



The design, mixing, application, and cost of— Emulsified asphalt slurry seal coats

Latest information is presented on this technique for reducing time and costs in sealing cracks in old asphalt pavements.

MAINTENANCE PERSONNEL on highways and streets have a never-ending challenge to provide the public with surfaces that are both smooth in riding quality and presentable in appearance. One of the most tedious, time consuming, and expensive portions of this work is in crack filling and rejuvenating a weathered surface that is cracked and spalled. Many surfaces which exhibit these characteristics could be revitalized to give many more years of useful service with a suitable means of performing the necessary work. In addition, many miles of pavement that require blanket resurfacing often need a pretreatment to fill cracks before the blanket is placed to prevent subsequent reflection cracking from coming through the new surface.

An emulsified asphalt slurry seal coat provides an inexpensive means of accomplishing these results. The purpose of the application is to prevent moisture and air from entering

a pavement, to fill all existing cracks and local depressions, and to rejuvenate or enliven a weathered surface.

About a year ago the Los Angeles County Road Department was concluding extensive field testing of pre-mixed slurry seals, and had developed satisfactory equipment and procedures. At that time Western Construction published one of the first complete reviews of the subject in the issue of April 1955.

The present article brings the subject up to date with authoritative information obtained from The Asphalt Institute, Pacific Coast Division.

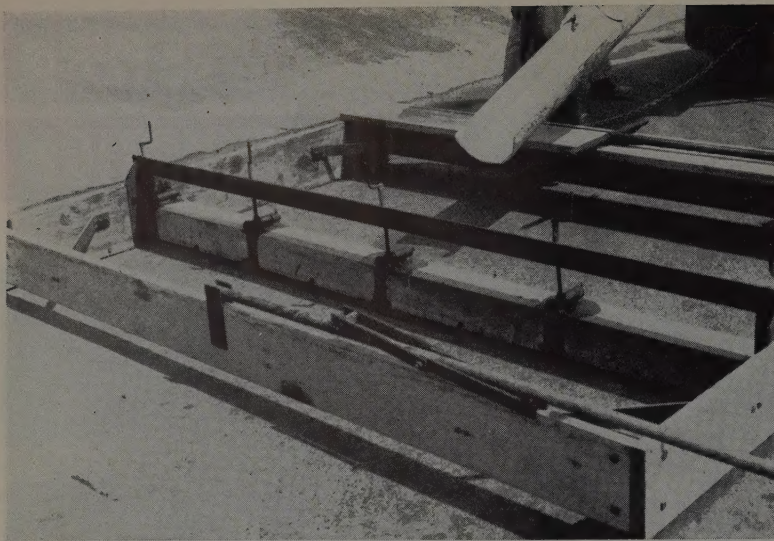
Editor

Specifically, the slurry seal was adapted by the Los Angeles County Road Department for sealing old asphalt pavements that were fundamentally sound but were cracked and spalled or were traffic worn. The slurry, properly mixed and applied, will fill and seal cracks and spalls, thus extending the life of the pavement or provide a sealed, well integrated surface on which to place a blanket of asphaltic mix.

It should be pointed out that while the slurry seal will fill all cracks completely, hair cracks in the same pattern as the original cracks may appear later on. These hair cracks may disappear under the kneading action of traffic in warm weather if sufficient thickness of slurry has been applied. In addition, these hair cracks can readily be bridged with a chip seal or blanket resurfacing without further reflection if such treatment is anticipated at a later date. In any event, the hair cracks will remain small and give no future trouble.

Design of the mixture

The slurry seal consists of a mixture of fine sand or crusher dust, or



SPREADER boxes as yet are mostly shop-built with design based on field experience. A typical one may have a wooden frame of 10-ft. width, with a squeegee of two layers of neoprene belting. This rubber blade can be raised and lowered at the quarter points with simple hand screws. A pipe hand rail is a fancy touch, and a plank across the top provides a stand for the operator.



SLURRY from the transit-mix truck is poured in as the screed is towed forward by the same truck. Note the consistency and the uniformity of the mix. Sand used for aggregate will all pass the No. 8 sieve.

a combination of both, with a mixing type emulsion (SS-1 or SS-1h) and water to form a very wet slurry. Specification SS-1h is the new designation for emulsified asphalt formerly denoted by the symbol SS-2. A minimum of 6% of rock dust passing the 100 mesh is essential in the aggregate. Considerable success has resulted by having approximately 50% of a batch (by dry weight) consist of plaster sand. A commercially produced rock dust with the following grading has been successful when used 50-50 with plaster sand:

Sieve Size	Per Cent Passing
20	100
30	91
50	54
100	20
200	3

A combined aggregate grading as follows is recommended:

Sieve Size	Per Cent Passing
8	95-100
16	70-95
30	50-70
50	30-50
100	10-25
200	3-10

Slurry seals have been placed with aggregates having as high as 15% passing the No. 200 sieve with some degree of success. If such aggregates are contemplated for use, however, the material should be non-plastic as determined by the Plasticity Index Test (ASTM Designation D 424-54T) or have a Sand Equivalent value of 40 or higher (California Division of Highways Test Method No. 217-A). In addition, short test sections should be tried to be assured of results before full scale operations are started.

Either SS-1 or SS-1h can be used successfully. In general, it is more satisfactory to use SS-1 in cooler weather and SS-1h in warm weather, but either type can be used within the normal working ranges of air temperature recommended for asphaltic construction.

Quantities for a typical batch consist of 25 gal. of water and 47 gal. of emulsion for each ton of aggregate (based on dry weight of aggregate). The exact amount of ingredients is not critical as the proper quantity of

each will depend upon the nature of the aggregate and the desired consistency. The desired consistency will depend on weather conditions, pavement surface, and type of aggregate.

As an example, if a very fine aggregate is used, more emulsion and water are needed than for a coarser aggregate. With fine aggregate, however, greater care must be exercised in order that too much asphalt does not remain after the slurry has cured. Actually, a wide range of fine aggregates will perform satisfactorily as long as proper consistency and asphalt content is maintained.

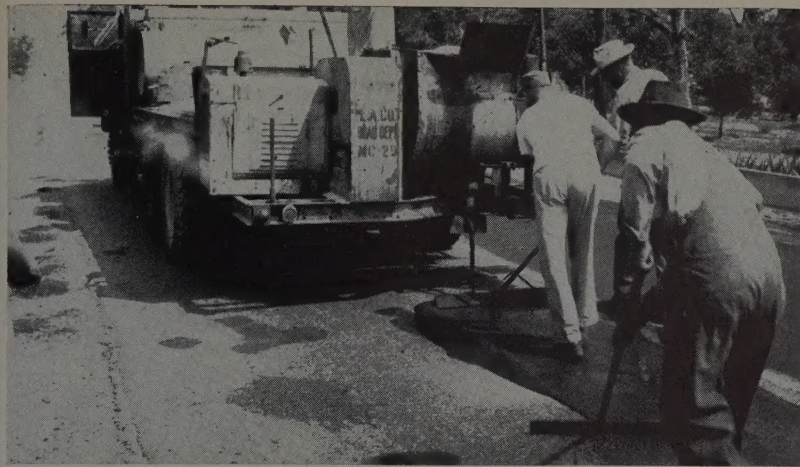
Transit-mix truck used

The mixture can be made in a transit-mix concrete truck for large operations or in a conventional plaster mixer for patch work in small quantities. The transit-mix truck is favorable for capacity and ease of operation. In addition, the ingredients can be stored at a common point, combined in accurate amounts there and mixed en route to the job site. The following is a sample batch for

RESULTS obtained with a slurry-coat seal are shown in these before-and-after views. The smoothing up of the rough-riding surface is obvi-

ous, and the improvement in appearance is equally important. In warm, dry weather slow traffic can be allowed on in 2 hr.





FOR SMALL JOBS the slurry can be mixed in small batches, poured and squeegeed by hand. Emulsion and water are blended in the mixer first, and then aggregate must be added slowly to prevent balling or lumping.

use with a 3-cu. yd. transit-mix truck:

Rock Dust	3,000 lb.
Plaster Sand	3,000 lb.
Emulsion (SS-1h)	140 gal.
Water (amount variable)	80 gal.

Constant observation and care must be exercised in proportioning, adding material, and mixing the slurry. The first step is to blend the emulsion and the water into the mixer. The next step is to add the aggregate in the proportions desired, at a slow and uniform rate while the mixer drum is rotating, so as not to cause any balling or lumping. A large amount of aggregate, especially if it is dry, dumped into the blend of emulsion and water in a few seconds can cause difficulties. Charging the transit-mix truck by a conveyor belt is ideal for this purpose; however, careful charging direct from a batch plant will also be successful. This step should take from 1 to 2 min. for a 6,000-lb. batch.

After all the ingredients are in the mixer, they should be mixed together for a minimum of 5 min. Mixing can continue for almost an indefinite period as long as too much moisture does not evaporate from the slurry. The mixture can be tempered with additional water as needed to maintain sufficient water content. If aggregate is wet, only a small amount of water is needed with the emulsion initially. The mixture, however, should not be allowed to become too dry or stiff during the mixing; if necessary, a measured amount of water can be added to temper the mix to proper fluidity and homogeneity before adding the balance of the aggregate.

During the entire mixing process, no breaking, segregating, or hardening of the emulsion, nor balling, lumping or swelling of the aggregate must occur. The slurry, ready for application, should be a smooth, free flowing, homogeneous mixture. If breakdown of the emulsion occurs during proportioning and mixing, the condition cannot be corrected by

further addition of water. Due to severe mixing characteristics of transit mixers, the drum should be allowed to rotate at the slowest possible speed while in transit.

Application procedure

Application of the slurry on the surface to be treated is simply a dumping process. The mixture is then spread by means of long-handled squeegees for coverage of small areas or chuted into a spreader box which is dragged behind the truck and spread evenly to the desired thickness. A neoprene rubber squeegee, the width of the desired spread and with hinged, adjustable sections, is built into the spreader box to distribute the slurry over the surface. It is desirable to have means for making vertical adjustments to the squeegee in order to allow for variations in pavement crown and to obtain the desired thickness of the slurry. A working drawing of a spreader box may be obtained from offices of The Asphalt Institute, Pacific Coast Division, in San Francisco, Seattle, Los Angeles, and Sacramento.

Before applying the slurry, all pot holes, rocking, and badly distorted areas should be properly repaired. Immediately prior to applying the slurry, the pavement surface should be thoroughly cleaned, broomed, and dampened with a light application of water, to insure coverage and proper bond. The slurry is then poured from the mixer onto the pavement inside the spreader box for application. Transit-mix truck operators should follow the standard practice of rinsing out the drum thoroughly as soon as a pour is completed. If this procedure is followed, no difficulty will be experienced in keeping the mixer drum clean.

The slurry seal is usually applied in an average thickness of 1/16 to 1/8 in. but may vary in thickness up to 1/2 in. depending upon pavement surface irregularities. If a somewhat thicker layer is desired, it should be

placed in two thin courses with adequate setting-up time between applications.

Traffic control should be maintained until a partial set of the slurry has been obtained. Except for heavy thicknesses, slow traffic may be allowed on it in warm, dry weather in less than two hours without damage to the seal, while fast traffic should be kept off for at least three hours.

Cost data

Cost of placing an emulsion slurry seal coat will vary with the aggregate, type of equipment, size of project, condition of pavement, and thickness of slurry desired. For strictly a crack-filling operation using transit-mix trucks with the squeegee tight against the pavement, less material will be used and costs approaching \$.002 per sq. ft. can be anticipated. For spreads having an average thickness of 1/16 to 1/8 in. the costs will be about \$.004 per sq. ft. For small patching operations done by hand methods, costs might go as high as \$.02 to \$.03.

These figures include labor, equipment, material, and overhead. By using transit-mix trucks in a well planned and organized operation, approximately 50,000 sq. ft. of 1/16 to 1/8-in. slurry seal can be placed per hour resulting in lower unit costs.

Conclusions

Applied in just one pass, the slurry seal gives a new, uniform, pleasing appearance to the pavement. By eliminating cracks and minor depressions, the riding qualities of the pavement are improved and an extension of the service life of an old pavement is accomplished.

This treatment must not be thought of as a cure-all, nor as a substitute for a blanket resurfacing of hot-mixed asphaltic concrete, but rather as an addition to the seal-coat family that provides an excellent and inexpensive means of rehabilitating many old but structurally sound pavements.

This authoritative review of a very current highway subject is based on information supplied by the headquarters office of The Asphalt Institute, Pacific Coast Division, San Francisco. B. A. Vallerger is managing engineer.

Utilities expand

California utilities have invested more than \$3,000,000,000 in plant facilities since 1946 to keep pace with the state's growth in population. About 70% of the total investment in plant facilities of utilities serving electricity has been put into service since the end of 1945. Gas companies have financed 71% of their total plant since 1945. In the telephone industry 91% of today's total investment in plant throughout California is for construction since 1945.



DRILLING an 18-in. hole for a timber pile that will be frozen into the permafrost. Refrigerating pipes are attached to the pile, the hole filled

with a sandy-silt slurry and frozen. The result is a direct supporting column extending from load down to the permafrost.

Alaska's frost and food problems

Engineers have to contend with permafrost in designing foundations and contractors find that food provides the key to getting and keeping efficient and satisfied crews. Morrison-Knudsen crews feed well at Bethel, an isolated outpost where timber piles are refrigerated.

ARCTIC CONDITIONS create foundation and food problems. The first are met by engineers through the development of specialized techniques to support loads directly on the permafrost. The second problems are solved by experienced "bush" contractors with heavily loaded tables of fine meals to maintain efficient and full crews during winter months in isolated camps. A typical example of this peculiar combination of construction problems in Alaska is illustrated by a Morrison-Knudsen job where foundations are being placed this winter on a Corps of Engineers' contract at Bethel. Timber piling will be installed in holes drilled down into the permafrost and the silt slurry will be refrigerated. Bethel is located on the Kuskokwim River on the western coast of Alaska where the river enters the bay by the same name.

Experienced hands on the job

Morrison-Knudsen Co., Inc., an old Alaskan hand on tough, remote construction, has joined with Peter Kiewit Sons' Co. to construct the Bethel project under contract with the Corps of Engineers. This Air Force

installation on the banks of the Kuskokwim River is another addition to M-K's long string of remote jobs in the Arctic. This contractor started specializing in lonely, off-the-beaten-path Alaskan construction during World War II and has carried on the tradition ever since.

Since 1946, fourteen "bush" jobs have been completed—Cold Bay, Northway, Aniak, St. Lawrence Island, McGrath, Cape Lisburne, Cape Romanzoff, Wales, Galena, Naknek, and a former project at Bethel. At the present time, this firm has three remote military bases under construction—King Salmon, Middleton Island, and this refrigerated Bethel installation. The Bethel project is one of seven similar Air Force stations, contracted by the Corps of Engineers, Alaska District, in 1955, at isolated locations.

Drilling holes for piles

This winter, Morrison-Knudsen is drilling 18-in. holes for the 30-ft. wooden piles in the permafrost. Several drilling tools were tested in the field to select the most efficient equipment. It was decided to use a special McCarthy auger (Salem Tool Co.),

equipped with an "Alaskaug" drilling head. This tool has four cutting surfaces with square carbide inserts that can be reversed to utilize the other sides. Then the head can be shifted into an upside-down position to provide more cutting surfaces. As frozen silt is highly abrasive, drilling into this frozen soil causes excessive wear on any cutting heads.

After holes are drilled, piles with refrigeration piping attached will be lowered. Thermacouples will be installed on some selected piling to check on the freezing action. Then a sandy-silt slurry will be pumped around the piles as backfill. Finally, refrigeration equipment will freeze-in the piling.

Can be re-frozen

Control boards will be connected to the thermacouples to regulate the artificial freezing process, and also will be used to check on foundation conditions after the base is in operation. The contract does not call for a refrigerating unit to be included in the permanent installation by the contractor, but necessary provisions are included so that freezing equipment can be installed by the Air Force after the base is occupied, in case of foundation thawing.

Aside from the novel foundation treatment, Morrison-Knudsen's Bethel project presents the usual "bush" job headaches that cause some contractors to dodge bidding on the remote sites. Many factors have to be considered.

Scheduling the movement of equipment and materials to the far-away place is a very important factor in keeping a job on schedule. Bethel is a good example. Ships can only enter the Bering Sea from June until September, due to the Arctic ice pack. Alaska Steamship Lines have only one boat a month to this area during this short summer season. These ships can sail up the Kuskokwim River to the CAA airport across from the town of Bethel. Then materials and supplies have to be unloaded and barged across the river.

Planes are necessary to supplement water transportation for perishable groceries, take-off omissions, unforeseen emergencies, repair parts for equipment, and personnel. Morrison-Knudsen has solved the air-freight and personnel problem by putting their converted B-24 bomber on their Alaskan "bush" run, connecting the going jobs of Middleton Island, King Salmon, and Bethel with weekly trips.

Planning the job

According to M-K executives, an isolated construction camp must be given much more thought and planning than the housing for crews in settled areas. It is necessary to plan work far enough ahead so that a chart can be compiled on how many men will be housed and fed and during what months. As Bethel is carrying on piling operations this winter, cold weather insulation and heating facilities for 50 deg. below zero temperatures are required. Water and sewer lines have to be heated. An ample reserve storage of water is necessary in a deep-freeze camp. The extra supply of drinking water is a



TIMBER PILES frozen by refrigeration into sockets drilled into permafrost. This view is of an installation similar to the one now under way at Bethel. The piping for the refrigerant leads to pipes fastened to the pile before it is placed in the hole.

safety factor in case the water source freezes in extreme cold.

Maintenance of equipment is a major "must" on a remote site as the superintendent cannot get on the phone and rent another bulldozer in a few minutes and have it on the job the next day as in stateside construction. Precision planning enters the equipment picture in trying to determine the correct number of spare parts needed. Too many parts will cause costly warehouse enlargements. But, if the job runs short, expensive rush air freight from the states runs up the project costs at an alarming rate.

Another important factor in running a smooth remote installation is

the material take-off. This must be very accurate, triple-checked, and expedited. The job has to start on schedule, and the materials, shipped by water from Seattle, must be on the job-site before a wheel turns to make the progress curve climb. Naturally, this bill of materials must be free of errors if the contractor does not want the curve to dive into the red.

Personnel and feeding

All the above factors are important in Morrison-Knudsen's successful operations of isolated projects, but their method of picking personnel and running the construction camp is a vital point in "bush" building.

ARCTIC WINTER day produces an eerie light for this construction scene. At the right is the drilling rig with the 18-in. McCarthy auger. At the

left the Worthington mixer prepares the slurry that is dumped in to fill the holes after the piles are placed.





FIVE MILES of access road had to be built across the tundra to reach the job site. The 3-ft. depth of sand fill placed as a base kept the heavy

equipment from disturbing the tundra that, in turn, would have softened the underlying permafrost which is the real foundation.

Men come and go on remote sites even under the best conditions. Turn-over can be terrific with accompanying transportation costs. M-K prefers to hire construction workers who have had previous experience, have proved themselves to be good, efficient workmen, and have a record of standing the isolation and not quitting under adverse weather conditions. One laborer, Chris Kay, has worked exclusively for Morrison-Knudsen fourteen straight construction seasons in Alaska. Most of M-K's "bushmen" have been employed by the company four or five years on an average.

Next to the superintendent, the most important man on an isolated project is the head cook. M-K hires top chefs and turns them loose to please the men, work up their own menus, and do their own ordering of food supplies. Fancy groceries are common occurrences on the messhall tables. Steaks are standard equipment. Excellent pastry and homemade bread and rolls are prime requisites. Remote site workers take their food seriously and will quit quickly if the cookshack fails to provide variety that is both wide and good.

Morrison-Knudsen employees claim that the company puts out the best meals of any contractor in the "bush" and that they have on their payroll the best camp cook in Alaska—Andy Anderson. They still talk about his food at the Indian Camp on the Alaska Railroad project. Men seem to get along without women for a summer season, but good food is a "must" to keep them happy.

A typical M-K Sunday supper illustrates their camp policy—it might be chicken chow-mein, chili, and enchiladas as main dishes to give variety to the menu after a heavy turkey dinner with all the trimmings at noon. Now and then, sirloin steak is served with the eggs at breakfast to break the monotony of the customary ham, bacon, or sausage. A good soup is a regular requirement at noon, and hotcakes as an extra at breakfast. Fresh

fruit is served as often as possible to give the men something to have between meals.

Transportation is by air

Another factor, not present on stateside construction, is common to Alaska's isolated jobs. In building a project at a remote site, the air lanes are the only available means for transporting men into and out of the work locations. According to George Nourse, one of Morrison-Knudsen's project engineers in Alaska, travel-time wages, subsistence, and quarters are always included in the bidding of a "bush" job.

Moving into Bethel

This \$4,053,457 Bethel project, bid jointly by Morrison-Knudsen and Peter Kiewit and run by M-K, received its notice to proceed from the Corps of Engineers, June 23, 1955.

The first barge load of equipment landed at the site August 1. Workers were flown from Anchorage and housed at the Bethel roadhouse to unload the barge. On August 8, camp supplies and building materials were docked by a second barge. The first barge returned to Anchorage and came back to Bethel with more equipment and supplies August 20. A third barge brought in materials the last of October—important items that will be needed in the spring of 1956 before commercial shipping can get into the Bering Sea. Insurance is void if boats go through the Akutan Island pass before June 1 because of the danger of the ice pack.

The first job operation was building a temporary construction camp at the beginning of a 5-mi. road to the base site. This road was principally sand spread over the tundra with a minimum 3-ft. fill. The tundra was not stripped as it provides excellent insulation to prevent thawing of the permafrost.

Drilling holes for the piling started in November. The main problem

during the first few weeks was keeping the drilling rig from freezing and halting operations. Winter work in the Far North is rugged, but Morrison-Knudsen is counting on their "old Alaska hands" and their "bush" know-how to complete this Bethel job on schedule by December 1956.

Supervising the job

The Morrison-Knudsen and Peter Kiewit project at Bethel, Alaska, is being handled by the M-K organization. The Seattle office has the following key personnel: Don Guiley, materials and sub-contracts; Arthur Stelzman, purchasing agent, transportation and materials expeditor; William Bunche, shop drawings.

Actual construction comes under the Alaska District Office: Aner W. Erickson, district manager; Walter W. Harfst, assistant district manager; William H. McClaskey, district engineer; Kip Ransdell, equipment superintendent; H. M. Haugen, district office manager; project engineers—Vincent J. Doran and George W. Nourse; Don Johnson, district purchasing agent.

In the field, the following are on construction: Mel Evenson, general superintendent; Hal Fackler, earthwork superintendent; Harry J. Pursell, office and camp manager; Ralph Morava, project engineer.

The Corps of Engineers, Alaska District, U. S. Army, has the design, administration, and inspection of the contract, with Col. Carl Y. Farrell, district engineer; Warren George, chief of design; Malcolm R. Gilpin, chief of construction; Robert B. E. Prescott, chief of projects North; Harold D. DeWitt, project engineer. A. C. Steinwandel is chief of construction; Frank Russell and John Ireton, geology and permafrost; Milon Essoglov, site engineer and F. Kitz, frost effects laboratory.

Photographs used to illustrate this article were made available by the Alaska District, Corps of Engineers, U. S. Army, Anchorage, Alaska.

San Francisco's Southern Crossing

Construction of three 5800-ft. long underwater tubes would be feature of proposed second Bay crossing. Total project including approach freeway would cost \$327,525,000, could be let for bids this year. Exhaustive engineering report describes plan in detail.

THE CONTROVERSIAL second crossing of San Francisco Bay came a step nearer realization with the completion of an extensive engineering study in December 1955. The report describes the Southern Crossing, a mole fill-trestle-tube affair, which would cost \$327,525,000 to build and which could be opened to traffic in 1961. The report was presented to the California Toll Bridge Authority by the California Department of Public Works, which spent two years in its preparation.

Covering 124 pages and including 18 tables and 53 fold-out engineering drawings, the report covers all aspects of the project, including planning and construction schedules, historical information, and a detailed

analysis of traffic and revenue prepared by the consulting firm of Coverdale and Colpitts. This article will be concerned mainly with abstracting that section of the report dealing with the construction of the underwater tubes.

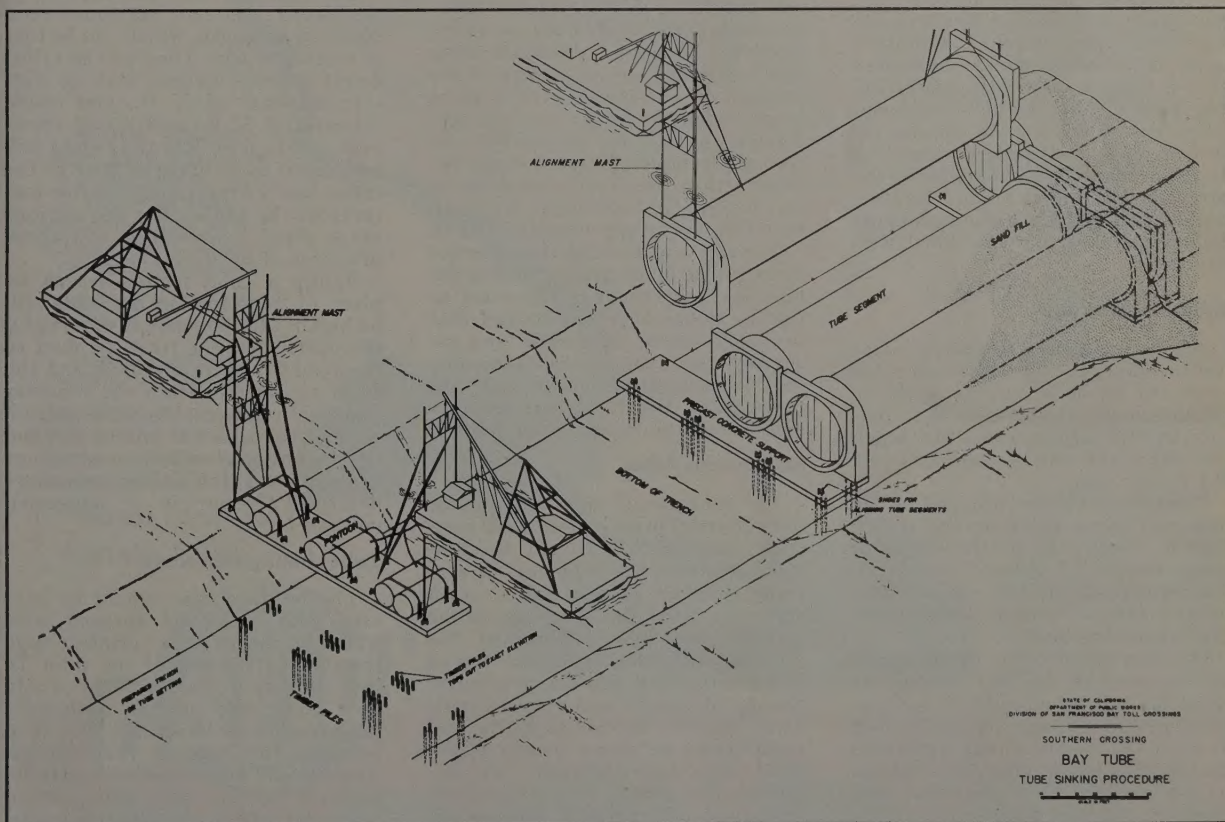
The proposed structure would run from the vicinity of Third and Army Streets in San Francisco to Bay Farm Island south of Alameda. It would provide 25 mi. of freeway for transbay traffic. In order to finance the project in its entirety it would be necessary to charge a 35c auto toll and raise the toll on the Bay Bridge from 25c to 35c. When the proposal comes up before the legislature in March it is expected that efforts will be made to keep the tolls at 25c by

eliminating some of the freeways and approaches at each end of the crossing. This alternative is covered in the report.

The 7.5-mi. transbay section, excluding the approach structures, is the most interesting aspect of the project from a construction viewpoint. It consists of two 3-lane roadways carried on mole fills and trestles, and two-lane roadways in each of three tubes 5,800 ft. long under the navigation channel.

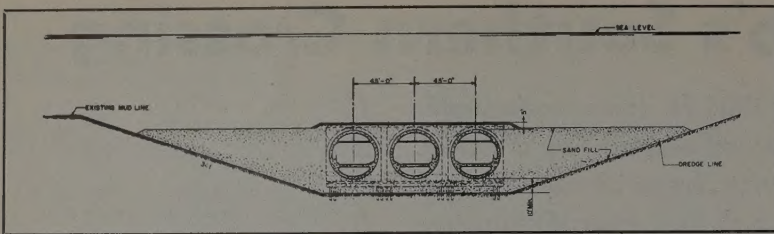
Two large artificial sand islands will be constructed, one on each side of the main shipping channel. Connecting these islands will be the three subaqueous tubes. The tubes will provide a minimum of 50 ft. clear depth of water for a distance of 1,500 ft. Vehicles will reach the islands from the San Francisco shore via a low trestle viaduct, and from Bay Farm Island over first a filled mole causeway and thence a low trestle viaduct.

Building the large islands in the relatively soft Bay bottom mud presents a formidable problem which is greatly complicated because settlements after construction must be



TUBE SINKING procedure involves bulkheading both ends of the tubes and covering the roadway slab inside with sand so that the tubes would float right side up. When the tubes are in position water would be sprayed on the sand by means of sprinklers at the top of the

tubes, gradually increasing the total weight. The sand prevents rapid shifting of the ballast water, assuring level sinking. Precast concrete slabs to support each tube joint would be sunk by slowly admitting water to pontoons tied to the slabs.



CROSS SECTION shows the shape of the dredged trench and the sand fill. The trench has side slopes of 3 to 1, is 7700 ft. long, and 60 to 70 ft. deep measured from the mud surface. In places excavation will be 145 ft. below sea level.

minimized. If these settlements are large, the tubes may be subject to serious damage or destruction. The development of an assured solution to this problem was given much time and effort by the staff of the Division and the board of consultants in 1948, and subsequently by the present staff and the present consultants. The plan outlined below was adopted after all other acceptable proposals were found to be less satisfactory.

The first step will be to dredge a trench in the Bay mud in which to place the sand fill and tubes. This trench will be approximately 7,700 ft. in length, 60 to 70 ft. deep measured from the mud surface, and will vary in bottom width from 140 to 350 ft. Side slopes will be three horizontal to one vertical. In places, excavation will reach a depth of 145 ft. below sea level. Laboratory analysis of boring samples indicated that a three-to-one ratio represents the steepest slope at which the trench sides will stand at the depths required and not slough into the trench. This slope is controlled by the strength of the soft mud and its ability to stand up without support before the trench is backfilled with sand.

Silting not serious

Silting up of the subaqueous excavation before the sand is placed is not expected to be a serious problem. Studies made available to the Division in 1948 indicated that the trench will fill at the rate of approximately 0.4 ft. per year.

Areas suitable for disposal of the material excavated from the trench will be designated by the Corps of Engineers, U. S. Army. Sand to fill the trench and build the embankment is available in various locations in San Francisco Bay.

As soon as a position of the trench is excavated in the Bay bottom, the sand fill will be placed. As early as possible the sand islands will be built to their full height, which in places is as much as 160 ft. above the bottom of the trench. This procedure will produce the maximum initial settlement in the shortest reasonable time. During this stage of construction the fill in the trench near the center of the channel will be carried only to the elevation of the bottom of the

tube sections. In this location, the ultimate additional load on the bottom of the trench is small and consolidation is not a serious problem.

Below the mud line there will be no difficulty in confining the sand as it is deposited in place. Above the Bay bottom, however, confining embankments must be placed around the areas to be filled to prevent the sand from flowing away. These will be built of rock and placed in five-foot lifts. Careful placement will be accomplished below the water level by discharging the material from buckets or pises.

Settlement must be uniform

A total additional settlement of one foot after the tubes are in place will not cause damage to the tubes providing this settlement is fairly uniform. Greater subsidence than one foot or an abrupt change in the amount of settlement over a short length might cause serious damage. Analysis of samples obtained by the recently completed test borings indicates that the total settlement in the materials underlying the deep sand fills will be approximately 2.5 ft.

The rate and amount of this settlement will be much greater during the first few years than in the years to follow. It has been determined that probably within 18 months and assuredly within two years all but one foot of the total settlement will have taken place. When this has been accomplished the tubes can be built.

Subaqueous tubes

The subaqueous tubes will consist of cylindrical precast reinforced concrete sections which will be constructed either in drydocks, in specially dredged casting yards, or in shipways. After the open ends of the sections have been bulkheaded, the sections will then be floated, towed to the site, sunk into the previously excavated trench, and covered with sand backfill. Special supports and connections to secure proper alignment and watertightness are required. The portals of the tubes will rest upon the specially constructed sand islands previously described.

After sufficient consolidation of the sand islands has been accomplished, a trench will be dredged through them to a depth sufficient

to permit placing the precast tube sections. This sand will not be wasted as it will be used to cover the tube sections under the main channel.

The placing of the tube sections is normally started at one end, and the sinking of successive sections extends the tube across the channel. Thus, access to the tube interior is gained from the end at which work is initiated. When a new section is placed and connection made to the previously placed unit, the temporary bulkheads between the last two sections are removed. The bulkhead at the outer end of the last section remains in place until another section is added. In this manner, work on the interior of the tube, including complete finishing of the joints can proceed close behind actual tube placing operations.

Fast construction schedule

The order of work will be so arranged that construction time will be held to a minimum. Dredging of the mud and placing of the sand fill will begin at one portal and proceed toward the other. Consolidation can be completed and tube placing begun at this end while settlement is still taking place under the more recently placed sand. Simultaneously, will be cast and prepared for placing.

The tubes for this crossing will be reinforced concrete sections, each 200.25 ft. in length, which can be cast in local drydocks. They will be cylindrical in cross section, with an outside diameter of 37 ft., and inside diameter of 32 ft., and a wall thickness of 2 ft. 6 in. Roadway slabs will be poured as an integral part of the tubes, but the remaining interior features will be added after the sections are in place. Each section will weigh in excess of 5,000 tons, as cast.

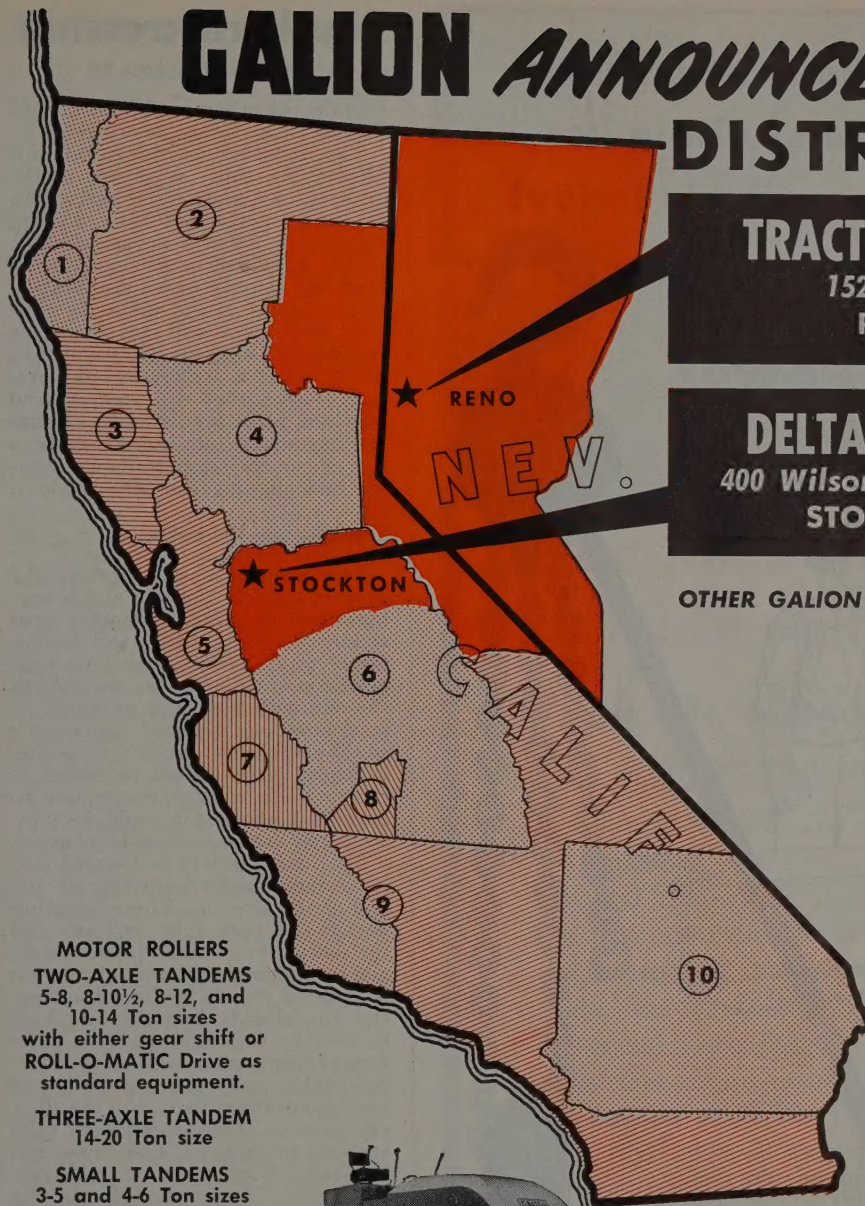
Before a tube section leaves its place of construction, its ends will be bulkheaded to make it watertight, the vents from the fresh air duct to the roadway section sealed, and the fresh air duct beneath the roadway filled with water. After the section reaches the site, the sinking method will be optional with the contractor. Consequently, the sinking procedure described below is a suggested method only.

Tube sinking procedure

The roadway slab would be covered with sand and sprayed with water by means of a sprinkler pipe installed in the top of the tube. In this condition the sections would float right side up and with very little freeboard. When the tube is in position for sinking just enough water would be pumped through the sprinkler system onto the sand to cause the tube to sink. By this means extremely heavy sections can be handled with ordinary floating derricks and barges. This method would tend to prevent one end sinking be-

(Continued on page 32)

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5-8, 8-10½, 8-12, and
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with either gear shift or
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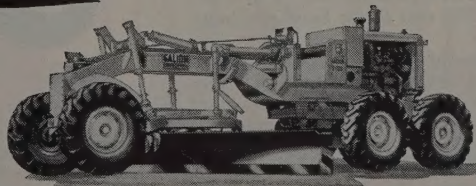
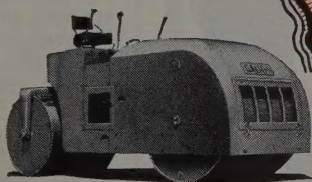
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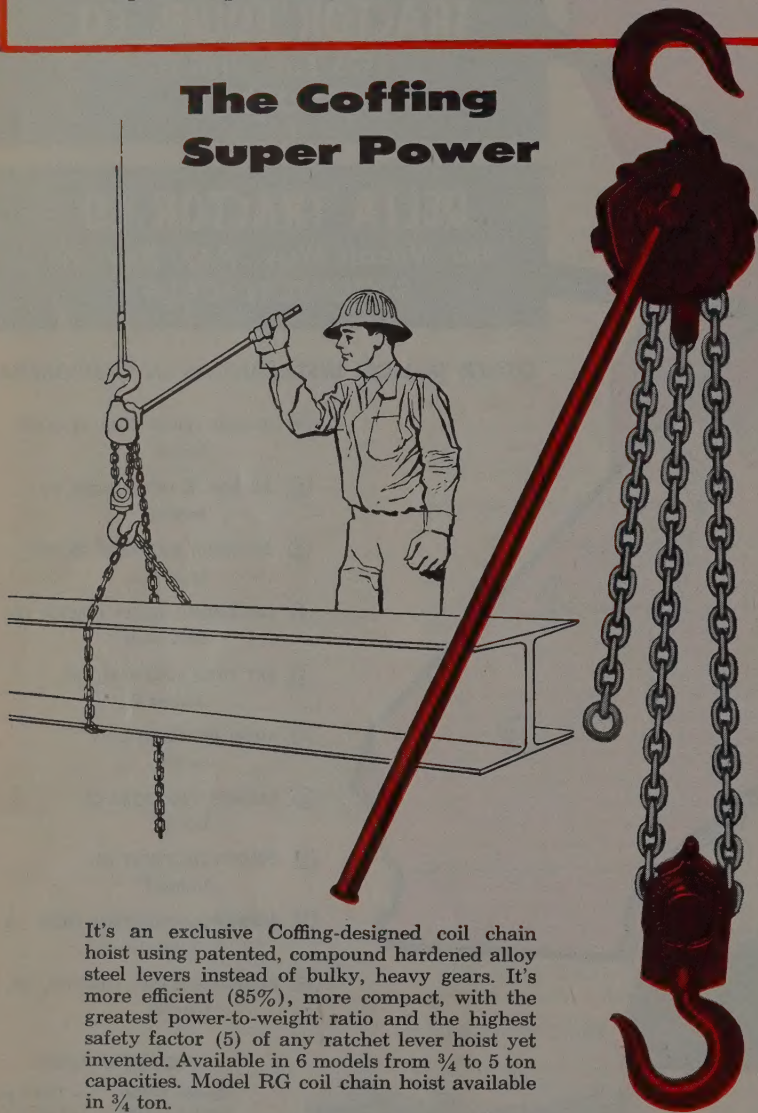
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It's an exclusive Coffing-designed coil chain hoist using patented, compound hardened alloy steel levers instead of bulky, heavy gears. It's more efficient (85%), more compact, with the greatest power-to-weight ratio and the highest safety factor (5) of any ratchet lever hoist yet invented. Available in 6 models from $\frac{3}{4}$ to 5 ton capacities. Model RG coil chain hoist available in $\frac{3}{4}$ ton.

"Safety valve handle" bends at point of maximum safe overload—may be adjusted for length and operated from either side of the hoist—can't spin out of control should operator's hand slip from handle. Every hoist must withstand the shock of its capacity load dropped in increments of 1" thru 4", an impact load of well over 5 to 1. Ask your Coffing distributor for literature or write for bulletin SP, Coffing Hoist Division, Duff-Norton Co., 811 Walter Street, Danville, Ill.

Branch office: 1016 Howard St., San Francisco, Calif.

COFFING HOISTS

Southern crossing

(Continued from page 28)

fore the other because of unbalanced loading or a shifting of weight.

The sequence of operations for placing the tubes is shown in the drawing. All underwater operations are to be performed from floating equipment. First, a group of short timber piles will be driven into the sand bed directly under the location of each joint in the tubes. In general these piles will not penetrate through the sand fill. They will then be cut off at a predetermined elevation. These piles will support and secure in place precast slabs of reinforced concrete into which have been cast shoes for temporarily supporting and aligning the tube sections.

Transporting the slabs

The manner of transporting the precast slabs to the site and lowering them in place is another procedure which probably will be optional to the contractor. One suggested method is to float the slabs to the site with buoyancy provided by steel pontoons fastened temporarily to the slab's upper faces. On the site, sufficient water would be added to the tanks to cause the assembly to sink, and placement could be controlled by cranes mounted on barges.

Tube sections will be lowered into place individually beginning at one end of the crossing. The connecting devices between tube sections and the special shoes on the support slabs are so designed that as each section is lowered it will be forced against the one already in place and held in exactly the right position. The face of one section will carry a special rubber seal which will be forced against a seat on the face of the adjacent section. Thus, when both tube sections are in place, the connection between them will be relatively watertight. The space between the rubber seal and the outer limits of the joint will be filled with tremie concrete.

As the tube sections are placed and connected, the dredged trench will be filled with sand placed under, around, and on top of the tube. The tubes will be covered with a minimum thickness of five feet of sand which will supply additional weight to hold the tubes in place.

Engineering personnel

The board of engineering consultants on this report included Charles C. Andrew, O. J. Porter, and Ralph Smillie. Traffic and financial consultants were Coverdale & Colpitts; legal advisor was Robert E. Reed; bond counsel was George Herrington. Frank B. Durkee is Director of Public Works. N. C. Raab is Project Engineer for the Division of San Francisco Bay Toll Crossings.

Blasting near radios

RECENT INVESTIGATIONS by the La Mesa, Lemon Grove, and Spring Valley Irrigation District in California have emphasized the danger involved when carrying out electrical blasting near radio transmitters. The District has been cooperating with the Pacific Telephone and Telegraph Co. and the Federal Communications office in San Diego in an effort to alert all users of blasting equipment and all users of two-way radios to the danger and to advise them of measures which may be taken to minimize it.

According to the investigations, the wires in an electric blasting cap can act as an antenna to pick up radio energy, so that if the configuration of the wires is just right in the vicinity of a radio transmitter the bridge wires in the cap can be heated to explode the cap. This occurred both accidentally and in test. Radiated power sufficient to detonate caps is transmitted by commercial broadcasting stations and by two-way radios installed in mobile equipment. Many of these installations operate with high wattage 24 hr. per day.

The Los Angeles Department of Water and Power has also studied the subject and has suggested the following four points:

1. Electric blasting caps should not be transported in cars with two-way radio.
2. They should only be transported in their original container and none should have their wires extended.
3. All cars with two-way radios while within 300 ft. of any electric blasting operation should have the transmitter turned off.
4. Only a non-electric blasting method such as blasting cap and fuse, or primacord with blasting cap and fuse should be permitted if within two miles of a commercial station.

Revisions in the State Safety Code are now under consideration. The main points in the proposed revision are as follows:

1. Keep electric blasting caps and conduct blasting operations at distances from operating radio transmitters and antenna equal to or greater than those in this table:

Station wattage	Safe distance (ft.)
30	100
100	200
250	500
1,000	1,000
5,000	2,000
50,000	5,000
	10,000

This table does not apply to radar or international broadcasting equipment which, because of high energy intensity, ordinarily requires even greater distances.

2. At distances less than shown in the table electric blasting shall be avoided. Blasts may be detonated by means of a non-electric method such as blasting cap and fuse.



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Cave-ins of trenches and other excavations can be dangerous and costly. Don't take chances with old timbers or other make-shift devices. See your local distributor for details on prices and delivery of the various types of precision-made, sturdy, Duff-Norton adjustable trench braces and timber fittings . . . or write the world's oldest and largest manufacturer of lifting jacks for bulletin AD-17A. Duff-Norton Company, P.O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

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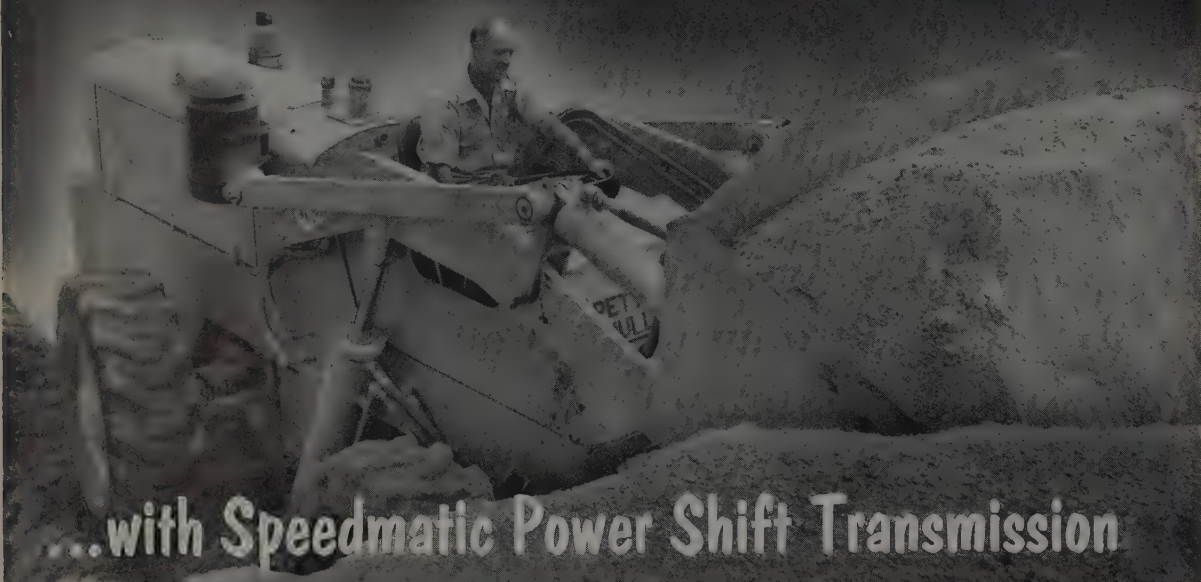
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THREE MODELS WITH STRUCK CAPACITIES OF 1¼, 1¾ AND 2½ YDS.

	Model 125	Model 175	Model 250
CAPACITY — STRUCK — CU. YD.	1¼	1¾	2½
CAPACITY — HEAPED — CU. YD.	1½+	2¼+	3+
HORSEPOWER — DIESEL	77	102	134
WEIGHT	15,830	20,310	25,550

WITH A FULL 2½ CUBIC YARD STRUCK CAPACITY the new Pettibone Speedall Model 250 tractor shovel is more than 20% larger than any other machine on the market. That means a 20% greater payload and a 20% reduction in loading time on any job.

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THE SPEEDMATIC POWER SHIFT TRANSMISSION—standard equipment on all three of the big new Speedalls—completely eliminates the clutch pedal and provides four

speeds forward and four speeds reverse at the operator's fingertips. Reverse speeds are 30% faster than forward speeds.

A FINAL PERFORMANCE PUNCH is added to this package by the Speedall's 17 to 1 planetary drive axles. These are 30% more rugged than any previously used. In thousands of hours of field tests not one axle failure of any type was encountered. If you check actual capacity before buying, you will buy Speedall.

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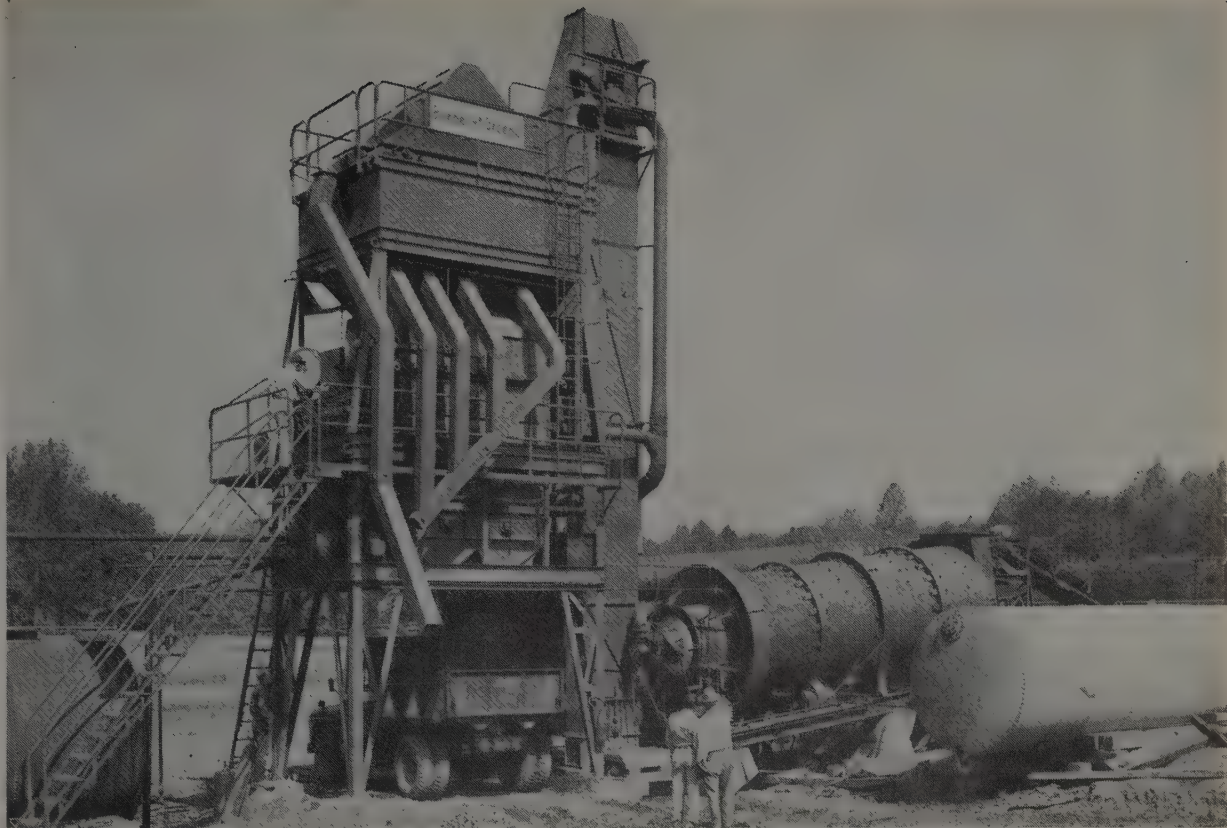
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Now you can choose the capacity that best meets your needs and get the money-making design features that lead the field . . .

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

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

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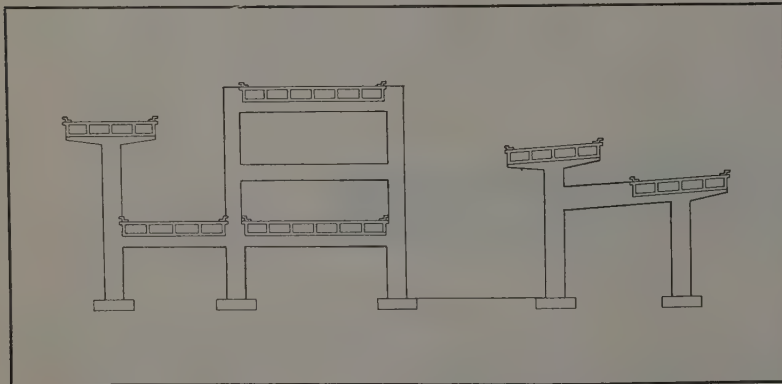
Forest of columns is freeway feature

Concrete columns are mass produced for multi-level structure as San Francisco project nears half-way mark. Light-weight aggregate will be used for decks to keep dead load down.

THE LAST of 183 concrete columns, which will support the elevated roadways of the traffic distribution structure now being built in downtown San Francisco, has been poured as construction on the complex project nears the halfway mark. The \$5,-213,162 contract was awarded April 8, 1955, to a joint venture of MacDonald, Young & Nelson, Inc., and Morrison-Knudsen Co., Inc., and is scheduled for completion in January 1957. The S-shaped structure will be 4,200 ft. long, running between Mission St., Fourth St., and the final approach to the San Francisco Bay

Bridge. In that distance there will be over 4 mi. of variable width roadway. Most of the way there will be 2 or 3 levels, 4 levels at one point, making it the West's largest multiple-level traffic structure outside of the Los Angeles area. At one point motorists will be traveling along over 80 ft. above the ground.

The forest of columns rests on another forest of concrete piles. A total of 2,100 piles have been driven to serve as column foundations. Raymond piles 16 in. in diameter were used. It was necessary to drive some of the piles 97 ft. down to reach bed-



WHILE NO cross-section can be called typical because of the varying nature of the structure, this one indicates how traffic will be carried on many different levels. As can be seen, the decks are of box girder construction and are of various widths. At one point the structure is eight lanes wide.



FALSEWORK remains as side and top forms are removed from beam which stiffens columns between decks. Reinforcing steel extending upward for next lift is 2 3/8 in. in diameter.



WORKMEN stand on shelves supported by steel brackets attached to forms to assist pour. Concrete lifts were usually about 25 ft.

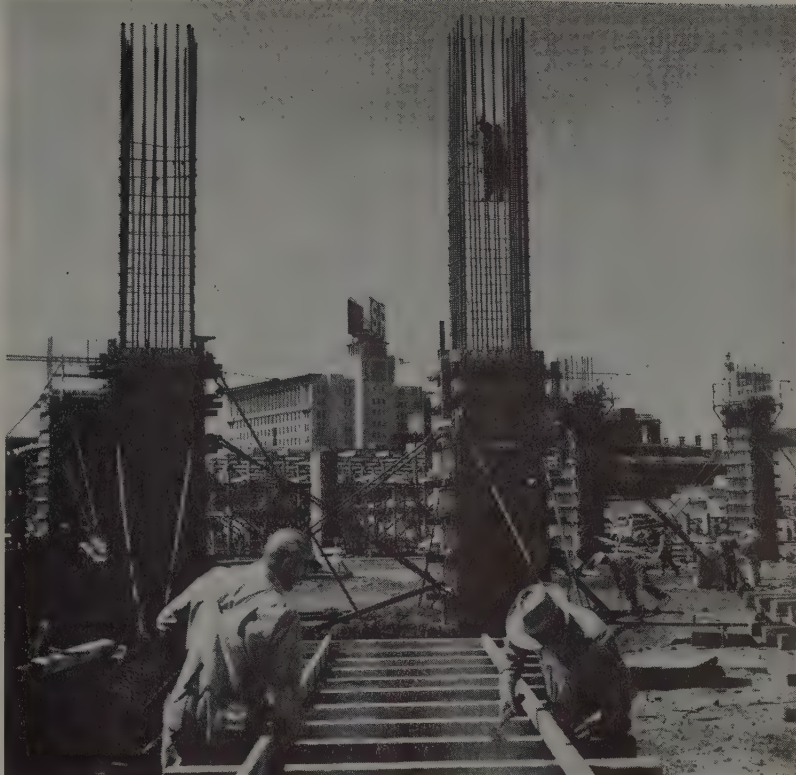
rock. In all, 73,000 lin. ft. of piles were driven.

An interesting side note to the pile driving in the Folsom to Mission Street section is the fact that during the foundation excavation prior to driving there was encountered much evidence of the 1906 earthquake and fire. Old building foundations, charred brick walls, debris, and even wheels and axles of early day railroad or trolley coaches were excavated to make way for the piers of the new structure.

Lightweight aggregate

The columns in the middle section of the structure rest on spread footings because the rocky nature of the soil in that area made pile driving difficult. The footings vary from 10 to 20 ft. square and from 3 to 5 ft. thick. Some of the footings took over 100 cu. yd. of concrete. Since this middle section passes over numerous existing streets and utilities that will remain it is desired to keep the size of the footings and of the columns to a minimum. To this end the load on the columns and footings will be reduced by using lightweight aggregate. Over 8,500 cu. yd. will go into place making this one of the largest uses of lightweight concrete in a state highway project to date. A total of 56,000 cu. yd. of concrete is required for the entire project. As of Jan. 1, 1956, the job is approximately 40% complete and within 2 or 3% of schedule. Some 20,000 cu. yd. have been poured to date.

The amount of steel reinforcement on this job is tremendous. To strengthen the concrete box girders



CARPENTERS construct forms while workman above ties reinforcing steel together. Form panels were as wide as 8 ft. and 20 to 30 ft. long. Acrow shores can be seen in background.



AT THIS point a column was removed to make room for new traffic lane. It was replaced by two new columns topped by a prestressed concrete cap as shown. Post-tensioning was by Rods, Inc.

and the columns, more than 2,000,000 lb. of bars measuring $2\frac{3}{8}$ in. in thickness are being produced by Columbia-Geneva Division of U. S. Steel. Use of the large bars permits better concrete distribution than would be possible with smaller bars, and reduces the cross-sectional area of the members—an important consideration in this congested area where space is at a premium. The total weight of all reinforcing steel is about 13,000,000 lb. All the spans will be of box girder design, except seven structural steel spans required

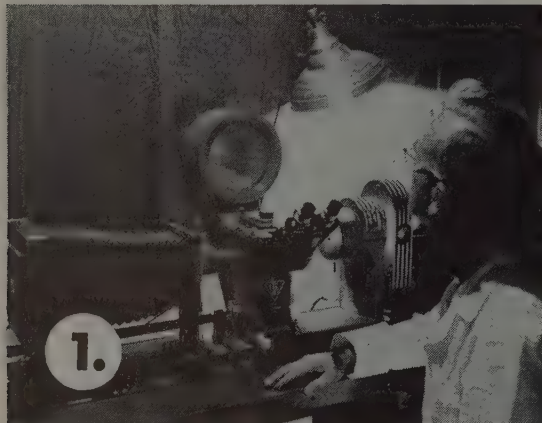
to clear an area of railroad tracks and Bay Bridge ramps.

Tallest is 74 ft.

All the columns are rectangular in cross-section, in 23 different sizes. The largest is 6 x 8 ft.—the tallest is 74 ft. high. Forms for the columns were made by carpenters on the job and consisted of a panel for each side of the column 20 to 30 ft. high. Plywood $\frac{5}{8}$ in. thick was used with 2 x 4-in. studs every 6 in. and 4 x 4-in. walers spaced at 2 ft. In most cases,

(Continued on page 46)

Tuffy® Tips



1. Metallographic Examination. Under powerful magnification, Union Wire metallurgists examine the microstructure of the steel in rods and wires to see that rigid specifications are met and maintained in processing.

2. Chemical Analysis Laboratory. Steel for Union Wire Rope is made to rigid specifications. Here rods and wire are chemically analyzed to make certain that the correct combinations of carbon, manganese, etc., are kept under control.



Here Are Some Of The Steps Taken To Pre-Determine Tuffy Toughness And Assure Longer Rope Life

3. Designed by Union Wire Rope Engineers. This accelerated fatigue tester is equipped with sheaves from 8" to 24" permitting application of any bending stress. Tensile loads up to 12,000 lbs. are applied. Thus wire rope life under toughest fatigue conditions is pre-determined.

4. Rope Testing Machine. This 3-story high machine is designed to test and record the breaking strength of the rope when finished and ready for the customer.

5. Static Flexibility Tester. The demand of machinery engineers toward smaller sheaves and higher speed made it necessary for Union Wire Rope Engineers to adapt this standard machine in order to test static flexibility.

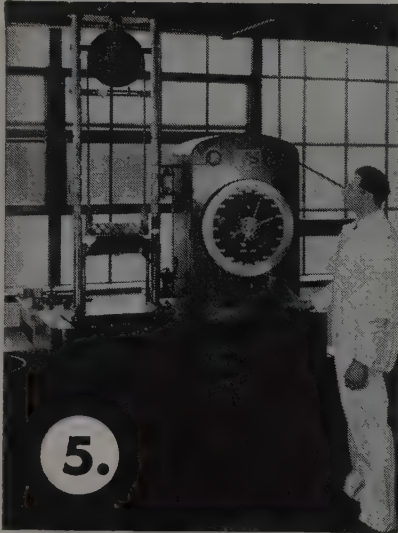
6. Wire Tensile & Torsion Tester. In tension and under torsion, this machine tests wires to see that they measure up to the extraordinary high level of strength and toughness mandatory in Union Wire Rope.

7. Another View Of Accelerated Fatigue Tester. Shows simultaneous testing of three different wire rope constructions. Here, in days, ropes are subjected to punishment equal to weeks or months of hard service.

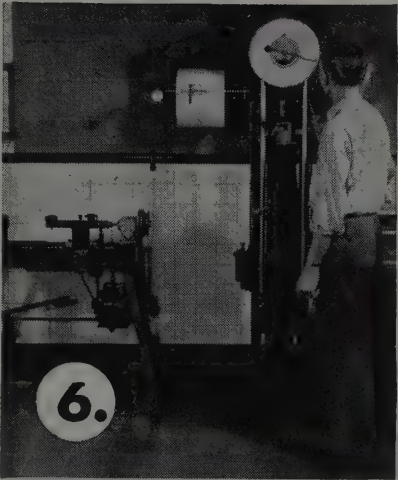
8. Wire Fatigue Testers. The fatigue strength of wire rope is the sum total of the fatigue strength of the wires in its construction. Here, the wires in tension and bending are tested for fatigue strength.



How Research Puts Longer Service Life Into WIRE ROPE



When you specify one of the **Tuffy Wire Ropes**, you can say **Tuffy** and forget complicated specifications



Tuffy Scraper Rope



It's flexible enough to withstand sharp bends, yet stiff enough to resist looping and kinking when slack. Save wasting sound rope—mount a reel on your scraper.



Tuffy Slings and Hoist Line



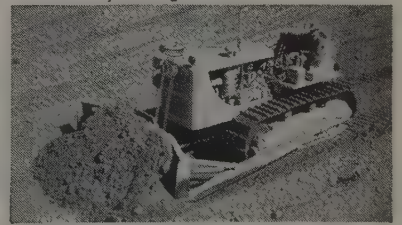
Tuffy Hoist Line, a longer running rope on all types of hoists. Slings of 9-part machine braided wire fabric. Kinking or knotting will not materially damage fabric.



Tuffy Dragline



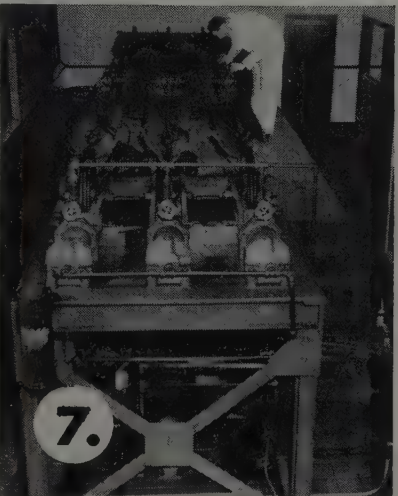
Constructed to give you maximum abrasive resistance with extra flexibility. Rides smoothly on grooves, hugs the drum when casting for full load.



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Increases service life . . . reduces down-time. 150' reels mounted on your dozers let you cut-off worn sections without wasting good rope. 1/2" and 9/16" diameter.



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He's the man who can help you find a fast answer to all your wire rope problems. He's also the man who often knows as much about some requirements of your equipment as the men who made it. He's the man who's eager to supply the kind of service that will hold your patronage. Feel free to call on him anytime.

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Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand



Pouring a 100-ft. tank in one lift

Contractor changes design plan from pouring 8 vertical segments to placing 354 yd. of concrete in the circular wall 32.5 ft. high in one continuous 12-hr. operation.

By ROBERT L. MITCHELL
General Superintendent
Walsh Construction Company
and
E. V. Lane Corporation

CONTINUOUS concrete pour of 354 cu. yd. to complete the 32.5-ft. wall of a 100-ft. digester tank without any joints was the outstanding construction operation at the San Jose, Calif., sewage disposal plant job. This procedure is estimated to have saved six weeks of elapsed time on each of the three tanks, in addition to providing a better wall. Available records would indicate these are the largest tanks ever poured by this method.

The construction problem that caused the most trouble was a water-table at ground level and the diverting of the sewage flow around the site.

Foundation problems

Average elevation of original ground at the site is 3.5 ft. and maximum high tide is 6.9 ft. The site was partially protected by dikes, but was subject to inundation during extreme high tides. Ground water was encountered in the excavation at elev. 0.0. In addition, during periods of high flow the sewage overflowed into a slough winding through the site. When completed, the entire site will be filled to elev. 10.0, well above high tides, and the sewage flow will be handled through the plant, but

during construction these conditions presented some serious problems.

First phase of construction was to build a dike 3,000 ft. long around the entire plant site; 4 to 6 ft. high, it provides protection from tidal flow. To handle peak sewage flow, a channel was dredged along the west side of the site, straightening and deepening the existing slough. This channel, with a 15-ft. bottom width, 4- to 10-ft. depth, extended 1,800 ft. At the lower end, a 54-in. CMP with a tide gate was installed. Another slough leading into the site was blocked off with a tide dam. The channel involved approximately 19,000 yd. of excavation, and an additional 23,000 yd. of material was imported for the dikes.

Euclid end-dump trucks were used to make the dike fills. Trucks were loaded with a Northwest 80D mounting a 2½-yd. dragline bucket. Channel dredging was accomplished with a Northwest 6 handling a 1½-yd. dragline bucket. Soft ground conditions made it necessary for both cranes to operate on mats.

Part of the site (outside building lines) was filled to elev. 8 ft. to provide a work yard well above flood levels. The 50,000 yd. required for this fill was hauled to the site in bottom-dump truck and trailer units. It is estimated that a total of 76,000 yd. of imported material will be necessary to bring the completed plant area to elev. 10. This is in addition to the 45,000 yd. available from the building excavations.

High water-table presented a continuous unwatering problem. In order to handle the pump discharge from several excavations simultaneously, a centrally located elevated reservoir was constructed. An 8-in. pipeline provided gravity flow from this reservoir to the diversion channel 600 ft. away.

Largest and deepest excavation was for an underground sludge concentration room and main pump room. This excavation, 140 x 110 ft., varied from 17 to 26 ft. in depth, below existing ground. Material encountered was a heavy, brown clay interspersed with waterbearing sandy strata. Except for the waterbearing layers, the formation was fairly tight and no difficulty was encountered in obtaining almost vertical side slopes, without shoring.

This excavation was unwatered by constructing a sump in one corner of the excavation and using French Drains to intercept water inflow at the sides of the excavation outside of concrete lines. One 6-in. and one 4-in. pump were required for initial unwatering, after which two 2-in. pumps were adequate for handling the inflow.

Although not as deep, the excavations for the three sludge digesters proved a more difficult problem. Each of these digesters required a pit 100 ft. in diameter, varying from a depth of 6 ft. at the sides to 16 ft. at the center. Before starting this excavation a pit was dug in the center of each digester, extending 4 ft. below final grade. A perforated steel drum filled with coarse rock was sunk to the bottom of this pit and a 2-in. pump suction line with foot valve was installed in the sump and extended above ground. By pumping

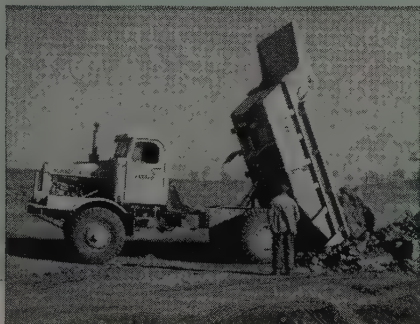
(Continued on page 44)

Advanced design results from 20 years of leadership in building off-highway Rear-Dumps



Some of the **OUTSTANDING FEATURES** of the R-15

- 10½ yd. body
30,000 lb. payload
- 218 h. p.
- loaded top speed
of 25 m.p.h.
- hydraulic booster steering
- air assist clutch
- free floating springs
- 14.00 x 24 drive tires
(16.00 x 25 optional)



POSITIVE CONTROL OF DUMPING

Double-acting 3 stage Euclid hoist and hydraulic system gives the operator fast, positive control of the body position at all times. Dumping angle of the body, in fully raised position, is 68°. Body, frame and hoist are designed and built as an integral unit. McDowell & McDowell are using six R-15 "Eucs" to haul heavy excavation at a big plant site job in Nashville, Tennessee.



SPEED AND STABILITY

The 5 speed transmission and Euclid planetary axle provide a top speed of 25 m.p.h. with full 15 ton payload... 27 m.p.h. with 16.00 x 25 tires. Free floating Euclid spring suspension gives maximum stability empty or loaded under all road conditions... permits faster safe travel speeds. Dale Bloom had a fleet of 6 Rear-Dump "Eucs" on this Kansas Turnpike job—2 of them the Model R-15.



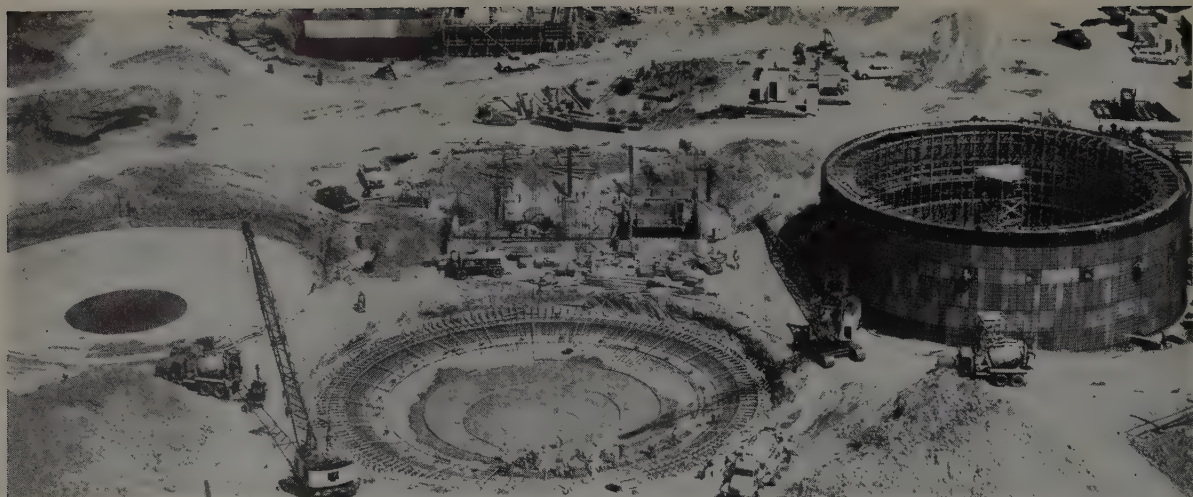
EASY OPERATION

Full width cab offset to left for maximum vision, air assist clutch, booster steering, 218 h.p. engine, fast acting hoist, free floating springs and fully adjustable seat contribute to driver comfort and easy operation. Four of these new Rear-Dumps worked on a highway relocation job of W. J. Menefee Construction in Missouri.

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





CONSTRUCTION PEAK at the site of the \$3,500,000 primary sewage treatment plant of San Jose, Calif., which will provide another step

toward eliminating pollution of San Francisco Bay. The 100-ft. sludge digesters are the largest units of the type to be poured continuously.

this line continuously the excavation could be accomplished in the dry and the bottom slopes could be graded by machine.

Excavation was carried 12 ft. below bottom of concrete slab and the space filled with coarse rock to provide a permanent drainage system. Before placing the concrete, the pump suction line was relocated so as to extend under the concrete slab to the edge of the excavation. Pumping prevented water pressure from building up under the slab until the concrete had gained strength.

Designed for uplift

The high water-table required all underground structures be designed to resist uplift pressures. In the sludge digesters and other tanks where the presence of ground water was not objectionable, the concrete slabs were provided with pressure relief valves to prevent uplift pressures. In the underground sludge concentration room and main pump room, mass concrete slabs 4 to 6 ft. thick were installed. These slabs involved 1,948 yd. of concrete. Placement was accomplished in four pours; the largest containing 880 yd. was in the floor of the main pump room. Four cranes were used to handle this pour in 10 hr. Sixteen 6-yd. transit-mix trucks hauled the concrete from the Milpitas Materials Co. 6 mi. away. The floor slab for the six sedimentation tanks and the six aeration tanks is a continuous structure, 240 x 220 ft. varying from 10 to 16 in. thick. This slab required 2,300 yd. and was placed in five pours, of which the largest was 510 yd.

Fortunately, soil tests of the underlying strata revealed a firm material, capable of supporting the relatively high loadings of these massive slabs. Pile foundations were necessary only under the engine generator sets where heavy loadings were unavoidable. Each of these four foundations

is carried on 12 piles driven to 42-ft. penetration. To eliminate possibility of unequal settlement, the pile cap is continuous for all four foundations.

Prestressed tanks

Pouring the walls for the 100-ft. diameter digester tanks presented some tough problems. These walls, 32 ft. 6 in. high, had to be poured without horizontal joints. Original design contemplated pouring in segments, with a specified minimum of eight segments to a tank. It was decided, however, that these walls could be poured as a monolithic unit, without joints.

Universal Form Clamp "Uniform" panels were used, and the inside wall form was set up complete, braced with towers anchored to the concrete floor and plumbed. Outside forms could then be set in place and tied without exterior bracing. All reinforcing steel and the first lift of outside forms were set prior to starting the pour.

The first lift was poured with two cranes working around the tank in opposite directions. As soon as the pouring crews completed a 20-ft. section of the first lift, carpenter crews started setting panels for the second lift and raising scaffold. These crews followed as closely as possible behind the pouring crews, and as a lift was completed cranes moved back to the starting point and the process repeated. Six lifts were required for a completed tank, each timed so that successive lifts could be placed without horizontal cold joints.

Concrete was a 6-sack mix with a 5- to 6-in. slump. Design strength was 3,000 psi. and actual test strengths were over 4,000 lb. An admixture was used to retard the initial set from 1 to 1½ hr. as insurance against the occurrence of cold joints in event of any unforeseen delays. Considerable care was exercised in vibrating the walls enough to obtain

a well-consolidated, homogeneous mass, without segregation. Pouring and forming operations required 12 hr. for the 354-yd. pour.

Largest of their type

As far as we know, these are the largest tanks ever poured by this method, although similar schemes have been used on smaller structures. An idea of the magnitude of this operation is obtained when it is realized that carpenter crews set in place 675 individual form panels during the pour. A crew of 8 carpenters and 8 laborers handled the form erection; another crew of 6 carpenters and 4 laborers handled the scaffold erection and moving. Four-man pouring crews worked with each rig. It is estimated that this method saved six weeks elapsed time on each tank, and provided a better and more satisfactory core wall for prestressing.

Prestressing will be accomplished with 1½-in. bars stressed to 30,000 psi. with turnbuckles. After prestressing and testing, the exterior will be coated with 2½-in. gunite cover over the prestress bars. All reinforcing steel and prestressing is being fabricated and installed by the Soule Steel Co.

Personnel

Contractor for this project is a joint venture of Walsh Construction Company and E. V. Lane Corporation. The author is general superintendent; W. C. McCandliss, Jr., assistant structure superintendent; John P. Martin, assistant mechanical superintendent; John W. Cook, project engineer, and J. J. Kennedy, office manager.

For the City of San Jose, Frank M. Belick is project engineer; John Hamilton, assistant project engineer, under the direction of Harold J. Flannery, city engineer.

Plant design was by Brown and Caldwell, consulting engineers.

Yes, all this adds up to quite a DAM!



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This aggregate (sand and stone) ranges from fine sand to extraordinarily heavy boulders as large as 20" in diameter. The rock breaks clean, leaving sharp edges which are good for concrete interlock

but bad for ordinary conveyor belting. To handle this most critical portion of the haulage, United States Rubber Company conveyor belts were selected. Although now in their fifth construction season, the belts are still going strong. This is another example of U. S. Rubber's Three-Way Engineering Service: "U. S." Belt engineers work with the designers of the conveyor system and the engineers of the dam—to provide the *right* belt for the jobs.

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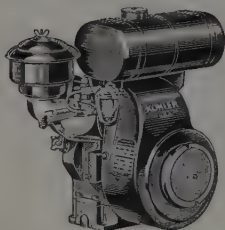
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WASHINGTON

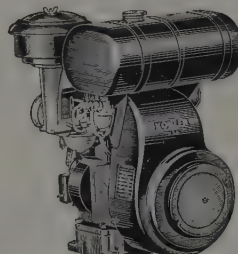
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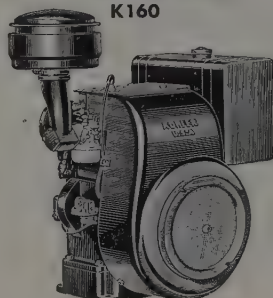
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Van's Supply, Cody



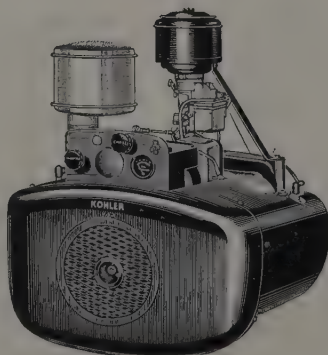
K90



K160



K330



K660

Freeway columns

(Continued from page 37)

these panels were reused 5 to 10 times. Forms were braced by Acrow shores.

Most of the concrete was placed with Northwest cranes with 1½-cu. yd. Gar-Bro concrete buckets with short elephant trunks. Steel brackets were attached to the form panels to support scaffolding. Concrete lifts were usually about 25 ft. The columns in some of the bents have vertical 6 to 8-in. deck drains positioned down the center.

Column removal

Although the main feature of the work so far has been column construction, there also has been some column removal. This was necessary at a point where one of the roadways passed under the main approach to the Bay Bridge directly through two existing supporting columns. To solve this difficulty without interrupting traffic on the bridge, each of the two existing columns was bracketed by two new columns. When these were up to strength a pre-stressed concrete cap was placed across the top to support the weight of the bridge approach. Then the old columns were removed. The caps are 43 ft. long and 7 ft. 6 ft. deep. An interesting feature of the post-tensioning work was the fact that the deep concrete flange on the underside of the bridge did not have to be cut out to make room for the caps. It was only necessary to cut a hole through the flange through which to pass the steel strands. This work was carried out successfully by Rods, Inc., of Berkeley, Calif.

With more than 30,000,000 vehicles crossing the Bay Bridge each year, the new distribution structure will be a great help in solving the city's traffic problems.

Soule Steel Co. is subcontractor for the steel reinforcement. For the California Division of Highways, George W. Thompson is resident engineer, and George Fung is assistant resident engineer. John Canfield is assistant in charge of surveys. For the joint venture of MacDonald, Young & Nelson, Inc., and Morrison-Knudsen Co., Inc., Elmer Cross is the general superintendent; Ed Kemp and Bill Mueing, the assistant superintendents. J. A. Crowl is the office or job engineer, and Bob Russell is the field office manager. (See picture on page 92.)

Another job across the Bay

At the other end of the Bay Bridge, in Oakland, Morrison-Knudsen and MacDonald, Young & Nelson recently completed a traffic distribution structure which involved four elevated roadways and 3,000 ft. of ground-level approaches. Robert Middagh was general superintendent; David Ball was project engineer.

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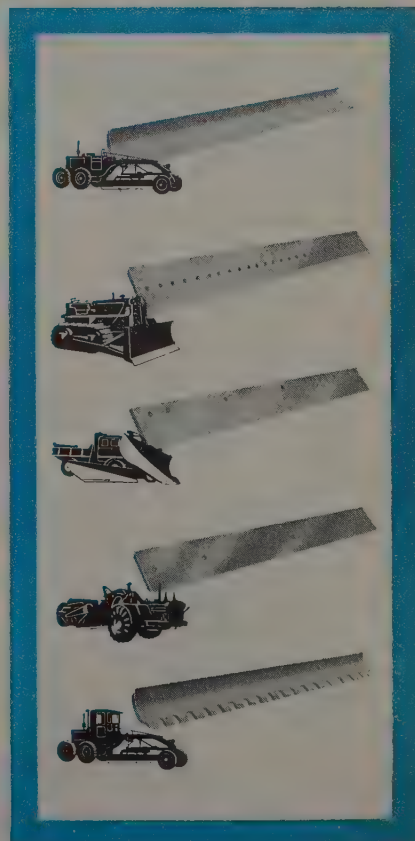


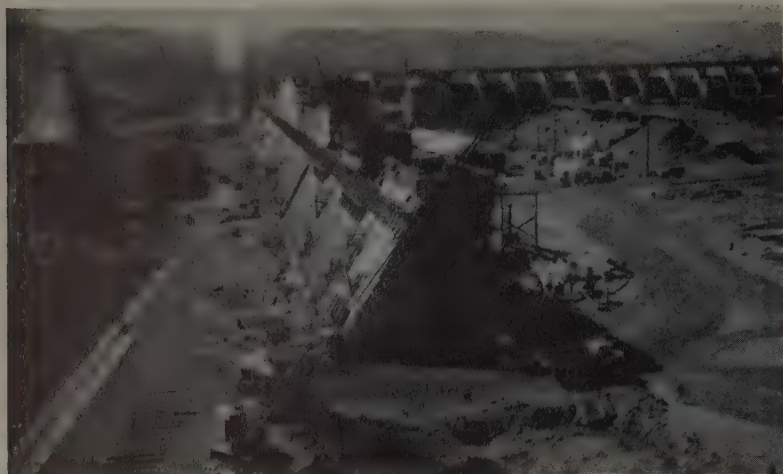
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Progress at The Dalles

PROGRESS on Phase II of The Dalles Dam project is well ahead of schedule. Over 130,000 cu. yd. of concrete were placed within 8 months following the contract award by the Corps of Engineers. Excavation is now completed. Delivery of turbines limits the rate of work on the powerhouse and completion date for the contract may extend into early 1958. Contract bid was \$12,731,000, which included an item of labor to install the \$11,000,000 of equipment and materials that will be furnished by the Government.

The job is sponsored by C. J. Montag & Sons, and the rest of the joint venture group consists of Carl M. Halvorson, Inc., Cascade Construction, Inc., and Austin Construction, Inc. Project manager is H. O. Montag, who supplied the information for this progress report, with Carl Jonasson as assistant. Project superintendent is C. C. Montag with Daryl Mason as assistant. Project engineer is Harold Johnson, and office engineer is Creed Allen.

Excavation superintendent was Robby Robinson; and now that he has left for another job, Lou Mace is in charge. Bob Austin is concrete superintendent, Hugh Long is master mechanic, and Howard Fosnot is carpenter superintendent.

The first work was to excavate to sound rock all the area to be occupied by the non-overflow dam, and the south fishway and ice sluiceway. The rock is lava basalt, typical of this section with characteristic flows and faults. A total of 91,000 cu. yd. was involved in this job.

The first lift was removed using a Lima shovel and Turnarocker hauling units, hauling the material to disposal areas along the bank of the river. The next lift was taken out as far as possible with a 1½-yd. backhoe, using a Lima. From there on

draglines, clamshells, backhoes, and an Eimco Loader were all used in various combinations.

One of the big problems was to dig the south fishway channel. This cut was 16 ft. wide, and at the deepest point was 60 ft. It was about 1,500 ft. long with no access to either end. Due to the shooting restrictions and the necessity to cut vertical faces on the sides for concrete placement, it was impractical to use a dragline to remove the rock. The first lift was, therefore, removed with the backhoe. Then a 4-yd. clamshell was bought and used with a 4,500 Manitowoc crane that was on the job. This proved partially successful, but it was soon found to be too slow and almost impossible to coordinate with the drilling operation.

To speed up the digging at this point, an Eimco overshot loader was bought and put to work. This was done by using a Lima crane with a 6-yd. rock skip. The skip was lowered into the trench and held in place with a Koehring Dumptor. It was then loaded by the Eimco, hoisted out, and loaded into 10-yd. end dump Eucs. This method proved to be the most satisfactory and economical, if the word "economical" should be

used anywhere in connection with this operation. Both machines took a terrific beating to get this job done, and maintenance costs were high, but up to this day no one has been able to suggest a better way of doing it.

Drilling was done with two drilling jumbos made up of D8 Caterpillars with three hydraulic-operated booms on each. Three Joy drills and three Gardner-Denver drills were used. The booms were extended so that 12-ft. wagon drill steel could be used as starters, and the 12-ft. holes drilled without changing steel. Quite often the holes blew out in the fault zones, leaving the shot rock large and blocky; and at times it looked like the Eimco was working against a solid rock face. Under the circumstances it was agreed this machine did a fine job.

Other main bid items were 167,000 yd. of mass concrete in the non-overflow dam, 24,000 yd. of concrete in the fish facilities and 96,000 yd. in the powerhouse.

Concrete in the non-overflow section was placed using a 4500 Manitowoc crane with a 140-ft. boom, hoisting a 4-yd. air operated concrete bucket. Cantilever steel forms were used throughout with the exception of special sections.

The powerhouse concrete includes the second stage concrete around the turbine parts, the downstream powerhouse wall and the powerhouse roof. This concrete is placed by using a Model 120 Washington Whirley, mounted on steel girders which ride the powerhouse bridge crane rail on one side and have legs extending to the tailrace deck on the other.

This crane has a 110-ft. boom and can handle the 42-ton lifts required to set the heaviest pieces of the embedded parts of the turbines. Four-yard concrete buckets are used, and these are hauled from the plant to the powerhouse on Diamond-T trucks which carry two buckets to the load. Concrete placement ranges from the draft tube to the powerhouse roof, a difference of approximately 130 ft. in elevation.

The concrete plant, which was designed and furnished by C. S. Johnson Co., consists of four 2-yd. mixers,



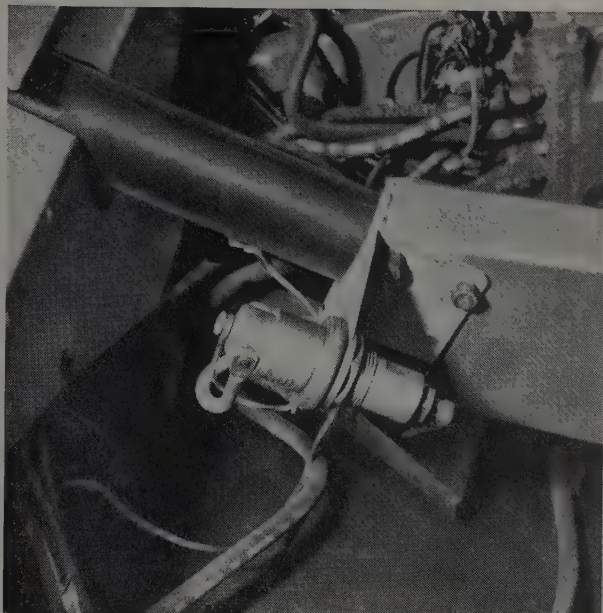
DIRECTING the contractor's operations on Phase II are (l to r): C. C. Montag, project superintendent; Bob Austin, concrete superintendent; Carl Halvorson, assistant project manager; and H. O. Montag, project manager.

The Engineer's Field Report

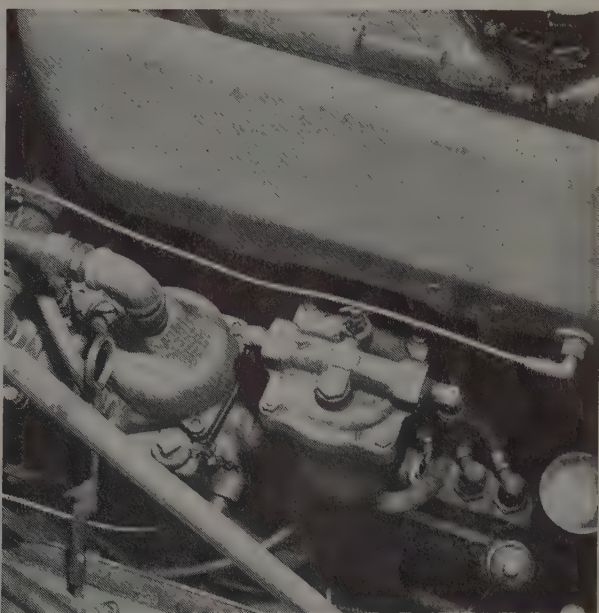
CASE HISTORY

Chevron Pressure
PRODUCT *Primer System*
Consolidated Freightways Inc.,
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Pressure Primer System starts diesels on 1st or 2nd turn with regular batteries—at minus 40°



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



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

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

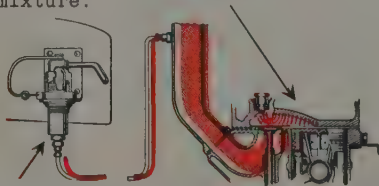


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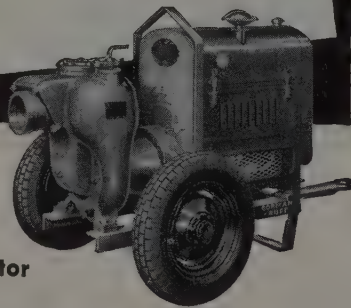
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Every pump covered by this plain-language guarantee!



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305 Bowman St., Mansfield, Ohio



TOUGHEST JOB was the excavation of this slot for the south fishway channel. With no access at either end it called for ingenious selection and use of equipment.

a bin capacity of 350 tons; 7,000-bbl. cement storage is provided by using two cement silos, and the cement is pumped from barges on the river into the silos, a distance of 500 ft.

Reinforcing steel totaling 11,500,000 lb. will be placed under this contract. This work is done by a subcontractor, the Holman Erection Co., who will also install the 2,690,000 lb. of structural steel for the roof framing which is being fabricated by the American Bridge Co. Switching structure steel amounting to 1,064,000 lb. is being fabricated by Bethlehem Pacific Coast Steel Corp.

In addition to these, and many smaller items of steel, the contract calls for the installation of the Government furnished intake gates, trashracks, embedded parts of the turbines, bulkheads, lifting beams, two 340-ton powerhouse bridge cranes, and the manufacture and placing of the concrete stoplogs. The total amount of all steel to be installed is approximately 20,000 tons. Most of the heavy steel erection has been subcontracted to the Holman Erection Co. with Ralph Holman in charge of the job. Erection of the embedded parts of the turbines, the electrical and mechanical contracts have been subcontracted to Cascade Constructors, made up of P. S. Lord Mechanical Contractors, Morgan Electric Co., and Wismer & Becker. This company is headed on the job by Elmer Griffiths.



Letters . . .

Clarifying compaction

Editor's note—

Because of a subsequent change in the specifications relating to compaction of fill material an explanation seemed in order covering a statement made in an article which appeared in our September 1955 issue, p. 54. One paragraph in that article referred to the specification requirements of the California Division of Highways with the following: "The standard specification control of not less than 90% compaction has not been altered to permit use of the Kompactor." This piece of equipment, which is a development of the Buffalo-Springfield Roller Co., represented an important feature of the article. The machine has segmented wheels that produce interrupted pressure on the fill.

To bring this subject completely up to date, we asked the Materials and Research Department of the California Division of Highways if they would clarify the situation with the latest information. Their full review and helpful reply to our query follows.

EDITOR.

SIR:

Your letter of November 22, 1955, referred to a change in the California Division of Highways standard specifications relative to compaction control. The revisions to the Standard Specifications are included in the Special Provisions for all projects advertised during the week of July 25, 1955, and thereafter. Attached is an excerpt from current Special Provisions covering the revisions of the 1954 Standard Specifications relative to compaction.

You will note that the revised compaction specification embodies two changes: (1) the 1954 Standards required certain types of rollers and also stipulated a minimum number of compaction units, whereas the current Special Provisions waive these requirements and specify only the end product, i.e. the required relative compaction, (2) the 1954 Standards specified two degrees of compaction, in general, 95% relative compaction for material within two feet of finish grade and for structure backfill; for other earthwork the requirement was 90% relative compaction. The current special provisions requirements, instead of stipulating two degrees of relative compaction, provided for greater densification of granular materials by setting up two compaction test procedures, one for clayey or plastic soils, another for cohesionless or granular soils. The final result, therefore, is essentially the same as under the old specifications, i.e. a higher degree of compaction is required for structure backfill and for material within two feet of finish grade; materials for these types of earthwork must be of a granular nature, with a sand equivalent of 25 or more and will, therefore, be tested by the "ten-layer" compaction test.

The revised compaction specifica-

tions also require that sandy soil (i.e. soil with sand equivalent of 25 or more) be compacted to the higher density, as determined by the ten-layer test, regardless of where the soil is placed. The new specifications,

SPECIAL PROVISIONS

SECTION 13. COMPACTION

(a) Relative Compaction Tests. In Section 6, Chapter II, of the Standard Specifications reference is made to the Relative Compaction Test stating that this test is performed in accordance with the method in use by the Laboratory of the Division of Highways. The method in use at the Laboratory of the Division of Highways at the time the August, 1954, Standard Specifications were issued is known as the "California Impact Compaction Test Method" using five layers of material in the tube, and will be designated in these special provisions as the Five-Layer Method. This same test will also be performed using ten layers in the tube and the test so performed will be designated in these special provisions as the Ten-Layer Method.

Whenever the Standard Specifications or the special provisions require that the relative compaction test is to be used as a control of actual compaction by the impact test method, the following shall apply.

FIVE-LAYER METHOD

All materials which have a sand equivalent of less than 25, except those within two feet of finished grade, shall be compacted to a relative compaction of 90 percent as determined by the Five-Layer Method.

TEN-LAYER METHOD

All materials which have a sand equivalent of 25 or more, structure backfill, and all materials placed within two feet of finished grade, including untreated bases shall be compacted to a relative compaction of 90 percent as determined by the Ten-Layer Method.

(b) Equipment. Those portions of Section 13, Chapter V, article (d), of the Standard Specifications which require certain types of rollers and also require a certain number of units based on stated production are hereby waived, provided that the specified relative compactions are obtained as determined by tests made in accordance with article (a) above.

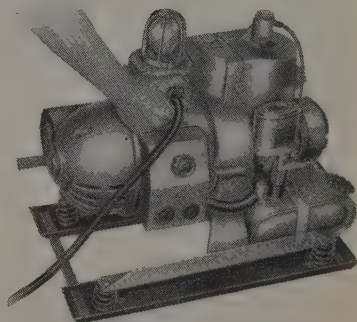
therefore, require thorough compaction of all soils, whereas the previous specifications permitted placement of
(Continued on page 60)

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Hangars move across the desert

TWO HANGARS, each weighing over 2,800,000 lb., were recently removed from their foundations, placed on 352 tires, and moved nearly two miles across the desert in Southern California. The hangars were constructed in 1944 at the Air Force Flight Test Center, Edwards AFB, on a site that did not permit the construction of a new 15,000-ft. test runway that is now required. The U. S. Army Corps of Engineers, the design and construction agency for the Air Force, decided to move the hangars intact to a new site two miles away. It is estimated that the Air Force saved \$2,000,000 by this method.

The contract was awarded to Vinnell Co., Inc., which subcontracted

the actual moving to Star House Movers, Inc. The \$1,500,000 project involved separating two buildings, each 278 ft. wide, 285 ft. long, and 90 ft. high, from adjoining concrete shop structures, moving them across ramps, roads, runways, and desert and installing them adjacent to new concrete structures at the new site.

Each hangar is a three-hinged arch, joined at the middle of the roof and at the edges of the concrete floor by a series of steel pins. Keeping the sides from spreading apart are 22 tie rods $2\frac{1}{2}$ in. in diameter which were buried in the original concrete floor to a depth of 18 in. Since it was decided to keep the tie rods attached to the hangars to hold them together

during transit it was necessary to break the concrete along their 275-ft. length. For this operation the contractor used a 650-cfm Caterpillar compressor mounted on an International 6-wheel truck, with the ram on a swivel. The reinforcing steel exposed was cut and the final concrete breaking was done by air-operated breakers. A Gardner-Denver 125 and two Ingersoll-Rand 125 Gyro-Flo compressors were used for operating the air tools. A Gradall removed the broken concrete.

When the first hangar was freed from its foundation, it showed signs that it might come apart even with the tie rods in place, so two bracing cables were used to prevent any excess spreading at the bottom of the hangar. These cables were $1\frac{1}{2}$ in. in diameter and were stretched tightly between the side supporting columns. Forty-four 90-ft. lines were suspended from the overhead trusses to help support the tie rods.

Fifty hydraulic jacks, each capable of lifting 50 tons, were used to raise the hangar from its foundation. Two $8 \times 4\frac{1}{2}$ -in. channels bolted to each of the 22 columns with 16 high-tensile bolts carried the initial load. After reaching a sufficient height the channels were supplemented by 90-lb. rails and heavy timbers. Two 6-ft. long threaded rods were placed at each column so that by tightening the nuts it was assured that the weight of the building would be carried by the bearing surfaces. Forty-four Calahan dollies were then positioned to carry the hangar during the move. Each dolly had 8 Goodyear 900 x 10 tires, 25 ply, inflated to 110 lb. This made a total of 352 tires



CLOSE-UP at one column shows arrangement of steel and timber cribbing. In order to make a turn it was necessary to jack up the hangar and reposition every one of the 44 dollies.



Shovel-Crane owners! sharing your profits with old-fashioned clutches?



Remember the day the weather was fine, footing good and the haulers were really rolling...

THAT was the day you thought the job was going to move out ahead of schedule. But the clutches were getting hotter all the time. By mid-morning the dragline went down for clutch adjustment—the heat had done it. After the noon break, the same thing happened. How much production do you figure you were penalized for having a rig with old-fashioned clutches?

Avoid costly downtime

With a Link-Belt Speeder you get modern power, hydraulic-actuated clutches that auto-

matically compensate for heat and normal lining wear. In fact, most Link-Belt Speeder owners will tell you these clutches are so good, adjustment is needed only once or twice a month.

It's just one of many ways you're big money ahead with a Link-Belt Speeder.

Get the complete story from your distributor. He'll show that whatever rigs you need—crawler or rubber-tired . . . ½ to 3-yd, 8 to 60-ton capacity—you'll earn bigger return on your equipment dollars with a Link-Belt Speeder. Or write for literature—LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA.

13,969

LINK-BELT SPEEDER

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



Safe, smooth pipelaying on Pittsburgh utilities job—by Cleveland "80W."



Same job—same day—same "80W"—backfilling and tamping.

PIPELAYING, BACKFILLING and trench compaction, too, where needed—*each* done expertly by the Cleveland "80W." This modern machine substantially reduces equipment and manpower requirements on underground construction jobs of all types. That's why so many users equip *each* of their crews with a versatile "80W." Check its *complete* performance features—see how it fits your program—put it to work for you. You'll be money ahead when you do.

See your local distributor

THE CLEVELAND TRENCHER COMPANY • 20100 St. Clair Ave., Cleveland 17, Ohio



CLEVELAND

for one of the biggest moving operations ever attempted.

When the hangar was ready to move, two flatbed trucks with 300-hp. winches were stationed about 500 ft. ahead, one on each side, directly ahead of each row of dollies. The cable set-up involved three pulleys at the front of each row of dollies and three forward pulleys near each truck. The forward pulleys were anchored with deadmen. One continuous cable passed from one winch through all the pulleys to the other winch, thus equalizing the force on each side no matter what the speed of either winch.

Winch operators used an old hand-operated air horn to coordinate their operations—one blast meant to stop the winches, two was the signal to start. During the move, the dollies were one behind the other in all cases, except when turning.

In order to turn it was necessary to jack up the entire hangar and reposition each dolly. Two turns were required on the first move, four on the second. To make the turn required when leaving the old runway a point was set at the center of the hangar and all the dollies were positioned with respect to that point, enabling the turn to be made in place without any forward motion. When the desired direction was reached the hangar was jacked up again and all the dollies were once more set in a straight line one behind the other.

Haul roads important

About 1½ mi. of the trip was over unimproved desert land. For this section it was necessary to prepare two roads 275 ft. apart on which the train of dollies on each side of the hangar could move. The two roads had to be the same elevation and very close to level. This required cuts up to 3½ ft. and fills up to 8 ft., with the entire length well compacted to keep the final grade stable and within close tolerances during the move. The roads were built with two Cat DW20s, two Cat D8s and two Cat model 12 blades.

There were four flat tires during the moves. It was found to be impossible to jack up only one lift point to remove a dolly, so the dolly would be jacked down, the cap removed, the dolly let up and rolled out, and the tire changed.

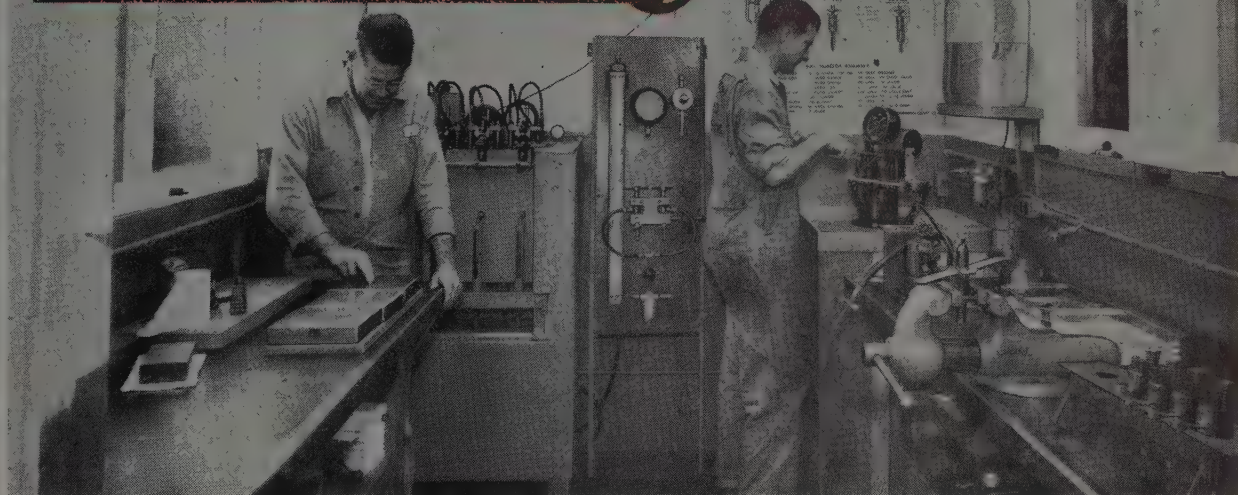
It took about six weeks to make each move, with construction crews working a normal 40-hr. week. The second hangar was in place at its new site in mid-December, 1955.

This article was prepared with the assistance of Bob Hardin, job superintendent for Vinnell Co., Inc., and the Air Force Installations Representative, South Pacific Region, monitor of construction activity in this area. Roger Neal is general superintendent for Vinnell; Wynn Cory is Star House Mover's superintendent. Resident engineer is George Davis.

First Class Service

FOR AMERICA'S

First Choice Diesel



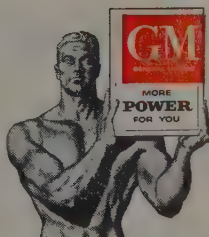
THE "AFTER SALE" service you can count on with a General Motors Detroit Diesel engine is one of the reasons it's America's FIRST CHOICE Diesel.

Typical of the work that Detroit Diesel Distributors do is injector servicing and reconditioning. Injector repair rooms have filtered air to protect vital parts from foreign particles—and proper equipment helps mechanics do a better job. But that's only part of the story:

- Your GM Detroit Diesel Distributor has the right combination of *factory-trained* mechanics and a complete stock of *factory-approved* GM Diesel parts.
- Your GM Detroit Diesel Distributor has special service tools and equipment to handle *every* GM Diesel service job, including complete engine overhaul.
- Your GM Detroit Diesel Distributor can incorporate all the latest improvements in your GM Detroit Diesel

engines. For example, he can convert your present unit injectors to the new "high valve" type to give you longer injector life and better engine performance.

Next time you need service on GM "51," "71" or "110" Diesel engines, call your GM Detroit Diesel Distributor. He's ready to give you *first class* service at all times.



DETROIT DIESEL

Engine Division
of General Motors

America's Largest Builder of Diesel Engines



Proper recognition

Credit for the development of this type of tunnel-boring machine was not reflected properly in the article appearing in the Feb. 1955 issue. James S. Robbins secured the basic patent which makes this machine possible in 1947 while working for a coal mining company. The patent was subsequently sold, along with some others, to the Goodman Manufacturing Company. In 1953 Robbins designed at least two continuous mining machines for Goodman that are now marketed in the coal mining industry.

When F. K. Mitty was low bidder on Stage I, Oahe Project, he proposed that Robbins use the basic concept of the coal mining machine to design one that would bore the 26-ft. diameter outlet tunnels. Robbins designed and directed the construction of the machine, supervising its operation in the initial stages. As the holder of the patent, the Goodman Company issued a license to Mitty for use in connection with this job.—Editor

Report from the field on operations and records of the —

Tunnel boring machine at Oahe Dam

By **JAMES S. ROBBINS**

James S. Robbins and Associates,
St. Paul, Minn.

A FOLLOW-UP REPORT seems in order to provide contractors and construction engineers with more detailed information on this tunnel boring machine. An article in the February 1955 issue of **Western Construction** described in some detail the machine as it was being used originally by Mitty Constructors in driving the outlet tunnels at Oahe Dam. As the person directly responsible for the design and building of the machine, I have followed field operations in great detail and can now report on operating progress and characteristics as determined by a careful survey during six consecutive shifts (two shifts per day, July 28-Aug. 1.)

At the time the original article was written the machine had undergone initial testing and had actually driven

about 400 ft. on the first of the 1,600-ft. tunnels, each 26 ft. in diameter. Seven months later, three of these tunnels had been completed and a fourth one driven 250 ft. representing an extensive use of the machine in boring about 6,700 ft. of tunnel.

Information gained in this extensive operation will result in a number of modifications to be incorporated into the design of "Robbins Tunnel Borer No. 2" which will be used by Oahe Constructors, holding the contract for Stages III and IV on the Oahe Project and successors to Mitty Constructors on Stage I.

After taking over from the original contractor a detailed engineering analysis was authorized covering the operation of the machine. This included continuous records of power consumed and variations in oil pressure. All auxiliary operations were timed and the causes of all delays were recorded in detail. The record of these six shifts can be summarized as follows:

1. Total operating time of the machine was 1,760 min., or 51% of the possible time of 3,480 min.
2. Total footage bored was 243 ft., or an average of 40.5 ft. per shift.
3. Average rate of advance while boring was 8.6 ft. per hour.
4. Breakdown of the delays, which represented 49% of the possible operating time follows:
 - a. 21% of the downtime was chargeable to the conveyor system.
 - b. 17% of the time was required in resetting and adjusting the jacks which propel the machine forward.
 - c. 10.5% was time required to permit the setting of steel roof support beams to catch up to the advance of the excavation carried out by the machine.
 - d. 15.2% of the downtime resulted from a lack of supplies, such as steel and blocking, due to the inability of the monorail conveying system to move sufficient material to the face.
 - e. 10.1% of the time was the lunch hour.



Wide bowl-opening on Rear-Dump provides easy entry, big target for shovel, dragline, or conveyor loader. Units come in 11, 22, and 35-ton capacities.

Smooth, streamlined, unobstructed body dumping at 66° angle readily sheds sticky material.

Hauls to overburden dump are made at speeds up to 32 mph by this C Rear-Dump.



Big-tire haulers beat mud problem

A Canadian company had the problem of stripping 30 to 75-ft. layer of wet clay out of rock pockets. Soft and sticky with trapped-in moisture, this overburden was loaded by draglines, and hauled half a mile to waste dumps. Four C Tournapull Rear-Dumps were used to speed hauling.

Exceptional mud-ability

As owners everywhere have found, Tournapull Rear-Dumps go through mud which stops conventional truck-type haulers. On this overburden job, for example, these Rear-Dumps worked out of deep mud-holes in the pit and off dumps so soft a man could not walk through them. The exceptional mud-ability they showed is due partly to traction of big 21.00 x 25 low-pressure tires...partly to

electric power-steer through geared kingpin which "walks" Tournapulls out of trouble...partly to exclusive differential which *automatically* transfers power from slipping wheel to wheel on firmer footing.

On rough haul-roads, Rear-Dumps with 5'6" diameter tires haul faster than trucks. The big tires grip and roll over the bumps, cushion machinery and operator from road shocks.

Turn around non-stop

These Rear-Dumps also work faster and with greater safety in narrow quarters than conventional haulers. They turn around in much less space. When bowl is raised, they shorten wheel-base to turn non-stop

in an area about 1/3 less their overall length. This maneuverability speeds haul on narrow roads, reduces spotting time at shovel and dumps.

Dump fast and clean

Practically no clean-up is needed on the dump. With front-wheel drive, Rear-Dumps back safely to edge of bank. Bowl swings behind and below rear wheels...loads fall free and clear over the edge, with little spillage, seldom call for clean-up.

Ask your LeTourneau-Westinghouse Distributor to show you first-hand how Rear-Dump advantages can pay off on your work.

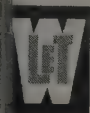
Rear-Dumps now available with optional tailgate.

Tournapull—Trademark Reg. U.S. Pat. Off. R-982-G-bw

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

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f. 8.5% was required to replace broken and worn cutter bits.

g. 12.8% of the delay was caused by cave-ins of the roof and tunnel face ahead of the ring beams.

h. 4.9% was miscellaneous delays.

5. Power consumption during drilling averaged about 200 hp., or 45% of the machine capacity.

6. Consumption of fixed cutter bits was 362, representing about 1.5 bits per ft. of tunnel advance.

7. There were no disc cutters consumed.

The total tunnel crew averaged 29 men including a foreman. The remainder of the crew included one machine operator, 8 men to set ring beams, a welding foreman directing a crew of 4 welders and 3 helpers, a mechanic, a conveyor tender, an operator for the monorail conveying system, an electrician, a mechanic, 5 laborers, and 2 surveyors.

Changes to increase efficiency

From the start of the operation it was evident that the vibrating feeder that delivers the discharge from the cutter-head buckets to the conveyor belt was inadequate to handle the tonnage. Although for frequent short intervals the machine advanced at a rate of 12 ft. per hr., this rate soon plugged the feeder completely. Present plans are to replace this unit with a pan feeder or a flight conveyor of greater capacity.

Outside the tunnel some delay was occasioned by insufficient hauling equipment when the machine was advancing at the maximum rate. This was particularly true during rainy weather when hauling units traveled slowly over slippery haulage roads. A surge hopper to receive the discharge from the conveyor would make outside hauling more efficient. The high loss of 21% of effective time charged to the conveyor system was a direct result of the curved alignment for the tunnels. Nine separate conveyors were required in the system, with as many transfer points, to negotiate the curve. The bulk of this system operated with a 24-in. conveyor belt running at 500 ft. per min. but the system was too small to handle the tonnage produced by the machine.

The average rate of advance, which was 8.6 ft. per hr., deserves further comment. Recording instruments indicated that under ordinary conditions advance of the machine could be about 12 ft. per hr. before the conveyor system was completely loaded. As stated in the original article, the machine is moved forward by hydraulic rams or jacks having a 4-ft. stroke. These units are retracted and reset as the machine moves ahead. The time interval between jacked settings therefore measures the rate of advance.

This period was timed under good operating conditions on July 30 and

found to vary between a maximum of 31 min. and a minimum of 18 min. Where the machine required 31 min. to travel the 4-ft. distance, the rate of advance is slightly under 8 ft. per hr. On the other hand, where the 4-ft. distance was moved in 18 min., the rate of advance is at 13.2 ft. per hr. On July 29 a record was taken showing the average for eleven such 4-ft. advances to be 9.3 ft. per hr.

The 15.2% loss attributed to the monorail system was another factor resulting directly from the speed at which the machine operated. This monorail was installed to transfer all supplies from the battery locomotives used for haulage in the tunnel to the mining machine. The installation of this monorail eliminated the need for a bridge extending over the fresh concrete in the invert. Boring operations moved forward much faster than concreting and the original 300-ft. length of monorail had to be extended up to a maximum of 1,100 ft. In spite of this monorail extension, it was necessary to shut the boring machine down frequently to permit invert concrete paving to catch up.

In the boring of the next two tunnels the plan will be to complete the excavation before the pouring of any invert concrete. This modification in the system will permit the battery locomotives to stay with the machine.

Definite improvement can be made in the 17% delay coming from the resetting and the adjusting of the propelling jacks. Up to the present time, these jacks have worked against the steel ring beams which are properly blocked to transfer the load back through 15 to 20 beams. A simpler method of propulsion is being designed which should cut this 17% loss to about 7%, although this improvement will not be ready until the last tunnel.

Consumption and replacement of the actual cutting units was considered to be remarkably low in amount and corresponding cost. The largest single item has been replacement of the fixed cutter bits and this represents a cost which runs less than \$5 per ft. of tunnel. The disc cutters show no sign of wear.

Management

Mittry Constructors used the machine in its initial design and completed two tunnels. Contract for Stage III was awarded to the Oahe Constructors, a firm made up of five well-known contractors: Foley Brothers, Inc., Winston Brothers Co., Donovan Construction Co., C. F. Lytle Co., and Missouri Valley Constructors. I was asked by this or-

ganization to design and build for them an improved machine. This same organization were the low bidders on Stage IV which involves boring six 30-ft. diameter tunnels and I am designing the equipment for this new stage of the project.

Letters

(Continued from page 53)

sand or granular soil in embankments at 90% relative compaction, as determined by the 5-layer test method, a state of compaction much lower than could readily be attained with normal compactive effort.

Since the revised specifications adequately control the end result and assure satisfactory compaction of all soils, it is no longer considered necessary to specify type or number of rollers or compacting units. Accordingly, the previous specification covering the type and minimum number of rollers is now waived, and the contractor is free to use any type or amount of compacting equipment so long as the specified relative compaction is obtained.

The excerpt from our current Special Provisions fully covers the changes in the compaction specifications. I have attempted to explain the reasons for and effect of the revised specifications by the above comments.

A. W. ROOT

*Supv. Mtls. & Research Engr.
Materials and Research Dept.
California Div. of Highways*

Vibratory compaction

SIR:

The articles on "Vibratory Compaction" in your December issue are interesting and add to our file on the subject. The appearance and use of this type of equipment on some of the highway contracts indicates that the contractors find it to their advantage to adopt this principle of soil compaction under certain job conditions.

BERNDT NELSON

*Asst. Construction Engineer
Construction Department
California Div. of Highways*

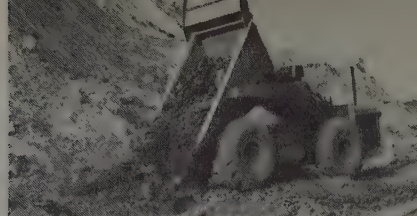
SIR:

We have read the articles on vibratory compaction with interest, and it seems to us that a salient point has been omitted.

One of the outstanding features in

Following preparation of the article, Mr. Robbins sent word that in six consecutive working days the fifth of the Stage I tunnels was driven 633 ft. Operating a full 18 shifts, production varied from a minimum of 13 ft. to a maximum of 61 ft. per shift.

Editor



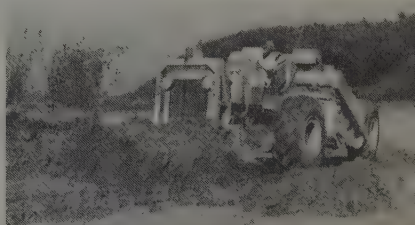
Rear-dump capacity 11 tons. Dumps clean over bank or ledge, tips vertical to clean fast.



Crane capacity 10 tons. Needs no outriggers. Lifts, carries over "off-road" footing.



Arch with electric-powered winch develops 26,500 to 72,000-lb. line pull. Winches in, skids logs, poles, pipe, etc.



Bulldozer capacity about 1 yard. Front-mounted. Electrically controlled from cab. Suitable for light dozing and push-loading.



V-type snow plow, mounts in place of dozer. Cleans path 9' wide, is 4' 8" high at ends of moldboard.

How a wide range of optional tools can insure your future!

When you buy a D Tournapull 2-wheel prime-mover it will pay dividends 12 months a year with the addition of interchangeable tools to handle a wide variety of jobs. You can save time and money on all types of construction and maintenance work. You readily convert to a suitable tool for any job to assure steady work and profits in any location and under any conditions of the future.

"D" vs. crawler-scraper team

Consider the value of this D Tournapull from a dollar-and-cents standpoint. You can almost buy two high-speed versatile "D's" with scrapers for just about the same cost as one large crawler with a 15-yard scraper. With the D Tournapull you have a fast, one-man dirtmover for self-loading, also adaptable to push-loading each other in pairs, or operating with a tractor or grader pusher in fleet operation. It works on production, scattered clean-up, and finishing. It fits for profits on big jobs or small

jobs. Each operator and machine is a profitable work-unit, any number can be combined anytime to meet any challenge of the future.

Interchangeable units

The D Tournapull-Scraper combination can be interchanged with rear-dump, flatbed, lift-and-carry crane, and winch-and-arch. Each of these auxiliary units is a simple, rugged, specialized tool for doing certain types of work at far lower cost than possible with general purpose equipment. Changeover, using same prime-mover, plus tires, wheels, and brakes from scraper, takes only a few hours. Each trailing unit costs only about $\frac{1}{4}$ the price of the original Tournapull and scraper. In addition, with any hauling unit, you can equip the prime-mover with bulldozer or V-snow plow, for additional applications, extra earnings.

Ask your LeTourneau-Westinghouse Distributor for all the facts on this versatile, high-speed "D". Learn how it can earn more profits for you.

Don't forget Talk to your LeTourneau-Westinghouse Dist. about Adams Motor Graders and Traveloaders!

Tournapull—Trademark Reg. U.S. Pat. Off. DP-962-G-b

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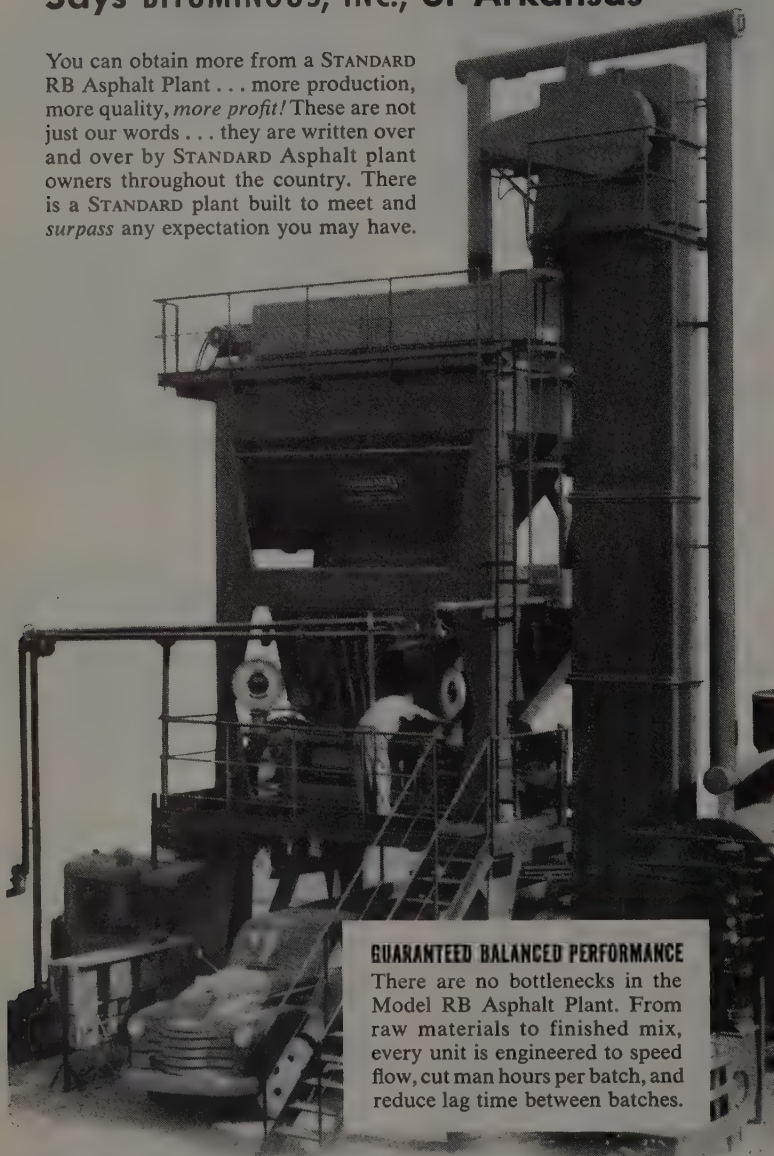


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"has exceeded our expectations"
Says BITUMINOUS, INC., of Arkansas

You can obtain more from a STANDARD RB Asphalt Plant . . . more production, more quality, *more profit!* These are not just our words . . . they are written over and over by STANDARD Asphalt plant owners throughout the country. There is a STANDARD plant built to meet and surpass any expectation you may have.



GUARANTEED BALANCED PERFORMANCE

There are no bottlenecks in the Model RB Asphalt Plant. From raw materials to finished mix, every unit is engineered to speed flow, cut man hours per batch, and reduce lag time between batches.

present-day earthmoving is the trend to higher speeds in equipment travel and unloading. Vibratory type compactors are limited to relatively slow speeds to be effective, with the result that proper coordination of all operating equipment is restricted and job efficiency impaired.

American Road Builders' Association Bulletin No. 109 deals with use of heavy equipment in vibratory compaction of soils, and contains a statement on operating speed. We quote: "To be really effective, vibratory forces must be applied for some time at the same spot. Very low speeds of roller motion not exceeding 200 ft./hr. would be required for the purpose."

The heavy duty pneumatic tired roller, such as the Southwest units, with individual oscillating weight boxes, have been proven of highest efficiency in working with earthmoving equipment, as limitations on speed are not a restricting factor.

FRED H. JUSENIUS
Construction Machinery Div.
Southwest Welding & Mfg. Co.
Alhambra, Calif.

Two comments on Kenai

SIR:

Your lead November article "Shipping Prestressed Girders 1500 miles" is an exceptionally fine and valuable one. It deals with an interesting subject and it reports with considerable frankness various construction difficulties that were encountered.

The objective sought: a concrete bridge deck whose parts are made in a plant or factory and are then field assembled into the closest possible duplication of a monolithic structure—is certainly an economically sound and meritorious one.

To do away with all the laborious concrete field operations of forming, reinforcing, concreting, curing and form stripping, subject to all the vagaries of weather and stream flow, and to substitute the assembling of controlled, plant-manufactured products—at the price of transportation, field placement and connection—becomes increasingly desirable as forming costs in both labor and materials continue to rise.

Particular credit is due to R. B. McMinn of the Portland B.R.P. office for his early recognition of this fact and for his pioneering efforts along these lines in the Turnagain Arm, Alaska, and Baker Lake, Washington bridges (Western Construction, March 1950).

It is by actual doing, by building the full-sized structure and one may say by having the full-sized attendant experience that genuine engineering progress is achieved. In this case where certain minor unforeseen difficulties developed, it is distinctly to

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1-B



How wide range of work keeps high-speed loader busy all year 'round



Here is a heavy-duty, self-propelled, belt-type loader having a wide range of applications for highway departments. It loads practically any type of loose material out of windrows or stockpiles. In addition to high loading capacity, it gets around fast from job-to-job.

Use Adams Traveloader for picking up surplus material on road and street construction or reconstruction. Use it for loading materials out of borrow pits and stockpiles. Traveloader works fast in dirt, sod, sand, gravel, crushed stone, slag, cinders, snow. It loads topsoil for landscaping with no prior preparation.

How it works

Traveloader loads in any one of a wide range of 5 working speeds from 0.29 to 1.9; has 5 travel speeds from 3.90 to 26.7. The floating, revolving, screw-type feeder automatically adapts itself to the load ahead and places a continuous flow of material on the conveyor-belt. Trucks can be loaded with loose materials at up to 10 yards per minute. Travel speed range makes it easy to keep Traveloader working to capacity. Trucks load behind loader, do not interfere with passing traffic. Moves job-to-job over highways and city streets at speeds to 26.7 mph.

Heavy, durable construction

All-welded, box-construction, one-piece frame extends full length of

machine. Heavy-duty front and rear axles, sturdy feeder mechanism, rigid conveyor with sealed-for-life roller bearings, give Traveloader the necessary strength to handle heavy loads at fast speeds with minimum downtime and maintenance. *Available with gasoline or diesel engines.*

Easy to operate

You will like Traveloader's centrally-located control station... up out of the dust, permitting clear vision in all directions. Easy, fast, hydraulic controls, give quick adaptability to any working condition.

Get all the facts on the Adams Traveloader from your LeTourneau-Westinghouse Distributor.



Cities have many uses for Traveloader. For instance, ice and snow on city streets can be loaded at the rate of 12 to 20 yards per minute. Traveloader finds work the year 'round.

On this road-widening job, surplus materials are loaded from windrow into truck in a matter of seconds. No traffic interference.



Side-shiftable cross conveyor (optional) loads trucks on either side of machine, assures proper balancing of load. A great time-saver in materials yards. Conveyor position power-controlled from operator's cab.



Here a contractor cuts and loads gravel out of a natural bank. Many contractors and highway departments use Traveloader for loading stockpiled materials of all kinds.

AL-5-G-b



LeTourneau-WESTINGHOUSE Company
Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

the credit of the Bureau of Public Roads that they are reported so fully and to the benefit of everyone who may in the future plan work along similar lines.

In closing, the writer must inquire about the \$100,000 saving effected by the use of prestressed concrete over the cost of a steel truss design. These are 70-ft. beam spans vs. a 190-ft. truss span. What is the point? An even larger and more impressive "saving" would have resulted from having the steel truss span 280 ft. long. But what of it? The \$100,000 figure has value if it indicates the sometimes superiority of a second

thought over a perhaps standard and habitual first thought but apparently it has not much value otherwise. Enlightenment is requested.

HOMER M. HADLEY
Hadley & Hadley
Consulting Engineers
Seattle, Wash.

SIR:

We enjoyed the article on the lightweight precast and prestressed Kenai River Bridge in Alaska. However, we feel there were some rather glaring omissions.

We have been active in design of the alternate girder design in the

lightweight prestressed concrete for over four years and when we were approached by C.M.R. Constructors and Empire Building Material Co. regarding the feasibility of stateside casting of girders, we were pleased to assist in preparing estimates and after C.M.R. accepted Empire's bid for the prestressed girders, to prepare light weight concrete for submission to the Bureau of Public Roads for approval. Following acceptance of our design—with minor increase in prestress allowance—we were retained by Empire to prepare working detail drawings for the girders, and the slabs, which C.M.R. later decided to have cast here also.

In addition to our design and drawings (and checking of stressing schedule prepared by Freyssinet), we supervised the yard work for the prestressing contractor, the load testing, and then the loading on shipboard for C.M.R. Constructors.

In light of our pioneer efforts in past years in developing lightweight prestressed concrete design, and our considerable part in design and supervision of this job for the contractor and the prestressing sub-contractor, we were amazed at the complete omission of this from your article.

Knowing your interest in accuracy and fairness, we felt you would want this information.

JAMES and HONEY
Consulting Engineers
Portland, Ore.

Correction gives credit for work at Chief Joe

SIR:

Undoubtedly, you have received a letter of complaint from Clyde & Meham, attorneys for Wiscombe Painting Company, regarding the article published in your December issue telling of the penstock interiors at Chief Joseph Dam. Unfortunately, an unintentional omission has caused concern on the part of Wiscombe Painting Company.

The name of Wiscombe Painting Company should have been mentioned in the article with reference to sandblasting in the interior of the penstocks. This omission contributed the inference that the sandblasting was done by Gustafson Coating & Blasting. The sandblasting staging assembly was devised and used by Wiscombe Painting Company, not by Gustafson Coating & Blasting, as one photo caption inferred because the name Wiscombe was not included.

I trust this information will enable you to print the correction which is desired by Wiscombe Painting Company and attorney.

GILBERT R. BEAN, Chief
Technical Liaison Branch
Corps of Engineers
Seattle District

MORE THAN **80%** OF ALL PAVED ROADS
ARE NOW SURFACED
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ASPHALT

CUMMER
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... CONSISTENTLY PRODUCE RECORD
TONNAGES WITH LESS DOWN-TIME

You can't beat the actual experience of "old hands" who have been operating Cummer Asphalt Plants for years when it comes to telling the real story behind Cummer equipment.

Such an "old hand" is Mr. Henry W. Jenkins, Vice-President of the Savannah Asphalt Company of Georgia. Mr. Jenkins says, "Our Cummer Portable Asphalt Plant—shown in the picture above—is rated at 60 to 70 tons per hour capacity. It's been delivering that in the three years we've owned it, and we're still surprised at how little we've had to shut down for repairs and replacements. The way we figure it, ruggedness and efficiency are built right into these Cummer Plants."

Cummer Asphalt Plants are batch-type complete with all motors and starter switches and all moving parts are individually motor driven.

Write now for your copy of the fully-illustrated Cummer catalog giving complete specifications on all plants and accessories.

Write now for names of our Western Representatives



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tearing off old asphalt from Cascade, Idaho, streets and hauling it away for use as fill on the new highway. Because C Tournapull can make a non-stop U-turn in a space only 30' wide (less than machine's length) it works rapidly in restricted areas such as this city street. Power-steer through geared king-pin allows prime-mover to turn 90° right or left.



Rubber-tired scrapers

rip asphalt...dig out soft spots...handle rough work on mountain highway job

Idaho State Highway 15 passes through the center of the city of Cascade. When Duffy Reed Construction Co., of Twin Falls, was awarded the contract to relocate and reconstruct 13.7 miles of this highway, job included tearing out the old asphalt from the city's main street. Company officials decided to use this broken paving to fill soft spots in other parts of the road.

Duffy Reed sent four C Tournapulls to move this scarified asphalt material. The "C's" maneuvered easily in confined quarters of city streets, spotted quickly for push-loading, got away fast with pay loads averaging 10 yards.

In out-of-town highway traffic, Tournapulls often had to make rough roadside detours to pass power shovels digging culvert trenches across road grade. Heavy traffic caused further delays. Most of the time, Tournapulls traveled the highway in fourth or fifth gear, at speeds to 30 mph.

"C's" get around in mud"

One of the big problems on this job was the many soft spots in the grade caused by decomposed vegetation, high water table, and numerous underground springs. C Tournapulls easily dug out these soft spots and filled in the cavities with rock and granite-sand.

"C's" were assigned to clean out the truck because they work easily in soft

footing where other haul units bog down. Their exclusive power-transfer differential automatically delivers more power to the drive wheel on firmer footing...slows the spinning wheel to keep it from "digging in". In very soft material, power-steer through geared king-pin enables operator to pivot drive wheels to firmer footing, "walking" the machine out of bad spots.

Says Owner Duffy E. Reed, "I like the way C Tournapulls get around in mud, and the way they handle excavation."

"Easy on the operator"

One important Tournapull advantage is the comfort it offers the operator. He sits relaxed in an air-foam, cushioned seat. He steers, raises, or lowers the scraper bowl, brings the tailgate forward, or raises the apron for dumping, with simple, electric, push-button controls. Big, low-pressure tires absorb shocks in rough going. Says Operator Maurice V. Cole, "Tournapulls are easy on the operator. You're not worn out when the day is over."

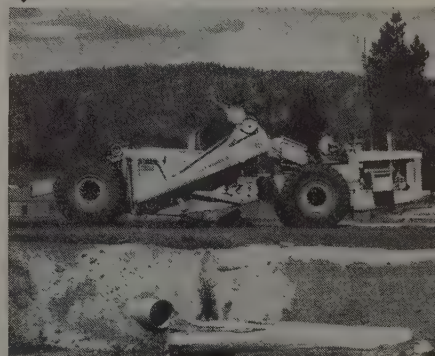
"It is easy to learn how to operate the Tournapull," adds Owner Duffy Reed.

Likes Tournapull interchangeability

"Tournapulls are adaptable, too, so I can switch anytime from scraper to rear-dump trailing unit," continues Reed.

State Highway 15 is an important link between the northern and southern parts of Idaho. Besides carrying heavy tourist traffic, many important Idaho products—millions of board feet of lumber, lead, zinc, silver and gold ores, monazite (needed for the atomic energy program), farm products, grain, cattle, and sheep—must be trucked to market over this route. Because traffic has grown too heavy for the old Highway 15, the Idaho State Highway Commission and Bureau of Public Roads is improving the poorest sections of its 120-mile length. Duffy Reed's million-dollar, 1½-million-yard contract to relocate the road through Round Valley is part of this larger project.

"C" spreads a load of sand and earth in controlled lifts to build up grade through Round Valley. "C Tournapull is a good rig for finish work," says Operator Maurice V. Cole.



Actually Tournapull prime-mover can be interchanged on rear-dump, bottom-dump, side-dump, logging arch, flat-bed, and crane. Each of these trailing units costs only about one-fourth as much as the original Tournapull.

Get the facts, now

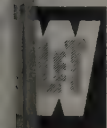
It will pay you to investigate Tournapull's many advantages. Your LeTourneau-Westinghouse Distributor will be glad to show you additional facts and figures, including owner-verified job reports on work similar to yours.

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LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company



ARIZONA

THE MAIN provisions in a proposed merit system for highway department employees have been approved by the Highway Commission. The proposal will now go before the Legislature in July. Included in the plan is a council made up of five employees elected by the employees who would hear appeals concerning decisions on promotions, hirings, efficiency ratings, discharges, and transfers.

AT THE END of 1955 State Highway projects totaling \$11,000,000 were under construction, according to State Engineer William E. Willey. This figure represented an increase of nearly 50% over the total value of construction under way a year ago. The biggest project is the San Carlos River Bridge which includes 9 mi. of grading, and 11 mi. of paving, with a contract cost of \$1,300,000. Next largest is the bridge over the Colorado River at Yuma, a joint Arizona-California project, which will cost \$1,200,000. It was hoped that an increasingly critical shortage of structural steel would not slow down the projects.

RECENT MAJOR CONTRACT AWARDS and low bids in Arizona include a low bid of \$108,302 submitted by Nafziger Tillage Service of Coolidge, for grading and surfacing in Tonto National Forest, Gila County. Morrison-Knudsen Co., Inc., of Los Angeles, Calif., submitted a low bid of \$1,247,797 for earthwork and structures on the Welton-Mohawk Division of the Gila Project. Copper State Construction Co., of Mesa, submitted a low bid of \$164,856 for grading and surfacing near Winkelman.

CALIFORNIA

REGULATIONS on hillside grading and excavating adopted by the Los Angeles Building and Safety Commission have caused subdividers and builders to protest on the grounds that the rules limit too severely the

amount of material which can be removed during the rainy season. G. E. Morris of the Building and Safety Department said that the regulations are necessary to prevent landslides and other damage during heavy rains. It is expected that a court hearing will be held concerning the protests.

PACIFIC GAS and Electric Co. has awarded a contract for the construction of Helms Dam on the King's River to Morrison-Knudsen Co. of Boise, Idaho, Walsh Construction Co. of San Francisco, and B. Perini and Sons of Boston, Mass., a joint venture. A contract for the reconstruction of 17 mi. of mountain road for access to the powerhouse site was also awarded to the three firms, which are at work on the Wishon Dam and an access road to Helms Dam site under a previous contract. Helms Dam, like Wishon Dam, will be a rock filled structure. It will be 290 ft. high and will have a crest length of 840 ft. and an elevation of 8,174 ft. The dam will require 1,450,000 cu. yd. of rock, including an upstream face of placed rock which will be capped with 28,000 cu. yd. of concrete. Work will not begin until spring.

THE WATER-PRODUCING potentialities of seven different San Francisco Bay barrier plans, including the Reber Plan, have been disclosed in a report prepared by engineers of the Division of Water Resources. The report stated that none of the seven barrier plans studied could conserve much more than 2,000,000 ac. ft. of water per year, even under the most optimistic conditions. This is in contrast to claims that as much as 33,000,000 ac. ft. per year would be made available by a barrier.

THE CONSTRUCTION of a \$1,663,000 improvement program for Highway 101 between Santa Maria and Los Alamos has been started by Madonna Construction Co. The contract calls for a four-lane freeway 11 mi. long, a bridge, and four equipment underpasses for the use of ranchers. It is estimated that it will take less than a year to complete the project.

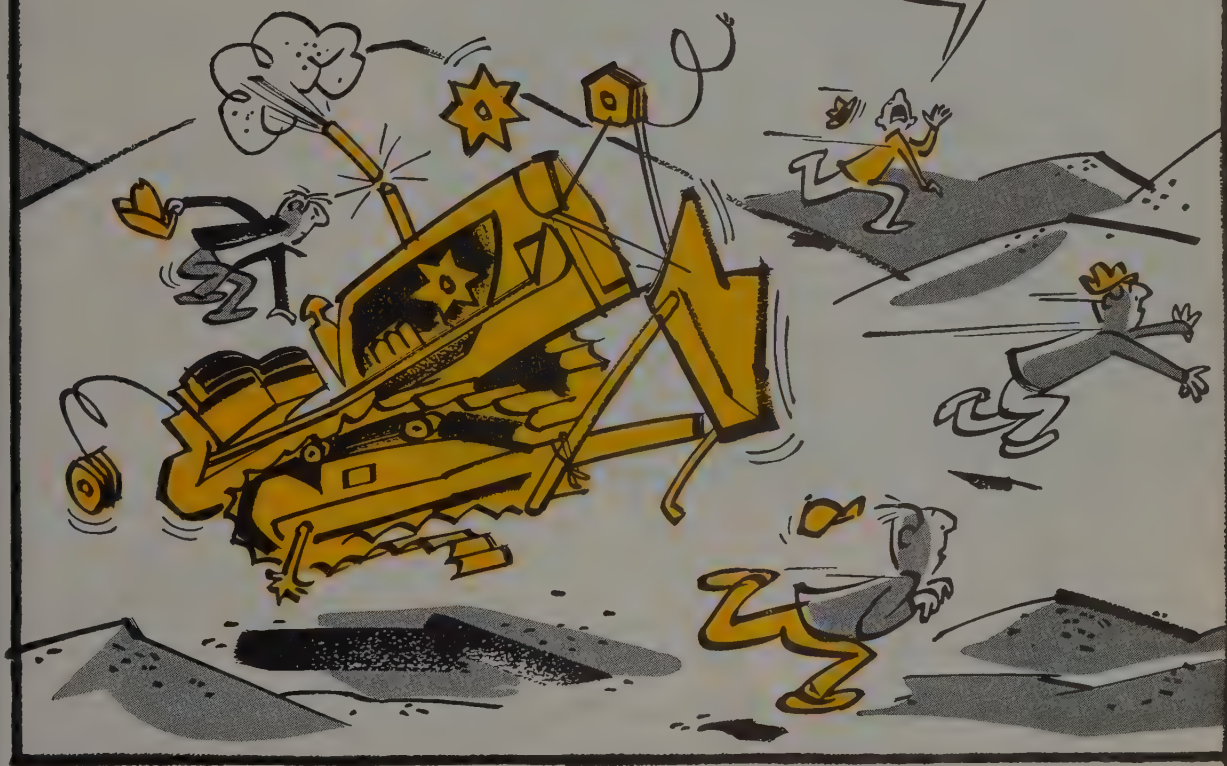
SOUTHERN CALIFORNIA EDISON Co. has disclosed it is acquiring lands near Oxnard upon which to construct a new steam-electric gen-

erating station. The first unit of the new station would cost \$35,000,000 and have a generating capacity of 200,000 kw. When fully developed it is estimated the company will have an ultimate investment in the project of more than \$75,000,000. Construction dates can not be determined until after the Public Utilities Commission has acted upon the application to construct the plant.

THE AWARD of the contract to build superstructure for the Carquinez Bridge to U. S. Steel Corporation's American Bridge Division was not illegal, according to a Superior Court decision. The contract award was protested by the second low bidder which claimed that American Bridge Division was not properly licensed in California. The objecting firms were Judson Pacific-Murphy Corp., Peter Kiewit Sons' Co., Stolte, Inc., and Fred J. Early, Jr. Co., a joint venture. American Bridge Division bid \$9,489,000, just \$30,000 less than the second low bidder.

RECENT MAJOR CONTRACT AWARDS and low bids in California include a low bid of \$551,471 submitted by M. W. Brown, of Redding, for grading, surfacing 4.7 mi. and construction of two bridges in Siskiyou County. Harms Brothers, Sacramento, submitted a low bid of \$439,067 for grading, surfacing, and construction of a bridge in Solano County. Granite Construction Co., of Watsonville, submitted a low bid of \$160,420 for 5.7 mi. of grading and surfacing in Kings and Fresno counties. A low bid of \$668,472 was submitted by Griffith Co., Los Angeles, for 2 mi. of grading, paving, and construction of two bridges in San Diego County. Transocean Engineering Co., of Sonoma, submitted a low bid of \$349,867 for 2.2 mi. of grading and surfacing on Bay Highway in Sonoma County. A low bid of \$665,745 was submitted by Oberg Bros. Construction Co., of Inglewood, for construction of two bridges in Los Angeles County. R. R. Hensler of Sun Valley, submitted a low bid of \$249,744 for 5.5 mi. of grading and surfacing in Riverside County. Basich Bros. Construction Co. and N. L. Basich of South San Gabriel submitted a low bid of \$259,903 for 5.6 mi. of grading and surfacing near El Centro in Imperial County. Clif-

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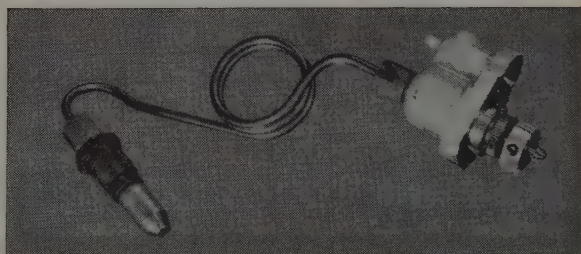
If the trouble's with substitute fuel injection parts, you should know this:

Original Caterpillar fuel pumps and injection valves are made from very special steel — the finest chromium alloy ball-bearing type. They're made with special tools in a special factory—only one of its kind in the world. Each pump is pre-set and given a 6-hour run-in. Single orifice design of valve cuts down possibility of fouling. In short, with Caterpillar parts you're sure of better performance, less down time.

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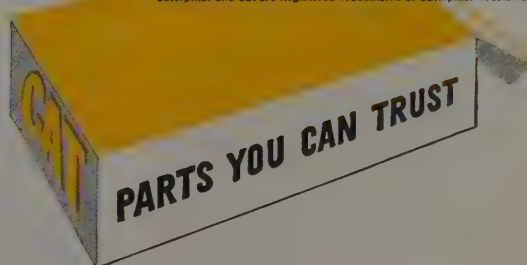
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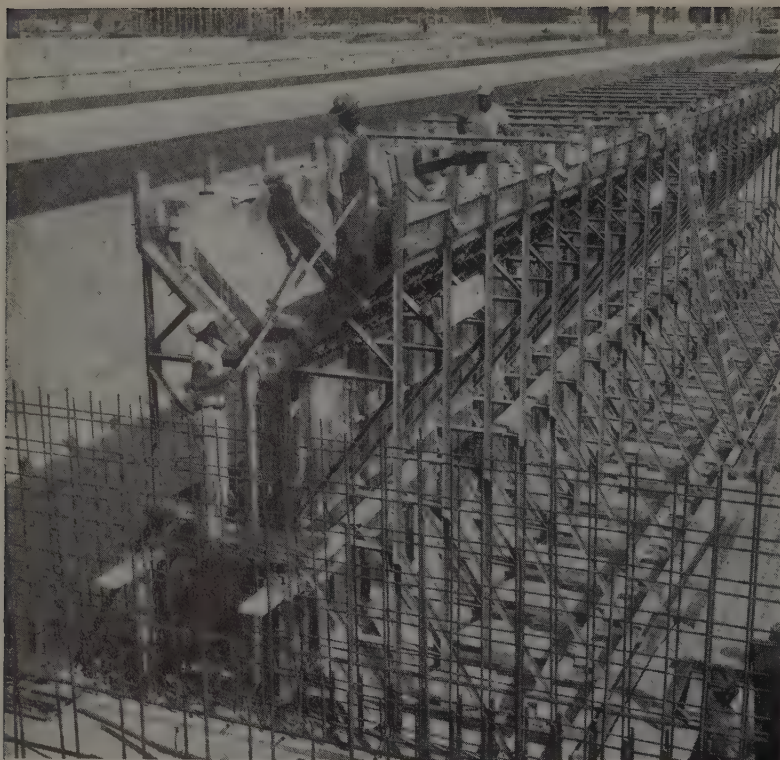


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Special Y wall forming system makes for simplified stripping operation. 100% reusability of all materials. Note complete absence of lumber normally required for shoring and bracing on this type of structure.

CUTS MATERIAL COSTS with Pre-Fab Form System on Sewage Plant Job

In the construction of the Miami Sewage Treatment Plant Job the Paul Smith Construction Co., of Miami, Florida chose to use the Uni-Form Panel System in the forming of one million sq. ft. of contact area. The contractor estimated that the use of the Uni-Form System *saved 40 percent in material costs alone*. In addition, faster form erection with fewer men kept the job moving ahead of schedule and reduced estimated labor costs considerably. These fine results were obtained even though this was the contractor's first experience with the Uni-Form Panel System.

This considerable savings in material and labor was realized in spite of intricate Y wall forming and pipe intersections which causes complicated forming problems with conventional forming systems.

Pre-fabricated, ready to use—completely engineered to handle most forming problems, the Uni-Form Panel System provides such advantages as simple assembly—minimum one side alignment and bracing—automatically accurate wall widths—positive internal spreading—faster stripping and maximum re-usage to give the contractor lowest all around form costs.

Y wall trusses designed to member with

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standard Uni-Form Panels formed a completely automatic system for handling the special forming problems, and were big factors in the economy and speed obtained on the job. Simple assembly of Standard Uni-Form Panels on the trusses eliminated many of the aligning, bracing and spreading problems usually encountered in Y wall construction. In addition to simplified forming the combination system of standard Uni-Form Panels and trusses eliminated many of the problems normally encountered in the stripping of a wall section of this type. The contractor was well pleased with all phases of his forming and stripping operations.

Why not investigate the many advantages the Uni-Form Panel System can bring to you? Write for the Uni-Form Catalog—or better yet, send us a set of plans for an estimate on your next job. Let us prove to you as we did to the Paul Smith Construction Co., that the Uni-Form Panel System can cut your forming costs.

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ford C. Bong & Co., of Arcadia, submitted a low bid of \$686,047 for grading, surfacing, and construction of one bridge in Los Angeles County. E. C. Young, Service Construction, Young & Arrieta, of Sun Valley, submitted a low bid of \$1,449,718 for 1.9 mi. of grading and surfacing near La Mesa in San Diego County. A. Teichert & Son, Inc., Parish Bros., and Harms, Sacramento, submitted a low bid of \$9,388,759 for grading, paving, and construction of three bridges in Contra Costa County.

COLORADO

CONSTRUCTION at the U. S. Air Force Academy, now confined to preliminary development of the utilities system, is expected to be in full swing by the latter part of 1956. Contracts for clearing and grading, and for construction of retaining walls and foundations will be awarded in March. February will see contracts awarded for heating plant equipment and grading and drainage of the second increment of roads. A third increment will begin in April and a fourth several months later. The May construction program calls for awarding of contracts on bridges, sewers, gas and heat mains, followed by construction of a sewage treatment plant in June.

WORK WILL BEGIN in March on Denver's 27-story Murchison skyscraper. The building, which will be Denver's tallest, is expected to be completed by January 1, 1958. It is not yet known whether the construction job will be let on a bid or on a negotiated basis.

ABOUT 1,000 construction workers will move into the Dillon area on the western slope early in the spring to begin work on the Blue River Water Diversion Project. The project includes a dam to impound water and a 23-mi. long tunnel to transport it under the Continental Divide to the Denver area. Dillon, a town of 200, will experience a boom when the construction workers arrive, but the entire city must be moved when the reservoir begins to grow. The residents will vote on a selection of a site for the new town.

PLANS HAVE BEEN announced for a \$5,000,000 shopping center at the southeast edge of Colorado Springs. Feature of the development will be a Sears Roebuck Co. store which will have 100,000 sq. ft. of floor space, all on one floor. An automobile facility will be included, with space for 3,000 cars.

A BOTTLENECK near Castle Rock has been eliminated by the completion of a 5 mi. long, 4-lane section of

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wire it's made of!*

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HAS THE CAPACITY TO ENDURE...

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Available in Complete Range of Sizes...

... to Make Your Concrete Gunning EASIER... MORE EFFICIENT... MORE PROFITABLE!

Whatever your concrete gunning requirements, now there is an AIRPLACO concrete gun sized just right to meet your specific needs, from 1/2 to 7 cu. yds. per hour.

BONDACTOR MODEL 750 — Capacity of 1/2 to 3/4 cu. yd. per hour. Operates with 75 or 125 CFM compressor.

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NUCRETOR MODEL 1500S — Capacity up to 3 1/2 cu. yds. per hour with 250 CFM compressor and 1 1/4" placement hose, or up to 5 cu. yds. with 315 CFM compressor and 1 1/2" hose.

NUCRETOR MODEL 1500L — Capacity up to 7 cu. yds. with 365 CFM compressor and 1 5/8" placement hose.

Capacities will vary with materials being gunned and with operating conditions.

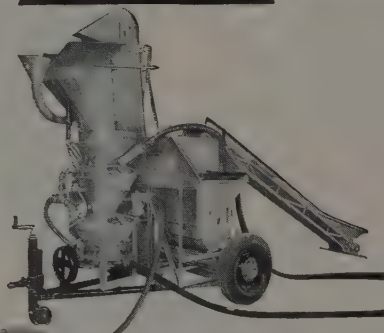


BONDACTOR MODEL 750



BONDACTOR MODEL 1250

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U. S. Highway 85-87. Henry Shore Co. did the grading and structures on a contract of \$781,000, and North-western Engineering Co. was in charge of paving on a contract of \$595,000. Completion of the job marked another step in the overall plan to connect Denver and Colorado Springs with a 4-lane highway.

RECENT MAJOR CONTRACT AWARDS and low bids in Colorado include a low bid of \$1,647,000 submitted by **Mead & Mount Construction Co.**, of Denver, for construction of junior high school in Virginia Village, Denver. **Robbins Construction Co.**, Denver, submitted a low bid of \$653,000 for construction of junior high school for the Harvey Park area, in southwest Denver.

IDAHO

ADDITIONAL DELAYS in the planned construction of the new underpass of Yellowstone Avenue on U.S. 191 in Idaho Falls have been announced by the Highway Board. The delays are caused by the need for re-designing the structure. Redesign is necessary because of the inability of the Right-of-Way Division to secure a small piece of land. If the new layout is accepted, it will be several months before the project can be advertised for bids.

ABOUT 200 MEN are working in two shifts at Idaho Power Company's Brownlee Project in Hells Canyon area of the Snake River despite below zero temperatures, according to Glenn C. Johnson, resident manager for Morrison-Knudsen Co. Preliminary excavation for a 2,450-ft. diversion tunnel 38 ft. in diameter has begun, and large quantities of rock and earth are being moved to expose the tunnel portal where rock drilling will begin.

RECENT MAJOR CONTRACT AWARDS and low bids in Idaho include a \$309,931 award to **Aslett Construction Co.**, Twin Falls, for grading and surfacing the Ketchum-Clayton highway, Sawtooth & Challis National Forest. A \$224,933 contract was awarded **Peter Kiewit Sons' Co.**, Idaho Falls, for grading and surfacing in Targhee National Forest.

MONTANA

THE STATE HIGHWAY Commissioners have announced that there will be no letting of highway contracts in February. Bids on several projects will be opened at the regular March meeting.

TWO NEW POWERFUL HUBER-WARCO MOTOR GRADERS

**Torque Converter and
Power-Shift Transmission**

**7D 140 H. P.
28,500 lbs.
6D 100 H. P.
25,000 lbs.**



Designed to Give the Power and Weight You Want in a Motor Grader

- Powered by GM 3-71 and GM 4-71 diesel engines.
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THE BUREAU of Reclamation has announced it will begin field surveys in June on the proposed Flathead Hydroelectric Development. The survey will concern itself with potential dam sites and diversion tunnel location.

RECENT MAJOR CONTRACT AWARDS and low bids in Montana include a \$825,790 award to **Fred H. Slate Co.** of Portland, Ore., for 4.3 mi. of grading and structures in Silver Bow County. **Schye & Sullivan** and **Riedesel Construction Co.** of Billings received a \$667,779 award for construction of a steel bridge in Custer County. **C. A. Reeves Construction Co.**, of Sheridan, Wyo., was awarded a \$227,215 contract for grading, surfacing, and structures in Rosebud County. A \$275,071 contract was awarded to **Walter Mackin & Son**, Billings, for construction of a bridge in Big Horn County. **Sather & Sons** of Yardley, Wash., received a \$416,797 contract for 8.2 mi. of grading and surfacing in Sanders County. **Carl E. Nelson Construction Co., Inc.**, of Logan, Utah, was awarded a \$205,057 contract for 6 mi. of grading and surfacing in Silver Bow County. A \$184,961 contract was awarded to **Hilde Construction Co.**, Great Falls, for 7.7 mi. of grading and surfacing in Broadwater County. **Francis H. Holland** of Bozeman was

awarded a \$461,054 contract for 7.3 mi. of grading and surfacing in Blaine County.

NEVADA

THE FEDERAL POWER Commission has authorized the Nevada Natural Gas Pipeline Co. of Las Vegas to build new facilities costing \$4,000,000 to enable it to transport additional gas to be received from El Paso, Texas.

RECENT MAJOR CONTRACT AWARDS and low bids in Nevada include a \$79,200 contract award to **H. Earl Parker, Inc.**, Marysville, Calif., for 8.2 mi. of grading and surfacing in Douglas and Ormsby counties. **Silver State Construction Co.**, Fallon, was awarded a \$680,558 contract for 17.6 mi. of grading and surfacing in Elko County.

NEW MEXICO

WORK IS PROGRESSING on the Civic Auditorium being constructed northeast of St. Joseph Hospital in Albuquerque. **Lembke, Clough** and

King are the general contractors on the \$1,000,000 contract. A dome-shaped earthfill is being built up to facilitate the pouring of the concrete shell roof.

RECENT MAJOR CONTRACT AWARDS and low bids in New Mexico include a low bid of \$893,346 submitted by **D. D. Skousen & Son**, Albuquerque, on schedules No. 1 and No. 2 for earthwork and structures on the Middle Rio Grande Project. A \$537,917 contract was awarded **Skousen-Hise Contracting Co.** of Albuquerque for 6.3 mi. of grading and surfacing in Torrance County. **Henry Thygesen & Co.** of Albuquerque was awarded a \$560,319 contract for 7 mi. of grading and paving in Mora County. **Badger Lynch** of Albuquerque submitted a low bid of \$130,440 for road improvements and drains, Middle Rio Grande Project.

OREGON

BOYLES BROS. Drilling Co. has begun moving in barges and equipment to carry out test drilling at the John Day dam site. Drilling is expected to be completed in about 45 days. The proposed dam is located between The Dalles and McNary Dams.

THE PORTLAND DISTRICT Corps of Engineers is proceeding with preliminary investigations of the proposed Cougar Dam on the south fork McKenzie River. The District has \$500,000 with which to continue planning and start construction of Cougar Dam, which will be a rock-fill type embankment 1,500 ft. long with a maximum height of 445 ft. from foundation to crest. The project is located within the Willamette National Forest and recreational planning will be accomplished in cooperation with the U. S. Forest Service.

THE BUREAU of Reclamation has announced preliminary plans for the construction of a reservoir on the Deschutes River to cost \$4,000,000. The project would include a rockfill dam 44 ft. high, a fish by-pass, and recreational facilities. No power development is planned because the reservoir would be operated primarily for irrigation purposes.

RECENT MAJOR CONTRACT AWARDS and low bids in Oregon include a low bid of \$3,195,782 submitted by **Gunther & Shirley Co.**, and **E. V. Lane Corp.**, Palo Alto, Calif., for completion of the power house and appurtenances at The Dalles Dam on the Columbia River, Washington and Oregon. **Copenhagen & Company** of Portland submitted a

(Continued on page 76)



Photo from Tacoma Dept. of Public Utilities

DRILLING OPERATIONS AT MAYFIELD DAM

Drilling jumbo moves in for initial operations on tunnel portal at Mayfield Dam on the Cowlitz River, about 50 mi. from Tacoma, Washington. Work on access roads and rock excavation for first block of dam is being carried out by general contractor **Arundel Corporation**—**L. E. Dixon Co.** of San Gabriel, Calif., holder of a \$10,863,140 general contract.



OLIVER OC-12 *delivers a basement every 5¼ hours!*



Full bucket loading is easier with the Oliver OC-12. Wide control range provides a big advantage in bucket rollback, digging depth and dumping height. Long track frame insures exceptional stability.

That's the production record of Harry H. Meyer Co. on this housing project near St. Louis. Digging basements 40' x 26' x 6' deep, the Oliver OC-12, equipped with 1¼-yd. loader, averaged 1½ of these excavations per day—only 5¼ hours each! That's low-cost dirt moving in anybody's language—and especially for exacting work of this kind.

No wonder the OC-12 is stepping into the picture and stepping out with bigger profits for its owners. Powerful, with 53 drawbar h.p. (either diesel or gasoline), this fast worker has the smooth, responsive control that lets you work more efficiently in close quarters. With heavier construction and many fine new features, the OC-12 is ready to handle your toughest assignments with greater speed and lower costs. Your Oliver dealer has the facts. See him today!

THE OLIVER CORPORATION

400 West Madison Street, Chicago 6, Illinois



a complete line of industrial wheel and crawler tractors and matched allied equipment

NEWS

(Continued from page 72)

low bid of \$132,642 for earthwork and structures on the Medford and Rogue River Valley irrigation districts. **United Builders, Inc.**, submitted a low bid of \$263,232 for construction of navigation guide wall at Oregon Trunk Railway Bridge, Celilo, The Dalles Dam Project.

UTAH

SECRETARY of the Interior McKay has announced that the Department will drop the controversial Echo Park Dam from the Upper Colorado Project. Various conservation groups had opposed the Echo Park Dam on the grounds that it would flood parts of Dinosaur Monument. The Secretary said that alternate action will be recommended in the hope of getting Congressional approval for the project in the coming year.

RECENT MAJOR CONTRACT AWARDS and low bids in Utah include a low bid of \$481,350 submitted by **Germer, Abbott & Waldron**, Tremonton, for grading and paving 6.7 mi. of the Blue Creek Pass in Box Elder County. **Jacobsen Construction Co.**, Salt Lake City, submitted a low bid of \$190,556 for work on the Deer Creek power plant and switchyard, Provo River Project. **Jack B. Parsons Construction Co.**,

Smithfield, submitted a low bid of \$765,788 for grading and surfacing the Becks Hot Springs overpass.

WASHINGTON

NOW UNDER CONSTRUCTION at Main and Wall Streets in Spokane is the Bon Marche's new building which will contain 300,000 sq. ft. of floor space. The foundation is being constructed by **Gus J. Bouten Construction Co.** Bids were expected to be opened in January for the rest of the building. Total cost of the project is near \$2,500,000.

THE FEDERAL POWER Commission will hold a rehearing commencing February 6 in Washington, D. C., in connection with orders issued in September of 1954 granting a preliminary permit to Public Utility District No. 1 of Douglas County, Wash., for a proposed hydroelectric project on the Columbia River, and denying a conflicting preliminary permit application by Puget Sound Power & Light Company of Seattle. The FPC said that further consideration of the issues raised by Puget Sound would be in the public interest. A preliminary permit does not authorize any construction.

AWARDS and low bids in Washington include a \$131,696 contract award to **Harry H. Hawkins**, Seattle, for construction of Cavaleros corner interchange in Snohomish County. **C & E Construction Co., Inc.**, Yakima, was awarded a \$250,336 contract

for 1.4 mi. of grading and paving in Benton County. **Goodfellow Bros., Inc.**, Wenatchee, was awarded a \$230,849 contract for construction of Pacific Railroad overcrossing and approaches in Adams County. A \$755,000 contract was awarded to **R. A. Heintz Construction Co.**, of Portland, Ore., for 6.1 mi. of grading and surfacing in Klickitat County. **Ward & Green & W. Carroll** of Portland, Ore., was awarded a \$591,538 contract for construction of radar facilities for Geiger Air Force Base. **Morrison-Knudsen Co., Inc.**, of Los Angeles, Calif., was awarded a \$1,869,580 contract for pumping plant additions at the Hanford Works, Richland.

WYOMING

THE HIGHWAY Department has published a book entitled Wyoming Highway Laws and Related Statutes. The book covers every phase of Wyoming highway law and is priced at \$5.00.

RECENT MAJOR CONTRACT AWARDS and low bids in Wyoming include a low bid of \$109,547 submitted by **Riedesel-Lowe Co.**, Cheyenne, for construction of the Cottonwood Siphon, Interstate Canal.

Here and There

RECONSTRUCTION of the existing Interstate Bridge across the Columbia River between Portland and Vancouver on a cost basis of 50% to be borne by the state of Washington and 50% by the Federal Government has been approved in principal by the Secretary of the Army, Wilbur M. Brucker. The reconstruction consists basically of raising the old bridge to give the same clearance as will be provided under the new parallel bridge.

THE FEDERAL POWER Commission has authorized the Pacific Northwest Pipeline Corp. to build new pipeline facilities to import natural gas from Canada into Oregon, Washington, and Idaho. The company will construct a total of 955 mi. of new pipe costing an estimated \$28,500,000.

SOUTHERN PACIFIC Railroad's 850-mi. pipeline from Texas to California via Tucson and Phoenix was expected to begin delivering gasoline in January. S. P. utilized its right-of-way in constructing the pipeline, which cost about \$34,000,000. The line includes 185 mi. of branches, which mainly serve air bases.



FIRST STEEL FOR PORTLAND BRIDGE

The first steel for Portland's (Oregon) Morrison Street Bridge has been shipped by Bethlehem Pacific's Seattle fabricating works. Two 84-ft. trusses, designed to brace sheet piling driven into the river bed, will enable pier work to begin.

TEST RESULTS

No. 470 Lowbowl Scraper (18 cu. yd. struck capacity) vs Competition

No. 470

AVERAGE
LOAD

18.1

BANK CU. YD.

Scraper A

18 cu. yd. struck capacity

AVERAGE LOAD

14.8

BANK CU. YD.

No. 470

AVERAGE
LOAD

18.1

BANK CU. YD.

Scraper B

Sideboarded —
18 cu. yd. struck capacity

AVERAGE LOAD

14.3

BANK CU. YD.

LOWBOWL ADVANTAGE:

3.3 bank cu. yd. per load

Test conditions: Damp silty clay—density: 3300 pounds/cu. yd. Weight Comparisons: Average net load, pounds: No. 470—59,840; Scraper A—48,675.

Comments: On one load, the operator of Scraper A was asked to obtain maximum heap. It took 2.40 minutes of push loading to pick up a load which weighed 58,875 net pounds—less than the average load carried by the No. 470!

LOWBOWL ADVANTAGE:

3.8 bank cu. yd. per load

Test conditions: Sandy clay. Density: 3100 pounds/cu. yd. Weight comparisons: Average net load, pounds: No. 470—56,225; Scraper B—44,400.

Comments: Average loading time for both machines was comparable. In total cycle time, the DW21 had the advantage. Its transmission provided a better match to rimpull requirements, and its shorter turns saved time on the fill.

No. 470

AVERAGE
LOAD

18.1

BANK CU. YD.

Scraper C

18 cu. yd. struck capacity

AVERAGE LOAD

14.3

BANK CU. YD.

No. 470

AVERAGE
LOAD

15.6

BANK CU. YD.

Scraper D

Sideboarded —
18 cu. yd. struck capacity

AVERAGE LOAD

13.3

BANK CU. YD.

LOWBOWL ADVANTAGE:

3.8 bank cu. yd. per load

Test conditions: Damp silty clay. Density: 3300 pounds/cu. yd. Weight comparisons: Average net load, pounds: No. 470—59,840; Scraper C—47,290.

Comments: Scraper C, like Scraper A and the No. 470, has a rated capacity of 18 cu. yd. struck. On the job, where results, not rated capacities, are the true yardstick of a machine's ability, the No. 470 Scraper with Lowbowl design decisively outloaded the other two.

LOWBOWL ADVANTAGE:

2.3 bank cu. yd. per load

Test conditions: Heavy clay. Swell about 40%. Density: 3440 pounds/cu. yd. Weight comparisons: Average net load, pounds: No. 470—53,550; Scraper D—45,630.

Comments: In the tests, Scraper D scored next best to the No. 470. Scraper D is the "old" DW21-No. 21, a unit that set records for high production at low cost the world over. Now, in the new DW21-No. 470, Caterpillar has produced a unit that's even better—and way ahead of competition!

Results on the job, not rated capacities, are the only true measure of a machine's ability to produce. Check the results here and judge for yourself how much the *extra yards* moved by the DW21-No. 470 Lowbowl Scraper can mean *profit-wise* to you!

Your Caterpillar Dealer has a complete report of this on-the-job test on the Kansas Turnpike—as well as similar reports from other sections of the country. Ask him to show you the advantages of Lowbowl Scrapers on your job.

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

CATERPILLAR*

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

**BIGGER, FASTER LOADS
WITH LOWBOWL SCRAPERS**

ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

RING OUT THE OLD—From the heart of Alaska, an area hit not long ago by one of the worst storms of the winter, we'll try to give you in this newsletter a picture of what 1956 will bring to the faithful readers of this column. This information is based on a careful analysis of a large mass of data that come across our desk in our role as a working newspaperman. While we make no claims to having a gift of prophecy, we nevertheless believe that the shape of things to come, construction-wise, in Alaska during the coming year can pretty well be mapped out on the basis of advance statements made by the District Engineer office, construction company executives and even by lending an ear to the views of construction workers. We'll toss our crystal ball into the Yukon River if by-and-large the data we give you below don't measure up to what actually happens in Alaska construction during 1956.

* * *

JOB PICTURE—If you're a construction worker—and I want to lead off with information for you, having a special interest in your fraternity since I was once a construction worker myself—the 1956 Alaska picture has its good, bad, and indifferent aspects. Looking first at the good side—there's no indication now that the level of wages and of take-home pay will slump during 1956. The past year was a good one, with plenty of beans and bacon and enough chips left over to make it a Merry Christmas for construction men in general. Wages were at an all-time high in most construction crafts and many a construction stiff has admitted to me: "We've never had it so good." Though there are rumblings of a cut-back attempt for wages and hours—none of the construction men I talked to think it stands the chance of a snowball in a furnace. So, as a construction worker, you can look forward to 1956 as a year of continued high unit wages and in many cases a continuance of the substantial overtime policies now in effect. Also on the good side is the fact that if you happen to go out to a remote site, camp facilities are steadily improved and men I've talked to said meals and lodgings at these remote Alaska sites, with one or two exceptions—"just can't be beat."

* * *

BAD SIDE—We don't want to dampen your New Year's optimism, but there's a gloomy side to this picture for you men who follow the construction trade. There's a gradually increasing labor pool in Alaska and this is coupled with a steady decline in the volume of Alaska

construction activity. The men I've talked to—and they're fellows who size up these things very carefully—declare that this means less take-home pay for the worker—if not in 1956, then surely in 1957.

One analyst stated: "Alaska is ceasing to be regarded as an overseas base to which workers must be lured by the promise of extravagant take-home pay." He emphasized that the construction labor picture in the territory right now is in what he calls a "transition stage." What he means is that right now we are passing from labor-shortage to labor-surplus; from construction-abundance to construction-decline. This always leads to an adjustment in the wage-price relationships in Alaska, bringing such wages and prices more in line with stateside standards. And let's face it—both wages and prices are mighty high right now in Alaska. To sum up: don't get too worried about an abrupt change in your earning power right away—but remember that those rainy days that every construction man has to face are very probably right ahead.

* * *

INDIFFERENT SIDE—In many respects, the 1956 construction season in Alaska shapes up to be one in which there will be little change in many categories. For example, the "job cycle" in the territory probably won't be radically different from previous years. In the spring—March, April and May, there'll be the usual seasonal "job-rush" to the territory, despite warnings from employment officials and union bosses. Until construction gets going in full gear around July and August, there'll be a lot of men on the unemployment lists. The short period of high employment will continue until October when the usual slack period rolls around, and construction workers head south again with the geese.

* * *

UNION CHANGES—There is growing sentiment in Alaska against "absentee control" of Alaskan workers by labor union officials in Seattle and other centers. In the past, this has been justified on the basis that big-city union men could negotiate with top officials of construction firms much more conveniently, and in most respects would carry on the administrative details of their unions more efficiently from a large central office. However, more and more Alaska workers are demanding that they be allowed to "stand on their own feet" and have their own representatives in the territory. As the labor market in Alaska grows, the administration of Alaskan crafts from United States union offices will grow

more and more difficult. The trend toward local autonomy will continue—and it will mean less labor strife on the construction job. One Alaska official points out that in the case of the carpenters, for example, labor relations have been disturbed and disagreements prolonged by attempts to throw off Seattle control. Unions will probably see the handwriting on the wall and fall in line on this—which, after all, is merely a procedural and organizational matter. And because of the twin facts of increasing labor supply and decreasing job volume, unions probably will be less difficult to deal with in 1956 than they have in some instances in the past.

* * *

FOR CONTRACTORS—Much as we would like to, we can't present too cheery a picture for the contractor who eyes Alaska as an expanding construction market. To a certain extent this is true; I believe without doubt that the tempo of commercial and municipal construction is increasing perceptibly year by year. At the same time, we just can't escape the harsh fact that the volume of military construction (which is the big frog in the pond here in Alaska) is going down steadily. Those of you in the construction business have had advance knowledge of this—as a matter of fact, there may be evidences of this decline on your balance sheets this year. The one happy thing about the decline is that it is gradual.

* * *

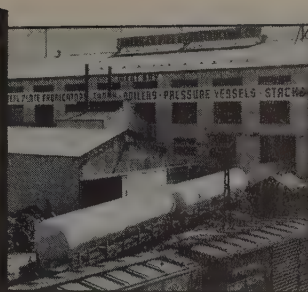
A LOOK AT THE BLUE BOOK—The latest "Blue Book" listing anticipated construction contracts which will be let by the District Engineers, has been furnished to me. Although most of you have copies of this, there are a number who have not so we might take a quick look at what is offered. Your reporter must admit this is one of the slimmest "Blue Books" he's seen in all the years he's been in Alaska. And the individual items offered aren't calculated to get anyone overly excited. Projects listed include only those scheduled for bid advertisement during the remainder of the fiscal year 1956 which ends June 30, 1956. The listings are further qualified with the sobering statement: "subject to availability of funds."

* * *

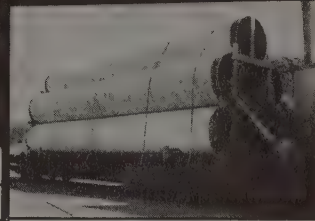
SILVER LINING—We don't want to sign off with our newsletter without a word or two of cheer for ambitious contractors. By no means is all the construction in Alaska military. There are various government agencies such as the Alaska Railroad, Bureau of Public Roads, and the like which have their own construction projects. And there's the aforementioned commercial and municipal construction which is increasing by leaps and bounds. So there's no reason for pessimism if you're interested in participating in construction on America's "Last Frontier." Not in 1956, at least.



ELEVATED TANKS



PRESSURE VESSELS



WELDED STEEL PIPE



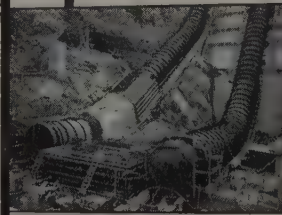
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STACKS • BREECHINGS



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

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

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

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NORTHWEST DIVISION
 518 N. E. Columbia Blvd. (near Union Ave.)
 Portland 11, Oregon • Ukiak 2531
 LOS ANGELES • HAYWARD • SAN DIEGO

ENGINEERS

on the move

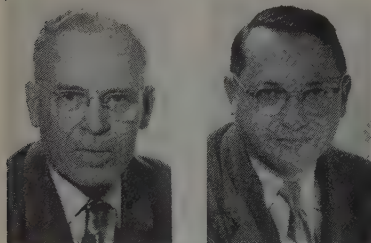
J. Donovan Jacobs has opened a consulting engineering office at 503 Market St., San Francisco 5, Calif. Services will be specialized within the field of heavy construction, including project planning, cost analyses, plant and methods design, inspection, field engineering and management. Jacobs recently completed employment as chief engineer for Kaiser-Walsh-Perrini-Raymond on the Snowy Mountains Project in New Zealand.

* * *

J. W. Vickrey and **Charles E. Waite** were appointed deputy state highway engineers for the California Division of Highways following retirement of **R. M. Gillis**. Both men have been serving as assistant state highway engineers. In making the appointments, State Highway Engineer **G. T. McCoy** said two deputies were named to provide the "additional top level administrative assistance required to handle the increasing program." **J. C. Womack** was named to fill the post formerly held by Vickrey, and **John A. Legarra** takes over Womack's former duties. **J. P. Murphy** succeeds to the post formerly held by Waite.

* * *

W. L. Fahey, district engineer in charge of operations for District 7 of the California Division of Highways at Los Angeles retired as of



Fahey

Langsner

Dec. 1. **George Langsner** was promoted to fill the position. Fahey, who is widely known throughout Southern California in construction and contracting circles, was appointed district engineer in November, 1948.

* * *

Frank A. Banks, the man who supervised construction of Grand Coulee Dam, was recently awarded an honorary membership in the American Society of Civil Engineers. He is the first member of the Spokane, Wash., Section to receive the highest honor of ASCE. Banks retired in 1950 after 44 years with the Bureau of

Reclamation, during which period he worked on six major dams in the Pacific Northwest: Jackson Lake, American Falls, Arrowrock, Owyhee, Thief Valley, and Grand Coulee.

* * *

Two personnel promotions were recently announced by the Oregon State Highway Department. **Forrest B. Cooper** was upped from assistant construction engineer to construction engineer, and **L. H. Young** succeeds to the post of assistant construction engineer.

* * *

R. D. Asbury was recently made reconnaissance engineer by the Oregon State Highway Department, located at Salem. He was formerly resident engineer for the Highway Department at Roseburg.

* * *

Malcolm R. Gilpin, who for eight years has served as chief of construction with the Alaska District, Corps of Engineers, has returned to the States to assume similar responsibilities with the Corps' Southwestern Division at Dallas, Tex.

* * *

Two engineers of the Portland District, Corps of Engineers, recently retired: **Harry E. Gleason**, with 22 years of federal service, and **Robert E. Bower**, with over 21 years.

* * *

Announcement is made of the election of new officers of Arizona Section, American Society of Civil Engineers, to serve for the forthcoming year. **Wilbur L. Heckler** was elected president; **Leigh O. Gardner**, 1st vice president; **Clarence H. Whalin**, 2nd vice president; **Robert M. Cushing**, secretary-treasurer, and **Hanen H. Williams**, director-at-large.

* * *

James A. Callan, a career man of 30 years with the Bureau of Reclamation, was recently appointed construction engineer for rehabilitation work in the area around Medford, Ore.

* * *

Thomas H. Durfee recently moved his consulting engineering headquarters to 701 East Main Street, Ventura, Calif., where he specializes in electrical, mechanical, nuclear, and structural engineering. Durfee was formerly connected with the Navy at Port Hueneme.

* * *

Eugene J. Dale recently joined the Seattle staff of the Portland Cement Association as field engineer. Before

commencing employment with the PCA, Dale spent five years with the engineering department of the City of Seattle and two and a half years with a professional engineer.

* * *

Richard N. Henderson, mechanical engineer with the Salt River Power District at Phoenix, Ariz., recently accepted a position as technician in charge of the engineering division of The Artibonite Project in Haiti, a large storage dam to provide irrigation to some 80,000 acre. This project is presently headed by **Lawrence L. Lee**, former assistant chief engineer of the Power District.

* * *

Frayne McAtee, Spokane paving contractor, was recently elected president of the Asphalt Paving Association of Washington at its first annual meeting in Seattle. He succeeds **Howard Sivers** of Everett. Other new officers include **C. R. Wilcox**, Seattle, vice president, and **George Mason**, Tacoma, secretary-treasurer.

* * *

Donald L. Clark of the W. G. Clark Construction Co., Seattle, Wash., has been elected 1956 president of Seattle Chapter, Associated General Contractors. He succeeds **Paul N. Odegard**. Those elected to serve the Chapter with the new president are **Andrew P. Wick** of Wick Construction Co., and **John C. Boespflug** of J. C. Boespflug Construction Co., vice presidents; **Theodore W. Teufel** of George E. Teufel Construction Co., secretary; **Gordon A. Mowat** of A. F. Mowat Construction Co., treasurer. **C. D. Harper** is manager.

* * *

Herman G. Witte recently closed 25 years of service with the Seattle District, Corps of Engineers. A civil engineer, Witte was chief of the map records section.

* * *

Joseph M. Baker, Portland, Ore., construction management engineer for the Army Engineers, retired the end of the year. He started working for the Corps first in 1934 as a levelman on the Snake River survey. In 1935-1936 he was in charge of The Dalles-Celilo canal.

* * *

Clyde E. Learned, assistant division engineer, Division 9, Bureau of Public Roads, retired recently with 37 years of service. He worked continuously from the Denver headquarters all of that time.

* * *

D. W. Asher, Los Angeles contractor, has been elected 1956 president of the Los Angeles Chapter of the Excavating and Grading Contractors Association. Other new officers are **John P. Schuh**, vice president; **Keith Rowland**, secretary; and **E. C. Young**, treasurer.

* * *

C. C. Davis has been selected as project engineer on the Corps of Engineers' Ice Harbor Dam on the Columbia River. A long-time staff

IMAGINE

NO CENTER PIN OR NUT

NO TURNTABLE ROLLERS

NO ADJUSTMENTS



**WITH LORAIN'S
NEW REVOLUTIONARY**

"Shear Ball Mounting"

**THE GREATEST SHOVEL-CRANE DEVELOPMENT
IN YEARS**

With this revolutionary type of shovel-crane mounting, the Turntable revolves on a full circle of over 60 hardened steel balls snugly sealed in hardened steel races. In this design, the outer race is attached to the mounting, the inner race is attached to the Turntable . . . and the design is such that the balls themselves interlock the two races and thus hold the Turntable on the mounting. As a result, the balls take all vertical, horizontal and radial loads and thrusts; consequently, there is no need for a center pin and center pin nut, no need for a centering gudgeon and bushing, no need for Turntable top rollers or hook rollers, no need for an exposed roller path. And, thus, all the constant adjustments and other nuisances of these items are also banished forever for shovel-crane users.



At present, this new development in shovel-crane mountings is standard on 30-ton rubber-tire Lorains; is available as optional equipment on (1) 20- and 25-ton crawler machines and (2) 25-ton rubber-tire Lorains, in which case it permits greater lifting capacities when working on outriggers. Be sure to get all of the money-making facts about the new "Shear Ball Mounting" from your Thew-Lorain Distributor!

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P. L. CROOKS & CO., INC.
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Seattle, Wash. Branches at Fairbanks and Anchorage, Alaska

member of the Army Engineers, both in civilian and military posts, Davis will have his headquarters in the Walla Walla, Wash., district offices during preliminary construction at the dam, later moving to a field office at the site.

* * *

Three engineers with international experience in the construction of dams and power plants were recently named members of a board of engineers for the Idaho Power Co.'s Snake River hydroelectric projects at Brownlee, Oxbow, and Hells Canyon. The new board of consultants is composed of I. C. Steele, San Francisco; Dr. Harold T. Stearns, Hope, Ida., and Dr. James P. Growdon, of Pittsburgh, Pa.

Steele is a specialist in dam design and formerly vice president and chief engineer of the Pacific Gas and Electric Co. Included in his 42 years of utility experience in Northern California are some 30 projects. He has served as consulting engineer on numerous other projects in various parts of the world. Dr. Stearns is a specialist in the geology of dam sites. He was with the U. S. Geological Survey for 25 years, and during the latter years of World War II was geologist-in-charge of Pacific investigations. Since 1947 he has been engaged on engineering studies of dam sites in the Pacific Northwest, including Brownlee, Oxbow, and Hells Canyon sites.

DEATHS

Ashel O. Thorn, 71, head of A. O. Thorn & Sons' Construction Co., Springville, Utah, died recently.

* * *

John P. Jones, regional director of the Bureau of Reclamation's Region 3, died in mid-December at Boulder City, Nev.

* * *

Thomas J. Keefe, 64, died in Bethesda Naval Hospital at Washington, D. C., recently. He was a veteran executive consultant of the American Road Builders' Association, and well known from coast to coast among the men who serve the highway industry and engineering profession.

* * *

Maj. Gen. Frank D. Merrill died in Fernandina Beach, Fla., while en route home from the annual meeting of the American Association of State Highway Officials where he had been elected president.

* * *

Valens Jones, 51, for many years a Bureau of Reclamation engineer noted for his work in the development of procedures and equipment for testing concrete for dams and related structures, and for the past year with the Commercial Testing Laboratories, died at Denver Jan. 2.

John B. Chattin, 60, veteran civil engineer of Idaho and later of Nevada, died recently at his home in Carson, Nev.

* * *

Melvin D. Williams, for many years district engineer for the Bureau of Public Roads in Alaska, died recently in Richmond Beach, Wash.

CALENDAR

Feb. 9-10 — Society of American Military Engineers, annual technical meeting, Palmer House, Chicago, Ill.

Feb. 13-15 — Association of Asphalt Paving Technologists, annual meeting, Hotel Cleveland, Cleveland, Ohio.

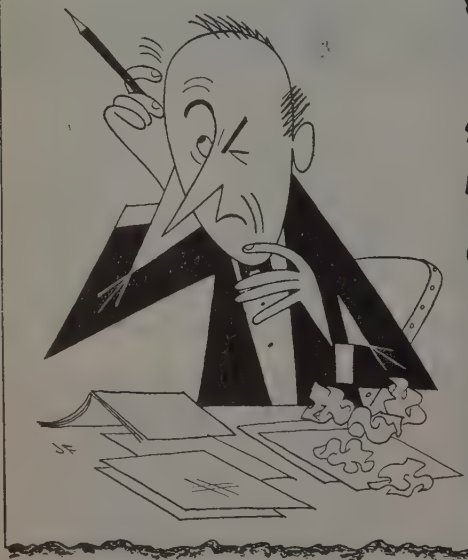
Feb. 13-16 — Associated General Contractors, annual national convention, New York City.

Feb. 20-23 — American Concrete Institute, annual convention, Bellevue-Stratford Hotel, Philadelphia, Pa.

Feb. 23-24 — Highway Engineering Conference of the University of Colorado, annual conference, Boulder, Colo.

Mar. 7-9 — American Road Builders' Clinic of the State College of Washington, annual meeting, Pullman, Wash.

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Nothing puzzling about the Yellow Pages. They're full of clear, concise information about the people you want to reach—who they are, what they have to offer, where you can see them or call them. Many alert suppliers also list the brands they carry, delivery areas and business hours. So, don't be puzzled—be practical. Use the Yellow Pages to find local folks who serve or sell.

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PROOF OF **LIMA** QUALITY



These 29 Limas at The Union Building & Construction Corp. illustrate Lima's ability to furnish a machine designed to fit every job requirement; 7 Type 34-T, 20 ton truck cranes; 1 Type 44-T, 25 ton truck crane; 2 Type 34, ¾ yd. crawler clamshells; 3 Type 44, 1 yd. crawler shovels; 3 Type 703, 1¼ yd. crane-dragline-pullshovel combinations; 1 Type 703SC special crane; 2 Type 802, 2 yd. crawler shovels; 3 Type 803, 2½ yd. shovels; 4 Type 1201, 3½ yd. shovel-crane combinations; 3 Type 1601, 4 yd. shovel-dragline combinations.

The Union Building & Construction Corp. . . .

Relies on fleet of 29 LIMAs for their many diversified jobs

The 29 Limas operated by The Union Building & Construction Corp., Passaic, N. J., are clear evidence of their reliance on Lima quality. Year-after-year, they've added to their fleet of these quality-built machines. Why? Because each of their Limas continues to give them top performance and operating economy on every digging and lifting job . . . without frequent, costly maintenance. That's how Lima quality builds profits for Lima users.

Across the country and around the world, firms like The Union Building & Construction Corp. rely on Limas for profit-making performance. It will pay *you* to contact your nearby Lima distributor for complete details on these quality-built machines . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Moving parts are flame or induction hardened for longer life.
2. Main machinery is placed well back of center of rotation.
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4. Big capacity drums and sheaves are easy on cables.
5. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
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COMPARE and you'll specify LIMA for shovels (to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.



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Feenaughty Machinery Co.
112 S.E. Belmont St., Portland 14, Oregon
Feenaughty Machinery Co.
600 Front St., Boise, Idaho
Smith Booth Usher Company
2001 Santa Fe Ave., Los Angeles 54, Calif.
Modern Machinery Co.
4975 Third Avenue South, Seattle 4, Washington
Alaskan Distributor: Western Tractor & Equipment Co.
2230 First Avenue South, Seattle, Washington

Heiner Equipment & Supply Co.
501 West 7 South, Salt Lake City, Utah
N. C. Ribble Company
1304 North Fourth St., Albuquerque, New Mexico
Bay Cities Equipment, Inc.
2606 Cypress Street, Oakland 7, California
Acme Iron Works
Culebra Ave. at Expressway N.W., San Antonio, Texas
Cascade Industrial Supply, Highway 99, So., Redding, Calif.
Modern Machinery Company
4412 Trent Ave., Spokane 2, Washington
Faris-Moritz Equipment Company
7095 South Jason St., Denver, Colorado



SUPERVISING the jobs

James C. Stewart, project manager, and H. J. Rowe, general superintendent, are top men in the employ of Utah Construction Co. and Stearns-Roger Manufacturing Co., joint venture which handled con-



H. J. Rowe

struction of the \$60,000,000 project just now completing at San Manuel, Ariz., for San Manuel Copper Corp. The contract which got under way in April 1953 covered a crushing

plant, concentrator, smelter, power plant, plant railroad system, roads, buildings, etc. Among the large crew of men on this project were superintendents: D. R. White, carpenter; H. L. Gassoway, concrete and labor; J. R. Fields, mechanical; C. B. Foster, brickmason; J. Gardner, boiler-maker-millwright; C. C. Sheppard, ironworker; A. S. Kastrinos, millwright. General foremen: G. A. Melford, sheet metal; A. I. Hughes, heavy-duty mechanical; H. W. Hagen, carpenter; Rod Feldavard and E. T. Hagin, pipefitter; C. O. Myers, ironworker; J. B. Shelton, sheetmetal, and J. A. Rhoad, boiler-maker.

Other key personnel: H. O. Dixon, office manager; C. B. Stetson, field engineer; B. Matson, assistant field engineer; Pat Staley, senior inspector; Val Webb, insurance manager, and Ray Swanson, chief warehouseman.

George Kalaf is superintending for Newbery Electric Corp. of Arizona on a subcontract covering electrical construction at San Manuel for Magma Copper Corp. Stewart Benson is electrical engineer, and T. Membrilla is assistant administrator. General foremen: Sam Allen, mill

area; Art Lopez, powerhouse and smelter; Mike Monyak, transmission lines and power distribution.

* * *

E. E. Ashock, project manager; Art Summer, general superintendent, and Roy Mimmo, assistant superintendent, are key men on hydro-electric power plant construction at Pilot Knob, 6 mi. west of Winterhaven, Calif. A \$2,794,000 project being built for the Imperial Irrigation District, work started in July last year and will continue probably through December 1956. Assisting as foremen are Newell Jensen, carpenter; Jack Luckcuck, master mechanic; Fred Rohl, labor; George Edlin, concrete, and Earl Pursel, gravel. Gunther-Shirley-Lane has the contract, with Herman Gunther handling the office and administrative work for the project.

* * *

PLANT SUPERINTENDENT at the Kaiser plant at Oroville, Calif., is S. S. "Stan" Lord, below. Fred Autran is foreman, and Harlow Terrell and Al Tuck are crane operators.



Lord

Urban

FRANK J. URBAN, above, superintendent for Utah Construction Co., recently directed the erection of a grain terminal at Stockton, Calif., a \$2,000,000 contract. He was assisted by Chester G. Liggett, assistant superintendent.

* * *

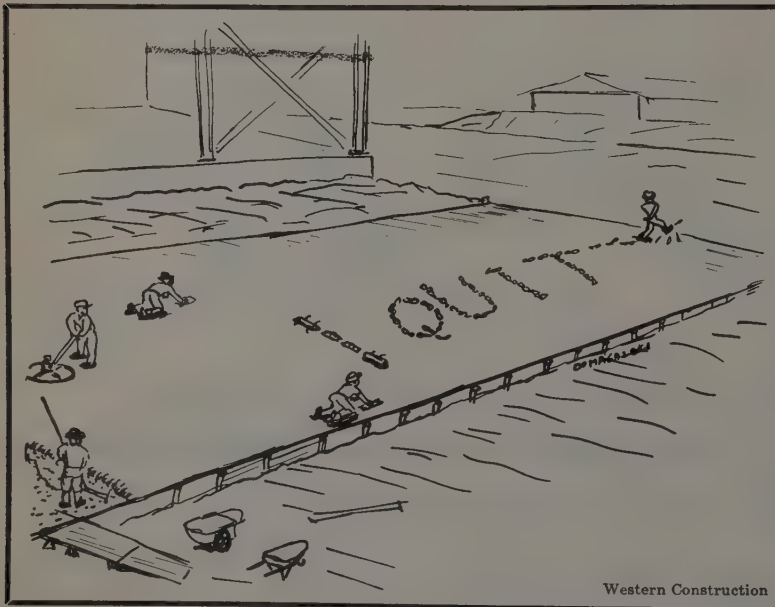
W. O. Loy is general superintendent for Fredericksen & Kasler on a \$1,394,000 award which went to this contractor early last year for flood control and dam construction, Trilby wash, Beardsley, Ariz. Carl Whetaire is structural superintendent. Other important personnel working on this Corps of Engineers' project are foremen Jim Fair, grade; W. "Slim" Ransdell, master mechanic; A. W. "Mac" McConnell, mechanic; C. T. Black, carpenter; "Andy" Hernandez, grade checker. M. H. Whalen is accountant. For USED George Shaffer is chief engineer and Don Putnam, resident.

* * *

Thomas B. "Bud" Kelley as general superintendent is in charge of a \$556,000 job for Harms Bros. consisting of grading and paving 2 1/2 mi., Highway 466 and 6, Mojave-Boron, Calif. Assisting in key positions are G. R. McFarland, master mechanic, and the following foremen: Otto Peterson, grade; Ray Henrici, crusher; Bill Tregumbo, hot plant; Jim Henry, paving.

(Continued on page 92)

Down-time By Domagalski



Western Construction

**200 to 400
TONS PER HOUR!**

when it gives
Production like this—
**IT'S A
CEDARAPIDS
COMMANDER**

Wherever you see a portable aggregate plant producing 200, 300 or 400 tons per hour, day after day and month after month, with low, low operating costs — chances are it's a Cedarapids Commander!

The plant shown below, owned by P. O. Pederson of North Branch, Minnesota, is turning pit run gravel (with crushing 1½" and up) into ¾" and 1" aggregate at a rate of 200 to 300 tons per hour. Other producers report as high as 400 tons per hour production!

The big, *balanced* production of crushers, horizontal screen and conveyors is the secret of the Commander's high tonnage output. Cedarapids-Quality construction is the secret of low maintenance and operating costs.

There's sure to be a Commander working near you. Watch it produce — ask the owner for his opinion — then call your Cedarapids distributor for additional information.



IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.





DIRECTING the work for MacDonald, Young & Nelson and Morrison-Knudsen Co. on the freeway traffic distribution structure in San Francisco are (left to right) **J. A. Crowl**, job engineer; **Elmer Cross**, general superintendent, and **Bob Russell**, office manager. The \$5,200,000 project is pictured on this month's cover, described in an article beginning on page 36.

James E. Ricker, project manager; **L. N. Spencer**, project engineer, and **William C. Burns**, assistant superintendent, head the construction force now completing Morrison-Knudsen Co.'s contract for irrigation canals and laterals. Wellton-Mohawk Division of the Gila River Project in Arizona, a USBR undertaking costing about \$800,000. **C. D. Johnson** is office manager; **C. G. Kincaid**, field engineer. General foreman is **James O. McGinnis** and the following are foremen: **Edwin W. Beall** and **Bruce L. Beall**, carpenter; **Lester C. Bishop**, **Harold D. Daigh**, and **Fred Scales**, concrete; **Robert W. Harper**, pipe; **James Lacey**, batch plant; **Bud Snowball** and **Max L. Ware**, excavation; **G. S. Van Landingham**, master mechanic.

* * *

L. G. Vinson has been directing a \$340,000 sewer construction at Yuma, Ariz., for Vinson Construction Co. Other important personnel on the project: **Tom Moore**, project engineer; **Ford Martyn**, office manager; **John Taylor** and **Hale Criner**, general foremen; **Charlie Reynolds**, pipe foreman, and **Dave Tucker**, equipment foreman.

* * *

Acce D. Miller, general superintendent for Fred J. Early, Jr., Co., Inc., is supervising a bridge going up across the Colorado River at Yuma, Ariz. This \$1,236,000 project, being built for the states of California, Arizona, and the Bureau of Public Roads, has been under construction since early last year and is now in the last stages. Other important personnel on the project are: **Roy Brownell**, project engineer; **Lafay Stapp**, field engineer; **Gar Collum**, office manager; **Clint Miller**, master mechanic;

Armin Kniep, carpenter superintendent; **Abe Garcia**, labor foreman, and **Bob Florence**, pile butt foreman.

C. O. Edmonds is supervising steel erection for American Bridge Division, U. S. Steel, which is doing the work under a subcontract. Field engineer is **G. A. Gix**. **A. Irby** is foreman. This is a plate girder, 5-span, 1,487-ton structure.

* * *

Curt K. Whitney, general superintendent, and **Eugene Bucko**, assistant superintendent, are Geo. A. Fuller's top supervisors on this contractor's \$5,500,000 award from the Corps of Engineers for construction at Edwards AFB, Calif. Job started last May; will probably end in October.

A. J. Trione of Carbro Construction Co. is acting as project manager for a subcontract awarded his company. **James Langford** is office manager. **Orlando Cotroneo** is superin-

tendent, and **Bud Cooper** is general foreman. Steel foreman is **Paul Downing**; **H. R. Taylor** and **W. R. Daniels**, carpenter foremen.

* * *

George E. Rudolph, project manager; **N. A. Ayers**, general superintendent; **M. G. "Jack" John**, construction superintendent; **George Fawcett**, mechanical superintendent, and **Stuart Russel**, purchasing agent, comprise the key men on the erection of a concentrating and refining plant at Boron, Calif., for Pacific Coast Borax Co., Division of Borax Consolidated, Limited. Southwestern Engineering Co. and Ford J. Twaits Co. (Sweco-Twaits) are engineers and contractors for the entire facility, estimated to cost about \$18,000,000. Work got under way in late October and finishing date is scheduled for May 1957.

* * *

M. H. Shear, superintendent, is finishing up the addition to the St. Francis Hospital at Santa Barbara, Calif., for Ford F. Twaits Co.

* * *

H. J. Ricard, superintendent, aided by **Glenn Campbell**, piledriver foreman, **James S. Green**, structural and reinforcing steel foreman, and **Duane Blackorby**, labor foreman, is supervising a recent award to Reed & Martin for construction of three steel bridges on the McKinley Park highway, Alaska, a 390-day job which started Sept. 23.

* * *

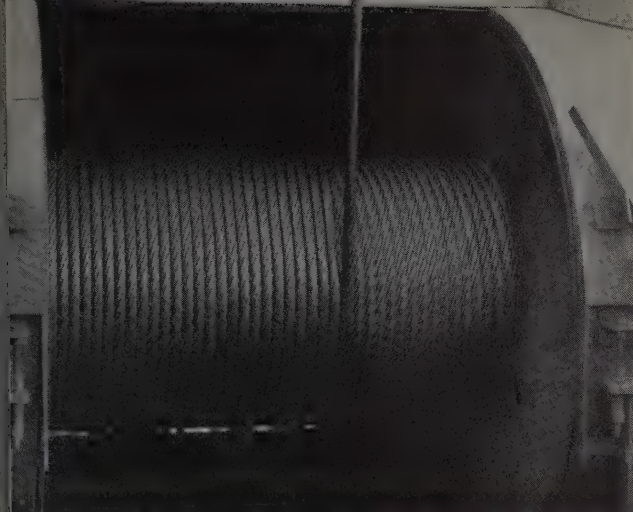
Werner "Bud" Schulz is supervising a 130-day, \$95,582 contract of Platte Valley Construction Co. for a bridge over Little Snake River on Savery Road, Carbon County, Wyo. Foreman on the job, which started Nov. 15, is **Leonard Dahms**.

* * *

F. L. Somers, partner in the firm of Somers & Stacy which is currently doing 7.20 mi. of grading near Callahan, Siskiyou County, Calif., is in over-all charge of the work. Superintending the \$337,914, 250-day job is **W. N. Dahlstrom**.



CHARLES NELSON, general superintendent, assisted by **Joseph D'Amato**, is just about through on King Construction Co.'s \$1,500,000 contract covering buildings for the Turf Paradise Club, a \$4,500,000 project located at Phoenix, Ariz. **Bill Steffen** was in charge of the office. Foremen were **Charles Thurman** and **Jack McKinney**, concrete; **C. D. Greenwood** and **Ben Booth**, labor. **Ken Scales** was architect's representative.



OVERCOMING ABRASION—Wire rope takes a beating on some jobs by abrasion. It is squeezed in multiple layers under tremendous pressure on rotary drilling drums in the Texas oil fields. In the Northwest it drags under heavy logs.

What can you do better with 6x19 Seale Red-Strand?

In this Arizona mine it is scraped over rocks to operate a slusher. Everywhere it is rubbed severely on winches that do not wind smooth. Under such conditions Red-Strand 6 x 19 Seale wire rope will last longer and save you money.

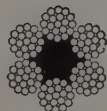
6 x 19 Seale has the same strength and weight as the more frequently used 6 x 19 Filler Wire, but the arrangement and size of the wires is different. You can see in the diagrams that the outer wires are fewer in number and larger in size. They provide *high resistance to abrasion* and greater wearing quality with somewhat less flexibility.

It's the perfect rope for certain jobs. Would it solve a problem for you? Be less trouble? Save more money? A Leschen man is near you. Perhaps he can help.

Send for the 64-page Leschen Wire Rope Handbook. It describes Seale and all other Red-Strand wire rope constructions.



6 x 19 Seale



6 x 19 Filler Wire

LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.
St. Louis 12, Missouri



TRICKS of the TRADES

Steel stake for hard ground

THREE YEARS ago a California home builder, just starting construction of a 750-home tract, experienced severe breakage when his workmen attempted to drive wooden foundation stakes into the concrete-like back adobe soil on which the tract was being built. Exasperated, he turned for help to Jack Eandi of the Eandi Metal Works, in Oakland, Calif.

Armed with an experimental order for 80 stakes, sufficient for one house only, Eandi went ahead and developed his first steel foundation stake which proved so successful that the day after he delivered his first order, he was asked to make 500 more. In the next few days another builder ordered 600, and inside two weeks more and more orders came flowing in.



The Eandi foundation stake is made from a 2x1x3/16-in. steel channel 45 in. long, to one end of which a 1 1/8x5 3/4-in. piece of round steel bar is welded. This acts as a driving plug which prevents damage to the stake while it is driven into hard soil.

Holes measuring 3/16 in. in diameter are punched in the channel for most of its length so that nails can be driven through it into wooden bracing which holds the concrete form in place.

A 1/2-in. diameter hole is then punched near the top so the driving plug can be plug-welded on in ad-

dition to regular weld. This is to give additional strength during the impact of driving.

After the stakes are driven—one opposite the other along the foundation—a 1/4-in. x 3/4-in. steel tie bar, which is made in different lengths according to foundation widths, locks the two stakes rigidly in place. The stakes can be used over and over again.

Although the steel foundation stake is just a side line with Jack Eandi, he has made over 100,000 to date, using approximately 1,000,000 pounds of steel, in the form of channels and rounds. Much of this steel has come from Bethlehem Pacific's South San Francisco plant.

Prestressed Concrete

The 1955 edition of "Bibliography On Prestressed Concrete" has been published by the American Concrete Institute. Expanded to 103 pages, the book now lists more than 2,100 American and foreign literature references on the subject of prestressed concrete, published from 1896 into 1955. A separate section lists 75 United States, British, German, and French patents. The 8 1/2 x 11-in. format is also punched for easy filing in three-ring binders. Price is \$2.00.

A supplement, containing the material added to this new edition is available at 35 cents to those who purchased the 1954 edition.

The book was prepared as a part of the work of ACI-ASCE Committee 323, Prestressed Reinforced Concrete, and can be secured from the Institute at 18263 W. McNichols Rd., Detroit 19, Mich.

New type timber roof

1955 SAW the inauguration of a new design for wood roof framing in which plywood is used in combination with steel.

This venture by Diamond Lumber Company of Portland, Ore., is known as Plywood Structures Incorporated, with offices in the Pittock Block at Portland, Ore. This roof truss design is being put on the market under the trade label of PSI.

The PSI truss comes to the site with all lumber and plywood cut to detail and all steel and hardware fabricated to pattern. It is usually sold as a packaged building f.o.b. cars, and Plywood Structures Incorporated is now establishing dealers or agents throughout the country.

Site assembly before erection can be handled by carpenters and helpers. Erection is usually done with mobile cranes.



Standard buildings are to be available in 32-ft., 40-ft., 50-ft., 60-ft. and 80-ft. spans. Longer spans may be had on special order.

The advantages of the PSI truss are seen in the small dimension material required and the continuous scarfed plywood upper chord, which functions both as truss upper chord and roof sheathing. At the same time the plywood roof decking provides diaphragmatic bracing.

Where dealers or representatives are established, PSI will send an erection superintendent to instruct the agent's crew until they learn the knack of putting the structure together.

All nails and bolts are galvanized. Extending the use of plywood to the exterior walls provides further bracing through stressed-skin principle.

Drilling holes fast

THE LOUIS C. DUNN Company, Los Angeles contractors who are in charge of construction of the Broadway Department Store's San Fernando Valley store and the Panorama City Shopping Center project, reports a profitable use of the Super Hole-A-Matic earth boring machines during the construction of these projects.

The problem, according to Charles A. McMahon, project superintendent and engineer, was to drill forty 16-in. diameter holes, 10 ft. deep, in the bottom of an excavation 20 ft. deep.

The job was done at one-tenth the cost of conventional drill rigs which require two men to operate as against the single operator required by the Super Hole-A-Matic. "Each hole," says McMahon, "was drilled by one common laborer in five minutes."

Copies of the Louis C. Dunn Company's report are available on request from the Gen-A-Matic Corporation, 14741 Bessemer Street, Van Nuys, Calif.

"3 REASONS WHY WE USE CAT* ENGINES:



- 1 All the power we need to do the job easily.**
- 2 Maximum dependability with minimum good care.**
- 3 Operators prefer Cat power to work with."**

NELSON ARMSTRONG, Supt.
Maxwell Bridge Co.

THOSE three reasons tell why Maxwell Bridge Co., of Columbus, Kansas, powers its cranes and excavators with Caterpillar Diesel Engines. The Koehring Crane shown here, placing I-beams for a bridge 5 miles west of Emporia, is one of 12 machines owned by Maxwell. Its engine? A Caterpillar D318, with well over 4000 hours on the meter.

Operators who have worked for this company from 8 to 25 years are particular about their power. Busy all year around, each man services his own machine. Naturally they want an engine that stays on the job without tinkering—and when they're asked to name their preference, they choose Caterpillar.

Most manufacturers of excavating equipment can supply Cat Diesels as original power. Or Caterpillar Dealers are ready to install these dependable engines

as replacement power. A full line of engines is available. The D318, for example, is rated at 137 HP (maximum) at 2000 RPM.

For the power you need and for service and parts you can trust, call your Caterpillar Dealer. He's as near as your telephone.

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

CATERPILLAR*

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

**MODERN HEAVY-DUTY
DIESEL ENGINES**



WEIGHING 35 tons, this 90-ft. plate girder was trucked to an overpass job near Ashland, Oregon. Because of its length a dual axle pole dolly

was required to support the end. Accurate distribution of weight on the trucks was required to stay within the established axle load limit.

Hauling jobs are for the specialists

Moving bridge girders is an example of a construction operation that takes equipment, skill, and knowledge of highway regulations.

MOVING LONG and heavy steel girders is a job for a specialist. Some of the problems include the loading of the unit either at the plant or from railroad cars, the proper distribution of weight on the hauling unit to maintain balance and come within legal limits, the necessary permits required from state and county highway authorities, the actual move and its traffic hazards and the final unloading at the destination. One of these moves is here described by E. J. Lee, assistant superintendent, Consolidated Heavy Hauling Service, Portland, Ore.

This job required the transporting of two 90-ft. steel plate girders weighing 35 tons each (picture above) from a railroad siding over about 1 mi. of state highway to the site of an overpass that was being extended. The job was located 1 mi. south of Ashland, Ore., where a 2-lane highway is being widened to 4 lanes. This required the extension of an

existing railroad overpass an additional 90 ft. to make room for the new highway width. The American Bridge Co. had the contract for supplying steel for the job and its erection. Under the supervision of the American Bridge project manager, Lew Hack, the girders arrived by rail at a siding and were ready then to be moved to the job site.

Aside from the usual problems of handling 35-ton loads that are 90 ft. long, the special transportation problem resulted from the restrictions on axle weights and the gross load to be moved over the state highway.

The first step was to secure permission from the Oregon State Highway Department to transport the girders using a lowbed trailer. This unit has an 8-ft. swinging bunk with heavy rollers on the extreme outer end. The bunk rests on an 8-ft. square steel plate 1/2-in. thick. Due to the extreme length of the steel member, it was also necessary to use a dual axle pole

dolly to support the other end of the girder. The load restriction which set a maximum of 37,000 lb. on a tandem axle made it extremely important to find the exact center of balance of the girder to assure the proper loading weight.

The unloading of the girders from the rail car to the hauling truck and trailer unit was performed by a 25-ton truck crane assisted by a second 20-ton crane.

After the girder was correctly placed and properly fastened to the moving units, the transportation moved over the state highway without difficulty under the necessary controls for traffic. Unloading at the job and the erection of the girder on the piers was performed by the same two cranes.

On another move two 49-ton girders 122 ft. long (picture below) were moved to a highway bridge site near Wenatchee, Wash., 1 1/2 mi. from the railroad siding. In this case the heavier load required two tandem axle pole dollies under the rear end. The first of these did not have a swinging bunk, and the girder itself steered this one. The second dolly had a swinging bunk with a tongue extending to the rear past the end of the girder, and was steered by another vehicle so that it would follow the tail sweep of the girder.

A truck crane followed the hauling unit from the loading place to destination just in case any difficulty was encountered. The move went smoothly. Only one day was required to handle each girder.

The highway departments of both Oregon and Washington are always most helpful in appreciating the problems encountered in making such hauls and issuing the necessary permits.



ON A HIGHWAY bridge job in Washington this 122-ft. long girder was one of two weighing 49 tons each that were moved from railroad siding to site. For this haul the second dolly had a tongue extending to the rear, and steering was done by a following vehicle.



KOLMAN Conveyor-Screen Plant Loads 7-Yd. Trucks in Half-Minute

Damp-to-Wet Gravel Handled in Record Time by Zaske Co.

Contractors throughout the country are finding that the KOLMAN Model 101 Conveyor-Screen Plant comes through with top productions under the severest operating conditions.

Here 7-yard trucks are loaded with damp-to-wet gravel in half a minute and ten yard trucks in less than a minute—over 800 tons an hour—by Weldon Zaske Construction Co., Danube, Minn. And KOLMAN's rugged construction permits

handling these heavy loads at constant rates without fear of excessive maintenance expense.

This 50'x36" conveyor carries a vibrating screen 8'x48" without additional support, and the screen need not be removed for transportation—it just folds under out of the way.

A steel dozer trap with built-in plate feeder, available as optional equipment, is an integral part of the conveyor and fully portable.

The model 101 KOLMAN is available in 18" to 42" belt widths and in lengths as desired.

See Your Nearest Dealer CALIFORNIA

BERKELEY—West Coast Engine & Equip., Co., 1077 East Shore Hwy.

EUREKA—E. W. Pierce Company, 4th and Broadway

MARYSVILLE—Valley Truck & Tractor Co., 100 "D" Street

SACRAMENTO—Sacramento Valley Tractor Co., Broadway and 19th Sts.

SANTA ROSA—Empire Farm Equipment Co., 1470 Santa Rosa Ave.

IDAHO

BOISE—The Sawtooth Company, 1115 Grove St.

NEVADA

ELKO—A-D Machinery Co., 251 West Commercial St.

OREGON

PORTLAND—Western Equipment Co., 2244 N.W. Savier St.

EUGENE—Western Equipment Co., 1360 West First Ave.

UTAH

SALT LAKE—Rasmussen Equip. & Supply, 1960 S. Second, West

WASHINGTON

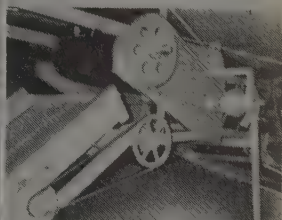
SEATTLE—Andrews Machinery of Wash., 3640 E. Marginal Way

SPOKANE—Andrews Machinery Service, 126 South Walnut St.

Western Representative

S. A. MADRID
1739 32nd Ave., San Francisco 22

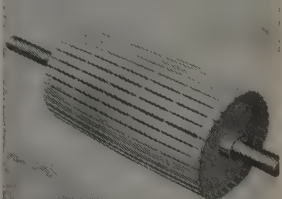
Folding feature permits weight of screen to be shifted back under conveyor.



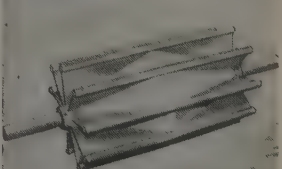
Head pulley clutch permits operation of screen while conveyor or belt is idle.



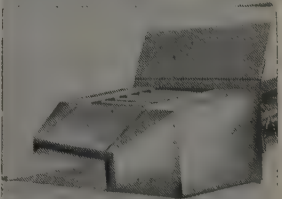
Motor-to-ground controls extend throttle and clutch for easy one-man operation.



Bar type head pulley eliminates the necessity of lagging. Extended shaft.



Self-cleaning wing type tail pulley protects belt against stone cuts and bruises.



Easily-portable dozer trap is built onto tail section. Grizzly bars stop large rocks. Designed for easy access to tail section.

Write Today for Literature and Prices

KOLMAN MANUFACTURING CO.

5670 West Twelfth Street, Sioux Falls, S. D.

NEW LITERATURE

For your convenience in obtaining free copies of literature described, the company address is provided with each review.

Pettibone Mulliken loader

A 28-page booklet has just been released by **Pettibone Mulliken Corp.**, describing the new Speed Swing Loader and its application to construction. The new loader has a swing of 180 deg. and features rugged construction and increased speed in handling big loads. For example, the booklet illustrates the speed swing using its full 30-deg. bucket tilt-up to pick up a heavy load which is then lifted, swung 90 deg., and dumped over without moving or maneuvering the machine itself. Attachments include a 4-cu. yd. snow bucket, crane tote hook, hydraulic crane extension, and fork lift. Copies of the booklet may be secured from the Public Relations Dept., Pettibone Mulliken Corp., 4700 West Division St., Chicago 51, Ill.

Loads for precast concrete units

Design information giving spans, safe loads and dimensions for lightweight expanded shale concrete channel slabs is provided in a new 4-page folder put out by **Empire Building Material Co.**, N. E. 92nd & Halsey St., Portland, Ore. Information on typical 6-in. and 8-in. Lite-Rock channel slabs is provided. Illustrations show how these units can be used in building construction with the elimination of all shoring.

A complete line of steam cleaners

A catalog in brief, describing the entire Malsbary steam cleaner line, has just been released. It describes concisely the difference between high pressure combination HPC models, steam vapor models, and fireless steam cleaners. Action pictures are shown of all models with suggestions indicating the work each is best fitted for. A chart provides information on pressures, temperatures, and capacities. Copies of Catalog 156 may be obtained by writing to **Malsbary Mfg. Co.**, 845 92nd Ave., Oakland 3, Calif.

How to load freight cars

A wall chart giving the do's and don't's for loading material into railroad freight cars may be secured from the **Signode Steel Strapping Co.**, 2600 North Western Ave., Chicago 47, Ill. The chart provides clear, simple illustrations indicating proper carloading procedures.

Blaw-Knox for road building

Three new machines now included in the **Blaw-Knox** "Complete Package" of heavy road building equipment are described and illustrated in a new catalog. The three machines are the Road Widener, Trench

Wire rope handbook

A complete handbook of 190 pages in pocket size with convenient spiral binding covering every phase of wire rope and its uses has been released by **Macwhyte Co.**, Kenosha, Wis. This catalog discusses the characteristics of all classifications of wire rope, including galvanized ropes, slings, assemblies, fittings, and lubrication. Extensive tables and a glossary of terms concludes this valuable handbook. Referred to as Catalog G-16, second edition. The handbook is available from the company or from its distributors.

Roller, and Base Paver, all made by **Blaw-Knox**. Catalog No. 2502 may be secured from **Blaw-Knox Co.** in Pittsburgh, Pa.

The latest about Transite Pipe

An 8-page booklet just released by **Johns-Manville** illustrates and explains the design installation and operation of "Transite Sewer Pipe with Ring-Tite Coupling." The booklet includes sizes, weights, and crushing strengths for this type of pipe, with illustrations on how the Ring-Tite Coupling makes up into tight joints with minimum time. Copies are available from **Johns-Manville**, 22 East 40th St., New York 16, N. Y.

Barber-Greene line of idlers

Idlers for every purpose are illustrated in a 4-page booklet just released by **Barber-Greene Co.** 400 No.

Design your own trailer

A clever and convenient folder by which trailers may be designed to meet any need of contractors or government agencies has been released by **Kit Mfg. Co., Inc.**, 1401 W. Seventeenth St., Long Beach 13, Calif. The folder contains typical layouts for a complete field office which was built to the specifications of **Isbell Construction Co.**, a mobile home for a well drilling crew and other variations of trailer units 35-, 40-, and 45-ft. overall. The folder also describes the construction features of the trailers including fiberglass insulation, vapor seal barriers, and top quality interior paneling.

Highland Ave., Aurora, Ill. The booklet Form 3547 includes a large cut-away illustration showing the design details for the standard troughing unit.

How to select a welder

An 8-page bulletin (No. 13430) by **Lincoln Electric Co.**, Cleveland 17, Ohio, contains information enabling contractors to select the right type of "Ideal Arc" for every job. The booklet explains reasons for choosing between AC and DC.

Turbo-Dozer by Michigan

More than 50 pictures illustrate a 20-page booklet describing the applications of the **Michigan Model 180 Turbo-Dozer** just released by **Clark Equipment Co.'s** Construction Machinery Division. The booklet contains information on the operating features of this rubber-tired dozer describing its hydraulic controls and how the 2¾-yd. capacity bowl can be tilted while the machine is in motion. Specifications are shown. Bulletin 157 may be obtained from **Clark Equipment Co.**, Pipestone Rd., P. O. Box 599, Benton Harbor, Mich.

All-purpose rubber hose

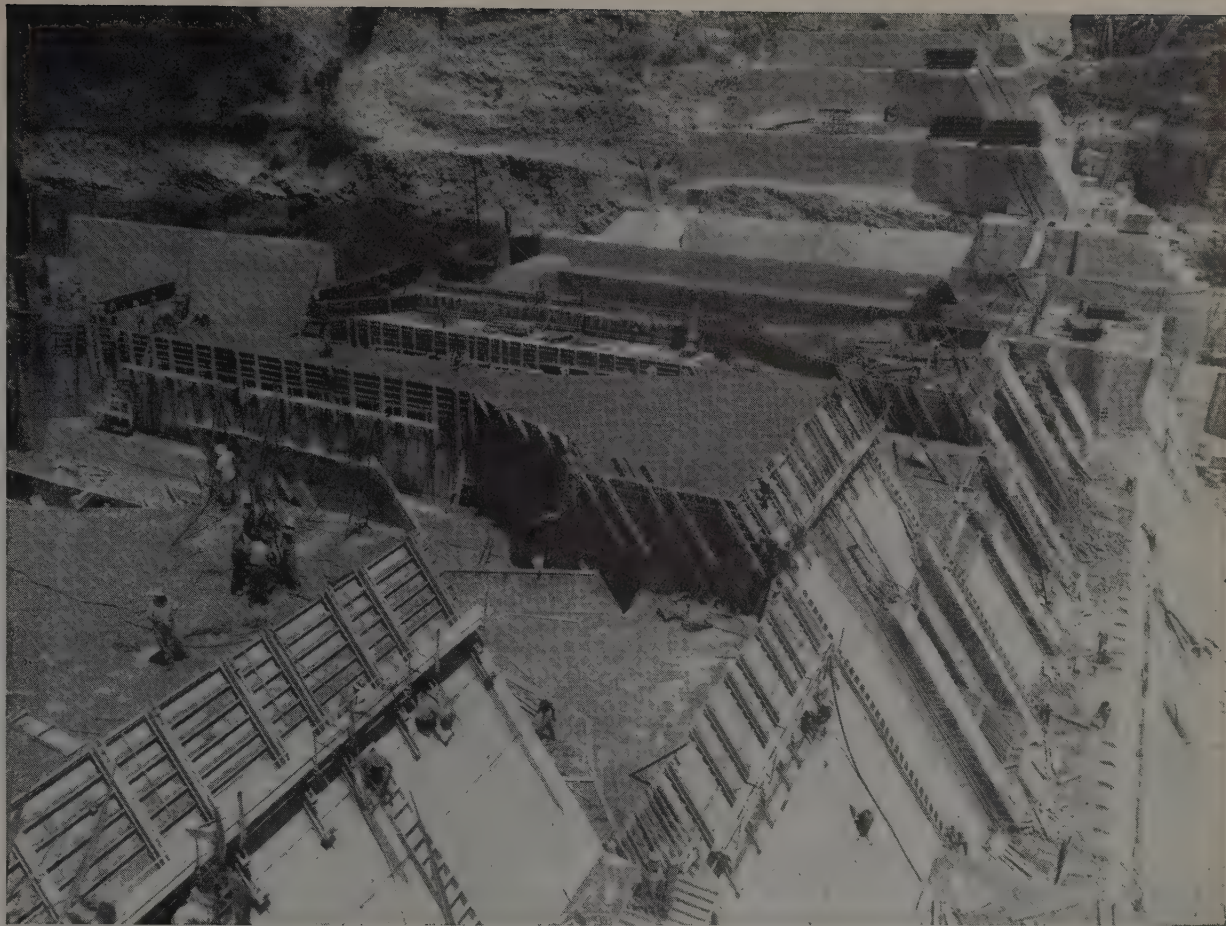
An advanced type of all-purpose hose is announced in Bulletin No. 7075 by **Manhattan Rubber Division, Raybestos-Manhattan, Inc.**, Passaic, N. J. Called Allflex, the hose is described as suitable for use with air, oil, water, and mild chemicals. Its major advantages include qualities which provide for a long life and non-kinking.

Heavy-duty trailers

Heavy trailers with removable goosenecks for loads up to 60 tons are described in a 4-page folder just released by **Transport Trailers, Inc.**, Cedar Rapids, Iowa. Bulletin No. 1055-GR describes the design of these trailers and methods of loading typical contractor's equipment. Dimensions and specifications are provided in detail. Convenience in loading and unloading of Models GPR and GBR is stressed in the bulletin.

The pipes of Armco

Armco Drainage & Metal Products, Inc., has just released a new 4-page bulletin describing its welded steel pipe with detailed information on dimensions and properties. The pipe is designed for factory piping, process piping, water supply and sewage, general contractors' use, and foundation piling. Copies may be secured from the Information Service of the company at Middletown, Ohio. Ask for WSP-11055.



Brown & Root, Inc., builds Peligre Dam in Haiti with Blaw-Knox Steel Forms

● The construction of the Peligre Dam project by Brown & Root, Inc., of Houston, is a typical example of the way Blaw-Knox Steel Forms and Blaw-Knox Engineers' Consultation Service can help solve difficult concreting problems. This buttress-type dam, which will span Haiti's biggest river, the central Artibonite, will be 1075 feet long and 225 feet high.

Among the problems which faced

Brown & Root engineers was forming the overhang buttress section. To solve this problem, Blaw-Knox suggested a special type cantilever form.

Whether the construction project is a big dam, tunnel, bridge, retaining wall or sewer, Blaw-Knox engineers can help in the preliminary planning stage to solve difficult forming problems *before* the plans are on the drawing board.

BLAW-KNOX PACIFIC COAST BRANCH, 818 Monadnock Bldg., 681 Market St., San Francisco 5, Cal.



BLAW-KNOX COMPANY

STEEL FORMS DEPARTMENT
P. O. BOX 1198 • PITTSBURGH 30, PA.

BLAW-KNOX EQUIPMENT DIVISION
• PHONE: STERLING 1-2700

Wire rope fittings

A new 28-page catalog describing a complete line of fittings for wire rope and chain has just been issued by The Thomas Laughlin Division of the American Hoist & Derrick Co. In addition to extensive pictures of the various items, the catalog includes engineering data and charts for each of the many types of fittings. For example, dimensions, safety factors, and other information is provided on links, rings, shackles, swivels, hooks, and ring bolts. The Laughlin firm, one of the oldest in this business, was merged with the American Hoist & Derrick Co., in 1955. Copies of the catalog (950-1) may be secured from The Thomas Laughlin Division, Portland, Maine; or American Hoist & Derrick Co., St. Paul 1, Minn.

Caterpillar low-bowl scraper

A booklet entitled "A New Caterpillar Scraper, the No. 463" has just been released coinciding with the announcement of the new low bowl design of Caterpillar scrapers. The booklet describes the No. 463 as a four-wheel crawler-drawn scraper with the new low bowl design which provides bigger loads, faster loads, and lower cost per yard of material moved. Copies may be obtained from any Caterpillar dealer or from Caterpillar Tractor Co., Peoria, Ill., asking for Form No. 31700.

Vibrator for concrete paving

Concrete paving vibrators with attachments and generators referred to as Hi-lectric are described in a 4-page catalog just released by Maginniss Power Tool Co., Mansfield, Ohio. The booklet contains a complete description of this vibrator for full slab and side form pavements. Photographs of the attachments, line sketches, and action views are included. Copies of the new catalog

may be obtained from the company at 154 Distl Ave., Mansfield, Ohio, or from distributors. Ask for catalog LL-1892.

Allis-Chalmers engine catalog

Allis-Chalmers has just released a new 8-page, two-color catalog describing the design, engineering, and performance of the four-cylinder, 60-hp. W-226 engine unit. The catalog includes specifications and cut-away views of the power plant and its component parts. Also included is a list of the special and extra equipment available. Copies may be secured from Allis-Chalmers Mfg. Co., Tractor Group, Milwaukee, Wis. Ask for Catalog MS-455.

Concrete form clamps

In 8-pages, Symons Clamp & Mfg. Co., 4249 Diversey Ave., Chicago 39, Ill., describes its system of concrete forms and their use. A new design is described which incorporates rigidity and lightness with absolute accuracy. Features include no swelling, no shrinking, no rusting, and a weight which runs 3-lb. per sq. ft. Special units for corners, fillers, and curves are described and illustrated.

Flexible ventilation pipe

Flexible fabric hose for handling air, dust, fumes, and light materials by either pressure or suction is described in a 6-page folder released by Flexaust Co., 100 Park Ave., New York 17, N. Y. The folder not only reviews the characteristics of this hose, or duct, but also indicates prices and available accessories.

Trailers by Fruehauf

The Fruehauf Trailer Co. has just issued a folder showing its various types and designs of trailers particularly suited to the construction industry. The types reviewed include carryalls, dump trailers, and those designed to handle bulk cement, asphalt and other liquids. Copies of this folder are available from Fruehauf branches or from the advertising department at 10940 Harper Ave., Detroit 32, Mich.

Handbook of steel products

Bethlehem Pacific Coast Steel Corp. has just released a 44-page new edition of its catalog on "Bethlehem Pacific Rolled Steel Products." Information includes the size, weight per foot, and design properties of all the structural and bar size shapes available from the rolling mills of this organization in Seattle, South San Francisco, and Los Angeles plants. The handbook also includes a commodity listing of the wire produced at the Los Angeles plant and tabulations of nut and bolt products. The catalog is available from any one of the sales offices of the corporation in Seattle, Spokane, Portland, San Francisco, Los Angeles, and Phoenix. Ask for Catalog 305-C.

Treated timber guard posts

Pressure-treated timber highway guard posts are described in a new folder issued by the Western Wood Preserving Operators' Assn. The booklet describes the sawn-timber treated guard posts developed through research by the Association and now adopted by highway departments in the Western states. Copies of the guide are available from Western Wood Preserving Operators' Assn., 1410 S. W. Morrison St., Portland 5, Ore.

Dig, load and convey

Digging, conveying, and loading equipment is described in a large folder just released by Barber-Greene Co., 400 No. Highland Ave., Aurora, Ill. The folder illustrates each of the models with action pictures from the job indicating the particular type of service performed by each type of machine. The folder indicates that more complete information is available on each of the various units including a new 192-page conveyor catalog.

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FOR GREATER SAFETY...EFFICIENCY...ECONOMY



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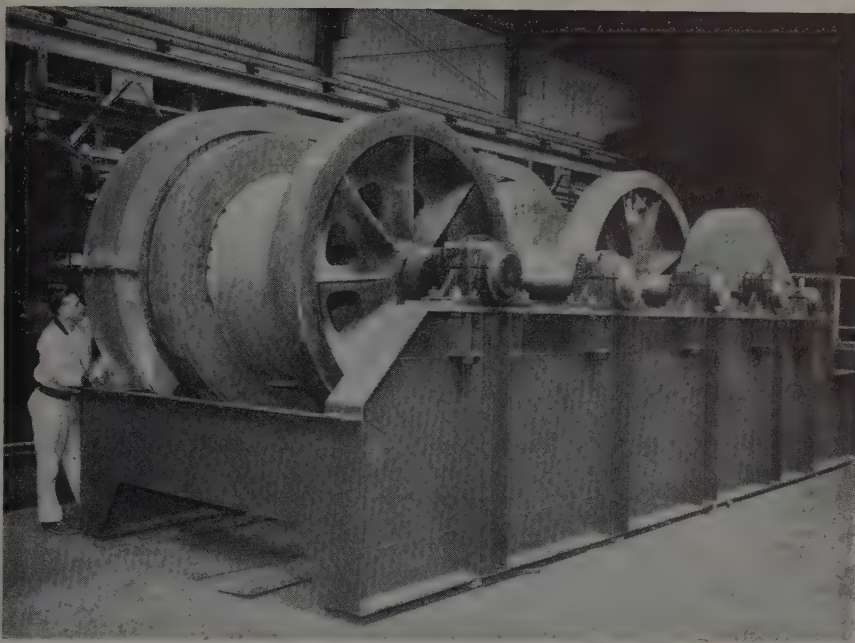
Phone: Pleasant 2-2571

420 Eighth Avenue, N. Seattle, Washington

Phone: Seneca 7142

Builders Supply & Equipment Co., 417 Kentucky St., Bakersfield, Calif.
Contractors Service Co., 221 W. Colorado St., Las Vegas, Nev.
Sierra Machinery Co., Inc., 2211 S. 19th Ave., Reno, Nev.
Hansen Lime & Stucco Co., 1574 S.W. Temple St., Salt Lake City, Utah
Superior Equipment Co., 2221 S. 19th Ave., Phoenix, Ariz.
Squires-Belt Material Co., 12th and L Sts., San Diego 12, Calif.

Yuba-Built Hoist Lifts 1000-Ton Loads



Typifies Machinery We Can Build to Your Order

This YUBA-built double-drum dredge hoist is designed to handle a 194-foot digging ladder and is capable of lifting 1000 tons. Single-drum hoist (bottom) built by YUBA for tramway carries 5200 feet of wire rope. We're old hands at

building such machinery. Every bucket ladder dredge YUBA has built combines many special "machines"—hoists, conveyors, drives, digging buckets, screening and metal saving equipment, winches, pumps—all designed and built by YUBA.

Experience and Facilities

YUBA's manufacturing experience includes grooved drums for large gate hoists, barges, steel and chemical plant equipment, earthmoving rigs, mining machinery, clamshell buckets, ordnance, structural steel fabricating, and other custom work. Where field assembly is required, all parts are fitted and match-marked before shipment to insure accuracy.

YUBA shops can fabricate 4000-ton dredges or forge and machine close-tolerance parts, both large and small. Facilities include:

ENGINEERING AND DESIGNING
STRUCTURAL STEEL FABRICATING
HEAVY AND LIGHT MACHINING
WELDING
FORGING
HEAT TREATING
PATTERN MAKING
EXPORT PACKING AND SHIPPING

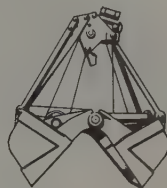
Send us your drawings and specifications for estimates. No obligation. Wire, write, or telephone EXbrook 2-0274.



BRAND NAME PRODUCTS BY YUBA



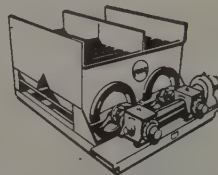
Bucket Ladder and Hydraulic Dredges for digging placer properties, moving sand and gravel, making harbor and channel changes, etc.



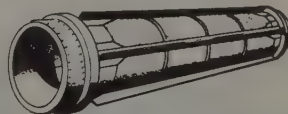
Clamshell Buckets for hard digging and dredging; **Tine Forks** for handling kelp, steel shavings, etc.



YUBA-SCHROCK Internal Drive Pulleys for belt conveyors and bucket elevators. ½ to 125 hp. Diameters: 10½" to 56".



Mineral Jigs for handling cassiterite, gold, platinum, monazite, zirconium, ilmenite, rutile, scheelite, garnets, sapphires, iron, copper, etc.



Flat or Revolving Screens for all screening purposes. Plates drilled to your specifications.



YUBA MANUFACTURING CO.

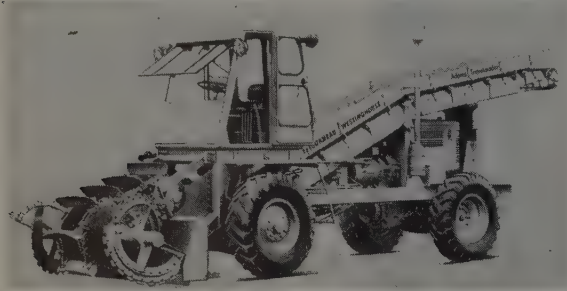
Room 653, 351 California Street
San Francisco 4, California

NEW EQUIPMENT

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

Self-propelled belt-type loader improved

LeTourneau-Westinghouse Co., Peoria, Ill., has announced an improved Adams TraveLoader. The machine is a self-propelled, belt-type loader for loading all types



of loose material into trucks from either windrows or stockpiles. A rocker-type foot pedal controls starting and stopping. No gears to shift when stopping, no spring clutch to ride. Feeder cross shafts have been eliminated, thus enabling the machine to load occasional large rocks or slabs of concrete. The loader is claimed to have a capacity of up to 10 cu. yd. per minute in loose material, and up to 20 cu. yd. in snow.

Galion adds 2 graders to line

Two new motor graders have been announced by Galion Iron Works and Mfg. Co., Galion, Ohio. The two models are designated as T-500 (125 hp.) and T-600 (140 hp.) Both are equipped with torque converters and power-shift transmissions. Clutch maintenance, time-consuming adjustments and clutch pedal are eliminated. Standard equipment on the T-600 includes a 13-ft. hy-



draulic and shiftable moldboard, 14x24 tires front and rear, combination manual and hydraulic booster steering, and 4-wheel hydraulic brakes.

SUPERIOR CARPULLERS and BARGE MOVING WINCHES

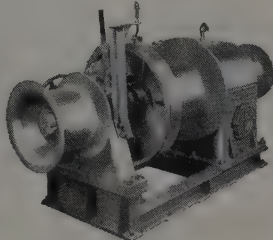
CAPSTAN TYPE • DRUM TYPE • SPECIAL TYPES



Model SC Superior
Capstan Carpuller



Model EP Drum
Type Carpuller



30 H.P. Electric Mooring Winch

Meeting any requirements of speed, space and capacity in Carpulers and Barge Moving Winches has been a specialty of ours for many years. When planning to improve the handling of barges and railroad cars, remember our long experience in the design and manufacture of this equipment is at your disposal.

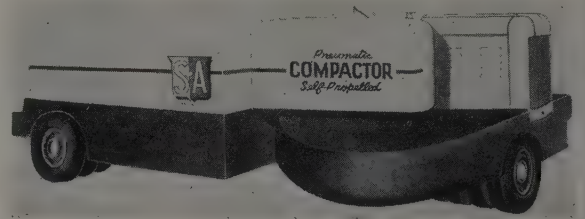
Write for Bulletins and Catalogs

SUPERIOR-LIDGERWOOD-MUNDY CORPORATION

Main Office and Works: SUPERIOR, WISCONSIN, U.S.A.
New York Office, 7 Dey Street, New York 7, N. Y.

Road compactor with pneumatic tires

A new pneumatic tired road compactor has been announced by Seaman-Andwall Corp., 285 No. 25th Street, Milwaukee 1, Wis. The compactor is self-propelled and capable of speeds up to 20 mi. per hour. It is equipped



with power steering and can make 180 deg. turn on a 20-ft. roadway. It has 9 tires on the rear and 8 on the front. Four 500 gal. compartments provide for liquid or sand ballast for wide variation in road weight from 5 ton empty weight to 15 tons of water and 20 tons of sand ballast.

Carrier designed for transit-mixer service

Crane Carrier Corporation, P. O. Box 5008, Tulsa, Okla., has announced production of the Mixer-Master, a carrier designed specifically for transit-mixer service. Components are manufactured by International Harvester, Fuller, Rockford, Eaton, and Hendrickson. Parts and service are readily at hand in the 5,000 IH branches and dealerships. Full information is available from the manufacturer.



Is Your Profit-Wise Choice

...in Pumps...in Building Mixers...in Truck Mixers

Rex Speed Primers are the "pumps that never let you down." Only Rex has the exclusive adjustable air peeler that assures new-pump efficiency for the life of the pump. Simple design...easy accessibility...light weight make Rex your choice for dependable pumping service. Capacities from 4,000 to 90,000 g.p.h.

Rex Building Mixers alone give you the correct basic design for fast charging and discharging. Rex tows much easier...spots much faster...and has the true operator convenience that really cuts down fatigue...means more yards per day. In 3½-S Tilter and Skipper models... 6-S, 11-S and 16-S models.

Rex Adjusta-Wate Moto-Mixers® have the unique design principle that adds up to biggest profits. The Adjusta-Wate principle offers the flexibility that reduces hauling, operating and delivery costs. And Rex Moto-Mixers always mix and deliver quality concrete regardless of slump. 3½-, 4½-, 5½-, 6½-, and 7½- yard models.

...and, for Pavers and Pumpcrete®, too,

See your Rex Distributor or write CHAIN Belt Company
7601 Telegraph Road, Los Angeles 22, California



CONSTRUCTION MACHINERY

MOTO-MIXERS®

MIXERS

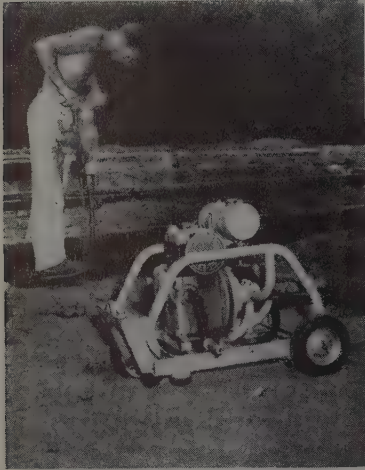
PUMPS

PUMPCRETES®

PAVERS

Rock drilling equipment

Driving form pins faster and more economically for new highway construction is one of the many uses for Pinazza rock drilling and demolition equipment, now being distributed by Pitnam Industrial Products Co., Inc., 608 Fifth Ave., New York 20, N. Y.



Their equipment uses a patented centrifugally activated hammer, powered by either a gasoline engine or electric motor through a flexible shaft. Pinazza hammers are available in 3 types, ranging in weight from 35 to 53 lb. Since the hammer and power unit are separate, the hammer can be used in any position, for either wet or dry drilling, and for depths up to 16½ ft. Standard flexible shaft lengths are 9 to 10 ft., but shafts can be coupled to triple length without affecting operating efficiency.

Model GTX triple-axle low boy

Information and specifications on the Model GTX trailer has been released by Transport Trailers, Inc., 1211 12th Street S. W., Cedar Rapids,



Iowa. The trailers are available with 15-in. or 20-in. wheels and with integral or removable goosenecks. Five sizes provide capacities from 25 through 45 tons. Complete details are available.

Truck crane has two front axles

The Model 43-MR, a 35-ton rubber mounted truck crane, has been announced by Marion Power Shovel Co., Marion, Ohio. The machine features dual front axles for best weight distribution, power-removable counterweight, for easy preparation of the machine for highway travel, and with

a capacity to carry maximum rated load, with outriggers, at a radius of 15 ft. It can be used as a crane, clam-shell, dragline, or steel rigger.

Tractors by John Deere

Handyman John Deere 420 Series Tractors, crawler and wheel type, are now in production at the Dubuque Tractor Works of Deere and Company, Moline, Ill. The new tractors closely resemble the 40 tractors which they replace but the new 2-cylinder, valve-in-head, which is common to both models, delivers 20% more horsepower. The crawler weighs slightly over 4,000 lb. and is available in 4 and 5 roller track sizes. A 24-page folder is available describing the new tractors.

Reversible wisdom teeth

A reversible tooth in two sizes has been announced by Petersen Engineering Co., Santa Clara, Calif., designed especially for use on earth boring augers and cutting heads. The teeth can be reversed after one side wears out and the boring angle permits boring in most instances without any down pressure, eliminating wear on clutch plates. Called Pengo



Wisdom Teeth, they are especially designed for use on augers powered by heavy and extra-heavy duty boring machines. Additional information is available.

Parsons Win-Ro spreader

Flaherty Manufacturing Co., Pocatello, Idaho, is manufacturing the Parsons Win-Ro spreader. The strike-off opening may be adjusted without tools to shape windrows from 9.2 cu. ft. per foot to 2 cu. ft. per lineal foot. Once set, it measures the aggregate to conform to the determined amount. The hopper is designed so material is activated at all times. It measures 11 ft. wide by 7 ft. 10 in. long.

Clutch for Kelley trowel

Power on the Kelley hydraulic trowel is transmitted through an automatic centrifugal clutch manufactured by Mercury Clutch Division, Automatic Steel Products, Inc., 1201 Camden Avenue, S. W., Canton 6, Ohio. The clutch provides gentle



input of power enabling blade pitch and motor speed to be keyed to the resistance of the concrete being troweled. Detailed information on clutch applications in the construction equipment field are available.

Liner clamp is fast

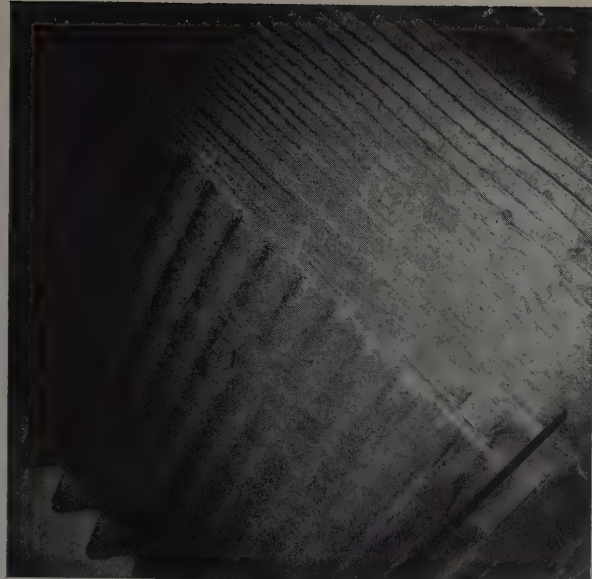
A new liner clamp for attaching alignment lumber directly to the Uni-Form concrete form panels eliminates wooden wedges, nails, and liner hooks and permits one man to align



forms in a fraction of the usual time. Called Liner-Loc by the manufacturer, Universal Form Clamp Co., 1238 No. Kostner Avenue, Chicago 51, Ill., the clamp attaches directly to the steel frame of the panels in one or two seconds. Tapping the wedge down tightens the alignment lumber against the panels and brings the entire form into line. Elimination of nails makes for longer life of alignment lumber. The Liner-Loc can be reused indefinitely.

Lightweight Waco scaffolding

Waco Manufacturing Co., 3555 Wooddale Avenue, Minneapolis 26,



how to **EXTEND** working life of jaw crushers

apply **VICTOR**
HARDFACING

No Disassembly This jaw crusher was hardfaced with jaws bolted in place, using 3/16" coated Tube Victorite. Despite cramped working area only 12" deep and 36" wide, high deposition rate and low spatter loss enabled welder to get uniform, non-sagging, long-wearing bead without distorting jaw.

Downtime Saver Because it goes on fast, without flux interference, and sets up quickly, coated Tube Victorite is wonderful for hardfacing on the job without disassembly of equipment.

Where To Use Coated Tube Victorite is a high alloy content rod with Rockwell C hardness of 55-58. It was developed specifically for tools subject to severe abrasion and impact, such as:

Ripper Teeth	Tool Joints
Pug Mill Augers	Scraper Blades
Jaw Crushers	Asphalt Mixer
	Paddle Shanks
Roll Crushers	Mill Hammers
Die Rings	Bucket Lips

Free Help—Victor hardfacing manual shows you the right rod to use and how to apply it. Ask your Victor dealer for manual and descriptive leaflets on Tube Victorite and other Victor rods . . . or write us.

It welds easily to carbon alloy and manganese steels—the latter frequently is used for buildup before applying coated Tube Victorite. It can be used for position welding. Deposit is smooth, even, free of pin holes. Made for AC and DC (reverse polarity) application.

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dealerships open;
inquire now!**

VICTOR

for hardfacing

VICTOR EQUIPMENT COMPANY
ALLOY ROD & METAL DIVISION

Los Angeles 59, California • Wakita, Oklahoma

Minn., has announced a new scaffolding rated at 50 lb. per square foot. The frames are 4 ft. high and 4 ft. wide with built-in ladders. Braces are tubular. A complete line of accessories is available and rolling towers can easily be made available by the addition of casters. Further information is available.

Three new forming tools

Three new additions to its line of forming tools has been announced by **Symons Clamp and Mfg. Co.** A flat tie form designed to be used with flat tie, can be stripped by merely disengaging connecting bolts and hinging form away from wall. The new adapter plate makes it possible to insert ties internally at various points within the panel. Only the connecting bolt is necessary to secure the tie at these points. Grout leakage is reduced because the tie fits snugly into the tie slot. Exact wall size has been stamped on each tie to avoid errors. For further information write the manufacturer at 4249 West Diversey Avenue, Chicago 39, Ill.

Portable crushing and screening plant

A portable crushing and screening plant designed for use in the intermediate crushing stage of gravel and rock has been added to the line of

Pioneer Engineering Works, Inc., 1515 Central Avenue, Minneapolis 13, Minn. The plant consists of a 4x8 ft. 2-deck Mesabi-type vibrating screen mounted ahead of a 2036 jaw crusher, with two delivery conveyors. Pro-



vision is made to convert the 2036 jaw into the 1536 size by use of 5-in. spacer, an optional item, which permits smaller settings of the jaw opening. The plant may be purchased with the 1536 jaw crusher, as such, installed as optional original equipment. Detailed specifications are contained in Form No. SB 440.

Hose for air and water

A hose of braided wire construction for safety at pressures to 2,000 psi. has been announced by **Manhattan Rubber Division, Raybestos-Manhattan, Inc.**, Passaic, N. J. It is built with steel braids that offer maximum resistance to crushing. In addition a neoprene tube withstands hot oil from compressors.

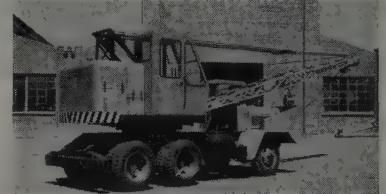
Full details are available in Bulletin No. 7107 on request.

Diesel electric sets

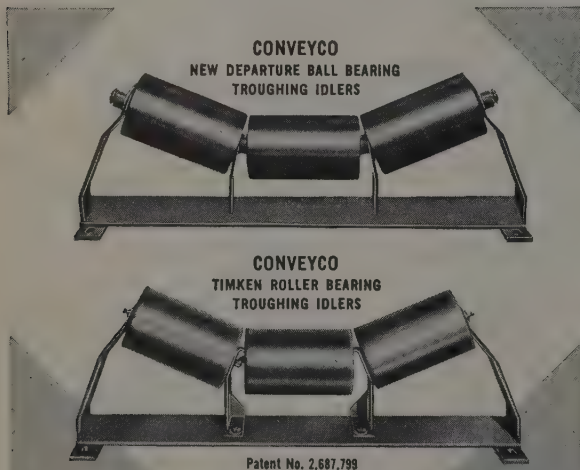
A series of lightweight generating sets has been introduced by the **Universal Motor Co.**, 540 Universal Drive, Oshkosh, Wis. The models are powered by 4-cycle diesel engines of 6 cylinders and are directly coupled to generators turning at 1,800 rpm. The models are produced in 10, 15, 25, and 35 kw., and can be furnished with various controls to meet every job requirement. Literature is available.

Truck shovel line expanded

Quick-Way Truck Shovel Co. 2401 East 40th Avenue, Denver, Colo., has announced four new models and five new carriers. The models include a



5 ton, $\frac{1}{4}$ yd.; an 8 ton, $\frac{3}{8}$ yd.; a 10 ton, $\frac{1}{2}$ yd.; and a 12 $\frac{1}{2}$ ton, $\frac{1}{2}$ yd.—all convertible with attachments. Lubrication features force-feed filtered circulation and daily grease fittings centrally located on cab.



Patent No. 2,687,799

THERE'S A SECRET TO LONGER IDLER LIFE! It's U.S. Patent No. 2,687,799

Whatever your job conditions may be, Conveyco Idlers with sealed-for-life New Departure Bearings or Conveyco Timken Bearing Idlers will give you better performance over a longer period. The secret is in the patented construction... let a Conveyco engineer show you how to reduce idler maintenance.

Note: Conveyco is a convenient source for repair or replacement parts on conveying equipment. Bearings, pulleys, etc.

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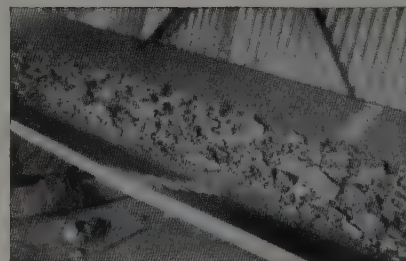
THE CONVEYOR CO.

3260 E. Slouson Ave., Los Angeles 58, Calif.



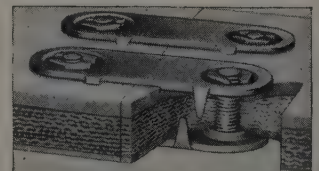
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BELT FASTENERS and RIP PLATES



FOR HEAVY
CONVEYOR
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BELTS OF
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- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
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- ★ Also Promal top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-112

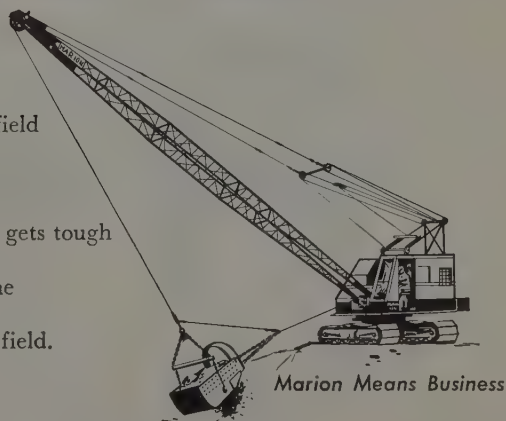
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4704 Lexington St., Chicago 44, Ill.



champions in their field . . .

Point! Flush! Retrieve! You thrill to the brilliant field work of an experienced Irish Setter. A glance tells you his sure-footed poise and his stamina when the going gets tough are the marks of a true champion. You'll recognize these same qualities in Marion's one-yard 43-M, a champion in its field.

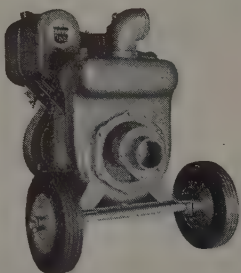


MARION POWER SHOVEL COMPANY, MARION, OHIO

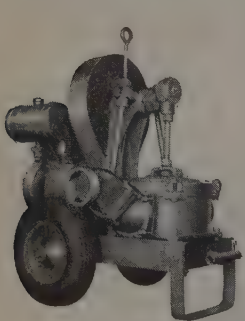
HOW MANY G.P.H. does your job require?

**4000?
up to 250,000?**

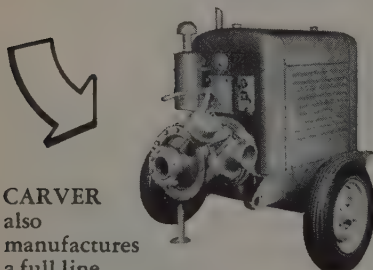
**You'll find the right pump
in CARVER'S Complete Line**



CARVER
manufactures
the complete
line of
contractor's
self-priming
pumps from
4000 G.P.H. to 250,000 G.P.H. —
pumps of proven performance on
large and small jobs throughout
the world!



**Sturdy
Carver
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Pumps,
6000
G.P.H.,
assure
outstanding
performance
where jobs are really tough.**



CARVER
also
manufactures
a full line
of high pressure Jetting Pumps.

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Ask for Bulletin No. 111**

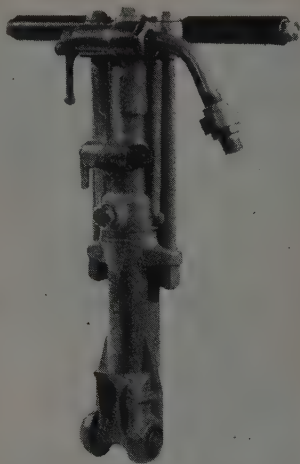


CARVER PUMP CO.
1416 Hershey Avenue
Muscatine, Iowa

*The quality name
in pumps*

Rock driller or cement chipper

An air-operated hammer for use as a rock drill or a cement chipping hammer has been announced by **Thor Power Tool Co.**, 175 No. State Street,



Aurora, Ill. An external control permits change from rotative to straight hammering action. The hammer cuts holes to diameters up to 1 1/4 in. Overall length is 17 1/4 in. with a 3/8-in. air hose and air hose inlet provided for.

Long range floodlight

An outdoor floodlight producing 115,000 candlepower with only a 500 watt rating has been announced by **Stonco Electric Products Co.**, 333 Monroe Avenue, Kenilworth, N. J. The unit is particularly useful for uses in which the light must be mounted a considerable distance from the area to be illuminated. Lamp life is stated to be 2,000 hr. Bulletin 140 describes the unit with complete light coverage tables.

Reflective street signs

Prepared reflective street-name sign faces—made to order for cities and counties—have been marketed

by **Minnesota Mining and Mfg. Co.**, 900 Fauquier Street, St. Paul 6, Minn. Made of Scotchlite brand reflective sheeting with the street name silk-screened in contrasting reflective colors, the ready-to-use faces are designed for shop refurbishment of existing street-name signs, or making new signs. Further information can be obtained from writing Dept. 5-357G.

Backhoe digs on either side

A new backhoe that digs at right angles to either side of the tractor as well as to the rear has been introduced by **Mid-Western Industries, Inc.**, 1009 Southwest Street, Wichita, Kansas. The backhoe is sold in com-



bination with the Davis loader and is mounted directly onto the loader frame. A selector valve lets the operator have immediate control of either the loader or the backhoe. It is possible to attach or detach the backhoe from the tractor in less than 5 min.

Shock dampers for light trucks

Road shock dampers for increased steering safety and riding comfort in light trucks has been announced by **GMC Truck and Coach Division**, 600 South Blvd., East, Pontiac 11, Mich. The damper consists of 11.8 x 4.4 in. metal cylinder containing a 12-lb. steel weight between two coil springs. The weight slides along a steel rod running the length of the cylinder.

PREFERRED by CONTRACTORS

Less initial cost—Lower upkeep

MARVEL CONCRETE VIBRATORS

GV-1, GV-2 & GV-3 Models Now Equipped
with Automatic Centrifugal Clutch as
Standard Equipment.
Interchangeable Flexible Shafts.

Write for full information

MARVEL EQUIPMENT CORPORATION
215-217 EAGLE ST. • B'KLYN 22, N. Y.





A Smith 6 cu. yard Tilter, mixing 7 1/2 cu. yard per batch.

Quality Concrete doesn't just happen . . . it's premeditated. Whether it's PRE-MIXED or TRANSIT-MIXED . . . the first step toward success is CONTROL . . . (1) material control (2) water control (3) mixing. Wherever you see a Smith Tilter, you know the owner insists on *all three* and delivers Quality Concrete. Smith Tilters are available in ANY size you want . . . 1 cu. yard...2 cu. yards...3 cu. yards...4 cu. yards...5 cu. yards...6 cu. yards...7 1/2 cu. yards.

Ask your nearby Smith dealer for literature.

THE T. L. SMITH COMPANY, 2871 North 32nd Street, Milwaukee 10, Wisconsin, U. S. A.

Affiliated with Essick Manufacturing Company, Los Angeles, California

BUILDERS OF BETTER MIXERS FOR MORE THAN 50 YEARS

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.
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LOS ANGELES
STEEL CASTING CO.

6100 So. Boyle Avenue, Los Angeles 58, California

**POUR CONCRETE
at LOWER COST**

**BUY EFCO
STEEL FORMS**

Lifetime steel faces
never need replating

Easy to handle and assemble

Save time, material, money

Low original cost

Other forms available
on a rental basis

Write for catalog to

ECONOMY FORMS CORP.

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DISTRICT SALES OFFICES: St. Louis, Mo. • Kansas City, Mo.
Lincoln, Neb. • Minneapolis, Minn. • Ft. Wayne, Ind.
Milwaukee, Wisc. • Cincinnati, Ohio • Cleveland, Ohio
Meluchen, N. J. • Rochester, N. Y. • Springfield, Mass.
Washington, D. C. • Decatur, Ga. • Dallas, Texas • Los
Angeles, Calif. • Oakland, Calif. • Denver, Colo.

Self-propelled line marker

A self-propelled line marker, featuring either solid or intermittent lines and automotive steering, has been announced by **M-B Corporation**, New Holstein, Wis. The ma-



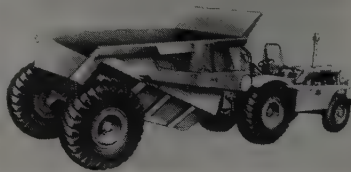
chine is one-man operated and travels at a speed of from 3 to 5 mi. per hr. A riding platform is provided where the operator is always in line with the paint guns and stripes to make retracing easier. The paint tank has a capacity of 18 gal.

Tampo slurry mixer

A mixer designed for use in ready-mix concrete plants to pre-mix cement and water has been announced by **Tampo Manufacturing Co.**, P. O. Box 2340 San Antonio 6, Texas. It is a pug mill type mixer with an air operated butterfly discharge valve, 7½ hp. motor, and a capacity of 63 cu. ft. which is sufficient to pre-mix a 6-yd. slurry of cement and water. It premixes cement and water to a slurry in 20 sec. and supplies concrete for approximately 1/5 the cost of a stationary mixer.

Athey rear dump trailer

Athey Products Corp., 5631 West 65th Street, Chicago 38, Ill., has announced the DW 15 rear dump trailer. Called the PR 15, it offers a capacity of 15.6 cu. yd., speeds up to



31.3 mph., right or left angle turns of 90 deg. and 3-stage hydraulic hoists which tilt about 60 deg. for positive ejection. The entire loaded unit weighs 84,683 lb. with 37% of the load on the drive wheels of the Cat 186 hp. tractor. Tires are interchangeable with tractor driver and trailer.

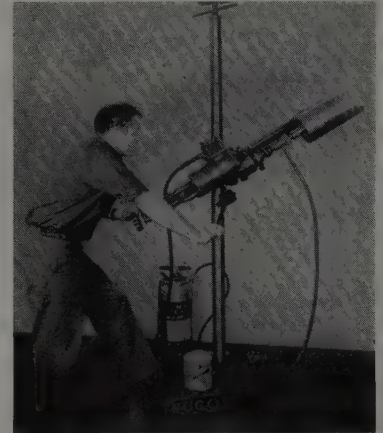
Attachment for road widening

Development of a 4-ft. stabilizing attachment for use in widening roads and building all-weather road shoulders has been announced by **Seaman-Andwall Corp.**, 285 No. 25th Street,

Milwaukee 1, Wis. Designed for mounting on a Seaman Pulvi-Mixer and Trav-L-Plant, the unit is complete with rotor, troque, and mixing chamber. Capable of 4-ft. mixing width, it can be installed in less than 30 min. Requires only removal of 8 bolts. Available as a complete package, the unit is capable of mixing fine and coarse aggregates, sand, and native soils, uniformly to a depth of up to 10 in. Details are available.

Truco portable drilling machine

A portable drilling machine for use with Truco swivel Diamond bits and Truco water swivel units has been introduced by **Wheel Trueing Tool Co.**, 3210 W. Davison Avenue, Detroit 6, Mich. The machine is wired



for 110 volts and 60 cycles. Any size hole up to 6¼ in. can be drilled in cement, reinforced concrete, tile, granite, marble, and other hard, brittle materials. The machine consists of a telescoping post which can be anchored between floor and ceiling or between opposite walls.

Asphalt supply trailer

An asphalt supply trailer is now available from **Standard Steel Works, Inc.**, 16th and Howell Avenue, North Kansas City 16, Mo. Glass fibre insulation in 1½-in., 2-in., or 3-in.

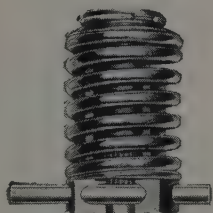


thickness is installed on all units hauling hot materials. A variety of pump engine combinations are available and either high or low burner equipment can be furnished. The trailer is adaptable for transporting emulsions, soaps, chemicals, and other liquids hot or cold in addition to bituminous materials. Complete details are available.

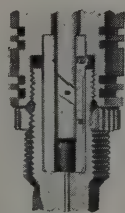
This is the **COMPLETE** fuel injection system of a **MURPHY DIESEL.....**

Here is the simplest, most effective diesel fuel system ever developed—the Murphy Diesel Unit Fuel Injection System. A low pressure fuel supply pump serving a unit fuel injector for each cylinder is all there is to it. There is no master high pressure pump. There are no high pressure fuel lines. On the rare occasions when service is necessary, just put in the spare injector and have the removed injector serviced at your convenience. But most important of all, the Murphy Unit Injector in combination with "true" diesel operation enables you to get more work out of every gallon of fuel . . . better performance at lower cost.

SIMPLE . . . DEPENDABLE . . . ECONOMICAL



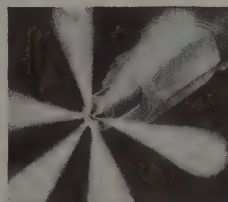
Injector drive is direct from the overhead camshaft by means of a rocker arm. Precision rack and pinion actuated by hydraulic servo type governor controls the amount of fuel to be injected.



Fuel enters the injector at approximately 20 psi, travels through an annular passage into the injector cylinder. No priming—no bleeding.



On the plunger's downstroke, the intake port is closed and the fuel forced out the nozzle through dual flat seat check valves—double protection.



Solid fuel forced through six properly sized holes in the nozzle is completely atomized as a fine fog and distributed through the incandescent air charge to provide thorough combustion.

HERE'S HOW YOU BENEFIT

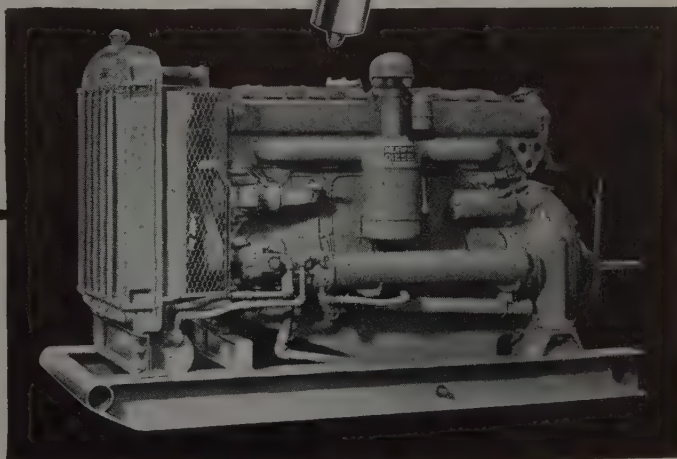
- Eliminates long high-pressure fuel lines
- Eliminates pre-combustion chambers, energy cells or hot spots
- Prevents erratic, irregular injection
- Eliminates priming or bleeding
- Stops after-dribble or leakage
- Eliminates elaborate injector adjusting equipment
- Eliminates maintenance of separate components
- Easier starting
- Greater economy
- Smoother operation
- More power
- Less fuel consumption
- Lower maintenance
- Less down time

**MURPHY
DIESEL**

341

MURPHY DIESEL COMPANY

5325 W. Burnham St. Milwaukee 14, Wisconsin
Heavy duty engines and power units, 96 to 264 H.P.,
generator sets 64 to 165 K.W.



News of DISTRIBUTORS

Hensley exclusive dealerships

Hensley Equipment Co., Inc., San Leandro, Calif., manufacturer of dozer and scraper rippers, cutting edges, bottom track rollers and allied tractor replacement parts, announces the appointment of the following exclusive dealers: Complete Industrial Supply Co., Phoenix, Ariz.; Contractors Equipment & Supply Co., Fresno, Calif.; Doug-Lynn Manufacturing & Machinery Co., Santa Rosa, Calif.; and Columbia Equipment, Ltd., Vancouver, B. C., Canada.

J. D. Ryan joins Anderson-O'Brien

James D. Ryan, lately associated with the Bank of America N. T. & S. A., has become associated with Anderson-O'Brien Co., Los Angeles, General Motors diesel distributor for Southern California. According to the announcement by M. H. O'Brien, president, Ryan assumes the position of secretary-treasurer.

Two sales staff additions

According to announcement by Sam A. Madrid, Western representative for Kolman Manufacturing Co., the Spears-Wells Machinery Co. of Oakland, Calif., is now handling the Kolman line of portable and stationary belt conveyors, portable conveyor-screen loading and screening plants, vibrating screens, and allied portable and stationary installations, throughout Northern California and coastal counties.

Personnel change

James H. Galbraith recently left the employ of Sacramento Valley Tractor Co., Sacramento, Calif., and Joseph Schaedler joined the organization.

Hough names new distributor

Orton Equipment Co., Stratford, Calif., is the newly appointed distributor in this locality for The Frank G. Hough Co. Payloader line.

Roebbling's-Republic Supply tie-in

John A. Roebbling's Sons Corp., wire rope manufacturer of Trenton, N. J., and The Republic Supply Co. of California recently concluded an agreement under which the latter is now distributor for Roebbling products in California, Arizona, and Nevada. A full line of Roebbling wire rope, slings, assemblies, and accessories will be carried in stock by Republic Supply.

Demo Tool names distributors

Demo Tool Corp., Los Angeles, Calif., has appointed Morrey Products Co., Seattle, Wash., and West Coast Industrial Sales, San Francisco, as distributors of the Demo portable electric rotary hammer. Morrey will handle sales in Washington, Oregon, Montana, Idaho, Colorado, Alaska, and Vancouver, B. C., while West Coast will cover Northern California and northern Nevada.

Peterson Tractor ups Bill Doyle

W. E. "Bill" Doyle, Jr., has been placed in charge of John Deere tractor industrial sales for Peterson Tractor & Equipment Co., San Leandro, Calif. Doyle was formerly in used equipment sales and before that worked in the tractor company's shop.

Garlinghouse-Fremont progress

A new, modern building under construction for Garlinghouse, Fremont & Co., successor to the retail division of Garlinghouse Bros., is scheduled for occupancy March 1. Located at 6046 E. Washington Blvd., Los Angeles, Calif., the new headquarters boasts large inside display floor and covered outside display areas as well as offices and service department. The new firm was recently appointed distributor for Unit cranes and shovels, besides representing all the heavy construction manufacturers previously handled by Garlinghouse Bros.

MANUFACTURERS

New Marion sales team

Marion Power Shovel Co. announces a strengthened sales organization in the Southwest, headed by Dean Calland as Western sales manager, 326 Shaw Road, South San Francisco. Two divisional sales managers, T. R. Fogelberg and E. J. Riggs, were recently named by Robert Campello, Marion sales manager, to work with Calland in expanding sales and service in California, Nevada, Utah, and Arizona. Fogelberg makes his headquarters at 4835 Crenshaw Blvd., Los Angeles, and Riggs is located at the firm's parts warehouse at 1017 No. 22nd Ave., Phoenix, Ariz.

LeRoi opens at Denver

Headed by W. E. Mattson, formerly district manager of the LeRoi

Division of Westinghouse Air Brake Co. at Lakewood, Colo., a new regional office has been opened by the company at Denver 2, Colo., in the Farmers Union Bldg., (Suite 610.) Also announced is the appointment of Tom E. Stone as district representative for eastern Colorado, Utah, and southern Idaho, with headquarters in Salt Lake City, Utah.

Huber-Warco new Western sales rep.

Huber-Warco Co. of Marion, Ohio, announces the appointment of John "Jack" McCaffrey of Pleasanthill, Calif., as its district sales representative for seven Western states, two Canadian provinces and Alaska. McCaffrey makes his headquarters at 436 Minton Court in Pleasanthill. He brings to his post a broad background of sales and industrial experience, having served as East Bay district sales manager for Western Traction Co., San Francisco. From 1945 to 1951 he was associated with Chicago Pneumatic's branch office at San Francisco as a contractors representative. In his new position he will work with Huber-Warco distributors in Arizona, California, Oregon, Washington, Montana, Utah, Idaho, and in Alberta and British Columbia.

P&H staff changes

L. M. Stout retired Dec. 31 after 20 years of active service with Harnischfeger Corporation. Replacing him as district manager in San Francisco is W. H. DeHuff who transferred from Denver. J. H. Taylor, former sales engineer in the San Francisco office, moved to Phoenix, Ariz., as district manager.

Banks joins Joy at L. A.

H. C. Banks, formerly located at the Dallas, Texas, factory of Joy Manufacturing Co., is now located in Los Angeles, handling sale of oil field drill rigs. Banks' territory covers California, Oregon, Washington, and western Nevada.

Thor steps up sales force

Added to the sales force to handle Speedtool and automotive sales in Oregon for Thor Power Tool Co., Seattle, Wash., are Robert J. Chic and Calvin G. Knox, service engineers.

Homer Stone joins Skil

Homer E. Stone, formerly power tool manager for Nordby Supply Co., recently joined the Seattle branch sales staff of Skil Corporation.

New Northwest sales mgr.

Donald L. Shirley has been appointed Pacific Northwest sales manager for Link-Belt Co., according to Harvey V. Eastling, San Francisco, general manager of the company's Pacific divisions. Shirley will have responsibility for sales in Washing-

NOW Model RD15 Movall, with Positive Ejection, Controlled Spread, for Cat DW15



This rugged wagon hauls 16 heaped yards (12 truck or 22 tons). It works off standard Caterpillar controls, has "dozer-type" ejector that gets rid of loads with a positive, 140,000-lb. push.

Like larger Movall, the Model RD 15 can dump at controlled rate into grizzlies or hoppers.

NEW C & D MOVALL MODEL RD15 for hauling rock, dirt, mud or any other top loaded material is designed especially for Caterpillar DW15 Tractors, both new and old; under favorable working conditions it also can be used with Cat DW10 Tractors. Like the larger, job-proved 25-yard Movall, the Model RD15 operates off standard Caterpillar controls, works interchangeably with scrapers, is simple and easy to operate. There's nothing new to learn.

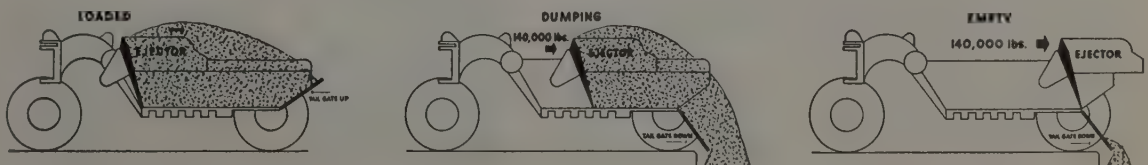
"DOZER-TYPE" EJECTOR PUSHES LOADS OUT QUICKLY—with a powerful, positive force of 140,000 pounds. This cleans the haul unit completely whether you're hauling dirt, rock, mud, gumbo, or frozen ore. There's no build-up or double hauling of sticky material, or time wasted cleaning. The "scraper-in-reverse" design, available only on C & D Movalls, also allows

you to place the load anywhere and in any manner you want: over the edge of fill; spread in even lifts of any desired depth; or dumped into hoppers at a controlled rate.

HANDLES ANY MATERIAL YOU CAN TOP LOAD with a shovel, drag line, or belt. You have a large loading target of 10' x 16' and short turning width of 27'. You get capacity loads every trip—tailgate minimizes spillage while loading, and during haul. Heaping loads are ejected over a fill in only 11 seconds.

ASK YOUR CATERPILLAR-C & D DISTRIBUTOR FOR A DEMONSTRATION on your job. Find out what a C & D Movall can do for you. Call him NOW or write direct to C & D Manufacturing Co., Perkins (near Sacramento), California. Phone Hillcrest 5-8592.

HOW IT WORKS—Movall uses standard cable scraper power control. To dump, operator releases back-haul drum to drop tailgate, engages ejector drum. Eight-part ejector line gives 140,000 lb. push to boost load out fast and clean. Operator has complete control of discharge, controls spread depth by varying travel speed. After dumping, backhaul line closes tailgate and rolls ejector to loading position.



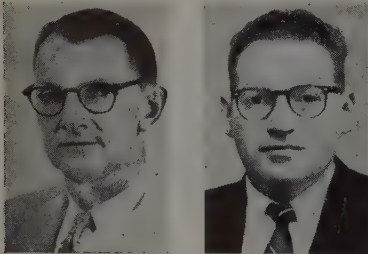
ton, Oregon, parts of Idaho and Montana, and Alaska, and will continue to make his headquarters at the company's plant in Seattle, where he has been district sales manager for the past year and a half. J. F. Strott, Seattle, is general manager of the Pacific Northwest Division.

Western district manager named

Appointment of Ralph Ratcliff as district sales manager for Duff-Norton Manufacturing Co. and its Coffing Hoist Division has been announced by James McCartney, vice president of Duff-Norton. Ratcliff will be in charge of both product lines in California, Oregon, Washington, western Idaho, and western Nevada, with office and warehouse operating at 1016 Howard St., San Francisco. Prior to the merger of Coffing Hoist Co. with Duff-Norton, Ratcliff was in charge of Coffing's Western sales. M. C. "Matt" Dillingham who represented the Duff-Norton line for the past 17 years is discontinuing his connection with the company. The full line of Duff-Norton jacks and Coffing hoists and winches will be represented by the San Francisco branch and will continue to be sold through leading distributors in the area.

Three Wooldridge appointments

Three top level appointments in connection with an extensive expansion program of Wooldridge Manufacturing Division are announced by Continental Copper & Steel Industries, Inc. Henry Gusman, CCS vice president, who has headed the Wooldridge organization in Sunnyvale, Calif., has moved to New York as a member of the CCS management



E. E. Esgate

J. D. Gusman

committee. J. D. Gusman, formerly assistant to the general manager of Wooldridge, has been made general manager of this division, and assistant vice president of CCS. E. E. Esgate, formerly a vice president of Thew Shovel Co., is now general sales manager for Wooldridge.

Yuba Manufacturing Co. buys C & D

Ernest J. Gorman, executive vice president of Yuba Manufacturing Co., San Francisco and Benicia, Calif., announces the acquisition of C & D Manufacturing Co., Perkins, Calif., to be operated as a Yuba divi-



STRUCTURAL FABRICATED Steel Corp., 7400 Laurel Canyon Blvd., North Hollywood, Calif., recently formed by Herbert Ziegler, president, to engage in industrial steel fabrication. Leo J. Caton is general manager, with over 30 years experience in the field. Don Charle is handling sales, and Harry Blitstein is in charge of production.

sion, with R. P. Nichols, formerly C & D sales manager, in charge of sales. He will report to P. C. Carmer, sales manager of Yuba Products Division. Chief product of C & D is the Movall, a heavy-duty wagon employing a unique, positive ejector that pushes earth, mud, ore, etc. out the rear of the wagon with a 140,000-lb. push. Yuba Manufacturing Co. has fabricated Movall wagons on a production line basis since they were introduced over a year ago, and their quick acceptance led Yuba to buy the company outright.

Seaman-Andwall buys spreader line

Seaman-Andwall Corp., Milwaukee, Wis., manufacturer of road stabilization equipment, announces the purchase of the Century line of cement and materials spreaders designed and originally manufactured by Century Engineering Co., Waukesha, Wis. This spreader line will be now manufactured and sold with Seaman-Andwall's allied machinery which includes Pulvi-Mixers, steel wheel and pneumatic rollers. Century Engineering Co., according to the company, will continue to manufacture its line of hydraulic components.

Sabin named sales manager

Joseph B. Cox, Oregon industrialist who recently purchased Powder Power Tool Co., nationally known cartridge activated building tool manufacturing firm of Portland, Ore., has named Guy Sabin of that city as national sales manager. His headquarters are in the factory offices at 5001 S. E. Johnson Creek Blvd., Portland 22, Ore.

IH names assistant manager

Appointment of Duane F. Kuntz, as an assistant manager of motor truck sales, is announced by W. C. Schumacher, vice president and general manager of International Harvester Co.'s motor truck division. Kuntz joined the International Harvester organization in 1926. After service in various capacities in the

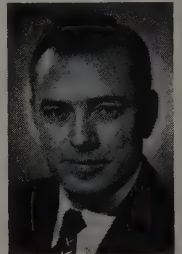
organization he became associated with the company's general office in Chicago as a regional manager in 1950.

CB&I expands S.F. quarters

Enlarged sales offices in San Francisco, Calif., are announced by Chicago Bridge & Iron Co. The new address is 100 Bush St., San Francisco 4.

LeRoi names construction sales mgr.

William F. Briney has been named manager of construction industry sales for the LeRoi Division of Westinghouse Air Brake Co., Milwaukee, Wis. Briney, who first joined LeRoi



Wm. F. Briney

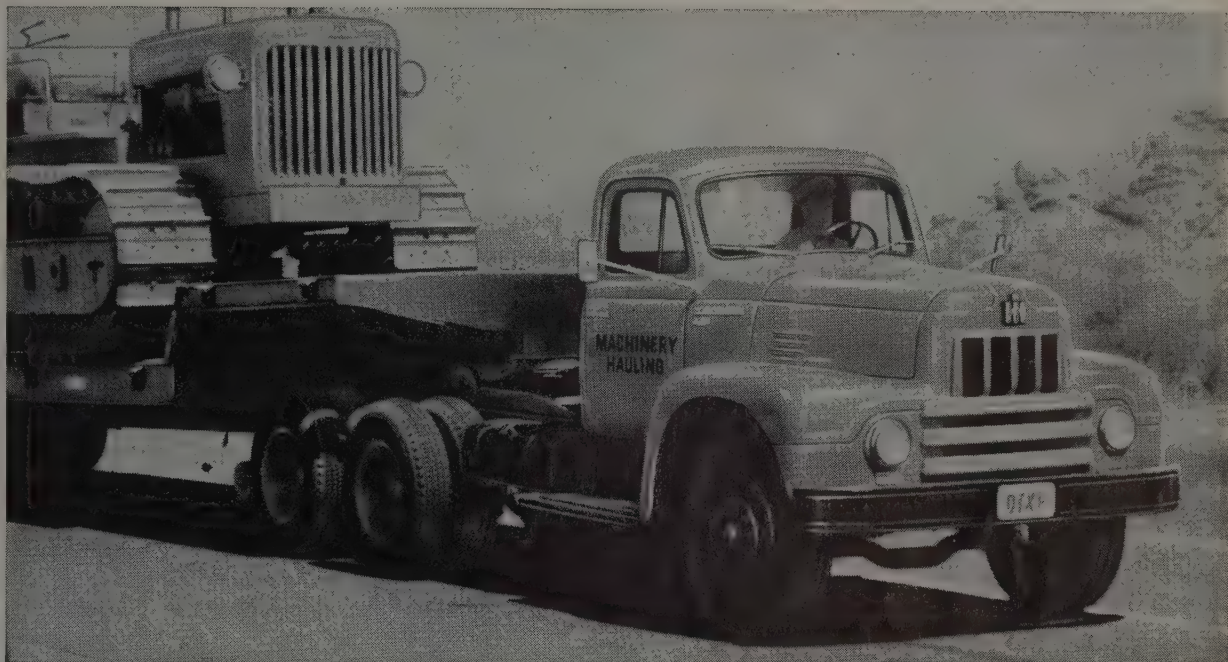
in 1949, is now responsible for planning the sales of portable air compressors, Tractairs, rock drills, and other products used by the construction industry. Another of his duties is to recommend development of new products in this field and the modification of existing equipment.

Power Crane and Shovel Assn.

Power Crane and Shovel Association, New York, N. Y., announces the following new officers: President—D. W. Lehti, president of Link-Belt Speeder Corp.; Vice president—M. B. Garber, vice president-sales of The Thew Shovel Co. Newly elected directors are: P. H. Birkhead, vice president of Bucyrus-Erie Co., and C. B. Smythe, president-treasurer of The Thew Shovel Co. They join board members continuing in office:

INTERNATIONAL TRUCKS

First choice of men who know 6-wheel costs



Model RF-201, gasoline-powered 6-wheeler, 39,000 lbs. GVW and 65,000 lbs. GCW.

Now — **NEW** Gasoline,
LPG and Diesels for a total
of 101 models

SF-180 Series—GVW rating, 30,000-33,000 lbs. GCW, 45,000 pounds. Gasoline or LPG engines.

RF-200 Series—GVW, 37,000-41,000 lbs. GCW, 65,000 lbs. Royal Red Diamond 212-hp gasoline engine, optional.

RDF-210-H Series—GVW rating, 37,000-45,000 lbs. Diesel-powered. For highway or off-highway service.

RDF-214-H—GVW rating, 45,000 lbs. Diesel-powered. For heavy off-highway service.

RDF-230-H—GVW rating, 60,000 lbs. Diesel-powered. For heavy off-highway service.

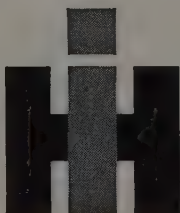
DF-400 Series—GVW rating, 40,000 lbs. GCW rating, 76,800 lbs. Diesel-powered. For highway or off-highway service.

Here are 3 BIG reasons why :

1. **World's Widest Range of 6-wheel Models.** The INTERNATIONAL 6-wheel truck line offers trucks of every size and type from 22,000 to 90,000 pounds GVW—conventional and COE, gasoline, LPG and diesel—all available in hundreds of variations for *exact* matching to the requirements of every job.
2. **Custom-Built on the Production Line.** Years of experience in volume manufacture has created unmatched ability for pinpoint specialization in production line assembly. This means appreciable production savings, and is one of many superiorities that have made INTERNATIONAL the 6-wheel truck leader for 21 straight years.
3. **All-Truck Built to Save You the BIG Money.** INTERNATIONAL 6-wheel trucks are *all-truck* from the drawing board out with every component designed to do a truck job. They *last longer, work more dependably*—to save you the BIG money, the over-the-years operating and maintenance money.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

***All-Truck Built
to save you
the BIG money!***



INTERNATIONAL TRUCKS

Motor Trucks • Crawler Tractors • Industrial Power
• McCormick® Farm Equipment and Farmall® Tractors

D. H. Ross, Clark Equipment Co.; Fred Salditt, Harnischfeger Corp.; F. W. Zimmer, Manitowoc Engineering Corp., and J. P. Courtright of Marion Power Shovel Co.

Bethlehem Pacific promotion

Appointment of Raymond Pontious as assistant superintendent of the bolt and nut department at Bethlehem Pacific's Los Angeles plant is announced. In his new position, Pontious will assist L. R. Gustin, department superintendent.

Kit Mfg. Co. has new prexy

Dan Pocapalia, a co-founder of Kit Manufacturing Co. of Long Beach, Calif., ten years ago, was elected president and general manager of the company recently, succeeding James H. Nicholson. In announcing the appointment, the board of directors indicated its new chief executive would devote his time exclusively to the mobile home manufacturing interests of the firm.

Yearly meet

Distributors met in Seattle, Wash., late last year for the annual conference held by Kenworth Motor Truck Co. Practical and successful sessions on Kenworth truck performance and

service to owners of the equipment were held at the plant and elsewhere. Distributors attending the meet had the opportunity also of examining recent engineering advances in Kenworth equipment.

Wath returns to San Francisco

Effective Jan. 1, Paul O. Wath returned to San Francisco as branch manager of Skil Corporation, having resigned as general sales manager in Chicago. Herman Pflug who has been branch manager at San Francisco will take on all wholesale activities for the Skil builders line sold by leading hardware stores.

Appoints assistant sales manager

Wisconsin Motor Corp., Milwaukee, Wis., announces the appointment of Tom Barrett as assistant sales manager. Barrett will team up with Will Perschbacher to assist Ray J. Fellows, sales manager.

B. F. Goodrich West Coast expansion

An expansion program is under way to increase by 50% the tire output at the Los Angeles plant of The B. F. Goodrich Co. Involving an expenditure of about \$6,000,000, the company expects to be operating at its new and higher capacities by mid-1956.

Le Roi names Cleveland plant mgr.

Louis E. Dondero has been named manager of the Cleveland rock drill plant of the Le Roi Division, Westinghouse Air Brake Co. Dondero was formerly manager of Le Roi's service department. He succeeds Russell R. Morgan who recently retired.

New general sales manager

Pittsburgh-Des Moines Steel Co. announces the retirement of John E. O'Leary, who has been general sales manager for the past 26 years. Widely known in the general construction and municipal waterworks fields, O'Leary has been associated with the



T. W.
Fauntleroy

company for 45 years. T. W. Fauntleroy has been named to succeed him. He has been with the company since the end of World War II.

UNIT PRICES

Selected abstracts for Western projects

BRIDGE—Construction of a bridge and overcrossing in Douglas County, Oregon

Oregon—Douglas County—State. Hamilton and Thoms submitted a low bid of \$406,161 for the construction of Fords bridge and Yokum Road overcrossing. Unit prices were as follows:

(1) Hamilton and Thoms.....	\$406,161		
(2) Lee Hoffman.....	418,704		
Tom Lillebo.....	423,095		
Peter Kiewit Son's Co.....	433,497		
Mason Construction & Engineering Co.....	503,848		
	(1)	(2)	
All Required			
1,500 cu. yd. Shoring, cribbing, etc.....	\$ 10.00	\$ 5.00	
140 cu. yd. Excav. below elevation shown.....	20.00	10.00	
513 lin. ft. Furnish steel piling.....	6.00	6.00	
9 only Drive steel piles.....	100.00	100.00	
1,900 cu. yd. Class "A" concrete.....	60.00	64.00	
460,000 lb. Metal reinforcement.....	.115	.11	
All Required			
1,160 lin. ft. Structural steel.....	11.00	9.50	
50 lin. ft. 8 in. metal drain pipe.....	4.00	3.00	
290 cu. yd. Structural excavation.....	7.00	4.00	
15 cu. yd. Excav. below elevations shown.....	7.00	4.00	
2,805 lin. ft. Furnish treated timber piling.....	1.20	1.20	
102 only Drive timber piles.....	35.00	80.00	
540 cu. yd. Class "A" concrete.....	55.00	64.00	
133,500 lb. Metal reinforcement.....	.115	.10	
100 lin. ft. 8 in. metal drain pipe.....	4.00	3.00	

HIGHWAY—Construction of 1.565 mi. of state highway near Carson City, Nevada

Nevada—Lyon County—State. Silver State Construction Co. received an award of \$127,348 for the construction of highway and structures near Carson City. Unit prices were as follows:

(1) Silver State Construction Co.....	\$127,348		
(2) Holcomb & Saxton Construction Co.....	142,100		
Dodge Construction Inc.....	152,427		
Young & Smith Construction Co.....	165,869		
	(1)	(2)	
Lump Sum			
4 ea. Signs.....	\$ 50.00	\$ 50.00	

2,045 lin. ft. Remove fence.....	.05	.08	
Lump Sum			
427 lin. ft. Remove timber bridge.....	1.00	1.40	
4 ea. Remove culvert pipe.....	100.00	300.00	
6 ea. Remove concrete boxes.....	10.00	30.00	
5 ea. Remove headwalls.....	10.00	20.00	
76 lin. ft. Remove concrete checkgates.....	.25	1.25	
2,580 sq. yd. Remove curb and gutter.....	.20	1.00	
7,495 cu. yd. Roadway excavation.....	.28	.45	
160 cu. yd. Drainage excavation.....	.28	1.50	
4 sta. V-type ditches.....	5.00	7.50	
22,222 cu. yd. Borrow.....	.20	.25	
140,435 yd. sta. Overhaul, yd. sta.....	.015	.02	
50,449 yd. mi. Overhaul, yd. mile.....	.10	.15	
1,050 cu. yd. Structure excavation.....	1.50	1.70	
1,240 cu. yd. Backfill.....	1.00	1.70	
1,949 M gal. Water.....	1.00	1.00	
Lump Sum			
15 hr. Furnish water equipment.....	7.00	7.00	
1,214 ft. hr. Power, roller.....	.50	.60	
11,750 ton Tamping or pneumatic-tired roller.....	.85	.85	
19 ton Gravel surface.....	35.00	36.50	
90 ton Liquid asphalt, type MC-2.....	2.00	2.00	
217 ton Sand blotter.....	32.00	34.00	
1,175 mi. Liquid asphalt, type SC-3 or SC-4.....	700.00	900.00	
0.247 mi. Roadmix (32 ft. width).....	900.00	1,100.00	
0.143 mi. Roadmix (46 ft. curb to curb).....	1,100.00	1,400.00	
2,146 sq. yd. Roadmix (56 ft. curb to curb).....	.10	.20	
509 cu. yd. Class AA concrete.....	70.00	67.00	
36 cu. yd. Class AA concrete piles.....	50.00	27.00	
55 cu. yd. Class AA concrete slope pavement.....	45.00	46.00	
101,760 lb. Reinforcing steel.....	.13	.123	
547 sq. yd. Mesh Reinforcement.....	.50	.47	
232 lin. ft. Standard structural steel rail, type D.....	10.00	8.60	
248 lin. ft. 15 in. reinforced concrete pipe.....	3.00	4.15	
1,518 lin. ft. 18 in. reinforced concrete pipe.....	4.00	4.50	
388 lin. ft. 24 in. reinforced concrete pipe.....	6.00	6.50	
48 lin. ft. 36 in. reinforced concrete pipe.....	10.00	15.00	
96 lin. ft. Relay culvert pipe.....	1.00	2.00	
218 cu. yd. Class AA concrete curb and gutter.....	40.00	39.50	
3,044 lb. Structural steel.....	.30	.30	
75 lin. ft. Standard steel guard rail.....	4.00	4.00	
60 lin. ft. Remove timber guard rail.....	.50	1.50	
29 ea. Culvert markers and guide posts.....	6.00	6.00	
1,895 lin. ft. Construct fence.....	.45	.35	
1 ea. 16-foot metal gate.....	70.00	85.00	
12 ea. Reference monuments.....	10.00	7.00	
20 ea. Right-of-way markers.....	6.00	7.00	
930 lin. ft. Steel shell for piles.....	4.00	4.80	
48 ea. Drive steel shell for piles.....	30.00	90.00	
2 ea. Load test.....	500.00	500.00	
4,796 lin. ft. Fibre tubes.....	.30	.32	



When the gun failed,
they used a tablespoon



HE LEARNED acting the hard way, barnstorming frontier towns by barge and stagecoach, playing in sheds and taverns.

One night in Houston, a Texan even suggested the troupe tour through Indian country, carrying their stage weapons for protection. Joe Jefferson declined. He later said he had shivered when he imagined himself facing a hostile Indian and armed only with a stage pistol whose tendency to misfire had several times "compelled our heavy villain to commit suicide with a tablespoon."

By the 1860's, Jefferson was America's favorite actor. When he played his famous Rip Van Winkle (see picture), "one-night" towns declared a "Jefferson Holiday." Business stopped, schools closed, so that everyone could get a chance to see him act.

They loved Joe Jefferson everywhere because he was a genius at making people happy. And his sunny outlook still sparkles in the spirit of America. Like Jefferson, Americans still know how to travel a hard road and smile when the going's roughest.

These confident Americans are the real wealth of our nation. And they are the real reason why our country's Savings Bonds rank among the world's finest investments.

That's why, to save for *your* goals in life, you cannot find a surer, safer way than United States Savings Bonds. Invest in them regularly—and hold onto them!

It's actually easy to save money—when you buy United States Series E Savings Bonds through the automatic Payroll Savings Plan where you work! You just sign an application at your pay office; after that your saving is done *for* you. And the Bonds you receive will pay you interest at the rate of 3% per year, compounded semiannually, for as long as 19 years and 8 months if you wish! Sign up today! Or, if you're self-employed, invest in Bonds regularly where you bank.

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WESTERN CONSTRUCTION



HIGHWAY—Grading, draining, and surfacing in Wyoming

Wyoming—Platte County—State. Lichty Construction Co. received a \$186,369 award for grading, draining, base course surfacing, sand-gravel seal coat and miscellaneous work on 3.1 mi. of the Glendo-Wheatland road. Unit prices were as follows:

(1) Lichty Construction Co.	\$186,369
(2) Read Construction Co.	202,105
E. L. Ryan & Son	207,188
D. W. Hopkins	209,396
Harren & Strong	214,460

	(1)	(2)
166,000 cu. yd. Excavation.....	.32	.34
42,300 cu. yd. Excavation special embankment.....	.35	.38
90,000 cu. yd. sta. Overhaul.....	.01	.01
138,900 cu. yd. mi. Cubic yard mile haul.....	.18	.25
2,130 M. gal. Watering (emb.).....	1.70	2.00
600 M. gal. Watering (base).....	1.70	2.25
294 hr. Sheep's foot roller operation.....	12.50	11.00
972 lin. ft. 18 in. std. R.C.P.....	5.60	5.00
120 lin. ft. 24 in. std. R.C.P.....	6.90	6.50
84 lin. ft. 30 in. std. R.C.P.....	10.00	10.00
188 lin. ft. 26 1/2 in. x 43 3/4 in. std. R.C.P. arch culv.	20.00	20.00
133.3 cu yd. Class "B" concrete.....	48.00	52.00

600 cu. yd. Excavation for pipe culverts.....	2.00	3.00
380 hr. Mechanical tamping.....	6.50	7.00
120 lin. ft. Relaying pipe.....	2.50	2.00
1,100 cu. yd. Class "1" riprap.....	16.00	14.00
30 cu. yd. Grouted riprap.....	25.00	20.00
320 cu. yd. Structure excavation.....	3.00	3.00
100 cu. yd. Special backfill.....	2.00	2.00
18,200 ton Crushed gravel base course (1 in. max.) ..	.55	.60
12,800 ton Crushed gravel base course grading A ..	.55	.52
460 ton Crushed sand-gravel.....	3.00	3.00
65,000 ton mi. Haul of surfacing material.....	.08	.12
294 hr. Equipment roller operation.....	12.00	14.00
185 hr. Pneumatic tired roller operation.....	6.50	7.00
25 hr. Smooth steel roller operation.....	15.00	10.00
125 ton Asphaltic material MC-prime.....	33.00	34.00
45 ton Asphaltic material RC-seal.....	35.00	36.00
10,630 lin. ft. Standard right-of-way fence.....	.20	.18
630 lin. ft. Standard right-of-way fence (swamp) ..	.30	.26
320 lin. ft. Standard right-of-way fence (5 wire) ..	.23	.19
1,810 lin. ft. Type A right-of-way fence.....	.25	.28
560 lin. ft. Type A right-of-way fence (swamp) ..	.38	.36
55 ea. Brace panels.....	12.00	11.00
60 ea. End panels.....	14.00	13.00
Lump Sum Removing existing structures.....		
50 ea. Right-of-way markers.....	10.00	8.00
0.1 mi. Detour obliteration.....	2,000.00	500.00
12,020 lb. Reinforcing steel.....	.15	.13
140 lb. Structural steel.....	.50	.50

Space is sold as advertisers' inches. All advertisements in this section are 1/2 in. short of contracted space to allow for borders and composition.

CLASSIFIED

Rates are \$8.50 a column inch. Copy should be sent in by the 15th of preceding month if proofs are required; by the 20th if no proofs are required.

AUSTRALIA

Department of Public Works, N.S.W.

ADAMINABY DAM

Construction of Main Embankments, Etc.

Tenders will be received up to 2 p.m. on Monday, 26th March, 1956, for the construction of the Embankments, Intake Structure, Stilling Basin and certain other works at Adamina Dam. The Main Embankment will be an earth and rockfill structure with a total volume of approximately 9,500,000 cubic yards. Specifications, which include small scale reproductions of all relevant plans, may be examined at:

Australian Consulate-General, New York, N.Y.
Australian Consulate-General, San Francisco, California.
Snowy Mountains Hydro-Electric Authority, c/o Office of Bureau of Reclamation, Denver, Colorado.
Office of High Commissioner for Australia, Ottawa, Canada.
Office of Australian Trade Commissioner, Montreal, Canada.
Office of Australian Trade Commissioner, Vancouver, Canada.

Bona fide Tenderers may purchase copies of the Specifications at \$10.10.0 (about \$23.50) per copy plus, if desired, Contact prints of plant at 5/ (about .55) each, set of 442(A)11.00 (about \$24.50). Available by air freight from the Department of Public Works, Sydney, N.S.W., Australia.

DIESEL ENGINES — DIESEL ELECTRIC SETS ALL TYPES OF HEAVY DUTY CONSTRUCTION EQUIPMENT

MINING EQUIPMENT - SAND & GRAVEL PLANTS

R. R. EQUIPMENT - INDUSTRIAL EQUIPMENT

PARTS FOR DIESEL ENGINES - YOUR INQUIRIES APPRECIATED

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5050 Market St., San Diego 2, California — CO 4-3149

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Learn latest methods to organize and run work. Prepare for the top jobs. Send post card for details.

Geo. E. Deatherage & Son

CONSTRUCTION CONSULTANTS
P. O. Box 921 Lake Worth, Florida

FOR SALE

- 1 RD8 tractor 1H series with D13000 motor installed.
- 1 Wooldridge TCR Carryall.
- 1 Angle dozer.

Howard Forrest, Meridian, Calif.

FOR SALE—4 TD24 INT, Dozers, Double Drum PCUs, excellent condition — \$10,500.00 ea. MID-STATE EQUIPMENT CO., Wenatchee, Washington. Phone — Normandy 2-7151 — CALL COLLECT.

FOR RENT

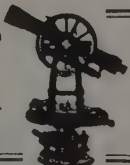
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Tucson Iron Works, Box 1949,
Tucson, Arizona

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PART PAID

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Excellent Working Conditions
Progressive California County
Civil Service Status

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Resident Engineer Inspectors

OFFICE POSITIONS

Design Engineer Draftsman Plans Engineer

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236 Third Street, San Bernardino, Calif.

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CABLEWAYS
IMMEDIATE SHIPMENT
ELECTRIC, STEAM OR DIESEL
CAPACITY 1 TO 20 TONS
SELL, RENT OR BUY
FOR SPEED ECONOMY EFFICIENCY FLOOD SAFETY LABOR REDUCTION
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ADVERTISERS in this issue

A

Air Placement Equipment Co.... 70
Allis Chalmers Mfg. Company, Construction Machinery Div.... 6, 7 & 97
American Pipe and Construction Co., Northwest Division..... 81
American Rubber Mfg. Co., The... 98
Austin-Western Company, Div. of Baldwin-Lima-Hamilton Corp... 20

B

Baldwin-Lima-Hamilton Corp. Construction Equipment Div... 85
Barber-Greene Company 35
Bethlehem Pacific Coast Steel Corporation 10
Blaw-Knox Company Construction Equipment Div... 101
Bucyrus-Erie Company 88

C

C & D Manufacturing Co. Subsidiary of Yuba Mfg. Co.... 115
Carver Pump Co. 110
Case, J. I., Company..... Cover 3
Caterpillar Tractor Company 67, 78, 79, 87 & 95
Chain Belt Company 105
Chicago Bridge & Iron Company... 19
Chrysler Corporation, Dodge Truck Division 30
C. I. T. Corporation..... 29
Cleveland Trencher Co., The..... 56
Coffing Hoist Division Duff-Norton Company 32
Colorado Fuel & Iron Corp., The Grader Blades 47
Conveyor Co., The..... 108
Cummer, F. D., & Son Co., The... 64

D

Drott Manufacturing Company. 16, 17
Duff-Norton Company..... 33
Coffing Hoist Division..... 32

E

Economy Forms Corporation.... 112
Euclid Division General Motors Corp. 42 & 43

F

Firestone Tire & Rubber Co., The... 90
Flexible Steel Lacing Co..... 108

G

Galion Iron Works & Mfg. Co., The 31
General Motors Corporation Detroit Diesel Engine Division... 57
Goodyear Tire & Rubber Co., Inc. 73
Gorman-Rupp Company 50

H

Hercules Motors Corporation..... 51
Homelite Corporation 52 & 53
Horn, A. C., Company, Inc., Pacific Coast Division, A Division of Sun Chemical Corporation... 77
Huber-Warco Company 71

I

Ingersoll-Rand Company 5
International Harvester Company Industrial Power Division... 12 & 13
Motor Truck Division 117
Iowa Manufacturing Company... 91

J

Jaeger Machine Company, The... 9
Johnston, A. P., Company, Inc.... 121

K

Kohler Co. 46
Kolman Manufacturing Co..... 99

L

Leschen Wire Rope Division H. K. Porter Company, Inc.... 93
LeTourneau-Westinghouse Company..... 59, 61, 63 & 65
Link-Belt Speeder Corporation... 55
Los Angeles Steel Casting Co.... 112

M

Marion-Osgood-General Marion Power Shovel Company. 109
Marvel Equipment Co. 110
Murphy Diesel Company..... 113

N

Northwest Engineering Co..... 3

O

Oliver Corporation, The..... 75
Oshkosh Motor Truck, Inc..... 11

P

Pacific Telephone & Telegraph Co. 84
Patent Scaffolding Company, Inc.. 102
Pettibone Mulliken Corporation.. 34

Q

"Quick-Way" Truck Shovel Company 14 & 15

R

Roebbling's, John A., Sons Corp... 69

S

Smith, T. L., Co., The..... 111
Standard Oil Company of California 49
Standard Steel Corporation..... 62
Stephens-Adamson Mfg. Company 8
Superior Concrete Accessories, Inc. 74
Superior-Lidgerwood-Mundy Corp. Lidgerwood Industries, Inc.... 104

T

Texas Company, The..... Cover 2
Thermoid Co. 41
Thew Shovel Co., The..... 83
Tractomotive Corporation 89

U

Union Wire Rope Corp..... 38 & 39
U. S. Pipe & Foundry Co..... Cover 4
United States Rubber Company Mechanical Goods Division... 45
Universal Form Clamp Company.. 68

V

Victor Equipment Co. 107

Y

Yuba Manufacturing Co..... 103

Johnston Stainless Welding Rods

Practical, Down-to-Earth Welding Rods
Alloys as they are supposed to be

Corrosion Resistant—
Clean metal

Strong—
Low in cracking

A. P. JOHNSTON CO., INC.
1845 E. 57th St., Los Angeles 58

BACKFILL, uncompacted

Coin toss wins contract

When two identical bids of \$79,200 were submitted for a state highway job in Nevada, representatives agreed to the selection of the contractor by the toss of a coin. This solution was proposed by the attorney for the highway department, and the coin was tossed by Ed Pine, secretary of the AGC for Nevada.

The two bidders were **H. Earl Parker Construction Co.** of Marysville, Calif., and **Nevada Contractors, Inc.**, of Reno. The toss of the coin gave the job to Earl Parker. The work will involve clearing right-of-way for the four laning of a highway south from Carson City.

Throwing away the vehicle

Every year water gets more precious in the West while we continue to waste it. The two large centers of population in California discharge into the ocean about 500,000,000 gal. of waste water each day. About 2,000 tons of water is used to transport a single ton of solids. This is a situation unparalleled in the history of transportation. In no other case is so large a vehicle sent forth to carry so small a burden; in no other case is

the vehicle thrown away at the end of a single journey.

Thus, does the Sanitary Engineering Research Laboratory of the University of California focus attention on the appalling waste of this natural resource.

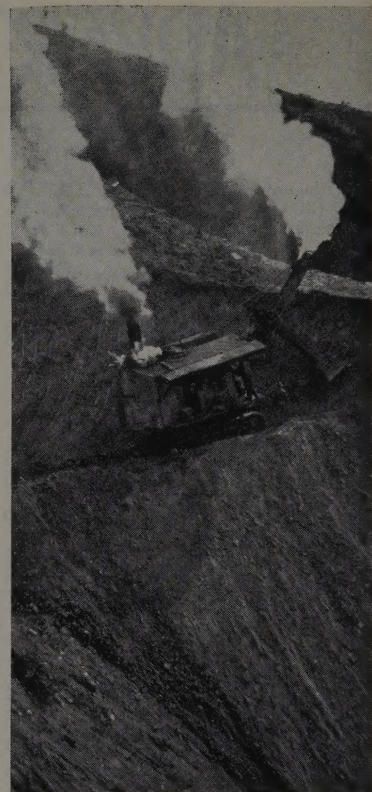
By the application of the term "sewage" to waste water we are consigning it to waste when it actually can be reclaimed for many useful purposes.

Women engineers

Only about 1% of America's 500,000 engineers are women, as compared to a corresponding figure of 25% in Russia. Each year about 105,000 women graduate from colleges in the United States and in the 1953-54 school year, only 816 were enrolled in engineering courses.

"Well, that's about average!"

When you say that, remember any average figure of weight, strength, size, or depth is a very loose and often dangerous term. There was the contractor's estimator who drowned while wading across the river that had an average depth of 2 ft.



VETERANS of construction in this Western region will recall this familiar old compatriot. It is a Bucyrus 30-B steam (obviously) shovel working in the Hollywood area on a highway project. The Bucyrus Company is now the Bucyrus-Erie Company, and is currently celebrating its 75th anniversary as a leader in the excavating industry.

Twenty-five years ago in *Western Construction*

"Tension builds up as the bid-opening day approaches for Hoover Dam. The structure is going to be twice as high as any dam built to date in the world and its volume of concrete—4,400,000 cu. yd.—will be more than the Bureau of Reclamation has placed to date in all of its dams and structures combined."

* * *

"The Engineering Board of Review for the Metropolitan Water District of Southern California has approved the location of the Parker route for the Colorado River aqueduct. This is the route which **Frank E. Weymouth**, chief engineer of the district, recommended. The aqueduct will be 265.36 mi. long and is estimated to cost slightly more than \$200,000,000."

* * *

"The 12th annual convention of the Associated General Contractors is being held in San Francisco as the issue goes to press. **Henry J. Kaiser** addressed the convention on the subject of promoting construc-

tion work with such projects as transcontinental highways and grade separations."

* * *

"The California State Highway budget for the biennium is \$63,322,500. This budget covers all expenditures including construction, maintenance, right-of-way, and administration."

* * *

"Concrete placing has just been started by **L. E. Dixon Co.**, on the Big Tujunga Dam No. 1 of the Los Angeles County Flood Control District."

* * *

"On the Columbia River, the first stage of the Rock Island dam and power project is nearing completion. **Stone & Webster Engineering Corp.**, of Seattle are doing the work and **W. D. Shannon** is general superintendent."

* * *

"**Grant Bloodgood**, assistant engineer of the Bureau of Reclamation is being transferred from the Riverton project to the Boulder Canyon project."

NEXT MONTH

A FIELD REPORT from the scene of the disastrous floods in the vicinity of Eureka, Calif., covering the reconstruction operations, as to extent, procedures and progress will appear in the next issue. This is the area where the Eel, the Mad, the Trinity and the Klamath rivers jumped their banks in the pre-Christmas deluge and did multi-million dollar damage to state highway and county roads.

TUNNEL articles usually feature the glamour of full-face driving, and the establishing of speed records. But how about the struggle required to get into the rock face through soft overburden. That is where the tunnel man has his problems, and where real skill becomes very important. Next issue will contain an article describing this operation on a highway tunnel.

... The Editors

The Beavers organize and make awards

The construction West has always had a one-big-family feeling among men and organizations. This fraternity of Western construction has now been given form and reality in "The Beavers." Organized only a few months ago, it could well become an intangible force to unite and elevate the industry that has laid the foundation and built the West.

These men and companies who carry out heavy engineering construction have much in common. They had good reason to meet socially for keeping alive associations created during years of friendly competition and joint venturing. By nature, the construction industry is not stable and moves from job to job with good friends made today, and then separated over the years.

Now, The Beavers have established a means for cementing these friendships and at the same time honoring those who have won positions of deserved attainment.

At the first of its annual meetings awards were presented to men who have been outstanding in their several fields from the concept of mighty projects through the skill of contracting management, to supervisory techniques and the supplying of materials. With our primary interest in field operations, **Western Construction** presents on its front cover the four superintendents who received their "Oscars" at this initial meeting. This quartet represents the men who have built the structures that have built the West. They well deserve the honor bestowed on them by their associates in the construction industry.

Management control hits construction

Management control—as it is known to the manufacturing industries—may have valuable adaptations for the work of contractors. At least, this subject was explored for the first time during a construction conference sponsored by the University of California, Los Angeles. More than 200 contractors and other interested men from the construction field wrestled with this problem and decided that the subject was worthy of continuing study.

Two of the basic elements of industrial production were stated in the opening remarks of Dean Boelter as: (1) the flow of materials, and (2) the flow of information. With perfect logic he told contractors these two functions applied equally to construction operations.

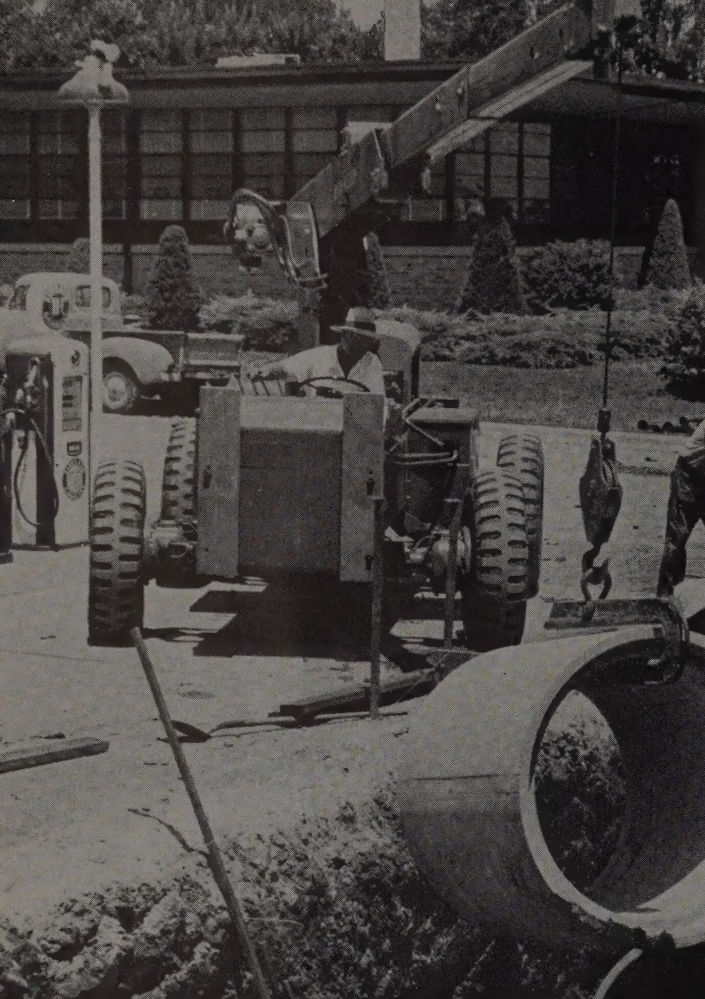
Flow of materials deserves more attention on any project, but particularly those involving buildings, with a large industrial plant as an outstanding example. Too many times poor planning in expediting finds the superintendent in dire need of materials for early use on the job, while supplies that will be installed later clutter up the building site.

The other factor in proper management is the smooth flow of information, and here again lessons can be borrowed from the manufacturing industries. The plant engineer or production manager does not have time to study individual operations for their efficiency or costs as he directs the overall operations. Likewise, the general superintendent, as he coordinates all the crews on the job, does not have time to plan and issue detailed instructions on individual segments of work. Borrowing a chapter from the book of industrial management, a planning engineer is the key to improvement in construction control. The overall program for the project may set up plans for major elements of the job, but they are of little use until translated into instructions down to the foreman level. Here is the staff job of the planning engineer.

So, the flow of materials and the flow of information represent industrial principles so well known in manufacturing and so little used in the construction industry.

It would stretch the imagination to picture all of those contractors attending this initial conference as rushing back to their projects and instituting planning and control operations on an elaborate basis. The process must be started slowly and adapted to the work of the organization and the individual projects if it is to prove successful. But the conference did call attention to ideas from industry that can be translated into improvements in construction procedures.

If the conference did nothing but expose contractors to these principles, which are the secret of American industry, it served a most useful function.



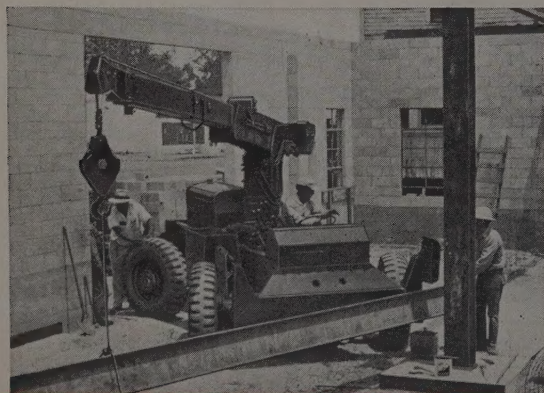
Highway Contractor
SAVES 82%
on Concrete Pipe Job

AUSTIN-WESTERN HYDRAULIC CRANE

Handles Work of 7 to 10 Men

R. S. Houge, Registered Professional Engineer, Springfield, Mo. says:

"Unique design permits use in locations where no other crane could operate."



"... Capable of 20 mph on the highway, this crane requires no loading and expensive transport."

"I never made a better purchase and at the end of six months paid off the balance."

"... This pioneer acceptance of the A-W Hydraulic Crane paid off to the tune of many thousands of dollars."

"No larger crane could have handled these loads beneath high tension wires of the overhead long distance transmission lines."

"... This was within practically one week's cost of returning 100% on our investment."

"We remember one particular day on which we laid 492 feet of 30-inch pipe in eight hours, after carrying approximately half of its distance of from 300 to 500 feet."

"... It can easily handle 10,000-pound 66-inch four-foot sections of concrete pipe."

"Instead of three men installing one bracket a day, he himself installed six brackets each day at a cost of \$14 apiece, as against his \$8 bid."

"... We haven't spent a cent for repairs in its first 11 months use."

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