

WESTERN

CONSTRUCTION

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PORTLAND CEMENT ASSN.
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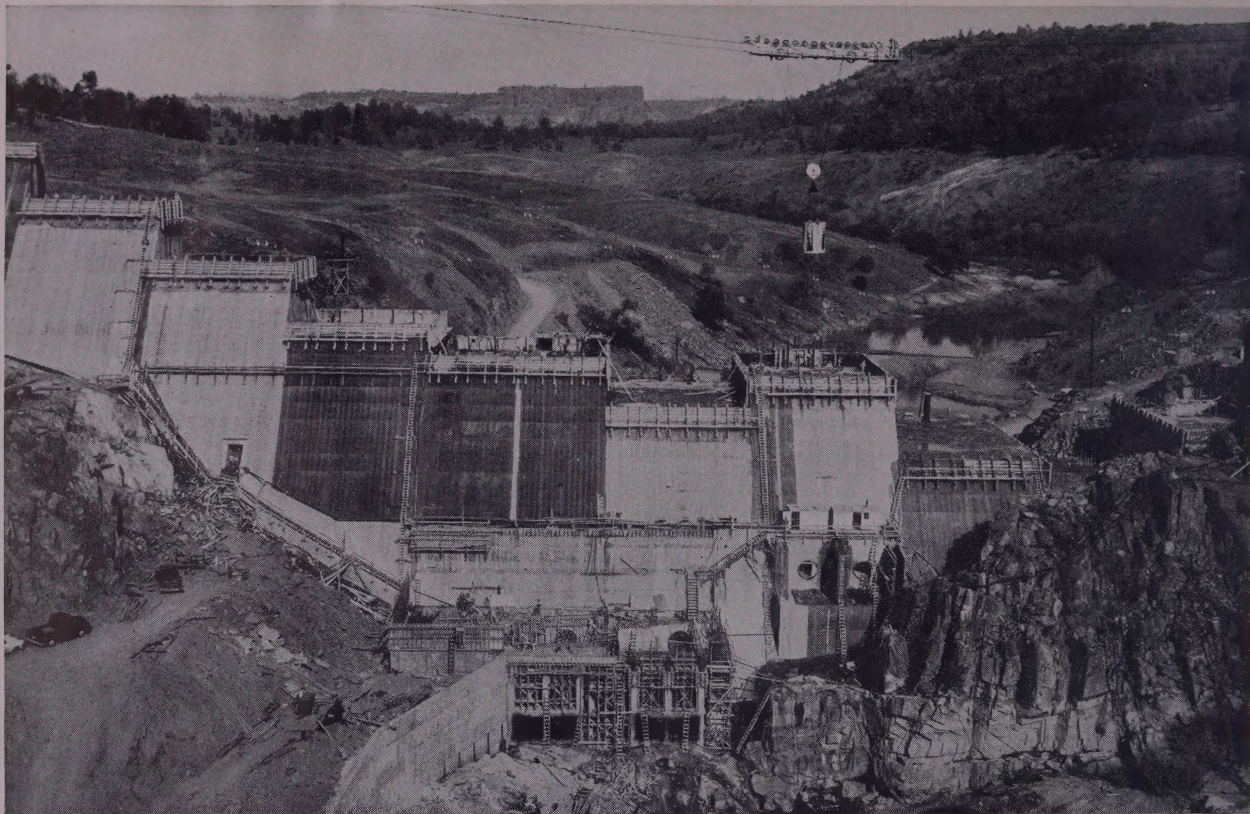


AUGUST 1957

Priest Rapids Dam—fast pace on \$93,000,000 job . . . page 23

Oregon breaks 10-mi. bottleneck on interstate route . . . page 26

EARTHMOVING—first of a series on job planning . . . page 62



100% TEXACO LUBRICATED, construction is ahead of schedule at the Tulloch Dam near Knight's Ferry, California. Backing up the Stanislaus River, the Dam will have a capac-

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FRONT COVER

JUNE saw the first bucket of concrete go into Ice Harbor Dam Lock and Dam huge Corps of Engineers project on the Lower Snake River. The major contract, \$30,000,000, is held by joint venturers Montag-Halvorsen-Austin and Associates. A one-page review of the project appears on page 30.

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Highway problems reflected by WASHO

WESTERN HIGHWAY PROBLEMS were brought into sharp focus at the first meeting of the Western Association of State Highway Officials to be held following active start on the expanded federal program. Large attendance at the 36th Annual Conference indicated the concern of Western highway engineers in getting the highway program rolling and keeping it going for the next decade or more.

Most obvious observation relates to the continuing concern over engineering manpower. Hardly a speaker omitted some reference to this problem. Principal means for securing greater engineering efficiency appear to be well recognized—electronic computers, photogrammetry and technicians to carry out routine operations. The emphasis was on getting all of these aids into effective operation as fast as possible.

Tied in with this concern was the related problem of recruiting, training and maintaining engineering staffs to handle the expanding volume of work in each highway department. The fast start on the current program in Western states was made possible by the backlog of plans prepared during the past several years. Today, engineering staffs must turn out plans at an ever increasing rate since the reservoir of blue prints is being rapidly emptied.

Growing importance of public relations was stressed by many highway administrators. Citizens are poorly informed on the highway system now getting started. So much has been written in newspapers and popular magazines about this network of super-highways that the average citizen expects to find one within a few miles of his residence. Highway departments must present the true story and in a manner that will place the present program in proper perspective.

Another problem relates to the excessive amount of state funds pouring into the Interstate System, with a corresponding decrease in

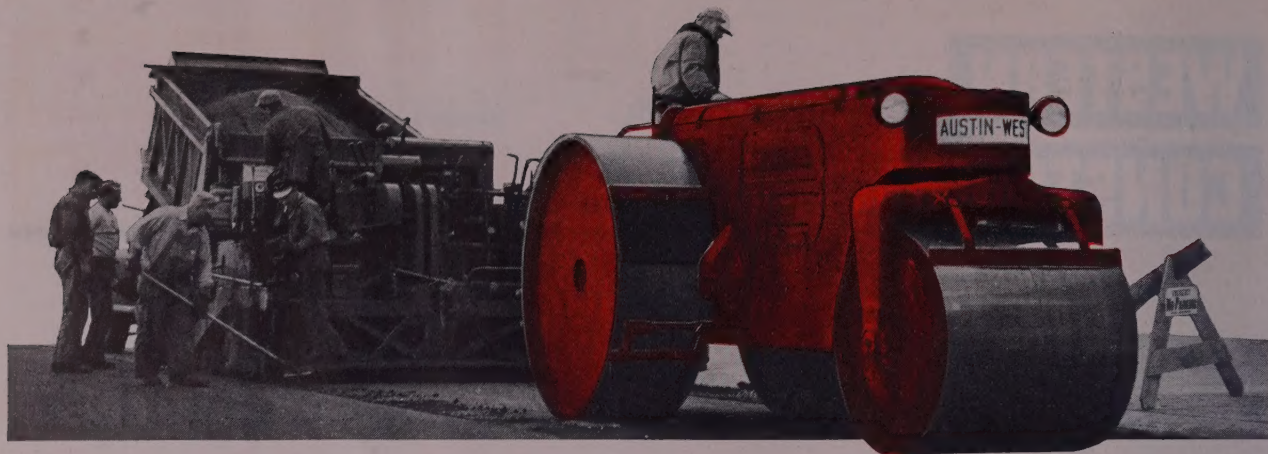
money available for ordinary highway work. Every state route from primary to farm-to-market roads could be adversely affected, and here again is an important public relations job.

The West is growing up to the point where men must be trained for administrative positions in state highways departments. This is emphasized by the fact that a course will be given this year in Wyoming, for the first time in the West, to help train engineers in administrative duties. Such a program must be extended by inter-department instruction to sharpen the supervisory talents on down the line.

Lastly, the highway program in the West is beginning to emerge into the construction stage. Although the 1957 WASHO Conference was strongly flavored with engineering problems, need for improving the relationship with contractors was not overlooked. Washington reviewed the conferences it holds with groups of highway contractors for the discussion of common problems. Highway engineers looked with favor on such meetings. Even when standard specifications cannot be changed there is value in an exchange of ideas. During the next year or so this general idea will undoubtedly be expanded as the highway program progresses further into the construction age.

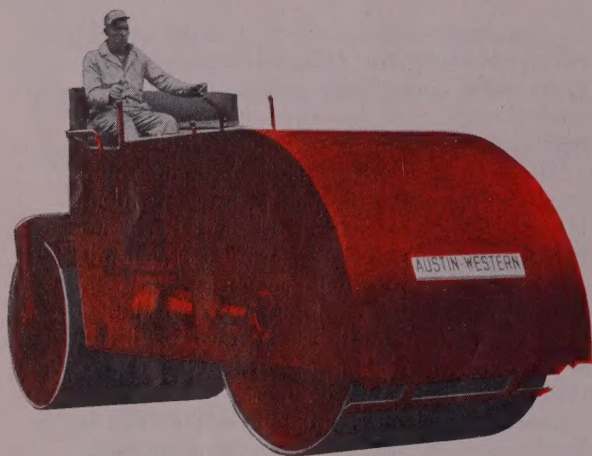
In general, the administrators and engineers at the WASHO Conference discussed their common problems resulting from the Federal Highway Program and benefited by the exchange. WASHO continues to fulfill its vital role as the clearing house for the ideas of highway builders who are making possible the growth of the West.

Jim Ballard



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8-11, 10-12, 12-14 ton models. The left drive roll is keyed to the axle shaft; the right turns on heavy duty bushings independent of the left roll and axle. Torque-proportioning-type differential transfers power automatically from a slipping roll to the opposite one, giving traction under almost any conditions.



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AUGUST 1957

WESTERN CONSTRUCTION

Fast pace set at Priest Rapids Dam

Contractor Merritt-Chapman & Scott is well ahead of schedule at Priest Rapids Dam, \$92,000,000 Columbia River project. Careful job planning is the secret, with an assist from the weather.

A VISITOR'S first impression of the Priest Rapids Dam project on the Columbia River in central Washington is one of tidy housekeeping on massive scale.

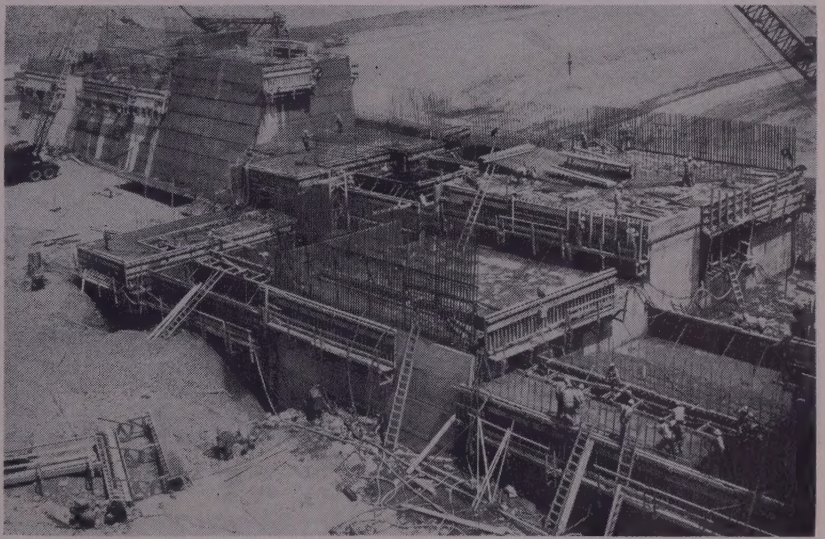
Approaching from the north, you turn off the Spokane-Seattle highway on the easterly side of the Columbia at Vantage, and for the last 24-mi. lap travel an improved, all-weather blacktop road put in by Merritt-Chapman & Scott, the contractor.

As the road dips toward the Columbia at the project site, the busy boom of a whirley gantry and the top of the batch plant are first to come into sight. Then the upper plateau of the project area sweeps into view as you cross an overpass straddling a haul road leading from the aggregate pit a half mile upstream. As you cross, a Euclid bottom dump truck roars beneath with no loss of speed.

The overpass is a visitor's first clue to the story behind the ahead-of-schedule construction pace set by Merritt-Chapman & Scott since award by the Grant County Public Utility District last July of a \$91,882,625 competitively bid contract to build Priest Rapids Dam and hydro-electric plant.

Thorough planning of the project site—with an eye always to maximum operational efficiency—was given prime consideration by the contractor from the outset. Through long experience, Merritt-Chapman & Scott has found that special care given initial lay-out pays dividends in construction progress. A tour of Priest Rapids builds up a progressive picture of compact integration, with emphasis on a smooth "flow chart" for equipment and material.

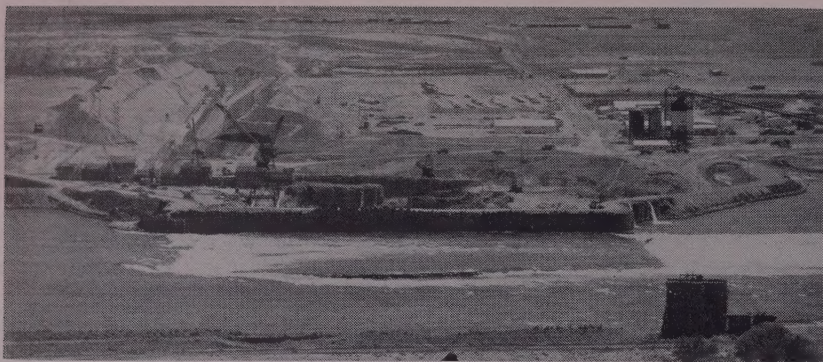
The physical statistics entailed in



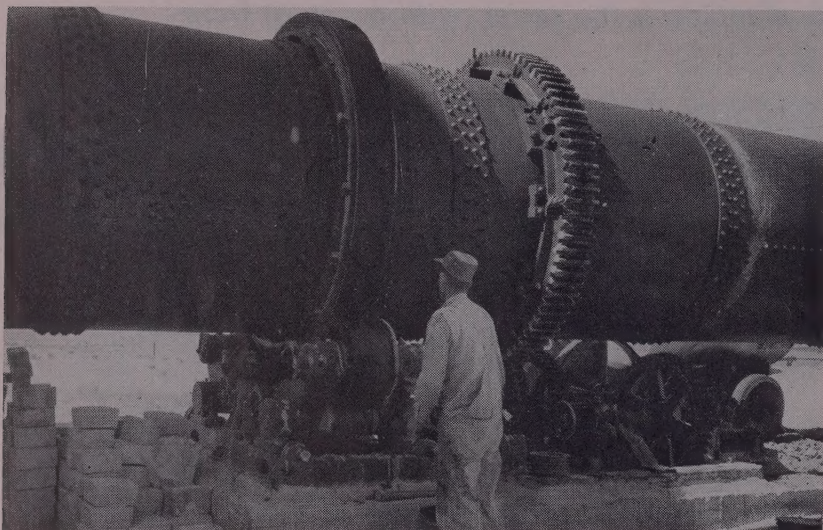
REINFORCING STEEL for the left bank fish ladders (above) is the first of 50,000 tons of various types of steel which will go into the dam. First concrete was poured in April.



DRILL RIGS go to work sinking blast holes into the bedrock as the powerhouse excavation gets underway. The powerhouse will be 1,025 ft. long, with a base width of 197 ft.



THE SLACKENING FLOW is starting to expose the Stage 1B cofferdam, which was stopped at high water. In the left center work is underway on the left bank fish facilities. Behind that is a 4,500-ft. trench which will be filled to form the left embankment.



POZZOLAN will be calcined in this brick-lined kiln by heating it to 1,000 deg. and then passing it through a ball mill. Pozzolan is found about 3 mi. upstream from the project site.

construction of Priest Rapids Dam, which was designed by the Harza Engineering Company, lend special meaning to this close attention to initial project site planning. The dam, 178 ft. high from deepest point of excavation, will be 8,412 ft. long. Of the total, 2,427 ft. will be of concrete, with earthen embankments extending 5,985 ft. Construction will entail placement of approximately 910,000 cu. yd. of concrete, 3,239,000 cu. yd. of excavation and 3,105,000 cu. yd. of fill.

The dam's spillway section will be 1,142 ft. long, equipped with 22 tainter gates, each 50 ft. high and 40 ft. wide. The 1,025 ft. long powerhouse is located on the easterly side of the river. The centerline of the powerhouse is 291 ft. downstream from the left embankment so as to permit future construction of additional bays whenever expansion plans may require.

Initially designed for eight generators with total rated capacity of

630,000 kw. Priest Rapids is scheduled in the future to be teamed with another Grant County PUD facility to be built approximately 18 mi. upriver. Rated capacity of this second dam, to be known as Wanapum in honor of the area's almost vanished tribe of Wanapum Indians, is to be 570,000 kw. The combined 1,200,000-kw. capacity of Priest Rapids and Wanapum represent the third largest source of hydroelectric power in the United States, outranked only by Hoover and Grand Coulee.

Construction progress to date has had an assist from the weather. To quote from the Grand County PUD's report for the first quarter of 1957:

"Construction work continues well ahead of the original schedule. Favorable weather and water conditions have made it possible for the contractor to perform work on the spillway section contained in Stage 1-B cofferdam (for the first 11 bays of the spillway) which was not contemplated until after the spring run-

off. Completion of the construction bridge (it was finished late in April) will enable the contractor to proceed with all phases of foundation work within the very near future, and it is expected that employment at the project will increase rapidly during the next quarter."

As at the time the first quarter report was written, some 45% of all excavation had been completed, as against a scheduled projection of 27%. Approximately 60% of all cofferdam and river diversion work was behind the contractor, against a scheduled 34%, and better than 85% of all access and construction plant was in place, compared with a scheduled 78%.

The contractor's ability to bridge the Columbia in advance of the 1957 high water season afforded a further opportunity to maintain this initial pace. With a railroad track down the center and flanking roadways on either side, the 1,750-ft. construction bridge provides a key across route for materials handling by rail and truck.

With tracks already in place throughout the project area, completion of the work bridge late in April provided the last link to tie the job into the spur line of the Chicago, Milwaukee, St. Paul & Pacific Railroad on the western side of the Columbia. Contractor-built haul roads on the west side of the river also tie the job into the area from which Merritt-Chapman & Scott is obtaining impervious fill for the embankments. The same haul road net also leads to the contractor's pozzolan plant, about a mile upriver from the bridge. In accordance with specifications, all Priest Rapids concrete will contained one part of pozzolan to three parts of cement.

The contractor's construction programming roughly breaks down into a three-stage plan, working from east to west. The first phase called for concentration on excavation of the left embankment core trench and excavation of the powerhouse area within the protection of a chain of twenty-three 54-ft. diameter steel sheet pile cofferdam cells. This Stage 1A cofferdam, which was abutted on upstream and downstream ends by long earthen dikes, was built well above the Columbia's high water mark to permit uninterrupted operations.

Excavation for the first 11 bays of the spillway section was conducted within a perimeter of forty 32-ft. diameter cells immediately outboard of the powerhouse area. This Stage

1B cofferdam purposefully was designed to permit overtopping, and a protective 2-ft. cap of concrete was in place atop its cells when the Columbia reach 1957 flood stage on May 3, 1957.

Merritt's present schedule calls for completion of the lower level of the eastern side of spillway section during the 1957-1958 low water season. Meanwhile a stage II cofferdam will be tied into the one around the powerhouse area. According to plan, this will permit removal of Stage 1B cofferdam in advance of the 1958 high water season, allowing the sweep of the river to pass through the entire spillway.

Moving to the west side of the river, it is Merritt's plan to throw a cofferdam around the area covering the remaining half of the spillway section and divert the Columbia through the first 11 bays. Present schedules anticipate completion of the western half of the spillway in advance of the 1959 high water season, and final work on the eastern side during the low water period of 1959-60.

Substantial progress toward meeting this schedule was marked at "first concrete" ceremonies this past April 25, with Governor Albert C. Rosellini of Washington turning a valve to place the first four-yard bucket in the toe of the excavation for the northeast corner of the powerhouse. Beyond this ceremonial touch, the occasion also offered a preview of the "flow chart" for handling of concrete at Priest Rapids.

Merritt's mix plant stands near the edge of the plateau overlooking the downriver end of the powerhouse excavation. A C. S. Johnson 1,100-ton plant, it is equipped with four-yard Koehring Mixers and 7,500-bbl. silos.

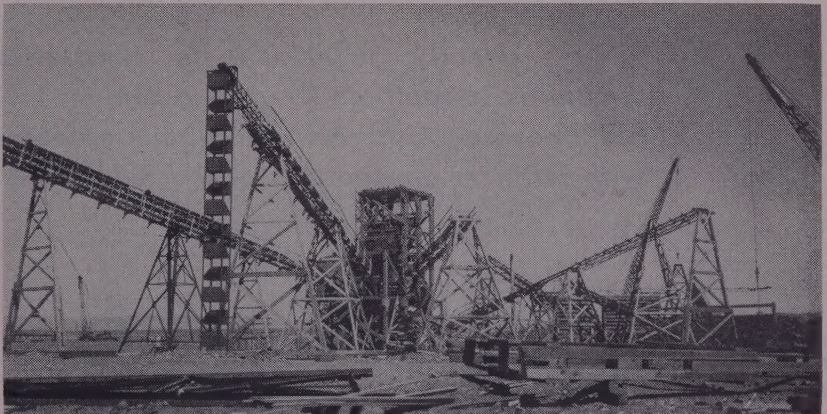
Cement in bulk is brought across the river via the construction bridge in railroad hopper cars and via screw fed elevators can be sent selectively either to the silo or batch plant. Pozzolan is brought across the river by dump truck and is similarly fed into the plant.

Gravel feeds into the mix plant via a 1,200-ft. covered conveyor leading from the nearby aggregate plant. From initial surge pile, aggregate is reduced to four sizes of gravel—6x3, 3x1½, 1½x¾ and ¾x4. Sand is routed to equalizing bunkers, and then to blending tanks.

From the mix plant, concrete is trucked by semi-trailers in 4-yd. buckets for placement by whirley gantry cranes, two upstream and two



CARPENTERS WORK on a 28-ft. wooden form that will be used in building draft tubes below the turbines. Entire job will require 85 acres of wooden forms for concrete work.



AGGREGATE SCREENING PLANT will classify all the gravel needed for the 910,000 cu. yd. of concrete. Wind storms with gusts up to 120 mph. required conveyors to be covered.

downstream of the powerhouse area. Concrete for the spillway will be placed by crawlers.

To date, sporadic wind storms with gusts up to 120 mph. have been the greatest weather hazard, and were the main consideration dictating enclosure of aggregate conveyor belts. All project shop and office facilities are of steel or aluminum construction, laid out with the orderly precision of a well planned township. Service area space has been no problem at Priest Rapids, but project layout emphasizes compactness in the interest of speed and supervision. Warehouses, repair shops, reinforcing steel and lumber yards are grouped within a comparatively small area close to the aggregate and concrete mix plants. Well coordinated provision for materials storage and handling, and for equipment

maintenance makes for an over-all impression of self-sufficiency, always a key factor in a project so isolated from supply and service points.

Employment is now running at the rate of approximately 1,000, and the peak figure expected throughout duration of the project will be 2,000. According to schedule, this payroll will progressively decline by about 75% this winter, will return to a peak of 2,000 next summer and thereafter gradually diminish.

Merritt's work at Priest Rapids is under the over-all direction of William Denny, executive vice president in charge of the company's Construction Department. Robert J. Jenks is in charge at the site, as M-C&S project manager, with Russell Hoffman serving as general superintendent and George H. Gothro as project engineer.



Breaking an Oregon bottleneck

Nearly \$6,000,000 in construction contracts are underway in southern Oregon to convert 10 mi. of U. S. 99 to full freeway standards. Shop-built equipment and blasting with fertilizer are features of the field work.

WHEN THE INTERSTATE Highway Program got underway last year, the state of Oregon turned its attention to one of its worst bottlenecks, the 10 mi. between Myrtle Creek and Canyonville on U.S. 99 in the southern part of the State. This was the only portion of U. S. 99 which hadn't been brought up to date at least once since it was originally constructed back in the 1920s.

The main reason Oregon hesitated to spend much money on this section was because the engineers knew the best improvement would be to relocate the highway on the other side of the Umpqua River—a job which would cost many millions of dollars because of the heavy rock work and earthmoving involved. In brief, improvements to the Myrtle Creek-Canyonville section were best done all at once or not at all.

Financial boost needed

The financial boost given by the Federal government in June of 1956 was exactly what was needed. By January of 1957, little more than six months after the passage of the Federal Aid Highway Act, several of the initial contracts had already been completed and well over \$5,000,000 worth of construction was underway

—and the main paving contracts are still to come.

C. R. O'Neil leads the way

The biggest contract is for grading 2.87 mi. from Myrtle Creek to a point called Missouri Bottom, which was awarded to C. R. O'Neil in January 1957 on his low bid of \$1,552,834. The job involves 1,250,000 yd. of unclassified excavation and is scheduled for completion in October of 1957.

The next contract, from Missouri Bottom to Fords Bridge unit, has 900,000 cu. yd. of unclassified excavation and was awarded to Kuckenberg Construction Co. for \$1,269,800 and should be complete by August of 1958.

Grading on the Fords Bridge unit was done by R. A. Heintz in 1956 for \$323,000. The paving contract is held by O'Neil, who has subbed it to Warren Northwest. O'Neil's bid on this paving contract was \$196,200. Completion date is September 1957.

The final grading contract, from Fords Bridge unit to Canyonville, was awarded to C. R. O'Neil in September of 1956 for \$697,708. Completion is expected by September of 1957.

One of the key structures, Fords Bridge, has been finished by con-

tractor Hamilton-Thoms on a \$456,000 contract which included one other smaller structure. Construction has started on two interchanges, one by Ausland Construction Co. on a \$114,500 contract, and one by contractor Lee Hoffman, on a \$719,642 contract.

MAJOR EQUIPMENT— C. R. O'NEIL

- 1 22 B Bucyrus-Erie shovel
- 1 Allis-Chalmers TD21 tractor
- 5 Caterpillar D8 tractors
- 1 Caterpillar D9 tractor
- 1 600-cfm Ingersoll-Rand rotary compressor
- 6 DW21 Cats with scrapers
- 2 Athey Rock Wagons
- 2 Cat DW20s with scrapers
- 2 Cat No. 12 graders
- 2 Northwest 80D shovels
- 4 63TDB Euclid trucks
- 1 Cat-mounted Joy drill
- 1 Ingersoll-Rand Trac-Drill

Much of the new alignment on both O'Neil jobs are on a steep side hill slope. Clearing a very steep slope is always a problem. O'Neil used two Cat D8s connected together through their winches with cables and a pulley. One D8 was positioned at the top of a slope on a small ledge bulldozed out for the purpose, and the other moved up and down the slope partially under its own power, partially

supported and assisted by the cable attached to the winch of the upper tractor. This was referred to as the "Yo-Yo" method by men on the job.

On the Myrtle Creek to Missouri Bottom section there are three cuts which total about 1,250,000 cu. yd. of unclassified excavation. Of this about 363,000 cu. yd. are rock which must be blasted.

Blasting with fertilizer

Gibson & Roberts is carrying out the drilling and blasting for O'Neil on a subcontract basis. G & R is using an Ingersoll-Rand Rockmaster which sinks 6-in. diameter holes at a rate of 30 ft. per hr. The rig handles 25-ft. lengths of steel. Bits are sharpened about every 30 ft.

Blasting is being done with fertilizer—a process which has been used for several years in mining operations but which only recently has found its way onto the construction job. On this project the fertilizer being used is a form of pearled ammonium nitrate made by the Spencer Chemical Company in Kansas City and distributed by Pacific Powder Co.

In general, fertilizer is harder to ignite than other types of blasting substances and for this reason is used only on large holes of, say, 3 in. in diameter and up. About a gallon of diesel fuel is added to every 80-lb. sack of fertilizer to assure complete ignition. Like any new material or method, some experience is needed before the crew can handle it at its top efficiency. The main advantage of using fertilizer for blasting are that it costs only about one-fourth as much as other blasting substances, is available at a moment's notice in almost any small town, and is not irritating to the skin.

Here's the way Gibson & Roberts loads a 50-ft. hole. First, about 25 lb. of gelatin is placed at the bottom of the hole. Then about 15 ft. of fertilizer is poured in, next about 10 lb. of gelatin, then more fertilizer. The top 10 or 12 ft. of the hole is plugged with dirt. Primercord is brought up from the bottom of the hole to assist in detonation. In blasting a series of holes, the row nearest the slope is usually delayed slightly to avoid breaking into the slope.

Rip-rap and slide problems

Part of the blasting is done in such a way to provide some fragments which are over 18 in. in diameter for use along the rivers edge, to eliminate the erosion problem. Specifications call for the outer 12 ft. of the fill to



AN INGERSOLL-RAND Rockmaster, visible in the background, is being used by subcontractor Gibson & Roberts on the C. R. O'Neil contracts. Bits are sharpened every 30 ft.



DRILLING on the Kuckenber contract is being done with a rig assembled in the contractor's shops. It's a 500 Joy drill mounted on a Cat D8 and powered by an I-R Air Flow Compressor.



FUEL AND GREASE truck is another successful piece of equipment assembled in the Kuckenber shops. Main components are a GMC truck and Shetky body and tanks.

be of this large material, a total of 150,000 cu. yd. of rip-rap.

The new alignment crosses through an area which has a long history of slides and slipouts. As an example of the severity of this problem it can be noted that just a few miles north of the present project, at Roberts Mountain, a cut slope that everyone thought was solid suddenly failed and about 150,000 cu. yd. of material moved onto a newly finished section of highway. And, on one of the present O'Neil projects, during the clearing and grubbing operation, there was a 75,000-cu. yd. slide. The plan to prevent another slide at this location is to make a large catch basin

at the top of the cut slope and carry away the spring water collected there through a 15-in. diameter pipe.

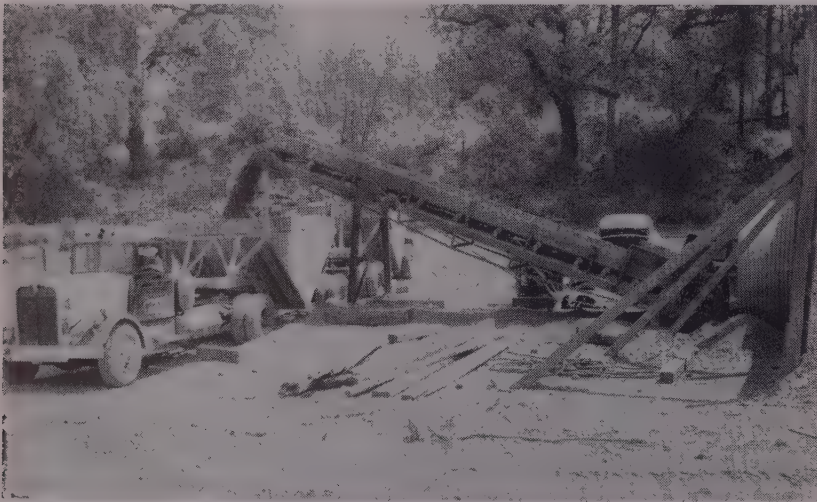
As the cuts are opened up, a state crew is placing a system of horizontal drains which reach about 100 ft. into the bank to tap the ground water. The outside ends of these pipes will be connected together to form a permanent installation when the job is finished.

Shop-made equipment

One of the features of the Kuckenber project which adjoins O'Neil's is the special equipment the contractor built in his own shops. One is a 500



YOU SCRATCH MY BACK, ETC. A Northwest 80D scrapes off an accumulation of mud from the bed of a Euclid. Mud was troublesome in the wet spring months.



CRUSHED ROCK is supplied from plant set up and operated by Warren Northwest, Inc. Base material is spread on grade by two Peerless trailers pulled by Kenworth truck.

Joy drill mounted on a Caterpillar D8 and powered by a 600 Air Flow Ingersoll-Rand compressor. The rig can sink a 4½-in. diameter hole 100 ft., but 60 ft. is about the maximum on this project. Bits are sharpened once or twice a day. This averages out to be about 150 to 300 ft. before a bit needs sharpening. Bill McFall, Kuckenberg's general master mechanic for all jobs, is working on a bit grinder which will be mounted right on the compressor.

Another piece of shop-made equipment the contractor is using is a combination fuel truck-grease truck. A General Motors truck was used with a truck body and tanks made by Shetky Equipment Corp. The truck mounts flexible hose outlets for hoist oil, two for engine oil, one for compressed air, chassis lube, gear oil, gear oil-extreme pressure, track roller,

water, diesel fuel, and gas. The diesel fuel tank has a 10,999-gal. capacity.

Kuckenberg's crews are working two 8-hr. shifts 6 days a week starting at 4 in the morning for an all daylight working day. O'Neil's crews are working two 10-hr. shifts four days a week with two 8-hr. shifts on Friday.

Kuckenberg's equipment fleet includes the following major items: 1 Cat D9, 2 Cat D8s, 1 Cat D4 with loader, 6 Euclid 18½-yd. end-dump trucks, 4 TDT Euclid scrapers, 2 No. 12 Cat graders, and 1 Northwest 80D shovel.

Bucket teeth on the Northwest shovel last about three or four days working in the rock. Several brands of hardfacing are being tried, including Airco electrodes, Lincoln Shield Arc, and Rankin Ranite electrodes. For a discussion of how to test hard-surfacing materials in the field see

the article starting on page 69 in the June issue of **WESTERN CONSTRUCTION**.

Supplying crushed rock

When all the contracts are finished the highway will conform to full freeway standards. A section taken through the roadway would reveal 18 in. of selected base material, an 8-in. course of crusher run material, a leveling course of 1½ in. of ¾-in. minus material, topped by a 4-in. layer of asphaltic concrete.

Warren Northwest, Inc., of Portland has erected a crusher to turn out both base rock and oil at the same time. The crusher will supply material to two of the O'Neil contracts and for a 1-mi. detour to be built on the Kuckenberg job. The set-up is designed to produce the following total quantities: 84,000 cu. yd. of 2-in. base course, 15,000 cu. yd. of ¾ to 0 binder course, 1,400 cu. yd. of 1¼-¾, 770 cu. yd. of ¾-½, 730 cu. yd. of ½-¼, and 590 cu. yd. of ¼-10.

Paving should start in July and crushing should end in August. A 4,000-lb. Madsen plant will be brought in to produce the 17,000 tons of asphaltic concrete.

Material from the crusher is carried and spread on the grade by two double-trailer trains supplied by Transport Service. About 26 cu. yd. are carried per trip. The longest haul is 3½ mi.

At the base material stock pile a Caterpillar D8 with a pushblade handles the material and heaps it over a 35 ft. long, 8 ft. diameter tunnel which contains a 32 ft. long, 36 in. wide Warren Northwest belt. This belt carries the material into waiting Kenworth trucks equipped with two Peerless bottom-dump trailers.

Personnel

Tom Edwards, formerly division engineer at Roseburg, is Oregon state construction engineer. Division engineer at Roseburg is Frank Morgan. Assistant division engineer is L. R. Chandler. Resident engineers on the Myrtle Creek to Canyonville section are Jack Rowland and C. C. Gall. Superintendent for C. R. O'Neil is George Posch. Louis E. Hillyard is superintendent for Kuckenberg Construction Company, Burford Persinger is superintendent for Gibson & Roberts, and V. H. Colvin is superintendent for Warren Northwest, Inc.

Harry McClure is in charge of structures on the project for the Oregon State Highway Department.

LIBERAL USE of modern techniques in concrete construction was the keynote in building the Redeemer Lutheran Church in South Gate, Calif., a project in which Peter Kiewit Sons' Co., the contractor, demonstrated effective use of slip-forms for the church tower and precast concrete arch frames, wall and roof sections for the main structure.

The church auditorium is framed and given architectural form by the use of nine precast concrete arches of Gothic type, which rise to a maximum height of about 45 ft. These arch frames furnish support for roof panels of thin precast concrete. The perimeter walls of the building are precast tilt-up panel walls designed for the usual crane erection.

The tower, 14 ft. square in plan, was constructed first and was carried to a height of 71 ft. by the slip-form method. The upper portion consists of a precast wall assembly 11 ft. high, surmounted by a structural steel pyramid covered with mosaic tile and carrying an aluminum cross.

Slip-form construction proved feasible and economical in spite of a number of problems. It was necessary to make provision for openings and for offsets. Two large door openings occurred in the first story section. Over one of them was a door opening in the second story, which also had two window openings in one of its walls. Near the top of the slip-formed tower, an opening in the form of a cross 17 ft. high was blocked out

Slip forms for concreting church tower 71 ft. high

on each of the four walls, to be filled in finally with glass block.

Temporary headers at the top of openings provided for the change from open to filled section, corner offsets were carried out by inserting new form elements to accommodate the change of corner condition. The slip-forms passed over an insert at second-floor line which provides doweling and keyed joint for later casting of the floor slab. Plastic tubes installed at each jacking unit provided means for maintaining the form assembly plumb and level; transit observation of targets on outer forms furnished a check on possible twisting or rotation.

The slip-form assembly for the 8-in. tower walls was framed to carry an exterior working platform, a 4-ft. lift of wall forms, and hanging platforms both inside and outside of the walls, to facilitate the work of the finishers as concrete is exposed with the passage of the slip-forms.

Raising of the form assembly was accomplished by the installation of eight jacks, furnished by B. M. Heede Co., Inc., which had been used with good results on bridge pier construction. This layout provided two jacks in each tower wall, operating on as

many jacking rods, which were placed at the quarter points from each wall corner.

A high quality of concrete and careful control of its consistency and other properties are essential in slip-form construction. Concrete for the tower was typically a mix with 1-in. maximum size of aggregate, requiring 6 sacks per cu. yd., containing no admixture, and placed at 2-in. slump.

Placing of concrete began on a Monday morning and was carried on continuously to completion on Thursday morning, at an average rate of about 10 in. of rise per hour. Steady progress at a slow rate is most desirable for slip-formed concrete; it makes it easy to secure even distribution and to keep a close check for uniformity of consistency. The time interval of four hours or more from placing to exposing fresh concrete made it feasible to use vibration without the incidence of sloughing, and also allowed the concrete to progress in hardening beyond the stage of initial set before the light rubbing given to insure a smooth finish.

Robert H. Ainsworth and Edwin Westberg were the architects, and Peter Kiewit Sons' Co. was the general contractor.

GOING UP at a rate averaging 10 in. per hr., the slip form produced a 71-ft. tower in a continuous pour beginning on a Monday morning and finishing three days later.



First concrete for Ice Harbor Dam

Concreting begins on huge Corps of Engineers structure on the Snake River. Power on the line is expected by 1961 with ultimate output of 540,000 kw. (See photo on cover.)

SATURDAY, JUNE 1, saw the placement of the first concrete at Ice Harbor Dam site on the Snake River. Attended by the Governors of the State of Washington, of Idaho, and a Governor's Representative from the State of Oregon, as well as the two Senators from the State of Washington, the ceremonial affair was apropos to the progress of the Corps of Engineers river development program on the Snake River.

Power on the line in 1961 is the construction schedule set by the Corps of Engineers for the completion of Ice Harbor Dam. Work on the first step cofferdam began March 19, 1956, by the Guy F. Atkinson Co., Contractors. The Grant Construction Co., holders of the access roads contract into both shores of the dam site completed their work on April 27, 1956. Steel driving for the first step cofferdam contract began August 29, 1956, and bids for the first step construction work within the cofferdam were opened December 18, 1956. In a joint venture bid the contractors, Montag-Halvorson-Austin and Associates, were awarded the near \$30,000,000 contract which includes construction of the south shore abutment, south shore fish ladder, powerhouse and

7½ of the ultimate 10 spillway bays. Work on the contract began late in January, 1957.

Railroad relocation work involves 27 mi. of two mainline tracks as well as 26 mi. of bank protection on existing tracks.

Construction of Ice Harbor Lock and Dam will follow a three-step-work schedule. Construction step one will consist of completing the south shore fish ladders, south shore concrete abutment, skeleton powerhouse structure and 7½ of the 10-bay spillway. During this construction step, the river will be channeled toward the north shore by the cofferdam which encloses the south shore 17-ac. work area.

The second step construction will be behind the north shore cofferdam which will overlap the first step cofferdam by 1½ spillway bays. This step will consist of constructing the navigation lock, north shore fish ladder and earthen abutment and the remaining 2½ spillway bays. Construction step three will consist of completing the powerhouse and installation of turbines and generators. It will be carried on at the same time as the north shore work. During step two construction, the river will flow through 6 of the completed low bays.

In addition to its major purpose of improving navigation, Ice Harbor Dam with its initial three generators will develop 270,000 kw. of hydro-electric power, with an ultimate capacity of 540,000 kw. when the three additional generators are installed in the skeleton bay. Ice Harbor will also make available incidental benefits to recreation, wildlife, and irrigation. Fish passage facilities on both the north and south shore similar to installations at downstream on the Columbia River, are included in Ice Harbor's design.

The 9,200-ac. lake that will be formed on the Snake River by Ice Harbor Dam will create a picturesque and rugged shoreline of about 80 mi. in the lower canyon of the Snake. The recreational facilities now enjoyed by the public on McNary-Dam reservoir, such as boating, fishing, hunting, and sailing will be extended another 35 mi. upstream. With completion of the John Day Dam on the Columbia River and the remaining three dams on the Snake, pleasure craft cruising will be possible from the Pacific Ocean into the very heart of the Inland Empire.

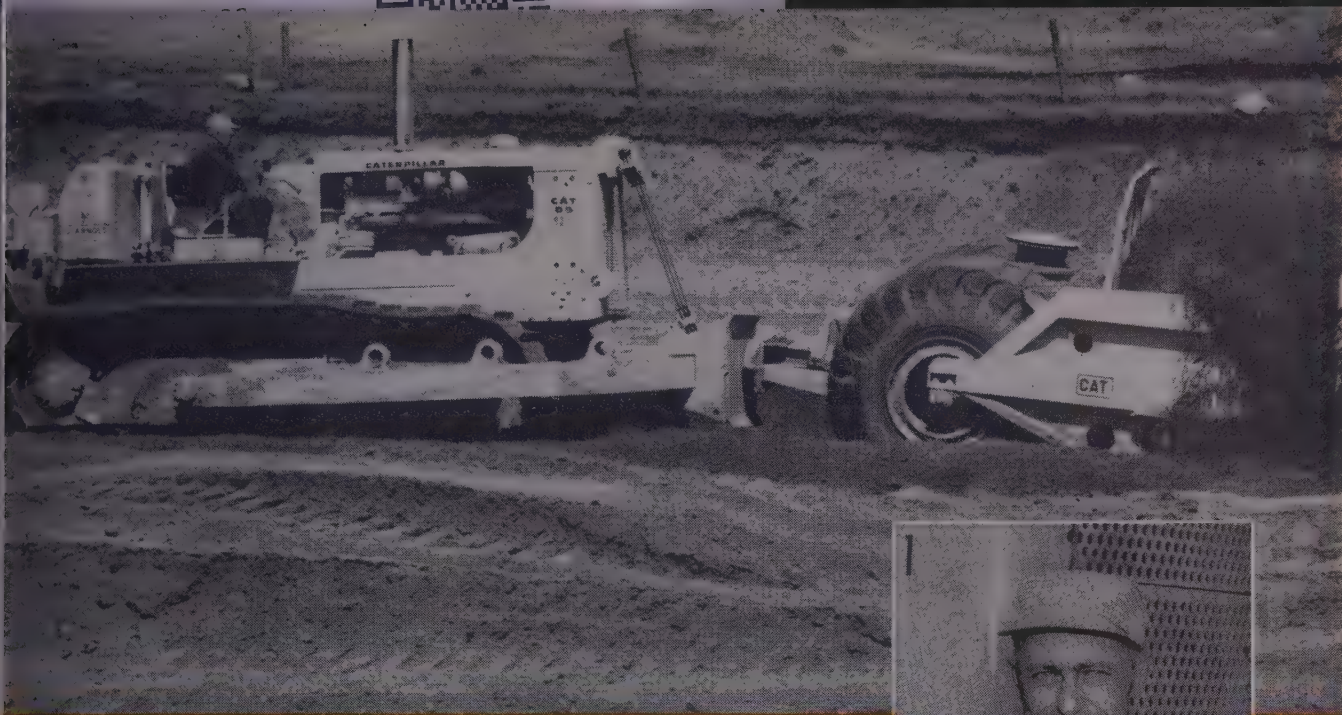
Completion of the John Day Dam on the Lower Columbia, now in the planning stage, along with completion of the three remaining dams on the Lower Snake River, will make possible slack-water navigation for commercial and pleasure crafts from the Pacific Ocean 325 mi. up the Columbia River to above Pasco and Kennewick and approximately 150 mi. up the Snake River to above Lewiston, Idaho, and Clarkstown, Washington.

Average annual commerce through the Ice Harbor pool and lock during an anticipated 50-yr. project life is estimated at 2,500,000 tons annually, consisting of bulk commodities, such as wheat, wood products, limestone and ores, petroleum products, fertilizer, farm and manufacturing equipment, and construction materials, machinery and supplies.

The navigation lock at Ice Harbor and at the three other authorized dams on the Snake River will be of uniform size, 86 ft. wide by 675 ft. long. This will correspond to the lock dimensions at McNary, The Dalles and at the planned John Day Dam. During Ice Harbor construction, through navigation on the Snake above the dam site will be halted.



FIRST STEP COFFERDAM has been completed by Guy F. Atkinson Co., and foundation work has started by joint venturers Montag-Halvorson-Austin, holders of a \$30,000,000 contract.

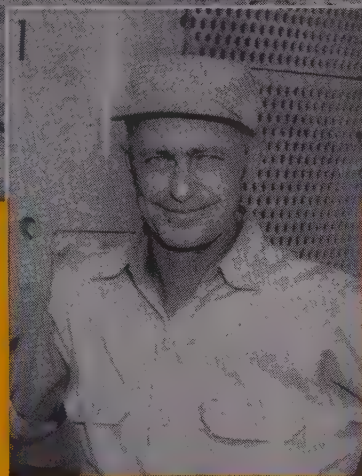


BEAR IN THE BORROW PIT

THIS D9 LOADS SCRAPERS

WITH 25 HEAPED YARDS

IN 45 SECONDS



Phil Dudenhoefer, grade superintendent, knows from production charts that the D9 pusher loads more yards faster, at lower cost.

Working on a highway relocation job near Eau Claire, Wis., L. G. Arnold, Inc., cut cycle times and boosted yardage with a Caterpillar D9 Tractor push-loading a CAT* DW21 and No. 470 Lowbowl Scraper.

On a round-trip haul of 3 miles they averaged 100 cu. yd. per hour — 4 heaped loads of 25 cu. yd. each. Loading time in the borrow pit, with the mighty D9 pushing, was an average of only 45 seconds.

Phil Dudenhoefer, grade superintendent for L. G. Arnold, Inc., says: "I've got both feet right in the dirt, where I record output and performance of every machine. With the D9 as pusher, the DW21-No. 470 unit is outproducing by far any other equipment on the job."

That experience has been shared by hundreds of firms, as more and more D9 Tractors have gone to work all over the country. For fast loading you simply can't beat the D9, with its 320 HP at the fly-

wheel and maximum drawbar pull of 98,000 pounds. Power-boosted controls and excellent visibility make this giant one of the easiest of all tractors to operate. Available either with torque converter or direct drive with oil clutch. Maintenance is easy, too. And it's ruggedly built to lick the world's toughest jobs.

Your Caterpillar Dealer can show you actual performance records of bigger production at lower cost per yard. He'll give you a demonstration right on the job. And he stands behind the long life of every machine with reliable service and parts you can trust.

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

CATERPILLAR*

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

ASPHALT PAVING

*Inspection, control
and workmanship*

Part two of two



Last month many of the practical problems faced on asphalt paving jobs were described and analyzed. This month the discussion is concluded with special emphasis on what inspectors and paving crews should know about motor graders and paving machines.

By VAUGHN MARKER

District Engineer
The Asphalt Institute
San Francisco, California

IF ANY unsatisfactory mechanical conditions exist in the paving equipment being used, the quality of the finished spread will suffer. If a condition exists in a paver that is causing difficulty in the spread, the difficulty will be magnified or aggravated with higher paving speeds. Little or nothing is gained by having a paving machine placing an asphaltic mixture at a faster rate than the plant can produce it. This condition will cause a non-uniformity of operation that will do no good to the end product. The paver will go fast for a few minutes and then wait for the next truck load of material to arrive. During the wait, the working parts of the paver will cool off, the remaining mix in the machine will become stiff and other related problems will arise.

When the paver starts off with the subsequent load of material, all the resisting forces will have increased and the paver must overcome these forces before it can settle down to a smooth spread again. In the distance it takes for this to occur, the quality of the surface of the pavement will be inferior to adjacent sections. In addition, an intermittent type of operation such as this will cause the truck string bearing the asphaltic concrete from the plant to the paver to bunch up at either one end or the other.

This causes a non-uniform operation at both places.

Plant-paver balance

To minimize these non-uniform operations, it is recommended that the paver speed be maintained at a rate that is in balance with the plant production. It is the opinion of the writer that under no condition should any paving machine be operated at a rate faster than 35 ft. a min. and preferably be maintained at between 20 and 30 ft. per min. At these speeds there are very few asphalt plants that can produce more material than the paver can place during a day. Therefore, at these speeds no curtailment of production should occur.

The purpose of the leveling course is to level up the irregularities in the subgrade on which an asphaltic mixture is being placed, as stated before. There are two generally accepted methods for placing leveling courses. The first, of course, is with the conventional paving machine. The second and less used method is to place the leveling course by spreading a windrow of material through a spreader box and then laying it out with a motor grader. There are advantages to both methods and under certain conditions one method or the other is probably the best.

Laying leveling course with blade

In the case of laying the leveling course with a blade, one of the pri-

mary benefits gained is to take advantage of the longer wheel base of the grader in eliminating excessive humps, sags and irregularities in the subgrade on which the mix is being placed. In general, the motor grader is superior to the paving machine in achieving these results if the motor grader operator is competent. On the other hand, if the motor grader operator is incompetent or careless in his work, he can do more damage than good by building irregularities in the leveling course that did not exist in the subgrade. When the leveling course is being placed in this manner, the street inspector should be alert at all times to make sure that the proper quantities of material are being placed in the windrow for spreading by the blade. He should also see that the leveling course is being laid to a true grade and cross-section so that the surfacing course subsequently will not suffer.

The second benefit gained by laying a leveling course with a motor grader is to achieve a rough-textured surface on which to place the surface course. By virtue of the segregation that occurs under the cutting edge of a blade, the surface of the leveling course will be much rougher in texture than one laid with a paving machine. The last material that remains in the windrow to be spread by the blade will be the coarse rock particles which usually are not fully pressed into the mat below. This rough texture is desirable in that it provides a surface that minimizes the possibility of a slip plane developing between the leveling course and the surface course which is placed on it.

In placing a course of asphaltic material by this method, whether it be a hot asphaltic mixture or a road mix, the operation should involve two pieces of equipment working in conjunction with each other. The first, of course, is the motor grader

and the second is a roller. It is preferable to use a rubber-tired roller in conjunction with the blade in this type of operation. With each pass of the motor grader, the rubber-tired roller should follow immediately behind, compacting the spread that is laid. This operation should progress until the final desired configuration is reached. If the motor grader operator manipulates his controls properly, he will leave more material in the depressions and less material at the humps and the roller immediately behind will compact this material, gradually building up a smooth, firm plane on which to place the surface course.

There are two general methods of placing a leveling course with a motor grader that will achieve satisfactory results. The first is to place the asphaltic mixture in a conventional trapezoidal windrow which is then manipulated by the motor grader operator in the normal fashion. With this method, the blade operator must make several passes taking material from the windrow each time and carrying it across the grade on which he wishes to place it in achieving the final spread.

The second method of utilizing a motor grader for a leveling course is to spread the material from a windrow box that leaves it in a wide flat spread from 4 to 8 in. high and possibly from 6 to 8 ft. wide. When the material is placed in this fashion, a wing can be attached to one end or the other of the moldboard thus allowing the motor grader operator to square blade material ahead if necessary. With this procedure, great care must be taken to see that the moldboard of the blade is not raised or lowered too rapidly to increase or decrease the load and also to see that too great a load is not imposed on the grader.

Both of these methods can give satisfactory leveling courses. Likewise, both of these methods require a skilled grader operator for the best results and constant attention should be paid to workmanship. As is the case of any work done using a motor grader, excessive manipulation of the controls by the operator will cause an inferior surface to result. It is important that the grader operator realize this fact, especially when placing a leveling course of asphaltic mixture.

The surface course of asphaltic concrete paving will almost invariably be placed with a self-propelled mechanical spreading and finishing machine, commonly known as a paver or paving machine. The

quality of work that can be anticipated from any paving machine is directly related to the condition and adjustment of the mechanical parts of that machine. *Any paver presently being manufactured is capable of spreading an asphaltic mixture satisfactorily.* As stated earlier, it is important that the street inspector recognize when a paving machine is doing its best work. The only way he can know this is to understand something about how it operates and what adjustments are necessary to make it operate properly.

Correct use of the paving machine

Besides being somewhat familiar with the mechanical workings of the machine, he should also be familiar with accepted good practices of operating it. It is actually a teamwork proposition between the inspector and the paving crew that provides the best finished product.

In any course of material being placed with a paving machine, a rule-of-thumb that has proven quite satisfactory, is to limit the depth of spread to approximately twice the dimension of the maximum size aggregate in the mixture. The most common asphaltic concrete mixture employs a $\frac{3}{4}$ -in. size maximum aggregate. This mix can be effectively placed to a depth of 2 in. If the depth of spread exceeds 2 in., for example, with a $\frac{3}{4}$ -in. mix, there is danger of differential compaction with the resultant possibility of the roller not being able to leave as smooth a surface as would be desired.

Unlike the leveling course, every effort should be made to obtain a uniform thickness in the surfacing course. This can be achieved only with the minimum manipulation of the thickness controls on the paving machine and by having a leveling course that is true to grade and cross section. Likewise, every attempt should be made to hold the handwork around a paving spread to the minimum. It has been amply demonstrated that finish work by hand cannot compare in quality to finish work by mechanical equipment.

Three points to check

There are several points of importance with all paving equipment that have a bearing on the quality of work capable of being done with it. These points of importance revolve around the mechanical condition of that piece of equipment as well as

the adjustment of the working parts. Needless to say, the adjustments will not mean too much if the mechanical condition of the parts being adjusted is not correct. Therefore, the first and most important part of checking a machine is to see that the parts are not excessively worn or otherwise injured.

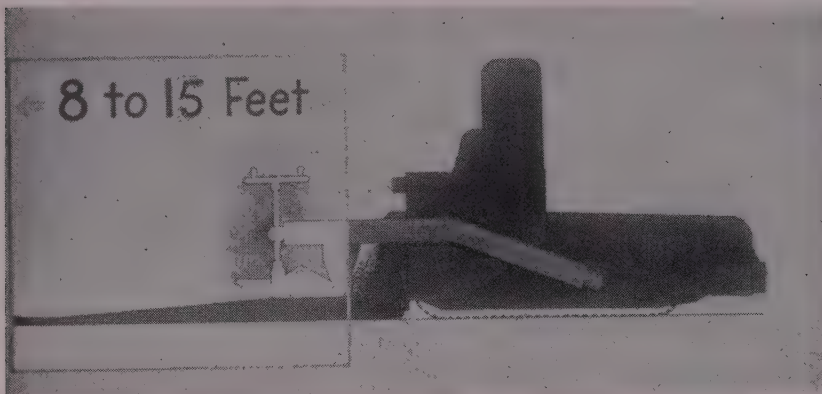
A point of importance in checking a motor grader before it is allowed to place a bituminous mixture is the condition of the cutting bit. During the earthwork operations, the blade receives considerable wear due to the abrasion with the material being moved. As the cutting bit becomes worn, the configuration of the path left by the blade becomes untrue in the degree to which the wear has occurred. For example, if a motor grader has been used extensively for cutting blade ditches, the ends of the cutting blade on the moldboard will be worn whereas if the motor grader has been used extensively for fine grading, it is probable that the center of the cutting edge will be worn. If the ends of the cutting edge are worn, the motor grader will place the bituminous layer of material with the outside edges of the spread higher than the center. Conversely, if the center of the bit is worn, the center of the spread will be higher than the edges.

Naturally, the condition of the cutting edge that leaves an untrue surface is of extreme interest to the paving crew as well as the inspector. It is a simple matter for anyone to tell if the cutting edge is excessively worn by sighting along that edge to see how true it is. Another simple way to determine any wear that may exist is to stretch a stringline against the cutting edge and actually measuring the deviations.

Another important condition that the inspector should check, is to see that the blade suspension system on the motor grader is snug. By that is meant the arms and levers that suspend the circle as well as the action of the wheels and steering mechanism. It is especially important that the blade suspension system be snug because the blade is free to move up and down during changes in the forces that are imposed on the motor grader, if there is excessive looseness. If the blade moves up and down, it leaves bumps that give an inferior surface. The controls must be positive because if they are not, the operator has little opportunity to leave anything but an inferior surface.

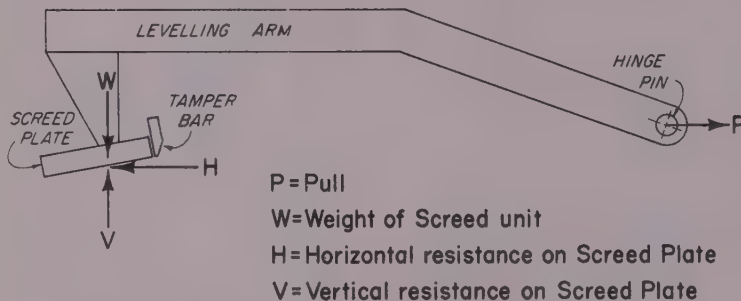
Some attention should be paid to the conditions of the tire casings on the motor grader. If a new tire

Changing the thickness takes time



THE BARBER-GREENE paver is not designed to permit sudden changes in thickness. When the thickness control handle is turned, the machine requires from 8 to 15 ft. to build a ramp to the new level. Why this is so is shown in the drawing below.

FORCES ACTING ON SCREED UNIT DURING PAVING OPERATION



WHILE THE PAVER is moving the pull, P , on the hinge pin always exceeds the horizontal resistance, H , on the screed plate. When the thickness of the mat is being increased, the screed plate is tilted upward (this tilt is exaggerated in the drawing for clarity) to allow more material to crowd under it. The result is that the vertical uplift, V , exceeds the weight, W , and causes the screed plate to rise. As it rises, the less V becomes until it again equals W , at which time the vertical motion stops and the screed plate once again moves only in the horizontal direction in a path parallel to the path of the hinge pins.

casing is used, the grippers or grousers on the casing will leave impressions or indentations in the surface being placed. While this is not quite as critical in the leveling course as it would be on the surface, it is still possible for these impressions to reflect through a surfacing course that is placed on them and eventually result in a washboard or chatter effect on the surface. This effect can be minimized if the motor grader uses tire casings that are worn or possibly tire casings that have been recapped with smooth camelback for a wearing surface. Likewise, the effect of the marks left by the tire casings can be minimized if the inflation of the tires is reduced somewhat. Lower tire pressures have the effect of spreading the load of the motor grader over a wider area and thereby making impressions of lesser depth than tires with high pressure.

Checking the Barber-Greene paver

There are several points on a Barber-Greene paving machine that should be checked at the beginning of a paving operation and examined periodically thereafter. Most of the points that should be checked involve moving or working parts of the paver such as the tracks, the tamper bar, the coil spring between the tamper bar drives, the screed itself, the distributing augers, the engine governor as well as the bar feeders in the hopper. A single check on most of these items will usually be sufficient during the life of any job. Others, however, should be checked almost daily to make sure they are in proper operating condition.

For example, if the tracks on which the tractor portion of the Barber-Greene paver moves are not snug it is possible for the paver

sprockets on which the tracks are mounted to climb the tracks with a rhythmic bumping movement. This movement is reflected to the screed in the rear which, in turn, causes a ripple effect on the surface of the pavement. There is a simple adjustment for these tracks and usually once it is checked, no further attention need be paid to it.

The tractor portion and the screed portion of a Barber-Greene paver are essentially two separate units, joined by the leveling arms which are pin-connected at the track casing on the tractor. Probably the most important portion of the Barber-Greene paver to keep an eye on is the screed portion. The screed portion consists of the leveling arms mentioned before, a screed plate which gives the ironing action to the mat, a tamping bar which is the compacting medium as well as the strike-off medium for the screed, the thickness control shafts by which the tilt of the screed plate is changed in order to increase or decrease the thickness of the mat being placed and the augers in front of the screed which distribute the material transversely in front of the screed plate. The augers are actually mounted on the tractor unit but function with the screed. The screed mechanism is also equipped with a heater that is used when the air temperature is cold or the mix is cold. Heating the screed plate as necessary allows it to iron over the mat being placed more satisfactorily.

Changing the thickness

Thickness control with the Barber-Greene paver is accomplished by changing the tilt of the screed plate. When a Barber-Greene paver is operating uniformly without an increase or decrease in thickness being effected, *the path of the face of the screed plate is parallel to the path of the hinge pins at the front of the leveling arms where the screed unit is connected to the tractor unit.* If the screed is tilted up, it allows more material to crowd under the nose of the screed causing it to build a ramp for itself and climb until its path again is parallel to the path of the hinge pins at the front of the leveling arms. This is an important point to keep in mind when using a Barber-Greene paver. It might be pointed out that it is impossible with the Barber-Greene paver to effect an immediate vertical change in thickness either when the machine is at a standstill or moving, as long as the screed mechanism is being supported

MOVE 2 MILLION YDS. OF SAND for 2.8-mi. freeway section



14 C Tournapulls handle earthmoving

At Colton, Calif., the firm of Crowell & Larson Engineering Contractors, Covenia, is moving approximately 2,000,000 cu. yds. of sand to lay the base for a 2.8-mi. section of the new San Bernardino Freeway. Time limit for earthmoving, on this job, is 385 working days.

Keeping the job on schedule is an all LeTourneau-Westinghouse Tournapull scraper fleet of 14 "C's" — 4 of them new, 18-yd. Fullpaks*.

Most of this material — 1,750,000 cu. yds. — is borrow picked up from a dry-bed section of the nearby Santa Anna River, and spread along the new road grade. Cuts bordering right-of-way supply the additional 250,000 yards required. All river bed loads are hauled over state scales, as the contractor is paid by the ton for his work.

2.4-mi. cycle in 10 min.

Crowell & Larson's 14 "C's" load in average length of 50', travel 1.2 mi. from river bed to fill, spread over 50' to 75', and return by the same route. Average time for this 2.4-mi. cycle is only 10 min. This is high production dirtmoving! In a 10-hr. day, each Tournapull scraper moves from 55 to 60 loads.

Material is tough to load, because the contract prohibits wetting the borrow pit from which loads are

weighed. Each Tournapull heaps an average of 15 to 17 cu. yds. (19 to 21 tons) per trip. Daily production, per unit, is approximately 900 weighed yds. Total average yardage is 12,600 weighed cu. yds. per day.

Big loads under all conditions

The firm's general superintendent, Donald Mosley, likes the ability of the C Tournapull® to move consistently big loads under adverse conditions. Gene Carpenter, project superintendent, likes the sturdy construction of these scrapers, plus their flexibility in handling all jobs.

If you have big yardages to move on your projects, you'll want to know more about the new, redesigned, 18-yd. C Fullpak scraper or the big 27-yd. B Fullpak. Fullpaks heap a full bowl every trip — load faster and spread clean. Ask for details.

▲
C Fullpak (center) and 2 older Model C's step-load on the San Bernardino Freeway project. While scraper at left is push-loaded, the others move into position — lowering scraper bowl to self-load a partial load before pusher makes contact for heaping load.

Crowell & Larson have grown big only in recent years. This firm began in the rubber-tired scraper business with two 7½-yd. D Tournapulls. They still own these two units. From this beginning, they moved into the bigger C Tournapull class with two L-W "C's". As they grew, they bought more units, the most recent on this job being four 18-yd. C Fullpaks within the past year.

Close-up of push-loading operation shows easy boiling action of new Fullpak bowl. Operator has instant, electric control of all loading operations.

▼
*Trademark CP-1276-DC-1

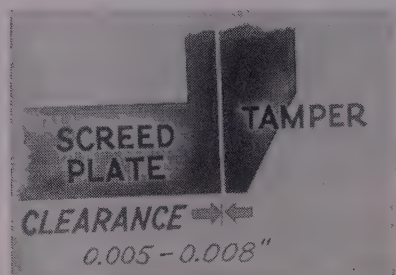
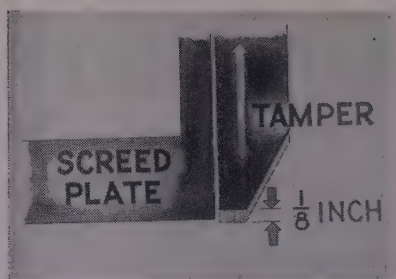
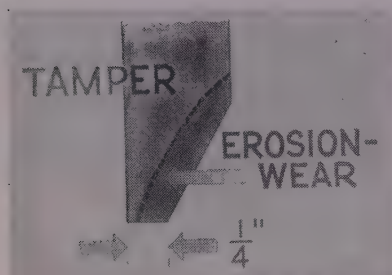


LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

The paving machine—

Three important adjustments



THE DRAWINGS above illustrate three important adjustments which should be checked by the inspector before the paving operation begins. The erosion wear on the front face of the tamper bar should not be so great as to reduce the thickness of the bottom edge to a degree that strike-off capability is affected. The horizontal clearance between the screed plate and the tamper should be between 0.005 and 0.008 in. The vertical range of the tamper oscillations is $\frac{1}{8}$ in. and at its lower limit should extend about the thickness of a fingernail below the screed.

by the mat being placed. The paver is not designed for making this kind of an adjustment without blocking up the screed.

As the screed plate is tilted up or down and material is varied in quantity under it, the screed plate builds itself a ramp up or down in seeking a new elevation. The elevation it seeks is that elevation that allows its path to be parallel to the path of the hinge pins at the front of the leveling arms. Before this path is found from one level to another, the paver must travel a given distance for it to occur. Actually, in the case of the Barber-Greene paver, this distance will probably vary between 8 and 15 ft. In other words, it takes between 8 and 15 ft. for the ramp to be built if the screed plate is changed in its tilt. In order to assist in the description of the method with which the Barber-Greene screed operates, it might be simpler to describe the forces that are acting on the screed itself.

First, of course, is the weight of the screed mechanism. Second, there is the force of the material under the screed plate that is supporting the weight of the screed and, thirdly, there is the force of the tractor that is pulling the screed along. When these three forces are in dynamic balance, the screed plate rides a uniform, level plane that is parallel to the path of the hinge pins in front. If any of these forces are changed, it follows that the work being done

by the screed itself will likewise be changed.

The forces acting up on the face of the screed plate can be changed by increasing or decreasing the tilt of the screed. If the screed is tilted upward, the forces on the face of the plate increase and cause it to ride higher. If the screed is tilted downward, the forces on the face of the screed plate are decreased, allowing it to go downward. Non-uniformity in the mix can also cause variations in the balance of forces acting on the screed plate thus affecting its behavior. These basic thoughts or ideas should be well in mind of anyone using a Barber-Greene paver.

How to build a roller coaster

It should be pointed out that over-manipulation of the thickness control handles on the Barber-Greene paver have the same net effect as over-controlling a motor grader or any other piece of paving equipment. Since we know that it takes a distance for a thickness change to occur with the Barber-Greene paver, we should then make our thickness control changes accordingly. It is quite common for the screed man to over-manipulate his controls because he does not realize what is happening. For example, to increase thickness he turns the handles and then measures the depth of material being placed in the mat directly behind the screed. He finds no change in thickness be-

cause he has measured too soon. He then increases the tilt of the screed plate some more and measures again. Maybe he will notice a change in thickness and maybe he will not, because the paver still has not traveled far enough. The third time he finds that the thickness is increasing, but all of a sudden he notices that he has increased the thickness excessively. This causes him to turn the handles in the opposite direction in order to decrease the thickness and the same procedure is repeated. The net result is that he has built a very nice wave in the surface of the pavement that is being placed. Naturally, if he continues to operate in this manner, the result is a series of waves in the pavement that have the effect of a roller coaster when being driven over by a car or truck.

Carrying the idea of thickness control further, it can be seen that any necessary change must be anticipated. Adjustment for thickness at a given point on the grade must be started approximately 15 ft. before the screed reaches that point. Proper control by a skilled screed man can do much to improve the surface smoothness of the finished pavement. Too much emphasis cannot be placed in the proper operation and manipulation of the thickness control handles on a paving machine.

Adjustments are minute

While we usually think of the Barber-Greene paver as a fairly large piece of machinery, it is not always commonly understood that the adjustments on parts of this machine are rather minute. For example, the travel of the tamper bar in the vertical direction is only $\frac{1}{8}$ of an inch between top and bottom of the stroke. This movement is occurring at the rate of approximately 1,200 times per minute. (The latest model Barber-Greene paver has a tamper frequency of 1,500 tamps per minute.) The action of other paving machines with the tamper bar principle is similar. A second example is the size and shape of the tamper bar itself. When new, the horizontal bottom face of the tamper is only $\frac{1}{4}$ of an inch wide. This gradually will wear back to a knife edge with use. Between the time it is new and the time it is worn to a knife edge, thousands of tons of material will pass through the paver.

The horizontal face on the bottom of the tamper bar is primarily the face which strikes off the material so that the screed plate can ride over

On 3,696-ft. cycle...up and down 4 to 13% grades...

three 7-yd. "D's" haul 168 yds. hourly



Photo shows Rear-Dumps on return portion of cycle, climbing grades to 12%. This new section of Trans-Canada Highway will eliminate narrow twisting roads with many hairpin turns.

Square M Construction Company Ltd. of Edmonton, Alberta, had 1,200,000 yds. of earth and rock to move on a 6-mile section of Trans-Canada Highway 1, eight miles west of Banff, Alberta. To help haul material, contractor brought in 3 LeTourneau-Westinghouse 7-yd. (11-ton) D Rear-Dumps. Here's how Tournapull haulers performed:

Rear-Dumps are shown here building a 10-ft. lookout point between grade of new highway and Bow River.

8 loads per hour

Three to 4 passes of a 2-yd. shovel loaded D Rear-Dumps with 7 yds. of rocky material in 58 sec. Units hauled 1,584 ft. down 4 to 13% grades to fill area, where load was spread in 18 sec. On 2,112-ft. return, units climbed grades to 12%. "D's" completed the 3,696-ft. cycle in 6 min. 40 sec. Each Rear-Dump hauled 8 loads per hour... for a total combined production of 168 yds. hourly.

Perfect safety on steep grades

On the steep-grade portions of each cycle, Rear-Dump's positive kingpin power-steer... 4-wheel, multi-disc air brakes... and excellent traction of big, low-pressure tires... gave oper-

ators complete safety and control, even at high speeds.

"The equipment for today's jobs"

With work progressing ahead of schedule, Foreman Carl Andreff said, "These units are the equipment for today's jobs. They can maneuver in tight places... travel through soft, spongy going."

Insure future earnings

An added advantage with Tournapulls is that rear-dump, scraper, bottom-dump, lift-and-carry crane, or flat-bed hauler can be used behind same prime-mover. With this interchangeability, you can adapt Tournapull to any type of future operation... keep busy the year-around... earn more annually. There are 3 sizes of L-W Rear-Dumps to choose from: 11, 22, or 35-ton capacity. Call or write for production figures, price, and delivery.



Building a 10-ft. lookout point between grade of Trans-Canada Highway and Bow River, D Rear-Dump spreads its load in about 18 seconds. Electric controls respond instantly for positive, controlled dumping.



Three to four passes by 2-yd. shovel fill 11-ton Rear-Dumps to heaped capacity. Low rear entry and wide bowl provide easy target for shovel operator... allow fast swing-out of shovel dipper, let shovel operator heap maximum yardage with minimum spillage.

Tournapull—Trademark Reg. U.S. Pat. Off. DR-1375-H-b



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it. The angled face in front of the tamper bar is primarily the face that affects the compaction of the mix as the paver moves along. The density of the loose asphaltic mix is increased as the material is forced down by the beveled face of the tamper. The maximum compaction that the tamper is capable of is attained in the material at the strike-off level of the tamper. The horizontal face of the tamper probably imparts a little compaction but its primary function is in striking the material off. It is important to know the relation of the faces to each other.

While the horizontal face on the tamper is wearing so is the angled face in front. The results of the wear, however, are different for the two faces. As the horizontal face wears, there is less and less of a strike-off action for the screed plate from the tamper. On the other hand, as the angled face wears, there is very little change in the compacting capability of the tamper. When the horizontal face has worn to a knife edge and it no longer strikes off for the screed plate, the screed plate must then strike off the material for itself before it can iron across. The result of the screed striking off the material for itself is to cause a pitted appearance in the mat behind. This is because the nose of the screed plate tends to hook the large rock particles in the mix and drag them forward a very short distance before ironing across. This action tends to leave a small void behind each large rock particle which is there forevermore.

While this pitted appearance does not hurt the structural quality of the mat being placed, it does have a very definite effect on the appearance. Also, in some parts of the country where snow and ice are prevalent, it might be that the depressions behind each one of these rocks could cause trouble in the pavement when ice forms, thus loosening the rock particles and causing raveling to occur in the pavement. A good rule-of-thumb to follow in checking the horizontal face on the Barber-Greene tamper is to note that time at which approximately half of the horizontal face is worn off and inform the contractor that some action should be initiated to replace the tamper. When the horizontal face has approached the knife edge condition and it is evident that the tamper is doing little to strike off the material, the paver should not be allowed to continue until the condition has been corrected.

Another adjustment between the tamper bar and the screed which is

very frequently overlooked is the clearance between the back of the tamper bar and the nose of the screed plate. The Manufacturers Operation and Service Manual recommends the tolerance of approximately 5 to 8-thousandths of an inch for this adjustment. If a lesser clearance exists, the tamper bar has a tendency to gall the nose of the screed plate causing small beads of metal to protrude from the bottom of the screed. These protrusions have a tendency, in turn, to drag the surface of the mat and cause a slight scuffing action. Again, this action does not affect the structural quality of the finished pavement, but does lessen the quality of its appearance. The bind caused by insufficient clearance accelerates wear in the tamper and screed plate as well as setting up excessive vibration in the whole mechanism.

If the tolerance is in excess of about 15-thousandths of an inch, there is room enough between the back of the tamper bar and the nose of the screed plate for a scum of oily material to work its way into the area. This oily substance is a combination of asphalt and very fine particles of aggregate in the mixture. When this builds up between the screed and the tamper, excess wear occurs due to abrasion, which causes the space to be increased even more. As this condition continues, more and more material builds up between the tamper and the screed and eventually the screed is not receiving the full benefit of the strike-off face of the tamper.

An important adjustment

Probably the most important single adjustment on the Barber-Greene paver as affects the quality of the appearance of the finished mat is the adjustment for the tamper bar which limits its downward travel. At the bottom of the stroke of the tamper bar, the horizontal face of the tamper should extend $1/64$ th of an inch below the bottom of the screed plate; $1/64$ th of an inch is approximately 15-thousandths of an inch or, roughly, the thickness of a fingernail. We have said that the bottom face of the tamper provides the strike-off for the material so that the screed can iron over it. If the tamper does not come down far enough, the screed must strike the material off itself which causes a poor appearance. If the tamper comes down too far, a scum of oily material will build up on the screed face and the net result again will be

that of scuffing appearance on the surface. Also, if the tamper comes down too far, it has a tendency to lift the nose of the screed plate a little higher than it should and thus creates a possibility for slight ripples to occur in the mat behind as well as reducing the effective ironing area of the screed plate. The importance of this adjustment cannot be over-emphasized. As stated above, it is probably the most important single adjustment on the Barber-Greene paver as affecting the appearance and quality of the finished mat.

In connection with the thickness control on the Barber-Greene paver, it should be noted that approximately $2\frac{1}{2}$ turns of the thickness control handle will cause a thickness change in the mat being placed of approximately 1 inch. We have already described what can occur if the screed thickness controls are over-manipulated. By knowing how much adjustment is made with a given amount of turn on the screed control, it follows that a statement can be made as to the maximum amount of adjustment that should be made at any one time. A rule-of-thumb to follow in this instance is to limit thickness control adjustments to not more than $1/4$ of a turn of the thickness control at any given time. After this adjustment has been made, the paver should be allowed to travel a distance of approximately 15 ft. before any further thickness adjustments are made. The description of this thickness adjustment, of course, is intended after the paver has started its operation and uniform paving is progressing.

The Blaw-Knox paver

The Blaw-Knox paver operates with the same general principles that the Barber-Greene paver does and the adjustments and tolerances are much the same. The major differences between the two is that the Blaw-Knox paver is mounted on rubber tires instead of tracks and that the method of changing the tilt of the screed plate is slightly different. Both machines have what are called full floating screed plates with tamper bars. However, the Barber-Greene screed plate is adjusted for tilt around a pivot pin above the screed where the plate is attached to the frame. In the case of the Blaw-Knox paver, the connection between the screed plate, the screed frame and the leveling arms that are connected to the tractor unit of the paver is rigid. The tilt of the Blaw-Knox screed plate is changed by

Here's tandem push-power in one easy-to-spot machine handled by one operator



Big B Tournapull, with 27-yd. Fullpak® scraper, picks up heaping load fast with Twin-C pushing. New tandem-engine pusher provides enormous power, plus speed to match rubber-tired scrapers. Owner benefits from economies of one-machine operation.

Big push-plate of Twin-C is raised and lowered by electric control. Operator can center plate on scraper push-block, to assure solid contact at all times. Once push starts, plate "floats" ... automatically adjusts to match movements of scraper push-block.



Since the trend in earthmoving today is to bigger-yardage contracts, you are using more and more of the larger-size scrapers ... machines of 18 to 27-cu. yd. capacity. To push-load these giants efficiently, contractors are finding it necessary to double-head their crawler pushers.

While this practice produces extra drawbar pull, it seldom proves practical. First, there is the problem of synchronizing the actions of 2 operators and 2 machines. Time is lost in positioning, and tandem crawler teams cannot effectively match the speed of rubber-tired scrapers. Finally, there's the added expense of operating the extra machine, with its extra operator.

LeTourneau-Westinghouse, alone in the earthmoving field, offers a unit that solves these problems. The job-proved Twin-C* pusher provides: a) synchronized tandem push-power, b) a speed range to match rubber-tired scrapers, c) single-unit ease in positioning, and, d) economy of one-machine, one-man operation.

Proven drawbar pull of up to 64,500 lbs.

Twin-C provides the combined horsepower output of two 210 hp GM diesels on one machine. With its 40 tons of tractive weight, its tires over 7' high and 2½' wide, this machine develops 64,500 lbs. of drawbar pull.

Consider, also, Twin-C's many additional advantages, besides its tandem power (a "first" in the rubber-tired pusher class). This pusher can develop speeds up to 20 mph forward, 5.8 in reverse. Air brakes on all 4 wheels provide 3,690 sq. in. of braking surface, for quick stops and fast maneuvering.

Positive, Tournapull®-type steer

There's new steering ease, too, with the Twin-C. Operator can make 90°

turns in tight quarters, because positive power-steer is applied through geared kingpin at base of yoke. It's the proven LeTourneau-Westinghouse steering principle used successfully on Tournapull-Scrapers all over the world. Front and rear sections line up automatically when steering power is shut off.

Power-lift on push-plate

Twin-C's big, electric-controlled push-plate is easily raised or lowered by operator to make on-center connection with every push-block. Once push starts, plate "floats" ... automatically keeps contact with scraper until bowl is filled.

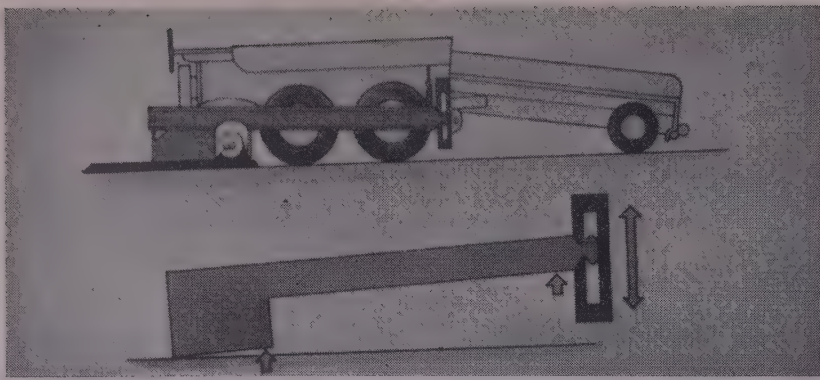
If tandem pushing is becoming the accepted practice on your spreads, find out more about the new Twin-C. Call or write for full specifications on this powerful pusher.

*Trademark TW-1133-DC-1



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ONE WAY that the Blaw-Knox paver differs from the Barber-Greene is that the tilt of the screed plate is changed by moving the location of the pivot point vertically, as shown above. Both machines, however, require from 8 to 15 ft. to effect a change in mat thickness.

raising or lowering the pivot point of the leveling arms at the tractor unit of the paver. In the case of the Barber-Greene paver, this point is pin-connected and cannot move up and down. It can be seen, however, from the description that the principle of changing thickness on the two pavers is the same. An increase in the tilt of the screed plate causes the mat thickness to increase and tilting the screed plate downward causes it to decrease.

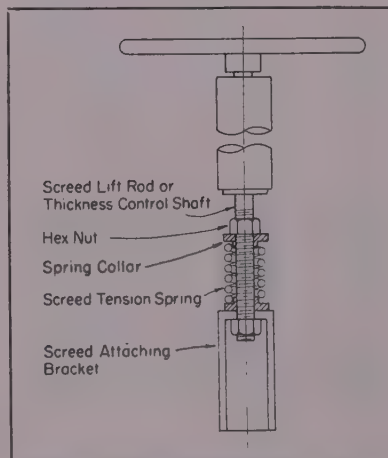
Of considerable interest, in the case of the Blaw-Knox paver, is the fact that it takes approximately 8 turns of the thickness control handles to effect a 1-in. change in mat thickness. It follows that the maximum adjustment that should be made with the Blaw-Knox paver is approximately one turn of the thickness control handles at any one time with a subsequent time lapse allowed for the paver to travel approximately 15 ft. before any further adjustments are made.

The Blaw-Knox paver has an adjustment for the transverse augers that distribute material in front of the screed mechanism which is not present on the Barber-Greene. When delivered, the augers on the Blaw-Knox paver are normally at the highest position, which leaves a clearance of approximately 9 in. between the auger and the ground. At proper operating position, these augers should have a vertical clearance of approximately 5 to 6 in. from the ground. This adjustment can be made by lowering both sides of the auger shaft evenly with the pin connections that are provided.

The tire pressure on the Blaw-Knox paver should be maintained uniform for all four of the drive wheels. The recommended tire pressure by the manufacturer is 90 psi. It is important, however, that the tire pressure in the four tires be ap-

proximately the same, whether they are exactly at 90 lb. or at some other pressure.

On both the Blaw-Knox and the Barber-Greene pavers the gates in the back of the hopper should be set to allow approximately the proper amount of material to be fed back to the screed mechanism so that the feeders can be run almost continuously. If they are set too far open, an excessive amount of material builds up in front of the screed and the operator must stop the feeders until this excess of material is used up. Too much material in front of the screed may cause the screed to rise and fall intermittently resulting in a wavy surface. On the other hand, if these gates are closed too far, the screed mechanism in the rear starves for material and areas in the mat will appear with little or no material. In either case, the result is intermittent and non-uniform



AN IMPORTANT CHECK to make on the Adnun paver is the spring on the lower portion of the thickness control handle. The hexagonal nut sometimes works loose and relieves the screed tension spring, which allows the screed to move up and down and leave corrugations on the mat. It is a simple matter to tighten up the nut.

operation of the feeders and paver which cannot be considered the best practice. Under good operating conditions, the feeders and augers should operate 80% to 90% of the time with the loose mix just covering the auger shaft.

The Adnun paver

The Adnun paver operates on a little different principle than either the Blaw-Knox or the Barber-Greene paver. It is essentially a spreader box suspended between the wheels in the front and the rolls in the rear. The material is deposited in the hopper in the front of the paver and falls directly to the subgrade. Just behind the back of the hopper is a transverse oscillating screed that strikes off the material so that the rolls can travel over it. This oscillating screed works in a horizontal direction with a total travel of approximately 5 in. back and forth and at a frequency of approximately 80 strokes per minute. This oscillating screed is known as the cutter bar. Compaction of the mat with the Adnun paver is obtained through the drive rolls which are directly behind the cutter bar.

A point of interest with this machine is the fact that it is possible to get a vertical thickness adjustment with the machine when it is standing still. The oscillating screed or the cutter bar on the Adnun paver is suspended from the thickness control screws which extend vertically upward through the paver. The thickness control handles are mounted at the top of this screw. At the bottom of the screw, the screed is connected to an attaching bracket which fits around the thickness control shaft. The screed is prevented from traveling any further down the shaft than its mounting position by lock nuts.

Above the screed bracket is a helical spring around the thickness control shaft which is supposed to maintain tension on the attaching bracket in order to prevent the screed from floating upwards. At the top of this spring is a hexagonal nut which is intended to maintain tension in the spring. This hexagonal nut, however, has no means of being locked in place. There are no cotter pins or jam nuts with which to do this. As a result, through normal operation of the paver, the nut is free to vibrate loose and allow the tension in the spring to be released. When this occurs, the spring is free to float up and down and likewise the cutter bar. The net result of this condition is the tendency of the

(Continued on page 68)



Tournapull operator sits up high, has clear view of load, pusher, blade and road. All scraper controls are in front of him, and lever is close to his right hand. He can concentrate on dirtmoving, relaxed.

How easy-to-run scraper makes best use of manpower

...new operators run "D's" at 22-loads-an-hour pace

Your skilled manpower needs will be a problem for several years. ARB officials say that America's 240,000-man roadbuilding army will have to be doubled just to handle the 41,000-mile interstate highway program. Choosing earthmoving equipment that's easy to operate and understand will help you get the most out of your manpower... help you cash in faster on those big projects ahead.

Two completely inexperienced men were given the assignment of operating D Tournapulls in a southern city, recently. Neither man had ever run any type of earthmoving equipment before. The work involved moving 13,000 cu. yds. of clay and shale — part of building an 1150' service road from a local hospital to a major U. S. highway.

Conditions were not particularly suited to "training" new operators. The haul-road included a 600' stretch down an 11% grade and the return route was up an 8% grade. To make matters worse, a rainstorm of cloudburst proportions made the clay sticky and slippery.

1914' cycles in 2.2 minutes

Bad working conditions were no problem for D Tournapulls and their inexperienced operators. After the cloudburst, the "D's" stripped and wasted top layer of wet material... were quickly back on production dirtmoving. Push-loaded by a Le-Tourneau-Westinghouse Tournapull,

the speedy 'Pulls racked up big payloads fast.

Each operator and unit averaged 22.7 loads per hour... completing 1914' cycles in 2.2 min. In one 5-hour period, one previously untrained operator hauled 111 loads, the other 112!

Easy-to-operate Tournapull® makes new operators good... good operators better

New operators are easier to train... good operators easier to get, and keep... because modern electrically-operated Tournapulls handle easily and with minimum effort. Getting the 'Pull underway is as simple as starting your car. Fingertip electric controls, on auto-like dashboard, are easy to reach and understand. They eliminate awkward stretching, twisting, and wrestling with hydraulic or mechanical levers. All-around visibility is excellent.

Tested safety features help, too. Center of gravity is low for stability; wide, low-pressure tires assure good ground grip; braking surface totals 2800 square inches. These safety aids give operator confidence for faster moving under any conditions... let him hop on and start building profits for you in a hurry!

Fast-stepping, 9-cu. yd. D Tournapulls are easy to operate, easy to schedule. With bare 8' roading clearance, and within 9-ton axle-load limit, "D's" are roadable in all 48 states without permit. Write for detailed information on how they can help speed *your* earthmoving.



Simple, fingertip controls are clearly marked on dashboard. To steer, load, or spread, operator flicks a switch... electricity does the rest. Because control is so easy, operator learns faster, gets production speed quicker.



Speedy Tournatractor kept Tournapull production high. It push-loaded "D's" to capacity in soft, uncertain footing... dozed on fill between times. Like the 'Pulls, this 210 hp unit goes anywhere fast, under its own power.

DP-1493-DC-1



LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

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WHERE QUALITY IS A HABIT

Colorado River Aqueduct expansion

Unprecedented growth in the Metropolitan Water District of Southern California has forced an accelerated program to increase capacity of this record aqueduct. Developments within the district and the resulting water supply problems are discussed in this article. Next month a second article will describe the construction activity.

By R. A. SKINNER

Assistant Chief Engineer
The Metropolitan Water District
of Southern California

IT HAS LONG BEEN recognized that Southern California, having constructed a vast economy through use of local water, would have to depend increasingly upon importation from distant sources. The foresight and vigor of its citizens and their leaders in this regard is exemplified in the Owens River Aqueduct of the City of Los Angeles, initially completed in 1913 and augmented in 1940 by extension to Mono Basin, and in the Colorado River Aqueduct, the initial development of which was completed in 1941.

In many areas of large extent, however, the rapidity of the transformation from the convenient utilization of local resources to the more arduous dependence on imported supplies recently has far exceeded the previous expectations of the water agencies, resulting in an over-all situation of considerable acuteness. This rather abrupt stimulation of timing has been brought about by the extended severe drouth in Southern California, now in its thirteenth year, and the impact of migration unprecedented in modern times.

During the 13-yr. drouth period the population of the five Southern California counties presently having territory

in the Metropolitan Water District, namely, the counties of Los Angeles, Orange, Riverside, San Bernardino, and San Diego, has increased from 4,145,000 to 7,591,000, or 83%. The population of the Metropolitan Water District itself has increased from 2,390,000 to approximately 6,800,000 during this period, or 184%, while its area has expanded from 627 to 3,018 sq. mi.

By way of comparison, the State of California currently is increasing in population at an annual rate of about 4.6% and continental United States at an annual rate of 1.8%

First use of the aqueduct

Service of water from the Colorado River Aqueduct to the constituent agencies of the District commenced in June 1941. The pumping capacity installed in the initial development of the system was 600 cfs. provided by three 200-cfs. units in each of the five pumping plants

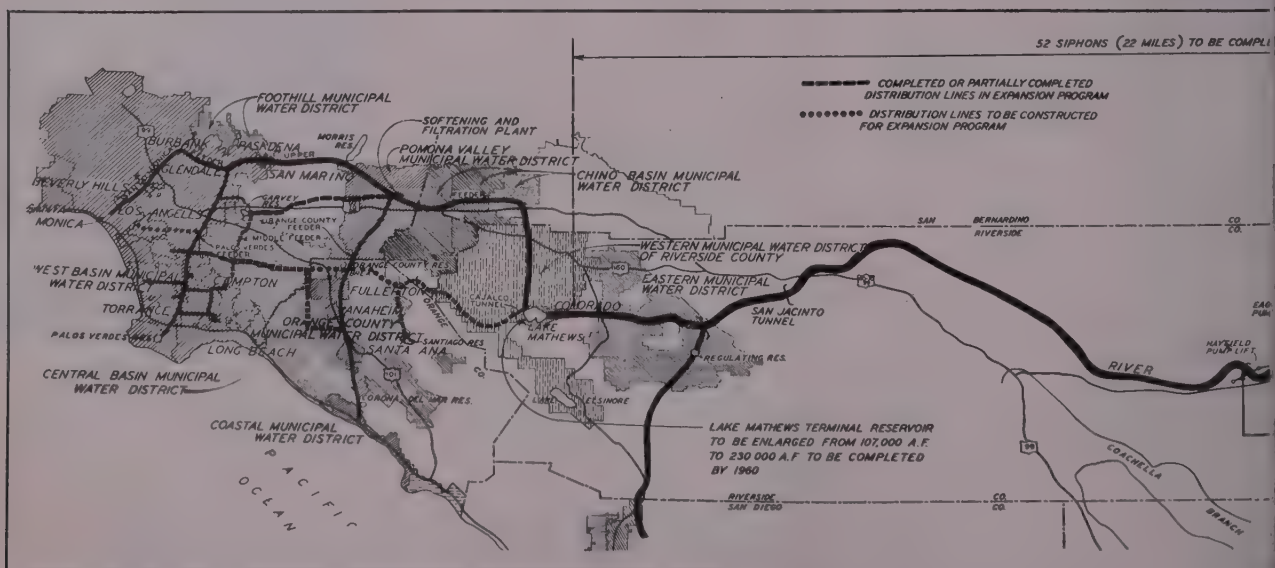
along the main aqueduct. The firm annual delivery capacity of the initial development thus was about 400,000 ac. ft., on the basis of an allowance of one month per year outage of each unit for maintenance. The first utilization of the full initial aqueduct capacity occurred in fiscal year 1955-56, when nearly 406,000 ac. ft. were delivered. In the meantime contracts had been let in 1952 for two additional 200-cfs. pumping units in each plant, with related equipment. One string of the new units was placed in continuous service in August 1956 and the second string about a month later, increasing the installed pumping capacity on the aqueduct to 1,000 cfs.

During the first 14 years of aqueduct service, total deliveries amounted to 1,780,000 ac. ft., or some 4,000,000 ac. ft. less than the available firm capacity of the aqueduct during that period. Therein lay a golden opportunity which was not realized, as the cumulative depletion of ground water storage during the time in some of the most important basins in the south coastal area, including the Central Basin and West Coastal Basin in Los Angeles County, Orange County Coastal Basin, and Chino Basin principally in San Bernardino County, could have been substantially circumvented if the affected areas, which at various times have become part of the District, had annexed earlier and utilized a sufficient fraction of the available imported water instead of continuing the unfortunate over-extraction of priceless ground water.

Overdraft and saline attack

The rate of overdraft in some of the important ground water basins, which has not yet begun to diminish appreciably despite the increasing importations of Colorado River water, currently

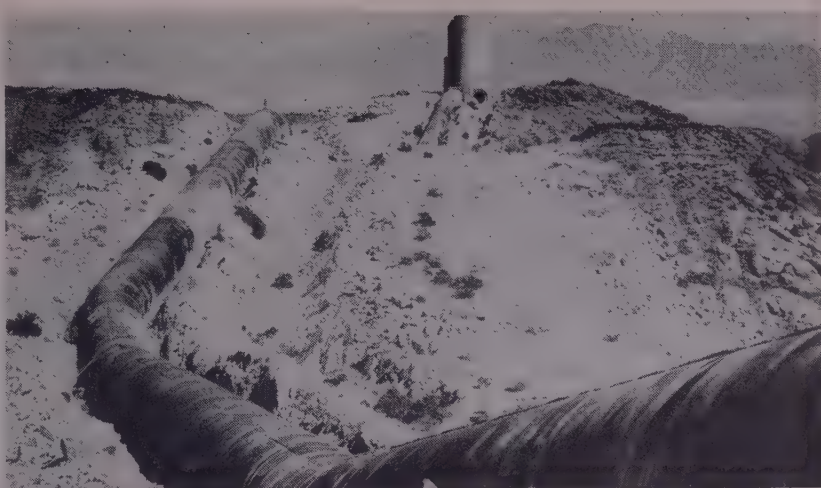
FAMOUS as a record construction achievement is the aqueduct bringing water from the Colorado River into Southern California. This key map will refresh memories as to its general location and its main distribution system.



amounts to about 400,000 ac. ft. per yr. in the aggregate, according to available estimates. The cumulative depletion of ground water storage in the portions of the south coastal area in Los Angeles, Orange, Riverside, and San Bernardino counties is estimated to be on the order of 3,000,000 ac. ft., based on recession of water tables in the basin since 1940. The physical consequences are manifested in the progressively higher pumping lifts for wells, loss of many wells, and disastrous landward gradients from the coast toward deep depressions in the ground water pressure levels, with the inevitable intrusion of sea water wherever the aquifers make contact with the ocean bottom.

Current rates of landward movement of saline water range up to 700 ft. per yr. along portions of the West Coastal Basin where an area of some 20 sq. mi. or more has been contaminated, and up to 1,000 ft. per yr. in the Orange County Coastal Basin where possibly 10 sq. mi. have been affected. The Dominguez and Alamitos gap areas near the southern coast of Los Angeles County also are beginning to be seriously involved, making the Central Basin vulnerable to saline attack.

One may ask why the people and their water agencies continued for many years to pursue a policy leading toward extinction of an invaluable resource rather than utilize the available supplemental supply. The answer, of course, is that only by laborious organization of public agencies having the power and financial capacity to act can the necessary remedial action be taken. Such organization requires (1) authoritative investigation and presentation of data of ground water resources and related problems, (2) wide dissemination of the resulting information and principles, (3) formulation of sound legal means of creating appropriate and effective machinery for definitive action and (4) culmination of all these processes in an adequate campaign to persuade the elec-



A TYPICAL INSTALLATION: THE EAGLE LIFT SIPHON AND SURGE TOWER

torate to recognize the importance of the need. These requirements have been developed in the Metropolitan Water District's service areas to an intensive degree during the past dozen years or so by groups of highly competent and dedicated leaders, resulting in what promises to be effective machinery to rehabilitate the vital underground storage basins, and the consequent events have had, and are having, an influence of greatest significance on the expansion of the Colorado River Aqueduct system.

Ground water replenishment

In the Orange County Coastal Basin and the West Coastal and Central Basins in Los Angeles County, organized procedures have been established for purchasing and utilizing imported water for replenishing ground water resources. In Orange County this has been accomplished through the agency of the Orange County Water District, initially by use of funds raised through its original taxing power, increased in 1949 to a maximum permissible rate of 15¢ per \$100 of assessed valuation, but beginning in 1954 by means of a water replenishment assessment levied by authority of an amendment to the Orange County Water District Act during the 1953 session of the Legislature. The Orange County Water District was established in 1933 under special legislation and its functions include that of safeguarding the water supplies of all users within its boundaries. The 1953 amendment provided for a dual tax structure and enlarged the area of the Orange County Water District to 174,000 ac., comprising most of the inhabited area of the county deriving its water supply from the Santa Ana River basin.

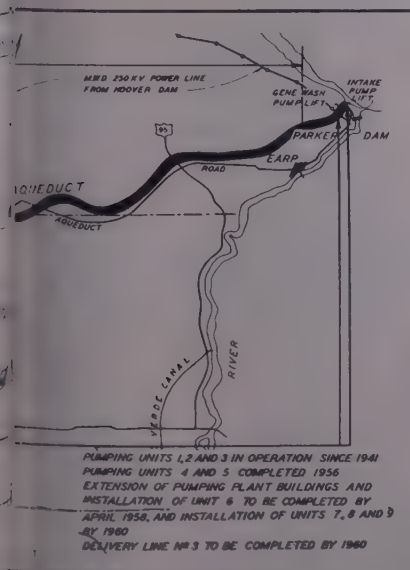
Beginning in August 1949 and extending through April 1957, a total of 308,500 ac. ft. of Colorado River water has been applied to replenishment of ground water supplies through the spreading facilities of the Orange County Water District. Of this total, 25,000 ac. ft. was purchased by the Orange County Flood

Control District in 1951-52 in aid of the replenishment program.

Water for the recharge program has been released into the Santa Ana River at three points. Initially, water was discharged from an 18-in. needle valve originally installed for blowoff purposes on the 750-cfs. capacity upper feeder at the north bank of the river at the crossing near Pedley, about 13 mi. upstream from Prado dam. Discharge through the needle valve was generally at the rate of 90 cfs., which is less than the rated capacity of the valve under the prevailing head of about 500 ft., but was found to be the maximum without introducing objectionable vibration.

In order to obtain about 75-cfs. additional discharge capacity an auxiliary connection was made in May 1954 to the upper feeder at a nearby flanged manhole, where control valves and energy absorbers were installed for release into a small channel leading to the river. Flow through the needle valve is measured by reference to the valve position rating curve applicable to the effective head, the rating having been checked in the field by means of a temporary weir. Deliveries through the auxiliary discharge connection are measured by means of a propeller meter.

Upon completion in August 1956 of the 750-cfs. capacity lower feeder to Orange County and the upper portion of the Santiago lateral, together with a spillway pipe line capable of discharging into the Santa Ana River the maximum flow in the lower feeder, a more suitable point of delivery of water for basin recharge became available. The spillway line discharges to the river 6 mi. downstream from Prado dam, obviating the losses inherent in passing the flow through the Prado flood control basin. The spillway serves the dual purpose of protecting the lower feeder against pressure rise and affording means of controlled release of water into the Santa Ana River. Water enters the spillway discharge line through a glory-hole type of spillway equipped with downward-opening slide gates in the Santiago lat-





GARVEY RESERVOIR: KEY UNIT IN AQUEDUCT SYSTEM

eral control tower 1.4 mi. north of the river, and is discharged to the river through a weir structure and stilling basin. Deliveries of imported water to the Orange County Water District's spreading grounds during the next 10 years may be expected to range from 70,000 to more than 100,000 ac. ft. annually.

In the Central Basin and West Coastal Basin, importation of water for replenishment has been accomplished through amendment of the Los Angeles County Flood Control District Act permitting the formation of zones of benefit within which a tax assessment of 5¢ per \$100 of assessed valuation may be levied for purchase and conservation of imported water. Zone I comprising essentially the Central Basin area was created in 1952 and water was first purchased for replenishment in 1954. A total of 159,366 ac. ft. of unsoftened water has been delivered for basin recharge in Zone I.

For future spreading operations, delivery facilities of 200- and 250-cfs. capacity, respectively, are being provided at the San Gabriel River and at Alhambra Wash channel, a tributary of the Rio Hondo, on a 72-in. diameter pipe line now under construction from the La Verne softening plant site to the District's Garvey reservoir in the city of Monterey Park. Prospective deliveries of Colorado River water to the Rio Hondo and San Gabriel River spreading grounds are expected to range from 25,000 to 150,000 ac. ft. per yr.

Zone II comprises the West Coastal Basin area and was formed in 1954 to purchase imported water for injection in wells along the coast for repulsion of sea water which is intruding into the basin. The initial fresh water barrier is fed by nine wells along a line approximately one mile long, but to protect the entire West Coastal Basin the barrier must be extended to a length of 11 mi. along the coast. The first segment of the barrier was experimental and its construction was made possible by a \$75,000 appropriation by the State Legislature, the work being performed by the Los Angeles County Flood Control District under contract with the State Water Resources Board.

Operation of the partial barrier has been highly effective within the limited

area served. Colorado River water has been injected into the barrier wells at an aggregate rate of approximately 3,000 ac. ft. per yr. Softened water has been used because no facilities have been available for transportation of unsoftened water to the West coastal area. Upon completion of the 11-mi. West Coastal Basin barrier the aggregate rate of injection may reach 75 to 100 cfs. according to the Flood Control District estimates. The proposed injection well barrier at Dominguez gap is expected to require 30 to 40 cfs. and the Alamitos barrier may require 10 to 15 cfs. Thus the total annual deliveries for these three barriers may average roughly 100,000 acre feet.

The total use of imported water for replenishment of ground water and repulsion of sea water intrusion in Los Angeles and Orange counties thus may reach the proportions of 200,000 to 400,000 ac. ft. per yr. in the near future, the amount in a particular year being affected by the magnitude of stream flow from natural runoff.

Ground water replenishment studies

So vital an issue has the program for replenishment of ground water reserves and repulsion of sea water become that the Los Angeles County Board of Supervisors has appropriated \$850,000 for a 3½-yr. investigation by the Flood Control District to provide the necessary data and determine adequate procedures for successful design and operation of the recharge facilities required for these objectives.

An important factor in the program for restoration of ground reserves is the procedure now available for organization of water replenishment districts under legislation enacted in 1955 and applying to the seven counties of Santa Barbara, Ventura, Los Angeles, Orange, Riverside, San Diego, and San Bernardino. The statute provides for the levying of replenishment assessments upon the production of ground water within the replenishment district, at a uniform rate per ac. ft. of ground water produced, the proceeds of the assessments to be used for purchase of imported water. Water associations and other groups in the West Coastal and Central

Basins are actively engaged in the organization of such a replenishment district covering these basins, an endeavor expected to require about three years.

Water rights in the West Coastal Basin are in process of adjudication by court action begun in October 1945. Pending the entering of a decree, a voluntary agreement was negotiated among the principal producers of water from the basin, which became effective on June 1, 1955, and has been made operative by order of the court.

Adjudication has not been commenced in the Central Basin and the adjacent upper San Gabriel Basin, but rapidly diminishing reserves of ground water in these two basins and the superior access to these resources enjoyed by the upper basin make it appear inevitable that some equitable solution to the question of correlative rights must be found. Equitable adjustment of rights and sharing in the expense of importing water might be accomplished through formation of replenishment districts covering both basins, a solution eminently preferable to the laborious adjudication of the extremely complex existing water rights in the two basins.

New method for reducing evaporation from reservoirs

EXPERIMENTS are under way at the U. S. Bureau of Reclamation's Rattlesnake Reservoir in Colorado to determine if a practical and economic "chemical shield" can be used to reduce evaporation from lakes and reservoirs and save vitally needed water in arid and semiarid regions. The studies this summer in Colorado are a continuation of experiments begun last year in Oklahoma, in which the Bureau is cooperating with a number of public and private agencies.

Laboratory studies indicates that up to 65% of evaporation losses can be eliminated with a "monomolecular" surface coating of hexadecanol, a chemical which has no known harmful effect on human or aquatic life. Western reservoirs lose between 3 and 8 ft. of water each year through evaporation.

"There are in this country many thousands of reservoirs for municipal and irrigation use, and hundreds of thousands of acres of surface area," Commissioner of Reclamation W. A. Drexler said. "If the treatment with hexadecanol can be made even 20% effective, at low cost, the water savings would be tremendous."

But research into the technique is still in early stages, and although it holds great promise there can be no guarantee at this stage in the investigations of even partial success.

The studies at Rattlesnake Reservoir on the Colorado-Big Thompson Project near Loveland, are concerned with the methods of applying hexadecanol, and with determining the presence and continuity of the invisible film.

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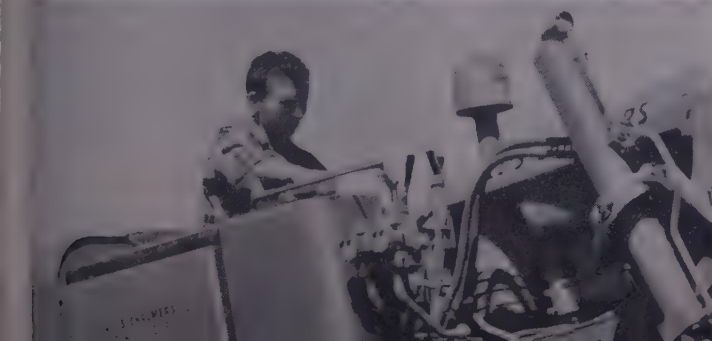
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WASHO studies expanding program

Impact of Federal highway program on the states of the West with its demands on engineering manpower and states funds occupied much of the 36th conference held in Houston. Willey of Arizona elected president.

WITH A RECORD attendance indicating accelerating interest in highway activity, the Western Association of State Highway Officials held its 36th Annual Conference in Houston, Texas, June 11-14. Presiding over the general sessions was D. C. Greer, president of WASHO and chief highway engineer of Texas. A report on the national highway picture and progress on the new highway program was presented to the Western group by Bertram D. Talamy, Federal Highway Administrator.

Officers elected for the coming year were: President, Wm. E. Willey, state highway engineer of Arizona; vice president, W. C. Williams, state highway engineer of Oregon; secretary-treasurer, T. D. Sherard, administrative engineer of Wyoming. Members of the Executive Committee include D. C. Greer of Texas, L. D. Wilson of New Mexico, C. E. Waite of California and two state highway commissioners, R. C. Rich of Idaho and J. J. Marsh of Colorado.

The sixth annual presentation of the "Dr. L. I. Hewes Award" was made to R. Glen Ryden, chief computer of the Arizona State Highway Department based on his outstanding work in pioneering the use of Univac for engineering calculations. Sponsored by WESTERN CONSTRUCTION, this annual award consists of an appropriate certificate and the sum of \$500 presented to the outstanding highway engineer in Western highway departments as selected by the Executive Committee of WASHO. Other official candidates proposed by state highway departments of several states were each recognized with appropriate certificates indicating their selection as outstanding engineers by their own departments.

The overall picture

Following the usual opening ceremonies, President Greer called the roll which showed that representatives were present from all the mem-

ber states of WASHO as well as the several federal agencies.

The first paper of the morning was a report on the overall federal highway picture by Bertram D. Talamy, Federal Highway Administrator. He credited the Western states with "a highly impressive showing as a group," indicating that "in terms of work actually underway, contracts have been awarded for 1,330 mi. of the National System of Interstate Highways, with nearly one-half of this total, or 617 mi., accounted for by the Western states represented in WASHO." However, he warned that although this indicated the program was on schedule there was no room for complacency. The fast start has resulted, in most part, from a backlog of planning and design carried out in the years preceding the passage of the Federal Highway Bill last year.

To present the view of the state highway departments on this same subject a corresponding statement was presented by W. A. Bugge, director of highways of Washington, and at the present time the president of AASHO. He pointed out that the allocation of highway funds from the Federal government at the present rate was placing a heavy responsibility on the individual states to main-

tain their financial obligation. He reminded the group that the state highway departments must continue to be the foundation of the nation's highway construction program and warned against the temptation for states to abdicate this responsibility and let the Federal Government take over the control of the highway program, merely because the financing leans heavily on that source of funds.

Because of some of the problems facing the average state highway department, and in order to maintain proper volume in engineering output, Bugge stated that consulting engineering firms may be required, but that it should be the policy among the states as far as possible to expand their own departments to meet the needs of the present program. He also emphasized that the shortage of engineers is going to require further study in the use of all time-saving devices.

A closer appraisal

The second general session of the conference included four papers presenting different views on the new highway program.

The first was the viewpoint of the highway administrator, presented by W. C. Williams of Oregon. He reminded the members of WASHO that an adequate and efficient staff in a highway department was the first requirement for successful administration. Referring to the highway construction program made possible by the Federal Act of 1956 as "the biggest public works project in the history of man" he emphasized



WASHO OFFICERS for the coming year are (l. to r.) Executive Committee Member, J. J. Marsh, Colorado; Executive Committee Member, Dewitt C. Greer, Texas; Secretary, Thurman D. Sherard, Wyoming; President, William Willey, Arizona; Vice-President, W. C. Williams, Oregon; Executive Committee Member, L. D. Wilson, New Mexico; and Executive Committee Member, Charles E. Waite, California. Not shown is Executive Committee Member, R. C. Rich of Idaho.

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

UTAH
Cate Equipment Company—Salt Lake City

WASHINGTON
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that only by straight-line scheduling with adequate planning and judicious financing could the program be kept on schedule for any particular state. Public relations has taken on a new emphasis for the highway administrator since only by public support can the program maintain proper progress. He emphasized the need for adequate salary schedules in highway departments so that men of competence would be attracted and held in their initial positions and full careers. As an indication of the magnitude of the program he indicated that Oregon is scheduled to spend 25% more money on highways during the next 13-yr. period than during the entire 40 years just passed.

The position of the highway designer in the new program was presented by L. D. Wilson of New Mexico. A major point of his discussion was to emphasize that concentration on the Interstate System was tending to divert state highway department thinking from the design and construction of other highways and streets which continue to become obsolete and dangerous. A balance must be maintained through which the Interstate routes maintain their proper position in the overall state program.

The position and problems of the construction engineer at the present time were discussed by R. F. Stapp, construction engineer of Wyoming. He mentioned the growing pressure coming from groups sponsoring different types of material and equipment as well as similar groups pushing for their particular type of service. For example, the large contractors would like to see highway awards made in large contracts so they can utilize their extensive fleets of equipment to best advantage. On the other hand, groups of smaller contractors create similar pressures relative to desiring contracts be kept small so they can have an opportunity to bid on more jobs. Railroads would like to have rail shipment specified for long hauls, while the trucking industry feels that it supports the highway program through taxes and should have corresponding advantages in the transporting of highway materials. In conclusion he expressed complete confidence that construction engineers and contractors will combine to handle the new program and keep it going at the scheduled rate of progress.

The concluding paper of this group discussed the problems of the right-of-way departments and was presented by L. G. Trueheart, right-of-way engineer of Colorado. He

Annual presentation of the "Dr. L. I. Hewes Award"

R. GLEN RYDEN, winner of the 1957 "Dr. L. I. Hewes Award" and chief computer, Arizona State Highway Department, was born in Minnesota and started his engineering career with Kittson County road department of that state in 1929. He worked for two years on location, construction and plans and moved to Arizona in December 1930. In 1931 he joined the Arizona Highway Department as an engineering aid. Since that time he has progressed through the various ratings to his present position as division head.

He has presented papers at conferences on increasing highway engineering productivity at Georgia Institute of Technology and Louisiana State University, at the WASHO conference of 1956 and the AASHO convention in Atlantic City in 1956.

His paper, "Earthwork Computations by Electronic Computer," ap-



THE "DR. L. I. HEWES AWARD" this year was won by Glen Ryden, chief computer, Arizona Highway Department. Receiving it for him is Grover J. Duff (right), chairman of the Arizona Highway Commission. Presentation was made by James I. Ballard, president of Western Construction which sponsored the award.

peared in the April 1956 issue of AMERICAN HIGHWAYS.

characterized the current acquisition of highway rights-of-way as the greatest overall real estate transaction in the history of the world. Its magnitude demands a thorough reappraisal of past methods and performances, with solid planning for the work to be done.

In a significant statement, Trueheart said, "a right-of-way engineer cannot help but view the new program with deep concern, even alarm. The right-of-way engineers of America are faced with the job of persuading millions of people to part with their land and improvements at an ultimate cost of billions of dollars. They are going to have to carry out this function under tremendous pressure if the highway program is to stay on schedule."

Cooperation with contractors

Joint cooperative efforts between contractors and state highway officials was reviewed and projected into the future by E. C. Simpson, construction engineer of Washington. He pointed out that the original committee established at the national level between the ACG and the AASHO was back in 1921 and that this was followed by similar joint committees at the state level. Important aspects of such committee activity to state highway departments has been the work done by contracting groups in arousing public and legislative interest in adequate salary

schedules for the departments. Contractors have been able to convince groups that such schedules are important in building up strong highway departments which, in turn, assure the carrying out of a proper highway program. These efforts on the part of contractors have proved most successful.

These joint committees at the state level have permitted a wide exchange of ideas indicating areas where highway departments could improve their performance and also opportunities for contractors to work for better overall results in road building. Improvement in financial stability among highway contractors is another result of this joint committee effort, with pre-qualification as a specific development.

Through committee effort the contractors have succeeded in getting highway departments to carry out more work by the contract method. Because some small jobs might appear to be outside of the normal range of contractors' interest, and might be carried out by state forces the contractor groups have made a special effort to provide satisfactory bids for these small jobs, with mutual advantage to the contracting industry and the highway departments. Contractors have urged the highway departments to prepare plans and call for bids as far as possible in advance of the bidding date so that more contractors have an opportunity

(Continued on page 53)

nity to study the jobs thoroughly. One of the more intangible results of committee activity at the state level has been the providing of an opportunity for both sides to sound-off and exchange valuable ideas, even if definite results were not secured.

Referring specifically to the state of Washington, a joint cooperative committee was organized in 1948 and annual meetings have been held since that time, with several special meetings called during the last few years. The ACG representatives hold an advance meeting of their own to consider items which the majority of contractors believe to be of sufficient importance to place on the agenda for the joint meeting. Through this process, subjects are confined to those of general interest and individual complaints are eliminated. Each one of these selective topics is assigned to one of the contractor members for discussion.

As a result of these meetings during the past several years, definite advantages have been secured for both sides including improvements in the preparation of plans which reduces to a minimum the work items that are incidental to other unit contract price items. The state department has also developed a standard plan for advance staking of highway contracts and in making available other information to assist the contractor in examining the work to be done. Further, the state has adopted a policy of paying one-half of the contractor's flagging costs in an effort to make this a cooperative aspect of the job with a resulting improvement in public relations. Washington has also changed from the calendar day to the working day for performing contract work with a corresponding increase in engineering penalty for delay in completion of the project from \$50 to \$150 a day. This has been a cooperative change meeting the approval of contractors and has resulted in faster completion of highway jobs.

Organizational changes in the Oregon State Highway Department designed to allow handling of the enlarged highway program were outlined by Forrest Cooper, deputy state highway engineer of Oregon. He mentioned nine specific changes: (1) expanding the reconnaissance engineering section, (2) installation of photogrammetric equipment, (3) building up and integrating a field estimating section, (4) installation of electronic calculating equipment, (5) expanding the urban design section, (6) centralizing the right of way description section, (7) enlarg-

ing the preliminary design section of the bridge division, (8) expanding and reorganizing the road design section and, (9) additions to the administrative staff. As far as possible engineers have been relieved of routine and sub-professional duties. Oregon continues to do all of its highway engineering work with its own forces.

The use of consulting engineers by Western highway departments in the expanded program was reviewed in the paper by Earle V. Miller, former Idaho state highway engineer and now a partner in a consulting firm in Phoenix, Ariz. This paper begins on this page.

Two resolutions of fundamental importance were passed at the conclusion of the conference, the first one put WASHO on record as vigorously opposing legislation which would use highway funds for the removal of the facilities of all utilities

from highway rights-of-way. The second indicated the opposition of WASHO to any additions to the mileage of the Interstate System at the present time, realizing that the present program will tax the abilities of the state highway departments, and proposing that any additional mileage be provided only when funds are considered adequate to complete the present program and remain available for such additional mileage.

Special events included a "Texas Night" party which was complimentary for those attending the conference and the long established "Family Dinner."

The Associated General Contractors held their usual invitational breakfast and the American Road Builders Association had an invitational luncheon which was addressed by Julian Steelman, president of ARBA.

Use of private engineers by highway departments

By **EARLE V. MILLER**, partner

Johannessen and Girand and
Earle V. Miller, Consulting Engineers
Phoenix, Arizona

CONSULTING ENGINEERS can and are being used to advantage by some Western highway departments to help accomplish the tremendous task facing state highway departments as a result of Federal Highway Act of 1956. The reasons for, and the procedures involved in the use of consulting engineers as seen from a consulting engineer's viewpoint are here reviewed.

In general, the highway departments of the various states, counties cities, Bureau of Public Roads, Indian Service, Forest Service and others involved with highway engineering were already working at full capacity, and therefore additional manpower would have to be recruited outside such sources.

When highway administrators contemplate the problem as it effects the additional engineering work-load necessary to accomplish the task, it is obvious that some of the states must be hard pressed to get off center. With a work-load two to three times normal, and on a long term basis, there is only one thing to do and that is to recruit all the talent and manpower available from whatever source and

Private consulting engineers have not been used to any large extent by the highway departments of these Western states. The experience record on both sides is rather limited. Because Earle Miller is well qualified to discuss this subject as former state highway engineer, president of WASHO in 1954 and at present a private consulting engineer, WESTERN CONSTRUCTION is presenting in full the paper he gave at the Annual WASHO Conference in June.

Editor

keep that talent and manpower working to help expedite the highway program.

Man-hours must be saved

The use of labor and time saving devices are a must but they still do not lessen the shortage of technical know how. This shortage is felt in private organizations as well as within state highway departments but by devices such as overtime pay, bonuses and other fringe benefits the private organization or consulting engineer can

(Continued on page 56)



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At 7,600 feet altitude, a fleet of 4 turbocharged diesel-powered Payhauler units help Morrison, Walsh & Perrini highball rock to build Wishon Dam—in Sierra National Forest, California. All operators vote superior riding comfort, torque-matic braking safety, and power-operated dumping brake, as stand-out '95' advantages!

Improve an International Payhauler's production-boosting speed! The "95" is turbocharged diesel-powered to highball at 38 mph—the "65" at 36.4 mph! Try the "pick-up truck" spotting ease—using exclusive high reverse and "zip-around" power steering to position the "big-target" body, double-quick. Compare how the double-acting hydraulic hoist, under exclusive hand-lever control, gives 10-to-12-second dumping. Measure the big profit-building margin of difference—see your International Construction Equipment distributor for a Payhauler demonstration!

Our three '65' Payhauler trucks move up to 2,000 cu yd of shot rock per 10 hours on a 1,200-foot delivery haul," states Warren Greer, for Greer Brothers and Young, London, Kentucky. The contractor is using these trucks to move 165,000 cu yd of hot rock relocating a section of U. S. 27 in Lincoln County, Ky.



On tough St. Lawrence Seaway—for United Waterways Constructors—11 '95' Payhauler trucks are sparking a demanding monthly production schedule of 120,000 cu yd of rock, and 100,000 cu yd of common earth. Next-to-automatic Payhauler control gives safe, capacity-adding speed over rough terrain!



"Engine power matches hauler capacity, to pull a 20-22 ton load from the quarry in second gear, over haul-road grades as steep as 15%," reports J. L. Sutherland, '65' Payhauler operator for Jefferson County Stone Company, Anchorage, Kentucky. "The Payhauler rides good, has excellent visibility, and maneuverability, shifts easy!"



Satisfaction with two Payhauler trucks on one successful rock-moving contract prompted Clarkson Construction Co., Kansas City, Mo., to add three more "95's" to their fleet—to help handle a new, bigger contract. "Best production I've ever had," says Project Superintendent H. D. Brown.



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CONSULTANTS

(Continued from page 53)

produce more per man per year than in many state engineering offices.

Labor saving devices such as electronic computation of quantities is accepted as a rule now by some private engineering companies. The same can be said of photogrammetry in its several phases, where it is used as an additional tool to help do a job faster and better. The day of the engineer pushing a planimeter by the hour to compute quantities and areas is, or should be, a thing of the past. The same should be true of the survey party trudging the proposed center line, not once but (in the old days) often several times in order to make it fit. Such waste of man days and engineering time is unexcusable.

Highway departments can take advantage of these new techniques now. They don't have to wait for delivery of computer machines or aerial cameras or plotting machines like Kelch or others. These are available now for their use through commercial sources and through consulting engineering services. States should take full advantage of this service now. It may be that some are still reluctant to hire consulting firms to do their work, simply because of lack of experience along this line. Actually, until very recently, most Western states had done but little regarding the use of consulting engineering manpower.

Arizona makes plans

Early in 1956 the Arizona Highway Department, realizing that they were facing a tremendous task with limited forces, began making plans to utilize consulting engineering services to perform a sufficient portion of the total engineering work so that the output of the state and consultants forces would complete all the work programmed within a specified time. William E. Willey, state highway engineer of Arizona, foresaw the possibility of a number of consulting engineers preparing plans on a different basis and in styles unfamiliar to the state and Bureau of Public Roads, thereby creating delays and confusion in the review and approval of the consultants work. He believed that the solution to this problem would be to have a standard procedure and policy for all consultants to follow when doing work for the state.

It was with this thought in mind that Arizona asked our firm in Phoenix to help them with this problem.

In preparing this procedure we obtained information from other states

relative to their current or proposed systems for handling work performed by consultants. We also reviewed current practices of the Bureau of Public Roads, Corps of Engineers, Department of the Navy, Air Force and others in relation to their use of consultants.

Manual prepared

With all this information at hand we prepared the manual entitled "General Information Concerning the Use of Consulting Engineering Services," published by the Arizona Highway Department in August 1956. There are two parts of the manual: PART I containing general and detailed information and instructions for the overall program, for negotiating contracts for policies and procedures of the state and each of the divisions; PART II of the manual contains a copy of Arizona Highway Department roadway design and construction standards, culvert and bridge standards, standard specifications for road and bridge construction, samples of maps and detail sheets and other information.

This manual was written in accordance with the following general policies:

1. That the consulting engineer would be directly responsible to the state.
2. That all plans and policies would be in accordance with present accepted practices and standards of the state and Bureau of Public Roads, unless otherwise directed.
3. That the procedures used would be set to provide the smoothest flow of work and information between the state and the consulting engineer.
4. That various reviews for plans and designs would be made by the state as a protection and speed-up for both the state and the consultant.
5. That the state would furnish sufficient criteria and samples for each particular phase of work.
6. That the consultant would know exactly what he must do in order to have a sound and definite basis for entering into a contract for performing specific engineering work.
7. That a step-by-step procedure for entering into an agreement and for the performance of its terms be outlined.

As noted in the manual all consulting engineering agreements are made by the state highway engineer with the authorization and approval of the highway commission. To assist the state highway engineer in Arizona, the position of Engineering Services Officer was established to negotiate

proposals, services and fees with consulting engineers, to maintain files of all correspondence and to coordinate all work.

Arizona procedure

The procedure followed by the Arizona Highway Department in employing a consulting engineer is to first select a project then ascertain from each of the several highway divisions, such as location, bridge, or materials, if they can adequately handle the work involved or if it should be given to a consultant. When the divisions have made their recommendations, the engineering services officer prepares a "Work Detail" (outline of all the work to be performed) and presents this to one or more consulting engineers who are capable of performing this type of work. The consultant then makes an analysis of the project and submits a proposal to the state. If the proposal is believed to be fair and reasonable a formal agreement is signed by the state and the consultant.

Our firm and other consulting engineers, have been, and are currently performing engineering services for the Arizona Highway Department under the provisions of the manual, and have found exceedingly pleasant relations in negotiating for and performing these services for the state.

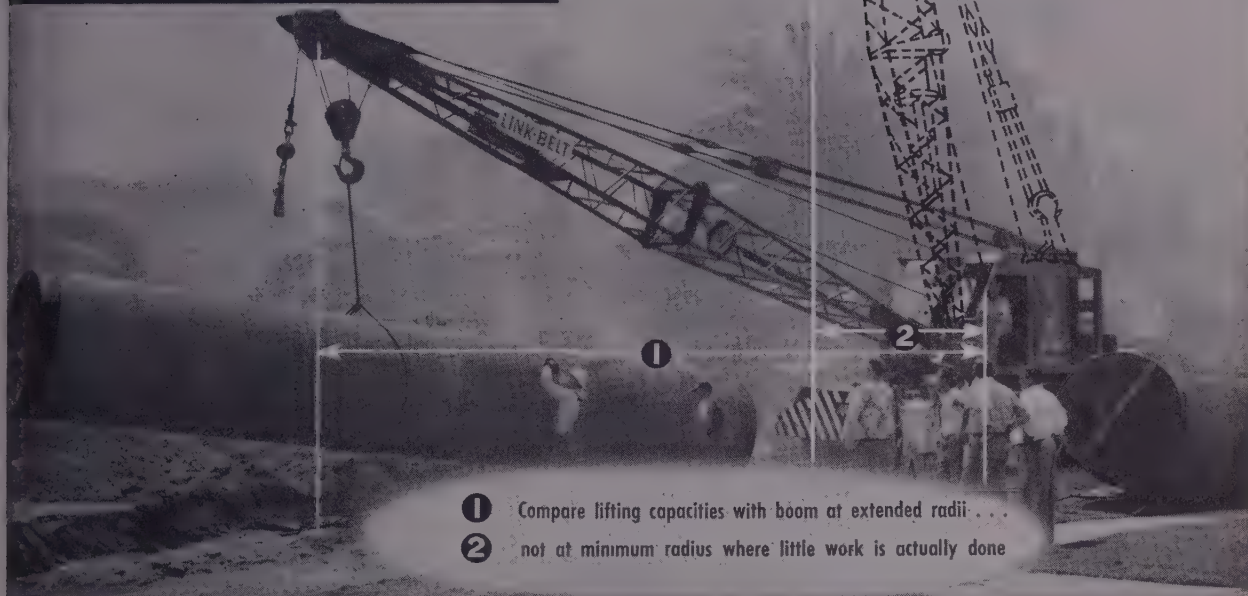
We believe that under the expanded highway program there is a definite place and need for the use of consulting engineers by state highway departments to perform that portion of engineering work above the capacity of the highway departments and for performing work of a special nature where the consultants may be especially qualified.

There are a number of well qualified consultants in the Western states who are ready and willing to perform engineering services for any of the Western states highway departments. The services they can give include: special reports and analysis, road locations and surveys, road plans, bridge location and design, bridge foundation studies, design of special testing and analysis, complex interchange and grade separations. The geometric design for urban or rural freeway or interstate highways, right-of-way plans and title searches, traffic surveys, study and analysis, photogrammetry and all its related uses, preparation of estimates and special provisions, construction inspection all can be done by the consultants.

It is our opinion that the consulting engineering field has two distinct

(Continued on page 82)

REPORT on new truck-crane standards:
(one in a series)



- ① Compare lifting capacities with boom at extended radii . . .
- ② not at minimum radius where little work is actually done

TRUCK-CRANE PRODUCTION: Most truck-crane jobs require using long booms at extended radii. Under these circumstances, Link-Belt Speeder machines are unsurpassed. Why? Because of high

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Air Bases improved in the Northwest

Averaging \$20,000,000 on each, the Corps of Engineers has improved or built four major Air Bases in the past four years in Montana, Idaho and Washington. Construction activity continues.

WITH LITTLE or no publicity heralding the fact, the past four years have seen three of the Pacific Northwest World War II air bases transformed from defense installations to first class air field bases. In the same period a fourth air force base designed as a jet interceptor base has also been practically completed.

This reactivation of World War II air force bases is all part of the defense perimeter program of the United States Air Force. Sites of these air bases are World War II defense bases at Larson Air Force Base, Moses Lake; Mountain Home Air Force Base, Mountain Home, Idaho; Malmstrom Air Force Base, Great Falls, Montana, and the new interceptor base at Glasgow, Montana. While all four of these Pacific Northwest installations are manned and are under the command of the United States Air Force, the design and construction work necessary to the transformation from temporary to permanent bases status has been under the supervision of the U. S. Army Engineers, North Pacific Division with the Walla Walla District of the Corps of Engineers being assigned jurisdictional responsibility.

An average of \$20,000,000 has already been expended at each of the four installations, and contracts totaling from \$3,000,000 to \$8,000,000 are still in operation at the various base sites.

In addition to this expenditure of defense funds for Air Force bases the Corps of Engineers is supervising contracts at several other Army Defense installations. At Camp Hanford, near the huge atomic energy plant at Richland, contracts representing near \$1,000,000 are in effect covering the building of ferry landing facilities and access roads, battalion headquarters facilities, development

of water wells and water supplies, and the construction of a signal maintenance shop and appurtenant utilities.

At the Umatilla Ordnance Depot, Ordnance, Oregon, a water supply drilling contract is in effect along with a recent \$500,000 contract not as yet officially awarded but on which bids have been opened, calling for the construction of ammunition renovation facilities at the huge Ordnance Depot. Two Army Reserve training centers, one at Boise, Idaho, and one at Great Falls, Montana, also have effective contracts. A contract for building of motor vehicle storage sheds, concrete bridges, and appurtenant utilities and paving amounting to \$251,722 is in effect with the work 28% complete.

The new interceptor base being constructed at Glasgow Air Force Base, Glasgow, Montana, has twenty contracts in effect representing a total contract cost of over \$16,615,545. The work calls for construction of dormitories and associated utilities, apron paving, alert taxiway and taxiway lighting systems; base jet fuel pumping facilities; construction of roads and installation of curbs and gutters; construction of airfield paving and construction of alert and readiness hangars, along with jet fuel bulk storage facilities; construction of a central high temperature heating plant, and of 26 buildings, two isolets, along with development of site building of an auto maintenance shop and an infirmary building; miscellaneous storage facilities, cold storage building, repair shop, modifications of alert hangars, access roads, curbs and gutters and drainage system and a recently awarded contract for \$3,523,388 calling for the construction of 200 family housing units.

Malmstrom Air Force Base, Great Falls, Montana, has eleven contracts in effect, representing a total contract construction expenditure of \$5,447,926. The work at Malmstrom Air Force Base calls for construction of rocket storage, check out assembly building and ammunition storage, an exchange sales store and the recreation gymnasium, squadron headquarters and operational building, readiness crew building, and headquarters group building, along with a near \$1,000,000 ammunition storage facility.

Larson Air Force Base near Moses Lake has three contracts in effect totaling \$2,045,331. These contracts call for the construction of an airman's bath house and swimming pool, 250,000-gal. steel water tank and a base hospital building just getting under way with a contract estimate of \$1,802,482.

The Mountain Home Air Force Base near Mountain Home, Idaho, has six contracts in effect amounting to a total of \$3,149,088. They include construction of a fire station, roadway and utilities, construction of an operating building and development site, construction of a \$335,000 swimming pool, along with a \$160,000 dental clinic and a \$145,000 post exchange facility annex. The largest contract at Mountain Home now 19% complete, is that of a base hospital building and utilities amounting to \$2,036,456. All the above construction work is under way ranging from 98% complete to percentages dependent upon appropriation of new funds. Contracting firms in the majority of cases which have been assigned these contracts are from within the boundaries of North Pacific states composed of Washington, Idaho, Oregon, Montana, and Wyoming.



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is extra rough, Fuller Transmissions put horsepower to work effectively. The closely-spaced ratios permit operators to select exact working speeds required. There's better load control, and engines operate in peak hp range with greater fuel economy.

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Field testing earthfills faster

From engineers experienced in soils and earth-fill construction come these letters with constructive suggestions prompted by the editorial discussion in the June issue. Faster testing methods now available.

By **NEVILLE S. LONG**

Resident Engineer
Tudor-Goodenough Engineers
Tulloch Dam, Tri-Dam Project

I READ with interest your editorial "Small Hole Is Key to Highway Program" in the June issue. I agree wholeheartedly with your statement that a better test for compacted fill control must be found. However, until such a test is found, I believe that the adoption of some of the philosophy of concrete control and some of the procedures used in the control of the construction of several recently completed earthfill dams in California could greatly alleviate the problem of TIME pointed out by you.

In the concrete placing operations, the engineer in charge exercises both quantitative and qualitative control of the materials going into the mix. Quantitatively all of the materials going into the mix can be controlled absolutely except for the important item—water. Because of its very great importance on the final strength of the concrete additional field control of this critical item is exercised through some form of a slump test.

In addition, a record is made by means of the casting of cylinders for breaking at a later date. The job, of course, is not held up until the breaking of these cylinders. However, they do serve many useful purposes besides being merely a record, or job history. Strengths indicated by the cylinders allow: (1) close control of future mix design with resulting savings of cement, (2) provide checks on structures which must obtain certain specified strengths prior to stripping and, (3) in rare cases show that concrete of extremely poor quality was placed thus necessitating its removal. However, in such rare cases, additional checks are usually made by means of core drilling before any concrete structures are actually torn down.

A close corollary of this situation exists in the control of earthfill structures. However, this is not recognized by all of those concerned with control of these structures. It is, of course, true that the fine degree of control available with a modern concrete batching plant is not presently possible with the modern earthfill construction plant. Nevertheless, satisfactory and workable control is possible.

The engineer specifies and is familiar with the material going into the fill. The amount of compactive effort to be applied to this material is also specified. Further, the amount of moisture in the material is a specified quantity. The science of soil mechanics and the techniques of earth-fill construction have advanced to the point where the final density obtained can be predicated within narrow limits if the three above factors are known and controlled.

The one factor which is critical here and which cannot be determined ahead of time or controlled by visual inspection is the same variable which has to be contended with in concrete, namely, moisture content. The standard method for determining soil moisture content is by oven drying of a sample of the material. However, from the time standpoint this method is even worse than the field density test in that it usually takes 24 hr. to complete.

There are several other methods in use for making approximate soil-moisture determinations, however. The quickest and easiest is, in my opinion, the so-called burn-out method, this is an old method which has recently seen considerable use in earth dam construction in California.

Lloyd E. Garst, who was chief of laboratory at the Santa Felicia Dam, built by the United Water Conservation District and the Beardsley Dam, a part of the Tri-Dam Project built under the engineering supervision of Tudor-Goodenough Engineers, described the method in detail in a

paper presented to the Santa Barbara-Ventura counties branch, Los Angeles Section ASCE in Feb. 1955.

Briefly this method consists of mixing some inflammable liquid with a weighted sample of the material, igniting and re-weighing after the burn-out is complete to determine the loss in moisture. Experience has proven alcohol to be the most satisfactory liquid and has also indicated the desirability of making the burn-out twice. The method was found to be satisfactory in any material with less than 25% clay-sized particles, which covers most materials going into highway fills.

During construction of Santa Felicia Dam, careful checks were made on the field tests by means of a temperature control oven. A mean difference of only 0.017% was found between the means of the two methods and even in the case of the materials containing as much as 25% clay-sized particles, results were obtained within 1% of the slower oven method.

The greatest advantage of this test is its speed. It takes about 10 min. to make the test and in practice two or three tests can be made simultaneously. In addition, the test is easily taught and can be made by previously untrained personnel. It is valid and readily understood by the contractor and his men.

The burn-out test thus provides a quick, easy and valid means for determining the field moisture of the material going into the fill. The compactive effort applied is a known quantity as is the nature of the material being used. From these three known quantities a good prediction of the final density can be made and it follows that adequate control of the moisture content of the material being placed eliminates the need of using the field density test as a control test.

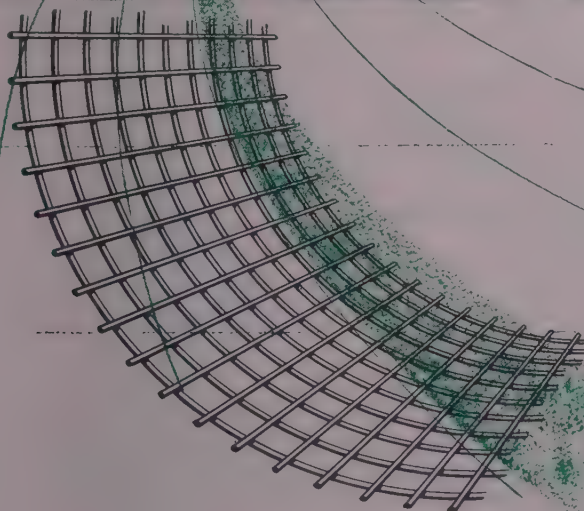
Because of the many variables which are encountered in soils engineering and construction, field density tests should continue to be made for record purposes and also to show up those few cases when for some unknown reason satisfactory compaction is not obtained. A preliminary answer on a field density test can be

(Continued on page 68)

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EARTHMOVING . . .

First of a series of articles presenting practical methods for improving estimating procedures and job controls. Chart shows correct scraper output.

By **RICHARD BENNETT**

Construction Consultant
Saratoga, California

REGRETTABLE BUT TRUE, most excavation estimates, and job management practices, are based too much on "hunch." Excavation contractors have been reluctant to adopt sound business methods. Only by using business principles can facts be developed on which to base estimates and to assure that each unit of work is being done at the lowest consistent cost. Too many contractors do their estimating on the back of envelopes, no record being kept of estimated costs, hoping that the job will be profitable. The estimating and job cost control methods given here, while new to many, have been both job and time tested as to practicability and effectiveness.

To bid more intelligently, most all contractors need more job planning and more study. Many say they have neither time nor money to do this. They feel that way because they are looking at it from the wrong end. Job research begins with the bid preparation, planning the work to the best of the organization's ability. It is continued throughout the job, and really begins when the job is completed.

Study your last job

Contractors should stop acting as though present jobs are the last ones of that type they will ever do. As soon as the job is finished they should start reviewing it to find out how the job could have been done with more profit, then set up the results in their own Standard Procedures Methods. With many successful firms this is standard practice. It is not costly. Simply assign one man or more, depending on size, to restudy the recently completed job to find better ways all along the line. The next time such a job, or any of its elements, comes up these cost-saving ideas can be incorporated.

Production

For the first article of this group it is well to analyze production of a

basic unit of excavating equipment—a 12.1-cu. yd. (struck measure) rubber tired tractor scraper.

The two most important features of production estimates are: (1) working rate per crew per shift and (2) delays estimate. Many do not grasp the fact that there exist vast production differences in equal-capacity units working under comparable conditions. For instance, the above size of unit with 2,000-ft. haul with no delays—based on 60-min. hr.—production has ranged from a low of 290 to a high of 925 cu. yd. per shift. This is due to the quality of supervision, equipment condition, and its operation, and the job conditions (see accompanying table).

Breakdown of Round-trip Cycle (12.1-yd. rubber tired tractor scraper)

WORK ELEMENT		POOR	AVERAGE	GOOD
1. Load	(min.)	2.2	1.4	1.1
2. Dump and turn at fill	(min.)	0.7	0.6	0.4
3. Turn in cut	(min.)	0.5	0.4	0.2
4. Cycle time (less haul and return)	(min.)	3.2	2.4	2.0
5. Haul speed—loaded	(ft./min.)	470	620	1110
6. Return speed—empty	(ft./min.)	370	660	1200
7. Loading distance	(ft.)	260	160	120
8. Dumping distance	(ft.)	180	110	60
9. Pay yardage per load	(% of struck capacity)	68	79	91

(Based on 60-min. hr.—no delays.)

The table presents a summary of average round-trip cycle information compiled by the U. S. Bureau of Public Roads on six highway grading jobs. Its use illustrates the large production variables which occur (authentically reported) in the same units working a full 60-min. hr. These production studies, made under a variety of job conditions (ranging from light earth to heavy clay and rocky materials) show performance much lower than is usually assumed.

Of course, these figures are not to be applied indiscriminately. Competent contractors compile their own specific past performance records, which also appraise the performance characteristics of various makes of equipment, kind of materials, grades, equipment condition, scheduled and

There is hardly any such thing as

non-scheduled repair and maintenance practices, operator efficiency, job management efficiency, tire inflation, haul road and condition, elevation, tractor pusher efficiency, etc. These facts are further elaborated by the author in the chart which illustrates their full impact on production, and provides quick facts for estimating and job control.

The chart enables the estimator or job manager to readily estimate or check job production. It is not necessary to carry the chart into the field if the three-time formulas are noted. Knowing the haul distance it is easy to compute the time per round trip for good, average and poor conditions. Then, noting actual job time, the job manager knows instantly just where his job rates.

Some contractors estimate production in the "good" range because the job is to be highly mechanized. It takes more than a high degree of mechanization to keep production in the "good" range, even sweating out the job from start to finish may not produce a profit.

the "average" job. Seldom, if ever, will a particular job have all the characteristics required. Each job must be analyzed and the character-

The author

The author is a civil engineer and has been connected with construction for many years. He was consultant to, and member of the board of directors of two contracting corporations. He now devotes full time to construction consultation to help contractors earn more profit. He says, "I have never known a contractor who did not know how to build his job, but I've known very few who knew how to take maximum potential profit out of his work."



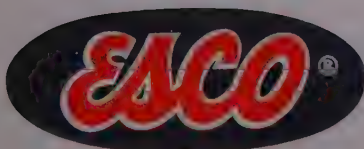
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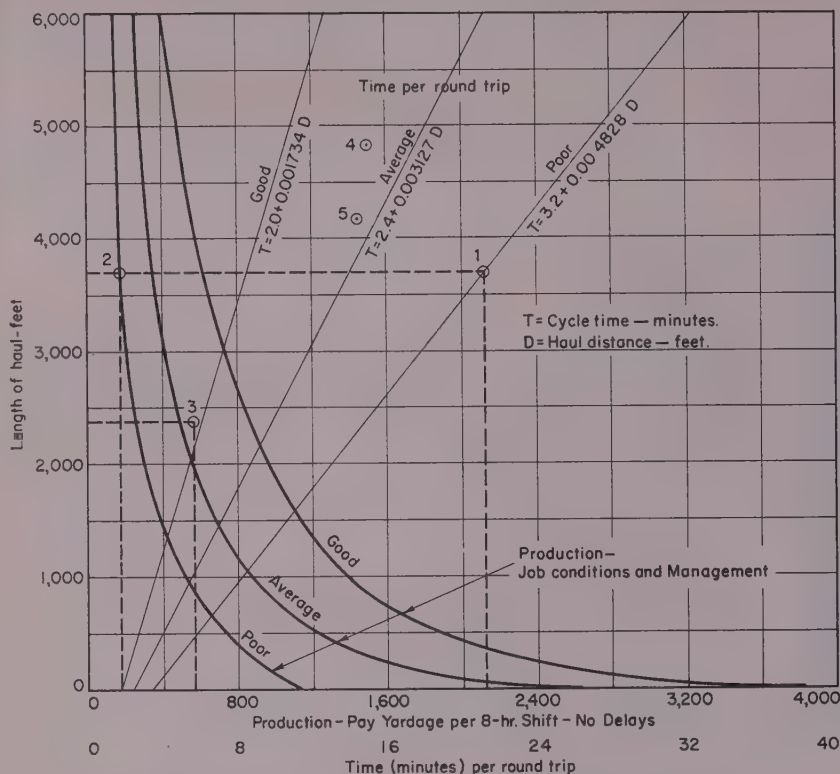


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PRODUCTION AND CONTROL — RUBBER-TIRED SCRAPERS

(Based on table on previous page for 12.1 cu. yd. scraper and 60 min. hr.)

This chart is constructed in terms of length of haul, time in minutes-per-round-trip, and pay yardage per shift for a single scraper for good, average, and poor management practices. Knowing any two of these factors, the other two may be determined. For example:

Case 1. You are a superintendent

and know the length of haul averages 3,700 ft. each way, and that each scraper takes exactly 21 min. to make a round trip. Using the chart, the intersection of 21-min. trip-time from bottom, and 3,700-ft. haul from left, we find: (1) that this is in the category of "Poor Management"; also intersecting "Poor Production" line

istics of poor, average or good determined for each operation.

Analyses show that many jobs actually classify in the "poor" range. Timing with an ordinary wrist watch, noting distances from the engineer's cut-and-fill stakes, will enable the job manager to determine where his job stands.

Haul distance is the distance traveled, excluding turning distance, from the point the scraper gate is closed after the load is obtained to the point where the scraper blade is opened to discharge the load. Pay haul distance is the distance between center of in-place material loaded in the cut to the center of this same material dumped in the fill. The pay-yardage is the actual cross-sectioned pay quantities. Return distance is the distance traveled from point where dumping is completed to point where scraper blade is lowered for loading. The time-per-round-trip lines cross

the horizontal axis to the right of the zero point. This distance represents the average time required for the three elements of load, dump and turn at fill, and turn in cut.

Historical production data

Most all earthmoving jobs can be charted in these three ranges of production—poor, average, and good. These curves enable the estimator to be always up-to-date on current production costs; they detect local cost trends; they result in more accurate estimates, and by comparing the percentage of actual job production to known "good" production, the job manager has a definite base on which to begin to build up job efficiency.

Historical production data—not historical costs—are a contractor's most valuable asset. Historical costs are nearly always of very doubtful value. They may or may not fit present conditions; they seldom con-

Case 3. This type of chart is especially valuable for production control. The job manager can spot check one round-trip cycle and then plot the data on the chart. A comparison with previous spot checks noted on the chart will give him immediate knowledge of job management regardless of length of haul. For example: (4) shows that for a 4,900-ft. haul, cycle time was 15 min. and much better than average; but, when the haul dropped to 4,100 ft. (5) cycle time was 14½ min. and was only slightly better than average. The chart position of these two spot checks shows something is out-of-step with check 5, and is of sufficient importance to warrant investigation.

Formulas for "time per round trip" are shown. For example: 3,700 (feet average one-way haul) $\times$ 0.004828 + 3.2 = 21.06 minutes. Such formulas are useful for estimating and job checks.

This chart can also be plotted with lines to show "Time in minutes per round trip per rig" for various job conditions and management, but to add these lines would make it too complicated for general use. with pay yardage at bottom, (2) we find that probable production per scraper to be about 175 cu. yd. per shift.

Case 2. You are a contractor and have a field report that a certain highway cut of 5,900 cu. yd. (cross sections) was removed by three 12.1-cu. yd. scrapers in three and a half 8-hr. shifts, with an average haul of 2,400 ft. This is equivalent to 560 cu. yd. per scraper per shift. Plotting this production and haul (3) on chart, shows that job management was better than "Average."

tain sufficient explanatory matter to properly classify the work; or job conditions. Historical production figures, supplemented by production information from the chart produce data on which sound estimates, schedules, and job controls may be based.

All grading contractors should compile this type of information. It is not difficult to build up such records based on actual labor, equipment and job conditions. Such systems actually are neither costly, complicated, nor "red tape" once they are understood and reduced to routine practice. Any method to improve the efficiency of his work will place the contractor in a more favorable profit position. The greatest barrier against the adoption of any new method is the strong resistance against CHANGE, and never forget — THERE IS ALWAYS A BETTER WAY.

Euclid Scrapers and Crawlers are your best investment

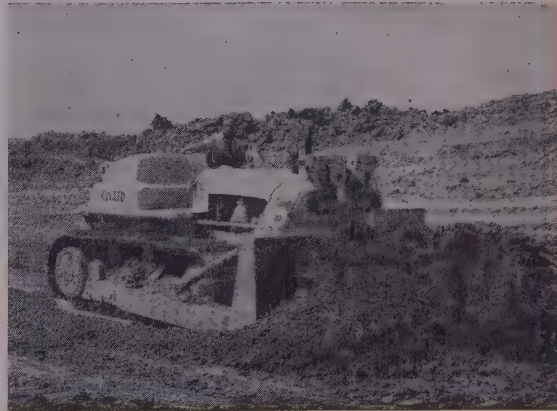


Overhung engine type Scrapers of 7, 12, 18 yds. struck capacity

Powered by engines of 143, 218 and 300 h.p., these scrapers have heaped capacities of 9, 16 and 25 yds. Advanced design of Euclid's hydraulic lever action, low bowl and 4 section cutting blade provides fast, easy loading. The 18 yd. model has Torqmatic Drive... all have NoSpin differential and Euclid planetary drive axle... unequalled accessibility of the power train and major components.

Four-wheel Tractor Scrapers

These 12, 18 and 24 yd. scrapers have maximum stability for rough roads and high speed hauls. At 3:1 slope heaped capacities are 14, 20 and 27 yds. A 200 or 218 h.p. engine with 5-speed transmission powers the 12 yd. scraper... drive tires are 21.00 x 25 with 24.00 x 25 optional. The 18 yd. scraper has 300 h.p. with 3-speed Torqmatic Drive... standard tires are 24.00 x 25 with 29.5 x 25 optional... a 17 yd. bottom-dump is interchangeable with the scraper. The 24 yd. scraper has a 300 or 335 h.p. engine with 4-speed Torqmatic Drive and 27.00 x 33 tires... 33.5 x 33 drive tires are optional equipment.



TC-12 Twin-Power Crawler

A completely new concept in tractor design and performance, this Euclid Crawler has two 218 h.p. engines for a total of 436 h.p. There is a separate Torqmatic Drive for each track. Top speed is 8 m.p.h. —change from one speed range to another or to one of the three reverse speeds is made under full power. Planetary drives can be serviced without removing track, frame or drive sprocket. Operating weight, bare, is 62,500 lbs.



Twin-Power "Euc" Scrapers

These scrapers have capacities, struck, of 18 and 24 yds. — heaped at 3:1 slope, 21 and 27 yds. Both models are powered by two engines, each with Torqmatic Drive, and have 27.00 x 33 tires with 33.5 x 33 optional. The Model TS-18 has a total of 436 h.p. Tractor of the Model TS-24 has a 300 h.p. engine—scraper wheels are driven by a 218 h.p. engine—a total of 518 h.p. "Twins" outperform other scrapers by a wide margin—they self-load and work under conditions that stop other scrapers.

Your Euclid Dealer will be glad to provide information on the complete line of "Euc" Rear-Dumps, Bottom-Dumps, Scrapers, and Crawler Tractors

EUCLID DIVISION, GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



REPORTS from the COURTS

By HOWARD S. BURNSIDE, Low and Burnside
Attorneys at Law, San Francisco—Menlo Park

Contractor's license required during entire job

The construction contract was entered into about April 3, 1953. Work started on April 15. The contractor's license was suspended between January and May 19, 1953. For the period of April 3 to May 19, the contractor (plaintiff) had no license and during this period finished the concrete work on a grandstand.

Thereafter the contractor had a valid license and on August 26, 1953, he finished construction of the grandstand. The defendant paid a portion of the contract price and refused to pay the balance. The contractor sued to recover the balance due.

Section 7031 Business and Professions Code requires that a contractor, in order to recover, must prove he was licensed "at all times during the performance" of the work. Applied rigidly, this language would prevent a recovery by the contractor although the work might be satisfactory; and the court did apply it rigidly. This is the usual result in this type of case, even though it may seem punitive and someone else is unjustly enriched.

The appellate court affirmed the trial court's decision and cited the case of *Lewis and Queen v. N. M. Ball Sons* (2), decided by the Supreme Court. In this case one of the two partners had an individual license but the partnership did not have a license nor did the other partner. The partnership, as a subcontractor, was not allowed to recover from the general contractor for work done, although the general contractor had been paid by the State for the entire work.

1. *Harrison v. Butte Steel Buildings, Inc.*, 150 Adv. C.A. 315.
2. *Lewis and Queen v. N. M. Ball Sons*, 48 Adv. C. 139.

Flooding of property is a taking

In 1952 after a condemnation proceeding, the Flood Control District acquired an easement across land occupied by plaintiff. Thereafter a large flood drain was constructed. Following completion a grating was installed at an open inlet which had been first de-

signed to be without a grating. Following a heavy storm, debris clogged the inlet because of the grating and the flood waters poured over plaintiff's property, causing damage.

The plaintiff sued the Flood Control District for damages from a taking of land for public use (2). The trial court entered a judgment for the plaintiff which was affirmed on appeal. The court cited an earlier case (1): "It follows that the taking or damaging of private property for the maintenance of an existing public improvement involving a deliberate act which has as its object the direct or indirect accomplishment of the purpose of the improvement as a whole, constitutes a taking or damaging of property for a public use, and the owner of such property is entitled to compensation."

1. *Bauer v. County of Ventura* 45 Cal. 2d 276.
2. *Ward Concrete Fr. Co. v. Los Angeles Co. Fl. C. Dist.* 309 P. 2d 546 (1957).

Incomplete incorporation fails to protect

To obtain the advantages of incorporation all of the several steps required to complete an incorporation must be taken. The mere filing of the Articles of Incorporation does not provide the protection usually associated with the corporate form. In the present case one of the partners in a roofing business failed to get the protection from personal liability after the firm incorporated.

Two partners operated a roofing business about eight years when they decided to, and did, file corporation papers. The roofing contractor's license was held in the partnership name. No stock was issued. No notice of dissolution of the partnership name was published. A year later one of the partners died. During the first year following "incorporation" an account with a supplier averaged about \$24,000. There were total credits in excess of \$27,000 and the final balance due the supplier was \$24,612.

The supplier filed suit against the surviving partner, contending that this was a partnership debt for which he was personally liable. He in turn argued that it was a corporate obligation because the accounts showed that the final balance was built up during the year following the filing of corporation papers. He also argued that the supplier knew it was selling to a corporation because during

the year several checks were issued by the corporation to pay items in the account.

The trial court held that the supplier was entitled to a personal judgment against the surviving partner. This was affirmed on appeal. The appellate noted that the license to do a contracting business as a corporation was not issued until after the first partner died and the business had been carried on under the partnership license. Also of importance was the failure to publish a notice of dissolution of the partnership and to issue stock of the corporation. The supplier had been dealing with the firm as a partnership for a considerable period of time.

Oregon Cedar Prod. Co. v. Ramos and Kohler 148 Adv. C.A. 710

Mechanic's lien only for direct supplier

Plaintiff furnished an electrical control panel for a drying plant and sought to enforce a mechanic's lien against an owner. This was furnished through a company which arranged for engineering work and supplied much other equipment. Plaintiff contended that the company was something more than a materialman such as an agent, contractor, designer or, etc. The court concluded that the company was a materialman and nothing else. The contract between the owner and the company was essentially one for the sale and purchase of equipment.

"The cases . . . stand for the proposition that where equipment is placed in a building constructed by another, the work done in placing the equipment is but the completion of the contract to deliver. The fact that certain planning or engineering was required in the instant case should not change this well established rule."¹

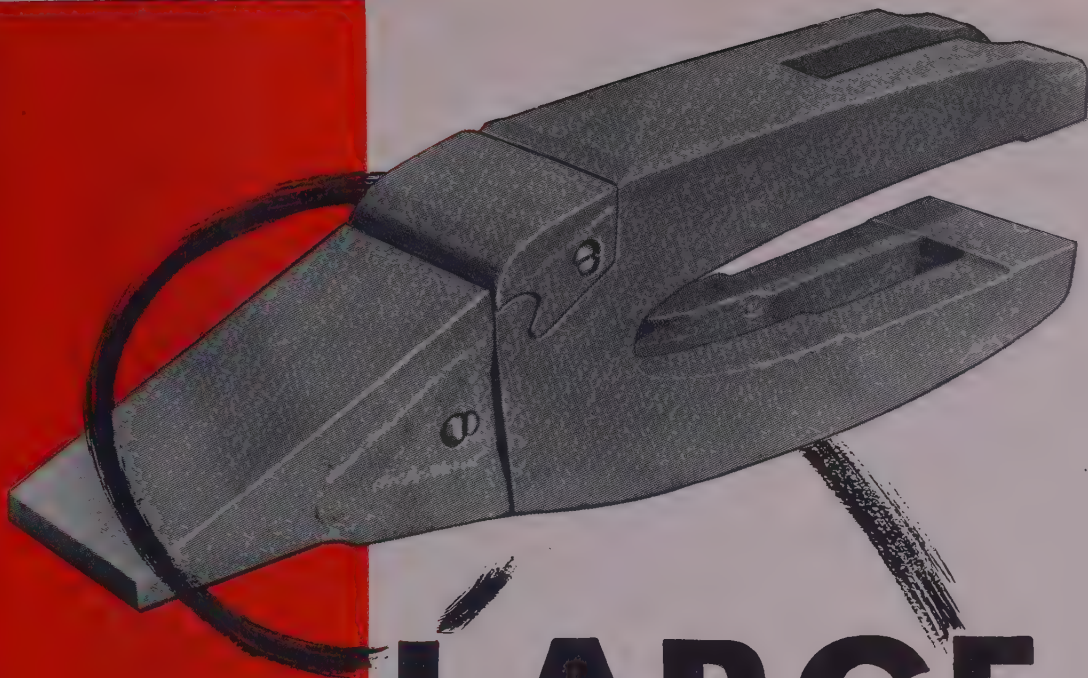
The plaintiff was a materialman of a materialman and as such was not entitled to a lien.

1. *Phillips E. Edwards Elec. Corp. v. Shintaffer* 299 P. 2d 913

Notes

"The appellants were engaged in the business of constructing tanks and the items heretofore mentioned, which were fabricated pursuant to contracts to be erected on real property outside of the state. In our opinion they were, under the facts of these particular cases, contractors within the meaning of the law of this state, and were consumers. It was said in *General Electric Co. v. State Bd. of Equalization*, 'Where the materials are combined with other materials so as to lose their identity and become part of the completed structure the contractor is deemed to be the consumer of such materials' (for the purpose of paying sales tax)."

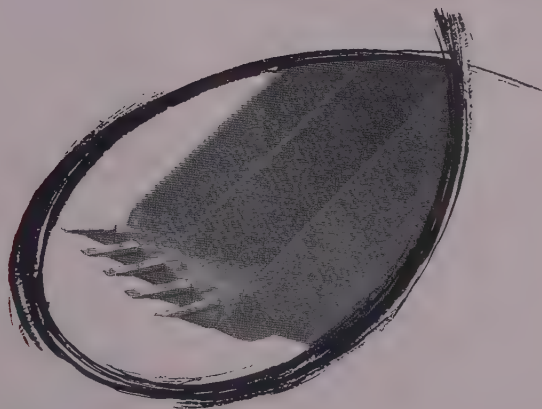
Levine v. State Bd. of Equal. 299 P. 2d 738 (California)



*Teeth
that
really
dig*

LARGE

or small



H&L leads the field

H&L

TOOTH COMPANY

1540 SOUTH GREENWOOD AVE.
MONTEBELLO, CALIFORNIA

ASPHALT PAVING *inspection control*

(Continued from page 42)

screed to float up and down with each stroke thereby leaving a very evenly spaced corrugation in the finished mat behind.

The proper adjustment for this helical spring is that position at which approximately half of the distance between the coils of the springs are closed. It is a very simple adjustment to make and it is an easy one to check. Merely by assuming a kneeling position and looking behind the hopper of the paver, the spring can be seen. It is a simple matter to feel by hand to see if that spring has tension in it. In the opinion of the writer, the adjustment on this spring is the most important single adjustment on the Adnun paver as affecting the smoothness quality of the finished spread.

There are several other adjustments on the Adnun paver that should be known by the paving crew and the inspector. When in proper operating position, the tilt of the screed should be such that the nose of the screed is approximately $\frac{1}{8}$ of an inch higher than the heel. This adjustment is made by the pantograph arms on the side of the paver. There is one adjustment on each side. It is a simple matter to make a direct measurement of the elevation of the nose and heel of the screed and adjust it properly. If the nose of the screed is too low, there is a tendency for the cutter teeth in the screed to drag and tear the pavement. If the nose is too high, the screed has a tendency to ride up and over a small amount of material upon every stroke that it takes. This, of course, has a net effect of leaving a washboard surface in the pavement.

Another point of interest concerning the condition of the Adnun paver is the screed drive linkage mechanism. This mechanism transmits rotational motion from the engine of the paver to the linear motion in a transverse direction at the screed. This is done by a series of shafts, levers, gear drives, and pin connections. As the paver gets older, the pin connections become worn, allowing a certain amount of looseness to occur at each pin. As this looseness increases, the resulting play must be taken up before the screed can reverse itself in its oscillating movement. When this lag in the reversing of the screed becomes excessive, the screed remains stationary for a short period of time with each

stroke while the paver is still traveling forward. This causes a differential amount of material to be left under the screed which, in turn, is reflected by a slight ripple or corrugation in the finished mat behind.

Still other points on the Adnun paver that should be watched are the rolls which compact the finished mat to see that they are not pitted, the pads and the scrapers on these rolls to see that they are cleaning the rolls properly, the spray system on the pads which should have water in them and be functioning properly, the steering mechanism on the paver which has a tendency to get "sloppy" through wear and the horizontal and vertical guide bearings which align the screed, for wear.

Two new paving machines

Recently, two new machines have appeared on the paving horizon. The first of these is the Pioneer Vibromatic paver. Essentially, the tractor portion of this paver appears to be much the same as the old Jaeger. The screed mechanism, however, is completely new. It embodies a screed plate to provide an ironing action to the mat, but instead of a tamper bar or rolls to afford compaction, it has a vibrator behind the screed plate. The compaction of the mat is intended to be received from this vibration. So far this paver has had only limited applications in the Western United States and little experience has been gained.

The second paver which has made an appearance is the new Cedarapids paver. This paver also embodies a screed plate and vibrator in a manner similar to the Pioneer. This paver is only now making its official appearance in the West. It is believed, however, that both of these pavers show possibilities for the future. As far as leveling action is concerned, from information that is available, it appears that they work on the same general principle as the Barber-Greene and the Blaw-Knox. Undoubtedly, both of these machines are capable of placing an asphaltic mix satisfactorily. Only experience gained through use will teach their idiosyncracies.

An attempt has been made in this series of articles to set forth a few of the things and conditions that a paving inspector must be aware of. The items which interest the inspector, of course, also are of importance

to the paving crew. Many items that interest the inspector from the quality standpoint will be of importance to the paving crew from the production standpoint. Usually an improvement in quality will go hand in hand with an increase in quantity. While some of the more important points in the opinion of the writer, have been highlighted, there are many additional details concerning both the equipment and the operating techniques that have not been mentioned. Sufficient to say that the exercise of good judgment and the employment of common sense are the greatest assets that will contribute to good workmanship.

TESTING FILLS

(Continued from page 60)

obtained in about an hour. In dam construction there will usually be not more than two new lifts over the area tested in this time.

In those cases where the test indicates the density is only a few percentage points below the specified density, the area in question can be re-rolled and brought up to a satisfactory density without removal of any material. In those rare cases where an extremely poor result is obtained, it is best to hold up work on the area in question until another test can be taken, after which such remedial measures as are required can be undertaken.

In the case of highway fill construction where lighter compaction equipment is usually used and where fills sometimes come up faster than is the case in dam construction, it probably would not always be possible to bring an insufficiently compacted area up to passing density by means of re-rolling on top of the fill. However, this problem could, in my opinion, be largely overcome by the adoption of the standard practice in concrete construction which permits a certain percentage of the tests, usually 15%, to fall slightly below the specified value. In the case of highly questionable areas, the inspector could hold up work on the doubtful area until the results of the field density test are available.

Two other important factors should not be neglected in any discussion of this subject, namely a good contractor with adequate equipment for the job and good qualified inspectors.

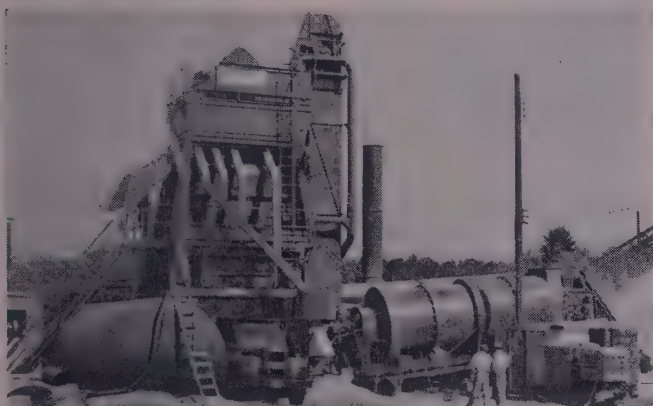
It is believed that the adoption of the suggestions made above could,

Why this paving contractor bought his 4th BatchOmatic . . .

PLANT
NO.



AUG.
'55



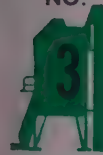
PLANT
NO.



MAY
'56



PLANT
NO.



SEPT.
'56



PLANT
NO.



Plant No. 4, a Model 894, has just been shipped and will probably be in operation before this ad appears.

Literature on request.

Bayer and Mingolla had been in the asphalt paving business for many years before introduction of the BatchOmatic. During these years they had vast experience with many different makes of batch-plants, and they are thus ideally suited to judge the merits of the various plants available.

Record production. Bayer and Mingolla's first BatchOmatic is a 4000-lb. Model 894. It had turned out 145,000 tons (including 20,000 tons for the Mass. Turnpike) by October, 1956. Plant No. 3 with a 2000-lb. rated capacity has consistently produced as much as 84 tons per hour.

Record ease of erection. Although set up by a crew completely inexperienced with the BatchOmatic, Plant No. 1 was ready to produce just three days after erection started.

Record low repair costs. The second Model 894 BatchOmatic has produced more than 102,800 tons for turnpike and state work. Total repair costs for this tonnage amounted to \$200 or just 2/10ths of a cent per ton of mix produced. After producing more than 145,000 tons, Plant No. 1 is still using the original paddles and pugmill liners.

Exclusive features include:

Simultaneous weighing of all sizes of aggregate . . . eliminates the human element in achieving accuracy and maximum capacity.

Instant change-over from automatic to manual operation . . . provides mixes for the drive-in trade . . . instantly reset to preset repetitive cycle operation.

New Dyna-Mix pugmill . . . gives thorough coating in less time than any other pugmill.

Instant, positive inspection of aggregate gradation and weight.

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Contractors Equip. & Supply Co. Albuquerque, New Mexico
Engineering Sales Service, Inc.,
410 Capital Blvd., P. O. Box 2796 Boise, Idaho
256 N. Second Ave. Pocatello, Idaho
Keremi Tractor & Equip. Co., 703 W. 17th St.,
P. O. Box 908 Cheyenne and Casper, Wyoming

Lang Construction Equipment Co., 1st South & 2nd West,
P. O. Box 1646 Salt Lake City 10, Utah
Ray Corson Machinery Co. Denver 19, Colorado
Road Machinery Co. Phoenix, Arizona
Santa Fe Equipment Co., Inc. Los Angeles, California
Sierra Machinery Co. Reno, Nevada
Western Construction Equipment Co.
. Billings and Great Falls, Montana

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Efficient

Safe

Sturdy

**Duff-Norton
Ratchet Jacks**

Efficient design and sturdy construction make Duff-Norton ratchet jacks highly dependable tools for a multitude of uses. They are built to do any sort of moving, lifting or bracing job in mine and mill, or in the field, and will stand up under hard usage with very little maintenance.

Duff-Norton offers nine models of these handy jacks with capacities ranging from 5 to 20 tons. A special safety feature of all models makes it impossible to trip the jacks when under load.

For full information on Duff-Norton ratchet jacks, consult your distributor, or write to the world's oldest and largest manufacturer of lifting jacks asking for our 204-A Catalog.

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Ratchet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks,
Ratchet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

to a large degree, eliminate the problems pointed out by you in your excellent editorial.

Washington comment

By H. W. HUMPHRES

Assistant Construction Engineer
Washington Highway Department

YOUR EDITORIAL concerning the important subject of field control of compaction of earth embankments, which appeared in the June issue has come to my attention.

I agree completely with your analysis of the importance of field control testing. However, your statement that "Today the same amount of time is consumed between digging the sample and reporting the results back to the engineer in charge as was required years ago" is true only for those agencies who have failed to take advantage of recent developments in field test methods and equipment. I refer to the Washington densometer method developed by our department and described in H.R.B. Bulletin No. 93 and in your June 1954 issue of WESTERN CONSTRUCTION.

Since adopting this method, which reduces testing time to about 20 min., we have had little trouble getting data in time to actually control the compaction procedure.

Another critical bottleneck to the field control process has been the problem of establishing the correct density values to be used as a standard for control, particularly for granular type soils. We feel that we have solved this problem successfully with the method for test described in our paper, "A Method for Controlling Compaction of Granular Materials," which was presented to the Highway Research Board last January.

Use of the densometer for obtaining field densities and application of our method for establishing standard densities for granular material has accelerated our control procedure to a point where we have felt justified in changing our compaction specifications from "roller-time" compensation type to the "end product" type.

I agree that further progress is needed and that a test capable of giving instantaneous answers would be desirable. However, the problem is not critical if we use the up-to-date testing equipment and procedure now available. The real problem to day is to convince the testing engineers that they should utilize these new methods wherever possible.

PRIVATE ENGINEERS

(Continued from page 56)

types of services to offer state highway departments.

One of these is that of preparing construction plans from complete geometric design criteria, in which most of the preliminary engineering thinking has been done by others.

The other type of service, available from major consulting firms, is that of providing the entire engineering planning and complete design as well as the preparation of construction plans. This type of service would include correlation of local long range planning to the project plan and may be applied to large extensive projects such as a major freeway selection.

The planning in this type of project would include study of future traffic requirements, present and future school needs, residential development, industrial development, sewer crossings, water line crossings, storm drain requirements and power.

Although there are not too many consulting firms now dealing in all phases of highway engineering, it would be good policy for the states to select such firms that will do them the most good in order to make best use and further develop the outside manpower and thereby make best use of their own engineers for review of the consultants work.

In the selection of a consulting engineer for any project it is well to bear in mind that price alone does not determine the value of the professional service. The engineering services that reflect highway experience and knowledge can often save the state many thousands of construction and future maintenance dollars. In the interest of expediting the expanded highway program, it is believed and recommended that highway departments of the several Western states make use of the available consulting engineering services to supplement and bolster their own forces in order that the anticipated construction schedule can be met year by year.

One way for a state to assure itself of having an available manpower pool is to concentrate on a very few competent consulting firms that can be expected to thoroughly understand the state's problems rather than trying to scatter a little work out to many. Scattering small jobs to the many tends to increase the problem and increases the time to get a job done whereas the larger jobs taken as a package, from surveys through plans, definitely relieves the state and expedites the over-all program.



STRONG, COMPACT AND LIGHTWEIGHT

The Coffing Mighty Midget Puller

Compact and lightweight, the Coffing Mighty Midget Pullers are handy lifting tools for all types of industries. The 1000 lb. capacity model weighs but 9½ lbs. and requires only 40 lbs. of handle pull. The 500 lb. model weighs 6½ lbs. and requires only a 28 lb. pull for full rated capacity.

The handle can be operated as a crank for fast lifting, or it can be used as a lever for short pulls, or for working in cramped quarters. Should the puller be overloaded, the "safety valve" handle will give before any load bearing part fails.

For full information on this compact, light and inexpensive lifting tool, consult your Coffing distributor, or write for Bulletin MP.



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Coffing Hoist

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Ratchet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks,
Ratchet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

No employment yet at Glen Canyon Dam

NO EMPLOYMENT is immediately available at Glen Canyon dam site on the Colorado River in northern Arizona nor will there be any hiring of any other than a few skilled engineering and heavy construction people for many months, according to Commissioner of Reclamation W. A. Dexheimer.

Commissioner Dexheimer said persons seeking work should not attempt to go to Arizona or Utah nor reach the construction area unless they have definite job commitments. He added that both Flagstaff, Arizona, and Kanab, Utah, the nearest communities to the dam site, are crowded and their resources are taxed to handle existing needs of workers now in the area.

His statement followed a conference with William Denny, executive vice-president in charge of heavy construction for the Merritt-Chapman & Scott Corporation which holds the contract for construction of Glen Canyon Dam. The dam site is in an isolated section of northern Arizona, more than 100 mi. from the nearest railhead and miles from the nearest arterial highway. Construction is now under way on access roads, a bridge across the Glen Canyon at the dam site and on the first of two diversion tunnels to take the Colorado River around the site. Until these preliminaries are accomplished and equipment is assembled for the main construction job, there will be relatively little employment other than for construction men skilled in the operating of heavy construction equipment.

The Glen Canyon Project was described in detail in *Western Construction*, February 1957.

Hills Creek Dam

A \$20,572,000 contract has been awarded by the Portland District, Corps of Engineers to Green Construction Co., of Des Moines, Iowa, and Tecon Corporation of Dallas, Texas, for construction of Hills Creek dam, outlet works and powerhouse. The structure is located on the middle fork of the Willamette River, and the Hills Creek project is closely related to the Lookout Point project with the two reservoirs to be operated as a unit.

Plans for the Hills Creek dam provide for an earth and gravel fill embankment 1,920 ft. long with a maximum height of 335 ft. above foundation.

Tri-Dam Project formally dedicated

CALIFORNIA'S Tri-Dam Project, a joint venture of the Oakdale Irrigation District and the South San Joaquin Irrigation District, was formally dedicated June 15. The dedication took place at the Beardsley Dam, about 150 mi. east of San Francisco. Three dams—Donnells, Beardsley and Tulloch—are involved in the project which will increase water storage on the Middle Fork of the Stanislaus River by 230,400 ac. ft. and provide 81,000 kw. of electric power contracted for by the Pacific Gas and Electric Co. Agreement between the irrigation districts and the private utility made it possible for the districts to obtain financing for the dam, and to insure an ample future supply of both power and water for the area.

The Donnells powerhouse is equipped with the largest vertical impulse type hydraulic turbine in the United States. This Allis-Chalmers six-jet turbine develops 74,500 hp. under 1,151-ft. head and is direct connected to a 67,500-kva. Allis-Chalmers generator. The 3-mi. reservoir at Donnells, greatest hydro-electric power producer of the three dams, will store 64,500 ac. ft.

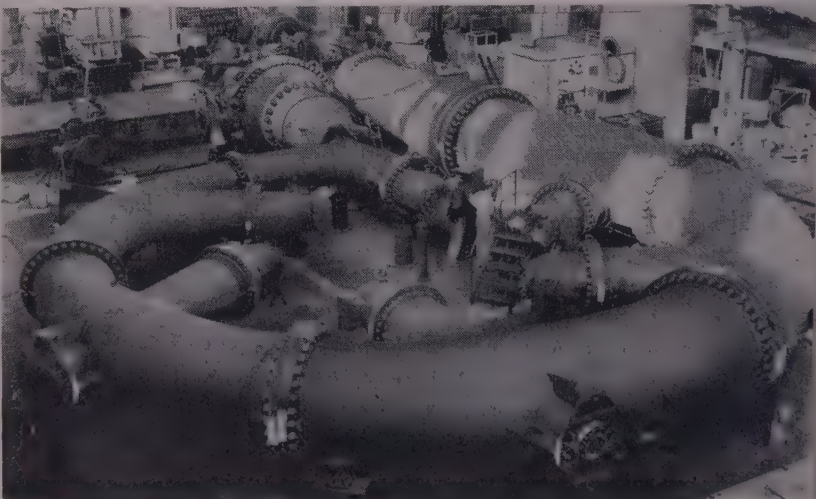
Control center for the three dams is the centrally located Beardsley powerhouse equipped with an Allis-Chalmers 14,000-hp. Francis type hydraulic turbine operating under 258-ft. head. The Tulloch Dam, 45 mi. downstream from Beardsley is still under construction. Its power generating equipment, furnished by S. Morgan Smith and Westinghouse,

will consist of two 12,000-hp., 153-ft. head Francis type hydraulic turbines direct connected to generators to provide 17,000 kw.

Engineering design for the Donnells powerhouse, Beardsley dam and powerhouse, and Tulloch dam and powerhouse was handled by the International Engineering Co. Engineering design for Donnells dam and Tulloch afterbay was handled by George E. Goodall Co.; Tudor-Goedenough Engineers co-ordinated and supervised all construction. Construction work for Donnells and Beardsley units of the project was handled by Tri-Dam Constructors (Morrison-Knudsen Co., Inc., Peter Kiewit Sons Co., Stolte Inc., and Macco Corp.). Construction of Tulloch was handled as a joint venture by The Arundel Corp. and L. E. Dixon Co.

Engineering and construction features of the project have been reviewed in articles appearing in *Western Construction* during the last several years.

FIRST building for downtown Los Angeles to be planned since the repealing of the height-limit restriction late last year is a 15-story office building. The structure is estimated to cost \$10,000,000 and will be located on the southeast corner of Sixth and Spring streets. This structure may be the first of several built to take advantage of the lifting of the building lid.



ASSEMBLED in the Allis-Chalmers plant, this six-jet nozzle will drive the turbine in the Donnells powerhouse under a head of 1,150 ft. developing 74,500 hp. The turbine will be direct connected to a 67,500-kva. Allis-Chalmers generator.

NOW TORQMATIC DRIVE boosts **S-7** performance



EVER SINCE it was first introduced the Model S-7 Euclid Scraper has been a top performer and profit maker for owners. Now it's available with 4-speed Torqmatic Drive, a new Torsilastic seat for greater operator comfort, and an improved hydraulic system that provides easier steering and is independent of other scraper operations.

With these new improvements the S-7 is a more productive machine than ever—here are some of the reasons why:

- **Faster loading** because the 4-speed Torqmatic matches engine power to job requirements—provides greater power in the loading ranges to get heaped loads of 9 yds. in a hurry.
- **Faster cycle time** because changes from one speed range to another are made under full power with no loss of momentum—operator can maintain higher average travel speed.
- **Lower costs** because Torqmatic has cushioning effect on entire power train—reduces downtime and maintenance expense.
- **Easier operation** because new Torsilastic seat absorbs road shocks, thus reducing driver fatigue—improved hydraulic system results in easier smoother steering—elimination of manual shifting makes good operators out of mediocre ones.

See your Euclid dealer for more details on this improved S-7 as well as the complete line of "Euc" Scrapers from 9 to 32 yds. heaped.



MORE VERSATILITY at minimum investment . . . a 10-ton rear-dump body is interchangeable with scraper bowl for work where rock and heavy excavation must be moved and where close quarter loading and dumping conditions prevail.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



Engineering School at College of the Pacific

ORGANIZATION of a School of Engineering at the College of the Pacific at Stockton, Calif., with Dr. Adelbert Diefendorf as dean, has been authorized by the board of trustees. At the same time the board announced the engineering building on the C.O.P. campus will be known as Baun Hall, in honor of Ted T. Baun, Fresno contractor. An engineering graduate in 1927, Baun was the principal donor to development of new facilities for the engineering school. The new development is an advance from the previous departmental structure under which engineering has been offered at Pacific since 1924, except during World War II.

Diefendorf, who came to the Pacific campus in February and has directed the engineering program during the spring term, is the former head of civil engineering at the University of Utah.

Gas line construction

EXTENSIONS to the natural gas transmission system of Pacific Gas & Electric Co. will include several active construction jobs during the remainder of this year. The "Super Inch" 34-in. transmission line bringing out-of-state gas into California at Topock will be completely doubled over its 502-mi. length by the end of 1957. The company has recently awarded a contract for the final 138 mi. of looping on this main delivery line. Award was made to Engineers Limited Pipeline Co., and work was to have started last month. This project will begin with a 30-mi. job in San Bernardino County, continue with a second section about 69 mi. long north of Mojave and a third portion of 39-mi. length will ex-

tend into the San Joaquin Valley.

The other project involves the building of a 12-in. line 160 mi. long to deliver natural gas from Tehama County to the area of Eureka and Humboldt Bay. A \$9,400,000 contract was awarded for this job to Engineers Limited Pipeline Co., and Alex Robertson Co. Work on this line will be rushed in an effort to complete the job by the end of 1957. Work of clearing is already under way where right-of-way has been secured. The 12-in. line operating at 750 lb. will have an initial capacity of 21,000,000 cu. ft. daily. It will provide some difficult construction problems crossing the rugged coast range and the contractors plan to use three spreads to meet the construction schedule.

Partnership dissolved

THE partnership of Haas-Haynie-Utah, created to develop 300 ac. of South San Francisco for new industrial sites close to San Francisco, has been dissolved according to a joint statement released by Utah Construction Co., and Haas-Haynie. Utah Construction Co. will receive the industrial property and will continue the program of land development, sales and building for lease or sale. Among assets received by Haas-Haynie is a building site at the corner of Front and Pine Streets in San Francisco where the company plans to construct a large office building.

Woodruff of AGC dies

KNOWN to many contractors of the West as the head of public relations for the Associated General Contractors and the managing editor of **The Constructor**, William E. Woodruff died as a result of injuries suffered in an automobile accident. He had been manager of AGC public relations since 1939.

All Eagle Gorge bids rejected by C. of E.

ALL BIDS submitted for construction of Eagle Gorge Dam, Federal flood-control project on Green River near Palmer, Wash., have been rejected, Colonel R. J. B. Page, Seattle district engineer, has announced. The action included rejection of the protest of the low bidder, Peter Kiewit Sons' Co., to the adequacy of the Government fair-price estimate which was \$4,071,258 below the Kiewit bid of \$10,874,360.

Authority to reject the Kiewit protest and all bids has been received from the office of the Army's Chief of Engineers, Colonel Page said. Invitations for new bids will be issued at the earliest practicable date, after receipt of comments by the Chief of Engineers on possible revised specifications, scheduling and funding requirements, according to the District Engineer.

Bids of four contracting firms for construction of Eagle Gorge Dam were opened in the Army Engineers' Seattle District office May 10. The Kiewit figure was 59% above the Government estimate. The statutory allowable justified maximum overage is 25%.

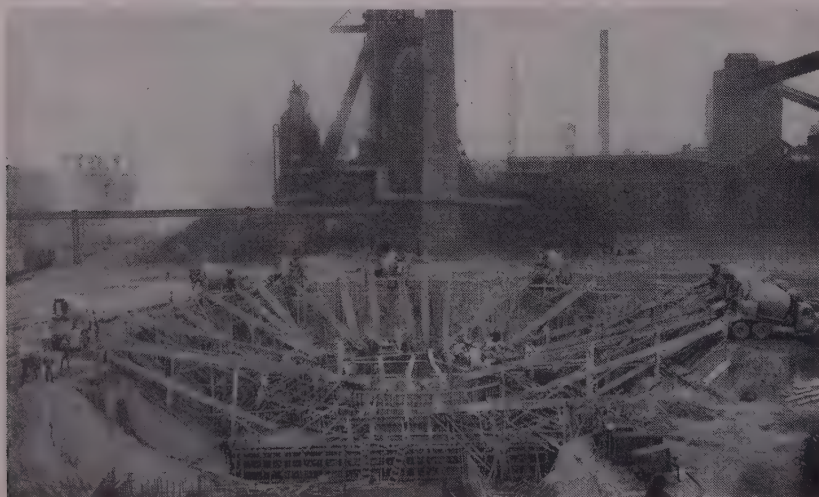
The Kiewit firm filed formal protest to the adequacy of the Government estimate and presented a detailed analysis of the bidding. The District Engineer studied the supporting documents of both the bidder and the Government estimate and reviewed field conditions at the project site, equipment to be used and other features of the proposition.

In his report to higher authority, which was forwarded by the North Pacific Division Engineer to the Chief of Engineers for action, Colonel Page stated that careful review of the Government estimate indicates that a moderate revision can be supported. However, inasmuch as the low bid exceeds the Government estimate by more than the statutory allowable maximum, and inasmuch as the analysis of the low bid establishes, beyond doubt, that the bid is excessive, it is recommended that all bids be rejected.

Washington adds to system

ACTION of the Washington Legislature added a net total of 149 mi. to the state highway system. Of this total 24 mi. were added at the request of the State Highway Commission because of requirements on the Interstate System. A total of 83 mi. of county roads were added and 12 mi. were removed from the state system.

Also in Washington, progress is rapid on the 3½-mi. section of U. S. 99 through Fort Lewis. This section is being constructed to Interstate standards with wide medians and limited access. Contract is being carried out by Woodward & Co., Inc., of Tacoma on a low bid of \$1,639,758 awarded last October. Opening of this section of highway to traffic is scheduled for this month.



CONTINUOUS POUR FOR BLAST FURNACE FOUNDATION

Foundations for Kaiser Steel's fourth blast furnace at Fontana, California, poured with 2,200 cu. yd. of concrete. The continuous pour was made in record time of 7 hr. and 7 min. using 49 mixer trucks, according to Kaiser Engineers, Division of Henry J. Kaiser Co., prime contractors of the \$194,000,000 expansion program at the plant. Expansion program will be completed by mid-1958 when ingot steel production will be close to 3,000,000 tons a year.

ONE-MAN ROAD GANG



Ingersoll-Rand PB-6 Paving Breaker powered by a 125-cfm Gyro-Flo rotary compressor, speeding utility repairs on a New England Street.



I-R PAVING BREAKERS

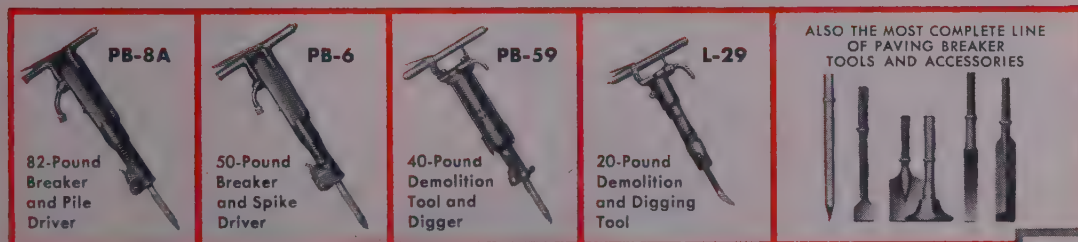
have right weight and power

to make light work of any pavement or demolition job!

Any paving breaker job is faster and easier, when you've got the right combination of weight and striking power. With Ingersoll-Rand's complete Paving Breaker line you select a tool that's right in weight, breaking power and ease of handling for each type of job.

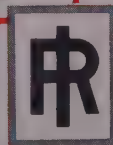
Match the *breaker* to the *job*. A heavier

machine where power is needed—a lighter machine where easy handling is more important. The I-R trade mark is your assurance of top performance on the job—day after day, year after year. Ask your I-R man about Ingersoll-Rand Paving Breakers, Tools and Accessories or Gyro-Flo Compressors. He's always at your service.



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THE BEST AIR EQUIPMENT FOR BETTER HIGHWAYS



ARIZONA HIGHWAY DEPARTMENT MOVES INTO NEW ENGINEERING AND ADMINISTRATION BUILDING

Last month, appropriate ceremonies opened the new home of the Arizona State Highway Department at 17th Ave. and West Madison St. in Phoenix. The Administration and Engineering Building is 161 x 475 ft. of contemporary design. The structure which required 2,250 cu. yd. of concrete and 218 tons of structural steel provides 54,000 ft. of floor space area for the Highway Dept. administrative and engineering personnel.

The following offices and divisions

are now housed in the new building: Offices of the State Highway Engineer Wm. E. Willey, the Commission Secretary, the Deputy State Highway Engineer, the Assistant Deputy Highway Engineers, and Office Engineer, and the District Divisions: Advance Planning, Bridges & Dams, Computing, Contracts & Specifications, Economics & Statistics, Plans, Urban & Secondary Roads, Right of Way, Reproduction & Blueprints, Traffic Engineering, Construction-Traffic Signals, Signs, Mark-

ers & Guide Line Painting, Traffic Safety, Adjustments & Claims, Legal, Personnel, Purchasing, Public Relations, Photography and Permits.

Fred M. Guirey and J. Harold MacDowell of Phoenix, were associate architects for the project. E. W. McIntire, Arizona Highway Dept. Plant Engineer, collaborated with the architects in supervision of the construction. W. T. Hamlyn was the structural engineer. General contractors were Homes and Son Construction Co. of Phoenix.

End-Welded NELSON® Stud

This NELSON torture test was performed on the testing platform at Thew Shovel Company, Lorain, Ohio. The equipment is a 30-ton Lorain Moto-Crane.

Close-up of Hydroscale measuring the 16,000 lbs. of tension against the end-welded NELSON stud. In the interest of safety, the test was not carried out to the point of destruction.

NELSON STUD WELDING

Permanente Cement has new So. Calif. plant

THE Permanente Cement Co. has officially opened its new \$13,000,000 plant at Lucerne Valley to become the largest cement producer in the seven Western states. With a capacity of 2,500,000 bbl. of cement per year, the plant marks Permanente's first major entry into Southern California.

The dedicatory program, attended by approximately 1,000 cement and construction industry representatives and business and labor leaders, was conducted by Eugene E. Trefethen, Jr., executive vice-president, Kaiser Industries Corp., and Wallace A. Marsh, vice-president and general manager of Permanente Cement.

The plant will produce both standard portland and special type cements, and is designed to allow for future expansion.

An adjacent limestone quarry will supply raw material. Permanente, in addition to operating the quarry for its own needs, will mine and crush metallurgical-grade limestone for Kaiser's steel mill at nearby Fontana, and also make the rock available to the glass and sugar industries in Southern California.

The Santa Fe Railway installed 29 mi. of new track from its main line near Hesperia to the plant site. In addition, Permanente has put into operation a

large fleet of bulk delivery trucks and other trucking equipment for product delivery.

A new sales division, with offices in Los Angeles, has been established to serve the Southern California, northern Arizona and western Nevada areas.

ACI organizes branch

A SOUTHERN California Chapter of the American Concrete Institute is now being organized. The area which will include all of Southern California represents about 5% of the total ACI membership. This is reported as the first official local or regional unit to be formed within the framework of the Institute. The organizing committee, which consists of 23 engineers, builders, producers and users of concrete, has informed all present ACI members in the area as to the chapter's objectives and plans. Applications will be received for membership in the chapter from present ACI members, followed by a drive to increase membership from firms and individuals interested in design construction or use of concrete who are not already ACI members.

Sam Hobbs is secretary-treasurer of the new chapter and further information can be secured from him at 742 South Hill Street, Los Angeles 14, Calif.

Highway officials

THE 1957 EDITION of American Road Builders' Association's convenient, pocket-sized directory of Highway Officials and Engineers is now available.

This edition contains more than 1,500 names, titles and addresses of administrative engineers and officials in the 48 state highway departments, the District of Columbia, and the departments in Hawaii and Puerto Rico. Administrative personnel of the Bureau of Public Roads, including the heads of its regional offices and the division offices in each state, are listed.

As in previous years, this directory is available at \$1.00 per copy from the American Road Builders' Association, World Center Bldg., Washington 6, D. C.

Seattle's new skyscraper

PLANS are nearing completion for a 21-story office building in downtown Seattle. It would be the first major office building to be built in Seattle in 25 years and is estimated to cost more than \$10,-

Resists 8-Ton Load!



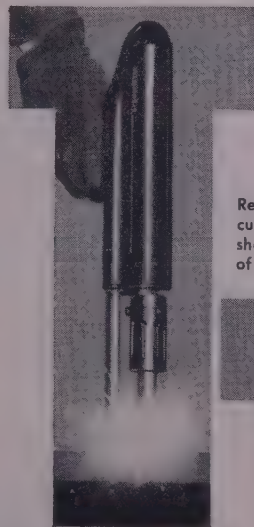
Close-up of stirrup used to complete the linkage between test stud and the crane cable hook. Photo was taken while stud was under full 16,000-lb. load. Bent stirrup indicates force of this grueling test.

● Nelson Engineers tested a 5/8" diameter standard headed stud to determine the strength of the weld.

These photographs attest to the amazing tensile strength of a NELSON end-welded stud. Torsion and shear strength are equally amazing.

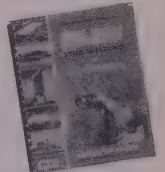
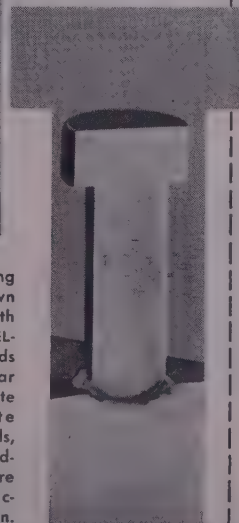
Holding power like this suggests that it pays to stop before drilling a hole and consider the NELWELD® method of fastening...the system that also saves time, eliminates flanges and bosses and makes "hole engineering" unnecessary.

The manual offered in the coupon goes into detail on design and applications, and recommended torque and tensile loadings of studs for normal applications.



The headed stud being used in this test is shown being stud welded with the portable NS-9 NELWELD Gun. These studs are often used as shear connectors on concrete and steel composite bridges. Threaded studs, and a multitude of standard types and sizes are available for manufacturing and construction.

Reason for strength... cut-away view of stud shows complete fusion of stud and base plate.



NELSON STUD WELDING CONSTRUCTION MANUAL

Fasten it Better at Less Cost with



000,000. It would occupy a site facing Second Avenue along Columbia Street. Need for the building is based on the predicted growth of Seattle and the State of Washington during the next decade.

Occupying a sloping site the building will rise 16 stories above the level of the main lobby and will have four floors below for parking. Location and design will emphasize the view of Puget Sound and the mountains on the Olympic Peninsula. Plans call for complete air conditioning. Work on preparation of the site will start immediately with demolition of existing buildings.

Pumping plant contract awarded in Montana

A \$1,056,383 Bureau of Reclamation contract for construction of an irrigation pumping plant, below the Canyon Ferry Dam and Reservoir near Helena, Mont., has been authorized for award to Misco-West Coast of Seattle.

The contract for the pumping plant structure is the second contract awarded in recent months for features of the Helena Valley Unit of the Missouri Riven Basin Project. Contract for a 7-ft. diameter tunnel nearly 3 mi. long was awarded in December. The pumping plant and tunnel will transport water from Canyon Ferry Reservoir to a canal and irrigation distribution system. This

system will supply municipal water to the City of Helena, provide a full water supply to 12,533 ac. in the Helena Valley Irrigation District, just north of Helena, and ultimately may furnish supplemental water to an additional 5,100 ac. currently being irrigated.

Low bids and contract awards

ARIZONA

W. R. Skousen, contractor of Mesa, submitted a low bid of \$444,215 for grading and surfacing 9 mi. of the Quartersite-Wickenburg Highway in Yuma County. **Black Contracting Co., Inc.**, Phoenix, submitted a low bid of \$149,013 for grading and surfacing the St. Johns School Bus Rte., west city limits of St. Johns in Apache County. **Royden Construction Co.**, Phoenix, submitted a low bid of \$124,694 for 7½ mi. of grading and surfacing the Holbrook-Keams Canyon Highway in Navajo County. **L. M. White Contracting Co.** of Tucson submitted a low bid of \$135,457 for 1¼ mi. of grading and surfacing in the city of Casa Grande in Pinal County. **Peter Kiewit Sons' Co.**, Phoenix, submitted a low bid of \$788,961 for 3¾ mi. of widening, grading and surfacing in the city of Flagstaff in Coconino County.

CALIFORNIA

McCammon-Wunderlich Co. & Wunderlich Contracting Co. of Palo Alto received a \$7,292,214 contract for grading, surfacing and construction of four bridges between Wick's Corner, north of Oroville and Jarbo Gap in Butte County. **Griffith Co.**, Los Angeles, received a \$3,161,807 contract for grading, surfacing and construction of six bridges in the cities of Anaheim and Fullerton in Orange County. A \$3,961,230 contract was received by **Peter Kiewit Son's Co.**, Arcadia, for 4.1 mi. of grading and surfacing and construction of five bridges south of Trabuco Creek in Orange County. **J. E. Haddock Ltd. & R. M. Price Co.** of Pasadena received a \$2,161,776 contract for grading, surfacing and construction of three bridges and lighting in the cities of Buena Park, Fullerton and Anaheim on the Santa Ana Freeway in Orange County. **Dan Caputo & Edw. Keeble** of San Jose received a \$1,675,879 contract for grading, surfacing and connections to be graded and surfaced and constructing seven bridges in Santa Cruz County. **Charles L. Harney, Inc.**, San Francisco, received a \$7,925,295 contract for grading, surfacing and construction of 16 concrete bridges, in and near the city of Walnut Creek in Contra Costa County. **Granite Construction Co.**, Watsonville, received two contracts for road work in Sutter and Santa Clara counties: \$480,151 for widening existing road and construction of one concrete bridge north of Robbins in Sutter County and \$268,513 for grading, surfacing and construction of two bridges west of Gilroy in Santa Clara County. **H. Earl Parker, Inc.**, of Marysville received a \$472,794 contract for grading, surfacing and construction of one bridge east of Hirshdale in Nevada County. A \$466,559 contract was received by **Jones Bros. Construction Corp.** of Beverly Hills for portions of a bridge substructure to be constructed across Los Angeles River near 8th Street in county of Los Angeles. A contract of \$305,824 was received by **Baun Construction Co., Inc.**, of Fresno for grading and surfacing between Mays and Nevada State Line in El Dorado County. **McAmis & Baker**, Gardena, received a \$270,000 contract for grading and surfacing in El Monte, Los Angeles County. **Ghilotti Bros., Inc.**, of San Rafael received a \$429,587 contract for grading, surfacing and modifying traffic signal system in the city of Santa Rosa, Sonoma County. A \$5,419,268 contract



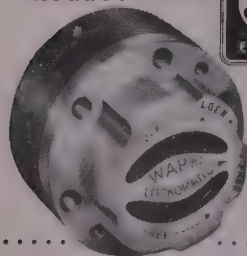
**LOWER COSTS
EASIER HANDLING**

for your **Jeep**

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4-wheel drive

WARN HUBS idle the front drive in 2-wheel drive

**Stop Drag
Reduce Wear**



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Free-wheeling 2-wheel drive with Warn Hubs means big savings in gear, engine, tire wear, gas, plus the pep, speed, performance and high gear power of any 2-wheel drive.

And now, with Warn Lock-O-matics, you have free-wheeling 2-wheel drive, or normal 4-wheel drive automatically, as you shift! When you need traction, you have it! When you shift to 2-wheel drive, you always have free-wheeling 2-wheel drive—with no drag, front gear whine, shimmy. Warn Lock-O-matics truly make "two vehicles out of 1!"

Ask your truck dealer for a free demonstration of Warn Lock-O-matic or Locking Hubs (manual control), or write for literature today! Models for all 4 w.ds. to 1½ tons.

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Another New and Bigger Forward Control 'Jeep' Truck

Here's the bigger, more powerful, 7,000-pound GVW Forward Control 'Jeep' FC-170 Truck:

- **Advanced Forward Control design!** The same new, advanced features that made the Forward Control 'Jeep' FC-150, an immediate success.
- **More cargo space on less wheelbase!** A 9-foot flatbed pickup box on a wheelbase only 103½-inches long! Bed is 27-inches from ground for back-saving ease of loading!
- **More efficient space utilization!** Compare it with any other 4-wheel drive truck — *only* the FC-170 gives you so much cargo space per inch of wheelbase!
- **All-time high for "big-load" maneuverability!** The FC-170 is the *only* 4-wheel drive truck to give you "go-anywhere" 'Jeep' maneuverability with a payload capacity of up to 3500-pounds.
- **Other outstanding features!** It's really a 4-wheel drive truck — *not* a modified 2-wheel drive truck, *not* a conversion! High-torque Hurricane 6-226 engine, time-tested and performance-proved • spacious Safety-View Cab • big wrap-around windshield • wide 63-inch tread for ground-gripping stability in off-road travel • shifts easily into 2-wheel drive for highway travel • with power take-off, operates a wide range of special equipment from winches to belt-driven machinery.

The newest addition to the 4-Wheel-Drive 'Jeep' family...ready for the bigger, tougher jobs!



SPACIOUS SAFETY-VIEW CAB puts you in a "Forward Control" position, gives you greater command of any driving situation.



EXTRA 4-WHEEL-DRIVE 'JEEP' TRACTION takes heavy loads to off-road areas impossible for ordinary vehicles to reach.

Jeep

4-Wheel-Drive

Forward Control

FC-170

WILLYS... world's largest manufacturers
of 4-Wheel-Drive Vehicles

Willys Motors, Inc., Toledo 1, Ohio

was received by **Gordon H. Ball, Gordon H. Ball, Inc., Ball & Simpson and Lew Jones Construction Co.** of Berkeley for 8.8 mi. of road construction and 15 bridges and three pumping plants to be constructed in town of Los Gatos, Santa Clara County. **Erick L. Peterson** of Long Beach received a \$723,562 contract for 3.7 mi. of grading and surfacing in and near the city of Pomona in Los Angeles and San Bernardino counties.

COLORADO

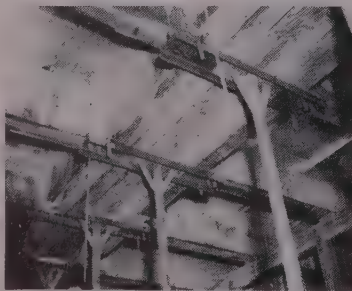
Peter Kiewit Sons' Co., Denver, submitted two low bids for road work Arapahoe and Prowers counties; \$449,-828 for street widening along the Colorado Boulevard between Mexico and Exposition, Denver and Arapahoe counties and \$159,941 for grading and surfacing between Hartman and Bristol in Prowers County. A low bid of \$999,-999 was submitted by **H & E Lowdermilk, Inc.**, of Englewood for grading, structures and surfacing between Gateway and Urovan in Montrose County. A low bid of \$461,226 was submitted by **Davis and Butler Construction Co.** of Salt Lake City, Utah, for Big Thompson Powerplant and Switchyard, Colo.-Big Thompson Project. **Northwestern Engineering Co.** of Denver submitted a low bid of \$481,360 for street improvement, city and county of Denver. A low bid of \$344,618 was submitted by **Shore-**

Bailey Construction Co. of Littleton for 4.6 mi. of grading, surfacing and stabilizing east and west of Meeker on State Highway No. 13, Rio Blanco County. **Gardner Construction Co.**, Glenwood Springs, submitted a low bid of \$264,-648 for grading and surfacing southeast of Grand Jct. on State Highway No. 6 in Mesa County. **Northwestern Engineers**, Denver, submitted a low bid of \$464,676 for structures, grading and surfacing 3.7 mi., southeast of Dove Creek extending through town, on S. H. No. 10 in Dolores County. **Leon K. Sumn, Inc.**, of Denver submitted a low bid of \$110,957 for construction of bridge over So. Platte River with approaches in city and county of Denver. **C. F. Lytle Co.** of Sioux City, Iowa, submitted a low bid of \$1,707,145 for construction of Vega Dam and relocation of county road, Collbran Project. **Gardner Construction Co.**, Glenwood Springs, submitted a low bid of \$763,763 for channel change and bridge on Valley at Santa Fe, Washington and Louisiana in city and county of Denver.

IDAHO

Nelson & Deppe of Boise received a \$245,668 contract for grading and surfacing portions of State Highway No. 68 in Elmore County. **Holmes Construction Co.**, Heyburn, received a \$112,216 contract for reconditioning portions of the U. S. Highways in Butte and Bingham counties. **Howard S. Wright Construction Co.**, Seattle, Wash., submitted a low bid of \$6,044,208 to construct Flight Engine Test Facility at the Aircraft Nuclear Propulsion area of the AEC's National Reactor Testing Station. Projects included within the scope of the major test facility contract include a large test building, control and equip. building and misc. supporting buildings, roadway, fuel, water, sewage and contaminated waste systems. **Fegles Construction Co., Inc.**, Minneapolis, Minn., received a \$752,000 contract to construct a power plant, buildings and equipment for the Argonne Low Power Reactor at the AEC's National Reactor Testing Station. **Carl Woodall** of Boise received a \$212,775 contract for 5.6 mi. of constructing the roadway and drainage structures on the Green Timber road, Targhee National Forest in Fremont County. **F. H. DeAtley & Co.** of Lewiston received a \$178,484 contract for 4.1 mi. of grading and surfacing the Melrose Jct.-Gifford road north, in Nez Perce County. A \$609,009 contract was received by **Kiely Construction Co.** of Butte, Mont., for 4.7 mi. of grading and surfacing U. S. Hwy. No. 2, between the Wash. State Line and Priest River in Bonner County. **Frank G. Balne Inc.** of Yardley, Wash., received a \$1,069,000 contract for grading, surfacing and construction of bridge on St. Hwy 8 from Deary to Bovill in Latah County. **Paul Hardeman, Inc.**, Los Angeles, Calif., received a \$1,205,117 contract for constructing the SPERT-II facility at the Atomic Energy Commission's National Reactor Testing Station.

For Better and Faster Beam Construction use the LUDERJAK T-HEAD



- ★ Fast—Economical
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MCCOY COMPANY
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NASH-DAVIS MACHINERY CO.
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NEW MEXICO EQUIP. CO.
Albuquerque, New Mexico

LEE REDMAN EQUIP. CO.
Phoenix, Arizona

**SANTA FE
EQUIPMENT CO., INC.**
Los Angeles and San Bernardino, Calif.

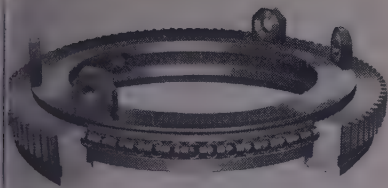
**SOUTHERN IDAHO
EQUIPMENT CO.**
Idaho Falls, Boise and Twin Falls, Idaho

TRACTOR & EQUIPMENT CO.
Sidney, Miles City and Glasgow, Mont.

**WORTHAM MACHINERY
COMPANY**
Cheyenne, Casper, Sheridan and Rock Springs, W.

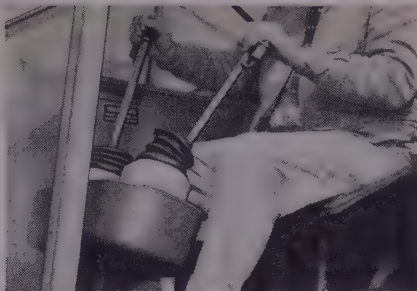
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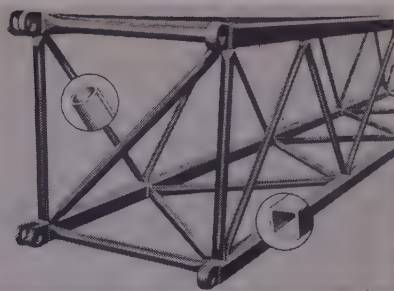
"SHEAR-BALL" TURNTABLE MOUNTING*

Turntable is secured to crawler and revolves easily and freely on a huge sealed "ball bearing." No center pin or nut, centering gudgeon or exposed roller path . . . no turntable rollers . . . no constant adjustment, maintenance or lubrication problems.



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The newest and most effortless of all shovel-crane power controls. "Metered Air" feeds power to clutches at any rate desired—yet operator retains full "feel" of all operations. Fewer levers, fewer motions, faster, smoother, less effort, less fatigue, more output.



SQUARE-TUBULAR-CHORD BOOM*

This new patent-applied-for design has startling advantages over conventional types. Reduces weight and increases lifting capacities. 30-ton crane capacity on 14-ft. long x 13-ft. wide crawlers . . . up to 100-ft. boom, plus tip extensions available.

*U.S. and foreign patents applied for.

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make money for you!



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MONTANA

Riedesel Construction Co. and **Schye and Sullivan** of Billings received a \$605,235 contract for construction of the Yellowstone River Bridge near Terry in Prairie County. A \$547,714 contract was received by **Baltrusch Construction Co.** of Havre for 12 mi. of grading and gravel surfacing the Armelle Creek-Hays-Harlem Highway in Blaine County. **R. J. Sundling** of Livingston received a \$351,061 contract for 8.4 mi. of grading and surfacing the St. Xavier-Hardin-South Section Highway in Big Horn County. **Earl L. McNutt Co.** of Eugene, Ore., received a \$249,363 contract for 6.2 mi. of grading and surfacing the Helena-Fletcher Pass-Lincoln Highway in Lewis and Clark County. A 129,-304 contract was received by **Cahill-Mooney Construction Co.** of Butte for construction of steel and concrete overpass on the Upper Nine Mile Road in Silver Bow County. **F & S Contracting Co.**, Butte, received a \$469,044 contract for 4.8 mi. of grading and surfacing the Pablo-Kalispell Highway in Lake County. A \$140,210 contract was received by **Richardson Construction Co., Inc.**, of Miles City for 10.3 mi. of grading and surfacing the Great Falls-Fort Benton Highway in Cascade and Chouteau counties. **Bober Construction Co.** of Minot, North Dakota, received a \$490,509 contract for 12.2 mi. of grading and surfacing the Miles City-North Dakota Line in Fallon County.

NEW MEXICO

Henry Thygesen & Co., Albuquerque, received two contracts for road work in Dona Ana and Socorro counties. A \$966,698 contract for 5.3 mi. of the Organ-White Sands Proving Grounds in Dona Ana County and \$789,199 for 9.1 mi. of grading and surfacing the Magdalena-West road in Socorro County. **Skousen-Hise Contracting Co. & D. D. Skousen & Son** of Albuquerque received a \$1,901,994 contract for 8.1 mi. of grading, surfacing and structures on the Jct. U. S. 66-84 easterly in Guadalupe County. A \$2,024,943 contract was received by **Brown Construction Co.** of Albuquerque for 10.5 mi. of grading, surfacing and structure on the Luna-Grant County Line-West road in Grant County. **Richy Construction Co.** of St. Johns, Ariz., submitted a low bid of \$98,990 for earthwork and structures, Middle Rio Grande Project.

NEVADA

Dodge Construction Co., Inc., Fallon, received two contracts for road work in Nye and White Pine counties. A \$659,-835 contract for 24.6 mi. of grading and surfacing near Warn Springs, Nye-Lincoln County Line in Nye County and \$348,501 for 1.5 mi. of grading and surfacing 15th Street in East Ely in White Pine County. A \$888,934 contract was received by **Silver State Construction Co.** of Fallon for 14.4 mi. of grading and surfacing near Silver Springs in Churchill and Lyon counties.

UTAH

Vega Engineering and Grading Co., Berkeley, Calif., submitted a low bid of \$433,844 for schedule 1 and 2, construction of Willard Dike, Weber Basin Project. **W. W. Clyde & Co.** of Springville submitted a low bid of \$443,189 for two concrete structures on Buckskin Wash and Paria Creek in Kane County. **Vernal Sand & Gravel Co.** of Richfield submitted two low bids for work in Sandpete and Uintah counties: a \$628,-615 bid for 11.6 mi. of grading and surfacing Spring City Main St., Sandpete County and \$276,711 for grading and surfacing 10.8 mi. of highway No. 88 in Uintah County. **Wangsgaard Construction Co.** of Logan submitted a low bid of \$504,642 for earthwork, structures and surfacing access road to Flaming Gorge Dam, Flaming Gorge Unit, Utah-Wyo. Green Div., Colo. River Storage Project. **Strong & Co.** of Springville submitted a low bid of \$639,-114 for 9.2 mi. of grading and surfacing the Monument Entrance-Deville Garden route in the Arches National Park in Grand County. **Witt Construction Co.** of Provo submitted a low bid of \$2,678,-606 for construction of highway, streets, utilities and residences for Flaming Gorge Community Facilities, Flaming Gorge Unit, Green Div. Utah-Wyo., Colorado River Storage Project. **Germer, Abbott and Waldron** of Tremonton submitted a low bid of \$245,288 for grading, surfacing and structure on 3.7 mi. of State Road 86 in Duchesne County. **Thorn Construction Co., Inc.**, Springville, submitted a low bid of \$353,066 for 1.2 mi. of grading and surfacing and construction of concrete structure, Springville Main Street towards Mapleton in Utah County. **Gibbons and Reed Co.**, Salt Lake City, submitted a low bid of \$226,289 for 3.3 mi. of grading and surfacing on Highway No. 171 in Salt Lake County.

WASHINGTON

C. E. Oneal Inc. of Ellensburg received a \$210,284 award for structures, Malott to Ikanogan in Okanogan County. A \$158,398 contract was received by **J. Arlie Bryant, Inc.**, and **Clarence Braden** of Spokane for 1.8 mi. of grading and surfacing, Kosmos to Glenoma in Lewis County. **Bocek Bros.** of Hoquiam received a \$195,989 contract for draining, grading, surfacing and construction of concrete bridge, Bernard Creek vicinity, Grays Harbor County. A \$262,201 contract was received by **R. A. Heintz Construction Co.** of Portland, Ore., for 1.2 mi. of grading and surfacing, from Johnson Creek to Hatchery Creek in Cowlitz County. A low bid of \$321,156 was submitted by **A. R. Sime** of Kennewick for earthwork and structures on Block 20, Wahluke Br. Canal Laterals, Columbia Basin Project. A \$2,324,834 contract was received by **Peter Kiewit Sons' Co.** of Vancouver for construction of the Port Washington Narrows Bridge, Unit 2, Kitsap County. **Wilder Construction**

Co., Inc., Bellingham, received a \$187,-200 contract for bridge construction in Midway Vicinity, Kittitas County. **Woodworth & Co., Inc.**, Tacoma, received a \$150,619 award for 3.2 mi. of grading and surfacing Eatonville Cut-Off & Much-Kapowsin Highway in Pierce County. A \$161,317 contract was received by **McAtee & Heathe, Inc.**, of Spokane for 16.1 mi. of grading and surfacing Winchester Wasteway to Naylor, Douglas and Grant counties. **Grant Construction Co.**, Coeur d'Alene, Idaho, received a \$242,259 contract for 2.3 mi. of grading, surfacing and structures, Park Rapids to Olsen Creek in Stevens County. **Northwest Construction Co.**, Seattle, received a \$385,902 contract for 3.5 mi. of grading and surfacing Middle Crossing of Snoqualmie River to Camp Mason, King County. **Max J. Kuney Co.**, Spokane, received a \$714,-507 contract for 5.5 mi. of grading and surfacing Pines Road to Greenacres, Spokane County.

WYOMING

Stanley H. Arkwright, Inc., of Billings received a \$589,743 contract for 6.9 mi. of grading and surfacing 4-lane divided highway on the Evanston-Ft. Bridger road in Uinta County. A \$1,060,905 contract was received by **W. W. Clyde & Co.** of Springville, Utah, for grading, surfacing and structures on the Rawlins-Sinclair road in Carbon County. **Schmidt Construction, Inc.**, Arvada, Colo., received an \$856,529 contract for grading, surfacing and misc. work on 4-lane divided highway including ramps and structures on the Wheatland-Cheyenne road, including connection from Torrington road to U. S. 87 in Laramie County. **Carl E. Nelson Construction Co., Inc.**, Logan, Utah, received a \$340,-871 contract for grading and surfacing 3.7 mi. of the Jackson-Moran road in Teton County. A \$297,680 contract was received by **Husman Bros., Inc.**, Sheridan, for grading, draining, storm sewer, surfacing and misc. work on the Greybull Streets in Big Horn County. **N. V. Lamb** of Lusk received a \$261,219 contract for grading, surfacing and misc. work on 7.6 mi. of the Gillette-Savage-ton road in Campbell County. **Summit Construction Co.** of Rapid City, South Dakota, received a \$347,506 contract for 6 mi. of grading and surfacing the Sussex-Linch road in Johnson County. A \$242,512 contract was awarded to **LeGrand Johnson Construction Co., Inc.**, Logan, Utah, for grading, draining and surfacing 5.1 mi. of the Auburn South to Nield String road in Lincoln County.

ALASKA

Moore & Mosley Construction Co. of Fairbanks submitted a low bid of \$423,-600 for constructing water supply storage at Cape Lisburne Air Force Station. **Pacific Alaska Contractors** of Anchorage received a \$910,668 for two schedules of a contract for construction of Air National Guard hanger, pump house, apron and parking area at the Anchorage International Airport.



MOSTLY MUCK

—but DW15s deliver profitable production
for Marion Construction Co., Ocala, Florida

This is one of four CAT* DW15s with scrapers building a 15.5-mile stretch of 2-lane blacktop on U. S. 1 between Jacksonville and St. Augustine. A D8 is push-loading it. This job is only 3 feet above sea level, and the material is wet and heavy. There are some 370,000 cu. yd. to be excavated and moved for fill on the stretch.

Marion Constr. Co. is making 2 uses of the borrow pits: (1) to get fill and (2) to provide drainage ditches for the road. On 6,000-foot round-trip hauls, the DW15s averaged 150 cu. yd. an hour each. They worked 10 hours a day, 6 days a week. According to Vice President Shaw Pearsall they performed excellently and with a minimum of down time in the tough going.

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ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

ITSCHNER VISIT—The visit to Alaska in June of Major General E. C. Itschner, Chief of Engineers, made front page news in each Alaska city he visited—mainly because the construction supervised by General Itschner's command has such a vital bearing on Alaska's economy. It was the General's first official inspection trip to the territory, but not his first trip north. He began his military engineering career nearly 30 years ago when he was assigned to the old Alaska Road Commission.

CONSTRUCTION OUTLOOK—Eagerly awaited by both the population of Alaska and contractors in the states doing business here was the General's forecast on the future of military defense construction in the territory. General Itschner made several pronouncements on this subject in both Juneau and Anchorage. Because of their importance I feel a good portion of this month's newsletter should be devoted to summarizing his main points.

GENERAL PICTURE—The general picture of Alaska's military construction future sketched out by General Itschner should alarm no one. He estimated that Alaska can look forward to military and civil construction near the \$100,000,000-a-year mark until the end of 1958. In addition to this year's \$125,000,000 worth of military construction, another \$90,000,000 for military projects and \$5,200,000 in civil works projects are scheduled through 1958. Although the General foresees a general tapering off after 1958, he said housing, technological improvements and new defense concepts may well change the picture within the next few years.

GUIDED MISSILES—At a press conference, the General said Nike sites now under construction are being built with future missile changes in mind. He said atomic warheads could be used at Nike sites at Elmendorf, Fort Richardson, Ladd and Eielson without major modifications. Asked if inter-continental guided missile sites might be built in Alaska, Itschner replied, "no one knows as yet."

AIR FORCE ENGINEERS?—General Itschner laid to rest one rumor—that the Air Force is attempting to get its own Corps of Engineers independent of the Army Corps for use on its own projects. The General said: "This is not desired by those responsibly in charge. It would result in triplication of facilities instead of the duplication we now have. There would be no advantage to it. It would be a tremendous mistake."

BILLIONTH DOLLAR—An interesting feature of Itschner's visit was his

stop at Ladd Air Force base where he presented a check to Reed & Martin contractors there representing passage of the billion-dollar mark in military construction in Alaska during the 11 years of supervision of such construction by the Army Corps of Engineers. There was no prediction as to when the two-billion-dollar mark might be reached—however, the General indicated that although the tempo of military construction in the territory in years to come will probably taper off, construction of civil works projects in the north may be stepped up.

RIVERS AND HARBORS—Past, present and future rivers and harbor work in Alaska was discussed by General Itschner. He pointed out that to date the Engineers have completed 23 such projects in Alaska, including harbors at Nome, Seward, Ketchikan, Wrangell, Petersburg, Cordova and Juneau. During the last few months, five new civil works contracts were awarded and two more projects are soon to be placed under contract. "In addition to these nine other projects are soon to be placed under contract and nine other projects have been authorized by Congress but no money for them has yet been appropriated. And nine more potential projects not yet authorized are being studied by Congress with a view to their authorization. One of these is a deep water port at Anchorage."

FUTURE OF HYDRO—Among the more important statements issued by General Itschner during his trip to Alaska were those pertaining to the territory's hydroelectric potential. The General stated that studies have shown that some 15,000,000 kw. of generating capacity could be developed in Alaska at reasonable cost. By way of comparison, he stated, the total installed hydroelectric capacity in the continental United States is about 25,000,000 kw. He said the engineers are now preparing an inventory of potential power resources which will prove valuable in planning future industrial developments. "It was hydro power that transformed the Pacific Northwest; hydro power has brought great industries into British Columbia and Alaska may well be next in line."

COOK INLET PROJECT—Improvements in the Cook Inlet area costing over \$5,000,000 may be added to the public works authorization bill according to word from the house rivers and harbors subcommittee. A total of 11 navigation projects for Alaska are under consideration, including dredging and breakwaters at Anchorage port and Homer, Ninilchik and Seldovia harbors. Total cost would be \$5,199,200.

ONE LOCATION—One of the busiest places, construction-wise this summer, is Fort Richardson near Anchorage. Major projects being pushed to completion on the post are a new \$750,000 non-commissioned officers club, a \$1,000,000 community center and a \$750,000 hangar at Bryant field, the Army airfield. Plans for the future include a million dollar road drainage program, a 200-man permanent barracks building and 14 new family quarters.

ALASKA SLUMS—The biggest slum clearance program in Alaska's history has been given the green light. An allocation of \$1,839,219 in temporary loan funds is being made available to Fairbanks by the Housing and Home Finance agency for the project and a capital grant of \$858,889 has been set aside as the federal portion of the completed undertaking. This is the scope of the project: 13 acres of blighted residential structures adjacent to downtown Fairbanks will be torn down, 160 buildings will be removed. A well-planned residential and commercial area characterized by modern construction will take its place. Eight families now living in substandard homes will be helped to find decent, safe and sanitary housing. The project is the first in Alaska. Six more projects are under study in Fairbanks and other Alaska communities.

CONSTRUCTION NEWS NUGGETS . . . The Sitka Chamber of Commerce warns workers against coming there in the hope of getting construction jobs on a new pulp mill there . . . Kodiak voters have approved a \$50,000 bond issue for a new city hall . . . \$1,398,477 in street, water and sewer improvements is planned in Ketchikan . . . Design work is being completed on an atomic power plant scheduled for the Big Delta area by the military . . . The Anchorage Carpenters Union has drafted a protest to the territorial Employment Security Commission over importation of stateside labor to Alaskan construction projects . . . The Alaskan Air Command has filed six withdrawal requests for radar stations in the eastern Aleutians. Sites included in the request are Port Heiden, Port Moller, Cape Sarah, Driftwood Bay, Cold Bay and Nikolski.

Mayfield Dam work stops

WORK has stopped on the construction of the Cowlitz River dams being built by the city of Tacoma following a decision of the Washington State Supreme Court holding that a city does not have power to condemn state property. Condemnation proceedings had been brought by Tacoma to secure title to a state fish hatchery which would have been flooded by the reservoir behind Mayfield Dam. Attorneys for the city of Tacoma are considering plans for a possible appeal to the United States Supreme Court.

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ENGINEERS and CONTRACTORS

C. H. Ferguson was recently appointed as manager of the San Francisco regional office of Intrusion-Prepakt, Inc., Cleveland, Ohio. Ferguson joined Intrusion-Prepakt in 1952 as regional engineer in the Seattle office. In 1955 he became district manager. Previously he had served six years with the Corps of Engineers and was on the Detroit Dam



C. H. Ferguson

construction in Oregon. A registered engineer in Washington and Oregon, he holds memberships in the American Society of Civil Engineers, American Concrete Institute, Society of American Military Engineers, and the Seattle Engineers' Club.

* * *

Niels K. Steenhil has been named a project manager of The Rust Engineering Co., Pittsburgh, Pa. He will be in charge of a steel expansion project for the Bethlehem Pacific Coast Steel Corp. at Seattle, Wash. For the past five years Steenhil was general superintendent of construction. A member of American Society of Civil Engineers, Steenhil has been with Rust Engineering since 1940 when he joined the organization as a field engineer.

* * *

Baird M. French has assumed his duties as new regional engineer of the Bureau of Public Roads, in charge of Federal highway work in Oregon, Washington, Idaho and Montana. French comes from Arizona where he was Public Roads division engineer. He succeeds **Frank E. Andrews**. **Robert N. Kellogg** has been acting regional engineer in the interim.

* * *

Four civilian employees of the North Pacific Division, Corps of Engineers, Portland, have been selected for key positions with the new Pacific Ocean Division, with headquarters in Honolulu, Hawaii. **George H. Kelleway**, who headed the Military Branch, has left to become chief of the Engineering Division of the new installation. He is being replaced by **David H. Meldrum**. **Robert**

G. Hooson has left to head the Supply Division and is being replaced in the Portland District Supply Division by **Voyl M. Eason**. **Miles C. Bubenik** leaves to head the Foundations and Materials Branch, and **Sigurd Halvorson** to take charge of civil works planning throughout the new division.

Several men have transferred from the Corps' Seattle District to the new Pacific Ocean Division. Among them were **Richard L. Nichols**, who becomes chief of Engineering, Planning and Reports Branch, and **Hervey S. Bardsley**, who transfers from Seattle to the Foundation and Materials Branch in Honolulu.

The Pacific Ocean Division became activated July 1 under the direction of **Brig. Gen. Ellsworth I. Davis**. Heretofore, construction in Hawaii has been the responsibility of the Honolulu area engineer under the South Pacific division engineer in San Francisco.

* * *

Wheeler H. Rucker, Portland, whose experience as a waterways engineer on the Columbia River spans 36 years, recently retired from the Corps of Engineers. His duties are being assumed by **Oliver J. Moreland**, chief of operations and maintenance branch, in addition to Moreland's other responsibilities.

* * *

Paul Kim of Ventura, Calif., has been appointed to succeed **Arthur Davis** who is retiring as programs coordination officer of the Bureau of Reclamation's Region 3 office in Boulder City, Nev. Kim joined the Bureau in 1949 as a design engineer.

* * *

C. A. Budnik, civil engineer and veteran heavy industrial construction manager, has joined Kaiser Engineers, Oakland, Calif., as assistant manager, Industrial Construction Division. He will assist **W. F. Bort** in the field management of Kaiser Engineers construction projects throughout the United States.

Theodore P. Dresser, Jr., chief engineer and vice president of Abbot A. Hanks, Inc., San Francisco, Calif., was one of the recipients of the Award of Merit given by the American Society for Testing Materials at their annual meeting in June. Dresser, a past president of the San Francisco Section of the American Society of Civil Engineers, received the award in recognition of long-time valued service in advancing the interests of ASTM on the West Coast.

Montana State Highway Engineer **Fred Quinnell, Jr.**, who recently succeeded **Scott P. Hart** to the top engineer post, announces three engineering promotions in the department. **Don B. DeVore**, construction engineer, was promoted to assistant state highway engineer, technical division, Quinnell's former position. Named construction engineer is **Lehman Fox**, who had been bituminous engineer. **Tom Ratchford**, former division construction engineer at Bozeman, is now senior assistant state construction engineer at the headquarters office in Helena.

* * *

Lt. Col. J. Newton Cox has reported to the Portland District, Corps of Engineers, to become the new district executive. The present district executive officer, **Lt. Col. Joseph F. Garbacz**, be-

**Lt. Col.
J. Newton Cox**



comes deputy district engineer, replacing **Lt. Col. Francis G. McBride** who left for another assignment.

Portland District also recently made the announcement that **Joseph C. Patterson** has been made resident engineer at Hills Creek Dam project on the Middle Fork Willamette River, replacing **Roy M. Cami**, transferred.

CALENDAR

- Oct. 7-10**—Federation of Sewage & Industrial Wastes Associations, Statler Hotel, Boston, Mass.
- Oct. 14-18**—American Society of Civil Engineers, annual convention, Hotel Statler, New York City.
- Oct. 18-19**—Professional Engineers of Oregon, convention, Eugene Hotel, Eugene, Ore.
- Oct. 23-26**—Associated Equipment Distributors, tri-regional meeting, Del Monte Lodge, Carmel, Calif.
- Nov. 13-15**—American Standards Association, annual meeting, Hotel St. Francis, San Francisco, Calif.
- Nov. 13-15**—Eighth National Conference on Standards, Hotel St. Francis, San Francisco, Calif.
- 1958**
- Jan. 16**—Beavers Award Dinner, Biltmore Bowl, Los Angeles, Calif.
- Jan. 20-23**—American Road Builders Association, annual convention, Washington, D. C.
- Jan. 26-30**—Associated Equipment Distributors, annual meeting, Conrad Hilton Hotel, Chicago, Ill.

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SUPERVISING the jobs



E. E. SNYDER, project manager for joint venture firm of Arundel-Dixon, poses with some of the key field supervisors on construction of Tulloch Dam, farthest downstream of the three dams on the Stanislaus River, Calif., which comprise the Tri-Dam Project. Left to right (standing): Snyder; **H. A. Hoover**, electrical superintendent; **Rube Miller**, construction superintendent; **Vic Miller**, master mechanic. Seated: **Jim Morris**, carpenter superintendent; **Bill Jones**, rigging superintendent.



J. B. GIBSON, job engineer (seated) appears with Arundel-Dixon's engineering staff and office personnel. Left to right (standing): "**Jiggs**" **Schmidtgal**, paymaster and cost engineer; **Omar Finsand**, assistant job engineer; **George Henningsgard**, office manager; **Herman Snyder**, accountant; **Jerry Henningsgard**, warehouse; **Mike Hughes**, assistant job engineer; **Pete Keyes**, timekeeper. Seated: **Catherine Doig**, office, and **Gibson**. Tudor-Goodenough Engineers supervised work for the owners.

Tom Reilly is general superintendent, **D. L. "Duke" Condrey**, superintendent, and **Lou Howard**, foreman, on 1.1 mi. of clearing, grading and draining, Primary Highway 2, from Keechelus Inn to Sunset Lodge in Kittitas County, Wash. Involved in this \$371,972 contract are 163,140 cu. yd. of solid rock. June 3 was the starting date, with Oct. 11 set for finish of the job. Contractor is Good-fellow Brothers.

John H. Lee is superintending a \$1,-068,474 award to Jack Adams for 4.5 mi. of grading, surfacing and structures on U. S. 70-80, Lordsburg urban road in Hidalgo County, N. Mex. Other important men on this job are **Boyd Smith**, carpenter foreman; **George Adams**, grade foreman, and **Norman Eaton**, field clerk. The Adams firm started on this job in May and has it scheduled for completion early next year.

Guy Haney, superintendent for S. Birch, Inc. and S. Birch & Sons, is handling construction consisting of 9.9 mi. of grading and gravel surfacing on the Lewistown-Roy highway in Fergus County, Mont. Other key men here for Birch are **Herb Kennedy**, **Ed Kiinen** and **John Montgomery**, foremen; **Austin Tayer**, mechanic, and **John Harwood** service man. Office is in charge of **Buc Felker**. The \$448,507 job is expected to be finished in October, having been in progress since June.

* * *

"**Slim**" **Bray**, paving superintendent for Morrison-Knudsen Co., Inc., is supervising a \$205,415 award for 7.4 mi. of plant-mix surfacing on U. S. 30 between Glens Ferry and King Hill in Elmore County, Idaho. The job has been going since the first of June and is now finishing.

* * *

Howard M. Byars, superintendent **George Conley**, grade foreman, and **Joe Krmpotic**, labor foreman, key men for Isbell Construction Co., head the list of workers on 1.9 mi. of state highway involving the widening of Main Street through Carson City, Nev. Isbell won the contract at a low bid of \$643,662 started the work in May, and expect to finish in October.

* * *

Tommy Carter, paving foreman, and **Woodrow W. Morgan**, plant foreman have been in charge of work of grading and paving on the Lebanon-Crabtree and Orleans-Lebanon roads in Lincoln County, Ore., for Morse Brothers, low bidder who received the award at \$153,299. A job of one-month duration, the work is now finished.

* * *

E. C. Young is project manager, and **H. L. Eddy** is superintendent for Kenneth H. Golden Co., Inc., M. H. Golden Construction Co., and E. C. Young Young & Arrieta, contractor on A. C. and concrete paving, bridges, excavation on 2.9 mi. of 8-lane freeway on U. S. 80, west of La Mesa Blvd., La Mesa and Ballantyne Lane, El Cajon, San Diego County, Calif. Other key men of the \$3,594,047 project are **James Finster**, purchasing agent, and **M. F. Landon**, concrete paving manager. Under way since June, the job will probably be finished about August 1958.

* * *

Keith J. "Mickey" Erickson is supervising a \$336,284 recent award to Erickson Paving Co. for 2.4 mi. of grading and concrete paving two new lanes from Hyak to Keechelus Inn in Kittitas County, Wash. **Bob Schasteen** is master mechanic on this job which is just starting and will finish in October.

* * *

R. H. Hayard, superintendent; **Don Huber**, engineer, and **Don Tallman** are key men for S. S. Mullen, contractor on 60-mi. crushed rock and sealcoating job on the Alaskan Highway. Just getting underway, the work is expected to be finished Oct. 1. Mullen received the contract on a low bid of \$169,634.

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TODAY's motorized grader can shave terrain accurately within 1/8th of an inch in 10 feet. Big and powerful? Yes. But control is the secret here.

On that score, TORQMATIC DRIVE helps do a far better job.

This matched converter-transmission team applies power to the wheels with infinite smoothness.

Full-power shifting is done with a mere flick of the wrist. Your operator concentrates on grading instead of shifting.

Take a tip from 55 manufacturers of 122 different kinds of road-building and construction equipment. Get the Allison TORQMATIC story.

Ask your equipment dealer or write:
Allison Division of General Motors
Box 894K, Indianapolis, Indiana

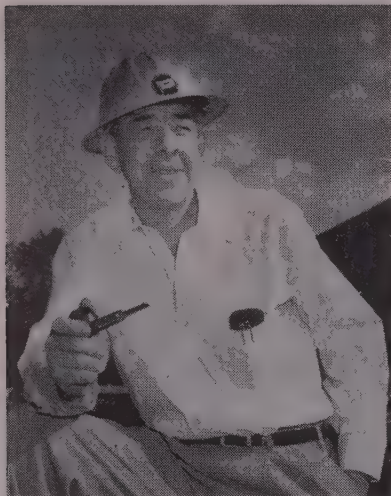
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Allison

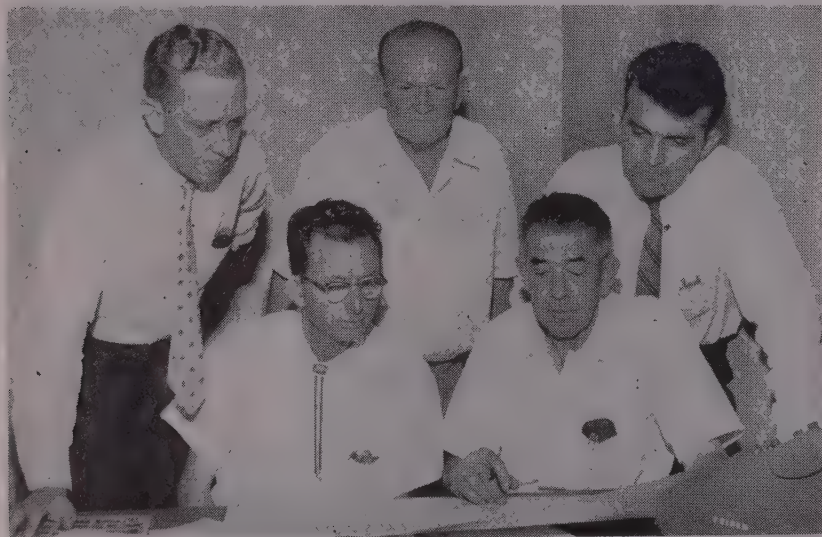
TORQMATIC DRIVES

Directing the start on Glen Canyon



HERBERT S. BOOTH, project manager for construction of Glen Canyon Dam and powerplant being built on the Colorado River in northern Ariz-

zona by Merritt-Chapman & Scott Corp. for the Bureau of Reclamation. Most of Booth's life has been spent in the West, and thirty years of it has been in active participation in the construction field. Booth joined M-C&S in 1956. Prior to that time he served as project manager for some of the country's leading heavy construction companies, including Morrison-Knudsen Co., Inc., and Guy F. Atkinson Co. While with Atkinson he was a project manager on McNary Dam. Purchasing agent for this huge \$107,955,522 project is **Richard C. Park**. Park was formerly field purchasing agent at Priest Rapids Dam, the \$92,000,000 hydroelectric power project under construction by M-C&S on the Columbia River. Also shown here are Merritt-Chapman & Scott's engineering and office staff. Front row, (l. to r.): **C. A. Porter**, chief electrical engineer, and **Booth**. Back row, **L. E. Haynes**; **J. Guthrie**, project engineer; **T. A. O'Connor**, construction field accountant manager, New York City. Work has already started at Glen Canyon Dam. The project is expected to be completed in seven years.



"**Chuck**" **Loser** is grading superintendent for C. L. Hubner Co., while **George Williams** is structures superintendent or a \$1,200,202 award to this contractor for grading, surfacing and structures, Pueblo easterly, Mineral Park to Belle Plair underpass on State Highway 18, in Pueblo County, Colo. Started last April the job is expected to be finished in November.

* * *

George Warren, assisted by **Pete Phillips** and **P. W. Jackson**, is supervising construction of a full 8-lane freeway and three bridges on Eastshore Freeway in the City of Oakland, Calif. Under way since May and expected to be finished by the end of next year, this project was awarded to Johnson Drake & Piper, Inc. at a cost of \$4,934,599. Office manager for the project is **A. L. Johns**.

* * *

L. M. Price, superintendent for Pew Construction Co., is in charge of bridge and overpass construction over Charles Fork River and Milwaukee Railroad in Missoula, Mont. Awarded to Pew on a low bid of \$683,472, the work started in May, with September the scheduled finishing time.

* * *

Bud Holley is superintending a \$514,387 contract for construction of an overpass and river bridge in Denver, Colo. **Ed Williams** is bridge superintendent. **Louis Chinn** is grading foreman, and **Gene Scherrer** is timekeeper. Awarded to Colorado Constructors, Inc., the contract, which got under way in April, is expected to end by the end of the year.

* * *

E. L. White, general superintendent and **John A. LaComb**, job superintendent, are head men on a contract held by Sully-Miller Contracting Co. to widen grade and pave 3.8 mi. of 4-lane on Sigr Route 22 in Orange County, Calif. Field superintendent is **H. C. Lorenz**, and timekeeper is **H. D. Herrmann**. With October set as the completion date, the job has been going since April 24.

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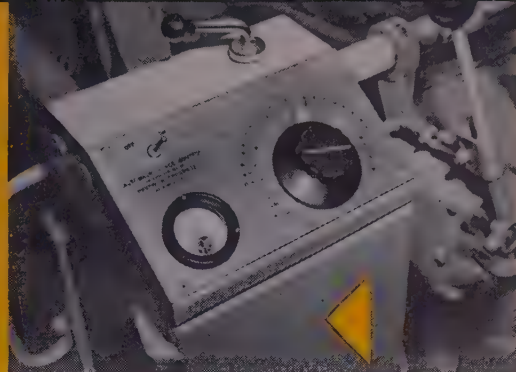
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Preco Automatic Blade Control is available only on the Cat No. 12 Motor Grader.



The Caterpillar No. 12 Motor Grader rightfully claims the title "standard of the industry." Yet Caterpillar is constantly seeking—and finding—ways to improve this great machine.

Latest advance is the Preco Automatic Blade Control, shown above, which keeps the blade at any desired slope, regardless of the roughness of the terrain. Accuracy in controlling slopes *within 1/8 inch in ten feet* has been demonstrated.

But this is only one more reason why the No. 12 is your best investment in a motor grader. Here are some of the others:

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CAT DIESEL ENGINE: Time tested through 25 years of Diesel leadership. Clean, economical burning of non-premium fuels. Injection valves and pumps never require setting or adjusting.

EXCLUSIVE OIL CLUTCH: Rate of clutch wear has averaged less than the thickness of a human hair for 1,000

hours of operation. Clutch down time is therefore practically eliminated.

CONSTANT MESH TRANSMISSION: On-the-move shifting is easy and fast because large gears remain in mesh, do not have to be shifted.

MANEUVERABILITY: The No. 12 is unmatched in this department. Oscillating tandem drive makes backing across ditches easy. Leaning front wheels make turns shorter, steering easier.

But these brief facts are only a hint of the Caterpillar No. 12's superiority. Get the full details from your Caterpillar Dealer. You can always count on him for fast, dependable service and quality replacement parts you can trust.

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

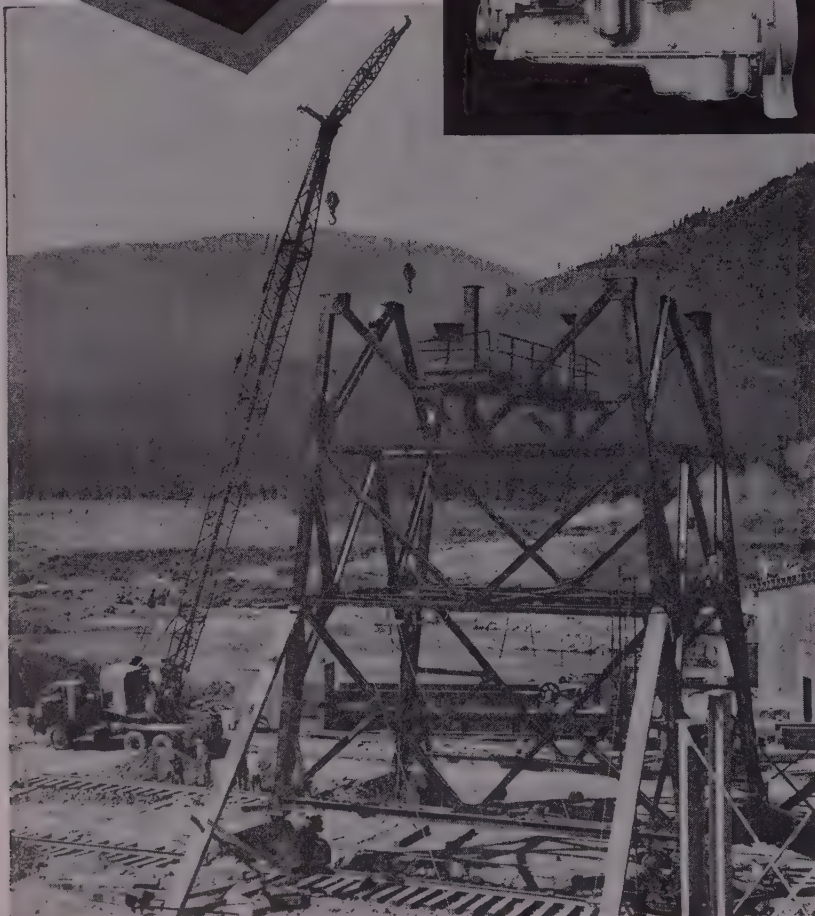
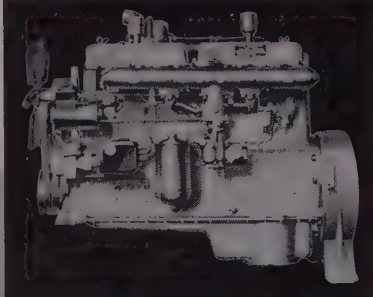
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Morrison-Knudsen own and use Lorain Crane

powered by
WAUKESHA

For the Noxon Rapids Hydroelectric Project on Clark Fork River in western Montana—Morrison-Knudsen Co., Inc. of Boise, Idaho are building a concrete and earth fill dam, maximum height 190 ft. and about 5930 ft. long. About the busiest piece of equipment on the job is their Waukesha-powered Lorain MC 505-W mobile crane. After setting up a concrete batch plant, it is shown here setting up a two whirley crane plant. The Lorain's 140-GK Waukesha Engine gives it safe, steady power with ready reserve for heavy handling as well as fast power for speedy mobility.

353

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

W. P. Sweeney, general superintendent, heads the work on a recent Atomic Energy Commission contract award to The Fluor Corporation, Ltd. This engineering-construction firm will construct storage tanks and related facilities for the handling of radioactive wastes at the AEC National Reactor Testing Station in Idaho. **H. M. Smith**, civil engineer and **G. T. Bryon**, office manager, also are key men for the contractor on this \$1,900,000 project.

* * *

Barney Barnewitz is project superintendent for Frank Capriotti who is the contractor on construction of seven buildings at Stead AFB, Reno, Nev. Foreman on this large contract which covers dining hall, central heating plant, dormitories, officers quarters, etc., is **Gary Britt**. Contractor Capriotti started work here the latter part of April and expects to have the job finished about March next year.

* * *

Robert A. Millard, grading and general superintendent on a \$157,405 contract awarded to J. F. England's Sons Co., Inc., is assisted by **John W. Fuller**, bridge superintendent, and **Joe M. Huston**, grading foreman. This work, which started in June, involves 7.2 of grading gravel and timber bridges on the Cleveland-Chinook highway in Blaine County, Mont., and will be finished about September.

* * *

Jack Harbert, co-partner in the construction firm of Harbert Brothers, is acting as superintendent on a \$102,600 award to his company for construction of revetment and embankment along the right bank of the South Santiam River north of Lebanon, Ore. Work is now in the finishing stage, having started in June.

* * *

Duncan Manning, general superintendent, **Orvel Burnett**, excavation superintendent, **George Wiggers**, paving superintendent (structures and drainage), **J. Dean Newell**, purchasing agent comprise the top men working on a \$2,570,432 award to Cox Bros. Construction Co. and J. E. Haddock, Ltd. Project is on the San Diego Freeway in California, and covers grading, surfacing of 2.3 mi., and construction of an undercrossing and three overcrossings in the city of San Clemente. Under construction since May, contractor expects to finish about August 1958.

* * *

Willis Smith, project superintendent for Fisher Contracting Co., is supervising a recent award for 5.4 mi. of grading and aggregate surfacing the Mogollon Rim section of Tonto and Sitgreave National Forest, Gila and Coconino counties, Arizona. Other key men on this \$756,479 job are **Gene Pierce**, field office manager; **Chris Hulls**, **Darwin Ritchhar** and **Ed Metz**, general foremen, and **Dar Broderick**, powder foreman. Weather permitting, the job will be finished Jan. 1, 1958, having been under way since mid-June.



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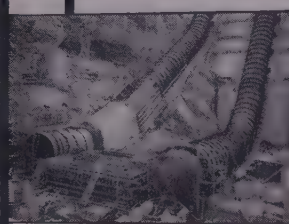
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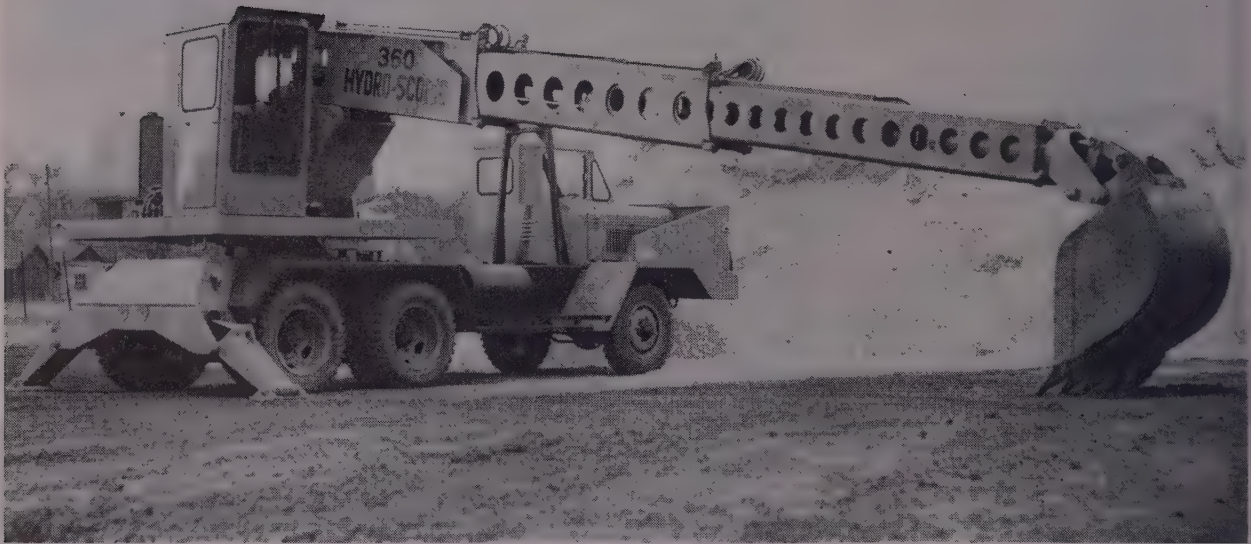
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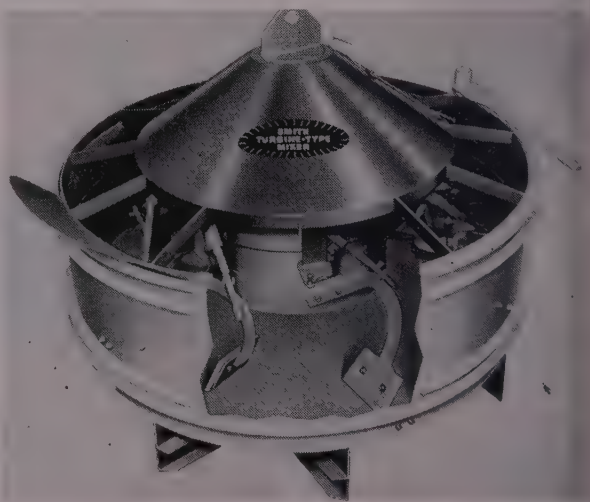
Versatile rig with all-hydraulic telescoping boom handles variety of highway jobs

The Badger Machine Co. of Winona, Minn., manufacturer of the Hopto Digger, has recently announced the addition of a new model to its line of completely hydraulic backhoes and shovels. The new machine, called the 360 Hydro-Scopic Hopto, has been engineered to meet the varied work demands of contractors, State Highway Departments, counties and municipalities. Several sizes of backhoe buckets for trenching and excavating, and various tools for grading, sloping, ditch cleaning, ditch forming, concrete ripping and concrete removal, are available. All of the buckets and tools are equipped with the exclusive patent pending, "snap-on" adapter. The Hopto "snap-on" bucket and tool adapter permits the operator to change the bucket or tool in a matter of seconds without leaving the operator's cab. The unique triple-section, all-hydraulic telescoping boom gives a digging depth of 20 ft., and a loading height of 19 ft. Boom retracts so that it may be carried on a carrier to meet all legal height and overhang regulations. The 360 Hydro-Scopic Hopto is also equipped with a bucket tilt mechanism for digging vertical walls and square corners. The bucket rotating mechanism of this new heavy-duty Hopto makes it an ideal unit for an endless variety of grading and sloping operations.

T. L. Smith Co. introduces turbine type mixer

The T. L. Smith Co. has just introduced a mixer incorporating new design principles. Based on a Swedish design, the Smith Turbine Type Mixer will materially reduce costs, because it mixes faster (up to six times as fast as known makes), fits into spots too low for conventional mixers and mixes so thoroughly that it actually homogenizes the materials. The mixer has a doughnut shaped mixing drum with the drive mechanism located in its center. This permits a "live mix" as there is no dead center in the mixing area. In addition, the blades are positioned so as to braid the material at the rate

of 9 ft. per sec. This fast blade speed whips the cement, making a faster and more thorough mix. The Smith Turbine Type Mixer will be manufactured in the 1/2-, 1- and 1 1/2-yd. sizes. The mixer weighs approximately 3,100 lb. in the 1/2-yd. size, 5,500 lb. in the 1-yd. size and 7,750 lb. in the 1 1/2-yd. size. Basically, it is a stationary type mixer. However, it does have a portable feature since it is equipped with a lifting hook. It can be handled by a crane or transported on a monorail.



In these two instances, the mixer becomes its own bucket and actually can be used to mix while transporting the batch to the pouring site. It is also feasible to adapt this mixer to a trailer type of mounting or to railroad car type of mounting. Another

"all new MODERN design"

torque converter

2-speed transmission



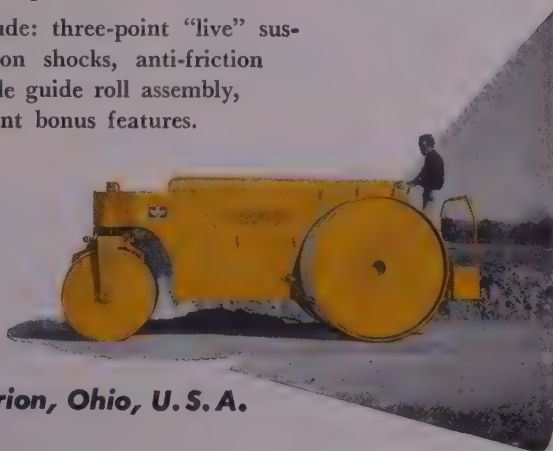
General Purpose • Finishing or Variable Weight

Huber-Warco's newly-designed 3-wheel roller is a powerful, rugged machine built for economy, performance and durability. Greater roller efficiency is achieved by the use of a torque converter, tail-shaft governor and 2-speed transmission.

Other important features include: three-point "live" suspension of the sub-frame to cushion shocks, anti-friction bearings throughout, completely adjustable guide roll assembly, dual braking systems, and many other important bonus features.

Huber-Warco 3-wheel roller can be supplied with variable weight rolls, or with cast iron rolls, in various sizes, for general purpose or finishing work.

See your Huber-Warco distributor for complete details. The Huber-Warco 3-wheel roller is the most modern, dependable roller you can buy.



A Product of Huber-Warco Company, Marion, Ohio, U. S. A.

Represented by

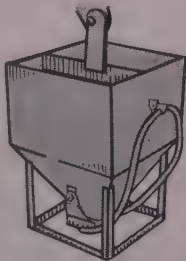
Nelson Equipment Company... 5251 S.E. McLoughlin Blvd., Portland 2, Oregon
 Santa Fe Equipment Company, Inc. 3000 Santa Fe Avenue
 P. O. Box 58007, Vernon Station, Los Angeles 58, California
 Santa Fe Equipment Company, Inc. 867 Colton Avenue
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 Caird Engineering Works Billings, Montana

Caird Engineering Works P. O. Box 87, Helena, Montana
 General Equipment Company 1501 East 2nd Street
 P. O. Box 2524, Reno, Nevada
 Western Traction Company 2230 Third Street, San Francisco 7, California
 Western Traction Company 16th and American River, Sacramento, California
 Equipment Sales Company 720 South 19th Avenue
 P. O. Box 6245, Phoenix, Arizona



STRATO-BOOM

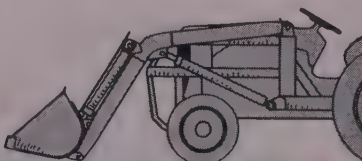
Henry's new Strato-Boom with material fork lifts 170 bricks, 32 blocks, or a fully loaded wheelbarrow up to any point as high as 20 feet. Saves time and labor on any masonry job. A Salina, Kansas, contractor reports that by using this machine one tractor operator kept 20 masons supplied with bricks. Fully automatic—works from tractor shovel controls—attaches easily to most Henry Tractor Shovels.



Concrete-Mortar Hopper

Attaches quickly to Henry STRATO-BOOM . . . takes mortar, wet concrete right up to job. One-third cubic yard capacity.

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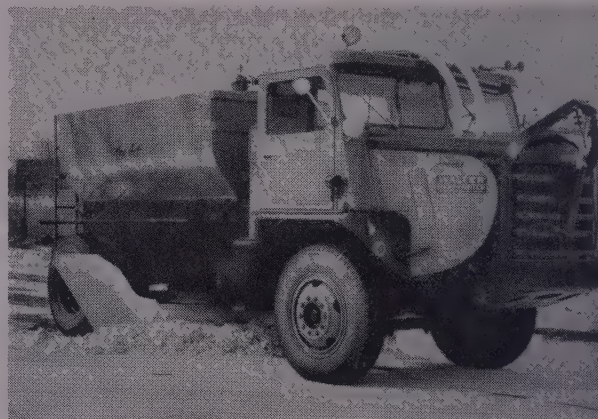


SALES AND SERVICE FROM COAST TO COAST

feature is the fact that this mixer can fit into existing plants which have very limited headroom. For example, the $\frac{1}{2}$ -yd. mixer charges approximately 30 in. above floor level, the 1-yd. approximately 38 in., and the $1\frac{1}{2}$ -yd. approximately 40 in. The overall height is approximately 48, 56, and 59 in., respectively. The mixer is virtually vibrationless, requiring no special installation. It has its own support and literally can operate without any hold-down devices. The mixer has operated while sitting on planks supported by two saw horses. Full descriptive literature is available from the T. L. Smith Co., 2835 North 32nd St., Milwaukee 1, Wis.

Maximum traction for Walter snow fighters

Four point positive drive and 100% traction are features of the new Walter Snow Fighters, Models ARB, manufactured by Walter Motor Truck Co., 1001-19 Irving Ave., Ridgewood, Queens, Long Island, N.Y. The modern overhead valve engine of 540-cu. in. piston displacement develops a full 200



hp. at a moderate speed of 2,600 rpm. The tractor type transmission provides six forward speeds of high efficiency with single lever control. The Walter four point positive drive, with correct automatic differential and driving action between all four wheels maintains maximum traction for all operating conditions. Due to the four point positive drive, suspended double reduction and large diameter tires, these models have the traction and power to scrape snow or ice efficiently and to plow deep snow on steep grades.

Two-speed independent travel on Bantam

Schield Bantam Co.'s crawler-mounted Model C-35 has all the same operating advantages and job speeding features as the Model T-35 Bantam, plus an advanced crawler design. A wide, nearly square crawler base gives the top unit stability. Fast operating cycle with easy operating mechanical controls cuts time and costs on all excavating or handling jobs. Two-



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ARMCO RETAINING WALLS MAKE YOUR JOB EASIER

In new construction, expansion programs, or in emergency repair, you frequently have earth control problems. And most of the time, they can be quickly solved with an Armco Retaining Wall—economically and efficiently. Look over the applications pictured below. Perhaps they may suggest an answer to a current question.

Armco Bin-Type Retaining Walls consist of cellular metal bins, assembled by bolting deeply-corrugated mem-

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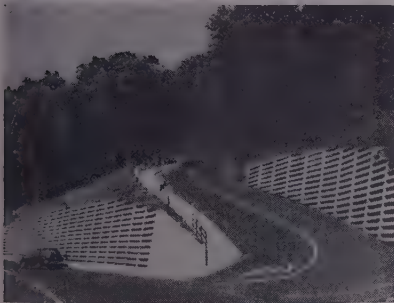
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ARMCO BIN-TYPE RETAINING WALLS



speed, independent travel allows simultaneous lifting, swinging and traveling. Available with 16-, 24-, or 32-in. pads, the C-35 Bantam works well in adverse ground conditions. This is especially true in swampy or marshy areas since the unit with 32-in. pads has the very low ground bearing pressure of 2½ psi. For highway travel, it falls easily within standard legal weight and width requirements for transporting from job to job. **Schild Bantam Co., Inc.**, Waverly, Iowa.

Design improvements on Barber-Greene finisher

A new crawler mounted asphalt paver which embodies four new improvements is announced by **Barber-Greene Co.**, 400 N. Highland Ave., Aurora, Ill. The Model 879-B Finisher has a new transmission which provides 12 forward speeds. Maximum operating speed has been increased to 64 ft. per min. and the travel speed to 3¾ mph. Faster laying speeds and reduced maintenance costs are made possible by a new high speed tamper. New crawlers feature precision drilled pads and larger pins, and a new power unit provides 20% more power.

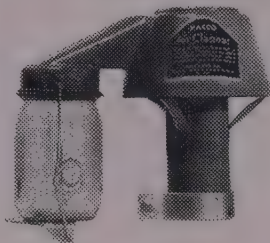


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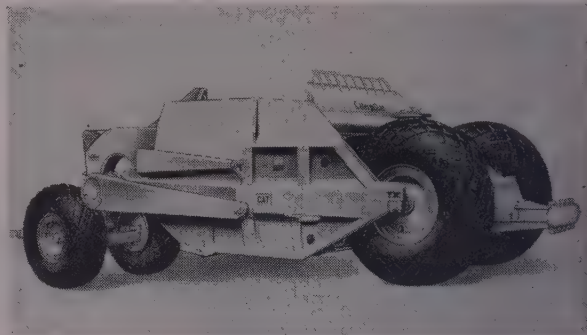
The **HARCO AIR CLEANER** can be serviced in 30 seconds and therefore requires very little of your time.

It will prolong the life of your engine and will cut your repair costs due to dust and grit getting into your engine.

This permits pushing bigger trucks, handling steeper grades and gives a greater reserve of power for high altitude operation, as well as making possible higher operating speeds. These improvements in design can be incorporated into older Model 879-A Barber-Greene machines. The necessary parts are now available in kit form, for field conversion, with each modification handled separately.

New Caterpillar scraper has struck capacity of 27 cu. yd.

The availability of a new large-capacity scraper, designed for use with the Caterpillar D8 and D9 tractors, has been announced by **Caterpillar Tractor Co.**, Peoria, Ill. Designated the Caterpillar No. 491 Scraper, the new unit offers



increased payload capacity to provide the earthmover with a high yardage scraper designed to match the power of the large track-type tractor. The No. 491 replaces the Caterpillar No. 90 scraper in the company line, and its payload capacity of 82,000 lb. is 12,000 lb. greater than the former model. The new scraper has a struck capacity of 27 cu. yd., and a heaped capacity of 34 cu. yd., representing an increase in yardage capacity of 26%. Another feature of the No. 491 is an increased apron opening, which provides 15 additional inches of opening over its predecessor model, facilitating thorough, positive ejection. This feature, combined with higher bowl sides and changes to the shape and height of the dozer-type ejector, permits easy handling of the scraper's larger loads.

IH introduces new truck line

Distinctive styling, a high-efficiency truck engine and greater driver comfort and maneuverability are features of this new heavy-duty truck with dump body manufactured by **International Harvester Co.**, 180 North Michigan Ave., Chicago 1, Ill. One of many models in the newly-introduced International truck A-line, the model A-180 is rated at 19,000-22,000-lb. gross vehicle weight. It is powered by a 141-hp. International Black Diamond engine with 154-hp., 308-cu. in. engine optional. Wheelbases range from 129 to 256 in. The new International A-line offers a complete selection of models from

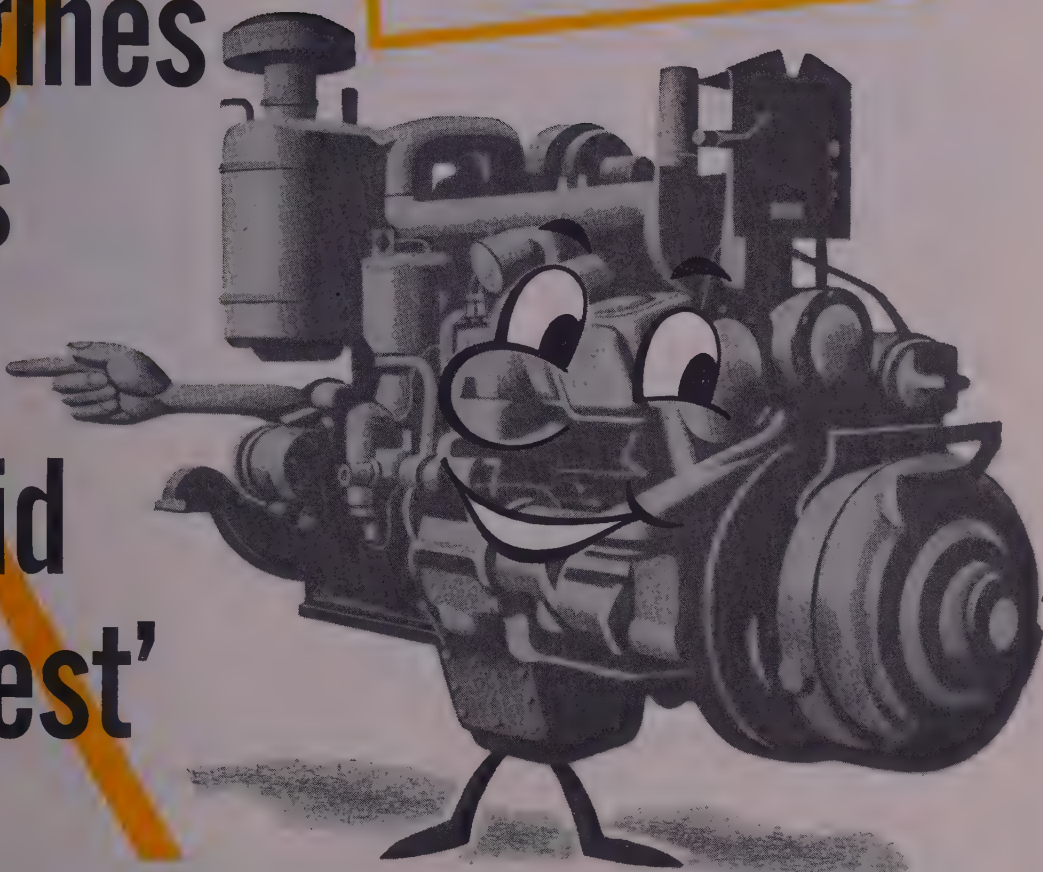


Now engines pass the 'acid test'

A worth-while story about
Shell men, techniques and



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OIL**



EVERY DAY of its working life, a heavy-duty engine faces the threat of *acid action*, the costly result of harmful acids formed during the combustion cycle.

Acid action eats away at piston rings and cylinder walls. It can steal years from an engine's useful operating life, destroy it faster than friction.

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Shell Rimula is *alkaline*. It neutralizes harmful acids, makes them powerless. The result? Added

years of trouble-free engine performance, and greatly reduced wear rates.

Rimula is the standard of quality for oils of its kind. Year after year, it is the only oil of its type which fully meets the specifications for America's leading diesel engines.

Chances are extra heavy duty Shell Rimula Oil or another superior Shell product is the right answer to one of your lubrication problems. These fine products are developed by Shell Research—a 1500-man team strong on lubricant experience. Why not put that experience to work this week?

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MONARCH Controls Your Plow

... automatically!

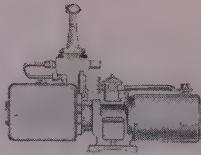


JEEPS

TRUCKS

POWER **MONARCH** CONTROL HYDRAULIC

Snow removal is fast, dependable and safe with Monarch Power Hydraulic Control Equipment . . . cab-controlled for one-man instant action, the Monarch zips snow plows into operation with ease and speed. Fan-belt driven or Electric models are available for practically all makes of vehicles. Proven in service everywhere, over 50,000 Monarch Controls have been sold. See your dealer or write for full details.



The Monarch DYNAMIGHT Model HEP (as illustrated) combines all parts in one package for ready installation on new or existing equipment.

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. . . improves performance and protects against wear.

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. . . less down time, cleaner engines

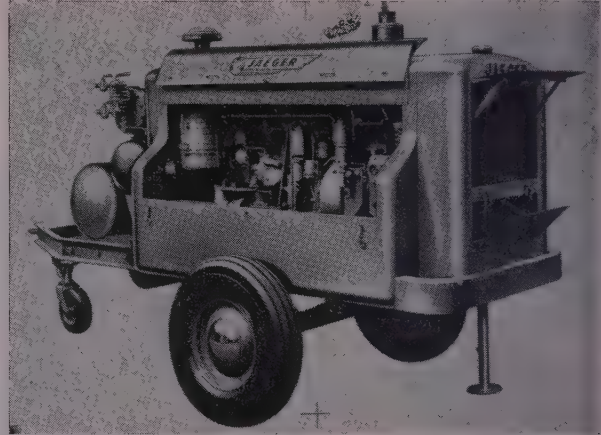
. . . better mileage, burns clean

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PROVIDE THE EXTRA QUALITY
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4,200 to 33,000 lb. gvw., in four and six-wheel and all-wheel drive conventional and new cab-forward design. A choice of five gasoline and four LPG-fueled International valve-in-head six-cylinder engines is available. Horsepower ratings of these high-torque powerplants range from 112 to 154. Design features of the line include a new 65-in. wide cab, which has the widest inside dimension of any comparable truck model.

Design advances on Jaeger air compressors

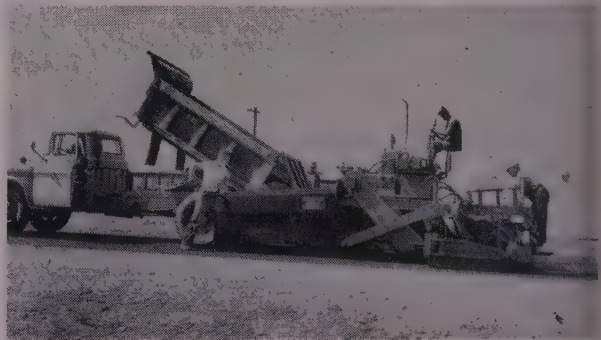
According to the Jaeger Machine Co., weight savings achieved by modern design now make possible either diesel or gasoline engine powered rotary air compressors of as large as 250-cfm. capacity, mounted on easily trailed two-wheel trucks. There are no valves, pistons or heavy crankshafts and air is



delivered at much cooler temperatures. In addition, a more advanced design of compressor unit enables this Roto Air Plus to produce full rated volume at 100 to 250 rpm. slower operating speed than other rotary compressors (1,700 rpm. instead of 1,800 to 1,950 rpm.), with a proportionate reduction in fuel consumption and engine and compressor wear. Also available with these same features in a smaller, 125-cfm. capacity unit, and in larger, four-wheel mounted 365- and 600-cfm. units. The Jaeger Machine Co., Columbus 16, Ohio.

New principle in bituminous paving unit

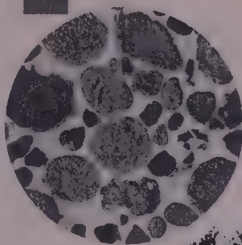
Controlled compaction and uniform density of mat are the results obtained from the new Vibromatic bituminous paver introduced recently by Pioneer Engineering, Division of Poor & Co., Inc., Minneapolis 14, Minn. A radically different vibrating and oscillating screed unit and a heated vibrating



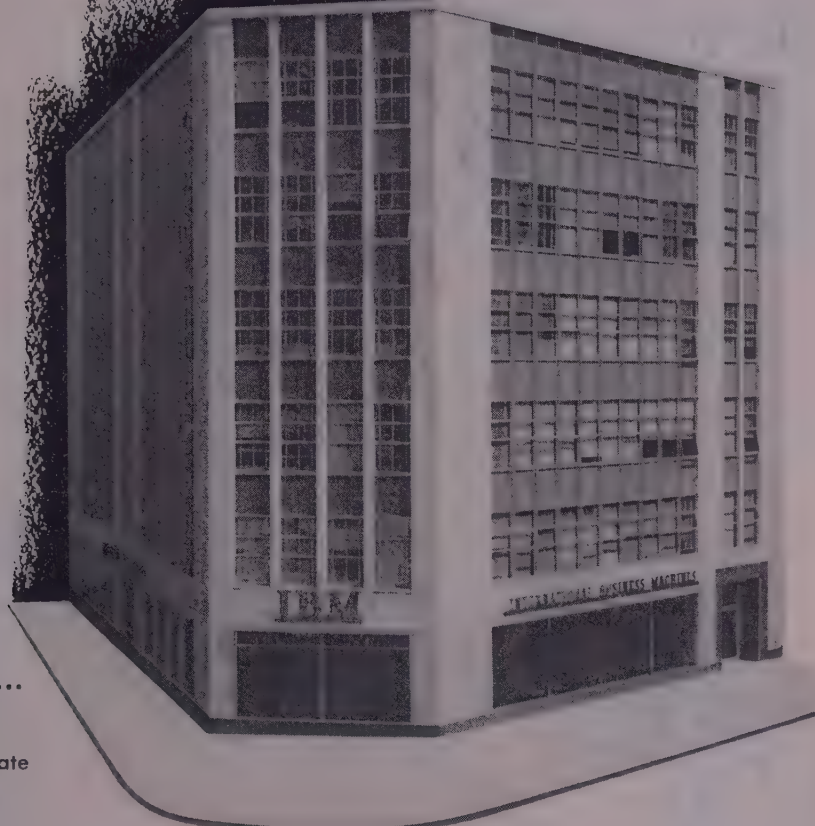
compactor are utilized in this Pioneer paver. The screed meters out and pre-compacts the material required for selected mat thickness and by its oscillating action fills in all voids across the entire width of mat being laid. A high-speed vibrating compactor, heated across its full width, follows the screed to iron out the surface of the mat and to increase its density uniformly as the paver moves ahead. New literature describing the paver is available. Ask for Form 655-2.

BASALITE

LIGHTWEIGHT
EXPANDED SHALE
AGGREGATE* . . .



EASES THE BUILDING LOAD



"Lightweight and high strength"...

is the keynote for BASALITE

Lightweight Expanded Shale Aggregate Concrete. It weighs up to 50 pounds less per cubic foot than conventional sand and gravel concrete of comparable strength and cement content.

Thus, BASALITE is the ideal aggregate to reduce the dead weight of multistoried structures, with *no sacrifice of strength!* Its light weight affords savings in reinforcing steel and foundation work. BASALITE promotes economy in construction.

340 MARKET STREET, San Francisco

ARCHITECT: Meyer and Evers, San Francisco

ENGINEER: Felix H. Spitzer, San Francisco

GENERAL CONTRACTOR: Cahill Bros., Inc., San Francisco

On your next lightweight concrete job... specify BASALITE Expanded Shale Aggregate for highest quality lightweight concrete construction. The rounded sealed particles makes the difference.



*Rounded Sealed Particle

BASALT ROCK CO., INC.

Aggregate Division

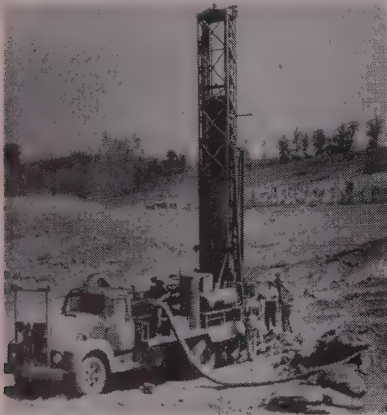
NAPA, CALIFORNIA • Phone Baldwin 6-7411

San Francisco: GARfield 1-3758

In Southern California it's ROCKLITE—manufactured by ROCKLITE PRODUCTS, Ventura, California

New, improved wagon drill uses longer steels for faster drilling

A new, improved wagon drill—larger, easier to use, and more powerful than previous models—has been announced by **Schramm, Inc.**, 900 East Virginia Ave., West Chester, Pa. It features long feed travel, a new down-pressure motor and line oiler, and a full range of feed



pressures. This drill, known as the Schramm DR-126-A, has many applications: in highway construction, for blasting rock from right-of-way and making rip-rap and grout holes; in dam construction, for diversion channels, foundations and grout holes. Mounted on barges, it is used for underwater pier and caisson drilling. A standard Schramm

4-in. drifter is employed with 10-ft. feed travel for 8-ft. steel changes—an improvement over the previous 8-ft. travel for 6-ft. steels. As a result, drilling time between changes is extended and delays are minimized. Other improvements include a double-cylinder, seven-blade air motor. This high-torque motor runs evenly with 14 impulses per revolution. Supply air can be throttled for an infinite number of feed pressures. Feed chain take-up is new and convenient. A new 2-gal. capacity line oiler is arranged so that a motor for the U-bar, or any other equipment, can be lubricated.

Aluminum saves weight on new dump truck box

Weight-saving aluminum provides an additional payload of 1,500 lb. in a new welded dump truck box built by the **General Machinery Co.**, Spokane, Wash., with Kaiser Aluminum & Chemical Corp.'s new high-strength, weldable, aluminum alloy 5086. The dump box, which has an 8 to 10-yd. capacity, was designed by Kaiser Aluminum development engineers in cooperation with General Machinery to permit all-welded construction with 5086 sheet and plate. Total payload savings actually amount to more than a ton. While the aluminum welded box weighs 1,500 lb. less than comparable steel units, an additional saving is gained by equipping the unit with a headlift hoist which weighs 940 lb.

Small core-cutter now available

Kor-It, Jr., is the newest precision boring instrument developed by **J. F. Hamlin Co., Inc.**, 746 Ellis St., San Francisco, Calif., producers of Kor-It, electric and gasoline-powered core-cutter that drills clean holes in hard surfaces, such as reinforced concrete. Kor-It, Jr., is smaller,



more compact and completely portable. Can be carried with one hand up and down stairways. With motor and attachments, total weight is only 36 lb. Kor-It, Jr., like senior Kor-It, uses diamond bits. Cuts holes up to 6 in. per min. in any diameter from $\frac{3}{16}$ in. to 2 in. It drills at any angle and up to depths of 8 in., and with extensions to considerably greater depths.



Maximum SAFETY plus SAVINGS

1. Matched set of angular contact bearings.
2. Practically friction free.
3. Seal keeps grease in, foreign matter out.
4. Faster hoisting due to non-spinning loads.
5. Faster load placement due to easy load turning.
6. Faster rigging due to elimination of cranky wire rope performance.
7. Elimination of twists and kinks means longer wire rope life.
8. Safer load placements due to non-spinning loads.

21 standard types available from
 $\frac{1}{2}$ ton to 250 ton working load



MILLER HIGH LIFT BLOCK

Welded Construction, Large Diameter Pin; Shortest Headroom, Moveable Swivel Hook, Individual Sheave Lubrication; Bronze spacers between Sheaves. Available with MILLER SWIVEL HOOK or TIMKEN BEARING HOOK. 5-50 Ton Capacity.



GENERAL MACHINE & WELDING WORKS, Inc.

1100 East Second St., Pomona, Calif.

SANFORD TRACTOR & EQUIPMENT CO.

North Valley Road • Reno, Nevada
Phone FAirview 2-8621

*Your New Bucyrus-Erie Distributor
in Nevada and Northeastern California*



SHOVELS



DRAGLINES • DRAGLINE BUCKETS



DRAGSHOVELS



CRANES



CLAMSHELLS



TRANSIT CRANES



HYDROCRANES



HYDROHOES

Now handling the full line of Bucyrus-Erie 3/8- to 4-yd. convertible excavators and cranes; 15-, 25-, and 35-ton Transit Cranes; fast-filling, fast-dumping dragline buckets; truck-mounted all-hydraulic 5-ton and 10-ton Hydrocranes; Sanford Tractor & Equipment Co. offers you:

- Complete modern sales and service facilities.
- Expert, reliable maintenance and repair work.
- Recommendations to help you select the right Bucyrus-Erie machine for your particular needs.
- A pledge of prompt, courteous cooperation at all times.

Stop in soon to discuss your excavator, crane, and bucket needs with the experienced personnel at Sanford Tractor & Equipment. You will find them ready and willing to help you.

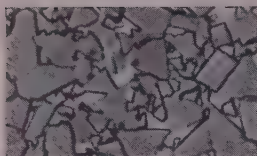
97Y57C



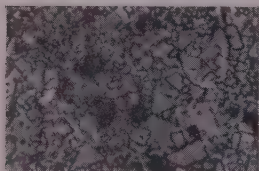
A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WIS.

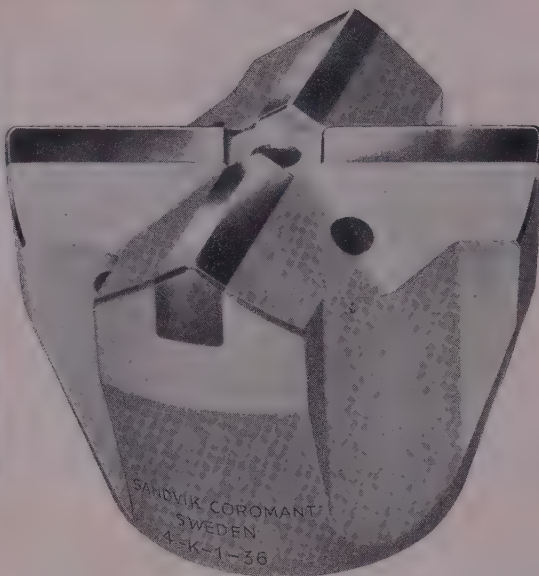
Longer bit life—with *new* Sandvik Coromant X-Bits



Sandvik Coromant Tungsten Carbide. (Microphoto) Uniformity of size, even distribution of grain are marked. Free from porosity and impurities—therefore stronger, longer-lived.



Low quality Tungsten Carbide. (Microphoto) Black marks are contaminations caused by deficient production control. They weaken the carbide, reduce its working life.



NEXT time you buy bits, specify Sandvik Coromant because they give you more footage per bit, lower drilling costs. Here's why:

- 1 Only first-quality tungsten carbide is used—as shown in the microphotos above. This means less wear, longer life and a better job.
- 2 the bodies are precision-made of high quality alloy steel—tough enough to take the strain throughout the extra-long bit life.
- 3 the bigger Sandvik Coromant bits are all of X-design, which prevents rifling. No wonder Sandvik Coromant inserts are the most widely used in the world, drilling more than one billion feet every year.

THESE STANDARD SIZES ARE AVAILABLE

	THREAD	DIAMETERS AVAILABLE (IN INCHES)
SHOULDER TYPE	$\frac{7}{8}$ " F.....	<u>$\frac{1}{2}$</u>
	1" H.....	<u>$\frac{1}{2}$</u> , <u>$1\frac{5}{8}$</u> , <u>$1\frac{3}{4}$</u> and <u>$1\frac{7}{8}$</u>
	$1\frac{3}{8}$ " D.....	2, <u>$2\frac{1}{8}$</u> , <u>$2\frac{1}{4}$</u> , <u>$2\frac{3}{8}$</u> , <u>$2\frac{1}{2}$</u> , <u>$2\frac{3}{4}$</u> and <u>3</u>
	$1\frac{1}{8}$ " K.....	3, <u>$3\frac{1}{2}$</u> , <u>4</u> and <u>$4\frac{1}{2}$</u>
BOTTOMING TYPE	$1\frac{1}{4}$ " Rope.....	<u>$\frac{1}{8}$</u> , 2, <u>$2\frac{1}{4}$</u> , <u>$2\frac{1}{2}$</u> , <u>$2\frac{3}{4}$</u> and <u>3</u>
	2" Rope.....	<u>$3\frac{1}{2}$</u> , <u>4</u> , <u>$4\frac{1}{2}$</u> and <u>5</u>
	400.....	2, <u>$2\frac{1}{4}$</u> and <u>$2\frac{1}{2}$</u>
	600.....	<u>$2\frac{1}{2}$</u> , <u>$2\frac{3}{4}$</u> , <u>3</u> and <u>$3\frac{1}{2}$</u>

The sizes underlined are X-shaped bits

SANDVIK COROMANT bits are supplied through Atlas Copco, the world's largest manufacturer of rock drills, who also supply Sandvik Coromant integral steels—the most widely used in the world—cross bits from $1\frac{1}{2}$ " to $2\frac{1}{2}$ " and extension steel equipment.

Write, phone or cable today for further details to any of the addresses below:

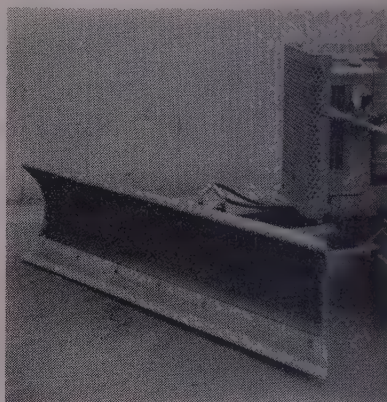
Atlas Copco

EASTERN — P.O. Box 2568 Paterson 25, N.J. Phone — Armory 4-3310
 PACIFIC — 930 Brittan Avenue, San Carlos, Calif. Phone — Lytell 1-0375
 CANADA — Montreal Airport, Quebec. Phone — Melrose 1-1871
 MEXICO — Apartado Postal 56, Torreón, Coahuila. Phone — 39-07

DST-78

Hydraulic dozer for crawler tractor

A new Hyteco Hydraulic Angle Dozer is now available for the John Deere 40C and 420C crawler tractors. The dozer has a maximum lift of 36 in. above ground and will dig 24 in. below ground. It can be angled hy-



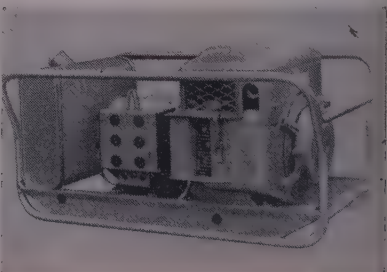
draulically from the driver's seat 26 deg. in either direction. The width of cut is 87 in. in straight dozing position. When in a fully angled position the width of cut is 73 in. The inside mounting of the dozer permits operation in very close quarters. Weight of the unit, 845 lb. For literature describing this unit, write to **Hydraulic Tool & Equipment Co., Inc.**, 10825 Sessler St., South Gate, Calif.

Increased capacity on Hopto unit

Major design changes on the Model 360 Full Swing Hopto Digger have been announced by **The Badger Machine Co.** of Winona, Minn. The unit, now called Model 360 57-90, is a completely hydraulic backhoe with a $\frac{1}{2}$ -yd. capacity. Recent design changes include a new split hydraulic system and a split valve bank. Digging depth of the unit has been increased to 20 ft., the ground reach to 30 ft., and the backhoe loading height to 16 ft. Two 6-in. ID cylinders on the boom lift have increased both the down pressure and the lifting capacity. Individually operated hydraulic outriggers with foot pads for greater bearing pressure are available as standard equipment.

New 5,000 watt dc. electric plant

A new lightweight, portable 5,000 watt direct current electric generating plant is currently being made available by **D. W. Onan & Sons Inc.**, 2515 University Ave. S.E., Minneapolis 14, Minn. This completely self-contained



Here's why



ROCK RIPPERS

lick jobs others can't touch!

TOUGHEST, BEST-DESIGNED SHANKS!

Contoured for extra strength at strain points; made of manganese-moly steel, heat treated four times. Special forged alloy straight shanks for sandstone also available.

DRAWBAR MOUNTING SAVES YOUR TRACTOR!

Rugged ATECO drawbar takes the pull, protects you against costly transmission case damage.

HEAVIEST-DUTY CONSTRUCTION ON THE MARKET!

Tool beam, for example, is box-girder welded of 1½" steel plate with sides in compression. Solid steel—not the weld—takes the strain.



OUTPERFORMS

'EM ALL! Replaceable rock points have splitting wedges; underground "quiver" of curved shanks works like a jackhammer to shatter rock and shale fast, with less power. Rock is rolled up and out in the clear, back of tool beam.

Make your tractor a 3-way profit maker with an ATECO ripper plus your dozer — ready to rip, bulldoze or push-load instantly without tool changing! No other ripper on the market matches ATECO's reliability and performance—why settle for less? Promptly available for all popular heavy duty crawler tractors—see your dealer or write for literature. Please address Dep't. W-1

American

39



TRACTOR EQUIPMENT

Corporation

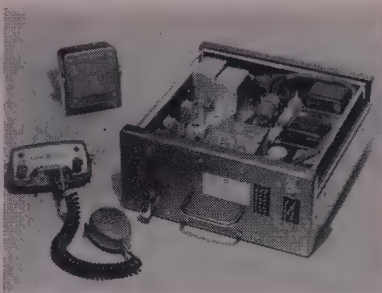
Designers and Manufacturers
Since 1920

9131 SAN LEANDRO BOULEVARD • OAKLAND 3, CALIFORNIA

generating plant will provide full-capacity direct current electric power to operate lights, electric tools and universal motors for contractors. Prime mover for this new Onan electric plant is the Onan two-cylinder opposed, 4-cycle, air-cooled, gasoline engine, Model CCK. This easy starting engine is rated at 12.9 hp.; is specifically designed for smooth running, heavy-duty, economical electric plant operation. The Onan-built, all-climate generator is direct connected to the engine for positive, permanent alignment. Of drip-proof design, it is rated at 5,000 watts, 115 volts direct current. Total weight of the entire unit is only 315 lb.

G-E two-way radio

Built to take the type of rough use that is to be expected in the construc-



tion business, the General Electric Progress Line two-way radio includes triple strength in an extra sturdy chassis. Progress Line units are designed to permit construction users to change components between units, add frequencies, change bands, power and type of reception. Adding of accessories or optional equipment is made easy with the G-E units, which have been engineered with simple servicing in mind. A smaller inventory of spare equipment—as much as 30 per cent less than formerly needed—is required for Progress Line combinations with transmitter and receiver interchangeability. **General Electric Co.,** Communication Products Dept., Syracuse, N. Y.

Highway safety fence

A unique Glare-Guard Highway Safety Fence that combines features of safety and beauty at a cost saving up to 50% over conventional installations has been developed by **Habitant Fence, Inc.** Designed specifically for use as a center-strip fence for divided highways, the fence is constructed of full-round cedar logs, in varying heights, and assembled on horizontal steel pipe rails with galvanized steel posts set in concrete as vertical supports. An additional safety factor is the cushioning effect and tough resilience of these cedar logs. Further information and complete specifications on the Glare-Guard Safety Fence and the parkway landscaping fence can be obtained by writing the Highway Division, **Habitant Fence, Inc.,** Bay City, Mich.

Eagle single, double screw units available in 54-in. screw diameter

To meet increasing demands for fine material washer-classifier-dehydrators in larger capacity, **Eagle Iron Works,** 129 Holcomb Ave., Des Moines, Iowa, has introduced a new, large unit in both single and double screw. Screw diameter is 54 in. and tub length is 34 ft. Normal



screw speed is 14 rpm. Capacity of the single screw is 250 tons per hour and 500 tph. for the double screw. Featured is an improved feed box which will become standard on all Eagle fine material screws. It is designed to reduce turbulence to a minimum in the settling pool area. It flows in material in a flat ribbon, below the waterline. The single screw weighs 26,000 lb. and the double screw 50,000 lb. Further information available on request.



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

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

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

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

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

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

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

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

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

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

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

LIMA ROADPACKER Distributors

Reno Equipment Sales Company, 1510 W. 4th Street, Reno, Nevada; **Feenaughy Machinery Company,** 112 S.E. Belmont Street, Portland 14, Oregon; **Feenaughy Machinery Company,** 600 Front Street, Boise, Idaho; **Farris-Moritz Equipment Company,** 1554 Wazee Street, Denver, Colorado; **Evans Engine & Equipment Company,** 4300 11th Avenue N.W., Seattle 7, Washington; **Bay Cities Equipment, Inc.,** 2792 Cypress Street, Oakland 7, California; **Bay Cities Equipment, Inc.,** 1178 West San Carlos Street, San Jose, California; **N. C. Ribble Company,** 1304 North Fourth Street, Albuquerque, New Mexico; **Smith Booth Usher Company,** 2001 Santa Fe Avenue, Los Angeles 54, California; **Shriver Machinery Company,** 1756 Grand Avenue, Phoenix, Arizona; **Heiner Equipment Company,** 501 West Seventh, South, Salt Lake City, Utah; **Hall-Perry Machinery Company,** 902 Central Avenue, Billings, Montana; **Hall-Perry Machinery Company,** 812 East Iron Street, Butte, Montana; **Hall-Perry Machinery Company,** 1116 15th Street, North, Great Falls, Montana; **Hall-Perry Machinery Company,** 127 East Main Street, Missoula, Montana; **Modern Machinery Company, Inc.,** East 4412 Trent Avenue, Spokane 10, Washington; **Evans Engine & Equipment Co., Inc.,** Post Road—Box 894, Anchorage, Alaska; **Shasta Truck & Equipment Sales,** South 99 Highway, Redding, California.

LIMA

SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

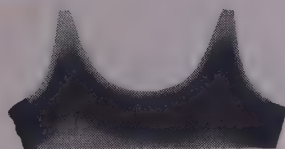


BALDWIN-LIMA-HAMILTON
Construction Equipment Division—LIMA WORKS

THE BOSS SURE IS A BUG ABOUT GETTING
THAT NEW **BORALLOY** INTO ALL THE
TEETH AROUND HERE!



HERE'S WHAT
BORALLOY
DOES...



It increases sprocket life 50 to 100%! Got the name?—*Boralloy*. It's a new alloy which Caterpillar uses to make sprockets and replacement rims. It permits a minimum of 61% deeper hardening.

Result: CAT* BORALLOY sprocket teeth hold their contour longer. Teeth and track bushings *stay* in proper mesh, reducing wear and tear on all track running gear. Don't take chances. Get parts you can trust—see your Caterpillar Dealer today! Where else can you get the long-life benefits of Boralloy?

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

CATERPILLAR*

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



DIGS STRAIGHT



DIGS CLOSE



DIGS FAST

Etowah Construction Company uses its Cleveland 95's compactness and shiftable conveyor to advantage on this utilities job in Franklin, Tennessee.

The Cleveland 95 "Baby Digger"—built by the Pioneers of the Modern Trencher, originators of *every* important trencher design feature—makes money for its owners because it . . .

- **fits more jobs**—digs to 5½' deep x 24" wide.
- **digs all soils**—full-size engine, over 30 graduated power and speed combinations.
- **digs faster**—more bucket capacity, more wheel-and-crawler combinations.
- **saves property damage**—full crawlers, easy on lawns and sidewalks.
- **lasts longer**—quality construction and materials mean longer life—it's in the records.

THE CLEVELAND TRENCHER CO.

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

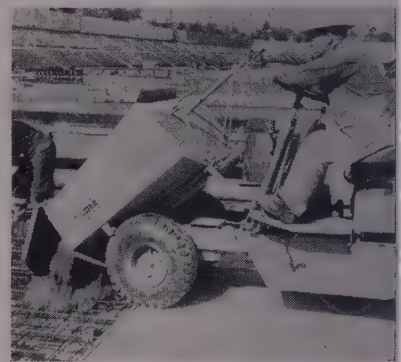


Lightweight diaphragm pump

The Ralph B. Carter Co., Hackensack, N. J., announces a new addition to its line of Humdinger Pumps—a rugged, full capacity 3-in. unit weighing just 125 lb. Designated as the Model 3 ADF, this lightweight, easy-to-handle pump is rated at 4,200 gph., although on maximum stroke tests, it actually handled over twice this capacity. The pump body and housing are cast of high strength aluminum alloy, especially selected for resistance to wear and abrasion. Streamlined waterways minimize internal friction. Body design allows full displacement action of diaphragm, resulting in top capacity on every stroke. Engine power is transmitted to the totally enclosed drive through a shock absorbing flexible coupling. Shafts, bearings and gears are all designed for heavy-duty operation.

New controls for torque converter trucks

Improved controls for the M30 Prime-Mover are announced by the Prime-Mover Co., Muscatine, Iowa. A heavier, simpler throttle linkage gives more sensitive acceleration response and assures



fullest use of the hydraulic torque converter range on this 18-cu. ft., 1½-ton construction materials handling truck. More round trips are made with less fatigue and at lower maintenance costs. A heavy direct rod dump release gives quick, clean dumping action easily controlled by the operator from a sitting position.

Low-lift platform trucks

Designed for handling odd-shaped or extra long loads, particularly where rugged duty is required, a new 20,000-lb. capacity low-lift platform truck, Model L-15, has been developed by the Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio. The truck is available with either electric or gasoline-electric power, has two-wheel drive and all-wheel steer. The frame is built of heavy steel plate, formed and electrically welded. Center sill construction is used with all major units attached directly to the heavily reinforced alloy steel bars which form the sills. The platform is raised by a double-acting hydraulic cylinder. The truck features a rocking link type platform lift with powered lower-

how's this for

performance?



**15 lbs. of scrap after
cutting 156 parts
from a 6' x 10' plate
of $\frac{3}{8}$ " steel**

Using four torches guided by an electronic tracer, an Airco #48 Duograph automatically flame cut 156 parts from a $\frac{3}{8}$ " x 72" x 120" steel plate. Of the original 918 pounds of sheet steel, only 15 pounds of scrap remained. Discover the advantages to be gained by using Airco flame-cutting machines for fast, economical production.

In addition to the #48 Duograph, Airco flame-cutting machines include the Airco Travograph, Oxygraph, Duograph, Monograph, Camograph, and Radiagraph.

Write Airco for complete information and literature.



AIR REDUCTION PACIFIC COMPANY

SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE
Bakersfield • Burbank • Emeryville • Fresno • Inglewood
Sacramento • San Diego • Stockton • Tacoma

Western Headquarters for
Oxygen, Acetylene and Other
Gases . . . Carbide . . . Gas Welding
and Cutting Machines,
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Welders, Electrodes and Accessories

Air Reduction Pacific Company is a division of Air Reduction Company, Incorporated. Principal products of other divisions include: PURECO — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • AIRCO — acetylenic chemicals • COLTON — polyvinyl-acetates, — alcohols, and other synthetic resins.

NEW EARTH COMPACTION RECORDS SET...



...by "JAY"!

Contractors Report up to 12,000 square feet per hour of high density compaction at a saving of 20 to one over old tamping methods. Moving at speeds of up to 70 feet per minute the "JAY" 36 delivers 2300 three thousand pound impacts per minute to properly keyseat and compact all types of materials.

Completely self contained and one-man operated the "JAY" 36 needs no lines, hoses, or expensive auxiliary equipment. Engineer recommended and contractor approved, the "JAY" 36 is the perfect companion and "big brother" to the already famous "JAY" Model 12.



"JAY" Tamper
Model 12

See your nearest "JAY" Dealer
or contact the "JAY" Company,
Columbus 7, Ohio

THE "JAY" Company



170 Mosack St., Columbus 7, Ohio
Please send me additional information on the "JAY" TAMPER

My Name _____

Street _____

City _____

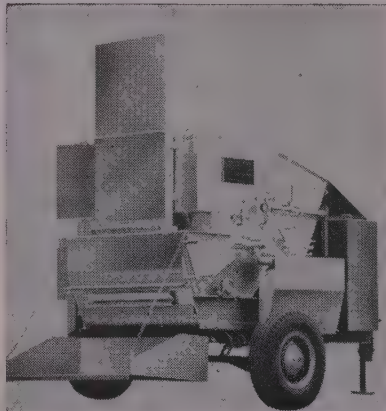
Zone _____

State _____

ing accomplished with full inching control through a control valve. A safety link protects the lift mechanism in the event the platform is rammed against an obstruction.

New half-ton capacity asphalt-patching mixer

This new McConnaughay HTD Mixer No. 10 is one of the largest trailer-type asphalt-patching mixers on the market today. Designed for use with asphalt cements, cut-backs, emulsions, or



tars, the unit features twin pug-mill mixer, positive proportioning with power-driven pump and counter, low pressure burner shielded from wind and elements, dust-free operation, and replaceable liners. It weighs 5,000 lb. and carries an asphalt tank of 200-gal. capacity; the aggregate bin is of 10-cu. ft. capacity marked for volumetric measuring. Complete specifications and proportioning tables are available from McConnaughay Mixers, Inc., Lafayette, Indiana.

New truck for construction industry

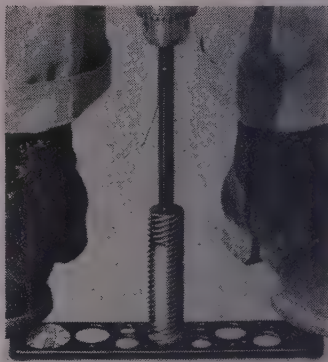
The "Getman Scoot-Crete," a new truck for the construction industry, has recently been put on the market and is now nationally distributed by its manufacturer, Getman Brothers of South Haven, Mich. Its price ranges from \$865



to \$1,899. One man can load, drive and dump the "Getman Scoot-Crete" carrying loads up to 3,500 lb. at speeds up to 15 mph. The "Getman Scoot-Crete" with caster steering turns in its own

Free starting guide offered for Tilden drills

A starting guide for Tilden Rotary Konkrete Kore drills is being offered free of charge by Tilden Tool Manufacturing Co., 209 Los Molinos, San Clemente, Calif. The Drill Guide has guide-holes for drills 1/4 in. diameter through



1 1/4 in. diameter and is simple to use. See illustration. Other starting drills cost from \$3.50 up, depending on size. These starting drills for core drills from 3/4 in. through 1 1/4 in. diameter would cost \$32.72 or more. Now you can eliminate this cost by using the Tilden Starting Guide which is supplied free to users of Tilden Rotary Konkrete Kore drills. The supply is limited. Obtain your Starting Guide from a Tilden distributor or write direct to Tilden Tool Manufacturing Co., advising size and make of drill being used and from whom purchased.

length for easy maneuverability. Heavy duty tires provide a sure grip on any surface indoors and outdoors. With drive wheels located directly under the load, the "Getman Scoot-Crete" has the power to climb grades up to 25 deg. for consistent performance under varied conditions. The locking brake lever holds the "Getman Scoot-Crete" positively immobile. Ruggedly built, with forward and reverse speeds, with Wisconsin gasoline or imported Deutz air cooled diesel engine, it can be used inside, outside and underground.

IH six-wheel truck for off-highway operation

Newest and largest model in the International V-line of heavy-duty trucks is the model VF-230 with a gross vehicle weight rating of 60,000 lb. This new V-8 powered unit can mount 8 or 9-yd. concrete mixer bodies as well as carry maximum payloads in earth moving, stripping, heavy construction and other heavy hauling operations. The VF-230 is powered by the new proven International truck-type V-549 engine rated at 257 hp. Standard equipment includes a 15,000-lb. front axle, 36,000-lb. rear bogie, hydraulic full-power steering, air

brakes, 12-volt electrical system, 15-in. clutch, 60-gal. right-side step fuel tank and heavy 2 $\frac{3}{8}$ -in. steel grille guard. International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

New boom attachments for Insley backhoes

New optional Arched Hoe Boom Attachments for both the Type K and Type L machines are now being offered by the Insley Manufacturing Corp., P. O. Box 167, Indianapolis, Indiana. Both booms are of the same design and have two vertical sheaves near the boom mid-



point and an enclosed horizontal sheave at the bucket. The Arched Hoe Boom Attachment for the Type K machine has a 16-ft. 9-in. boom, 10-ft. 2-in. arm (hinge pin to bucket teeth), and a digging depth of 17 ft. 6 in. The Arched Hoe Boom Attachment for the Type L machine has an 18-ft. 9-in. boom, 10-ft. 2-in. arm (hinge pin to bucket teeth), and a digging depth of 19 ft. 3 in. The new boom is adaptable to all Type L machines and most Type K machines in the field.

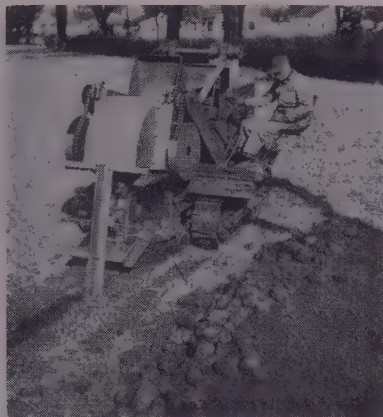
Newest Hydrocrane can lift 20,000 lb.

The all-hydraulic H-5 Hydrocrane is available as a $\frac{1}{2}$ -cu. yd. excavator and as a 10-ton lifting crane. It is designed for mounting on a new or used conventional motor truck, eliminating any need for a costly crane carrier. One outstanding feature of the H-5 is its capability, depending on truck selection, to conform with state highway restrictions regulating width, height, and axle load limits. The H-5 has a 20,000-lb. maximum lift, can be equipped with a standard 2-piece boom (telescoping hydraulically from 24 ft. to 36 ft.) or with an optional high-lift, 3-piece boom (extendible hydraulically from 38 ft. to 50 ft. long). The machine is self-powered and is equipped with a 75-hp. Ford engine mounted on the upper deck. For further information write Bucyrus-Erie Co., South Milwaukee, Wis.



Improved utility ditcher announced by Gar Wood-Buckeye

Production of an improved Gar Wood-Buckeye Model 403 utility ditcher that incorporates foot pedal steering, a shiftable spoil conveyor and new hydraulic controls has been announced by



Gar Wood Industries, Inc., Wayne, Mich. Specially designed for "stop and go" utility ditching, the compact 403 is now equipped with a new hydraulic pump that provides full-time hydraulic pressure for instant control of the digging boom. The new system eliminates the need for a hoist-clutch, while at the same time reduces the number of moving parts. A new foot-pedal steering arrangement on the ditcher replaces hand levers. An exclusive slip-clutch on the new model automatically protects the machine from overloads. The redesigned 403 also features a shiftable spoil conveyor which the operator can easily move by hand to either side of the machine.

COMPACTION for a FRACTION



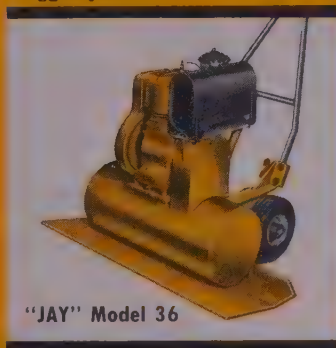
with "JAY" TAMPERS

NOW Get engineer proved uniform high densities at lowest possible per mile.

NOW "JAY" is the only machine on the market with proved maintenance cost of 80¢ per month per machine.

NOW One machine does all the tamping, large jobs as well as small. Maximum compaction in ditches, roadbeds, cross cuts, airstrips as well as all the hard to get at places.

NOW You can buy six "JAYS" at the price you would pay for one piece of most other equipment and no lines or hose to get tangled in the job. Be sure to see the "JAY" Model 36 too. Perfect for the larger areas and bigger jobs.



"JAY" Model 36

See your nearest dealer or contact
The "JAY" Company,
Columbus, Ohio.
170 Hosack St., Columbus 7, Ohio
Please send me additional information on the "JAY" TAMPER

My Name _____

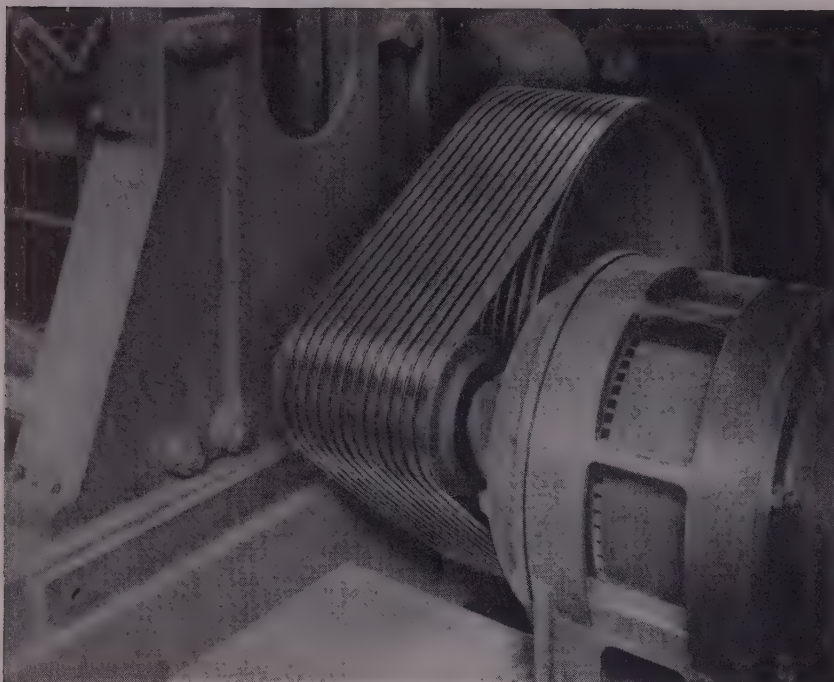
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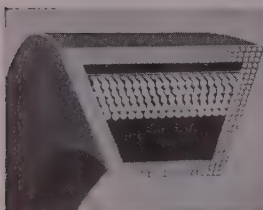
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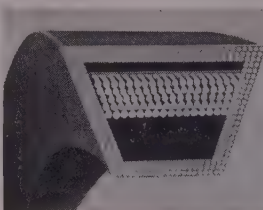
Are you using the *right* QUAKER V-BELT?



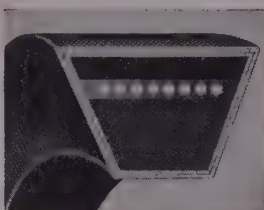
Quaker Rubber Division offers a full line of tough, long-lasting V-Belts. Each is designed to give long, efficient service. And each is designed to do a specific job. For example . . .



For drives requiring additional horsepower, the Quaker Super V-Belt—40% stronger than standard V-Belts—is available in a complete range of sizes, AP through EP cross-section.



For normal operating conditions without special speeds, loads or center distances, Quaker has the Multiple V-Belt at reasonable cost. Available from 26" to 660" in all cross-sections from A to E.

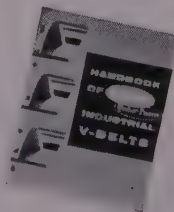


For drives under 1 HP, the Quaker Fractional Horsepower V-Belt gives quiet operation without vibration, stretch or twisting. Ideal for light duty applications. Available in cross-sections from 15" to 100".

HOW TO SELECT V-BELT DRIVES

Send for free, illustrated, 72-page handbook packed with facts on selecting V-Belt Drives . . . service factors . . . recommended V-Belt cross-sections for various horsepower and speeds . . . maintenance hints. Write:

H. K. Porter Company, Inc.
Quaker Rubber Works, Philadelphia 24, Pa., or
Pioneer Works, Pittsburg, California



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

New hose for pneumatic drills

A new hose for pneumatic drills called Duroil Air Drill Hose has been developed by **Hewitt-Robins, Inc.**, Stamford Conn., for heavy-duty use, road construction and other types of service requiring a hose that is tough yet light and flexible and easy to handle. It contains: Buna N Tube resistant to oil and oil vapors, a braided rayon cord carcass which will not contract, elongate or "fight back" under working pressures and a cover of natural rubber having a tensile strength in excess of 2,000 psi. The hose is capable of resisting the tearing, gouging and impact abuse common to air drill hose service. The product will be available in 500-ft. reels and diameters of 1/2 in., 3/4 in. and 1 in.

Portable sump pump resists corrosion

A new, self-contained sump pump has been announced by **Schramm, Inc.** The pump body, impeller, and strainer are made of bronze, to resist corrosion and to insure spark-free operation. Heavy duty thrust and radial bearings support



the two-part, non-clogging impeller, which is mounted on a stainless steel shaft. Bearings are double-sealed to protect them and the air motor from contamination or damage by dirt or corrosive liquids. Requiring no priming, the pump is ready for instant use. It is 19 3/8 in. high and can be passed through a hole as small as 9 x 11 in. Additional information about the Schramm bronze body, or its companion iron body, sump pump, is available from Schramm, Inc., 900 East Virginia Ave., West Chester, Pa.

Double acting hand pump for 10,000-psi. hydraulic pressure

A new double acting hand pump for 10,000-psi. hydraulic pressure has just been announced by **Mechanisms Co.**, 118 East 2nd St., Uhrichsville, Ohio. The Variable Leverage Hand Pump Model 1687 has a patented internal toggle linkage and a capacity of .475 cu. in. per cycle (2 strokes)—more than three times the maximum capacity normally used with a constant leverage hand pump for 10,000 psi.

HYSTER®

WINCH PULLING POWER KEEPS CONSTRUCTION JOBS MOVING

Here's the flexible pulling power that keeps equipment on the job and moving. A Hyster towing winch on your new or used Caterpillar-built tractor puts that power *where* you want it, *when* you want it.

Rescuing bogged-down equipment, land clearing, assisting other equipment up steep grades, winching machines in and out of hard-to-reach locations—any tough job is routine for a Hyster Towing Winch.

Hyster makes a matched Towing Winch model for each of the Caterpillar-built Tractors.

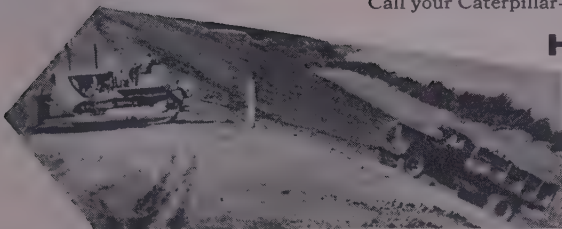
At Caterpillar-Hyster Dealers throughout the world.
Call your Caterpillar-Hyster dealer for complete details.

HYSTER COMPANY

A full line of Winches for
Caterpillar-Built Tractors



Portland, Oregon
Peoria, Illinois
Nijmegen, The Netherlands



Easing equipment down steep slopes is only one of many utility jobs performed by instantly available winch power.



Bogged down scraper put back into action fast,
cuts production loss, increases profit.



Dependable, closely
controlled winch power makes this
job go faster.



Tough bulldozing jobs like
this are possible with
steady, reliable Hyster
winch power.



Higher production
is possible when other machines
get assistance from tractor-mounted winch.

Caterpillar and Cat are registered
trademarks of the Caterpillar Tractor Co.

NEW LITERATURE

For your convenience in obtaining free copies of literature described, the company address is provided with each review

Euclid tractor maintenance

A new Euclid TC-12 tractor maintenance bulletin has been released by the **Owatonna Tool Co.**, 389 Cedar St., Owatonna, Minn. This bulletin features a new OTC Pivot Shaft Removing Tool giving step by step instructions. It also covers the OTC Hydraulic Track Master Pin Pulling and Installing Set, which simplifies track maintenance. Other pushing and pulling tools which make speed maintenance of Euclid machines are listed.

Kaiser aluminum highway products

A new 20-page brochure giving comprehensive information on the complete line of Kaiser Aluminum highway products is now available from **Kaiser Aluminum & Chemical Sales, Inc.** The new booklet entitled, "Kaiser Aluminum Highway Products," gives detailed design, construction and installation data for bridge railings, extruded highway signs, sign blanks and accessories, which are available from Kaiser Aluminum. Photographs, scale drawings and handy

tables giving data on dimensions, alloys and weights facilitate use of the brochure. The booklet may be obtained from **Kaiser Aluminum & Chemical Sales, Inc.**, Highway Products Sales Office, 919 North Michigan Ave., Chicago 11, Ill., or from any Kaiser Aluminum sales office.

Cummins issues wall chart of common engine troubles

"Principles of Trouble Shooting for Cummins Diesels" is the title of an informative bulletin published by the Service Division of **Cummins Engine Co., Inc.**, Columbus, Ind. It is designed to unfold so that it can be used as a wall chart. On the chart are listed some of the most common complaints encountered during the service life of a diesel engine and probable causes are noted.

All-purpose test-boring drill

A new all-purpose test-boring drill, the **Pendrill Model B Testborer** is described in a six-page brochure released by **Pen-**

drill Manufacturing Division, Pennsylvania Drilling Co., 1201-1215 Chartier Ave., Pittsburgh 20, Pa. Applications of the unit as an auger drill, an automatic sampler and driver and core drill are described and illustrated by scale drawings and photographs. A list of tools and accessories is also provided.

Syro highway guard rails

Syro highway guard rails are described in a four-page bulletin released by **Syro Steel Co.**, Girard, Ohio. Syro "Zee" posts are described as having twice the resistance to upsetting as standard steel post types. All posts are pierced for bolt holes and are corrosion protected with one coat red lead primer. The illustrated brochure is available upon request from the company.

New buildings from Standard Steel

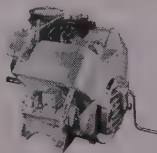
A new 16-page bulletin has been released by **Standard Steel Corp.** describing the R-M line of semi-portable asphalt batch plants from 2,000 to 6,000

When Ordering Engine-Powered Equipment Up to 20 BHP...
Be Sure to Specify
AMERICAN MARC Diesel Engines

AMERICA'S
LARGEST
MANUFACTURER OF
AIR-COOLED DIESELS
PRESENTS

THE BIG 4

AC1:
Air-cooled, one-cylinder, 4-cycle, 6.5 BHP @ 1800 RPM



AC2:
Air-cooled, two-cylinder, 4-cycle, v-type, 14 BHP @ 1800 RPM



WC1:
Water-cooled, one-cylinder, 4-cycle, 7 BHP @ 1800 RPM



WC2:
Water-cooled, two-cylinder, v-type, 4-cycle, 15 BHP @ 1800 RPM

A1Q Generating Plant: 3KW generator quill-mounted to American MARC air-cooled Model AC1. This and the Model A2Q Generator (5 KW) are ideal all-weather plants for marine, industrial, and rural electrical service.



AMERICAN MARC INC. dominates the field of light-weight, low-horsepower Diesels by building its diversified line from the "Big Four" basic models illustrated here. Purchase and maintenance of engines and parts are simplified by the use of these compact and rugged prime movers. All four types of American MARC Engines are employed daily by thousands of satisfied customers in industrial, agricultural, petroleum or marine fields.

AMERICAN MARC'S COMPLETE UNITS

Complete units for many purposes are also manufactured by American MARC—Diesel generating plants from 3 to 10 KW (AC or DC, and industrial three-phase), Diesel pumping units from 48 to 1700 GPM, marine propulsion, refrigeration units and power-packages for other services. American MARC can adapt any of its Big 4 engines to fit any job requiring from 6.5 to 20 BHP.

IN
DIESEL
POWER

6-103

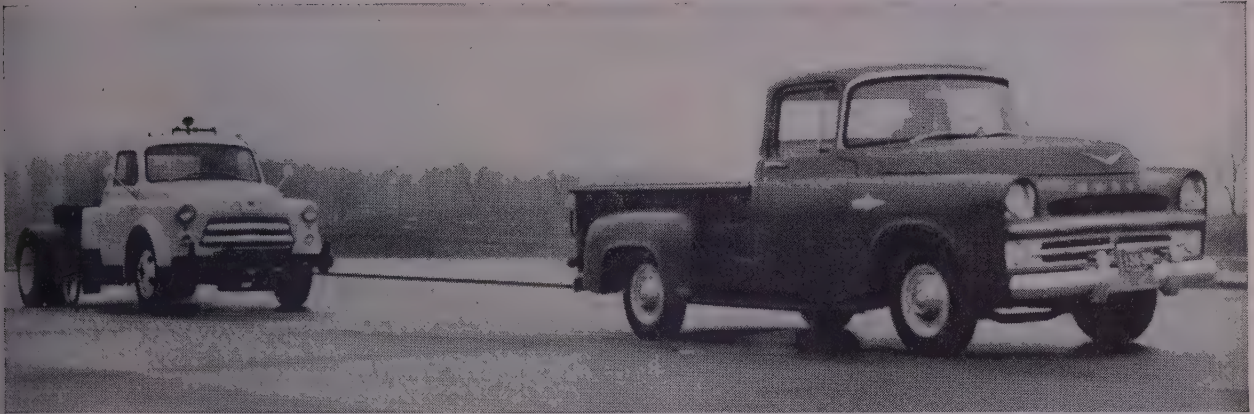
AMERICAN MARC INC.

1601 WEST FLORENCE AVE. INGLEWOOD, CALIFORNIA
Dept WC-87



INQUIRIES ARE INVITED FROM QUALIFIED DISTRIBUTORS AND DEALERS.

Actual road tests prove Dodge outpulls "other two" low-priced trucks by 32%



Dodge gives you Extra Pull . . . cuts running time and maintenance costs



Here is definite proof that Dodge gives you a big power advantage that will pay off on your hauling jobs.

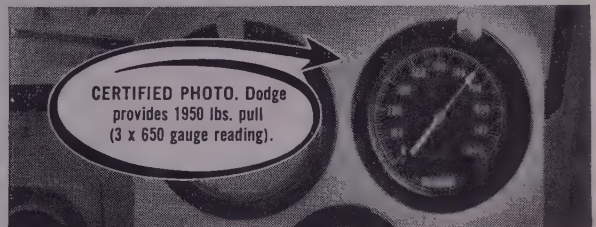
All three low-priced trucks were recently compared side by side in a grueling series of performance tests. The dynamometer test shown here is only one of them. And in each test . . . *climbing power . . . passing power . . . pulling power . . .* Dodge proved the outstanding truck of the low-priced three.

Extra power does it. From 204- to 232-hp. V-8's, Dodge Power Giants deliver the extra power you need to handle your hauling jobs faster, with less engine strain. Naturally, less strain means less wear, fewer repairs as you pile on the miles.

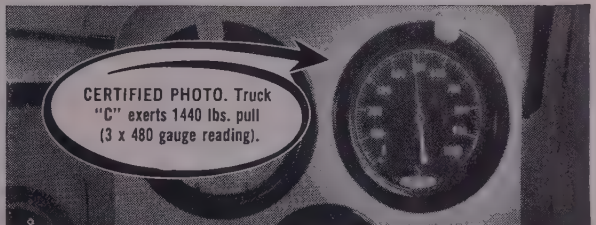
See proof for yourself. Certified results of all the comparison tests are in your Dodge dealer's showroom. Look them over and we think you'll be convinced that your next truck should be a Dodge.

DODGE

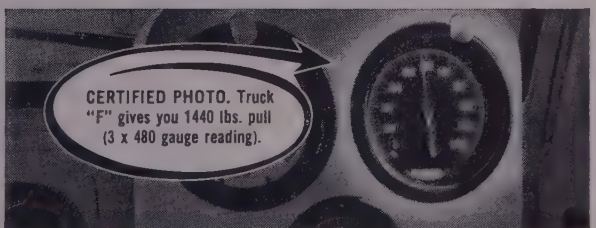
PowerGiants



DODGE and competitive trucks were tested for pulling power by towing a special dynamometer truck. Gauges measure maximum pulling force exerted. To convert this force into pounds, gauge reading is multiplied by three.



TRUCK C, pulling the same dynamometer truck as the Dodge, was unable to equal the Power Giant mark in repeated tries. Gauges show Dodge outpulled Truck C by 32%.



TRUCK F in its turn pitted all its pulling power against the Dodge, to no avail. The sealed, accurate gauges reveal clearly that Dodge offers most "pull power" of the low-priced 3.

MOST POWER OF THE LOW-PRICED 3

BIGGER PROFIT- MAKERS FOR CONTRACTORS



Marion trailer dumps (above) can also be mounted with front end telescopic hoists, providing mounting simplicity, superior performance and light weight.

MARION FRONT END TELESCOPIC HOISTS

By design, Marion front end telescopic hoists give better load distribution for longer bodies. Together with the inverted type hoist assembly that takes up only a minimum of room, increased payloads are assured.

Available in five models for either straight trucks or trailer mounts, the hoists are powerful and have fast dumping cycles. There's no wonder contractors throughout the nation are buying Marion front end telescopic units for the bigger profit—better performance features they offer.

MARION

BODIES AND HOISTS

MARION METAL PRODUCTS CO.
MARION, OHIO, U.S.A.

SEE YOUR MARION DISTRIBUTOR AND SAVE!

M & F Equipment Co.
824 Arno St., N.E.
Albuquerque, New Mexico

Bogard GMC Company
2626 South Fourth Avenue
Tucson, Arizona

Truck Body Company
2865 East 26th Street
Los Angeles 23, California

Ruckstell California Sales Co.
2985 Ford Street
Oakland 1, California

Ruckstell California Sales Co.
452 West Yolo
Fresno, California

Woerber Auto Body & Mfg. Co.
4950 Jackson St.
Denver 16, Colorado

Pacific Body Builders, Inc.
1812 N.E. Grand
Portland 12, Oregon

Alloy Manufacturing
Route No. 4 (West on U. S. 10)
Spokane, Washington

Washington Truck Equipment, Inc.
3626 Airport Way
Seattle 4, Washington

Erwin H. Johnson, Inc.
Box 1831, 1101 3rd St., N.W.
Great Falls, Montana

J. H. Holan Corp.
302 East Pima St.
Phoenix, Ariz.

lb. capacity. Also published is a new four-page bulletin on the TM Mobile Mixer which is completely self-contained on a single trailer frame. Essential parts of the semi-portable and completely portable plants are shown in photos and thoroughly discussed in the text and specifications of the asphalt plants and accessories are described in the bulletin available from the Road Machinery Division, **Standard Steel Corp.**, 5001 South Boyle Ave., Los Angeles 58, Calif.

IH power units

International Harvester Co. has made available an eight-page booklet on its extensive line of 16 power units. On-the-job photos depict the widespread use of these units. Brief specifications of the power unit line, including three 6-cylinder and three 4-cylinder diesels, and six 6-cylinder and four 4-cylinder carbureted units are also given. Request Booklet CR-513-G, **International Harvester Co.**, Construction Equipment Division, 180 N. Michigan Ave., Chicago 1, Ill.

Rexarc equipment

"Rexarc Keeps Earth-moving Equipment Rolling," is the title of a new 14-page brochure on Rexarc automatic welders and positioners, and components, manufactured by **The Sight Feed Generator Co.**, West Alexandria, Ohio. New equipment featured includes a roller and idler welder and positioner capable of handling eight tractor rollers at a time, a rail welder attachment for varied circular and conical weldments, as well as numerous added features on Rexarc welding equipment. Complete charts show estimated time and material required to build up and hard face a full set of tractor rollers and rails.

Bendix computer report

A four-page illustrated report has been issued by **Bendix Computer Division** describing in detail how Bendix digital computer saved considerable time and costs on highway earthmoving computations. The total cut and fill requirements of 230 cross sections of a three-mile strip of parkway was solved in 45 minutes at a total cost of \$38.80. Copies of the report are available upon request to Bendix Computer Division, Bendix Aviation Corp., 5630 Arbor Vitae St., Los Angeles 45, Calif.

Brunner & Lay Hole-Master

Both 6 and 6½-in. Brunner & Lay Hole-Master bits, for use with "down-the-hole" type drills, have been added to the line of percussion rock drill bits manufactured by **Brunner & Lay of Los Angeles, Inc.**, 2425 E. 37th St., Los Angeles 58, Calif. The splined body is of super-tough steel, with fast drilling carbide inserts that have unusual resistance to wear and shock, the manufacturer points out.

New GM Hydrostarter brochure

General Motors' new and improved Hydrostarter, which provides instant starts for Diesel engines while eliminat-

NOW 3 VERMEER Pow-R-Ditchers

A Model For Every Need



MODEL 524T POW-R-DITCHER

Here's the lowest priced BIG ditcher on the market! Digs 8" to 24" wide at speeds of 1' to 15' per minute. A self-propelled, one man operated ditching machine that's ideal for contractors, municipalities, utility companies and institutions. Especially designed for wide foundation footings, gas, water and sewage lines.

MODEL 4T POW-R-DITCHER

A powerful, rugged ditcher for the light construction field. The 4T Pow-R-Ditcher is only 42" wide. Very maneuverable, it is especially designed for laying gas pipe, water and cable lines and for digging home foundation footings. Digs 6" to 14" wide and down to 4 1/2' deep.



MODEL W-2 POW-R-DITCHER

The biggest little ditcher on the market . . . the "midget" of the Pow-R-Ditcher line. Digs 2 1/2" to 4" wide at 1' to 10' per minute. Ideal for gas service, electrical service and shallow water lines. Has self-propelled 4 wheel drive.

*The Vermeer Mfg. Co. is pleased to announce the appointment
of the two following Pow-R-Ditcher distributors . . .*

in Oregon, Washington and Idaho

by MITCHELL, LEWIS & STAVER

801 S.E. ALDER ST., PORTLAND, OREGON

*in California, Arizona, Western Nevada
States of Baja and Sonora, Mexico*

by B. HAYMAN CO., Inc.

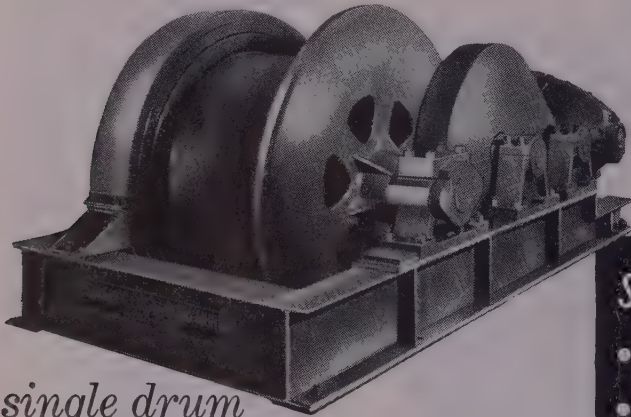
3301 LEONIS BLVD., LOS ANGELES, CALIF.

ing the maintenance costs of batteries, cables, magnetos, air compressors, etc., is fully described in a new brochure just issued by **Detroit Diesel Engine Division**, General Motors Corp. Copies may be obtained from Detroit Diesel distributors and dealers or by writing the Division, 13400 W. Outer Drice, Detroit 28, Mich.

Eimco tractor operator's manuals

Eimco Corporation, 634 So. Fourth West, Salt Lake City, Utah, announces two new manuals for operators of Eimco Model 105 tractors—The Eimco tractor-excavator, a high-production over-head loader, and the Eimco Model 105 front end loader. The new manual on the

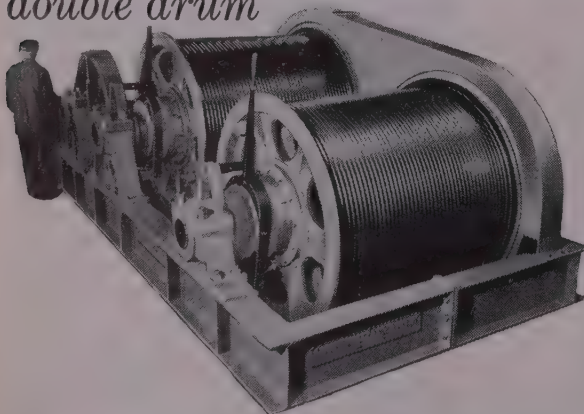
tractor-excavator offers tips for efficiency in operation of the tractor as well as detailed information on preventive maintenance to extend the tractor's usefulness. The 24-page brochure is illustrated with numerous pictures emphasizing the role of the operator in obtaining maximum performance and usage. Safety precautions are emphasized. The brochure's number is B-L1055. The front end loader booklet (B-L1056) is a four-page illustrated pamphlet which outlines efficient operation of this attachment. The booklet also offers tips on operation of the fork lift attachment, an hydraulically operated tool which is interchangeable with the bucket of the front end loader.



single drum

SPECIAL CARPULLERS

double drum



Specify
• load
• speed
• special conditions

*For your
Special
Carpuller
consult
Superior-
Lidgerwood-
Mundy—They
Know How*

Write for
New 24 page
Bulletin C-616

Superior—Lidgerwood—Mundy Corporation

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

Explosives fact book and catalog

Facts and figures to help users of explosives, as well as descriptions of the company's complete line of explosive products, are included in a new edition of its 48-page catalog just published by **Atlas Powder Co.** Containing more than a score of tables and over 100 illustrations, the book provides specific assistance in the selection of explosives for mining, quarrying, construction, seismic prospecting, pipelining, agriculture, lumbering and other industries. Over 150 items are listed in the catalog section. Complete information, in text and tabular form, is included to describe the properties and appropriate areas of application of eighteen types of high explosives,* six low order blasting agents, blasting caps (including a section describing the Rockmaster millisecond delay blasting system), blasting machines (including the 1200-cap Shotmaster condenser-discharge type blasting machine), safety fuse, and other blasting accessories and supplies. The booklet, entitled "Atlas Explosive Products," is available without cost to users of explosives by writing, on company letterhead, to Explosives Division, Atlas Powder Co., Wilmington 99, Del.

Features of the M30 Prime-Mover

New literature issued by **The Prime-Mover Co.**, Muscatine, Iowa, describes the M30 Prime-Mover for fast delivery of concrete on bridge construction; piers, warehouses and other long haul jobs. The bulletin illustrates features of the unit such as hydraulic torque converter drive, easy steering and braking, and convenient dump action controlled from the driver's position. Specifications and optional equipment are also noted.

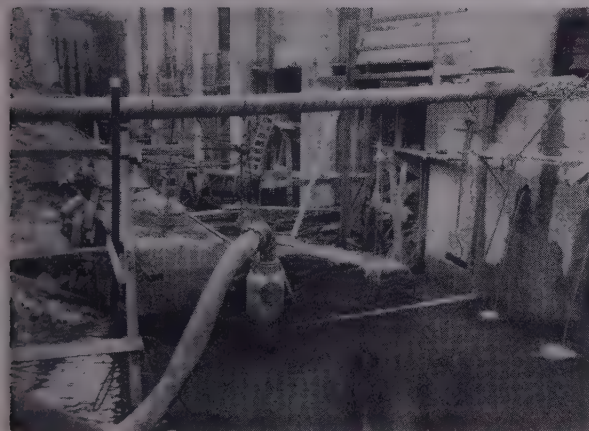
American Rubber products for the construction industry

Rubber belting, hose and specialties for construction work, rock plants and mines are featured in a four-page pamphlet issued by **American Rubber Manufacturing Co.**, 1145 Park Ave., Oakland 8, Calif. American conveyor, elevator and transmission belting are discussed and illustrated with photographs and cross-section views. A list of American specialty products such as chute liners, tapered rubber sleeves and boom bumpers is included.

Kaiser aluminum highway products

A new 20-page brochure giving comprehensive information on the complete line of Kaiser Aluminum highway products is now available from **Kaiser Aluminum & Chemical Sales, Inc.**, Highway Products Sales Office, 919 North

DE-WATERING PROBLEMS LICKED WITH FLYGT PUMPS ON FEATHER RIVER PROJECT



For construction of a power plant for Pacific Gas & Electric Co. on the famous Feather River, Bechtel Corp. was awarded a contract to build a power house for housing two 53,000-kilowatt turbine generator units, an up-river concrete diversion dam 420 feet long and 60 feet high, and installation of the greater portion of a penstock 780 feet long and approximately 14 feet in diameter. Known as the POE project, the work presented some interesting and difficult de-watering problems. For instance, certain areas of the power house site were well below the river surface and continual seepage required pumping from the lower elevations to a 43 foot head, where the water was returned to the river.

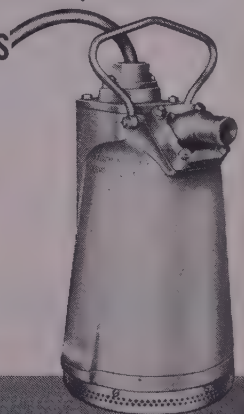
As an important part of the pumping equipment, three submersible Flygt electric pumps—a 3" Model B-80 and two 8" Model B-150/200's—were installed. Results regarding the utility and performance of the Flygt products indicated they do a remarkable job, without question. They proved easier to handle because they can be put to work and forgotten. Service requirements were held to the minimum because Flygt Pumps are perfectly sealed to keep water out of the electric motor, and are easily maintained. Observers reported the 8" Model Flygt Pump was one of the "pumpingest" pieces of equipment they had ever seen. Their flexibility of application proved ideal for this particular operation.

Pump operators find Flygt Pumps tops in performance. Users particularly like their fool proof features, the advantage that they work in any position, and the fact that they do not clog up. They can take a lot of solid stuff like mud and sand without hurting them in any way. The rubberized pump casing and hard chrome alloy impellers combine to make Flygt Pumps rugged equipment.

Flygt centrifugal pumps range in size from 1 1/2"—65 GPM capacity to 8"—2850 GPM capacity. Head capacities range up to 210 feet. Weights range from 70 to 1300 pounds. Ask for complete information today.

CHECK THESE FLYGT FEATURES

- ✓ Electric
- ✓ Heavy Duty
- ✓ Submersible
- ✓ Continuous Duty
- ✓ Will pump up to 30% solids
- ✓ Resistant to salt water
- ✓ No priming needed
- ✓ Easy to handle
- ✓ No installation costs
- ✓ Low maintenance costs
- ✓ Quick and easy to service



**CALL OR WRITE YOUR NEAREST
FLYGT PUMP DEALER**

CONSTRUCTION MACHINERY CO., San Diego, Calif.; CROOK COMPANY, Los Angeles & Bakersfield, Calif.; WIN-WARD CO., Pomona, Calif.; C. H. BULL, San Francisco, Calif.; WEST COAST ENGINE & EQUIPMENT CO., Berkeley, Calif.; CAL-ORE MACHINERY EQUIPMENT CO., INC., Medford, Oregon; CRAMER MACHINERY COMPANY, Eugene & Portland, Oregon; THE CARRINGTON COMPANY, Seattle, Washington; TURNER SALES COMPANY, Spokane, Washington; ENGINEERING SALES AND SERVICE, INC., Boise & Idaho Falls, Idaho; WASATCH EQUIPMENT COMPANY, Salt Lake City, Utah; SHRIVER MACHINERY CO., Phoenix, Arizona; RENO EQUIPMENT SALES COMPANY, Reno, Nevada; CUMMINS RIO GRANDE SALES & SERVICE, Albuquerque, New Mexico; CONSTRUCTORS EQUIPMENT CO., INC., Denver, Colorado; HALL-PERRY MACHINERY CO., Billings, Butte, Great Falls & Missoula, Montana.

Stanco
— MFGS. & SALES INC. —

1931 Pontius Street
Los Angeles 25, California

FREE!

HORN CONSTRUCTION DATA HANDBOOK

yours for
the asking...

108-page,
authoritative handbook

Just off the press, this handbook, issued in celebration of our 60th Anniversary, is just chock-full of valuable information. You will come to depend on it as a prime daily reference source.

THE HORN CONSTRUCTION DATA HANDBOOK contains 3 indexes, over thirty construction tables, guides and time saving charts, along with a brief outline of the use, application and coverage of over 95 Horn construction and maintenance specialties.

DON'T MISS SENDING FOR YOUR FREE COPY. THE SUPPLY IS LIMITED, SO MAIL COUPON TODAY!

A. C. HORN CO., Inc.

A Subsidiary of Sun Chemical Corp.
252 Townsend Street
San Francisco 7, California

Please send me, without obligation,
Horn's Construction Data Handbook.

MY NAME _____

COMPANY _____

TITLE _____

ADDRESS _____

*Please attach coupon to your firm's letterhead.

(PLEASE PRINT CLEARLY)

Michigan Ave., Chicago 11, Ill. The new booklet entitled, "Kaiser Aluminum Highway Products," gives detailed design, construction and installation data for bridge railings, extruded highway signs, sign blanks and accessories, which are available from Kaiser Aluminum. Photographs, scale drawings, and handy tables giving data on dimensions, alloys and weights facilitate use of the brochure.

Use and types of pile hammer leads

A new bulletin recently made available will prove of interest to contractors and engineers involved in any phase of pile driving operations. Bulletin 66, published by McKiernan-Terry Corp., contains valuable information on the evolution and use of pile hammer leads, describes the basic lead types with their additions and variations, and presents precise tabular data on weights and specifications of leads and accessories. The bulletin includes ingenious specification cards, used to obtain additional data, that can be removed for mailing. Information given on each lead type includes its use, types of pile for which used, exactly what types of jobs for which specific leads can and can't be used, and the advantages and disadvantages, if any, of specific equipment. Illustrations of each type and its components are included, as well as tabular data giving the weights of leads and accessories applicable to each McKiernan-Terry hammer. Also included is a table of weight data for crane load estimations. Copies of Bulletin 66 are available on request from McKiernan-Terry Corp., 100 Richards Avenue, Dover, N. J.

New Vibromatic bituminous paver described in Pioneer brochure

An eight-page bulletin describing the new Vibromatic bituminous paver has just been issued by Pioneer Engineering, Division of Poor & Company, Inc., 3200 Como Avenue, Minneapolis 14, Minn. In addition to describing the Vibromatic principle and the excellent results obtained by it, the new bulletin contains complete specifications, dimension drawings and numerous photographs, both of the on-the-job and of the machine-feature varieties. It is available from the manufacturer or from any Pioneer distributor. Ask for Form No. 655-2.

Integral diesel-engine compressors

Integrally-built diesel-engine compressors for use in large construction projects are shown in a new bulletin just released by Ingersoll-Rand. The unit

featured in this new booklet combines a 4-cycle V-angle heavy duty diesel engine and the slow speed horizontal compressor on a single crankshaft, without the use of gears or other coupling mechanism. Designated as the "SVO" compressor, it is built for continuous full-load operation, and is ideal for installation in isolated locations or where additional compressor capacity must be obtained without additional demand on existing power facilities. Copies of this bulletin, Form 3207, may be obtained from any I-R branch office or by writing to Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Mobile Drilling Inc. issues catalog packet

Mobile Drilling, Inc., has combined all its descriptive literature in a handy catalog-packet available to persons interested in the soils engineering and soils testing fields. The main body of the catalog is devoted to Mobile's extensive line



of earth drilling accessories including augers, core barrels, drilling heads and bits, winches couplings and other equipment. Pockets on the inside front and back covers carry additional literature on the company's complete line of mobile rotary drilling rigs, as well as the story of Mobile's soil and foundation engineering service. Requests for the catalog-packets should be addressed to Mobile Drilling, Inc., Dept. 19, 960 N. Pennsylvania St., Indianapolis 4, Ind.

New Gurley catalog on engineering instruments

A completely revised catalog of engineering instruments has been published by W. & L. E. Gurley, Troy, N. Y. A number of explanatory tables, featured in the 72-page book, make it possible to locate detailed information at a glance. Recent models of instruments, such as the Model OP-57-20 Optical Plummet Transit, are described in detail, as are many of the features of Gurley instruments such as reversion levels, variable power eyepieces and covered glass reticles. Many cross-sectional photographs and drawings show the parts of instruments, to aid in their proper use and to facilitate parts orders. Among the sections in Bulletin 50 are: Transits, Levels, Leveling and Stadia Rods, Topographic Instruments and Equipment, Compasses, Field Supplies, Current Meters, Water Level Recorders, Repair Service and an outline of other Gurley publications.

NOW! DOUBLE AND TRIPLE-DECK VIBRATING SCREENS

are available on the

KOLMAN

**COMPLETELY PORTABLE
CONVEYOR-SCREEN PLANT**
CONVEYOR • SCREEN • TRAP • FEEDER

Multiple separation with a Portable Conveyor-Screen Plant? Yes that's just what the owners of the KOLMAN plants pictured here have got! Two and three-deck Vibrating Screens are now available on the KOLMAN Model 101 Portable Field Conveyor.

KOLMAN Screens, designed to eliminate all possible excess weight, are ideally adapted to conveyor installations. Their "floating action" avoids transmission vibrations to the conveyor. And see how easily the KOLMAN Heavy Duty Conveyor supports these multiple-deck screens without extra bracing.

With either a double or triple deck screen on a KOLMAN Portable Conveyor-Screen Plant it is possible to accurately make several sizes of material at one time. The plant has also proved ideal for scalping out oversize and rejecting fines in a single operation. With the top deck removing oversize, the capacity of lower decks for screening fine material is increased. All this on a portable outfit!

The two pictures above show a Type DC 6'x36" double deck KOLMAN Vibrating Screen installed on a 50'x30" Model 101 KOLMAN Conveyor used for loading and sizing coal in one operation by Rasmussen Bros., Sheridan, Wyo.

This portable plant owned by Holm & Stebner, Powell, Wyoming, uses a 5' x 32" triple deck screen on a 50' x 18" Conveyor to make various sizes of sand and aggregate for oil field road building. Here, a spray bar has been added.

Above is a 7'x42" double-deck screen on a 50'x24" Model 101 Conveyor. The owners, Claude C. Wood Co., Lodi, Calif., report excellent results loading and screening aggregate on a central California dam project.

See Your Nearest Dealer

ARIZONA

PHOENIX—Equipment Sales Co., 720 S. 19th Ave.

CALIFORNIA

LOS ANGELES—Brown-Bevis Industrial Equip. Co.,

6550 E. Washington

OAKLAND—Spears-Wells Machinery Co.,

1832 West 9th St.

COLORADO

DENVER—Faris-Moritz Equipment Co.,

5790 Colorado Blvd.

IDAHO

BOISE—The Sawtooth Company, 1115 Grove St.

MONTANA

BUTTE, BILLINGS, GREAT FALLS and MISSOULA—

Hall-Perry Machinery Co.

NEW MEXICO

ALBUQUERQUE and FARMINGTON—J. D. Coggins

Company

NEVADA

ELKO—A-D Machinery Co., 251 W. Commercial St.

OREGON

PORTLAND—Contractors Equipment Corporation,

2727 S.E. Union Ave.

UTAH

SALT LAKE—Rasmussen Equipment & Supply Co.

WASHINGTON

SEATTLE—Air-Mac, Inc., 3838 4th Ave. South

WYOMING

CHEYENNE, CASPER, ROCK SPRINGS and SHERIDAN

—Wortham Machinery Co.

ALASKA

FAIRBANKS, ANCHORAGE—The Carrington Co.

91 Columbus St., Seattle

Western Representative

S. A. MADRID

1739 32nd Ave., San Francisco 22

SEND for FREE literature

KOLMAN Manufacturing Co.
5670 West 12th St., Sioux Falls, S. D.

Please send free literature on—

☐ Model 101 Heavy Duty Conveyor

☐ Model 202 "Junior" Conveyor

☐ Vibrating Screens

☐ Traps

☐ Feeders

Quote.....size orcapacity

Name

Address

City

News of DISTRIBUTORS

Hercules Powder Intermountain outlets

Contract Engineering Co., Denver, Colo., has joined the following distributors in the Intermountain territory handling blasting supplies and explosives manufactured by Hercules Powder Co., Inc., according to L. W. Early, Hercules manager at Salt Lake City, Utah: Ambrosia Supply, Inc., Grants, N. Mex.; G. B. Coan Explosives, Inc., in Aztec, N. Mex. and Cortez, Colo.; Eureka Powder Co., Eureka, Utah; Florence Hardware Co., Florence, Colo.; Sam B. Ford Explosives located in Billings and Sidney, Mont., and Casper and Rock Springs, Wyo.; Plateau Hardware, Inc., Moab, Utah; Southern Powder Co.,

Cedar City and Milford, Utah; Western Mine Supply Co., Monticello, Utah, and Western Powder Co. whose headquarters are in Salt Lake City.

Change in IH personnel

International Harvester Co., Chicago, Ill., announces the appointment of Clarence A. Hubert, formerly manager of engineering of the Farm Tractor Division, as general manager of the firm's Construction Equipment Division. Another appointment in this division is that of Warren H. Thompson as general supervisor in the sales development section.

A series of personnel changes in the Motor Truck Division of IH are also

announced. Ralph M. Buzard, formerly manager of sales, has been appointed general manager of this division. Louis W. Pierson succeeds to Buzard's former post. William E. Callahan, formerly sales manager in the Eastern region, was appointed assistant sales manager, serving along with D. F. Kuntz, whose appointment was announced in 1956.

Atlas Copco Pacific adds to staff

James H. Aikins has been added to the San Francisco Bay Area sales staff of Atlas Copco Pacific's compressor division, Western outlet for Swedish-made construction equipment, as well as industrial and mining items. Aikins will concentrate on sales of Copco's specialized lines of air compressors and Deutz diesel engine equipment from company headquarters at San Carlos, Calif.

Shepherd Machinery promotes two

Shepherd Machinery Co., Los Angeles, Calif., announces the appointment of Alvin Arkin as general credit manager and Marlon A. Piper to the position of appraisal manager.

New—OWL-LITE—New
all electronic LONG-LIFE
dependable

WARNING NEON FLASHING LIGHTS

Barricade-type Lite Unit:
9 months steady field use life

"SET THEM—FORGET THEM"

- Longer flash (People see it!)
- No overtime or weekend labor
 - Kerosene alone costs more
 - Adjustable flashing rate
 - Works at All Temperatures

Exclusive Distributor

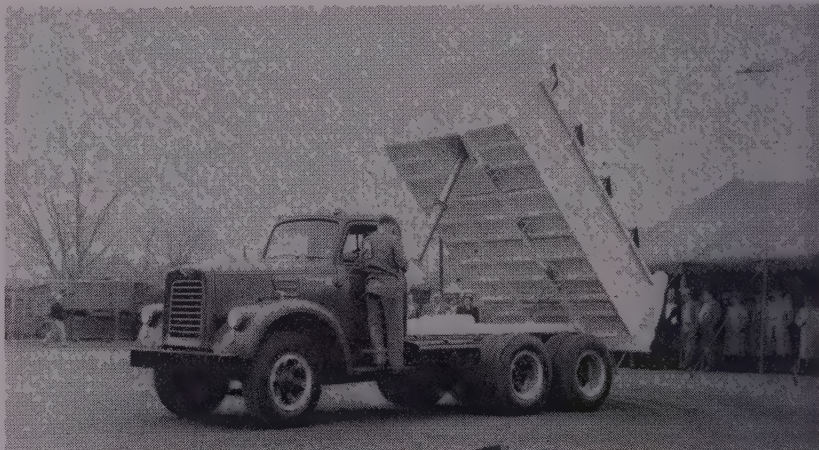
California, Oregon, Washington, Idaho,
Nevada, Utah, Hawaii

OWL-LITE PACIFIC

P. O. Box 583 San Jose, California

Dealership Inquiries Invited
Rental/Service—Sales
Immediate Sales in Open Territory

*Patents applied for.



AT ANTHONY COMPANY sales conference at Streator, Ill., recently, Anthony distributors saw this demonstration of a batching body capable of hauling four full batches of cement within legal load limits. Ninety per cent of all company distributors attended the meet and seven of them were elected to a newly formed distributor advisory board. Charles Lambert of Lambert Co., Ltd., Los Angeles, was elected vice-chairman of the group, which will meet several times a year with company management to discuss marketing and distributor problems.

SCAFFOLDING

SALES — RENTALS

FOR GREATER SAFETY...EFFICIENCY...ECONOMY



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420 Eighth Avenue, N., Seattle, Washington..

Phone: Seneca 7142

SHORING

SIDEWALK BRIDGES HOIST TOWERS

Standard Builders Supply Co., 1574 S.W. Temple St., Salt Lake City, Utah

Allied Industries, Inc.

1028 East First St., Spokane, Wash.

Columbia Concrete Pipe Co.

Foot of Ninth St., Wenatchee, Wash.

James A. C. Tait Co.

316 S.E. Madison St., Portland, Ore.



This unique GMC 12-wheeler hauls 9 legal yards within 60,000 GVW

Warner of Philadelphia—one of America's top three ready-mix outfits—uses GMC's to swing 2½ extra yards every trip

IT TAKES plenty of truck backbone to haul 18 tons of concrete. But Warner Company took advantage of GMC's enormous reserve strength—had an extra front axle installed locally for the desired weight distribution—and they have mixers that swing 9-yard loads!

That means each of their GMC FWX660's is hauling, in *two* trips, almost as much payload as their previous trucks delivered in *three*. Multiply that by the 26 GMC's in Warner's fleet, and you'll see how delivery costs take a nose dive.

"GMC gave us the ideal weight setup in an easy-to-maneuver c.o.e.," says Equipment Superintendent Charles Ponti. "What's more, these trucks have the ruggedness—and then some—to

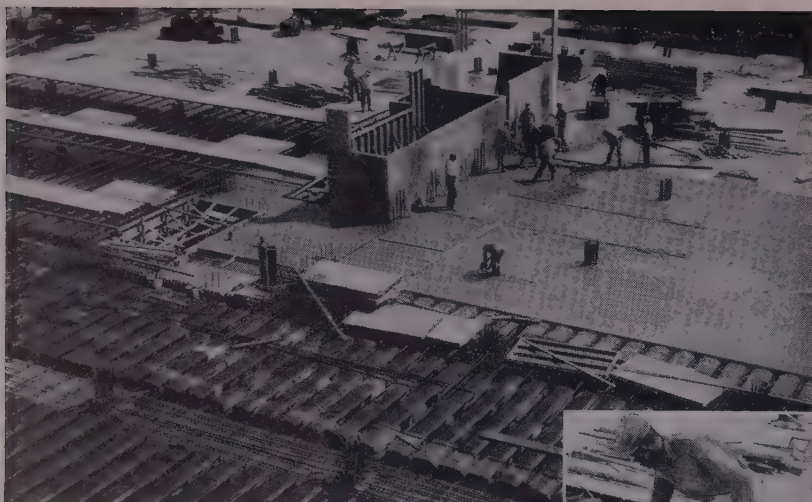
handle their big loads under the toughest conditions we ever meet."

The first of these GMC FWX660's was put to work in early 1956. How successful were they? Warner ordered 6 more eight months later. Then 3 more. Seven others were delivered this past March.

No mystery about the reason: "On every job where we can use their full 9-yard capacity, we are making substantial savings," says Ponti.

Here, then, is another example of the way GMC's—of every size and type—are cutting costs for America's top construction firms. No matter what you haul—or where you haul it—check *all* the GMC advantages with your GMC dealer!

GMC TRUCK & COACH—A General Motors Division



Above: Pouring section of first floor of new 5-story Herman Miller Bldg., Dayton, Ohio. Right: Close-up of operator using a Master "1-Man" vibrator between closely spaced reinforcing rods.



"1-Man" vibrators cut cost on \$4,000,000 office building

"Our two '1-Man' vibrators are the best pieces of equipment on the whole job," says Zimmer Miller, Supt., Miami Valley Construction Co. "We use them exclusively to vibrate the 7,000 yds. of concrete going into footers, columns, walls and slabs on this job. We cover 6,950 sq. ft. with each slab pour and *one man* with a Master vibrator keeps up easily with the pour and thoroughly vibrates the heavily reinforced pan slab.

"We like these vibrators because we know they can take it and because they save us money every day on the job."

You'll like the new "1-Man," too, because it gives you *100% longer life* than other makes. The motor is sealed in the vibrating head; there's no flexible shaft to get out of whack; no oiling or greasing problems. It's actually a self contained, *precision* built vibrator. It weighs only 25 lbs. . . and with no heavy engine or motor to drag around, one man handles it easily. Plugs into any regular 115 volt AC or DC outlet. Find out yourself . . . write for free folder or ask your Master distributor for a free demonstration.

MASTER VIBRATOR COMPANY
1/5½ Stanley Ave., Dayton 1, Ohio

MASTER

DISTRIBUTORS

ANDREWS EQUIPMENT COMPANY.....	Spokane, Washington
ANDREWS MACHINERY OF WASHINGTON, INC.....	Seattle, Washington
POWER EQUIPMENT COMPANY.....	Denver, Colorado
SHRIVER MACHINERY COMPANY.....	Phoenix, Arizona
SIERRA INDUSTRIAL CO., INC.....	Reno, Nevada
THE SAWTOOTH CO.....	Boise, Idaho
WEST COAST MASTER, INC.....	Los Angeles, California



W. W. SHEPHERD, general manager of Shepherd Machinery Co., Los Angeles, Calif., at Elgin Air Force Base, Florida, one of the places he recently visited as a member of a Joint Civil Orientation Conference for businessmen sponsored by the U. S. Department of Defense. Now known as "Jet Jockey" Shepherd, he received the honorary title following his successful piloting of an Air Force Jet.

New "Fort Worth" distributorship

Newly-established Bearing & Power Transmission Co., (formerly Williams Supply), 761 South Seventh St., Grand Junction, Colo., has been appointed a distributor of mechanical power-transmission equipment and materials-handling machinery manufactured by Fort Worth Steel & Machinery Co., Fort Worth, Texas. "Fort Worth" products stocked and offered by B&PT include V-belt sheaves, V-belts, sprockets and "Beeline" screw conveyors and accessories. The firm serves the construction industry on the western slope of Colorado and in eastern Utah.

Fred E. Barnett made Hanson rep

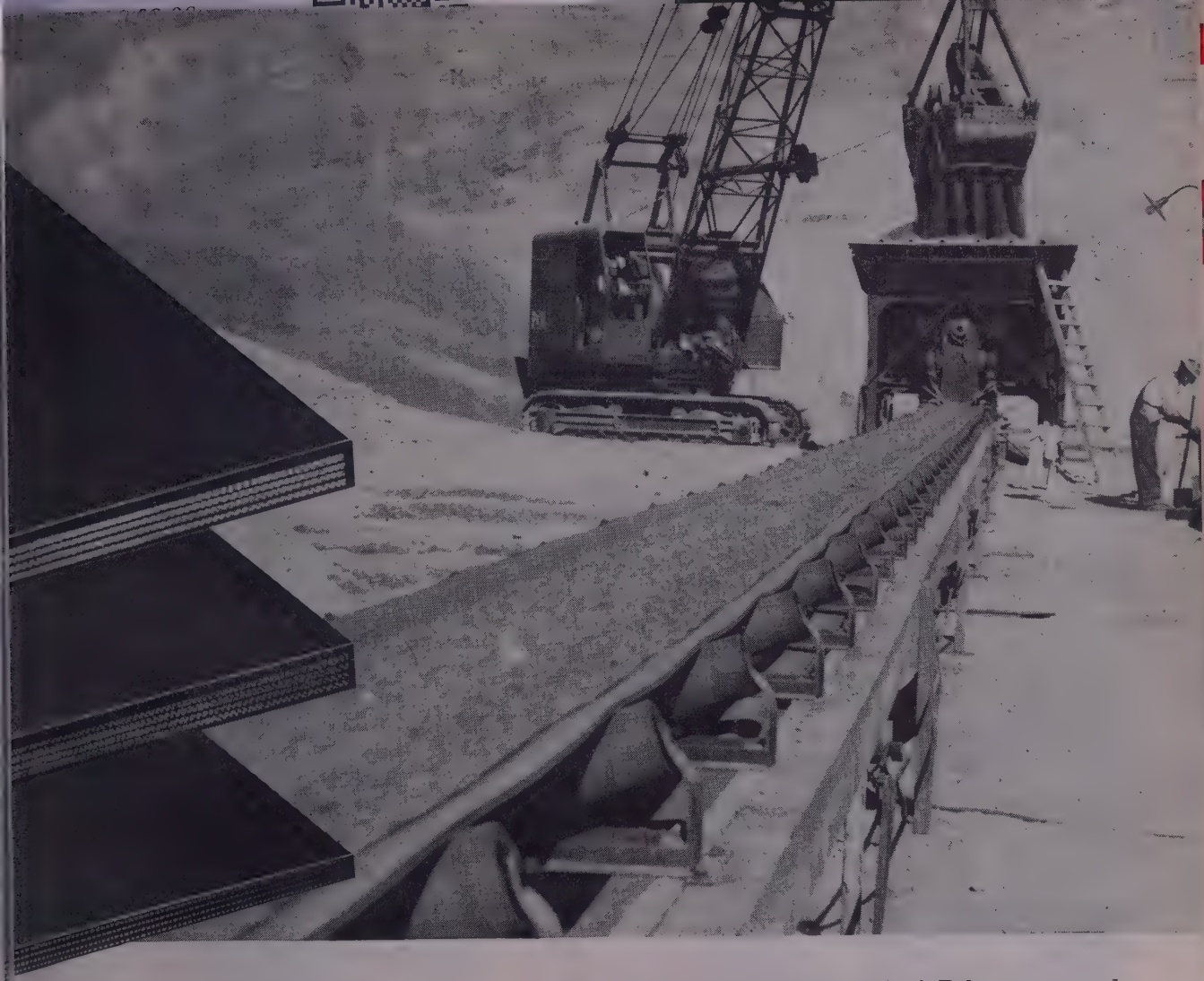
Fred E. Barnett Co., San Francisco, Calif., has been appointed representative in Northern California and in the state of Oregon for the products of The Hanson Clutch & Machinery Co., Tiffin, Ohio. The Hanson line of excavators and cranes includes models in ¾, ½ and ¼-cu. yd. bucket capacities, 5- to 25-ton crane capacities, and yard and dock cranes in 3- and 5-ton capacities.

Byrne Machinery elects officers

Byrne Machinery Co., Spokane, Wash., dealer in northeastern Washington and northern Idaho for Caterpillar Tractor Co., announces the election of Carl P. Jones as a vice president, and J. K. "Jack" Byrne as assistant treasurer. Jones joined the sales staff in 1946, and was appointed sales manager in 1953. The new assistant treasurer assumes his new responsibility along with his duties as credit manager. E. E. Byrne heads the machinery company as president.

Brunk GMC promotions

Frank Brunk, president and general manager of Brunk GMC, Oakland GMC dealership, announces the following



Thermoid **Conveyor Belting** **...pays on the** **long haul!**

Here's belting with real stamina! Belt carcass and cover are welded together by Thermoid's exclusive impregnation process. With Thermoid's specially woven, finest quality reinforcement it troughs easily, withstands shock loading as no ordinary belt can—yet it is flexible enough to avoid internal heat build-up. The results of this unusual combination are years and years of trouble-free service on the toughest jobs.

There's a Thermoid Conveyor Belt made expressly for your materials handling requirements. For example: *Thermoid HT* for extremely abrasive materials such as quartz ores, trap rock and coal . . . *Thermoid A* for highly abrasive materials such as slag, lime, rock, ore, ashes, hot cement and crushed stone . . . *Thermoid C* for moderate abrasives such as sand, loam, gravel.

Your Thermoid distributor will help you select the conveyor belt that's exactly right for your needs.

Cut costs with
Thermoid Multi V-Belts . . .

... and Thermoid Hose.



Thermoid

Thermoid Company • Trenton, N.J.

changes. Charles H. Schumacher has been appointed service manager; John "Duke" Regener has been made general shop foreman, and Ed Wilson, shop foreman. Manager Brunk feels that with these new assignments his organization is in an even better position than before to serve the San Francisco Bay area trucking industry as all these men have been with the firm for a number of years and are well qualified to help customers with their trucking problems.

Jonathan Kludt made vice president

Jonathan Kludt has been elected executive vice president and general manager of Lincoln Engineering Co. by the board of directors of The McNeil Machine &

Engineering Co., Akron, Ohio. Kludt joined Lincoln in 1934 and soon became vice president in charge of production. In April last year when Lincoln merged with the McNeil organization he was elected general manager of the Lincoln Division, a recognized leader in its field of designing and building lubrication equipment.

Johnson Western expands facilities

Johnson Western Gunite Co., formerly located in San Pedro, Calif., has moved to new quarters at 1355 West 190th St., Gardena, Calif. The new location has a 200-ft. frontage and is 180 ft. deep, providing larger office space and yard area, plus a more central location.

Ellertson made officer of Poor

O. J. Ellertson, president of Pioneer Engineering, Minneapolis, Minn., has been elected vice president of Poor & Company, parent company in Chicago.



O. J.
Ellertson

At the time of acquisition of Pioneer by Poor & Company, Ellertson was Pioneer treasurer; in 1941 was elected to the vice-presidency, and in 1952 he was placed in charge of production. He was elected president in 1953, a position he will continue to hold in addition to the vice presidency of the Chicago company.

Change in sales policy by Heltzel

A major change in sales policy in California and Nevada for the Heltzel Steel Form & Iron Co. and Flexible Road Joint Machine Co. is announced by Ken Simpson, West Coast representative. According to Simpson, all future sales in the area will be made direct in order to provide maximum service to the customer. The combined companies have had more than fifty years experience in supplying wide range of equipment to the paving contractor and concrete industry.

Californian heads Wood Preservers

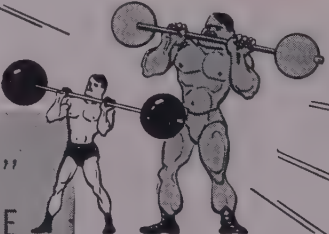
W. W. Jackson, general sales manager of J. H. Baxter & Co., wood preservers, San Francisco, Calif., was recently elected chairman of the board of directors of the American Wood Preservers Institute, Chicago, Ill.

J. A. Mitchell joins United Conc. Pipe

James A. Mitchell, formerly plant superintendent of Standard Steel Corp., Vernon, Calif., has been appointed production manager of United Concrete Pipe Corp., Baldwin Park, Calif. Mitchell's responsibilities include all operations, estimating, and engineering in all of United's seventeen plants throughout the West. A subsidiary of U. S. Pipe & Foundry Co., United produces fabricated steel products as well as all types of concrete pipe.

Pacific Builders handling Kwik-Mix

Pacific Builders Supply Co., Portland, Ore., has been appointed distributor by Kwik-Mix Co., Port Washington, Wis. Equipment to be sold will include plaster mortar mixers, a 3-cu. ft. capacity concrete mixer, and three-way material handler called the "Moto-Bug." Sales territory covered by the distributor-company agreement includes all of Oregon with the exception of Malheur County, and the following Washington counties: Clark, Cowlitz, Klickitat, Skamania and Wahkiakum.



here's "HEAVYWEIGHT"
POWER PERFORMANCE

in a light weight, man-size

WISCONSIN
Air-Cooled
ENGINE

the NEW
56 H. P.
Model VR4D
4-Cylinder Engine

- Climaxing years of engineering development, this great new engine offers manufacturers and users of power equipment all the advantages of AIR-COOLING, at temperatures from low sub-zero to 140° F., in an exceptionally rugged engine that measures up to any "heavy weight" industrial type liquid-cooled engine, horsepower for horsepower, with many *plus values*.

The outstanding High Torque characteristic of the Model VR4D engine, combined with its extremely rugged construction and heavy-duty stamina, provide *load-lugging holding power*, long life and top power performance.

Advanced "V" design provides an extremely compact power package which includes all traditional Wisconsin heavy-duty features such as tapered roller main bearings plus additional new features.

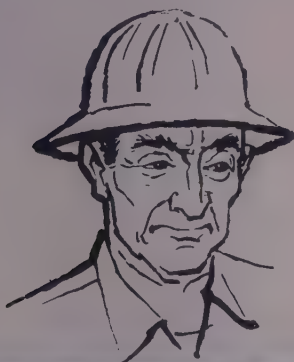
Model VR4D Open Engine with heavy-duty clutch, rotating screen, electrical equipment and pre-cleaner.

This new engine rounds out a complete line, comprising 15 models in 4-cycle single cylinder, 2- and 4-cylinder sizes, from 3 to 56 hp. Write for "Spec" Bulletin S-207.



WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

"DEWATER
SANDSTONE
WITH WELLPOINTS?
IT CAN'T BE DONE!"



"STANG DID IT!"

Holding back the mighty Mississippi is a king-sized job anytime, but it posed a particularly tough problem on the St. Anthony Falls Lock and Dam project.

The job called for dewatering and support of a crumbly, porous sandstone material on the very edge of the river and immediately adjacent to the cellular cofferdam.

The prime contractors Johnson-Kiewit, together with the U.S. Army Engineers supervising the project, made a daring decision. They called for Stang wellpoints to eliminate the serious piping which developed from the river, under the cellular cofferdam and on into the excavation area.

They banked on Stang's versatility and it paid off. The wellpoint installation was highly successful; not only eliminating the piping condition, but actually lowering the water table below the deepest subgrades.

Call on STANG engineers for experienced services and special equipment to solve your water handling problems—any size, any type, *anywhere!* STANG engineers are on call in your area for consultation day or night.



WRITE FOR BULLETIN 100. D

JOHN W. STANG CORPORATION

Engineers and Manufacturers of Dewatering Equipment, Wellpoint and Pumping Systems
Dewatering Planning—Equipment—Service

BELL, CALIFORNIA
8221 Atlantic Avenue
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Telephone: Wainut 7796

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

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



Putting water in its place

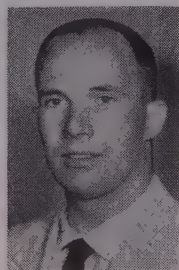
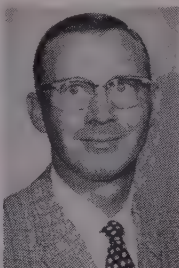
...anyplace!

Arnold adds to sales force

Arnold Machinery Co., Salt Lake City, Utah, announces the addition of three new members to its sales force. Named as floor salesmen are Joseph B. Mallory and Jerry D. Crawford. Mal-



Mallory
Crawford



Smith

lory has been with Arnold since October 1956. Crawford recently transferred from Tractor Implement Co., a sister company of Arnold Machinery. New salesman E. Sterling Smith has moved

from inside to handle Arnold outside sales of building lines in Utah, Salt Lake, Davis and Weber counties in Utah.

Wendel heads Vermiculite Institute

C. H. Wendel of Los Angeles, president of California Zonolite Co., was recently elected president of Vermiculite Institute of Chicago. William V. Culver, manager of Vermiculite-Northwest, Inc., at Seattle, Wash., was named to the board of directors. Walter J. Bein, Chicago, was reelected treasurer, and Edward R. Murphy was returned as managing director.

Stow names C. P. Concrete Equipment

C. P. Concrete Equipment Co., of Inglewood and Oakland, Calif., specialists in all types of concrete equipment, has been appointed by Stow Manufacturing Co., Binghamton, N. Y., as stocking distributor for Stow equipment, including gasoline and universal electric vibrators, rotary trowels, vibrating screed and portable concrete grinders.

Distributor named for San Diego area

Construction Machinery, 2175 Newton Ave., San Diego, Calif., has been named exclusive distributor in that area for the Construction Equipment Division of Little Giant Products, Inc., Peoria, Ill., manufacturers of road sweepers.

Garlinghouse, Fremont sales addition

Recent addition to the sales staff of Garlinghouse, Fremont & Co. is Leonard "Len" Parks. He has had many years experience in the construction industry



Leonard Parks

Parks will cover the western part of Los Angeles County in California and sell all lines of heavy construction machinery distributed by Garlinghouse, Fremont & Co., Los Angeles, including Cal-Batch, CMC, Gar-Bro, Hewitt, Robins, Kue-Ken, McKiernan-Terry Trojan, Unit and Viber.

New Lima outlet in N.E. California

Shasta Truck & Equipment Sales South 99 Highway, Redding, Calif., has been named distributor for Lima equipment and will cover nine counties in the northeastern portion of California. for Baldwin-Lima-Hamilton Corp., Construction Equipment Division, Lima, Ohio.

1,000 Man-hours Saved on Highway Job with GRIPHOIST



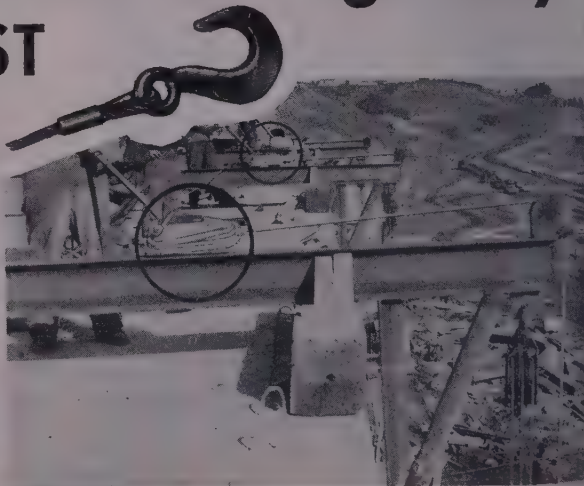
GRIPHOIST
TIRFOR

When you bid — figure on GRIPHOIST

You too can save. On 12-span bridge job, 8-man gang, using conventional methods, dismantled one set of forms in 14½ hours. Then Super placed three needle beams under forms and installed 6 GRIPHOISTS with cables attached to beams. Six men lowered 45-ton forms in 2½ hours . . . saved 1,000 man-hours.

For scores of other Griphoist uses . . . see your local dealer.

East of Mississippi
Princeton Griphoist 32 GEORGE ST.
BOSTON 19, MASS.
West of Mississippi
Griphoist, Inc. 424 BRYANT ST.
SAN FRANCISCO 7, CALIF.



EASY TO DROP 45-TON BRIDGE FORM

Upper—close-up of 3 manually-operated GRIPHOISTS used as lowering device. Lower—start of smooth, simple GRIPHOIST operation that cuts stripping time.

At the U.S. Air Force Academy...

Bucyrus-Eries Help Keep Construction Costs Low



One of the projects at the new U.S. Air Force Academy near Colorado Springs, Colo., was the installation of storm sewer pipe. This Bucyrus-Erie 22-B, owned by Stitt and Herrick Construction Co. and under lease to Hardeman Construction Co., did double-duty for the contractor. As a dragline, it trenched; as a crane, it placed the pipe. So pleased was Sidney Hardeman with the fine versatile performance of his rented 22-B that he plans to buy one himself.

You, too, can get high production and low-cost dependability — even on the toughest projects — when you put a Bucyrus-Erie to

work. Bucyrus-Eries are available in $\frac{3}{8}$ - to 4-yd. capacity, fully convertible to shovel, crane, clamshell, and dragline. Dragshovel front end is available for machines up to and including 2½ yards. Carrier-mounted Transit Cranes are available in 15-, 25-, and 35-ton models.

For more information on any of these high-output, big-dividend machines, see your Bucyrus-Erie distributor listed below. Find out how an investment in quality design and construction can pay off for you. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

353E57-n

SEE US FOR COMPLETE INFORMATION

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

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

A Familiar Sign . . . **BUCYRUS-ERIE** *. . . at Scenes of Progress*

MANUFACTURERS

McKiernan-Terry granted patent

A patent on a radically new compound steam-air pile hammer has been granted to John J. Kupka and Carl W. Shattuck of McKiernan-Terry Corp., Dover, N. J. This new hammer incorporates numerous features previously unattainable in comparable pile hammers, according to the manufacturer. It requires about half the amount of motive power required to operate conventional hammers of similar rate striking energy, has an extremely low total weight to ram weight ratio; and it has simplified and

improved construction with readily removable and replaceable valve subassemblies. McKiernan-Terry is presently manufacturing the hammer in one size, the C-5, with 5,000-lb. ram.

W. E. Shurtleff joins Thew

Wade E. Shurtleff has joined The Thew Shovel Co., Lorain, Ohio, in the position of director of industrial relations. He was formerly with Standard Products Co. from 1951 to 1956.

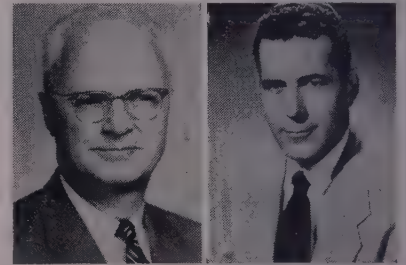
Basalt Rock Co. moves office

Basalt Rock Co., Inc., Napa, Calif., has moved the location of its San Francisco office to 126 Post St. The company manufactures lightweight aggregate,

lightweight concrete masonry units, and lightweight, precast, prestressed concrete structural products in Napa.

Executive appointments

Paul D. Smith was recently elected president of Intrusion-Prepakt, Inc., succeeding retiring company founder Louis S. Wertz. A director of the Cleveland contracting firm since 1939, Smith



Smith

Roberts

became active in Intrusion-Prepakt operations in 1942, and since 1955 has been executive vice president. Also recently announced was the appointment of Harrison H. Roberts as vice president. He has been with the organization since early 1956. Intrusion-Prepakt specializes in concrete construction and foundation stabilization.

Key appointments by Hyster

Three appointments involving key Hyster Company personnel at Portland, Ore., and Danville, Ill., are announced. Ray M. Ronald, Western division sales manager at Portland, was appointed



Ronald

Moody

domestic sales manager of the tractor equipment division, working with all phases of Hyster tractor equipment sales in the United States, Alaska, Hawaii and Canada. Robert F. Moody, who has been Eastern division sales manager of industrial trucks at Danville, has been made domestic sales manager, in charge of all industrial truck sales in the United States, Hawaii, Alaska, and Canada. In another personnel change at the Portland plant, Raymond Howerton, formerly assistant sales promotion manager, becomes sales promotion manager. Dar Johnson, manager of this department for the past 13 years, is now heading an organization development program for Hyster.

Visking Company promotes Pierce

Russell F. Pierce has been promoted to the newly created position of operations manager of the plastics division,

get
concrete
facts
about
concrete
handling

GAR-BRO MANUFACTURING COMPANY

Main Office and Plant
2415 E. Washington Blvd.,
Los Angeles 21, Calif.

Branch:
1600 N. Adams St., Peoria, Ill.

...ASK FOR GAR-BRO CATALOG NO. 300

This colorful 34-page catalog features Gar-Bro's complete line of over 300 items. Has simple, fast reading list of equipment features. Shows proper handling methods for cutting concrete placing costs. It's the most complete catalog of concrete handling equipment ever compiled.

Ask your Gar-Bro dealer or write for free copy.



ASK FOR THE GAR-BRO MANUAL

This 56-page "Manual for Handling and Placing Concrete" is a condensed handbook which illustrates and describes all phases of concrete construction methods. It includes complete check lists of job specifications, conditions and summary. In addition, there is current technical data, useful tables and comparative concrete placing methods.

Ask your Gar-Bro dealer or write for free copy.





The 101-SE is a highly portable plant. The frame is extra strong to hold rigid alignment of all equipment and drives. A rocker beam with full width axles supports most plant weight. Four wheels, each with dual tires, oscillate separately to compensate for rough terrain.

Big Production at your Fingertips with the New AUSTIN-WESTERN push-button controlled Diesel-Electric 101-SE

Here's a high output, mobile gravel plant that combines top efficiency with modern ease of operations and low maintenance. It is DIESEL-ELECTRIFIED, PUSH-BUTTON OPERATED—a triumph in crusher engineering.

All plant components except jaw and roll crushers are electrically operated in this closed circuit plant. All operations are powered with individual electric motors through short coupled V-belt drives, instantly controlled from the operator's platform. Chains, idlers, sprockets and clutches, normal cost items on mechanical plants, are eliminated.

Regardless of load, all components operate at peak efficiency at all times, delivering top production and

accurately sized aggregates. A single convenient push-button station controls the plant.

See your nearby Austin-Western distributor . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio, for illustrated booklet.

COMPARE . . . then you'll specify AUSTIN-WESTERN

Welded steel plate crusher frame for high strength without weight of cast steel frame.

Inclined positive-throw type vibrating screen.

All bearings are anti-friction type.

Machined steel toggle plate for absolute protection of crusher.

Edward R. Bacon Company San Francisco, California
Columbia Equipment Company
Portland, Oregon; Seattle, Spokane, Washington
N. C. Ribble Company Albuquerque, New Mexico
C. D. Roeder Equipment Company Reno, Nevada
Shriver Machinery Company Phoenix, Arizona
Smith Booth Usher Company Los Angeles, California

Western Machinery Company Salt Lake City 15, Utah
Western Machinery Company San Francisco 7, California
Keremi Tractor and Equipment Company, Cheyenne, Casper, Wyoming
Hall-Perry Machinery Company
Billings, Butte, Great Falls, Missoula, Montana
Engineering Sales Service, Inc. Boise, Idaho
Macdonald Equipment Company Denver 16, Colorado

AUSTIN-WESTERN
CRUSHING, SCREENING AND WASHING EQUIPMENT



BALDWIN-LIMA-HAMILTON
Construction Equipment Division — LIMA WORKS

Visking Company, Terre Haute, Ind. He has been chief engineer of this division.

Ramset has new sales manager

James J. Clarke has been named sales manager for Ramset Fastening System, Cleveland, Ohio, a part of Olin Mathieson Chemical Corp. A member of the Ramset organization since 1955, he replaces Clarke Tryon who recently resigned.

Reo Motors bought by White Motor Co.

The White Motor Co., Cleveland, Ohio, has purchased the assets of Reo Motors, Inc., of Lansing, Mich. Reo is one of the oldest producers of motor

trucks and will be operated as a division of White under the direction of John C. Tooker who will be general manager of this division.

M. K. Jennings heads Eimco PR

Appointment of Melvin K. Jennings as director of public relations for The Eimco Corp. and subsidiaries in Salt Lake City is announced. Jennings is a veteran of 20 years experience in publicity in the Intermountain region and joined Eimco in January of this year.

Gardner-Denver elects three veeps

Three new vice presidents were recently elected by Gardner-Denver Co., Quincy, Ill.: George W. Gutekunst, C.

H. Rieman, and Brice D. Maddox. Gutekunst has been general sales manager since 1954. Prior to that time he was G-D's district manager in Los Angeles. Rieman is general manager of the Denver plant, and Maddox is general manager of the Keller Tool Division of the company at Grand Haven, Mich.

DuToit made West Coast manager

Herbert L. DuToit from Columbus, Ohio, has been appointed sales manager



Herbert L.
DuToit

of the West Coast for the Jay Company. He makes his headquarters at La Verne, Calif. W. J. Juergens of Covina, Calif. has been named to head Jay's Midwestern territory.

Andy Anderson heads new department

Republic Supply Co. of California has set up a new pipe department under the direction of J. G. "Andy" Anderson, pipe specialist of more than thirty years experience in this field. According to Roy W. Johnson, executive vice president at Los Angeles, the new department is organized to more efficiently handle the company's growing volume of steel, aluminum and plastic pipe sales.

Edward Meier made advertising mgr.

Edward J. Meier has been named to the newly created post of advertising manager of Standard Steel Corp., Los Angeles.



Edward
Meier

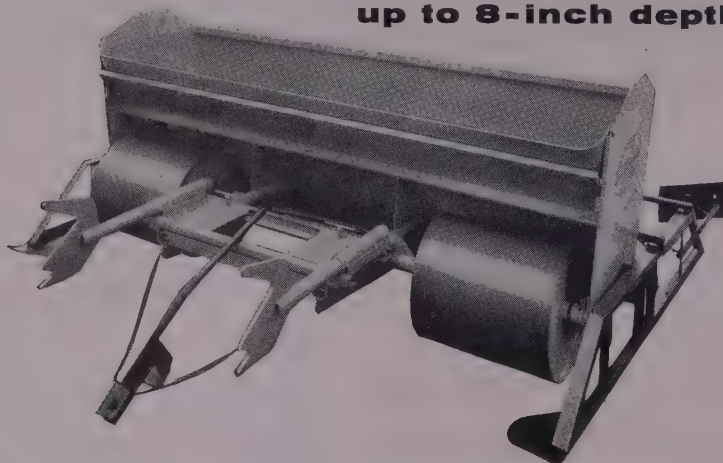
Angels. On coming West from New York last September, Meier joined Standard Steel as director of public relations.

U. S. Rubber advances George Oberg

United States Rubber Co. announces appointment of George Oberg as truck tire manager in the Portland, Ore., District. Oberg has spent several years a territory sales representative in eastern Oregon and brings to his latest assignment a thorough knowledge of truck tire applications in special service operations. He will also assist D. McKinnon, U. S. Rubber's regional manager for construction tire sales in this area.



**For aggregate and asphalt spreads
up to 8-inch depths**



• Fits All Standard Dump or Semi-Dump Trucks

- Needs No Special Attachments
- 2-Man Operated
- Spreads Any Width to 10 Feet
- Smooth, Accurate Spread

Designed for contractors, by a contractor, the "Odell" aggregate and asphalt spreader out-performs any spreader on the market.

Hot or cold-mix asphalt, bank-run gravel, coarse slag or stone, limestone, cinders and practically any kind of base material (up to 4" in diameter) can be spread up to 8" in depth. Width of box is 8 ft., adjustable to 10 ft. spreads in 2" increments. Block-off plates supplied for narrower spreads.

Extremely accurate spread depth is controlled by the exclusive "floating" strike-off bar, mounted on runners independent of the roller and hopper. The wide steel

rollers eliminate tire marks, ruts, etc., assuring absolute smoothness of spread. Low in original cost, the Odell needs no special truck attachments. It fits all dump and semi-dump trucks... hooks up in a matter of seconds.

Usually operated by only two men, the use of the Odell relieves extra manpower to perform other important work. Paving contractors report savings of over 50% on average jobs since switching to the Good Roads "Odell" Spreader.

For complete details see your Good Roads distributor, or write Good Roads Machinery Corporation, Minerva, Ohio.



ANK UPPED CAPACITY



Four-Axle Truck Crane Helps Raise Sides of Lime Tank at Pulp Mill

A maze of conveyors, pipes, stacks and tanks is representative of today's American industry—industry that is continually expanding. And the truck crane in the middle of this maze is representative of the modern machines which make expansion possible.

Job site?—a pulp mill in Virginia. The job?—lift tank parts into place, some of them weighing as much as seven tons. Machine chosen for the job?—a Marion 43-M Truck Crane.

The truck crane in Virginia, at the time it was ordered, the maneuverable 43-M was driven 40 miles to the job site from the owner's headquarters in Richmond. The heavy-duty machine was quickly loaded with a 100-foot boom and 30-foot jib and was lifting steel plates into position as fast as the able crew could handle them. It worked 12 hours

Four-axle stability was important on this job where the tanks were high and had to be made at a sharp boom angle. The owner praised Marionair Control which made it easy to handle and spot the heavy plates. He particularly likes the 43-M Truck Crane's large-size

Modern Marion can help your company grow, too. Get the story from your Marion distributor. Find out about today's 40-ton 43-M Truck Crane.

Whatever your job requirement, there is a Marion machine of the right size and type for greatest efficiency.

Your MARION distributor is the man to see. He can save you money!

EUGENE, OREGON—Western Equipment Co., 1360 W. First Avenue, P. O. Box 3205, Phone: 4-4265. **PORTLAND, OREGON**—Western Equipment Co., 2244 N.W. Savier Street, Phone: CApital 8-4128. **SAN FRANCISCO 3, CALIFORNIA**—George M. Philpott Co., Inc., 1060 Bryant Street, Phone: HEmlack 1-5475. **FRESNO, CALIFORNIA**—George M. Philpott Co., Inc., 2376 South Railroad Avenue, Phone: FRESno 6-9843. **OAKLAND, CALIFORNIA**—George M. Philpott Co., Inc., 2928 Poplar Street, Phone: GLencourt 2-0458. **LA PUENTE, CALIFORNIA**—Kyle Equipment Company, Division of Willis B. Kyle, Inc., 125 North Vineland, P. O. Box 2128, Phone: EDgewood 6-4581. **SACRAMENTO, CALIFORNIA**—George M. Philpott Co., Inc., 6260 Folsom Boulevard, Phone: GLadstone 2-2641. **PHOENIX, ARIZONA**—State Tractor and Equipment Co., 407 South 17th Avenue, Phone: ALpine 2-1731. **TUCSON, ARIZONA**—State Tractor and Equipment Co., 1202 North Main Street, Phone: 4-2335. **DENVER 4, COLORADO**—Western Machinery Company, 2400 West 7th Avenue, Phone: TAbor 5-7151. **CASPER, WYOMING**—Mass Equipment & Supply Company, 3100 East Yellowstone, Phone: 2-4547. **GRAND JUNCTION, COLORADO**—Western Machinery Co. **SEATTLE, WASHINGTON**—Star Machinery Company, 241 Lander Street, Phone: ELIott 0760. **SPOKANE, WASHINGTON**—Star Machinery Company, E. 415 Sprague Avenue, Phone: RIVERSide 6121.

MARION

POWER SHOVEL COMPANY

Marion, Ohio

SEND ME information about MARION _____ yard shovels,
_____ yard hoes and _____ ton cranes (☐ crawler
mounted ☐ truck mounted). ☐ Have a salesman call.

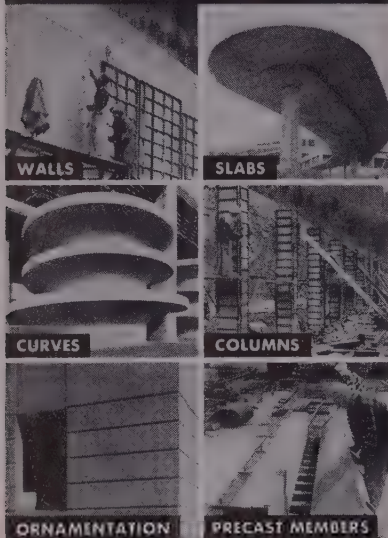
NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____

BEST for ANY JOB!

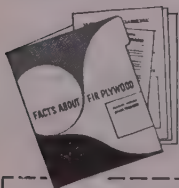


FOR DESIGN ADAPTABILITY, no other material compares with fir plywood. Monolithic surfaces, curves, special effects are easily achieved with fir plywood. Large panels are easy to cut, fit and fasten. Plywood forms smoother concrete, cuts application, finishing time. Interior PlyForm® grade gives up to 10-12 re-uses; Exterior PlyForm® 25 or more; overlaid plywood about 200!

specify



Fir Plywood CONCRETE FORMS



FREE: New portfolio to help you design and use fir plywood forms. Contains complete specification, construction and design data.

DOUGLAS FIR PLYWOOD ASSOCIATION
D. pt. 150, Tacoma 2, Wash.
Please send new Fir Plywood Concrete Form Portfolio. (Offer good USA only)

Name

Firm

Address

City Zone State

Chicago Bridge adds a man at S. F.

Chicago Bridge & Iron Co. has added N. C. Iler to its San Francisco staff. He is a transfer from the Cleveland office.

B-L-H appoints division manager

Perry A. White, general controller of Baldwin-Lima-Hamilton Corp., Philadelphia, Pa., has been appointed vice president and general manager of B-L-H's Eddystone Division. At the same time, Robert G. Tabors, vice president and assistant general manager of the Hamilton division, has been named vice president and general manager of the electronics and instrumentation division, Waltham, Mass. Succeeding White as general controller is Robert P. Bauer.

New field engineer moves West

Moving out from the plant of the Gradall Division of The Warner & Swasey Co. at New Philadelphia, Ohio, to the West Coast is Troy Sitter. He has been assigned as a field engineer to Los Angeles where he will work under R. C. Bechtel, division manager for this area.

New Western sales representative

Norman D. Ingersol of Ukiah, Calif., has been named field engineer for Weatherhead Industrial Distributor Division, Fort Wayne, Ind. His territory will include Northern California, Nevada, Utah and Colorado. Ingersol brings to the Weatherhead Co. a varied

background of experience. He was partner owner of Aikins Tractor Co. of Yreka and Ukiah, Calif., from 1950 to 1954. Prior to that he was branch manager for the Buran Equipment Co. of Oakland.

Chain Belt top management posts

Chain Belt Co., Milwaukee, Wis., announces the retirement of three executives and new appointments to management positions. Alfred R. Abelt retires as vice president—sales; Edmund F. Meyer retired as works manager—Milwaukee plants, and Louis J. Michiel, a sales manager—foundries. To fill the vacancies the following appointment were made: Luther H. Bosnian to senior vice-president; William J. Sparling to vice-president—manufacturing and facilities; Edward M. Rhodes to general manager—industrial equipment section and Harold Patzer to sales manager—foundries. George H. Woodland, general sales manager for the industrial equipment section, will assume sales function responsibilities relinquished by Abelt.

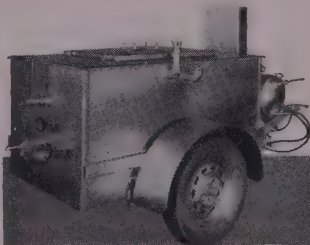
New gen. manager for Pioneer Works

Appointment of James H. Joyner as general manager, Pioneer Works Quaker Rubber Division of H. K. Porter Co., is announced by G. A. Dauphinais vice president and general manager. Joyner joined Quaker as a salesman in 1950. He spent two years as district manager in Los Angeles.

White

HEATING KETTLES

FOR SAFER MELTING OF BITUMINOUS MATERIALS

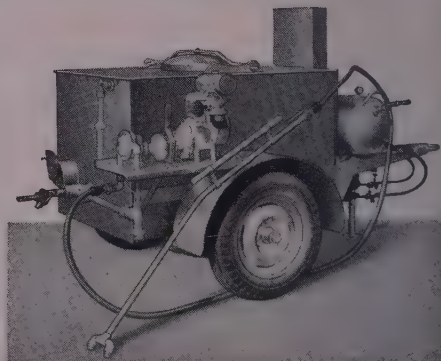


Tool Heaters

Surface Heaters

**Special F-10 Compound
Kettle**

Torches and Burners



Capacities from 80 to 325 gallons. All equipped with *exclusive* FIRE PROOF TOP (hinged tops available for roofing use). Operator and equipment are *protected* from flash fires. Complete line of accessories optional. Choice of kerosene and propane burners.

White

MANUFACTURING COMPANY

ELKHART 15, INDIANA

Some Dealer's Territories Available—Write Today

WATCH FOR FIRESTONE WHEN THE BIG PUSH IS ON!



Firestone Rock Grips lead all tire choices where highways end—and big jobs begin!

Firestone Tubeless Rock Grips save time where you're pushing big projects. That's because of two great tread designs that carry your heavy equipment *over any terrain!* They eliminate your need for changing tires to match the job. You get the *full flotation* you need for sand and soft stuff. You get the *armored grip* you want for rough runs over broken rock. Safety-Tensioned Gum-Dipped® NYLON bodies combined with cut-resistant treads make these tires top choice for off-highway users. Your Firestone Sales Engineer can show you why you'll make them *your* top choice, too. Contact him today—through your local Firestone Dealer or Store.

Firestone

Copyright 1957, The Firestone
Tire & Rubber Company

BETTER RUBBER FROM START TO FINISH



ROCK GRIP WIDE BASE

ROCK GRIP



EN ROUTE to an 8-month tunneling job at Caracas, Venezuela, **Thomas H. Lee** of Seattle, Wash., veteran of 25 years service on major construction projects here and overseas, stops off at the Eimco Corporation in Salt Lake City, Utah, to see two bulldozers and two tractor-excavators roll onto railroad cars for the start of their journey to Lee's next job. Showing Lee the simple controls on the powerful Eimco are: **John Carabine** (in smock), assembly line superintendent, and **R. H. "Dick" Walch**, assistant chief engineer in the Eimco tractor division. Under **Theodore "Ted" Lash**, veteran Morrison-Knudsen construction official, and **Vern Wilsonholm**, another M-K attache widely known throughout Western America, Lee will serve as mechanical supervisor on the South America project.

Realignment of top management

Realignment of executive responsibilities of Davey Compressor Co., Kent, Ohio, is announced. **Paul H. Davey, Sr.**, company founder and president since

1929, has been elected chairman of the board. His son, **Paul H. Davey, Jr.**, succeeds him as president. New general manager is **J. T. Myers**, previously vice president in charge of sales.

Western appointment by U. S. Rubber

William R. Tise has been appointed Western belting engineer for the conveyor and elevator belting department of United States Rubber Co. He was a sales engineer at U. S. Rubber's headquarters in Passaic, N. J., before receiving his new assignment, which combines technical sales and engineering service in the eleven Western states. He will make his headquarters in the company's Los Angeles branch sales office.

Top level assignments

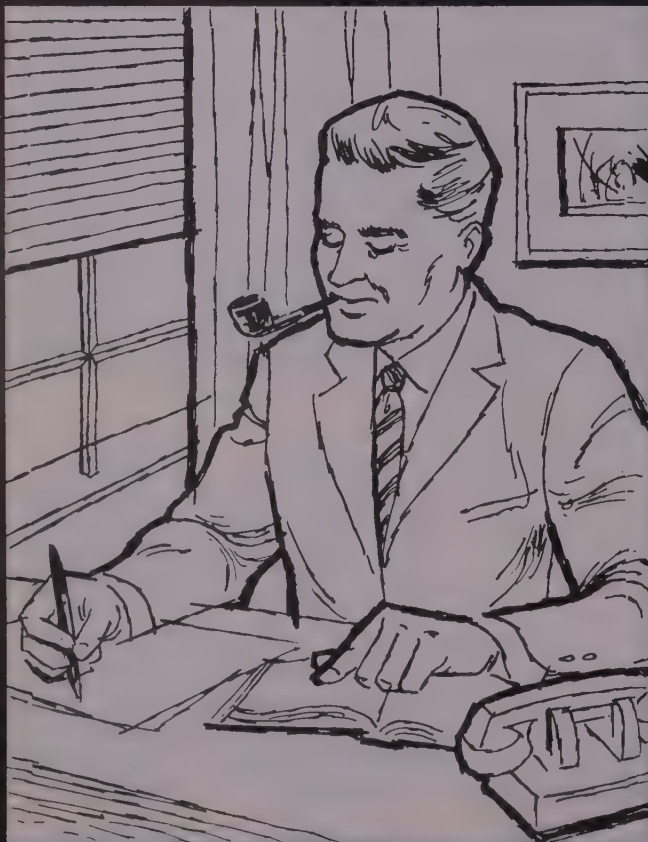
V. H. Peterson, vice president in charge of engineering at Fairbanks, Morse & Co., Chicago, Ill., has been made vice president in charge of sales, and **John C. Elmburg**, assistant general sales manager, has been promoted to general sales manager.

Schild Bantam breaks ground

Formal ground breaking ceremonies were recently held for the Schild Bantam Co.'s new office building located at the factory site in Waverly, Iowa. An early 1958 completion date is expected.

Thew to make front-end loaders

The Thew Shovel Co., Lorain, Ohio, announces it will manufacture a complete line of rubber-tire front-end loaders in addition to its present line of power shovels and cranes. These loaders will be identified and marketed as Moto-Loaders and will be merchandised under the direction of **W. H. Madden** as loader sales manager.



*you can rest
assured with...*

NATIONAL SURETY CORPORATION CONTRACT BONDS

Available nationwide through a network of independent insurance agents and brokers.



NATIONAL SURETY CORPORATION CONTRACT BONDS



The FUND Insurance Companies

FIREMAN'S FUND INSURANCE COMPANY
FIREMAN'S FUND INDEMNITY COMPANY
HOME FIRE & MARINE INSURANCE COMPANY
NATIONAL SURETY CORPORATION

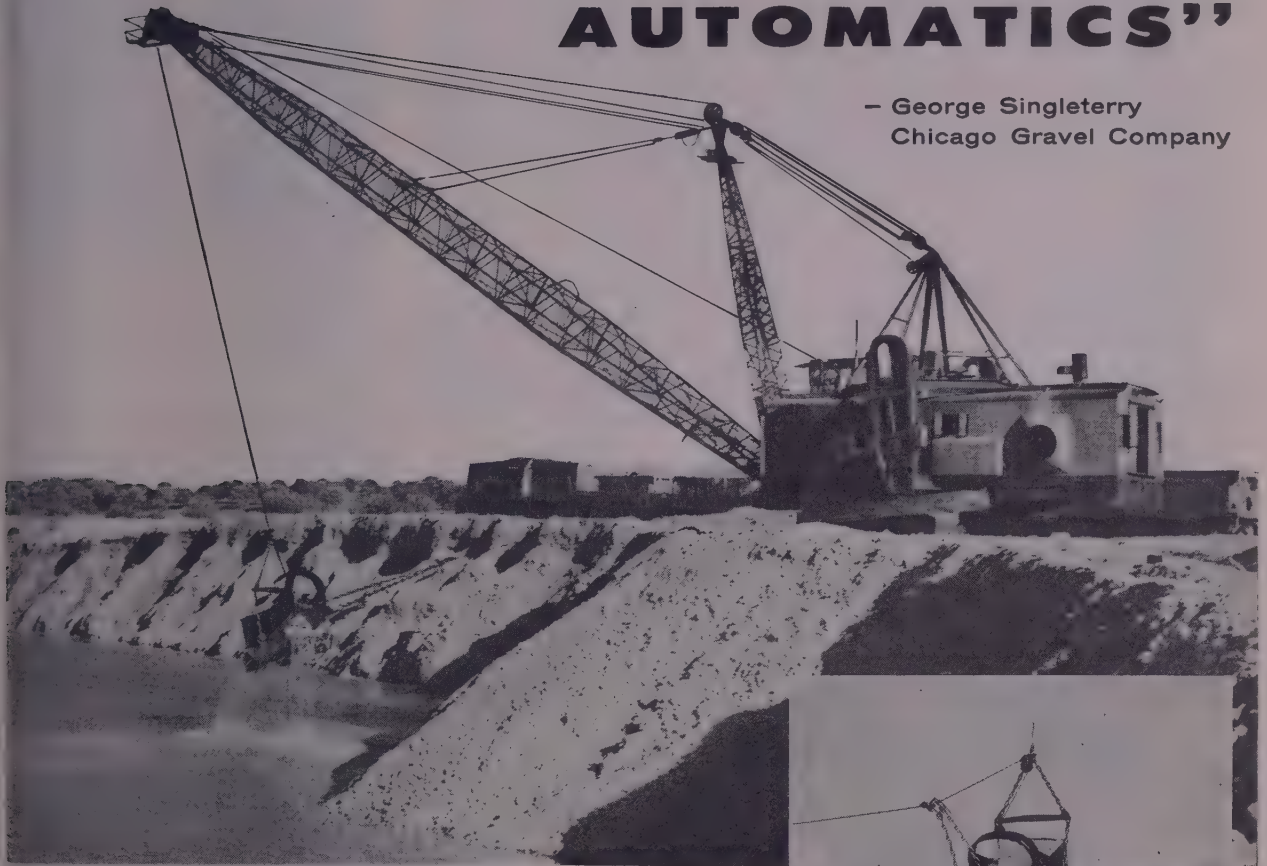
Central Bonding Offices:

3333 California St., San Francisco • 4 Albany St., New York

Branch Offices in Principal Cities Throughout America

"we need **PRODUCTION...**
ALL our buckets are
PAGE
AUTOMATICS"

— George Singleterry
Chicago Gravel Company



**OPERATOR DIGS UNDER 35 FT. WATER...
TAKES OUT FULL RATED LOAD EACH CYCLE**

Here's why Page Automatics are the preferred bucket at Chicago Gravel Company, one of Northern Illinois' largest producers.

This Page Model 618 Dragline, equipped with a 5 yd. Page Automatic Bucket, is loading 33 yd. capacity cars (inset) at an average rate of one car per 5 minutes. The Bucket is digging 35 ft. below the water's surface and comes up with a full load in less than 2 lengths of the bucket. That's *digging* that means *production*!

There's no substitute for digging ability in a Dragline bucket. Your investment in a machine is too big to settle for less than the best digging bucket you can buy. And when it comes to digging, no bucket will equal a Page Automatic — the bucket that's built to dig faster, and carry out more on every cycle.

Ask your nearby Page Automatic Distributor for full details.
Write for Catalog A57.



Page
Automatic Dragline
Buckets
Walking Draglines

If it's a PAGE... It DIGS

D3111

137

EASY TO REPLACE ON THE JOB

Tamprite Tips

NO WELDING!

DRIVE OFF WORN TIPS
DRIVE ON NEW TIPS

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

PATENT NO.
2131941

LOS ANGELES
STEEL CASTING CO.
6100 So. Boyle Avenue, Los Angeles 58, California

Massey-Harris-Ferguson expansion

Construction is starting immediately on expansion and complete remodeling of the Massey-Harris-Ferguson, Inc., plant in Detroit, Mich. When finished it is expected the plant will be one of the most modern tractor assembly plants in the United States.

Macwhyte Pacific Coast sales additions

According to Fred M. Sime, Pacific Coast manager of Macwhyte Company, San Francisco, the following men have been added to the Pacific Coast sales force: Vernon H. Swan, Seattle; Evan E. Rushing, Jr., Portland; Dean Hillyer, San Francisco, and John Zaylor and Milton T. Larson at the Los Angeles office.

T. W. Krueger becomes sales manager

Promotion of T. W. Krueger to sales manager was announced by the Duff-Norton Co., Pittsburgh, Pa., one of the nation's leading producers of jacks and hoists. He was formerly sales manager of D-N's Jack Division, and in his new position is in charge of all sales for this division and the Coffing Hoist Division.

F. B. Sykes heads new sales division

Frank B. Sykes has been appointed sales manager of the newly-created commercial crane carrier division of Four Wheel Drive Auto Co., Clintonville, Wis., truck-manufacturing specialists. Sykes, who has been active in crane carrier design and sales for more than

ten years, will be in charge of marketing FWD's new line of crane carriers to commercial crane, dragline, shovel and backhoe manufacturers.

Changes in top level management

Worthington Corporation, Harrison, N. J., recently announced the election of Walther H. Feldmann as president, suc-



Schwanhausser

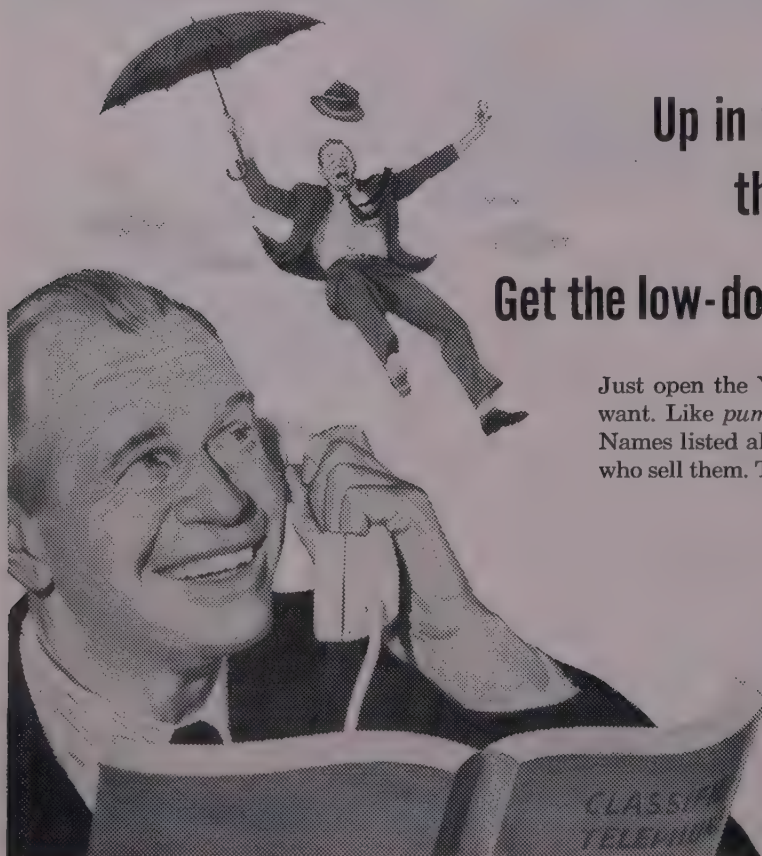


Feldmann

ceeding Edwin J. Schwanhausser, who becomes vice-chairman. Hobart C. Ramsey continues as chairman and chief executive officer.

Recent appointments by Macwhyte

Ferd Chiappetta, formerly assistant wire rope engineer, has been appointed wire rope engineer for Macwhyte Company, Kenosha, Wis. He replaces William C. Russell on his retirement after 34 years of service with Macwhyte. Chiappetta is assisted in his new position by Fred E. Dykeman, who has been named fabricated products engineer, and by Vernon J. Young.



**Up in the air about who sells
the BRAND you want?**

Get the low-down in the Yellow Pages!

Just open the Yellow Pages to the product heading you want. Like *pumps*, for instance. There you'll find Brand Names listed alphabetically—each with the local dealers who sell them. That's all there is to it...takes just seconds.

You'll find it fast in the...



Pacific Telephone

Top level appointments; new sales rep

William L. Little was elected chairman of the board and president of Bucyrus-Erie Co., following the annual meeting in South Milwaukee, Wis. Little, who has been president of Bucyrus-Erie since



Little



Calland

1952, has been associated with the company for 31 years. In other management changes, Lyle S. Cline was elected vice president and secretary, and David W. Harris was elected vice president. William W. Coleman was named honorary chairman of the board.

Another announcement by Bucyrus-Erie is the appointment of Dean Calland as a sales representative in the company's Western sales district. He maintains headquarters with Road Machinery Co., a Bucyrus-Erie excavator distributor in Phoenix, Ariz, and reports to the Western district office of Bucyrus-Erie at South San Francisco, Calif. For a number of years prior to joining B-E, Calland was in charge of sales in California, Arizona, Nevada, and Utah for another excavating equipment manufacturer.

Willys names division sales chiefs

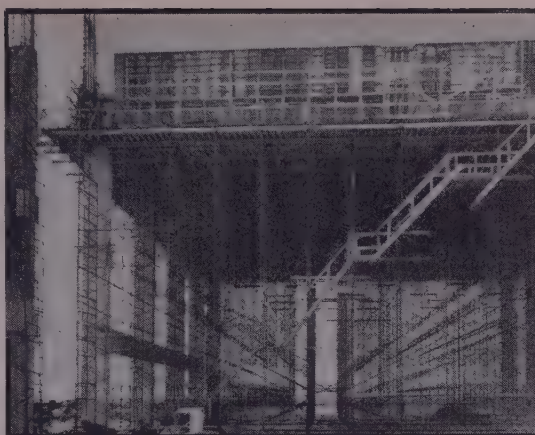
James J. Beattie, Jr., Eastern division manager of Willys Motors, Inc., has been appointed manager of the Western division with headquarters at San Francisco. Beattie succeeds Howard P. Grove, Western manager for many years, who is taking an extended leave of absence. Succeeding Beattie at New York City is C. M. Ritchey.

Fleco Corp. tenth anniversary

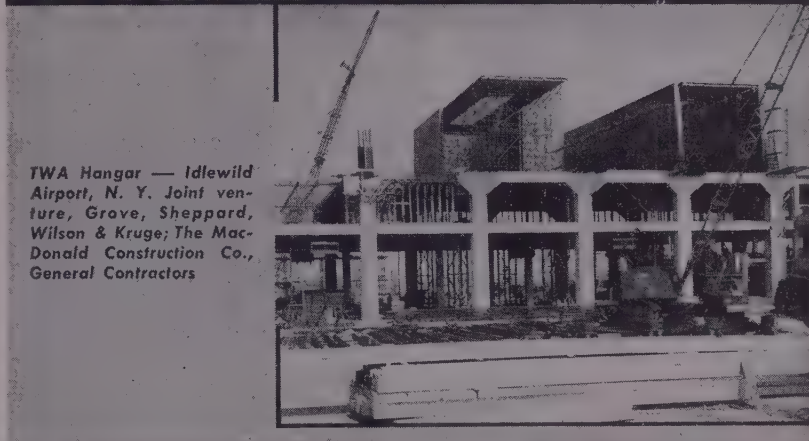
Fleco Corporation, headed by Franklin G. Russell, president, and Wirt A. Beard, executive vice president, is celebrating this year its tenth anniversary in the making of land clearing equipment as an allied manufacturer of Caterpillar Tractor Co. The equipment offered by Fleco in 1947 included the detachable stump puller and root rake which maintain an important place in the line today. Since then they have expanded to include twenty major pieces of equipment such as the D9 M-A rake and Traxcava rakes.

Changes at Union Carbide divisions

With the shortening of the name of Union Carbide & Carbon Corp. to Union Carbide Corp., the name of Linde Air Products Co. division has also been shortened to Linde Company. Linde Company is one of the nation's leading oxygen producers. They also make nu-



TWA Hangar — Kansas City, Mo. MacDonald-Creighton Construction Co., General Contractor



TWA Hangar — Idlewild Airport, N. Y. Joint venture, Grove, Sheppard, Wilson & Kruege; The MacDonald Construction Co., General Contractors

"REPEAT PERFORMANCE BY COMMAND"

Detailing the reasons for superior scaffold performance is easy enough to do, but isn't it easier to *experience exceptional performance* again and again on your own construction jobs?

The ADVANCE scaffold shoring applications illustrated are for TWA hangars, but at widely separated geographical locations. Photo A is a project at Kansas City; Photo B is a similar hangar under construction at New York's Idlewild Airport. The fact that the ADVANCE Shoring System was used at both locations is not mere coincidence. Here's what job superintendents report:

- ADVANCE scaffold assembles faster — replaces as many as 12 wood or steel shores that require twice as much time to place.
- ADVANCE scaffold towers are self-supporting — eliminate additional lateral bracing — greatly reduce nailing requirements . . . afford more freedom of worker movement and assure maximum safety.
- ADVANCE Roller Assemblies enable speedy removal and relocation of forms from one pour area to another with substantial savings in manpower.

These and many more reasons justify "REPEAT PERFORMANCE BY COMMAND." Outstanding *value* makes ADVANCE the accepted name for *quality scaffold, engineering service* and on-the-job PROFITS!

Beaver-Advance CORPORATION
Ellwood City, Pennsylvania

Send for this descriptive catalog, it's FREE!

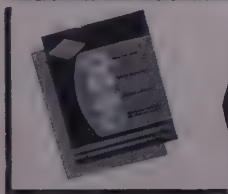
BEAVER-ADVANCE CORPORATION, ELLWOOD CITY, PA.

Name.....

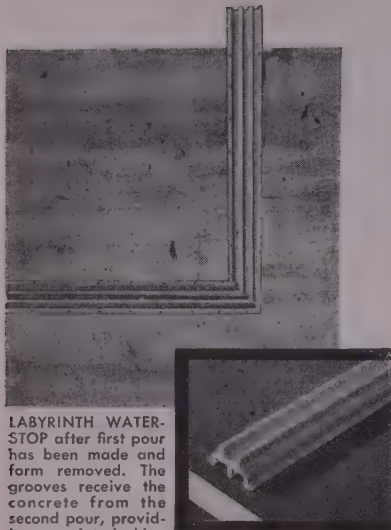
Company.....

Address.....

City..... Zone..... State.....



Waterstop in place in seconds!



LABYRINTH WATERSTOP after first pour has been made and form removed. The grooves receive the concrete from the second pour, providing an interlocking joint.

Just a few seconds were needed to nail this LABYRINTH WATERSTOP to the form...just a few seconds and water seepage worries were over before they could ever have a chance to start.

LABYRINTH WATERSTOP forms a waterproof bond between two pours. The corrugated ribs bond firmly with the concrete.

LABYRINTH WATERSTOPS are made of flexible polyvinyl plastic... that has superior weathering qualities, is not affected by temperature changes and chemical activity.

LABYRINTH WATERSTOPS are easy to work with, can be cut to any desired length. "L" and "T" joints can be welded with just a hot knife. Find out now how your costs can be cut...and end your seepage problems.

Distributed by

WATER SEALS, INC.

Chicago 6, Illinois by:

THOMAS CONCRETE ACCESSORY CO.

1219 S. Herbert St.
Los Angeles 23, Calif.

HYDRO PRODUCTS CO.

1350 Old County Road
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W. J. BURKE & CO.

2344 N.W. 21st St.
Portland 9, Ore.

merous types of manual and automatic equipment for cutting, shaping, conditioning, heat-treating and welding of metals.

Announcement concerning another Union Carbide division is that Robert M. Briney has been appointed president of the Haynes Stellite Co. Briney has been an employee of the corporation since 1924.

F. D. Cummer expansion

Nation's pioneer asphalt plant builder, F. D. Cummer & Son Co., recently moved their general offices and warehouse to new quarters located at 2110 East 21st St., Cleveland 15, Ohio. The new facilities provide quicker service, specialized engineering, and improved sales coordination for Cummer customers.

Sherman names sales and service reps

Two men have been appointed field sales and service representatives in the West for Sherman Division of Sherman Products, Inc., Royal Oak, Mich. According to announcement by Robert W. Humes, the Division's sales manager, Ralph L. Tennant of Boise, Idaho, and Lauren F. Moore, Berkeley, Calif., will assist zone managers and Ford Tractor distributors and dealers in their respective territories.

D-A Lubricant West Coast appointments

Appointment of Michael "Mike" Ervin and Walter E. Keller as West Coast representatives has been announced by

D-A Lubricant Company, Inc., Indianapolis, Ind., manufacturer of heavy duty lubricants for the construction industry. Both men have had extensive experience in lubrication and maintenance of heavy-duty equipment. Ervin makes his headquarters at 1844 Stuart Ave., West Covina, Calif., and Keller at 2387 Mountain Ave., Pomona, Calif.

V. M. Holloway heads new A-C dept.

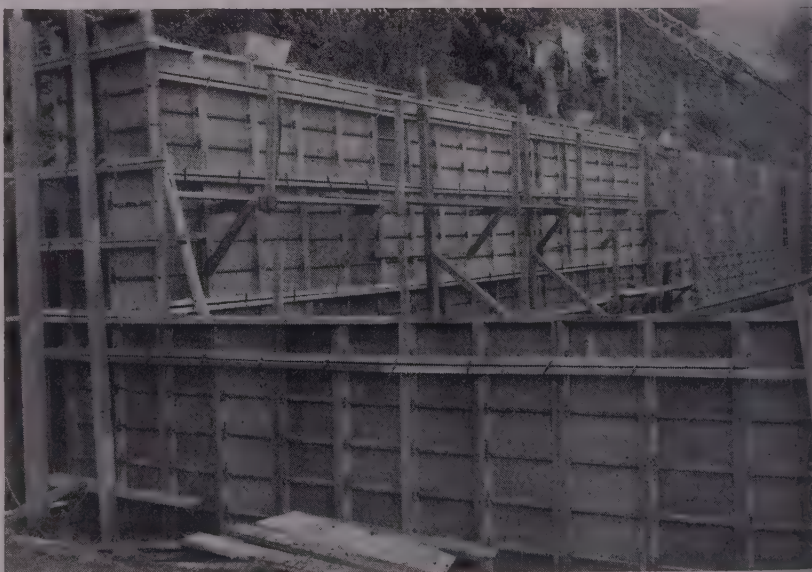
Expansion of the sales department. Construction Machinery Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis., by the creation of a new de-



V. M. Holloway

partment within sales is announced. V. M. Holloway, assistant sales manager of the division, is promoted to head up this department, which will devote its full time to growth development of dealers and their sales organizations. J. M. Haile is promoted to assistant sales manager to take over the duties of Holloway. Holloway has been associated with Allis-Chalmers since 1937. He was appointed Northwest

Advertisement



Symons Forms Help Build Retaining Wall

James H. MacFarland Contractor, San Francisco, California, used Symons High Strength Form with steel cross members on 12" centers to build retaining walls for petroleum storage, Criss Field, The Presidio. This heavy duty form is recommended for pouring concrete walls with pressures up to 1,500 pounds per square foot. Its weight averages just 5 pounds per square foot.

Symons Forms are not confined to a single type of application. They can be used on any type of general construction job and on any height wall. Frequent tests prove that no other method of forming can do a more efficient job.

Symons Representatives and Engineers can help you with any forming problem and will train your men to do a fast and excellent job. Symons Forms can be rented with purchase option.

Symons Clamp and Mfg. Company, 634 Williams Street, San Leandro, California.

Phone: Lockhaven 9-9159

territory manager in 1947 and promoted to assistant industrial sales manager in 1948.

Changes at American Marc

American Marc, Inc., after a year's negotiation has acquired complete ownership and management of the Diesel Engineering Division of Hallett Manufacturing Co. of Inglewood, Calif., basic products of which are four high-speed, lightweight, low-horsepower diesel engines. In its new premises management is composed of both new appointees and former Hallett executives. W. Denis Kendall who has a long history of executive accomplishment has been resident since 1955. Russell G. Livingston with a background of 15 yr. in engineering and government liaison for Hallett, is vice president in charge of sales. Wren Jones, with Hallett for six years, is Livingston's assistant and parts and service manager. The new chief engineer is Tom B. Danckwortt.

Conner made Permanent PR director

Robert G. Conner has been appointed director of publications and advertising for Permanente Cement Co., Oakland, Calif. Conner has been with the Kaiser companies for nine years, most recently as PR representative for Kaiser Services.

A. F. Working named vice president

Loren F. Working has been named vice president of the Gen-A-Matic Corp. of Van Nuys, Calif., manufacturers of earth boring machines, generators, pumps and two-way flasher light warning signals. Working was formerly executive vice president of the Chain-veyor Corp., and, previously, vice president in charge of sales for Clayton Manufacturing Co. Announcement of the appointment was made by Eugene John Freeman, president of the Gen-A-Matic Corp.

New appointment at CF & I

A. F. Franz, president of The Colorado Fuel and Iron Corp. has announced the appointment of Karl H. Baessler as director of wire product development for the Colorado, Wickwire Spencer and Pacific Coast Divisions of the company. Baessler has been associated with CF & I since 1934 and since 1949 has been works manager of the Pacific Coast Division.

New Mack outlet in Redwood Empire

Mack Trucks, Inc., has opened a direct factory branch in Arcata, Calif., located at 50 South "G" St. Rex Frazier is in charge of sales and G. E. "JeJry" Parle is in charge of the parts dept. The move was made in order to provide the best possible service for Mack owners in The Redwood Empire.

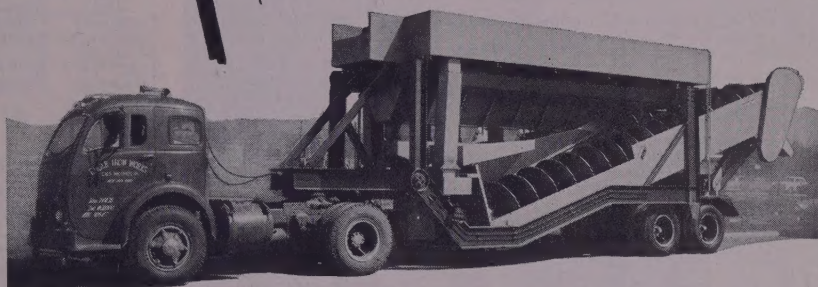
Hough Co. appointment

T. G. Granryd has just been appointed manager of the Product Improvement Dept., according to R. L. Beyerstedt, executive vice president, Engineering, The Frank G. Hough Co., Libertyville, Ill. A former senior engineer, Granryd was promoted to project engineer in 1957.



**PRODUCTION OF
SPECIFICATION
FINE AGGREGATES
at
WIDELY SCATTERED PIT SITES!**

with the
**Eagle Portable Washing-
Classifying-Dehydrating Section**



On many jobs mobility means money—you have it with this "Eagle on wheels". Size and weight permit highway travel from pit to pit. Quickly attached to semi-tractor. Can be hauled to pit and positioned next to screen. Washer side flares—removed for travel, as shown—are quickly installed, water connection is made, and you're ready to operate!

Operating in a dry pit or with hydraulic dredge, the unit removes excess silt-laden water and classifies the desired aggregate which is dehydrated by the two screw washer-classifier-dehydrators. Material delivered suitable for handling by conveyor to stockpiles or bins, or by trucks. Both screws can produce same product or each can produce a separate gradation—facilities provided to remove overage of any excess sand meshes.

This simple, compact, economical Eagle Portable Section can process up to 200-tons per hour of specification material. Design based on Eagle's long experience and field testing. Get the complete story—send for Bulletin 557.

✓ CHECK THESE ADVANTAGES:

- Fast take-down, transport and erection means less down time when changing pits.
- Flexibility—use both screws to produce one product or produce a different gradation with each screw.
- Field-proved automatic bleeder valves give attention-free operation—minimum man power.
- Easy manual control of Splitter Gates with Blending Flumes adapts unit to variety of pit conditions.
- Quickly returns its cost through mobility plus capacity and range of materials.

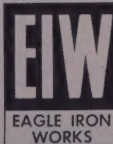
EAGLE IRON WORKS

203 Holcomb Ave., Des Moines, Iowa

Sold and Serviced by

Cook Bros. Equipment Co., Oakland, Calif.; Brown-Bever Industrial Equip. Co., Los Angeles, Calif.; Balzer Machinery Co., Portland, Oregon; Intermountain Equip. Co., Boise, Idaho; Spokane, Wash.; Kereml Tractor & Equip. Co., Cheyenne, Casper, Wyo.; The Lang Co., Salt Lake City, Utah; H. W. Moore Equip. Co., Denver, Colo.; Jack Sahiberg Equip. Co., Seattle, Wash.; Shriver Machinery Co., Phoenix, Ariz.; Sierra Machinery Co., Reno, Nev.; N. C. Ribble Co., Albuquerque, N. Mex.; Western Construction Equip. Co., Billings, Missoula, Great Falls, Bozeman, Mont.

SINCE 1872



EAGLE IRON
WORKS

UNIT PRICES

Selected abstracts for Western projects

RAILROAD—Construction of railroad for AEC in Idaho

Idaho—U.S. Atomic Energy Commission. A \$144,904 contract was awarded A. L. Gladney for extension of railroad at the National Reactor Testing Station in Idaho.

(1) A. L. Gladney.....	\$144,904
(2) A. D. Schader Co.....	187,403
Wm. A. Smith Contracting Co., Inc.....	206,507
T. F. Scholes, Inc.....	214,381

	(1)	(2)
15,700 cu. yd. Excavation for roadbed and drainage..	\$.60	\$.545
59,000 cu. yd. Borrow.....	.65	.60
562 lin. ft. Furn. and laying 8 in. perf. helically-corr. metal pipe culverts (16 ga.)...	3.00	2.80
50 lin. ft. Furn. and laying 18 in. pipe culvert...	10.00	9.70
214 lin. ft. Furn. and laying 24 in. pipe culvert...	14.00	11.80
48 lin. ft. Furn. and laying 18 in. x 11 in. corr. metal pipe—arch (10 ga.).....	8.00	7.00
26 lin. ft. Furn. and laying 22 in. x 13 in. corr. metal pipe—arch (10 ga.).....	12.00	11.00
28 lin. ft. Furn. and laying 36 in. x 22 in. bit.-ctd. corr. metal pipe—arch (10 ga.).....	22.00	20.50
36,300 t. ft. Laying track.....	1.50	2.88
18,900 cu. yd. Ballasting.....	1.10	.96
1 ea. Constructing motor car set-off.....	100.00	105.00
1 ea. Constr. Type I wood plank road crossing	1,200.00	1,015.00
2 ea. Constr. Type II wood plank road crossing	150.00	132.00
20 Constr. reinf. concrete pipe sump.....	40.00	39.00
Lump sum Constructing steel railroad bridge....	13,000.00	12,815.00

BRIDGE—Combination reinforced concrete and structural steel bridge in California

California—Marin & Sonoma Counties—State. A \$2,309,498 contract was awarded Ben C. Gerwick, Inc., and J. H. Pomeroy & Co., Inc., for construction of a combination reinforced concrete and structural steel bridge over Petuluma Creek near Black Point, construction of detours and grading of bridge approaches.

(1) Ben C. Gerwick, Inc., and J. H. Pomeroy & Co., Inc.....	\$2,309,498
(2) Judson Pacific Murphy-Kiewit.....	2,670,890
Chas. L. Harney.....	2,710,166

	(1)	(2)
25 ea. Portable timber barricades.....	\$ 40.00	\$ 20.00
1,000 lin. ft. Removing traffic stripes.....	.50	.20
Lump sum Removing existing bridge.....	20,000.00	115,000.00
Lump sum Clearing & grubbing.....	10,000.00	42,000.00
Lump sum Dev. wat. sup. furn. wat. equip.....	6,000.00	6,000.00
2,700 M gal. Applying water.....	3.00	.05
71,880 cu. yd. Roadway excavation.....	.50	.72
990 cu. yd. Structure excavation (Type "A").....	20.00	11.00
545 cu. yd. Structure excavation.....	6.00	3.75
100 cu. yd. Structure backfill.....	5.00	5.50
2,600 cu. yd. Ditch & channel excavation.....	1.00	1.10
335,000 sta. yd. Overhaul.....	.01	.005
3,800 ton Imported subbase material.....	4.00	3.25
8,600 sq. yd. Mix., spread, & compacting C.T.B.	.40	.33
440 bbl. Portland cement.....	6.00	6.40
20 ton Asph. emul. (curing sl., pt. bdr. & med. sl. ct.).....	70.00	55.00
55 ton Screenings (seal coat).....	10.00	8.60
165 ton Paving asphalt (P.M.S.).....	40.00	8.80
3,315 ton Mineral aggregate (P.M.S.).....	10.00	8.80
130 cu. yd. Class "A" concrete (footing block).....	50.00	55.00
Cont. sum Class "A" concrete (bridge) (3,400 cu. yd.).....	225,000.00	253,120.00
Lump sum Class "A" conc. (fts., bents 6 to 25, incl. & caps, bents 26 to 29 incl.)...	129,500.00	115,000.00
264 ea. Furn. precast prestress. conc. girders...	2,305.00	2,320.00
44 ea. Furn. precast concrete girders.....	830.00	900.00
2 ea. Furn. precast prestress. conc. caps (bents 7 & 8).....	7,000.00	9,000.00
22 ea. Furn. precast prestress conc. caps (bents 2 to 6 incl. & bents 9 to 25 incl.).....	5,500.00	7,100.00
8 ea. Furn. precast conc. caps struts.....	1,600.00	1,500.00
264 ea. Erect. precast prestress. conc. girders	200.00	340.00
44 ea. Erecting precast conc. girders.....	100.00	125.00
24 ea. Erect. precast prestress. conc. caps	1,500.00	400.00
8 ea. Erecting precast conc. cap struts.....	500.00	230.00
4,407 lin. ft. Concrete railing.....	6.00	7.00
1 ea. Drop inlet Type A2.....	300.00	300.00
1 ea. Drop inlet Type J.....	300.00	400.00
Cont. sum Bar reinf. steel (bridge) (940,000 lb.)...	132,000.00	150,000.00
518 lin. ft. Furn. 10 in. steel piling.....	4.00	5.25
20,630 lin. ft. Furn. 200-ton bearing piling.....	18.00	20.00

12 ea. Driving 10 in. steel piles.....	100.00	240.00
187 ea. Driving 200-ton bearing piles.....	700.00	635.00
Lump sum Load test 200-ton bearing pile.....	12,000.00	10,000.00
Cont. sum Structural steel (530,000 lb.).....	100,000.00	175,000.00
90,000 lb. Miscel. iron & steel.....	.40	.60
Lump sum Clean. & paint. structural steel.....	6,000.00	10,000.00
Lump sum Treated timber fenders.....	50,000.00	85,000.00
288 lin. ft. Rem. & recon. met. plate guard rail	4.00	2.00
3,700 lin. ft. New property fence.....	.60	1.00
62 lin. ft. 18 in. C.M.P. (14 gage).....	8.00	5.50
38 lin. ft. 24 in. C.M.P. (14 gage).....	10.00	8.50
2 ea. Ent. tapers for 12 in. metal pipe...	50.00	80.00
69 lin. ft. 12 in. C.M.P. downdrains (16 gage)	4.00	5.00
2 ea. Downdrain slip joints.....	50.00	50.00
2 ea. Downdrain pipe anchors.....	30.00	55.00
Lump sum Finishing roadway.....	2,000.00	1,100.00
1,040 lin. ft. Raised traffic bars.....	2.00	2.10
Lump sum Safety equipment.....	1,000.00	900.00
Lump sum Relocat. drawbridge warn. system.....	1,000.00	500.00
Lump sum Navigation lighting equipment.....	5,000.00	4,000.00

HIGHWAY—Construction of 21 mi. of highway and one bridge in New Mexico

New Mexico—Valencia and McKinley Counties—State. A \$571,386 contract was awarded Skousen Construction Co. for construction of 21.6 mi. of highway and one combination concrete and structural steel bridge.

(1) Skousen Construction Co.....	\$571,386
(2) Jack Adams.....	651,133
Allison & Haney.....	651,782
O. D. Cowart.....	652,393

	(1)	(2)
Lump sum Removal of old structures.....	\$9,000.00	\$2,500.00
Lump sum Removal of obstructions.....	200.00	1,000.00
154,625 cu. yd. Excavation—unclassified.....	.20	.22
135 cu. yd. Excavation for structures.....	2.00	2.00
1,045 cu. yd. Excavation for pipe culverts.....	2.00	2.00
11,856 M gal. Watering.....	.50	2.00
575 hr. Rolling (tamping roller).....	6.00	6.00
1,367 hr. Rolling (pneumatic tired).....	4.00	3.00
823 hr. Rolling (steel tired).....	6.00	5.00
875 hr. Fifty (50) ton roller operation.....	6.00	10.00
325 hr. Mechanical tamping.....	6.00	5.00
220,055 sta. yd. Station yard overhaul.....	.01	.02
75,162 ¼ mi. yd. Quarter mile yard haul.....	.05	.04
766,474 ton mi. Ton mile haul.....	.06	.06
13.86 mi. Obliterating old road.....	100.00	100.00
Lump sum Grading.....	2,500.00	2,000.00
12,800 lin. ft. Contour ditches.....	.08	.10
363 cu. yd. Wire enclosed riprap.....	9.00	12.00
6,664 lb. Wire fabric.....	.30	.35
83 cu. yd. Excavation for riprap.....	2.00	5.00
205 lin. ft. Steel stakes.....	4.00	2.00
1 ea. Cattle guard—12 ft. roadway.....	1,200.00	1,200.00
1 ea. Cattle guard—18 ft. roadway.....	1,700.00	1,400.00
10 ea. Cattle guard—24 ft. roadway.....	2,000.00	1,600.00
66,345 lin. ft. Galvanized barbed wire fence.....	.28	.20
17 ea. Gates—Texas type.....	20.00	10.00
130 ea. Bracing.....	10.00	10.00
132 ea. Right-of-way markers.....	7.00	7.00
3 ea. Std. Fed. aid proj. markers, Type I...	50.00	50.00
75 ea. Trtd. tmbr. warn. posts, refl. (6 in. dia.)	7.00	7.00
72,305 ton Controlled gradation sub-base.....	.70	1.20
29,655 ton Base course.....	1.25	1.30
34,395 ton Stabilized base course.....	1.15	1.30
1,875 bbl. Bituminous material, Type MC-1.....	7.00	7.50
2,196 ton Plant mix surface course.....	3.35	3.60
6,205 bbl. Bit. mat., Type 120-150 (plant mix)...	6.50	7.00
472 bbl. Bit. mat., Type 120-150 (track coat)...	8.00	8.00
119.0 cu. yd. Class "A" concrete.....	50.00	70.00
202 cu. yd. Class "B" concrete.....	48.00	60.00
51,113 lb. Reinforcement for concrete structures	.15	.10
54 cu. yd. Grouted rock retards.....	20.00	15.00
842 lin. ft. Culvert pipe—24 in. diam.....	6.00	7.00
764 lin. ft. Culvert pipe—30 in. diam.....	7.50	8.00
1,072 lin. ft. Culvert pipe—36 in. diam.....	10.75	11.50
594 lin. ft. Culvert pipe—42 in. diam.....	14.00	14.00
350 lin. ft. Culvert pipe—48 in. diam.....	16.50	16.00
60 lin. ft. Culvert pipe—54 in. diam.....	23.00	19.00
472 bbl. H.V.M.S. emul. asph. for seal coat.....	9.00	10.00
45 ea. Removing, resetting & repaint. right-of-way markers.....	6.00	6.00
BRIDGE ITEMS		
24 cu. yd. Excavation for structures (bridges)...	5.00	10.00
70.18 cu. yd. Class "A" conc. bridge substructure...	85.00	80.00
44.62 cu. yd. Class "C" concrete (piling).....	50.00	50.00
110.40 cu. yd. Concrete for precast bridge units.....	90.00	110.00
13,455 lb. Structural steel.....	.40	.50
1,472 Closed-end steel pipe piles.....	10.00	9.00

BUILD TO ENDURE WITH CONCRETE

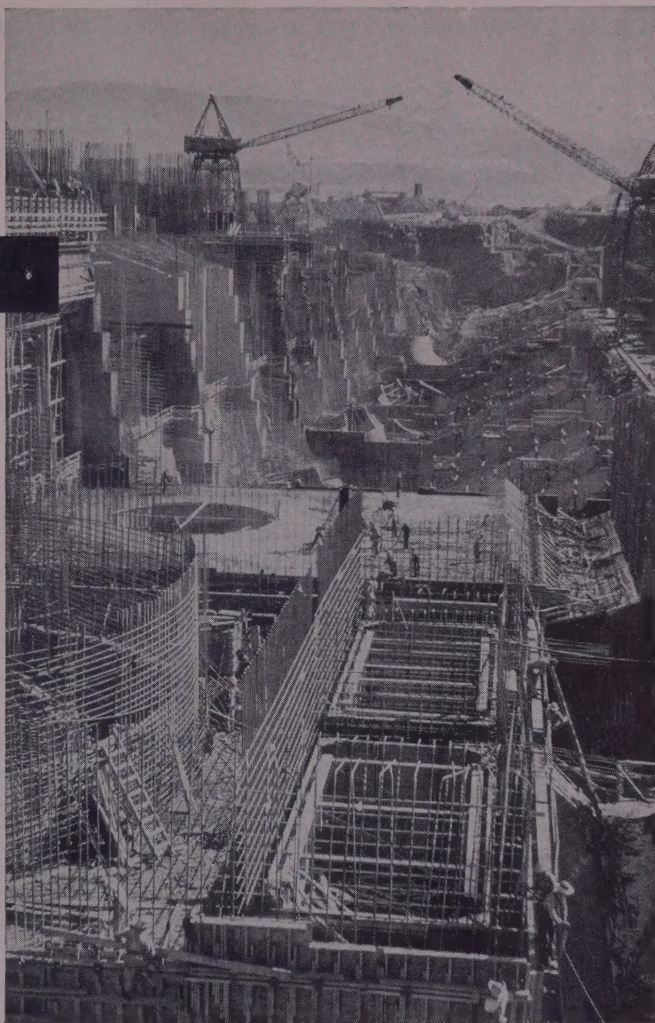
When the ancient Romans invented concrete—by mixing sand and crushed rock aggregates with a crude cement made of lime with an admixture of Pozzolan earth—they created a construction material, which for strength, versatility, durability and economy, has no rival in the building field.

The invention of Portland cement, in 1824, which solved many technical problems in the use of concrete for construction, has made concrete the building stone of the Atomic age.

A constantly growing list of new uses for concrete has also resulted in many improved variations in the basic portland cement formula, as the need for special purpose concretes increases each year. PERMANENTE STANDARD AND SPECIAL TYPE CEMENTS are manufactured in 13 different types—to provide a cement for every construction purpose.

Write for booklet: "Cement Types and Uses," describing Permanente's Standard and special types of cement—with recommended uses.

Address: Permanente Cement Company, Kaiser Building, Oakland 12, Calif.

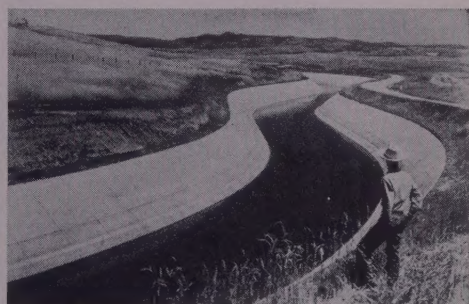


The Dalles Dam, latest unit in the great Columbia Valley complex. Permanente special type cements are being used in its construction.

University of Washington Men's Dormitory. Permanente standard portland cement was used in its construction.



Overpasses on East Shore Freeway, Oakland, Calif. built with Permanente Standard and Modified portland cements.



California's Delta Mendota Canal. Alkaline soil required Permanente Type 2, Low Alkali cement throughout.



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

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HIGHWAY—Roadwork and concrete bridge in Utah

Utah—Grand County—State. A low bid of \$348,465 was submitted by W. W. Clyde & Co. for 2.9 mi. of road-mixed bituminous surfacing and construction of one concrete bridge over a 20-ft. span.

(1) W. W. Clyde & Co. \$348,465
(2) Nelson Bros. Construction Co., & D. W. Brimhall. 371,188

	(1)	(2)
629 ton Bituminous material, Type MC-3.....	\$ 42.00	\$ 42.00
95 ton Bituminous mat., Type MC-1 or MC-2.....	42.00	42.00
61 ton Bituminous material, Type RC-4.....	46.00	45.00
142 gal. Bituminous additive.....	2.25	2.50
3,684 mi. Scarifying and mixing.....	1,200.00	1,000.00
707 ton Cover material, Type "A".....	3.50	5.00
707 ton Cover material, Type "A," in stockpile.....	2.25	2.50
3,000 ton Cover material, Type "A," in stockpile.....	2.25	2.50
23,700 ton Gravel surface, Type "B" (stockpiled).....	.95	1.08
10,000 ton Gravel surface, Type "B" (stockpiled).....	.60	.68
2,000 ton Gravel surface, 1/4 in. max. (stockpiled).....	.87	.78
15,500 cu. yd. Gravel base course.....	.90	1.00
25,500 cu. yd. Selected material base course.....	.48	.53
87,300 cu. yd. Unclassified "roadway" excavation.....	.25	.30
226,000 sta. yd. Class "A" overhaul.....	.015	.015
11,700 yd. mi. Class "B" overhaul.....	.15	.15
2,135 M gal. Watering.....	1.50	2.00
640 hr. Rolling, tamping roller.....	10.00	10.00
170 hr. Rolling, pneumatic tire or power roller.....	8.00	10.00
899 lin. ft. 24 in. spec. alk. res. pipe Type "A," if C.M. pipe is used.....	7.65	8.00
278 lin. ft. 30 in. spec. alk. res. pipe Type "A," if C.M. pipe is used.....	9.40	9.60
312 lin. ft. 36 in. spec. alk. res. pipe Type "A," if C.M. pipe is used.....	14.70	14.90
94 lin. ft. 54 in. spec. alk. res. pipe Type "A," if C.M. pipe is used.....	26.70	23.50
200 lin. ft. 72 in. spec. alk. res. pipe Type "A," if C.M. pipe is used.....	41.50	42.00
106 lin. ft. Spec. alk. res. pipe arch 72 in. x 44 in., Type "A".....	34.50	35.00
534 cu. yd. Concrete Class "A".....	71.00	78.00
99,900 lb. Reinforcing steel.....	.155	.16
1,250 cu. yd. Excavation for structures, unclassified.....	2.00	2.50
2.00 mi. Obliteration of old road.....	300.00	733.00
100 cu. yd. Small ditch excavation.....	1.00	1.00
90 hr. Mechanical tamping.....	7.00	6.00
73 ea. Guide posts.....	7.00	8.00
1,316 lin. ft. Deep beam hi-wy gd. rail (conc. posts).....	4.00	3.50
5 ea. Removal of existing struct.....	400.00	6,200.00
1,000 cu. yd. Loose riprap.....	4.00	5.00
34 ea. Right-of-way markers.....	7.00	8.00
6 ea. F.A.P. markers.....	25.00	35.00
Lump sum Furnishing water equipment.....	2,000.00	1,000.00
Lump sum Furnishing construction signs.....	1,000.00	2,000.00
CONCRETE BRIDGE		
400 cu. yd. Excavation for structures, unclassified.....	3.00	4.00
701 cu. yd. Concrete Class "A".....	71.00	75.00
96,550 lb. Reinforcing steel.....	.155	.16
243 lin. ft. Steel handrail.....	12.00	14.00
3,190 lin. ft. Piles (other than timber).....	9.90	7.50
Lump sum Furnishing pile driving equipment.....	2,750.00	1,800.00
1 ea. Removal of existing structure.....	2,000.00	3,500.00

HIGHWAY—Construction of 7 1/4 mi. of highway in Arizona

Arizona—Pima County—State. San Xavier Rock & Sand Co. received a \$387,607 award for grading, draining and bituminous plant mix surfacing 7 1/4 mi. on the Tucson-Benson Highway in Arizona.

(1) San Xavier Rock & Sand Co. \$387,607
(2) Martin Construction Co., Inc. 399,285
Construction Materials Co. 405,218
W. R. Skousen. 412,426

	(1)	(2)
40,050 cu. yd. Roadway excavation.....	\$.30	\$.35
3,050 cu. yd. Drainage excavation.....	.35	.35
16,800 lin. ft. Grader ditches.....	.08	.08
7,100 cu. yd. Structural excavation.....	1.50	.50
1,250 cu. yd. Overhaul.....	.35	.30
138,750 cu. yd. Borrow (CIP).....	.36	.36
Lump sum Provide water supply.....	1,000.00	1,000.00
13,315 M gal. Apply water.....	1.45	1.90
2,265 hr. Rolling.....	8.00	8.50
73,950 ton Select material (CIP).....	.50	.43
29,700 ton Aggregate base (CIP).....	1.05	1.50
2,280 ton Cov. mat. for sl. ct. (Type B) (CIP).....	4.50	4.65
17,550 ton Bit. mix (Cl. II-plant mix) (CIP except cost of liquid asphalt).....	2.30	2.90
705 ton Liq. asph. for bit. mix (gr. SC-6) (CIP).....	38.00	41.00
441 ton Liq. asph. for pr. ct. & tack ct. (gr. MC-2 or MC-3) (CIP).....	49.00	51.00
260 ton Emul. asph. for sl. ct. (gr. B) (CIP).....	45.00	46.50
170 cu. yd. Class "A" concrete (CIP).....	45.00	41.00
343 cu. yd. Class "D" concrete (CIP).....	42.00	44.00
91,760 lb. Reinforcing steel (bars) (CIP).....	.13	.13
278 lin. ft. 18 in. C.M.P. (CIP except excav.).....	3.75	4.75
572 lin. ft. 24 in. C.M.P. (CIP except excav.).....	5.60	6.44
144 lin. ft. 30 in. C.M.P. (CIP except excav.).....	6.70	7.50
362 lin. ft. 36 in. C.M.P. (CIP except excav.).....	10.50	10.70
200 lin. ft. 42 in. C.M.P. (CIP except excav.).....	13.00	12.50
78 lin. ft. 48 in. C.M.P. (CIP except excav.).....	15.00	13.60
130 lin. ft. 29 in. x 18 in. arch Type C.M.P. (CIP except excavation).....	5.90	6.44
192 lin. ft. 36 in. x 22 in. arch type C.M.P. (CIP except excavation).....	9.50	7.50
1,680 lin. ft. Furn. & drive steel H-column piles (10 in. x 42 in.).....	7.40	8.00
2,000 lb. Cutoff steel H-column piles.....	.10	.10
12 ea. Splicing piles (steel H-column).....	25.00	20.00
3 ea. Cattle guard (3 unit) (std. C-14) (CIP except excavation & concrete).....	850.00	1,000.00
400 lin. ft. Road guard (std. C-7) (CIP).....	4.25	4.25
200 lin. ft. Road guard (spec.) (precurv.) (CIP).....	5.40	4.75
57 ea. Guide posts (std. C-8) (Type BL and BR) (CIP).....	7.00	7.35
51 ea. Right-of-way mkr. (std. C-1) (Type B or C) (CIP).....	9.00	7.65
32,700 lin. ft. Line fence (std. C-16) (CIP).....	.19	.19
6,530 lin. ft. Chain link fence (4 ft.) (cyclone or equal) (CIP).....	1.25	1.15
1 ea. Steel fence gates (std. C-16) (CIP).....	60.00	71.50
4 ea. Steel fence gates (20 ft.) (std. C-16) (CIP).....	70.00	71.50
1 ea. Surv. monu. & cov. (std. C-1) (CIP).....	50.00	50.00
1,206 lin. ft. Single curb (special) (CIP).....	1.60	1.60
420 lin. ft. Bank protection (std. RB-2) (CIP).....	23.00	21.00

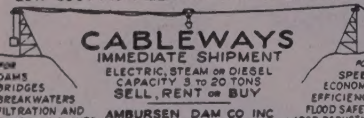
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