting in less fatigue and more uniform control. The device is easily installed and costs are soon regained in safety, less road time, and reduced wear to truck and motor parts.

Grizzly screen attachment for loaders

A grizzly screen attachment, suitable for installation on all hydraulically-operated Austin Overshot load-



Write or wire for prices, specifications, literature.

FLOODLIGHT PROJECTOR

For Night Lighting

The BL-64 propane floodlight is a self contained, totally weatherized unit, rugged in construction and completely portable. Will provide a clear, white light of approximately 6000 c.p. for 50 hours when operated at maximum pressure (15 #). At lower pressures, capable of giving workable lighting for 150 hours or more. Operating pressure can be controlled from 1/2 to 15# as lighting needs require. The BL-64 can be instantly lighted with a match. Is unaffected by weather and will operate in temperatures to 45 degrees below zero. Available with or without telescope stand.

At left—Til-Lee Floodlight projector mounted on a 4 ft. to 8 ft. telescopic stand with revolving base. Diameter of reflector 14 inches.

Selected Dealer Territories Are Now Being Set Up in the Western States.
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CABLE ADDRESS: "LEELIGHTS"

EQUIPMENT?

That's the feature of *Western Construction* next month. It's the

8th Annual Highway Issue

Read *Western Construction* in June to find out (for instance):

What's doing with tailgate patchers in Idaho.

What's wanted in snowplowing power in Colorado.

What's available in vibratory compaction from Vibro-Plus Products, Inc.



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gives you the ideal arc

AC and DC

for every welding job

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Idealarc gives you *both* AC and DC welding current to handle all electrodes efficiently.

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Idealarc gives you Arc-Booster starting on DC as well as AC. Makes it simpler to produce top quality welds.



NEW LINCOLN IDEALARC

gives you the ideal arc for low-cost welding and hard-surfacing.

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THE LINCOLN ELECTRIC COMPANY

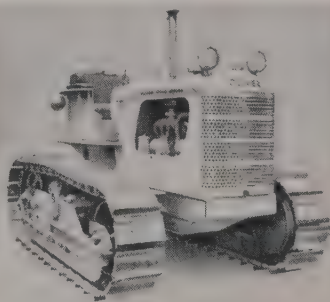
Dept. 4302, Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

ers, is now available. Made by Austin Division, **Central Ohio Steel Products Co.**, Galion, Ohio, the device enables Austin loaders to dig, screen, and load pit-run gravel and other materials into trucks in one operation. Gravel as loaded is ready for spreading without additional screening. Oversize material is dumped alongside the truck. The attachment is available in capacities of 1 to 4 cu. yd. and is suitable for mounting on D2, D4, D6, D7, and D8 tractors.

Oliver introduces the OC-12

A new industrial crawler tractor designated the OC-12 has been announced by **The Oliver Corporation**, Merchandising Dept., 400 W. Madison St., Chicago 6, Ill. Two engines are available, a full diesel with 45.1 drawbar hp., and a gasoline with 44.3 drawbar hp. Engine features in-



clude: double filter, full-flow oil system, chromium-plated piston rings, belt-driven generator, and an electric starter. Operator convenience was given full attention throughout the design. The OC-12 is available in two track widths: 44 and 60 in., and two track lengths, for use with either four or five lower track wheels. Operating weight for the tractor without equipment is 11,000 lb. a new catalog will be sent from the manufacturer on request.

Rock bucket has grizzly action

A new two-position skeleton rock bucket is now available for the Caterpillar No. 6 Traxcavator. The bucket is 96 in. wide and has a capacity of 1½ cu. yd. struck. The bucket is for use in handling clean rock such as in riprapping operations on rivers or dams. The skeleton structure provides a grizzly action which eliminates smaller material, leaving only the desired larger sizes of rock. Like the standard general purpose bucket for the No. 6, the new bucket can be tilted back 11 deg. at the ground level for easier loading and better load retention. **Caterpillar Tractor Co.**, Peoria, Ill.

Front-end loader reaches 10 ft. 10 in.

Two hydraulic powered front-end loaders offering greater reach at maximum and intermediate heights than any comparable machine have

been added to the **Sherman Products** line of excavating, earthmoving, and material handling equipment. The loaders are designed for installation on Fordson Major tractors.

Features include: twin double acting cylinders controlling bucket tilt; double acting lift cylinders, which provide both lift and down pressure for maximum operating efficiency; a crankshaft-mounted gear pump; chrome-plated piston rods; and built-in spill guards on buckets. Literature describing these loaders is available free by writing **Sherman Products, Inc.**, 3200 W. 14 Mile Road, Royal Oak, Mich., Dept. 535A.

Less saw blade friction

Both sides of a new cutting blade are covered with raised abrasive spots which act as extra cutting edges. Testing shows that the "polka dots" reduce side-friction. The blades are reinforced out to the cutting edge with glass fiber webbing, with extra reinforcing on both sides of the blade at the hub, where the strain is greatest. The new "Polk-A-Dot" blades will handle all masonry materials, hard to soft. Detailed information on request. **Clipper Mfg. Co.**, Dept. 696, 2800 Warwick, Kansas City 8, Mo.

Scrape paint at 100 sq. ft. per hr.

Now there is a paint-scraper which does the job without gouging, leaving a completely smooth surface for repainting. An average worker can remove more than 100 sq. ft. per hr., which is 4 times as fast as the conventional flame method. Also, the new machine does not expose the building to the danger of fire.

The Rotor Paint Scraper consists of a 1/3-hp. motor connected by a flexible shaft to a rotating cutter head. The cutters can be resharpened when necessary. The scraper not only removes the paint from the vertical



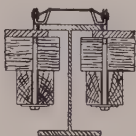
5

SUPERIOR WAYS OF HANGING FORMS FROM STEEL BEAMS AND GIRDERS (NOT FIREPROOFED)

*Especially designed to meet field
conditions on BRIDGE SUPERSTRUCTURES*



**Standard Coil
Hanger Frame**

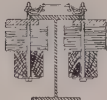


When hanging forms where specifications do not permit any hanger wire to be exposed after stripping, use Superior *Standard Hanger Frames*. Detail at left shows their use with double ledgers, $\frac{1}{2}$ " coil bolts, and flat washers. Total safe load on both bolts is 10,000 lbs., or 5,000 lbs. per bolt.



**Plate
Hanger Frame**

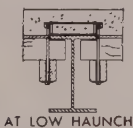
FOR ADJUSTMENT
FROM TOP OF
DECK



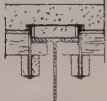
The Plate Hanger Frame, shown at left, has metal plates with a punched hole instead of wire coils. The Coil Bolts are passed through the holes and secured from above with coil nuts. The plates provide adequate bearing for the nuts, which being square will not turn when the bolt is removed. The installation and necessary adjustment to bring the deck forms tight against the flange are from above the deck. The total safe load on both coil bolts is 10,000 lbs., or 5,000 lbs. per bolt.



**Special
Hanger Frame**

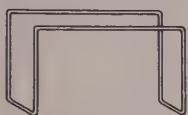


AT LOW HAUNCH

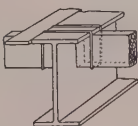


AT HIGH HAUNCH

The design of certain bridge superstructures allows for the permanent deflection of the beams or girders due to the pre-calculated dead load. This deflection is compensated by a concrete haunch on the upper flange, which varies in depth. Superior *Special Coil Hanger Frames* were developed to meet this field condition, at the same time avoiding any exposed hanger wire. The extent to which the $\frac{1}{2}$ " Coil Bolts are threaded into the coils allows for these varying haunch depths from maximum to zero. (See detail at left.) Total safe load per frame is 10,000 lbs., or 5,000 lbs. per $\frac{1}{2}$ " bolt.



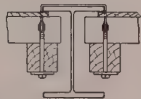
Wire Beam Saddle



Wire Beam Saddles are used to hang centering joists from structural steel beams when the beams are not fireproofed with concrete. On non-fireproofed structures the load is determined by the allowable spacing of centering joists rather than the capacity of the hanger. Available in three gauges and sizes as required. Will carry safely, total loads of 2,500 lbs. to 6,000 lbs. Layouts and estimates will be sent upon receipt of plans or quantities. No obligation.



Coil Beam Saddle



Superior Coil Beam Saddles are used, as shown at left, where hanger wires may be cut after stripping the forms. The Coil Bolts allow for any variation in lumber and flange thickness and tightening the bolts pulls the forms tightly against the flanges. Forms are easily stripped. Safe load is 6,000 lbs. per saddle, or 3,000 lbs. for each $\frac{1}{2}$ " Coil Bolt. Coil Beam Saddles are also furnished for $\frac{3}{4}$ " and 1" bolts.

WORKING PARTS (Bolts and washers) are returnable. Layouts and estimates for Superior Hangers are available without obligation.

SUPERIOR CONCRETE ACCESSORIES, INC.

4110 Wrightwood Avenue, Chicago 39, Illinois

New York Office

1775 Broadway, New York 19, N. Y.

Pacific Coast Plant

2100 Williams St., San Leandro, Calif.

face of clapboard, but also the underside edge of the clapboard as well. For more information: **Stow Manufacturing Co.**, 56 Shear St., Binghamton, N. Y.

Allis-Chalmers earth drill

An earth drill has been added to the line of matched attachments for the 50 hp. HD-5 crawler tractor made by **Allis-Chalmers Mfg. Co.**, Tractor Division, Milwaukee 1, Wis. The drill, mounted without disturbing either



front-mounted shovel or dozer, is driven through the power-take-off. Adjustments are hydraulically controlled. The drill bores holes up to 24 in. in diameter. An optional pole setter handles poles up to 45 ft. in length.

Lightweight electric generator

A new generator, light enough to be carried by one man, produces 1,500 watts, enough to operate small tools, floodlights, and electric pumps. The generator is powered by a 3-hp. gasoline engine. It has an automatic rewind starter and two built-in sockets. Available DC (97 lb.) or AC (107 lb.) from **Master Vibrator Co.**, 262 Stanley Ave., Dayton, Ohio.

Gar Wood adds to hoist and body line

Two new models have been added to the line of hydraulic hoists and

matching dump bodies manufactured by **Gar Wood Industries, Inc.**, Wayne, Michigan. The A-50 medium and A-60 are arm-type units with capacities up to 10 and 125 tons. The "GB" and "GC" series bodies include general contractor and combination dump and platform bodies.

Idealarc—all-purpose welder

A combination arc welder, Idealarc, which provides a choice of either AC or DC current has been put on the market by **Lincoln Electric Co.**, 22801 St. Clair, Cleveland 17, Ohio. The machine can be quickly set for maximum efficiency on every type of welding; ferrous or non-ferrous materials, sheet metal or heavy plate, all positions, and under arc blow conditions or poor fit-up. In addition to dual-control of the arc the machine has a booster switch for selecting normal or hot starting. Models are available at 300, 400, and 500 amp. AC combined with DC capacities in 200, 300, 375, and 450 amp.

15-ton CraneMobile for scattered jobs

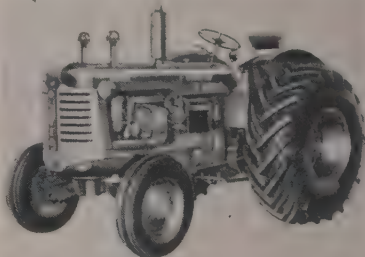
A new 15-ton capacity CraneMobile is now being offered by **Bay City Shovels, Inc.**, Bay City, Mich. With standard equipment, including 30-ft. boom, the machine weighs 41,500 lb. The boom is of pin-connected lattice construction supported by a cable-suspended floating bridle. The boom may be lengthened by the addition of a center section without changing the boom hoisting cable. Maximum recommended boom or boom-and-jib is 75 ft. The three sheaves in the boom point and in the standard hook block permit reeving for 2, 4, or 6 parts of line. For full details ask the manufacturer about Model 151-T41.

New pavement breaking tool

A new "Superkut" chisel is now on the market, claimed to break concrete 50 per cent faster than any other tool. Wedging action enables the tool to cut through heavy mesh or reinforcing rods without fouling or jamming. It also is good for use on asphalt, brick, or cobblestone pavement. Forged from high grade steel and hardened to rigid specifications, the "Superkut" stays sharp 3 times longer than conventional wedge or spread points, 8 to 10 times longer than conventional moil points. Manufacturer is **Vulcan Tool Mfg. Co.**, 35 Liberty St., Quincy 69, Mass.

General purpose tractor by Oliver

The new Oliver Super 99 offers for the first time in a wheel tractor a 2-cycle GM diesel engine, which starts quickly on diesel fuel alone. Other features: six speeds forward, a flat operator's platform with an abun-



dance of room, rubber spring seat, double disc brakes, and a recirculating ball-type steering gear that makes the tractor easy to handle. Special units include an independently controlled PTO and a three-way hydraulic system. **The Oliver Corporation**, 400 W. Madison St., Chicago 6, Ill.

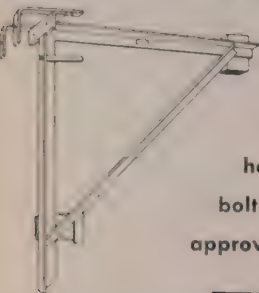
Maintenance distributor for small work

The S-J maintenance distributor has been announced by **Standard Steel Works**, 16th and Howell, North Kansas City, Missouri. Designed for jobs where larger equipment is expensive and impractical to operate, the S-J can be diverted from such jobs as patching and shoulder repair to major secondary road construction. All operations are confined to the rear of the unit, eliminating trips from front to back. It is built for truck mounting or as a complete unit in itself. All piping and valves are flanged to permit easy repair.

OTC adds to hydraulic line

A two-speed, hand-operated hydraulic pump is the latest addition to the line of OTC hydraulic equipment. The pump has two separate pumping units which permit a variation in the operating speed of the ram, jack, or other equipment. By merely changing the pump handle either pump can be put to use. Any combination of piston diameters

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JACKS**



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Fast . . . safe . . . no sway!

Low cost, ruggedly built Waler Jack

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abutments—all concrete construction jobs using

horizontal walers. Use on 2 x 4 or 2 x 6 waler—or

bolt to wall. Can be used on bottom waler. State

approved, light weight—a real moneymaker!

FREE TRIAL ON YOUR JOB!

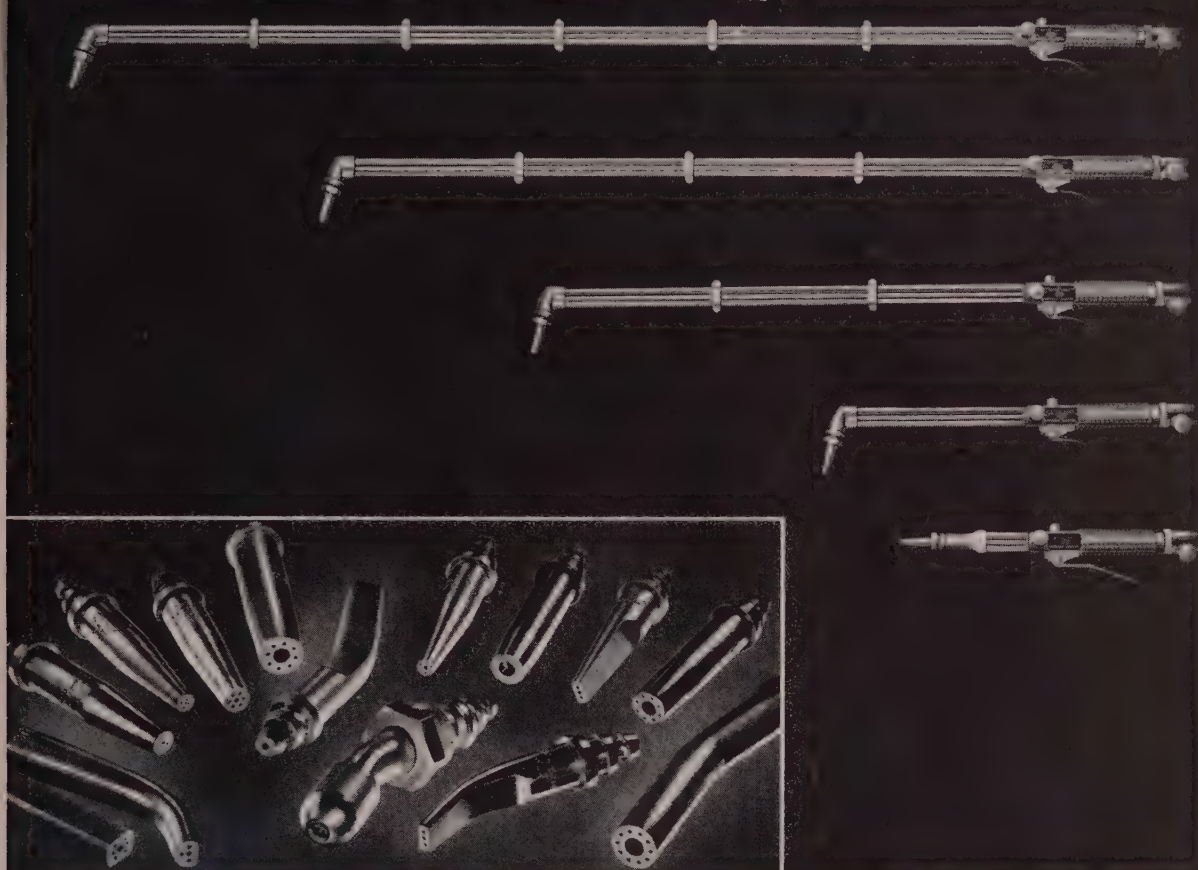
Write for
Descriptive
Literature

Dealer Inquiries Invited

SUPERIOR SCAFFOLD COMPANY Dept. WC

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Airco Cutting Torches...from 13 inches to 6 feet in length!

The Airco 9000 series hand cutting torches are designed to make short work of jobs in scrap cutting, rivet washing and general maintenance.

Here's flexibility at its finest. Torches range from the 13-inch length for working in confined areas to the 72-inch length for keeping heat and fumes at a distance and include the standard 21-inch model. Torch heads are available with 45°, 75°, 90° and straight heads—your choice of monel or bronze.

An extremely wide selection of cutting tips, (over 25), make them adaptable for cutting metal thick-

nesses from sheet metal up to 12" steel. Tips are available for cutting with acetylene, propane, or natural gas.

Companion accessories include the Airco Flash Circle Burner which is adjustable to cut circles 2½" to 17" in diameter. This unit can also be used with all cutting attachments and machine cutting torches.

See your Airco representative or Authorized Airco Dealer for detailed information and assistance —or— write Airco direct. Request Catalog 818.



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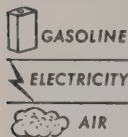
at the frontiers of progress you'll find



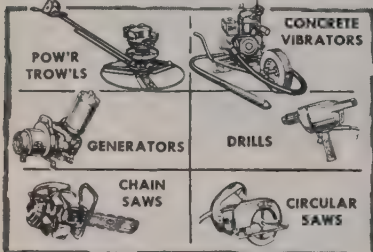
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from $\frac{3}{8}$ in. to provide 20,000 psi. to $\frac{3}{4}$ in. which delivers 3,000 psi. is available at extra cost. For prices and complete details write to **Owatonna Tool Co.**, 389 N. Cedar St., Owatonna, Minn.

Rubber-tired carrier for Badger

A self-propelled digger has been announced by **Badger Machine Co.** of Winona, Minn. The new machine is a standard Hopto digger mounted



on a rubber-tired carrier. The machine can dig 11 ft. deep and is available with buckets up to 36 in. wide. Swing of the unit is 180 deg. It is powered by a Continental 226 water-cooled engine.

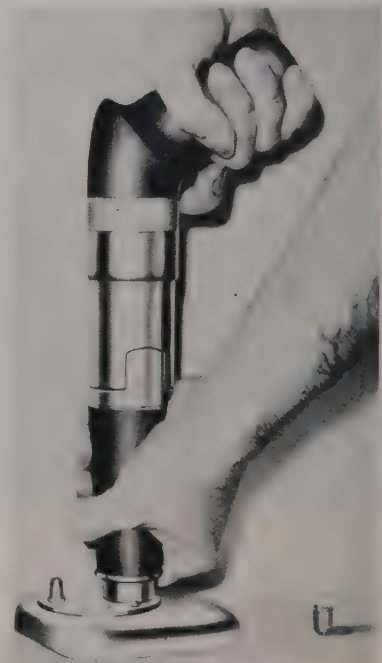
Henry hydraulic backhoe

A new backhoe made by **Henry Mfg. Co., Inc.**, can be easily attached to or detached from almost any make of wheel or crawler tractor in a mat-

ter of minutes. It has a telescopic boom which is fully automatic. It digs 10 ft. 6 in. and loads 8 ft. The unit also comes with a standard boom digging 8 ft. A new parallel circuit control valve permits digging and dumping in one action. It is particularly well adapted to digging close to buildings and hard-to-get-at places. For more information write to the manufacturer at 1700 N. Clay St., Topeka, Kans.

New powder-actuated tool

A new powder-actuated tool for use in all types of construction is now available. Called the **Creary Drive-It 330**, the tool weighs less than 6 lb., and is 13 in. in length. It features a snap-open breech action with automatic cartridge extractor and foregrip with the rest of the tool in pol-



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forms for concrete:

1. EFCO "Lifetime" Steel Forms

BUY these forms for your: (a) Minimum form requirements. (b) Larger form requirements where reuse of the form equipment and simplicity of the form work seem to make purchase more practical.

2. SPECIAL ECONOMY Forms

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For details and estimates, call or write:

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ished finish. It comes packaged in a steel case with accessories. The "330" uses 56" sizes and kinds of drive pins, enabling it to be used for a variety of jobs. Literature is available from **Powder Power Tool Corp.**, 7527 S.W. Macadam Ave., Portland, Ore.

Air entrainment

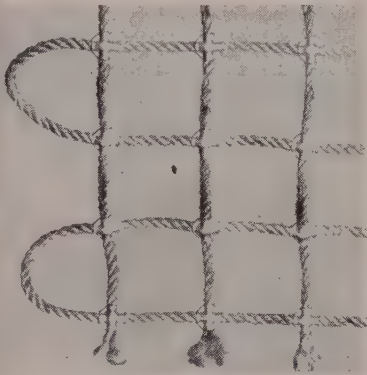
Permite N-Tair is a new air entraining agent for concrete. The product is guaranteed not to segregate, settle out, become gummy, or lose efficiency even during storage in the field. The new product meets all essential specifications and is approved by ASTM, Bureau of Public Roads and Corps of Engineers. It is packaged in 5-gal. pails, 30-gal. drums, and 53-gal. drums. Manufacturer is **Permite Curing Compound Division**, Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, Ohio.

All-steel waler jack

An all-steel waler jack manufactured by **Superior Scaffolding Co.**, 5624 Bankfield Ave., Culver City, Calif., may be used on the bottom waler. It can be bolted to the wall or stud, and used on either 2x4 or 2x6 walers. An important feature is the double hook which slips over the waler for a firm, snug grip that makes side-sway impossible. It is of all-welded construction.

Reinforced life net

Life nets constructed of $\frac{3}{8}$ -in. manila rope, with a breaking strength of 1,350 lb., are now being manufactured by **E. D. Bullard Co.**, 275 Eighth St., San Francisco 3, Calif. The rope is chemically treated to make it water-



repellent and mildew-proof. Nets are available with 4-, 6-, 8-, or 12-in. squares, and are made to specification for each job. Literature and samples are available from the manufacturer.

New line of 3/4-yd. machines

A complete line of $\frac{3}{4}$ -yd. machines has been introduced by the **Wayne Shovel & Crane Division** of **American Steel Dredge Co.**, 2511 Taylor St., Fort Wayne, Ind. The line has been designed to make all major wearing



parts interchangeable throughout the machine, and all assemblies are easily accessible. Featured are a positive crawler lock and one-lever steering control in the crawler model, and a 19-ft. trench hoe boom which permits a 31-ft. 2-in. reach and

digging depth of 20 ft. 5 in. The new models are available as a shovel, trench hoe, crane, clamshell, and dragline.

Newly designed totally-enclosed motor

An electric motor for duties requiring a completely enclosed unit is now in production at **U. S. Electric Motors Inc.** It has been designed more compactly than previous types and the same horsepower is provided in less space. No general disassembly is required to gain access to the bearings. The new motor, Type J, is engineered for operation where fumes, dusts, and moisture are prevalent. Type J is being produced in ratings from 1 to 10 hp. and also may be had in the fanless type for lower ratings from 1 to $1\frac{1}{2}$ hp. Write to **U. S. Electrical Motors Inc.**, Box 2058, Los Angeles 54, Calif., and ask for Bulletin 1879.

Crane attachment for Michigans

A crane attachment with a forged steel hook and double tilt cylinders is now available for all models of Michigan tractor shovels. The cylinders provide capacity to change the crane hook angle independent of the



boom lift cylinders under maximum load conditions.

Boom length of the smallest attachment is 3 ft. and for the largest $4\frac{1}{2}$ ft., with corresponding load capacities of 4,000 to 7,500 lb. when the vehicle is stationary. Removal of four pins permits replacement of the bucket with the crane and no hydraulic connections are broken. **Clark Equipment Co.**, Benton Harbor, Mich.

Builders' level is fully guaranteed

Umeco Optical Division has announced an 11-in. builders' level which weighs $6\frac{1}{2}$ lb. It has a 20-power telescope. The horizontal plate has graduations to 30 min. with double vernier reading to 5 min. The instrument is imported. American parts and accessories can be interchanged. Fully checked before shipment and fully guaranteed. Price: \$125. Address: **Umeco Optical Division**, 465 California St., San Francisco 4, Calif.

New series of electric plants

Production is under way of a new series of 5,500-watt AC electric plants which, in addition to improved performance, carry a lower price tag than former models. The size is only

37x29 in. in height. Weight is under 500 lb. The plants are available with manual control, electric starting or remote control—and in all needed voltages. Detailed information from **Universal Motor Co.**, 532 Universal Drive, Oshkosh, Wis.

Fast low-hydrogen electrode

A new low-hydrogen electrode for high-speed welding has been introduced by **P&H Welding Products Division**, **Harnischfeger Corp.**, 4618 W. National Ave., Milwaukee 46, Wis. Named DH-170, the electrode offers 50 per cent faster speed in application and improved striking and restriking characteristics. Bead appearance and slag removal are likewise superior to older types. Available in sizes from $\frac{3}{32}$ in. to $\frac{1}{4}$ in.

Skwee-Gee is new diaphragm pump

A diaphragm pump with a variable speed, rubber cushioned, vertical stroke plunger for longer life and trouble-free operation has been announced by **Construction Machinery Co.**, 500 Glenwood St., Waterloo, Iowa. Called the Skwee-Gee, the pump is ideal for jobs ranging from dewatering to pumping sludge. It is well suited for applications involving high suction lifts, seepage control or small wellpoint dewatering jobs. Suction and discharge connections are 3 in. bushed to 2 in. so that pump may be used as either a 2- or 3-in. pump. Handle heads up to 40 ft. Ask for Bulletin FDL-3-55.

Equipment briefs . . .

FIFTY-ONE improvements are claimed for 1955 models of the **Seaman Self-Propelled Trav-L-Plant** and **Pulvi-Mixer**. The frame, gearing, shafts and bushings are larger and heavier. New accessories are a scarifier and a 7-ft. dozer blade. **Seaman Motors, Inc.**, 278 N. 25th St., Milwaukee 3, Wis.

CONSOLIDATED WESTERN has begun production of "Western Guard Rail," spring bracket-supported rail which has flexibility and "bounce" when vehicles strike it. **Consolidated Western Steel Division**, 25 Beale St., San Francisco 5, Calif.

ELECTRONIC CONTROL is now standard equipment on P & H electric shovels, according to **Harnischfeger Corp.**, 4400 W. National Ave., Milwaukee 46, Wis.

A SNOW PLOW ATTACHMENT with a hydraulic lift is now available for all models of Michigan tractor shovels. The plows range from 1,850 to 3,400 lb., are adjustable and have replaceable cutting edges. **Clark Equipment Co.**, Construction Machinery Division, Benton Harbor, Mich.

News of DISTRIBUTORS

New company and lines

Thomas L. Pierce recently established a new company under his name, located at 518 West San Carlos St., San Jose, Calif. and is handling the Minneapolis-Moline Industrial Tractor line. Allied equipment handled are Reese loader, Ottawa loader and backhoe, Henry loader and backhoe, Ateco earthmovers, and other equipment lines. A complete service department is maintained.

New branch mgr.

Frank J. Crawford is appointed branch manager at Los Angeles, Calif. for the Tractor Division, Allis-Chalmers Manufacturing Co., succeeding L. D. Benedict who has retired. Crawford has been assistant branch manager at Billings, Mont. since 1952.

New Western headquarters

Jeffrey Manufacturing Co. has opened a Western territory sales headquarters. Stanley M. Mercier, for the last 15 years chief engineer of the Columbus, Ohio division, has been appointed manager, with offices at 870 Market St., San Francisco. This newly established headquarters will direct Jeffrey sales activities in the 11 Western states.

Wm. Zepp heads Western sales

Templeton, Kenly & Co. has named William H. Zepp as Western district sales manager. He will cover the states of California, Arizona, Nevada, Oregon and Washington, with headquarters to be established in the San Francisco Bay area.

Gar Wood promotes Hoop

Gar Wood Industries, Inc. has appointed A. F. Hoop manager of the company's Los Angeles direct factory truck equipment sales branch. He has been assistant manager of the Los Angeles branch since 1948.

Foulger revises sales staff

Foulger Equipment Co. announces a re-vamping of its sales and service department in preparation for the introduction of a line of new heavy equipment. This line is being manufactured by Euclid Division of General Motors, for which Foulger is Intermountain distributor. In the reshuffling of personnel, Jack Vetchell, sales manager, will assume new duties which will take him into southern Utah to establish the new line. The responsibilities of sales manager will be assumed by Vice President W. D. Archer. At the same time,

Foulger announces the employment of a new salesman and parts specialist, Robert M. Zabriski, formerly with Motor Mercantile Co. in Salt Lake City.

New service manager

New service manager for the Western Division of The Hyster Co. is James R. Leep, who will fill the position formerly held by Allen G.



James R.
Leep

Owen who will become service manager at San Francisco. Leep has been associated with Hyster for eight years, more recently as Western Division parts manager, in which capacity he will continue to act in addition to his new duties.

Johns-Manville expansion

Johns-Manville Sales Corp., industrial products division, announces the expansion of its Pacific Coast merchandising organization. Arthur W. Knight has been named Pacific Coast merchandise manager, and Johan H. Peterson will continue as Pacific Coast staff manager for J-M transite, asbestos-cement, pipe products. Both men are headquartered in San Francisco. Other changes include the promotions of Lawrence M. Osborn, Lafayette, Calif. to Pacific Coast staff manager (other than transite pipe) and of H. C. Bruner, Torrance, Calif. to Pacific Coast staff engineer.

New branch building

Power Equipment Co. just completed a new branch building at Grand Junction, Colo., located on Highway 50, just south of Grand Junction. A complete stock of parts will be maintained and modern shop facilities for servicing all types of construction equipment will be housed in the new Butler type, 40 x 80-ft., building with concrete flooring and masonry front.

New locations for Leschen

A move to 6424 East Fleet St. in Los Angeles by the Leschen Wire Rope Division of H. K. Porter Co.,

Inc. has been announced by D. G. Berglund, district manager. The new location will house both warehouse and sales office. For the Seattle warehouse and district sales office, a new location is also announced: 2724 First Ave. South.

Anderson-O'Brien opens new branch

Anderson-O'Brien Co., Los Angeles, General Motors diesel engine distributor for Southern California, announces the opening of a new branch located at 2412 Durfee Ave., El Monte, Calif. R. S. (Bob) Murray has joined Anderson-O'Brien as supervisor of the service department at this new branch, and Roy Rose has been transferred to supervise the parts department.

Lincoln extends service

Marion Woods has recently been appointed welding engineer for Lincoln Electric Co. for the Fresno, Calif. area, with office at 2112 Wilson Ave., Fresno. This represents an expansion in the Lincoln field organization and extends Lincoln service more adequately to that area.

I. B. Rabel heads Star Machinery Co.

Irvine B. Rabel has been elected president of Star Machinery Co., Seattle, Wash., advancing from the position of executive vice president and succeeding Victor E. Rabel who resigned the presidency to become chairman of the board. Otto R. Rabel retired as chairman after serving in that capacity for nine years.

N. J. Thomson dies

N. J. "Tommy" Thompson, 56, Western waterworks sales manager of Dresser Manufacturing Division, died recently in Tucson, Ariz., after an illness of several weeks. His home was in Denver, Colo. He joined Dresser early in 1949, and worked closely with waterworks engineers and penstock designers throughout the western half of the United States.

Dorr-Oliver centralization

Dorr-Oliver Incorporated announces the centralization of its divisional sales headquarters at Stamford, Conn., Chicago, and Oakland, Calif., and the resulting relocation of six divisional head offices. Located at Western Division headquarters at 2900 Glascock St., Oakland, will be E. D. Flynn, acting Western Filtration Division manager; W. T. Marston, Western Industrial Division manager, formerly in Denver; and F. G. Nelson, in charge of the Western Sanitary Division, headquarters of which were previously in Los Angeles.

Lima distributorship

N. C. Ribble Co. of Albuquerque, New Mex., was recently named distributor for Baldwin-Lima-Hamilton Corp., Construction Equipment Di-

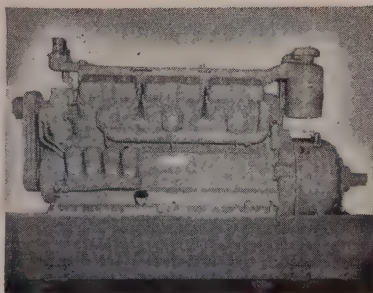
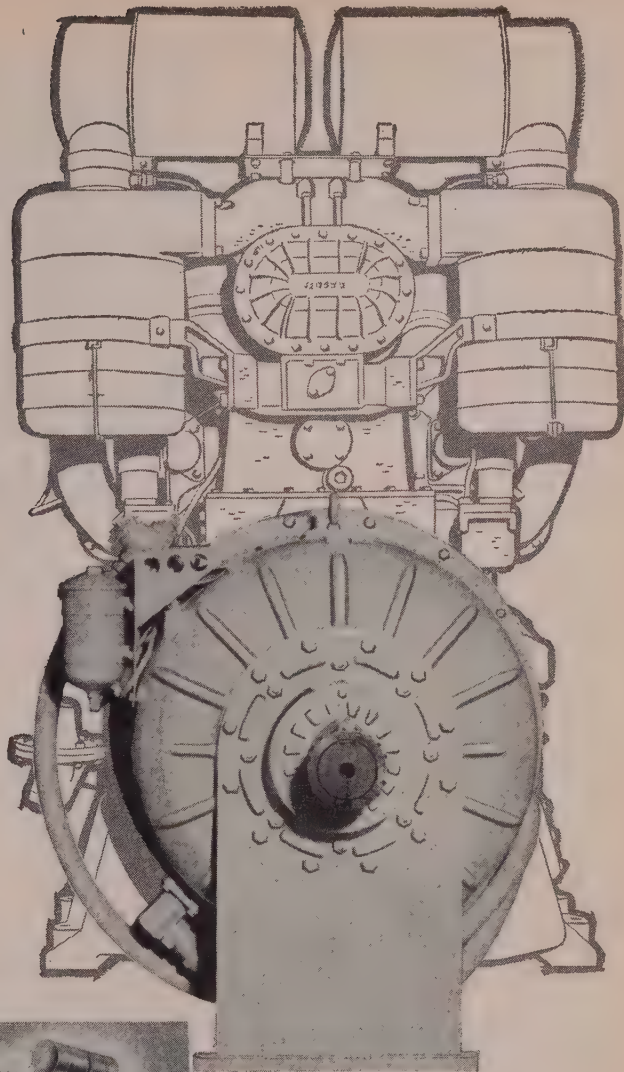
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CATERPILLAR

Torque Converter

Power Units . . .

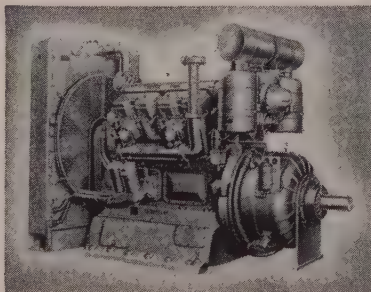


Caterpillar Torque Converter Power Unit — a Model D386 Cat Diesel working through Twin Disc Model CF Torque Converter.

FOR THE FIRST TIME, you can order any one of 6 Cat Diesel Engines *Torque Converter-equipped at the factory . . .* as complete Torque Converter Power Units, developed through design teamwork by Twin Disc and Caterpillar engineers.

The result is *tremendous* performance—for power source and power linkage are *ideally* matched.

To give you a quick idea of how much Torque Converters mean to modern diesel power, here are a few facts you'll want to remember: on the new Cat Power Units, the Twin Disc Torque Converters • *match torque output automatically to the load* • *start loads smoothly* • *provide control of load movement without using*



Cat D375 Torque Converter Power Unit. Twin Disc Torque Converters are standard equipment.

clutch • prevent overloads from killing engine • permit hovering or holding under power • keep engines operating in maximum efficiency range at all times.

Whether you're thinking about a new power unit or planning to replace a present one, find out how much *more flexibility, more wear life, and more work* you'll get through Twin Disc Torque Converter Drive. Contact your engine dealer . . . he'll give you the facts and figures.

Twelve different torque converter arrangements are available for six Caterpillar Diesels, up to 493 hp. Twin Disc also provides a wide choice of output shafts, for both in-line and side loads.

In the meantime, if you want more details on other Industrial-Type Torque Converters, write Twin Disc, Hydraulic Division, Rockford, Ill., and ask for Bulletin 135-D. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois.



TWIN DISC
Torque Converters

Branches: 2950 Leonis Blvd., Los Angeles 53, Calif. • 820 1st Ave. S., Seattle 4, Wash.

May 1955 — WESTERN CONSTRUCTION

vision. Ribble will handle Lima shovels, cranes, draglines and pull shovels in the entire state of New Mexico with the exception of the seven extreme southern border counties.

New plant, new name

Shepherd Machinery Co. recently announced plans to construct extensive new facilities on a 34-ac. site located on the new San Gabriel River Freeway at Cliota St. near Whittier, Calif. The plant will afford an enclosed area in excess of 110,000 sq. ft. Construction will start immediately. At the same time, W. W. Shepherd, general manager, announced the company's new name, stating "Shepherd Machinery Co. is a partnership with the total ownership remaining in the hands of former Shepherd Tractor & Equipment Co. partners."

New Mexico outlet for Ledeen

Ledeen Manufacturing Co., Los Angeles, manufacturer of valves, cylinders, valve actuators and air hydraulic pumps and boosters, announces the appointment of A. E. Boyd Equipment Co. of Albuquerque, New Mex., as distributor for that territory.

New Stow distributors

Stow Manufacturing Co. recently appointed W. J. Burke & Co., 1101 Elliott Ave. W., Seattle, Wash., and the same company located at 2344 N.W. 21st Ave., Portland, Ore., as distributors in these areas. The new distributors will handle the complete Stow line of vibrators, portable concrete grinders, vibrating screeds, and the new Roto-Trowel.

Standard Machinery adds roller line

Standard Machinery Co., San Francisco, has been appointed distributor in Northern California for the "Welco" complete line of rubber tired rollers manufactured by Welded Products Co.

New Shield Bantam outlet

Cal-Ore Machinery Co., Inc., Medford, Ore., has been appointed as exclusive distributor for southwestern Oregon for the Shield Bantam Co. Cal-Ore will sell and service the manufacturer's complete line of truck and crawler-mounted $\frac{3}{8}$ -yd. power cranes and excavators, including the Bantam line of specialty-engineered crane carriers.

U. S. Steel Supply

Alman J. Ashmore, who has been credit manager in the Portland District of U. S. Steel Supply Division since 1949, has been named to a like position in the San Francisco District. He is being replaced in Portland by Lloyd A. Vondracek.

California representation

Appointment of Calavar Corporation, Los Angeles, Calif., as a distributor to handle the combined lines of Marion-Osgood-General equipment in Los Angeles and Southern Cali-

fornia has been announced. Also announced is the appointment of Buran Equipment Co., Oakland, Calif., as distributor for Northern California. These two distributors will maintain complete sales and service facilities for all Marion-Osgood-General equipment up to 4 cu. yd.

Personnel moves at Joy

Joy Manufacturing Co. has named George W. Boulter sales engineer for the Idaho and eastern Washington areas, with headquarters in Kellogg, Idaho. Boulter replaces Harry W. Pierson and Robert L. Frazer who have been transferred to the company's new field office at Grand Junction, Colo., and to the Denver district office, respectively.

Huber-Warco sales

Huber-Warco Co. announces the appointment of a divisional sales manager. Joseph D. Whalen of Walnut Creek, Calif., will head sales activities in the western half of Canada, western United States, Mexico, Hawaii and Alaska. Whalen last served



Joseph D.
Whalen

for four years as district sales representative for the W. A. Riddell Corp. which recently merged with Huber. He will have his headquarters in Marion, Ohio.

Also announced is the appointment of Clayton M. Porter of San Jose, Calif., as district sales representative for California, Arizona, Utah, Nevada, Idaho, Montana, Washington, Oregon, and western Canada. And Andy Winters of Dallas, Texas, as district sales representative for Colorado, Wyoming, New Mexico, Texas, Oklahoma, Arkansas, Louisiana, and Mexico.

Johns-Manville at Portland

A new warehouse for building materials was recently established at Portland, Ore., by Johns-Manville. Products to be warehoused and delivered from this point are: asphalt roofing materials, asbestos roofing and siding shingles, batts and blankets of home insulation, asbestos felts for built-up roofing, asbestos sheets, both flat and corrugated, and the full line of J-M insulating board products. The warehouse is located at 2303 N.W. Front Ave.

Change of address

West Coast Industrial Sales Co., San Francisco, distributor of concrete drilling machines and tools, and other equipment, recently moved to 746 Ellis St., San Francisco 9.

Charlie Grant dies

Charles E. Grant, Jr., technical sales supervisor for Air Reduction Pacific Co., in the San Francisco Bay area, died Jan. 18. He had been with Airco for over 20 years and had retired due to ill health on Jan. 1.

AED names three to national posts

Three California distributors have been appointed to committee posts of Associated Equipment Distributors, according to Ray J. Finn, president of AED. They are I. R. Kraemer, Buran Equipment Co., Oakland; H. J. Mayer, Western Machinery Co., San Francisco; and A. F. Garlinghouse, Garlinghouse Brothers, Los Angeles. Kraemer was appointed chairman of the Contractor Relations Committee, a group which acts to create a better understanding between distributors and construction machinery users. Mayer will continue to serve with the Manufacturer Relations Committee, a group which meets with representatives of manufacturers to solve mutual problems. Garlinghouse, who was president of AED in 1948, was named to the Advisory Board, composed of selected past presidents.

Marsh Wall expands

The Western division of Marsh Wall Products, Inc., a subsidiary of Masonite Corp., recently opened new and larger office and warehouse facilities at 1577 Rio Vista Ave., Los Angeles. The new quarters are located in a building recently acquired when Masonite purchased Pacific Board Fabricators, now a Masonite division at the same address. Masonite has set up its own warehouse there also. E. C. Crampton is Western division manager.

Men move at Chicago Pneumatic

Henry P. Hansen, manager of the Los Angeles branch of Chicago Pneumatic Tool Co. for many years, also assumed charge of the San Francisco branch as of April 1. C. W. (Scotty) Scott will devote his entire time to contractor relationships. His territory will comprise the Pacific Coast states and he will headquarter at the San Francisco offices of the company.

Totem opens Spokane branch

Totem Equipment Co. of Seattle has opened a branch at Spokane under the management of Matt Finnagan. The new branch is located at 525 E. Trent Ave., and will feature all lines handled by the Seattle office.

New Euclid dealer

Announcement is made of the appointment of Evans Engine & Equipment Co. of Seattle, Wash., as authorized dealer for the complete line of Euclid earthmoving equipment.

Fairfield Engineering distributors

King and East Machinery Co., Denver, Colo., is named exclusive distributor in Colorado and southern Wyoming for the Fairfield builder



LEO BRUNELL, left, equipment superintendent for the State Highway Department of Oregon, takes delivery from **Robert Ebersole**, right, manager of Interstate Tractor & Equipment Co., Salem, of 11 new John Deere tractors for use in highway maintenance. The tractors are the latest 40-U machines with John Deere Model 47 heavy duty mowers, built to handle the most rugged mowing jobs under all conditions.

conveyor. In Las Vegas, Nev., Inland Service & Supply Co. will handle the equipment for southern Nevada. Likewise, Arnold Machinery Co. in Salt Lake City, Utah, is appointed for Utah and the southern part of Idaho.

Geo. Kushman named Western rep

George A. Kushman Co., manufacturers' agent of Oakland, Calif., has been appointed Western representative by Char-Lynn Company, manufacturer of hydraulic power-pacs, valves, cylinders, quick connect couplers, hose, etc. Distributors are now being appointed by President George A. Kushman.

Rucker Co. appoints Zintz

Howard C. Zintz is appointed chief engineer of the Rucker Co., Oakland, Calif., manufacturer and distributor of fluid-power systems and components. The company was recently appointed exclusive distributor for the products of Monarch Road Machinery Co. in Washington, Oregon, California, Idaho, Nevada, and Arizona, plus Hawaii and Alaska.

John Plehn rejoins B-E sales

John H. Plehn has rejoined Bucyrus-Erie Co. as a sales representative. He has been assigned to the Seattle

office, under the supervision of R. P. Brooks, Northwestern sales manager. Plehn first joined B-E in 1935, succeeding through various positions to sales representative in 1949, handling tractor equipment in the San Francisco area, a post he held until Dec. 31, 1953, when B-E terminated tractor equipment sales.

Nelson Equipment news

Nelson Equipment Co., Portland, Ore., recently formed two new divisions within the corporation, thereby promoting three of its top men. In the newly formed Contracting Division, Lynn Perrott, former salesman, has been promoted to sales manager. With Perrott in this division, which will serve road, building and large general contractors in Oregon and southern Washington, are Bill Glasby, Dale Cook, Robert Rundle, James Beardsell, Neil O'Brien, Robert Laam, and Atlee Pearcy.

The other new division is the Logging Division. Tom Miller, formerly sales manager, was promoted to general manager of that division, and Al Burke, former salesman, was made sales manager.

New lines recently taken on by Nelson are R. G. LeTourneau, Inc., and Huber-Warco Co.

MANUFACTURERS

American Hoist—Laughlin merger

Acquisition of Thomas Laughlin Co. has been announced by American Hoist & Derrick Co. The merger is the first step of a planned expansion program authorized by American Hoist stockholders a year ago. The more than 50-year-old Laughlin firm is well established in the forged wire rope accessory business. The merger enables American Hoist to market the joint products more effectively by offering a complete line of fittings and wire rope accessories from a single source.

Multi-Matic adopts new policy

A new domestic distribution policy was recently announced by Multi-Matic Corp. Five classifications of distributorships have been set up, and distributors will be required to place a minimum order, based on the classification into which they fall. They are: Class A, covering counties with 100,000/130,000 industrial employment; Class B, 70,000/99,000; Class C, 45,000/69,000; Class D, 25,000/44,000; and Class E covering counties with up to 24,000 industrial employment.

Advancements at Stephens-Adamson

Stephens-Adamson Mfg. Co. announces the election of A. D. Sinden as vice president and appointment of D. W. Parkin as chief engineer. E. O. Weise is now assistant chief engineer.

Crane Carrier purchases tool plant

Crane Carrier Corp., manufacturer of heavy-duty truck-type carriers, has more than doubled its manufacturing facilities with the purchase of the Hinderliter Tool Co. plant at Tulsa, Okla. Simultaneously with the Hinderliter purchase, CCC announced plans for the manufacture of heavy duty trucks other than carriers, including ready-mix concrete trucks, logging, pipeline, construction and special vehicles for well servicing, drilling machines and the oil industry in general.

Major changes at B-L-H

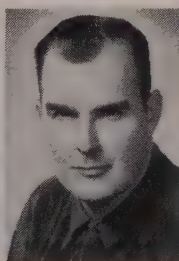
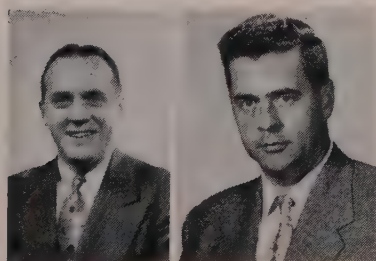
Recently announced by George A. Rentschler, board chairman of the Baldwin-Lima-Hamilton Corp., are some major changes among the company's top executive personnel. McClure Kelley, president of the Austin-Western Co., a B-L-H subsidiary, was promoted to executive vice president of the parent company and of its entire operations. Ralph K. Stiles, executive vice president of Austin-Western, becomes its new president. Henry F. Barnhart, vice president of Lima Division, succeeds to the post of general manager of B-L-H's construction division—also vacated by the promotion of Kelley. Henry F. Lockhart has been promoted to di-

Zintz

Plehn

Kushman

Perrott





A HI-UP TRUCK MIXER manufactured at Worthington Corporation's Plainfield Works, being demonstrated at an actual job site. The Mixerama is part of the company's concentrated program of selling through on-the-job product demonstrations.



FLEET OF FOUR motorized field training units recently put into the field by the Tractor Division, Allis-Chalmers Manufacturing Co. to bring "at the door" service training on the company's new diesel engines to dealer service organizations.

rector of sales of the construction equipment division of the corporation, stepping up from his former position as manager of Austin-Western's Rochelle, Ill., plant.

In line with B-L-H's new program of expansion and diversification, the corporation recently acquired complete ownership of Ruge-de Forest, Inc., industrial testing-equipment and electronics manufacturer of Cambridge, Mass.

Raymond Concrete Pile v.p.'s

George F. Ferris, president of Raymond Concrete Pile Co., foundation and heavy construction firm, announces the election of Myron W. Krueger to the newly created office of executive vice president. Also announced is the election of Donald W. Moss, James Pinnell and Herbert M. Crowley as vice presidents, and the appointment of James P. Cummins and Gordon F. A. Fletcher as assistant vice presidents. Moss will have general direction of domestic sales; Pinnell will be in general charge of all domestic construction; Crowley will have charge of central planning; Cummins will direct sales activities of the Eastern zone; and Fletcher will manage the boring division.

Koehler becomes adv. director

Richard H. Koehler was recently appointed director of advertising and publicity of Westinghouse Air Brake Co. He moves up from the post of advertising and sales promotion manager of the company's Le Roi Division.

New company

Consolidated Freightways recently announced the reorganization of its heavy hauling department. Set up as a separate company, and operating as a division of Consolidated Freightways, the new firm is known as Consolidated Heavy Hauling Service, serving Oregon, Washington, Idaho, Montana, Utah and California. Heading up the new company

is S. F. Reeves, who has been manager of CF's heavy hauling activities since establishment of the department in 1941. Elmer Lee is assistant manager. Both men are located in Portland, Ore.

Link-Belt sales execs.

D. W. Lehti, president of Link-Belt Speeder Corp., announces the appointment of two new sales executives. C. "Cal" Basile is named vice president of manufacturing and sales, and Gordon W. Rowand has been promoted to sales manager. Both men will make their headquarters at Cedar Rapids, Iowa.

Mathy made v. p.-genl. mgr.

National Welding Equipment Co., San Francisco, announces the appointment of Ernest L. Mathy as vice president and general manager of the

Ernest L. Mathy



company. Mathy, for over 30 years intimately connected with the welding industry, was also elected a member of the board of directors.

Northwest organizational changes

Several organizational changes in the Northwest Division located at Portland, Ore., of American Pipe and Construction Co. have been announced by Vice President W. Allen Grubb. John C. Silliman has moved from production manager to operation manager of production, engineering and field erection, and is succeeded in his former position by William E. Steele. Ward Woody, who retired after many years as division chief engineer, is succeeded by Rob-

ert S. Edens, formerly with Southwest Welding Co. Jack Cottingham has been transferred from the plant at South Gate, Calif., to become industrial engineer at Portland. Gordon L. C. Scott is a new sales engineer under Sales Manager Carl W. Hopp.

Macwhyte sales mgr.

Francis D. Holden has been appointed manager of sales of Macwhyte Company. He moves up from the position of assistant general sales manager which post he held since 1948.

Baldwin-Lima buys Madsen works

Madsen Iron Works, Inc., La Mirada, Calif., was recently purchased by Baldwin-Lima-Hamilton Corp. The Madsen company, founded in 1910, is a foremost manufacturer of heavy road construction equipment including asphalt plants, travel-mix plants, float-finishers, and other machinery. It will continue to function as a wholly-owned subsidiary of B-L-H.

White Motor announcement

Formation of a special products division to handle the development and manufacture of a diversified line of non-automotive products is announced by The White Motor Co. Kenneth F. Ode has been appointed general manager in charge. White Motor manufactures a substantial percentage of the components used in its own trucks and tractors. The new division will give the company an opportunity to apply some of these components to the manufacture of non-automotive commercial, industrial, and military products, according to V. W. Fries, vice president in charge of production.

Ramset appointment

James J. Clarke has been appointed sales promotion manager of the Ramset Division of Olin Mathieson Chemical Corp., making his headquarters at Cleveland.

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BACKFILL, uncompacted

More for you these days Had you noticed?

Beginning in January, we have organized **Western Construction's** contents in a different manner from before. Gone is that 50-page bunch of advertising pages up front.

Also beginning in January—really with the more normal February issue—we have adopted a policy of shorter articles, but lots more of them. This has crowded things considerably on the table of contents page, but that's a small concern compared with what it has meant to you.

Not so often now do you read about just a project. For instance, you didn't read about Box Canyon Dam on page 48 this month. Not really. Instead, you learned just one thing: how one contractor handled winter concreting.

And we didn't take you from A to Z on the Pit 4 project. Just the tricks and problems of handling the machinery installation.

There's more for you in **Western Construction** these days. Had you noticed?

How to write an article? Actually, you don't!

Now that headline doesn't really sound right, does it? But it's true, and we think you'll be glad to know it, especially if you think you have done something on one of your jobs that ought to be written up for **Western Construction**.

You don't have to write an article. You probably haven't the time, and don't really know how to begin. If you did, you'd be on our staff.

You do write a letter. You gaze at the ceiling until you remember the big money-saver method you used on the Ritzville job (or wherever). And then you start a letter beginning, "Dear Ralph . . ."

From then on it's a cinch. Just be sure to tell your secretary (if she is with you on this) to stop you when you've spouted enough to fill a couple of ordinary typed letter pages. Single-spaced, that is, and don't cheat with wide margins.

You round up some of your own snapshots, or prints of those pictures the Chicago-Pneumatic man took on the job. You write something on the back of each one, pointing out to the editor—and to the reader later on—just what you're driving at. One picture is worth a thousand words, they say. Maybe you can get off with a shorter letter this way.

You stick all this in an envelope, and you put on enough stamps to get

it to us. We do the rest—after you mail it.

We have experts who can correct anyone's spelling. We have printers who make all the lines the same length. We have imaginative guys who can make utility trench pictures look like the Grand Canyon on one general contract. We have honest-to-gosh engineers who can pick up the high spots from your letter and write a headline that is accurate but still makes your work sound important. (Which it is. If an idea did you some good, telling about it in **Western Construction** may help some other Westerner.)

We publish this sort of thing in the magazine. We do it every month.

Now, isn't it about your turn to get on record? Tell us about the methods that have paid off for you. If we run the story in **Western Construction**, we send you extra copies of the magazine! Autographed if you like. And also a check—autographed for sure!

No more design charts

It was like burning the mortgage. We had lived with "Construction Design Charts" for so long we hated to see the last of them go.

The charts were the brainchild of James R. Griffith, a professor at Oregon State College back in the 30's.

Twenty-five years ago in *Western Construction*

"Edwards, Wildey & Dixon Co., engineering and building contractors of Los Angeles, has changed the firm name to the L. E. Dixon Co."

* * *

"The Washington Electric Co. (Puget Sound Power & Light Co.) awarded a contract in January 1930, to Stone & Webster Engineering Corp. for the first stage of a 240,000-hp. development at Rock Island on the Columbia River 13 mi. below Wenatchee."

* * *

"Hodgman & MacVicar Pasadena, California, have completed their contract for 17 mi. of grading on the Florence-Tucson highway, from Coolidge to Pichacho."

"Equipment consisted of one Caterpillar 60 and one 30; one 60 elevating grader; one 12-ft. blade; one 7-point scarifier; six fresno outfits; one 10-S, two 7-S, and one 4-S mixers."

They were a series of nomographs published monthly in **Western Construction**, and they caught on fast. Concrete form design was the general subject at first—stud and waler dimensions against form heights and resulting fluid pressures. Lumber quantities for forms of different sizes, too.

The charts were so popular we reprinted them in bound form. And we published more of them—after the war now. The last volume contained 100 charts. And even after that we ran additional ones in the magazines. The subjects broadened (or perhaps we should say "narrowed") to include even a nomograph for the computation of wind loadings on flagpoles!

You've seen the advertisements for "Construction Design Charts" right in these pages. And you've sent in your money. To the point where there are no more books left. If you're one of the 2,115 owners, hang on to your copy!

NEXT MONTH

HIGHWAYS and nothing else, unless it's roads, streets, bridges, overpasses, culverts, compaction, base course, plant mix, drainage, and all such detail stuff as that.

MOSTLY EQUIPMENT and methods of highway construction and maintenance. That seems to be the main interest of field people. We'll look at a number of Western jobs to find out—

WHAT'S DOING in equipment applications, and what's doing in methods these days. There'll be ideas from all over the region, swapping from northwest to southwest in these pages. But that isn't all. We'll also ask a number of people—

WHAT'S WANTED in equipment, to do a better job. New machines, or just improvements and more beef? We'll see what's wanted in some other highway engineering subjects too. And finally, talking about equipment again, we'll have our own little road show of—

WHAT'S AVAILABLE to do the job today. There's a lot of machinery, and there are a lot of tools running around to choose from. We're trying to screen things down to the best recent developments, with a little "why" for each one. And there'll be plenty of pictures here, so you can't mistake the item.

... The Editors

Highway cost analysis: Contractors furnish the figures in Oregon

If you know the value of a dollar sign, it's a lot easier to know the value of a dollar! Sounds peculiar, but it's true. And in the field of highway engineering Oregon's department stands as proof.

Under R. H. Baldock's administration the state highway department has long shown that it knows the value of a dollar. But how this position was achieved is the unique story. It's a case of knowing the value of a dollar sign—of knowing what a cost department can do, and then letting them do it.

Cost work—obtaining, recording, analyzing, filing—too often is a “continuing” or “routine” function in the worst sense of the word. It's done in an ivory tower, and based only in some notion of historical value. The cost department gets to be nothing more than a library, and a pretty musty one at that.

Not in Oregon. The cost department there—like the “line” departments of design, bridges, construction, and maintenance—is alive and kicking. It's in constant touch with all others. And most important of all, it's in constant touch with the outside world—the contractors who build Oregon's highways.

Oregon looks at its contractor's books. That's the simple statement of the matter. But there is obviously a lot behind it. Isn't it apt to be delicate, for example, when the engineer knows all the ins and outs of the contractor's bid, including his unbalancing?

The answer is yes. And the solution has to lie in some form of gentlemen's agreement. For Oregon to come to its present enviable position of being a party to many such agreements took many years. The missionary work was done by E. H. Clymer, cost analyst for the state highway department until his death a little over a year ago.

But more important here than the arrangement itself is what the cost department has fostered through use of its unique sources of information.

Better engineering . . .

One thing is better engineering. Only by knowing what an operation in highway construction really costs to perform (not just what was bid on it) can engineers work toward a design or specification that will permit less costly construction.

Unit prices for crushed base course material may be slowly rising. The highway department cannot stop using base! But cost analysis (working with the “dollar sign”) may show the offending component of its cost to be haul. If hauls are getting costlier, they're getting longer. Now the spotlight is really on what was previ-

ously just a suspicion that sources of spec material were drying up.

Furthermore, the cost analysis shows just how much it is worth to try for a remedy. The results, in Oregon, may be a new base specification, built on tests of still-common materials that can be combined and processed to perform satisfactorily.

Better contracting . . .

Oregon's cost department has also fostered better contracting. There has been no club held over anyone's head. But education and moral suasion have been inevitable by-products of the gentlemen's agreements. And the contractors themselves have done the rest.

“Routine” bid unbalancing—to obtain bigger early estimates—has decreased. And insofar as this practice reflects a less than optimum financial position, the highway department has profited by the decrease. Of course, contracting is speculative; and speculative unbalancing, when the bidder sees a possible overrun, is still a normal thing. If the bidder is wrong, he knows he'll pay. If the department is wrong, it will pay.

But the Oregon estimators (that cost department again!) are seldom wrong. There is little unbalancing of any kind. In short, the state highway department attracts good bidding. And it's a chain reaction from there. Better bidding means fewer bum guesses—fewer desperate situations in the field—fewer wrangles with the resident engineers—and a better profit in the final estimate.

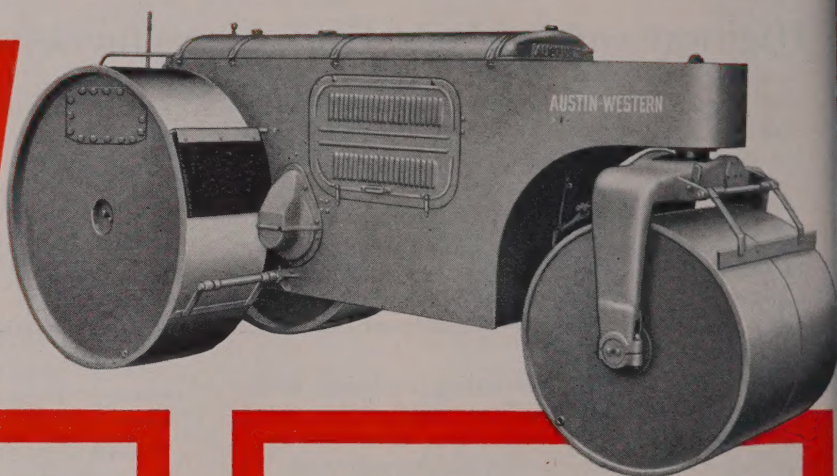
Oregon's cost people have unique access to accurate cost data. And they come up with statistics that mean something for the design and construction forces of the highway department. Oregon knows the value of a dollar because it also knows the value of a dollar sign: It knows what can be done with cost analysis.

What about other Western states?

Many Western highway departments make exhaustive annual compilations of average bid prices for important contract items. Some states carry the activity even further, computing quarterly cost indexes for comparison to the Bureau of Public Roads' famous composite mile index.

What each Western state is doing in this respect, with abstracts of the latest data and a comparative chart of indexes where possible, will appear in the pages of *Western Construction* next month.

COMPLETELY NEW



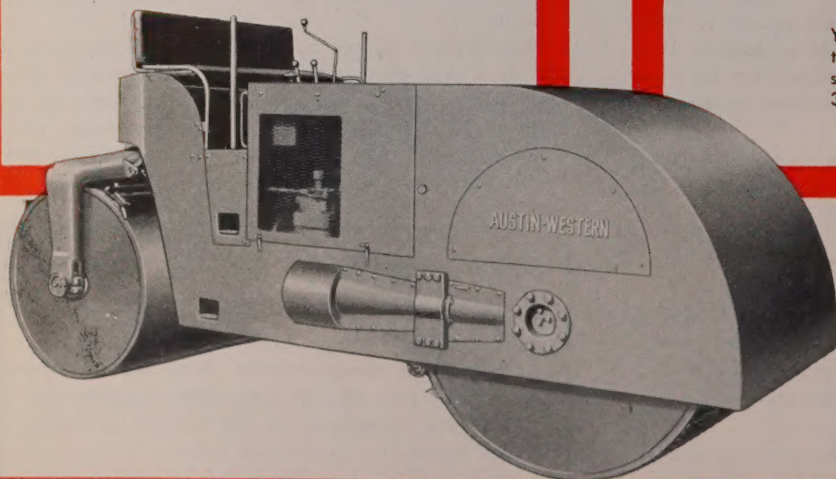
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