WESTERN CONSTRUCTION

AUGUST 1958

OPEN PIT MINING SPECIALISTS, the Isbell firm relies exclusively on Texaco lubricants to keep 17 large dump trucks, 4 shovels, 2 'dozers and 2 rotary drills o

"This truck has run over 7500 hours —and we've never removed the pan

"The Texaco Simplified Lubrication Plan keeps maintenance costs down, keeps the job on schedule," reports George L. Laughton, Supt. of Isbell Construction Company's Three Kids Mine project.

Isbell Construction Company is doing strip mining on contract with Manganese, Inc., Henderson, Nevada. They are using a Texaco Simplified Lubrication Plan for this project, and it is piling up some outstanding records.

"As of January 17, the truck shown in the picture had operated 7,714 hours using *Texaco Ursa Heavy Duty SAE 40* exclusively, and it's never had the pan removed," reports Superintendent George L. Laughton. "We also use *Texaco Crater 2X Fluid* for wire rope, *Texaco Gear Lube HD* for transmissions, *Texaco Marfak* and *Texaco Marfak Heavy Duty,* for chassis and wheel bearings. We are entirely satisfied with Texaco lubricants," says Mr. Laughton, "and we have never had a failure due to lubrication."

For *your* equipment, Isbell's outstanding success with Texaco lubricants proves two things: the quality of Texaco lubricants, and the advisability of getting Texaco to work out *your* Simplified Lubrication Plan. Because it is tailored specifically to each job's special needs, a Texaco Simplified Lubrication Plan enables you to handle all major lubrication with very few lubricants—as few as 6 in many cases. That keeps lubricant inventories low, and cuts down your chances of making lubrication mistakes. It also trims your maintenance expense. Above all, your equipment runs smoothly so your jobs can keep on schedule.

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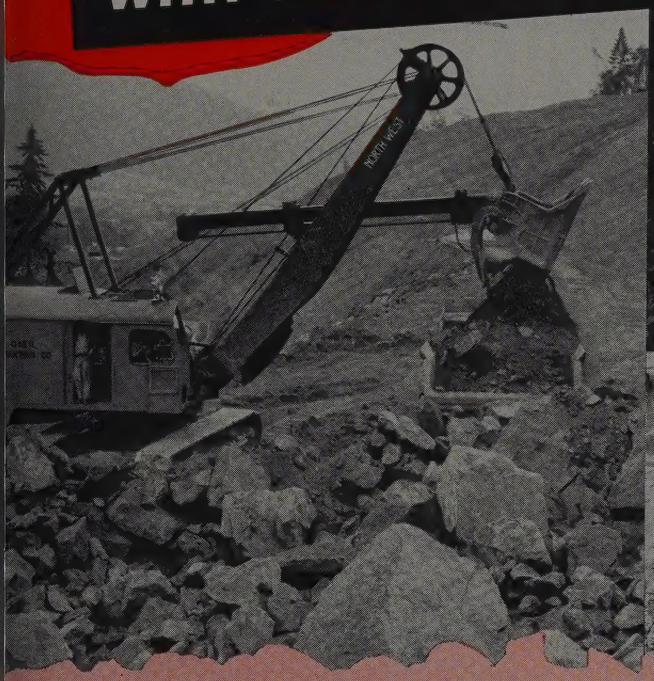
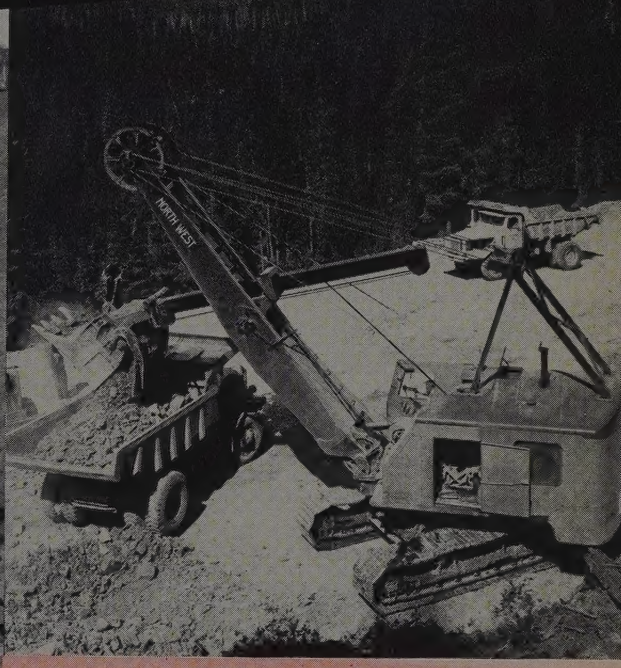
TWO MORE PACIFIC NORTHWEST CONTRACTORS MAKE RECORDS WITH NORTHWEST 80-D SHOVELS





THE Pacific Northwest is rugged country as everyone knows. At the right above is a big 80-D shovel, the third repeat order for C. E. Oneal of Ellensburg, Wash. This job was on Snoqualamie Pass near Easton, Wash. It had to be fast before the snow hit. The Northwest 80-D made records in moving the 162,000 yds. of Rock and the 261,000 yds. of Common and helped keep the job ahead of schedule. To the left is another O'Neil of different spelling—C. R. O'Neil of Ore. on a rock cut near Myrtle Creek. Look at that digging! Shot Rock! Here's another repeat order buyer—also a third repeat order. And here again Northwest high output has been demonstrated in tough Rock digging.

Northwest Shovels are *real* Rock Shovels—fast money makers. Northwest advantages, Northwest ruggedness—cast steel machinery bases and machinery side frames—the "Feather-Touch" Clutch Control, Uniform Pressure Swing Clutches, the Cushion Clutch, the Northwest Dual Independent Crowd and other Northwest features all combine for high output and smooth day after day operation.

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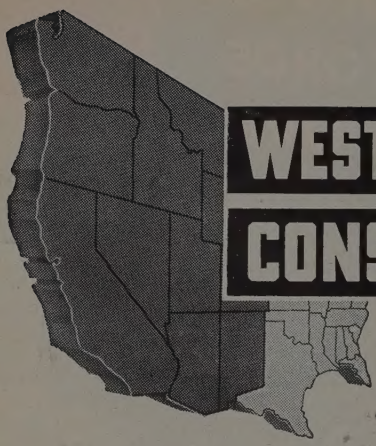

WESTERN CONSTRUCTION

KING PUBLICATION

August
1958
Vol. 33 No. 8

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FRONT COVER—The Crown-Zellerbach building in San Francisco is shown with steel at 12th floor, 8 more to go. For article on how steel straps are used on this job see p. 29.
Bethlehem Pacific photo

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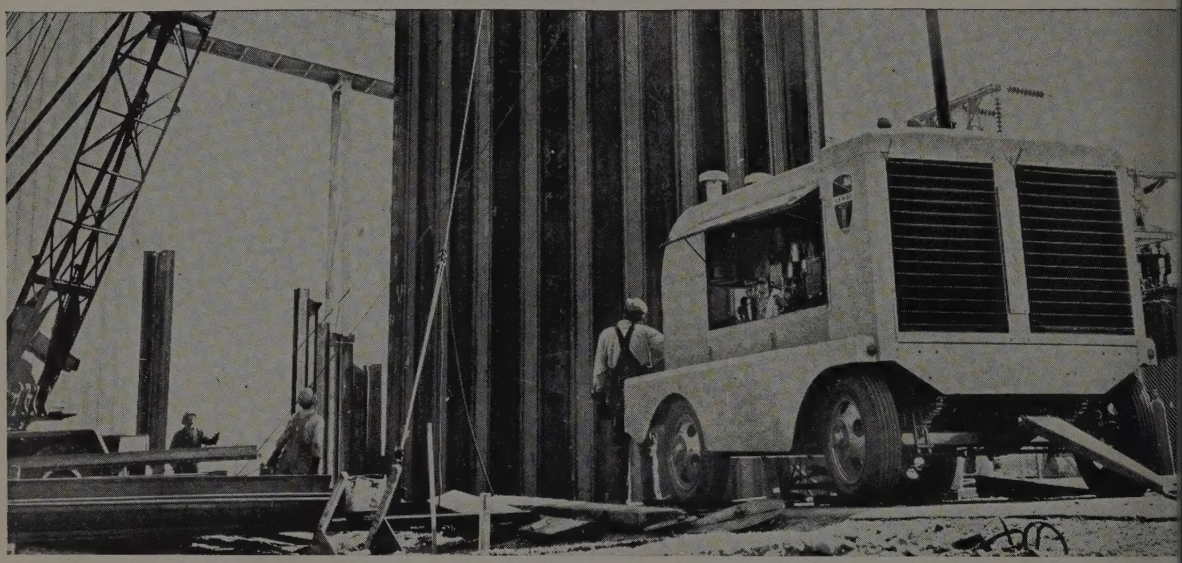
NEW EQUIPMENT

Obtain more information on these new developments in construction equipment by circling the corresponding numbers on reply postcard.



World's largest rotary compressor

What is believed to be the world's largest portable rotary air compressor manufactured to date is now available from the **Le Roi Division, Westinghouse Air Brake Co.**

The new Le Roi 1200RD2 is a twin-unit rated at 1,200 cfm. of free air compressed to 100 psi. and designed for large tunnel jobs, pile driving, large-hole quarry drilling, four-drill pipeline rigs, multiple drill shaft jumbos and air drilling in the petroleum industry.

The twin-unit design of two-stage, oil-cooled, sliding vane type compressors, powered by two GM 6-71 diesel engines, provides flexibility of cfm. output presently not available on units near this size. Mounted on a unit welded steel frame and four 7.50 x 20, 10-ply tires, the 1200RD2 has a good ratio of weight to cfm. of air delivered; dry weight is but 14,700 lb. Length is 14 ft. 6 in.; height, to top of hood, is 8 ft.; width is 7 ft. 11 in., which is within limits of all existing state highway regulations. It has an 18-ft. turning radius.

The twin-unit 1200RD2 operates at rated output speeds of 1,800 rpm. for the compressors and 2,000 rpm. of the engines. The compressors are coupled to the engines with hydraulically actuated clutches. Each unit has a 100% capacity control which matches air supply to air demands within a pressure range of 10 psi. One combination air receiver-oil separator is used.

Each unit has its own independent controls and can be operated separately for 600-cfm. delivery or together for 1,200-cfm. delivery. The capacity controls are arranged so that each unit modulates separately or the two units modulate simultaneously. This allows one unit to be stopped when air requirements are 600 cfm. or lower, or when servicing, without complete interruption of job operation. . . . *Circle No. 151*

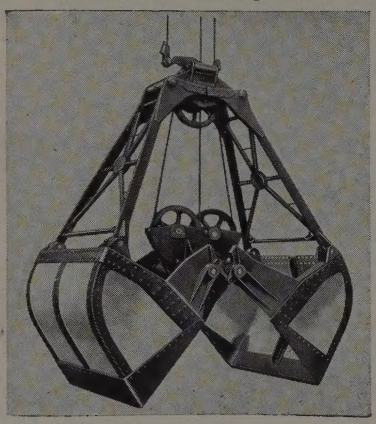
Conveyor belt is all hydraulic

Smooth, trouble-free performance and simplicity of operation results from the all-hydraulic drive developed by the **Morgen Manufacturing Co.**, for belt conveyors designed for the construction industry. The conveyor is capable of elevating almost all building material including concrete to heights of 28 ft. The hydraulic system gives perfect control of the belt at all times with a great variety of speeds in both forward and reverse drive and positive locking of the drive pulley in the neutral position. It will elevate ½ yd. of concrete per min. and will move all materials at speeds up to 220 ft. per min. Top drive is achieved by locating the hydraulic motor at the head or top of the conveyor and coupling it directly to the head pulley. Power is transmitted to the motor through steel hydraulic tubing mounted inside the trough. The belt tightener is located in the tail

pulley mounting, easily operated even when the belt is carrying a load. Screw-type adjustments on the head and tail pulleys are provided for belt training. A self-cleaning wing-type tail pulley keeps material from accumulating on the back side of the belt. Available in 24, 32 and 40-ft. lengths. The height of the discharge end is continuously adjustable with a worm-type elevating winch, and may be raised to a maximum elevation of 45 deg. . . . *Circle No. 152*

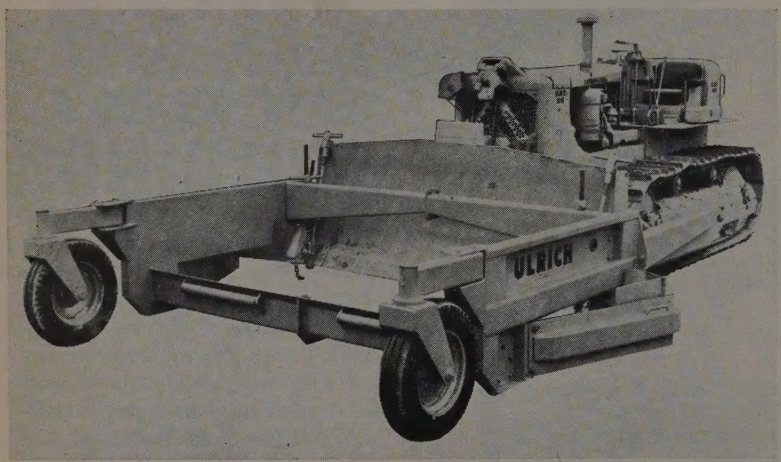
Dead weight reduced by aluminum buckets

Aluminum has been introduced into the construction of power crane clamshell buckets by **The Owen Bucket Co.** for the handling of coal and other free-flowing materials. Use of aluminum in buckets of 3-cu. yd. to 10-cu. yd. capacity (2.5 to 8.5 tons of coal) has the obvious advantage of reducing materially the dead weight of the bucket, thereby reducing the load on the crane. In the design of the lightweight bucket, several features have been incorporated to minimize wear and strain on parts and on the crane on which the bucket is mounted. Tandem positioning



of the lower closing sheaves permits the closing line lead to function in the center plane of the bucket. Centerline reeving eliminates bending of the cable at the guide rollers as the bucket is hoisted, thus doubling the life of the cable. These aluminum buckets are individually designed to meet specific job requirements.

. . . *Circle No. 153*



Base spreader fits on dozer

For use with Caterpillar track-type tractors, is a new base and aggregate spreader announced by **Ulrich Manufacturing Co.** The new tool, designated the S-16 Dozer-Spreader, can be installed on any D6, D7, or D8 equipped with a straight or angling bulldozer. Principal feature of the new spreader is its use of the dozer blade as the strike-off.

Two large clamps, easily disconnected, attach the hopper to the dozer blade. No dozer parts are removed to install the spreader. In less than ten minutes, the tractor can be freed for dozer work or made ready to operate as a spreader. The hopper is a full 12 ft. wide which permits quick, easy positioning and dumping of the largest trucks. The unit is of all-welded high tensile steel to withstand both shock and abrasion. Truck push rollers are located on the front cross member for contact with the wheels of dumping trucks.

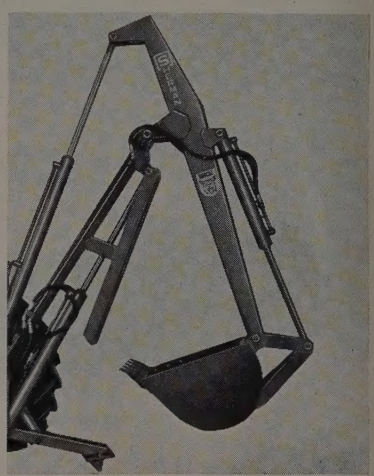
The S-16 can spread gravel, stone, sand, asphaltic mixes—any spreadable material. Hinged wings on each side of the hopper are adjusted to obtain spreading widths ranging from 10 to 16 ft. Spreading depth can be adjusted from 1 to 20 in. by two large acme-threaded adjustment wheels.

The operating position of the dozer-spreader's wheels can be varied to permit proper matching of spreads. The wheels caster to permit operation on curves. They are equipped with tapered roller bearings and 7:00-20 rib-type grader tires. The spreader can be lifted to transport position with dozer controls. Either cable or hydraulic controls can be used. Complete information and specifications are available.

. . . *Circle No. 154*

Sherman Bobcat on the market

A tough, dependable digger called the Bobcat is now being produced by **Sherman Products, Inc.** The Bobcat has a fast, operating cycle, moves earth fast and economically, and is extremely stable, particularly when working directly be-



hind the tractor, where 90% of all digging is done. It digs close to the tractor, permitting easy maneuverability in tight places. Its mounting close to the tractor controls makes it easy for the operator to change tractor positions and adjust throttle settings. The multi-purpose digger travels quickly between jobs and digs at a fraction of the cost of manual labor—as deep as 10 ft. below grade in mud, sticky clay, hardpan, gravel, shale, oiled roads, black top and stony ground. The Bobcat has an 18-in. bell hole shovel, interchangeable with a trenching shovel, and telescoping stabilizer. . . . *Circle No. 155*

(Turn to page 104 for more New Equipment. For best manuals on shores and scaffolds see page 98.)

Men to Match Alaska's Mountains

ALASKA'S FUTURE will be keyed to construction. Statehood will bring accelerating growth. This growth must have a firm foundation starting with facilities produced by construction activity. Because of physical likeness this construction activity will be similar to the type of projects that have paced the fast growth of this Western region. To aid and supplement the existing construction industry of Alaska, the West will be the logical source of experienced engineers, contractors, supervisors, men, and equipment.

The coming phase of Alaskan growth will relate to the development of its natural resources. Needs and requirements are obvious. Transportation is foremost. Distances and difficult terrain point to air transportation, with modern airports required by the dozen. Heavier transportation will be by highway and the fine start already made on a highway system must be continued and accelerated. This combination for communication and transportation will be the foundation for growth.

With accessibility provided, the next requirement will be for power. The development of natural resources creates a heavy demand. The distance to the United States and world markets emphasizes the advantage of processing the raw materials in Alaska and shipping semi-finished products to reduce transportation costs. This will require abundant power.

With transportation and power available will come industry and population. With people and trade will be a rising demand for commercial plants and community facilities of all types. In fact, actual construction volume at this stage will increase as small projects multiply, even though they lack the glamour of the more spectacular work in the pioneer development of transportation and power.

The sequence just outlined places the foundation for Alaska's economic growth ahead of population. The reverse is too uncertain and slow. Assurance of adequate means of transportation, power, and water supply is the guarantee of rapid population growth in a country rich in natural resources. It will be necessary to borrow against the future. To those planning for the next decade in Alaska this is the clear-cut challenge.

Engineering and construction problems, as the new state moves from a military to civilian economy, can be solved with technical assistance and trained manpower from this Western region. Common characteristics have created the proper techniques and organizations for solving the problems faced by Alaska. These engineers have conquered the same type of mountains and these contractors have learned to work at construction sites far removed from sources of supply. The construction industry will form the first permanent bond between the states of the West and the new state.

Alaska cannot wait for its new population to arrive and become discouraged with lack of essential facilities. It must carry out as fast as economically possible those improvements that will make it possible for basic industries to generate and support the population growth. In this essential undertaking the entire construction industry of this Western region is ready with its experience and its ability to assist in the attack on another rugged frontier.

Jim Ballard

A-W Tandem Roller compacting base for asphalt road at Dayton, Ohio. Owned by Earl D. Creager, Inc.

"Our A-W Tandem is doing an excellent job..."

—Earl D. Creager, Inc.

Earl D. Creager, Inc., is a general contracting firm in Dayton, Ohio, which does a considerable amount of road and highway construction work. The company owns about $1,000,000 worth of equipment, in 1956 grossed more than $3,000,000. In May 1957 it purchased a new A-W Tandem Roller.

Earl D. Creager, president, says: "We made our decision to buy an Austin-Western after looking the market over very carefully. Precision and dependability were our main concerns, and the A-W seemed to fill the bill best.

"Our operators tell us that the machine gives exceptionally smooth and steady performance. Also that its full visibility, convenient dual controls, and hydraulic steer make finish grading easy. All in all, we feel that our A-W Tandem is doing an excellent job and we are sure that we put our money into the right machine."

A-W rollers are available in these models: tandem (5 to 14 tons), portable tandem (3½ to 6 tons) and 3-wheel (8 to 14 tons). Get all the facts from your nearby A-W distributor or write to us.

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KING PUBLICATION

WESTERN CONSTRUCTION

AUGUST 1958

Steel strapping speeds formwork

Unusual forming technique is a highlight of 20-story Crown-Zellerbach building in San Francisco.

THE LAST piece of structural steel has been placed by Bethlehem Pacific (with an appropriate ceremony) on the 20-story Crown-Zellerbach building in downtown San Francisco. Encasing the 6,000 tons of steel columns and beams in concrete is under way by the general contractor Haas & Haynie using steel straps to reinforce the forms.

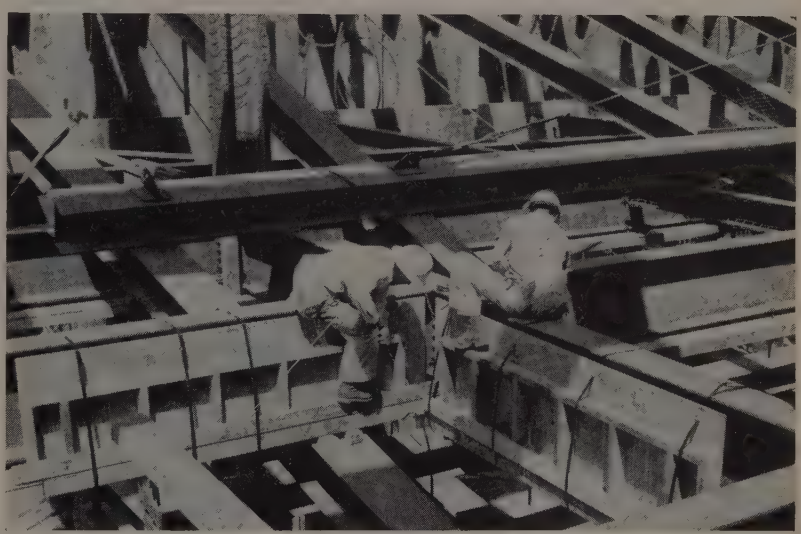
Work on the project began in early 1957 and should be completed in early 1959. An article by Edward T. Haas in the December 1957 issue of WESTERN CONSTRUCTION described the dewatering of the 46-ft. deep excavation.

The drawings and photographs accompanying this article show how the straps and forms are used for both the columns and beams. The arrangement shown in the drawing of a typical column form varies considerably with the size of the column. The larger the column, the more support must be given to the plywood panels. This can be done by adding more horizontal 2 x 4 braces or by adding more vertical 4 x 4's, 4 x 6's, or 4 x 8's.

The spacing of the straps around the column varies from several inches at the bottom to over a foot at the top of the column where the pressure of the concrete is less.

(Considerable information on column form design and strap spacing is contained in the literature available from the manufacturers of straps.)

The tools and equipment to carry out a strapping job are few and simple. On the Haas & Haynie job is a centrally located wheeled reel holder which carries 1,400 ft. of strap. A workman can work over 50 ft. from this reel easily. Other equipment includes another wheeled cart which carries extra reels of strap and a supply of seals, and 3 hand tools — a stretcher, a sealer, and a cutter. At the beginning of the job the contractor tried air-powered tools, but found them



PRE-CUT STRAPS are spaced along beam at left. One man inserts straps through slots in side forms, drawing them underneath beam with aid of long wire. Man at right follows with tensioning and sealing tools. One man can do job alone, drawing strap from reel.

TENSION is applied to strap by movement of lever on tensioning tool. Final step is use of sealing tool, handles of which can be seen. Procedure is fast, easy to learn.

less efficient for his present operation than hand tools. All of these tools have been used for many years in other industries and have been developed to a high degree both in ease of operation and freedom from maintenance troubles. So, if you are considering the use of steel straps on your next concrete job you needn't worry about using tools that are not fully tested.

The columns supporting the huge 200-ft. high structure are among the largest ever used, weighing up to 2,500 lb. per ft. The outside limits of some of the built-up sections are as large as 3 x 6 ft. To reinforce the forms used for concreting these columns, the contractor is using straps 1¼ in. wide by 0.035 in. thick. The tensile strength of a strap this size is about 4,850 lb. When working with straps of this weight and stiffness it was found best to precut the straps to the proper length rather than draw them continuously out of the reel. After the straps have been cut, large staples are driven around the forms to hold the straps in place before sealing. Each strap is passed through the staples around the column and the two ends are inserted through a small metal seal. The stretching tool is applied and the strap is drawn up to the proper tension (determined by feel, not by instruments). The sealer (also called a crimper) is then applied to the seal. These two tools are often left hanging on the strap while the next higher strap is inserted through the staples.

It should be emphasized that all of this is done by one man, resulting in a sizeable savings in labor over conventional forming methods. Stripping, of course, is extremely fast — cutting the straps takes only seconds.

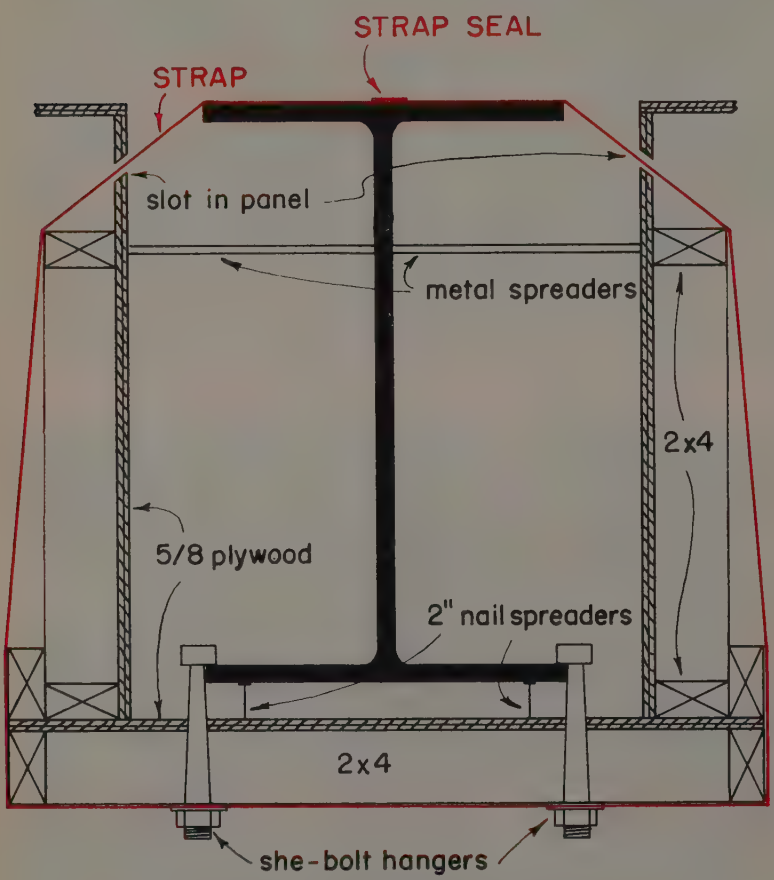
Whether or not re-use of the straps is economical is doubtful. Re-use would require gathering up the straps, cleaning and straightening them, storing, and carrying them to the next point of use, which would have to be an application which called for a slightly shorter strap. It would also be difficult to determine how much strength had been lost by the kinking which occurs during use. On this project re-use of the straps will probably be negligible.

Devising a formwork system for the beams, which are cast integrally with the floor slabs required considerable study and experimentation. The design presently being given an extensive trial is shown in an accompanying drawing. It features the use of she-bolt hangers and slots cut into the side forms through which the steel straps are passed. Part of the strap remains buried in the concrete.

On beams the contractor is using bands ¾ in. wide and 0.028 in. thick. Tensile strength for a strap of this size is about 2,300 lb. When setting forms for a beam the first step is for two men to raise the soffit form into position from the floor below while standing on a rolling platform. Break-back nail spreaders are in place on the form to keep it the proper distance away from the bottom flange of the steel beam.

The soffit form has several pairs of accurately located ⅞-in. holes through which are passed tapered she-bolts. The drawing of the typical beam form shows how the soffit is supported on the lower beam flange by means of nuts on the ends of the she-bolts. When stripping the forms the she-bolts are screwed out, leaving the nuts in the concrete. The she-bolt hangers thus perform three functions: They temporarily support the soffit form while the side forms are positioned, they automatically center the form because of the pre-drilled holes, and they carry part of the load of the concrete after it has been poured.

After the side forms have been placed a carpenter applies the steel straps while sitting on the beam and drawing the strap from the centrally located reel. A seal is slipped over the end of the strap and the strap is inserted through the pre-cut slot in the top of the side forms (see drawing). Enough strap is fed through the slot until the end of the strap is hanging below the bottom of the beam by several feet. Next, a long piece of stiff wire bent into a right angle and with a hook on the end is used to reach around under the beam and draw the strap up the other side. With practice a skilled workman can carry out this maneuver



TYPICAL BEAM FORM

The concrete floor is of integral beam and slab design. The beams are formed by using tapered she-bolts suspended from the lower flange of the I-beam and steel strapping passed through slots cut in the side forms. The top section of strap remains imbedded in the concrete.

without the slightest hesitation.

The strap is passed through the second slot, brought to the top of the beam, and inserted for the second time through the seal. The stretching tool is attached to the strap and by working the tool's lever back and forth the strap is brought to the proper tension. The sealing tool is then applied to the seal to secure the joint. The strap is broken off flush with the seal by merely tilting the stretching tool—no third tool for cutting is needed. The cutter is used only when stripping the forms. Applying a strap requires less than a minute.

The contractor has worked out a different method when two men are used. The straps are pre-cut to the proper length. This wastes a few inches of strap each time since the workman must be given extra length in order to bring the ends of the strap together before the tension ist applied, but carpenter foreman Peter Rudometkin feels the small wastage is offset by the time saved. (When the reel is used there is no waste because the strap is broken off flush with the seal.)

One man moves along the beam inserting the straps through the slots and the second follows a few minutes later with the tools for tensioning and sealing. In this way each man becomes thoroughly familiar with his task and the operation moves smoothly and efficiently.

The floor slab forms rest on 4 x 4 falsework beams set 3 ft. on center and supported from below by adjustable 4 x 4 shoring. When stripping the beam forms the lower nuts are removed from the tapered she-bolt hangers, the she-bolts are taken out, the straps are cut where they emerge from the top of the forms, and the forms are pried down with crowbars. The final step is to break off the nail spreaders and trim the remaining strap stubs.

Two strapping companies, both with long experience, are furnishing steel straps, tools and technical assistance for the Crown-Zellerbach project: Acme Steel Co., and Signode Steel Strapping Co. Both have good distribution facilities for their products, and can assist contractors in designing forms and training workmen in the new technique.

Personnel

Project manager for Haas & Haynie is Arch Johnson, assisted by William Rudometkin and Jay Stone.

In charge of steel erection for Bethlehem Pacific Coast Steel Corp. is M. H. Frincke.

Associated architects are Hertzka & Knowles and Skidmore, Owings & Merrill. H. J. Brunnier is structural engineer, and Dames & Moore are soils engineers.

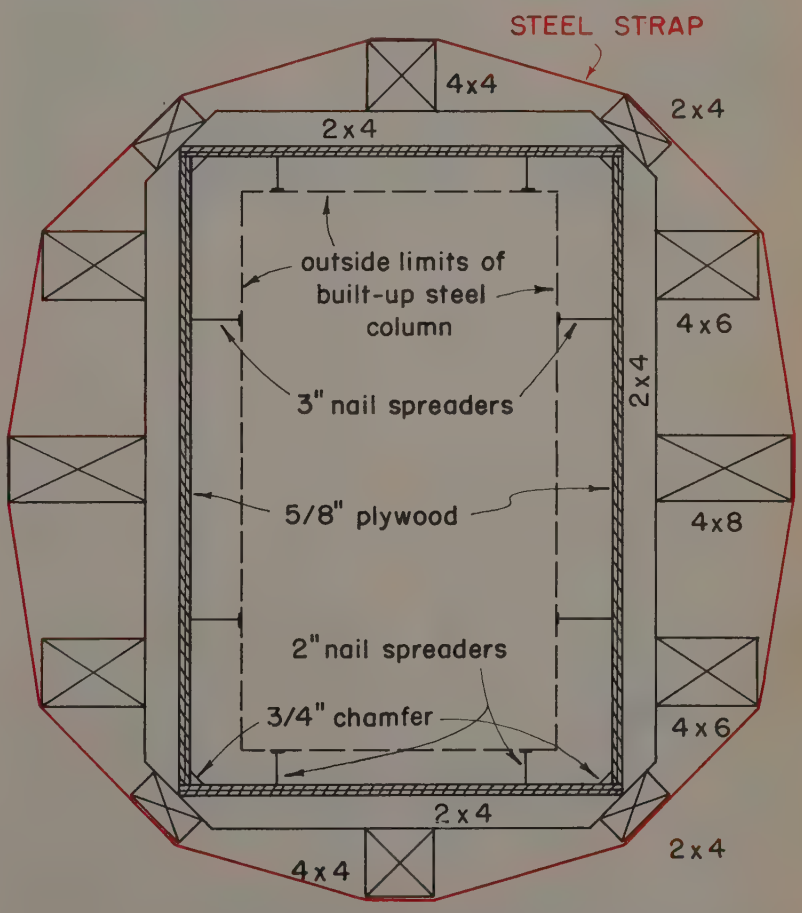
Data from the makers

ACME—Two 8-page brochures are available from Acme Steel Co. which describe the use of steel strapping in forming concrete columns. Cross sectional views of six different sized columns show exactly how column forms should be built and reinforced with straps. In each case a list of the materials required is furnished. A data chart is included which gives the weight and strength of bands of various sizes. A full explanation is given on how to figure strap spacing, given the width of the column, the height of the column and the density of the concrete. Also given are large photographs of the technique being used on various jobs, as well as closeups of the tools required.

. . . Circle No. 156

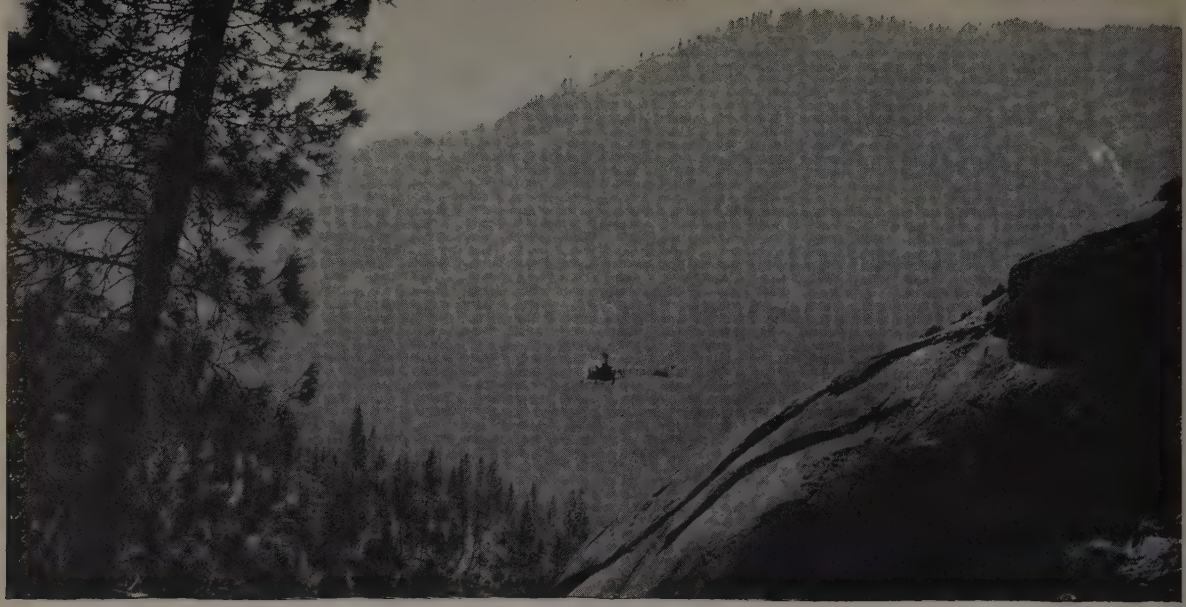
SIGNODE—A folder is available from the Signode Steel Strapping Co. describing a slide rule available for $1.00 which quickly calculates correct strap spacing on column forms. The variables which the slide rule accommodates are the safety factor, the diameter or diagonal of the column, the size of strapping, and the distance between the straps. The folder contains complete and clear instructions on how to use the slide rule to find the most economical size and spacing for the straps. Photographs of the required tools are also given. Also available from Signode are four 1-page bulletins showing how steel strapping can be used to make pipe joints, wall forms, column forms, and a folder which shows how costs were cut by the use of straps on a large apartment building.

. . . Circle No. 157



TYPICAL COLUMN FORM

The contractor developed a column form design using steel strapping which features a 2 x 4 at each corner. The larger the column to be formed the more support must be given to the plywood by the addition of vertical 4 x 6's or 4 x 8's. Stripping is fast.



Helicopters help at Mammoth Pool

Helicopters are proving to be a versatile construction tool at Southern California Edison's Mammoth Pool project, as they are used to place power poles, string line, and erect floodlight towers.

By NEVILLE S. LONG

Resident Engineer
Mammoth Pool Project
Southern California Edison Co.

WHEN THE original investigations were being made at the Mammoth Pool Dam site in the 1890's, the airplane had yet to fly. In the intervening sixty years, aviation has made phenomenal advances but until early this year the Mammoth Pool Dam site remained virtually unchanged. When construction was started in January 1958, the Southern California Edison Co. saw a chance to use this versatile machine to save time and money.

The Mammoth Pool Hydroelectric Project is being constructed on the San Joaquin River approximately 80 mi. northeast of the city of Fresno, Calif. Main features of the project, which will cost an estimated $50,000,000, are the dam, the power tunnel and a two-unit powerhouse. The dam will have a net height above stream bed of about 330 ft. and a gross height above bedrock of about 430 ft. with a crest elevation of 3,360 ft. It will be of rolled dirt-fill construction containing approximately 5,000,000 cu. yd. of fill. The dam will create a reservoir 8 mi. in length with a gross capacity of 123,000 ac. ft. The power tunnel is a 20-ft. diameter horseshoe tunnel, almost 8 mi. in length which supplies water to a 126,000-kw. powerhouse. The dam and powerhouse are being constructed by the Bechtel Corp.; the power tunnel is being driven by the Utah Construction Co., and the 28-ft. diameter 2,200-ft. long diversion tunnel was recently completed by Macco, Morrison-Knudsen, Kaiser and Shea.

To provide power for the project, the Edison Co. constructed with its own forces a 16-kv. transmission line from their Big Creek Powerhouse No. 8 to the Mammoth Pool Dam site with branches being provided to the powerhouse and to the tunnel portal and addits. The transmission line covers typical rough Sierra topography climbing from an elevation of 2,230 ft. to over 6,000 ft. and dropping back down to just over 3,000 ft. at the dam area. The line includes one span 4,400 ft. in length. A reconnaissance survey made early in January showed that it would be feasible to set approximately 40% of the poles with a helicopter and that this would result in substantial savings in cost of construction of the line.

An S-58 Sikorsky helicopter was rented from the United Aircraft Co. with the Rotor-Aids Co. of Ventura, Calif., being the flying contractor.

Flying operations, with Ray Dallom as pilot, required about five and a half days. This was during a time of particularly inclement weather and had the weather been better the operation could have undoubtedly been completed in two days time as the total flying time was only 10 hr. and 59 min. During this time the helicopter set a total of 39 poles of which 34 were actually placed in their holes and five were set adjacent to the holes. In addition, 5¾ mi. of shot line were strung and three loads of miscellaneous material were hauled from the staging area to various locations on the line. The average round-trip time for the 39 trips was 6.2 min.

A poleyard or staging area was developed near the Mammoth Pool road at an approximate elevation of 4,250 ft. Poles were picked up at this area and flown to their final location, which was generally below or approximately at this elevation. Because of the heavy timber cover at higher elevations and also the reduced lifting capacity of the helicopter with increased elevation, no poles were set above 4,250 ft.

The poles were laid down in the staging area with their crossarms, hardware and insulators wired to them and with rope slings fastened on the poles ahead of them. Pole holes were dug before the helicopter was brought in and pole setting crews were strung out along the

transmission line early each morning before the operation commenced. Bob Sheldon, Edison engineer in charge of pole line construction, served as "bombardier" riding in the belly of the helicopter and guiding the pilot by means of an intercom system. The pilot was in direct contact with the loading area by means of a two-way radio and the next pole to be set was ordered on the return trip of the helicopter. After the helicopter was spotted over the hole, the pilot brought it down under the direction of Sheldon until the pole placing crew was able to guide the butt into the hole. As soon as the pole was landed at the bottom of the hole, the pilot was notified and the rope sling was released from the electric controlled hook by the pilot and the helicopter returned for its next load. The pole setting crew moved onto the next hole during which time a pole would be set by a second pole setting crew thus providing sufficient time for the first crew to get ready for the helicopter when it came back to them.

Most of the poles handled weighed about 1,800 to 2,200 lb. with the heaviest having an estimated weight of 2,950 lb. This was a 60-ft. pole with a 71-in. butt circumference and a 40-in. top circumference.

Stringing line

The shot line which was strung was a ¼ rope which came in spools containing 1,800 ft. of line. The stringing of the line was accomplished by loading the passenger compartment of the helicopter with a number of spools. Two Edison crewmen rode in the helicopter and when the line from one spool approached the end of the spool, the pilot was signalled to hover and the beginning of the next spool was tied onto the line being strung, thus enabling a continuous shot line to be laid in lengths up to 12,000 ft.

The helicopter cost for setting each pole was just over $70.00, which is substantially less than the cost would have been to provide access to the pole locations by conventional means.

Erecting floodlights

Early in May another opportunity arose to effect savings in construction costs by the use of a helicopter. The Bechtel Corp., in connection with their dam construction contract, planned the erection of three floodlight towers on each abutment to light up the work area for night shift operations. Both abutments at the Mammoth Pool Dam site are composed of massive granite rising hundreds of feet above the work area and while they offered excellent sites for floodlight towers, these sites were only accessible to men on foot.

FLOODLIGHT TOWERS were spotted on almost inaccessible locations overlooking dam site. The towers hold twenty 1,000-watt mercury vapor lamps, are made of 3 x 3 x ¼ steel angles.

FLOODLIGHT TOWERS on dam abutments were erected with a Bell G-2 helicopter, which has a maximum load capacity of about 500 lb. Pole placement was done with larger Sikorsky rig.

Bechtel's electrical superintendent, Wayne Johnson, prepared a cost estimate for packing the material to the sites on foot. He then prepared an alternate estimate based on use of a helicopter to carry the material to landing areas in the vicinity of the tower locations. These estimates showed that a savings of approximately 50% would result from the use of a helicopter and it was decided to go ahead on this basis.

The helicopter used for this work was a Bell G-2 helicopter owned by Aircopter Transport, Inc. with headquarters at the Orange County Airport, Santa Ana, Calif. Pilots for this operation were Ed Cronin and Fred Reese. The helicopter was trucked to the job site and flew from a temporary heliport located on a bare rock knoll near the shop area.

Flying operations were carried out from May 6 through May 9 during which time a total flight time of 15 hr. and 28 min. was recorded. During this flight time, 63 loads weighing approximately 12 tons were hauled to staging areas on both abutments. This helicopter is much smaller than the Sikorsky machine which was used for the power line construction and has a rated maximum load capacity of approximately 500 lb. Some of the loads approached the maximum of 500 lb. In general, the loads were limited by their bulk rather than by their weight.

This operation proved to be quite successful and resulted in a total cost which closely paralleled the original estimate. No one will be surprised if more jobs for this versatile machine arise before the project is completed.

Concrete pipe to collect oil-field waste water

Experience shows that irrigation-type pipe can be used for gathering highly mineralized water where disposal problems exist. Design features of system described.

By ERNEST C. FORTIER
Consulting Engineer
Fresno, California

SPECIAL PROBLEMS are involved in the disposal of waste water from oil fields. The highly mineralized water cannot be used for irrigation and must be kept from damaging agricultural lands. The oil industry is constantly alert to its community responsibility and goes to great lengths to make sure its operations do not in any way harm or disturb the welfare of the communities where it operates.

This waste water is highly corrosive to steel and usually contains hydrogen sulphide which can cause damage to steel or concrete alike if not controlled. Further, a certain amount of oil usually passes off with this waste. To indicate some of the difficult characteristics, in the Raisin City Oilfield solids amount to nearly 22 ppm. In the Coalinga field the total mineral solids amount to more than 4,500 ppm. of which sodium sulphate is the predominate salt. In this waste water the hydrogen sulphide content ranges from 23 to 136 ppm. and the temperature may vary between 85 and 114 deg. F. This is the type of contaminated water which must be removed to a point of proper disposal.

In 1947 the Jourdan Concrete Pipe Co., of Fresno, California, was asked by an oil producing company operating in the nearby Raisin City Oilfield to design and install a concrete pipe system to gather from 10,000 to 12,000 barrels of waste water each day from six scattered tank settings and convey this water to a processing plant. After processing the clear water was to be pumped down an abandoned oil well at 500 psi. to return this volume of water to the same strata from which it was produced. In spite of the many problems in handling this type of water with characteristics just indicated, an inspection of this disposal line in 1955 indicated no apparent bad effects on the concrete pipe, stands or vents after 9 years of use.

As a result of this experience and record the Jourdan Co. was again asked in 1955 by one of the major oil companies operating in the Coalinga Oilfield of the San Joaquin Valley to collaborate in designing a concrete pipe gathering system for waste water from a group of oil well tank settings. The company was asked to submit a bid for construction. Bidding successfully, the company completed the job in the summer of 1955. With a slight change in design and a few minor repairs the system has been in continuous and successful operation to the present time.

Coalinga Oilfield disposal problem

Waste water at this field originated in 10 tank batteries located in a stretch of about 5 mi. After processing to remove oil the water from the wells is ponded in open dirt reservoirs about 25 ft. square and 3 ft. deep. This ponding assists in further separating oil from the water but some continues to pass from the tanks with the discharged water. The handling problem consisted of collecting the water draining from these tanks and conveying it to a surface reservoir. As the final step in disposal the waste water was to be pumped from this reservoir through a 6-in. steel pressure line to a disposal field operated by another company. Reservoir and pressure line were handled by separate contract.

By way of concluding this review of disposal, before presenting details on the concrete pipe collecting system, the system includes the following seasonal procedure. The pressure line discharges into open and unlined earth reservoirs. During winter months the disposal is by seepage which was approved by State authorities when studies showed that such percolation would not adversely affect groundwater. However, in the summer months this water is pumped from the reservoirs through pipelines to a sprinkler system in the foothills. Disposal is by evaporation in the air from fog nozzles and on the ground surface. As a final precaution, provision is made to return any excess to the main reservoirs through a system of connecting sumps, although this amount is negligible.

Collecting system design

In preparing the concrete pipe gathering system design, the following requirements were considered: (1) Elimination of the definite hazard of deterioration of pipe by hydrogen sulphide gas. As an illustration of this hazard, a galvanized hardware cloth screen over one standpipe was completely destroyed after three months of operation by the escaping gas and some of the slanting steel pipes in the overflow stands which do not flow full have required replacement. (2) Minimizing possible damage from sulphates in the water. (3) Hydraulic design features which would assure the line being constantly filled with water to prevent attack by the gas. (4) Ease of operation and low maintenance cost. (5) Low first cost, consistent with the foregoing requirements.

The gathering line was designed to carry 477 gpm., or slightly over 1 sec. ft. at the lower end. This quantity exceeds the present flow of about 320 gpm., part of which is from the tanks of other companies and thus allows for future expansion of the gathering system. The main gathering line and laterals to reach the tanks consist of 26,718 ft. of 8-in. and 2,900 ft. of 10-in. Standard Concrete Irrigation Pipe, made to A.S.T.M. Specifications C118-52.

It was thought that the first objective—control of hydrogen sulphide—could be accomplished by designing the system so that the pipelines would always be full. This prevents accumulation of the gas at the top of the pipe and possible oxidation into the highly corrosive sulphuric acid. Since there is a fall of over 300 ft. in the collection line, it was necessary to provide gradient control structures at frequent intervals to avoid excessive pressures and permit entry of water from the side laterals connecting the tanks.

These control structures were spaced hydraulically to limit the hydrostatic head on the line pipe to a maximum of about 20 ft. As originally constructed, the control structure consisted of a hub-end gate valve, as commonly used in

constructing irrigation lines, fitted with bronze seats, located a few feet upstream from a 12-in. concrete sewer pipe vent set in a 24-in. concrete pipe base.

The vent extended a minimum of 5 ft. above ground surface. It was thought that the gate valves could be used as operating valves to control the hydraulic gradient so that the line would always be completely filled. This was on the assumption that the flow would be fairly constant.

In operation, however, there was some difficulty in keeping the valves properly adjusted because the shut-down of individual pumps for maintenance caused a fluctuation in flow and production of water from the wells varies from day to day. Another difficulty resulted from the sludge carried in the water. Because of the relatively low flow in relation to size of line pipe, it was necessary to close the gates almost shut to obtain the desired upstream gradient. The small opening caused accumulation of sludge ahead of the valve which would periodically break through and thus upset the hydraulic gradients.

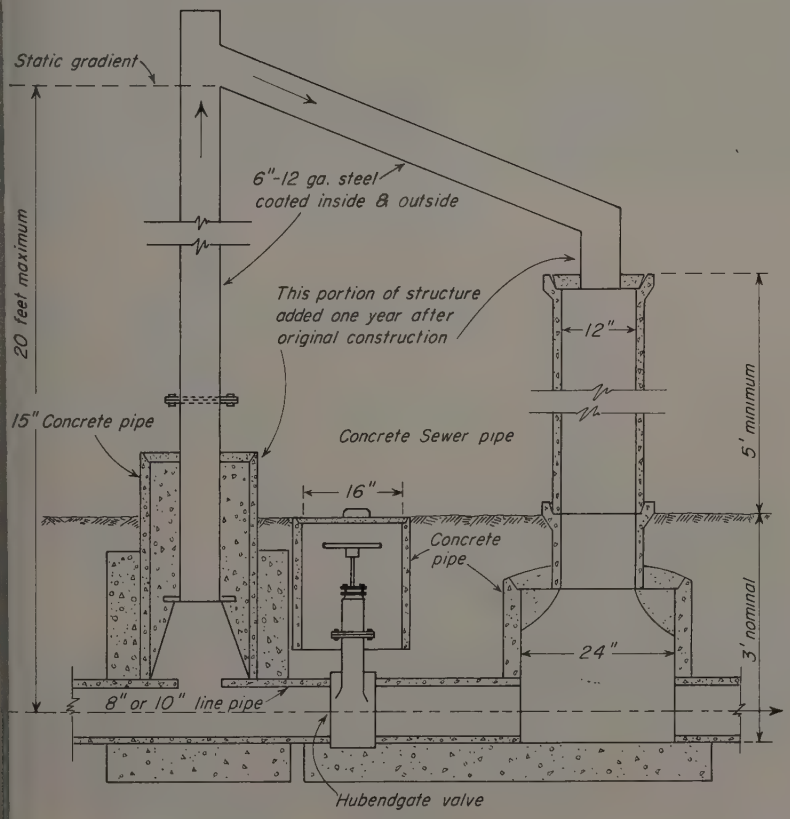
As a remedial measure it was decided to install 6-in. 12-gauge metal pipe stands upstream from the gate valve and to connect the upright pipe with a slanting pipe to the top of the 12-in. concrete vent below the valve. With the valve closed, all of the water passes over the overflow and thus maintains a constant hydraulic gradient upstream with the line remaining full constantly despite changes in the rate of flow. The valves still serve a very useful purpose for flushing.

The overflow type of structure was not used originally for fear of setting up surging in the system similar to that experienced occasionally in underground irrigation distribution systems. Air entrainment with falling water in a structure has always been a source of trouble. In the present case it is believed that surging does not occur because air can escape up the slanting overflow pipe, coupled with the relatively slow velocities and the irregular spacings of the structures which prevent the tendency of amplifying small oscillations into major surges. Surging, however, did not occur in this case and the overpour structures have operated very satisfactorily in all respects.

A 24-in. concrete pipe stand connects the 8-in. concrete pipe laterals to the sump at the well. The connection from the stand pipe to the sump consists of a steel pipe equipped with a valve and Dressler coupling entering the stand pipe at the desired waste water level in the sump or tank.

Actually the selection, design and spacing of gradient control structures provided the key to meeting most of the design objectives listed above. The design permitted the use of the least expensive type of pipe on the market by limiting head. These structures provided full flow in the line pipe which not only controls the hydrogen sulphide problem but also reduces other operational hazards; and they provided minimum, almost attendant-free, operation.

CONTROL STRUCTURE MAINTAINS CONSTANT HYDRAULIC GRADIENT



Pipe and installation

The 8- and 10-in. concrete line pipe was manufactured to A.S.T.M. Specifications C118-52 for Standard Concrete Irrigation Pipe. The 24-in. stand pipe (base of 12-in. vents) was to A.S.T.M. Specifications C75-54, and the bell and spigot 12-in. vent pipe to A.S.T.M. Specifications C14-54. All concrete pipe furnished was made with Type II, low alkali cement to resist sulphate attack. The pipe was installed in accordance with Specification for Installation of Concrete Irrigation Pipe (revised 1954), recommended by Western Concrete Pipe Association.

The subgrade was excavated to a nominal depth of 3 ft. with a standard wheel type excavator. An attempt was made in setting the subgrade to maintain minimum earth cover of 2 ft. over the pipe.

The type of joint was exactly the same tongue and groove joint, joined with cement mortar, as is commonly used in irrigation lines. A five man crew laid 1,200 to 1,500 ft. per day. While this operation is relatively inexpensive it requires a high degree of skill, especially on the part of the pipelayer.

The 8-in. concrete line crossed a creek and a swale on grade using 8-in. steel pipe on steel bents furnished by the oil company. These crossings were 100 and 60 ft. respectively. Each end of the crossings was provided with an expansion joint formed by connecting a section of 10-in. concrete pipe to the 8-in. concrete line and inserting the steel pipe approximately 1 ft. into the concrete pipe. The annular space between steel and concrete pipes was caulked with

(Continued on page 66)

Sacramento starts hydro program

Preliminaries including licenses and an $85,000,000 bond issue by utility district permit work to start on series of dams, tunnels and powerplants.

By JOHN MATTIMOE
Engineering Staff
Sacramento Municipal Utility District
Sacramento, California

ALBERT GIVAN (Registered Civil Engineer No. 1, California) was extended the honor of opening bids for the construction of Jaybird Tunnel, first heavy construction to be undertaken on the Sacramento Municipal Utility District's Upper American River Project. Givan was honored on this occasion in recognition of his early efforts and work on the project as far back as the early 1920's when he was city engineer for the City of Sacramento. He was employed by SMUD in its early years and retired from the position of civil engineer with the District in 1947.

Construction of the Upper American River Project will assure the Sacramento area of a continued supply of low-cost power for some years. In addition, water available from the project will be delivered to the municipal system of the City of Sacramento assuring its adequate supply well beyond the turn of the next century.

A brief summary of the historical progress on this project follows:

Early investigations under the supervision of Albert Givan were carried out over a period of more than 20 years beginning in 1920. In 1947 the district retained Frank Bonner of San Francisco, nationally known authority in the field of hydroelectric work, to prepare an up-to-date report on the entire project utilizing additional data and changes in construction methods and designs.

In December of 1955 voters of the district approved the sale of $85,000,000 of revenue bonds to finance the project. In March of 1957 the State of California issued the necessary water rights to the district for the construction of the project. The same year a license for the project was issued by the Federal Power Commission and the district engaged Bechtel Corp. to perform final engineering designs and to supervise construction.

The project consists of nine reservoirs and dams and eight major water conduits or tunnels and four powerhouses—19 structures in all. Starting at the headwaters of the project and working downstream or westerly (see map), the project structures are:

1. RUBICON DIVERSION DAM, a rock fill dam at elev. 6,553, 40 ft. high and 1,475 ft. long on its crest. The dam will have a reinforced concrete apron on its upstream surface. Reservoir created by the dam will store 2,160 ac. ft., creating a lake of 146 ac. Preliminary design shows approximately 50,000 cu. yd. of rock fill.

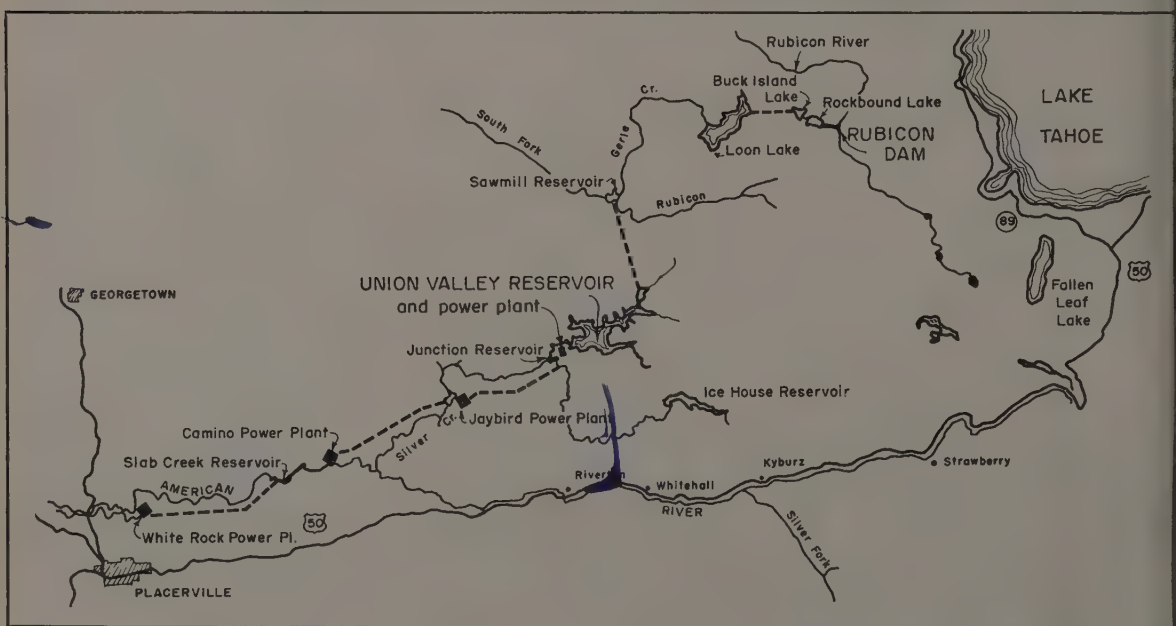
2. ROCKBOUND TUNNEL, an unlined, 9-ft. diameter tunnel, 1,040 ft. long, connecting Rubicon Diversion Reservoir with Rockbound Lake.

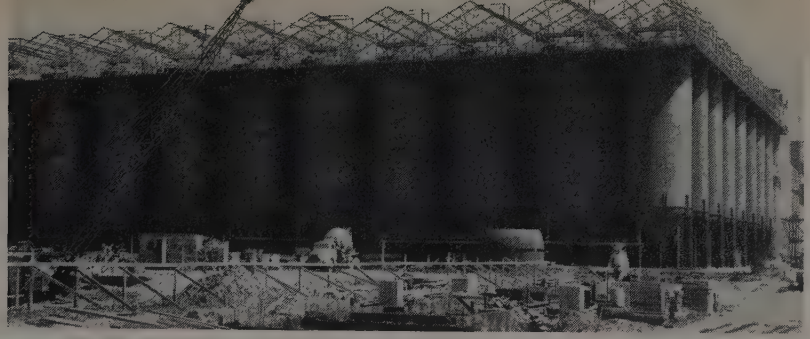
3. BUCK ISLAND LAKE DAM, a rock fill dam at elev. 6,452, 42 ft. high and 706 ft. long. The dam will raise the existing lake level 21 ft. for a total storage capacity of 1,371 ac. ft. The lake area will then be 87 ac. Preliminary design shows approximately 15,000 cu. yd. of rock fill.

4. BUCK LOON TUNNEL, an unlined 9-ft. diameter tunnel, 8,450 ft. long connecting Buck Island Lake with Loon Lake.

5. LOON LAKE DAM, a rockfill dam at elev. 6,400, 130 ft. high and 1,600 ft. long. The dam will raise the existing lake level 41 ft. for a storage capacity of 48,000 ac. ft. The lake will then have an area of 1,290 ac. (Loon Lake Dyke, of earth fill construction 63 ft. high, will prevent raised lake from spilling over at its westernmost reach.

MAP SHOWING FEATURES OF THE SMUD HYDRO DEVELOPMENT PROJECT





Part of the 144 cone bottom precipitators fabricated and erected for Alcoa by PDM. The units, each 24′ diameter x 60′ shell height, represent 8500 tons of platework, with another 3100 tons of structural steel on top.

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Loon Lake water will reach Sawmill Reservoir by way of Gerle Creek. Preliminary design shows approximately 350,000 cu. yd. of rock in the main dam and 300,000 cu. yd. of earth in the dyke.

6. Sawmill Reservoir Dam, a concrete arch-type at elev. 5,002 on the South Fork of the Rubicon River immediately downstream from the mouth of Gerle Creek. The dam will be 98 ft. high, have a crest length of 385 ft. and create a 19½-ac. reservoir with a storage capacity of 492 ac. ft.

7. Robbs Peak Tunnel, an unlined, 9-ft. diameter tunnel, 22,000 ft. long connecting Sawmill Reservoir in the Rubicon River drainage area with the Tells Creek arm of Union Valley Reservoir in the American River drainage area.

8. Union Valley Dam, a rockfill earth-core dam at elev. 4,840 on Big Silver Creek approximately 2 mi. upstream from the mouth of the South Fork of Silver Creek. It will be 344 ft. high and have a crest length of 1,700 ft. The dam will create the largest storage reservoir of the project — 2,204 ac. — with a capacity of 181,000 ac. ft. Preliminary design shows approximately 3,000,000 cu. yd. of fill in the dam.

9. Ice House Reservoir Dam, a rockfill, earth-core dam at elev. 5,452, 152 ft. high, 1,500 ft. in length. It will create one of the three largest reservoirs of the project—602 ac. in surface area—with a storage capacity of 40,300 ac. ft. (Ice House Auxiliary Dam of earthfill construction 36 ft. high will prevent water from spilling over on reservoir's northern side.) Preliminary design shows approximately 700,000 cu. yd. of fill in the dam.

10. Union Valley Powerhouse will have one 22,500-kw. generator. It will be located about ¼ mi. downstream from Union Valley Reservoir Dam and will be connected with the reservoir by a 540-ft. tunnel and steel pipe 1,805 ft. long. Static head-feet at Union Valley Powerhouse will vary between 391 ft. when full to 203 ft. during dry periods. Peak power capacity will vary from 22,500 kw. to 8,000 kw.

11. Junction Dam is a concrete arch-type dam on Silver Creek, downstream from the confluence of Big Silver Creek and the South Fork of Silver Creek. It is to be 167 ft. high, 385 ft. long at its crest, and will create a reservoir of 70 ac. at elev. 4,467 with a storage capacity of 3,650 ac. ft.

12. Jaybird Tunnel is an unlined 14-ft. diameter tunnel, 21,100 ft. long on the south side of Silver Creek connecting Junction Reservoir with Jaybird Powerhouse penstocks.

13. Jaybird Powerhouse will have two 88,000-hp. turbines and two 70,000-kw. generators. It will be located on Silver Creek approximately 6 mi. northeast of Pollock Pines. Static head will be 1,527 ft.

14. Camino Diversion Dam, a concrete gravity dam on Silver Creek immediately below Jaybird Powerhouse, 63 ft. high and 275 ft. in length at crest, and at elev. 2,913 creating a reservoir of 7.3 ac. with a capacity of 180 ac. ft.

15. Camino Tunnel is an unlined 14-ft. diameter tunnel, 27,220 ft. long on the north side of Silver Creek, connecting Camino Diversion Reservoir with penstocks at Camino Powerhouse.

16. Camino Powerhouse will have an 86,500-kw. generator. It will be located on the South Fork of the American River immediately downstream from the PG&E El Dorado powerhouse, approximately 3 mi. northwest of Pollock Pines. Static head at Camino Powerhouse will be 1,054 ft.

17. Slab Creek Dam will be concrete arch-type dam, 130 ft. high and 400 ft. long at its crest. It will be located on the South Fork of the American River approximately 1,000 ft. upstream from the mouth of Slab Creek. It will create a reservoir of 8,400 ac. ft. and an area of 140 ac. at elev. 1,860. Preliminary design shows approximately 35,000 cu. yd. of concrete.

18. White Rock Tunnel is an un

TENTATIVE CONSTRUCTION SCHEDULE

For construction purposes the entire project is tentatively set up under four stages with approximate bid advertising as follows:

	TO BE ADVERTISED
Stage I	
Jaybird turbines	(Note 1. below)
Jaybird Tunnel	(Note 2. below)
Transmission lines (10 miles)	June 1958
Ice House Dam	June 1958
Aggregate production (all of Stage I)	July 1958
Jaybird Powerhouse	May 1959
Junction Dam	June 1959
Camino Dam	May 1959
Transmission line (25 mi.)	May 1959
Stage II (Based on predicted load growth)	
Union Valley Dam	1959
Sawmill Dam	1960
Robbs Peak Tunnel	1960
Camino Tunnel	1960
Union Valley Powerhouse	1961
Slab Creek Dam	1961
Camino Powerhouse	1961
Rubicon Dam and Tunnel	1962
Buck Island Dam and Tunnel	1961
Stage III	
Loon Lake Dam	1963
2nd Unit at Jaybird	1963
2nd Unit at Camino	1964
Stage IV	
White Rock Tunnel	1964
White Rock Powerhouse	1966

1. Awarded to Allis-Chalmers, April 1958
2. Frazier Davis of St. Louis, low bidder

The above dates are tentative depending on the District's load growth but are indicative of the time schedule that may be set.

ined 14-ft. diameter tunnel, 30,900 t. long, connecting Slab Creek Reservoir with penstocks at White Rock Powerhouse.

9. White Rock Powerhouse will e located on the South Fork of he American River at the mouth f White Rock Creek about 2 mi. pstream from Chili Bar. The owerhouse will be located ap-roximately 3 mi. northeast of Pla-erville. Static head at the power-ouse will be 860 ft.

The project includes installation f approximately 6,000 ft. of pen-tock which will connect the tun-els and reservoirs to the four pow-rhouses. All of the above sizes, lo-ations, and quantities are approxi-nate and subject to change.

The entire project when com-lete will collect now wasted flood unoff water in the upper Rubicon asin at the north and lower end f Desolation Valley about 3 mi. pstream from Rubicon Springs. onserved water will be routed by ay of the Rubicon Diversion am, Rockbound Lake, Buck Is-nd Lake, Loon Lake, Gerle Creek, awmill Reservoir, and connecting nnels to the main storage unit at nion Valley Reservoir.

Ice House Reservoir will collect ood water from the basin of the outh Fork of Silver Creek. The itial operation of Ice House Res-voir calls for release into the outh Fork of Silver Creek and nto Junction Reservoir. Under ltimate operation, Ice House Res-voir water can be channeled into nion Valley Reservoir through e House-Union Valley Tunnel.

Flood water accumulated in the ove-mentioned reservoirs will be eleased and regulated through ur powerhouses (see map).

The area from which flood wa-rs will be collected and stored has n average annual precipitation of) in.—mostly in the form of snow. uring the March to June thaw, elting snow flows seaward un-sed, causing erosion and flood nditions. After the spring thaw, reams and creeks dwindle in size nd in some cases almost go dry.

The project will to a large de-ee correct this waste of water sources.

SMUD's project organization is t up under the direction of James . McCaffrey, General Manager nd Chief Engineer; Paul E. Shaad, ssistant General Manager and hief Engineer; and Clyde H. pencer, Project Engineer (for-erly Director of Region 2 of the . S. Bureau of Reclamation).

SLURRY SEAL—A review from Los Angeles County

CONTINUED expansion and advance in the use of slurry seal for a surface treatment of asphaltic surfacing requires an occasional checking on current steps in this evolution. In the February 1958 issue, Western Construction presented a review of slurry seal being used on the runways at Billings, Montana. This project with its features of extreme climatic conditions and a use of this procedure on a municipal airport indicated another milestone.

Since almost 3 years had elapsed following our review of initial work (April 1955) carried out by the Los Angeles County Road Department, it was logical to return to this organization to check developments where the experience record was the longest. As the result of a request for information on current developments and techniques, the following information was received from A. A. Kambeitz, assistant chief deputy, Road Department, County of Los Angeles. Sam R. Kennedy is road commissioner.

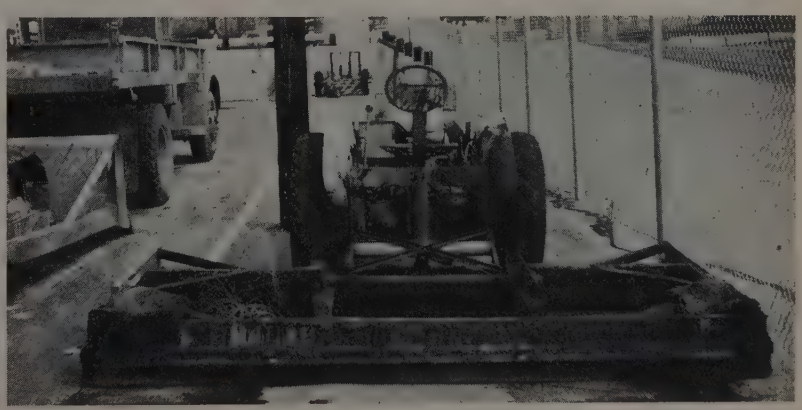
Since its first use of this procedure the Road Department of Los Angeles County has placed several thousand tons of slurry seal by the contract method. It is placed on a ton-per-mile basis on various types of streets and highways under county jurisdiction throughout the unincorporated territory. In an effort to keep pace with the expansive residential and industrial development in Los Angeles County, the road department has found slurry seal a rapid, economical and practical means of maintaining existing road surfaces. It is still considered to be a stop-gap method for attaining these ends, prior to reconstruction and widening required to handle larger traffic volumes.

During these 3 years there has been no basic change developed by this organization in either the ingredients or the mixing process, since the inception of slurry seal as a sealing method.

There has been in-placing technique. This modification involves the protecting of a 3 or 4-ft. strip of pavement next to curbs that were placed without monolithic concrete gutters. In this type of use it acts as a deterrent to the dissolving of the bitumuls and the corresponding washout of the smaller aggregates

(Continued on page 66)

TRENDS in the design of spreader boxes feature lighter weight and portability. The one shown is light enough to be handled by rubber-tired tractor equipped with hydraulic lift to raise the box for travel.



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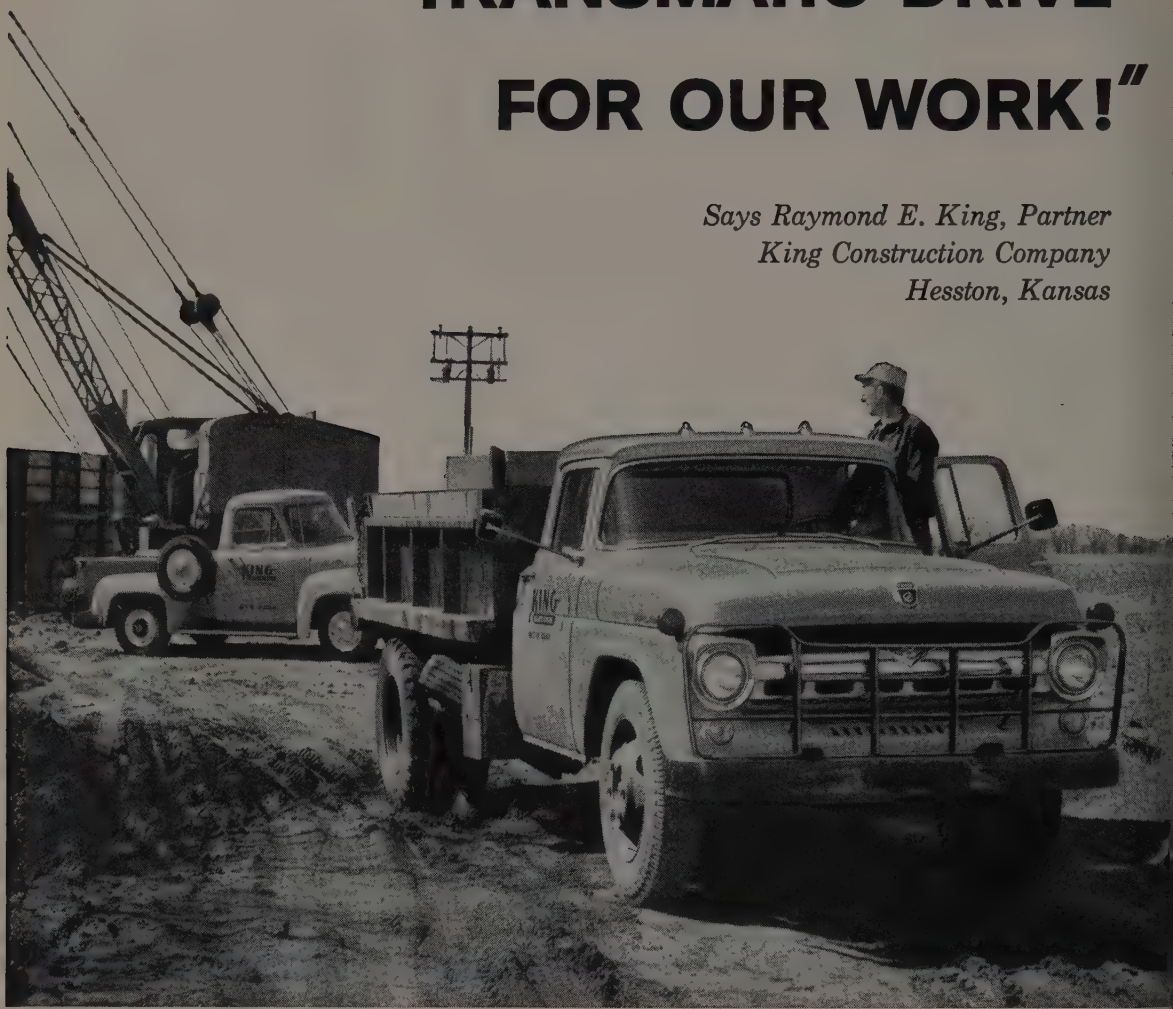

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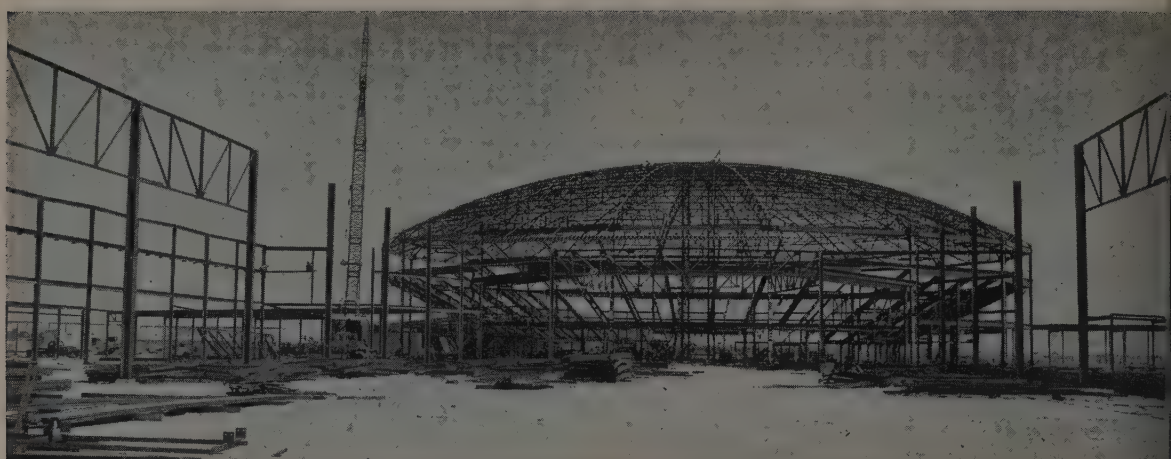


Huge steel dome erected in Nevada

Placing center falsework tower on jacks is the key to successful erection operation.

By HAROLD S. DEWDNEY

Chief Structural Engineer
Vinnell Steel
Irwindale, Calif.

THE HUGE Convention Center now under construction in Las Vegas, Nev., was a step nearer completion in May of this year when the steel roof covering the rotunda was erected. This accomplishment brought to fruition the months of careful planning by owner, architect, engineer and contractor. All concerned were pleased to see the sinews of steel spanning the full 267 ft. from column to column after the temporary erection tower had been lowered and removed.

The roof over the rotunda is a dome framed in structural steel. The diameter of the rotunda area is 267 ft. 4 in., and the height to the springing of the dome from a level line is 46 ft. 11 in. The height of the crown from the same level line is about 77 ft. The radius of the dome intrados is 279 ft., as shown in the drawing.

Framing system

The system of framing consists of three basic elements: (1) the compression ring at the crown, (2) the 16 meridional arch rib trusses, and (3) the tension ring at the springings of the arch ribs.

The compression ring is a sizeable weldment of wide flange sections and plate, similar in make-up to a spoked wheel. The outer "rim" of the wheel was originally intended to be a curved wide flange section, but practical difficulties of curving led to the following modification: The flanges were burned from plate in the required circular shape, the web was easily curved from plate, and the flanges and web were joined by fillet welding. Shipping limitations required that the compression ring be shop fabricated in two pieces. These two pieces were joined by field welding on the ground before erection.

The arch rib meridional trusses are similar to other riveted trusses except for their curvature and for the fact that they normally carry axial compressive stresses in both top and bottom chords. Thus milled field splices were required on both chords, and lateral bracing was required for the bottom chord as well as for the top chord. The structural steel subcontractor, Vinnell Steel, recognized at an early stage that steel detailing and shop fabrication were critical if the erection of these trusses was to proceed smoothly. Therefore the engineering department and the shop worked hand in hand at all stages of the planning and of the fabrication of the trusses. This procedure resulted in trouble free erection, as anticipated.

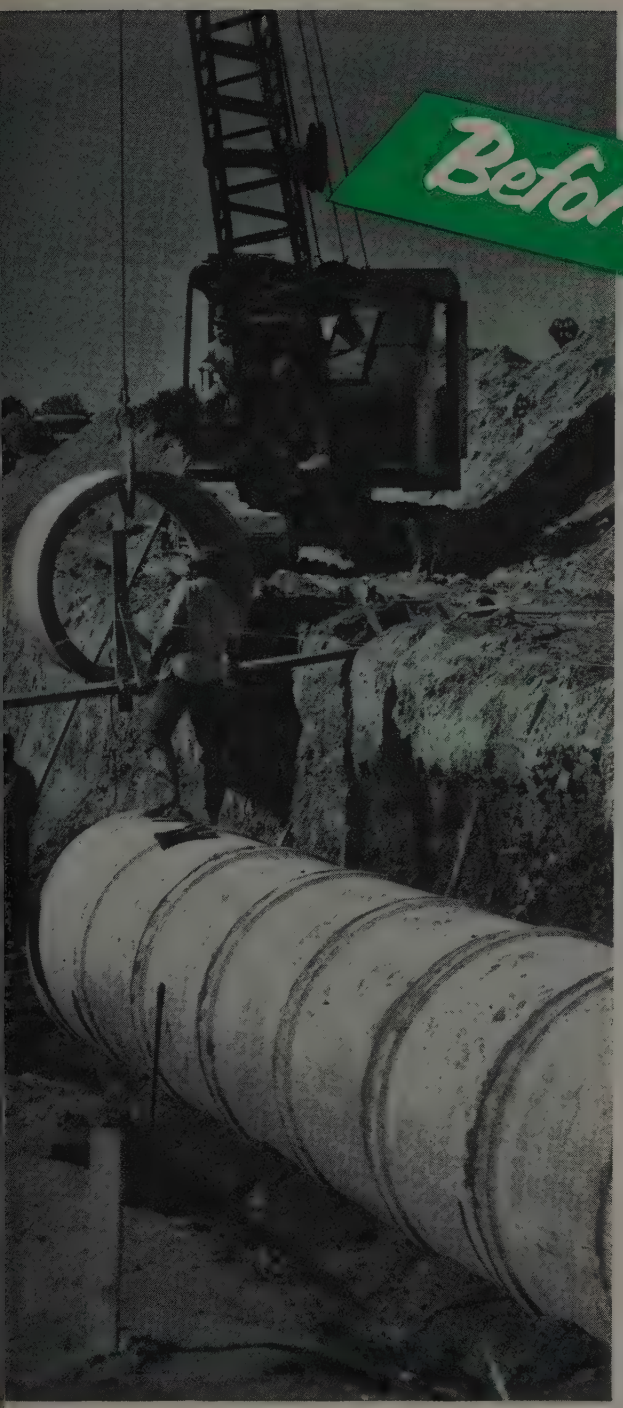
Due to their great length th trusses were shipped in thre pieces, field spliced by means high tensile bolts, and erected a complete unit. Considerations truss deflection led to some adjus ment in the high tensile bolte connections at each end of th trusses.

The tension ring is an 840-l long continuous tie composed a heavy wide flange shape wi flanges vertical and with hea plates welded to it top and botto i.e. to the toes of the flanges. Th tension ring is spliced at each the sixteen columns by means wing plates shop welded to t columns and field connected to t main tie by means of high tensi bolts.

It may be appreciated that of the three elements describ above are necessarily interdepen ent; that they must all be in pla and interconnected for the do structure to be able to span t large area successfully. The er tion problem then was how place all the elements in positi without exceeding allowable te porary stresses, how to conne them, and finally how to remo any temporary supports.

Dome erection

The steel erectors were Tay Steel Co. of Henderson, Neva subcontractors to Vinnell Steel Irwindale, California. The meth of erection chosen was simple a



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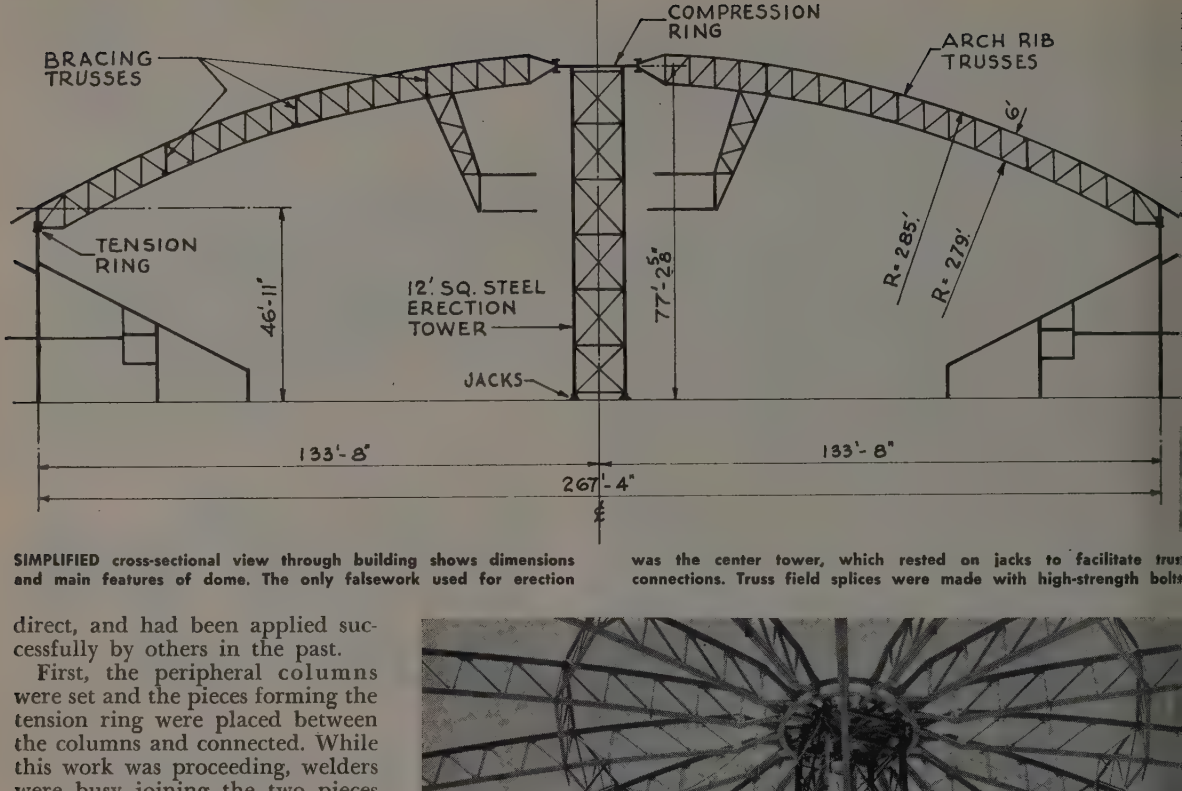


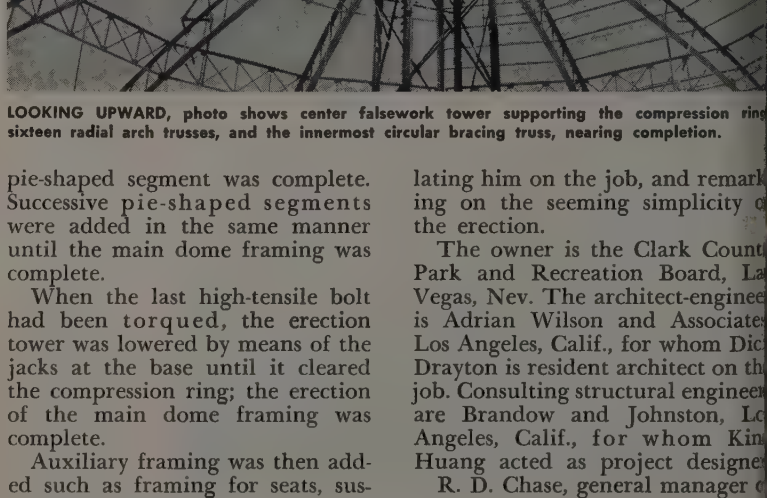
SIMPLIFIED cross-sectional view through building shows dimensions and main features of dome. The only falsework used for erection was the center tower, which rested on jacks to facilitate trus connections. Truss field splices were made with high-strength bolts

direct, and had been applied successfully by others in the past.

First, the peripheral columns were set and the pieces forming the tension ring were placed between the columns and connected. While this work was proceeding, welders were busy joining the two pieces of the compression ring, and another group was preparing a temporary erection tower. The erection tower was the only falsework used, and was 12 ft. square by 77 ft. high. The tower was placed on jacks and raised slightly above the final deflected level of the compression ring. The extra elevation used was carefully calculated to allow easy connecting of the trusses at their ends. If the tower were not high enough the trusses would have to be forced in under compression; if it were too high the trusses would appear to have been short and connecting them at both ends would have been difficult. As it turned out, the precalculated amount was just right and erection proceeded smoothly.

Therefore, when the tower had been jacked to the desired elevation, the completed compression ring was placed on top of it. The tension ring was now ready, as were the trusses, which had been field assembled to full length.

The arch rib trusses were raised using two 25-ton truck cranes. After erection of the first truss, temporary ties were installed to act as lateral bracing. When the second truss had been placed the three corresponding bracing trusses (see drawing) were installed between the two rib trusses. Thus the first pie-shaped segment was complete. Successive pie-shaped segments were added in the same manner until the main dome framing was complete.



LOOKING UPWARD, photo shows center falsework tower supporting the compression ring sixteen radial arch trusses, and the innermost circular bracing truss, nearing completion.

When the last high-tensile bolt had been torqued, the erection tower was lowered by means of the jacks at the base until it cleared the compression ring; the erection of the main dome framing was complete.

Auxiliary framing was then added such as framing for seats, suspended catwalks, rigging platforms, ceiling framing, etc., and all the other steelwork required for such a structure.

The ease of erection of the dome and all of its accompanying complicated framing surprised and pleased the general contractor, Lembke Construction Co. of Nevada, and the inspection agency, Raymond G. Osborne Testing Laboratories. They each wrote letters to the steel subcontractor congratulating him on the job, and remarking on the seeming simplicity of the erection.

The owner is the Clark County Park and Recreation Board, Las Vegas, Nev. The architect-engineer is Adrian Wilson and Associates, Los Angeles, Calif., for whom Dick Drayton is resident architect on the job. Consulting structural engineers are Brandow and Johnston, Los Angeles, Calif., for whom Kin Huang acted as project designer.

R. D. Chase, general manager of Lembe Construction Co. of Nevada, is in overall charge of construction, and Al Lermusiaux, vice president, is in immediate charge. Chief structural engineer for Vinnell Steel, the subcontractor, is Hal Dewdney. A. E. Bickerton is erection superintendent for Vinnell and was in overall charge of erection. Erection subcontractor to Vinnell was Taylor Steel Co., and Dick Taylor personally supervised the work.

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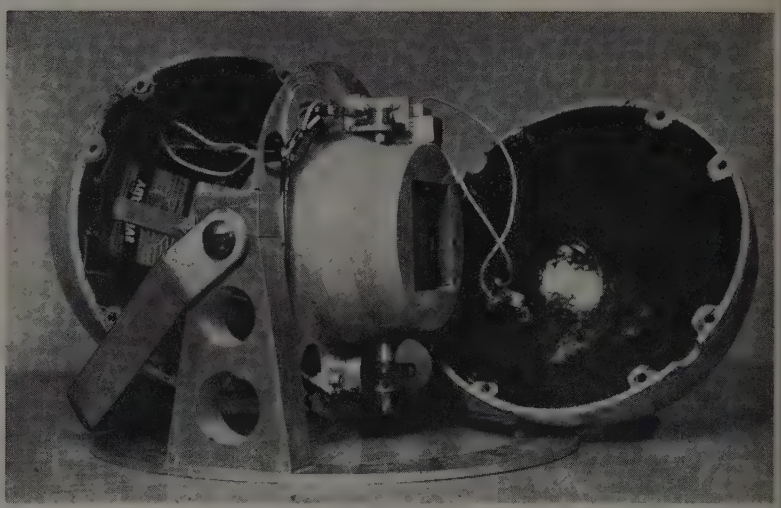
Atomic energy tests bridge welding

Highway department of Texas develops portable equipment and safe procedures for using radioactive iridium for shop and field testing of bridge steel welds.

By ALBERT H. POLLARD
Supervising Field Engineer
Materials and Tests Division
Texas State Highway Department

●

The 1958 "Dr. L. I. Hewes Award" of WASHO went to Albert Pollard based on the development he describes in this article.



GAMMA-RAY projector showing the operating motor and gear train at the bottom and switching mechanism at the top. The rotating section of the projector is visible in the rectangular opening.

FOR SEVERAL YEARS the Texas Highway Department has made increasing use of radiography in the non-destructive inspection of welds on highway steel bridges. At first, radium salts were used, and then x-ray equipment. With the development of nuclear reactors, a source of radio-active material became available which replaces radium and x-ray within a limited field. For most of the welding work encountered in highway bridges, a radio-active capsule of iridium or cobalt may be used to expose the radiographic film.

These capsules are irradiated in reactors of the Atomic Energy Commission, or in reactors licensed by the Commission. When placed in suitable lead-shielded containers for protective purposes, the capsules of activated metals may be controlled for exposing film to secure shadowgraphs exactly the same as are obtained by x-rays. The radio-active capsule furnishes the energy to expose the film.

Prior to use of radiographic methods, inspection of steel welds necessitated close observation before, during and upon completion of the work to determine quality and compliance with specifications. It was extremely difficult to know definitely that dangerous defects were not present within or adjacent to the weld metal.

For example, subsurface cracks may occur in the weld metal due to subsequent operations of welding. Without radiographic means, discovery of such hidden defects was difficult. Spot checks could be made by cutting out a small portion of the weld. This procedure calls for rewelding, which is expensive and is also subject to defective workmanship. Other methods such as magnetic particle or ultrasonic investigations are not always as satisfactory as a film record.

Portability is important

As a means of improving workmanship, as well as discovery of defective work, the radio-active metal method has proven to be a very valuable tool in the hands of the Materials and Tests Division of the Texas Highway Department. To distinguish between methods, inspection work using the radioactive materials for energy sources is called "Gamma-Ray Inspection," as compared to "X-Ray Inspection" for work employing X-ray machines.

Despite the weight of lead used for operator protection, the overall simplicity of gamma-ray compared to x-ray for portable equipment is outstanding. For x-ray work it is necessary to have a high voltage generator and attendant accessories along with the transformer and x-ray head. Some of this equipment is relatively fragile. For gamma-ray work the exposures may be made with a radioactive energy source in a container with total weight from 30 to 100 lb. for nearly all exposures on highway bridges.

Over a period of several years of investigational work, equipment most suitable for highway needs has been designed and built. Commercial equipment is being developed rapidly, but since the needs of the highway department were more specific than the usual designs provided, it was decided to tailor the equipment to the special requirements to secure more efficient use and space utilization.

The projector and controls were designed first. The projector, sometimes known as an isotope camera, or source holder, is essentially a lead case, spherical in shape, with a protrusion at one side, so arranged that a section of the case can rotate. The source of energy, a radioactive isotope of the metal iridium, known as Iridium 192, is attached to the surface of the rotating section so it may be kept at the center of the lead case when it is not in use.

Method of use

When it is desired to make an exposure, this section is rotated so the isotope is brought to the outside surface of the case, thereby permitting its total energy to be radiated toward the weld, behind which is located the sensitive film. Any variations of density in the metal caused by presence of air voids, cracks, changes in thickness or composition of metal, or foreign matter such as slag, will show up on the film after development, and may be interpreted by a trained operator.

The projector case of lead is surrounded by a fiber-glass shell about

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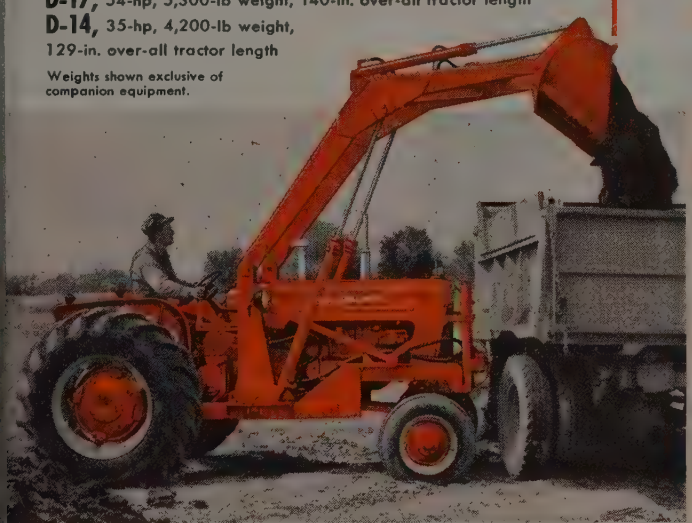

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PROJECTOR and remote timer control box are provided with neon lights that flash to indicate radiation danger when the projector is in operating position. In addition to the motor mechanism there is a manually operating lever for the projector.

12 in. in diameter. This case is used principally to keep operators from being so close to the isotope. Even with the lead case about 3 in. thick between the isotope and the outside of the case (radiation decreases as the square of the distance) a safer instrument is made by the addition of a few more inches of space. The shell is also used to house small batteries and remote control operating switches and motor.

There is a flashing neon lamp on the shell and a receptacle on the surface of the shell for plugging in a remote flashing unit and the operating controls.

Data on defects

To secure a radiograph of a welded area to be inspected, a special type of film is placed in a relatively flexible, lightproof case called a cassette. The cassette is then placed over the area to be examined on the opposite side of the steel from the gamma-ray projector. Appropriate identification symbols of lead letters and figures are taped to the outside of the cassette or on the surface of the steel. These will show up on film as light areas because of the greater density of the lead. Any cracks, slag, or unfused areas, porosity, holes or included foreign matter with density less than that of steel will appear as dark areas because of greater amount of radiation being permitted to pass from the source to the film.

With proper type of source and film, and with suitable technique of placement, exposure and development, a high degree of definition and detail may be obtained. Generally, a 2% sensitivity is desired under specifications used in bridge construction. This is not difficult to obtain when correct procedures are followed.

In operation, the projector is placed in position for exposing the film, with the rotating section closed to permit maximum protection to the operator and any nearby workmen. The control box is placed in a remote position and plugged into the projector. There is a timer on the control box which is set for the amount of exposure which has been calculated for the conditions involved.

After warning all persons nearby and setting up signs and barricades in the working area, the operator throws the switch on the control box. The motor on the projector rotates the isotope into exposure position. When the timer reaches the end of the preset time period, it automatically throws the switch off and the motor closes the movable section of the projector. While the projector is in operating position the neon light on the shell and the remote extension light flash to indicate the radiation danger. The remote warning light system is devised to flash green when projector is safe and red when in an unsafe condition.

In addition to the motor mech-

(Continued on page 53)

AWARD WINNER—Expert on welding

Recipient of the "Dr. L. I. Hewes Award" this year, Albert Pollard was nominated as a candidate by D. C. Greer, State Highway Engineer of Texas with the following citation: "On the basis of his work in adapting radiography to non-destructive testing of welds, he has made a valuable contribution to highway engineering."

A native of Texas, Pollard is a civil engineering graduate of Rice Institute in Houston. After some engineering service in one of the district highway offices he was transferred to the Materials and Test Division in 1930 with the title of technical assistant in the laboratory. His specialized research is now chiefly concerned with welded structures and prestressed concrete. Test report forms used by his division were originally devised by Pollard.

His service with the Texas Highway Department has been continuous for more than 30 years, except for the period of 1940-47 when he was granted a leave for military service with the Army. After an initial assignment in the planning and construction of Camp Swift, he was sent overseas in 1942 and assigned to Eisenhower's staff.

As an intelligence officer in G2 section he was sent on a special mission to Marseille to organize an advance detachment of G2 section of Allied Force Headquarters in France. Illness forced his return to the United States in 1945.

He organized the 980th Engineer Battalion (Construction), United States Army Reserve, under the sponsorship of the Texas Highway Department in 1949.

WELD INSPECTION

(Continued from page 50)

anism there is a manually operated lever to open and close the projector. This lever also serves as a pointer to show the open and closed positions of the projector.

After exposure, the cassette is removed to the dark room for development of the film, which process is very similar to usual photographic work.

A special radiographic laboratory was designed to facilitate development of the film and to provide adequate accommodations to house and transport all supplies and equipment. Due to the special nature of the equipment, it was decided to build the mobile laboratory at a shop of the Texas Highway Department. Much of the equipment for the laboratory was also built in the equipment shop.

A refrigerated processing tank, film drier and electric room heater were purchased. The installation of these and the construction of cabinets, sinks, water tanks, projector cabinet, filing cabinets, desk and counters was done by the equipment division shop.

On a one-ton chassis the laboratory body was then constructed as a unit so it may be transferred to a new chassis when necessary. Equipment is arranged around the side walls and front end with the rear door the only means of access. At the front end there is a refrigerated processing tank for films, with five compartments. On the right side of the body in succession are the film drying cabinet, above which is a 50-gal. stainless steel water tank, a lavatory and storage closet. Also included are a 5-kw. 110-a.c. generator and air-conditioner compressor powered by an auxiliary gasoline engine with controls located in cab and dark room.

A lead encased box for the projector is hung beneath the floor at the rear of the dark room. It is accessible only from the inside through a trap door. On the sides of the dark room there are compartments accessible from the outside which provide space for special brackets, hoisting winch, stands, ladders, etc., used in field and shop set-ups.

The dark room is finished inside with aluminum and stainless steel, with fibre glass insulation between it and the steel outer covering. The frame work is of steel box tubing and specially formed crown members to give strength and good appearance. Whenever possible, welding has been used. Neatness of sheeting was achieved by the use of blind rivets and metal screws.

IN POSITION to expose film that will check a butt-splice weld on an I-beam highway bridge. Experience has shown that this non-destructive method of inspecting field welding produces a good psychological influence on welders and their supervisors. Arrow points to projector.

CLOSE-UP of projector in position at the butt splice. The film is in the lightproof holder on the opposite side of the weld. After warning all people and setting barricades, the operator throws the switch on the remote control box to make the exposure.

In designing all the equipment the safety of operators or any personnel in the vicinity has been considered of prime importance. Operators use survey meters to define safe boundary lines around equipment and working areas. They are trained to check and double check equipment and conditions. Dosimeters to measure the total daily exposure to radiation are worn by each operator. Film exposure badges are worn by each person working with equipment to secure a record of total monthly exposure. Physical examinations are made of each person working with radioactive material prior to beginning employment and each three months thereafter.

The radiographic unit may be operated by one man, but where volume of work is great enough, two men can work efficiently.

The more important welds such as butt splices of flange and web plates of girder units are radiographed in the shops prior to assembly into the girders. If defects

(Continued on page 66)

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"They're all tough requirements, but our 16 Macks have the stamina to handle these jobs . . . and they do it economically, with minimum maintenance, and less than one per cent down time," says Mr. John M. Reid, Treasurer, of Arm Excavating, Inc., of Philadelphia.

Armour is especially pleased with Mack's speed transmission because it's built to give best performance under all driving conditions, f city street to tough off-highway low-speed haul

Macks have what you need for dependable, pr able operation in on- or off-highway constructio maneuverability and ease of handling for fast s

Another of Armour's Macks dumping asphalt paving material. The combination of Mack's Balanced Bogie with Power Divider and the 20-speed transmission makes these trucks unexcelled for the roughest off-highway hauling, yet gives them the flexibility needed for open road operation.

one percent

g and dumping; the ability to haul maximum
loads with low operating costs; and only routine
intenance requirements — sensible reasons why
u can't afford *not* to operate Macks!
Your nearest Mack branch or distributor will be
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MACK
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TRUCKS

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HEAPED CAPACITY—True measure of scraper capacity

By D. K. HEIPLE

Chief Field Engineer
LeTourneau-Westinghouse Co.
Peoria, Ill.

TWO SCRAPERS can have the same struck capacity but a sizable difference in heap. Two scrapers can have the same heap, but a small variation in struck.

12.2 cu. yd. struck—15 cu. yd. heaped
12.2 cu. yd. struck—18 cu. yd. heaped
13 cu. yd. struck—18 cu. yd. heaped

They all can be correctly rated and the explanation is relatively simple. Which combination is the best one can also be easily demonstrated (see sketch).

Box A is 3 ft. square and its struck capacity therefore is 1 cu. yd. Above the struck if you add a pyramid with 1 to 1 slopes, the heap addition is .166 cu. yd. and the total heaped capacity is 1.166 cu. yd.

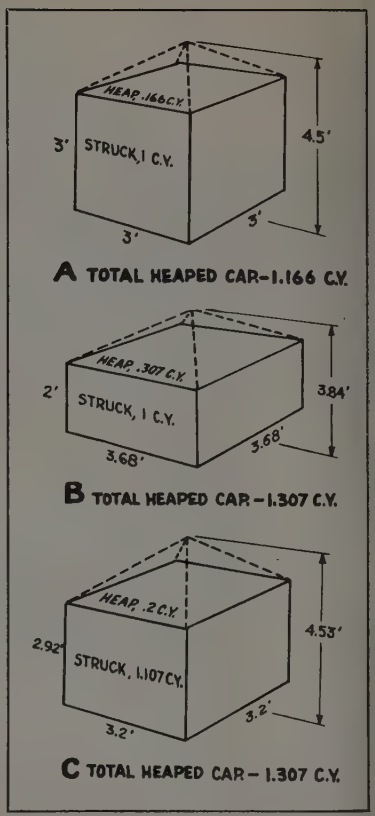
Box B is also a box with 1-cu. yd. struck capacity, but this box is only 2 ft. high. To get the yard in, the bottom dimensions are larger—3.68 ft. on each side. But we can pile more on top—.307 cu. yd. on the same slopes of 1 to 1. An interesting point to note also is that the total height to the peak of the 1.307-cu. yd. heap is 3.84 ft., only 85% as high as the 1.166-yd. heap on Box A.

Box C has the same heaped total as B, 1.307, but in this instance the 1 to 1 sloped pyramid is smaller and the struck measure larger. The base is larger than A, smaller than B. The height of the sides is higher than B, and a little less than A. The height to the peak of the pyramid is just slightly higher than A and considerably above B. Obviously then, Box B is best designed for greater heaped capacity.

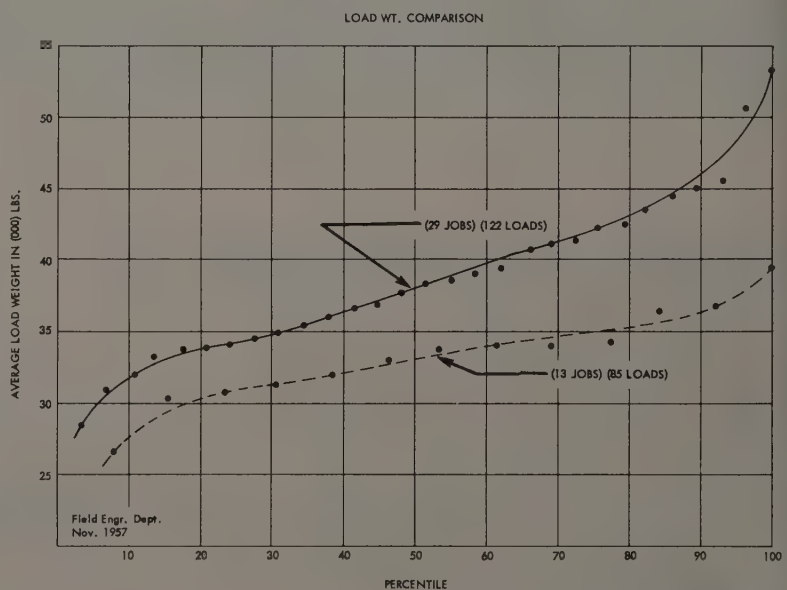
These boxes are easier to visualize than scrapers, but the principle is the same. A wide, essentially square-bottomed scraper along with minimum height side sheets can and will carry a greater total load and a higher ratio of heaped capacity than other conformations, and it will carry that load without the necessity of raising dirt as high as other designs.

Although it is desirable to know struck capacity, these simple facts make heaped capacity the significant figure in scraper ratings. The fact that a bigger heap from the same struck capacity does result in larger average loads has been measured in the field by weighing scrapers in a wide range of materials. Obviously, a range of materials as well as different size pushers has some effect on the actual weights involved. However, the two curves shown illustrate the point that a larger heaped capacity, even though both scrapers have the same struck capacity, will consistently produce added yardage.

The top curve covers 29 jobs and 122 weighed loads for the scraper with the bigger heaped capacity. The lower curve covers 13 jobs and 85 weighed loads for the scraper with the smaller heaped capacity. Struck capacity of both of these scrapers is the same. The point to remember is that although struck capacity is one measure of a scraper, it is not the only measure and that quite often the heaped capacity is the more significant figure.



COMPARISON OF HEAPS



Comparison of weighed loads obtained by two scrapers of the same struck capacity. The upper curve of Scraper X shows the advantage of larger heaping to produce more total capacity as compared to Scraper Y (lower curve) which has the same struck capacity but a smaller heap.

Service stations on wheels protect costly equipment

By L. L. MEIKLE
President
Lincoln Engineering Co.
Los Angeles, Calif.

VALUE OF construction equipment continues to rise and 1958 will find contractors with heavier investments in machinery. Time lost on any job becomes a more important factor in determining the difference between profit and loss. This places unusual emphasis on lubrication as the key to reducing lost time for these expensive equipment units and in cutting cost of overhaul and replacements.

The 1958 season will see more emphasis on lubrication, and particularly the servicing of equipment on the job. Mobile lubricating units, which are growing more common every year on construction projects, have the advantage of being able to service equipment with a minimum of delay and as frequently as the schedule dictates. Skilled service men operating these rigs do a more complete and satisfactory job because they are experts and have the proper equipment. The net result gets the proper lubrication to bearings in a program that will prolong equipment life and cut repair bills.

These mobile lubricating units are now available to meet the needs of any construction operation. They can be provided either in custom-made units complete with truck or in package form for the contractor to install. In general, either kind of unit provides the proper size and type of pumps, hoses, reels and the necessary control devices for dispensing lubricants directly from the original 120-lb. or 400-lb. drums. One of the most popular assemblies for complete lubrication service will provide these dispensing facilities for chassis lubrication, motor oil, gear oil, track-roll lubrication, air, water and diesel fuel.

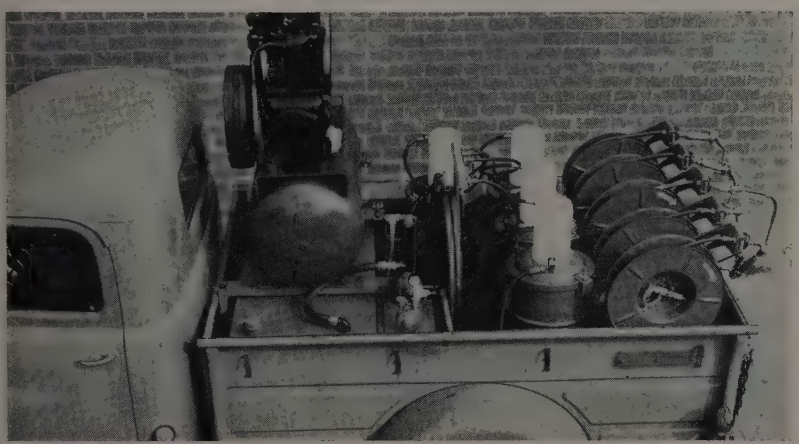
Reels are usually mounted at the rear of the truck to handle the long hoses which are required to reach all parts of a large piece of equipment without moving the lube truck. The air compressor on the unit provides power for the grease and oil pumps as well as supplying air for other uses. If the job is operating around the clock these portable lube plants include a generator set and floodlights. Depending on the services to be provided by the unit and the amount of individual treatment these installations will cost from $1,500 for a small simple setup to as much as $8,000.

Fitting the lubrication unit to the job to be accomplished in the field is an important consideration and should be given some thought. Advice from the manufacturers of such servicing equipment should be sought, and used. In our own organization as a large manufacturer of this type of equipment, we have found it best to discuss the field requirements of each contractor at the time he is planning such a purchase. The contractor and the lubrication experts are able to work together in drawing up plans for the type of unit and fittings which will be necessary as standard components or the design of the custom units.

In some cases, contractors find that a pickup truck fits into their operations most effectively, while others may require a 2½-ton flatbed to carry all the needed equipment. Depending on the number of jobs or the size of any one particular project, many contractors have three or four mobile units in operation all of the time.

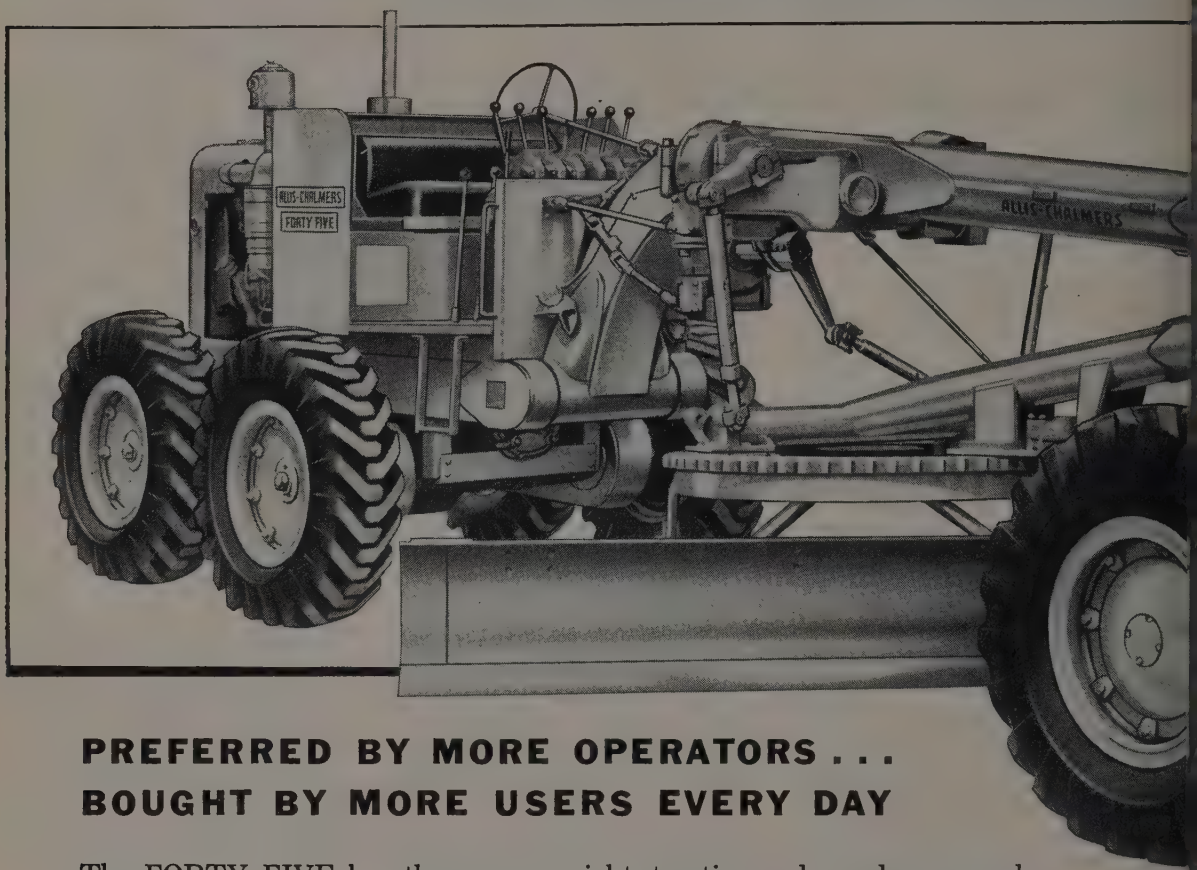
Another important point is that these portable units carry the lubricants in their original containers. The grease or oil is dumped directly from these 120-lb. or 400-lb. containers to bearings, gear boxes or crankcases without chance for contamination. The material arrives in the bearing as it left the refinery. Of course, it is essential that the proper type and quality of lubricant be used, and this is assumed if the contractor is interested in getting profitable work from his equipment. But if these lubricants are contaminated between the refinery and their arrival in the bearing, they cannot perform their proper function.

During the 1958 season, it will be the contractor who is conscious of costs and concerned with maintenance who will succeed. Among the items which are essential to keeping equipment rolling and to reducing the cost of repairs and upkeep the service station on wheels can be the key.



MOBILE LUBRICATING units are designed to meet all construction needs. This is a typical five-pump service station pumping from 400-lb. refinery drums and is complete with light plant.

For consistently tough jobs, compar
with any other heavy-duty motor grade



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BOUGHT BY MORE USERS EVERY DAY

The FORTY FIVE has the power, weight, traction and speeds you need for high-production grading. Superior stability and precision control give you deep precision cuts or smooth finishes. The FORTY FIVE is built to take the shocks and strains of heavy-duty service — and to keep production steady.

Look ahead... *move ahead* ...and stay ahead with **ALLIS-CHALMERS**

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Trinity Tractor Company—Eureka

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

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

MONTANA
Mountain Tractor Company—Missoula and Kalispell
Seitz Machinery Company, Inc.—Billings and Great Falls

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OREGON
Haupert Tractor Company—Medford
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- 120 brake hp
- 6 forward speeds to 20.6 mph
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- 23,800 lb approx.

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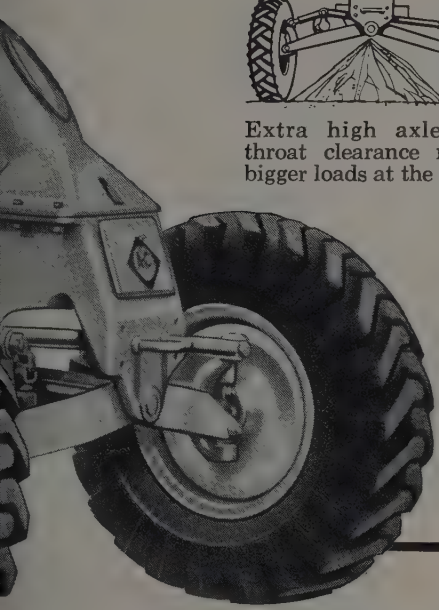
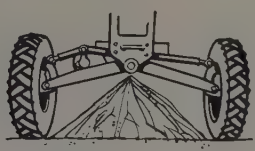
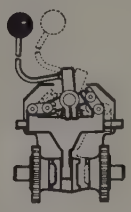




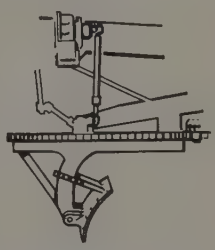
Extra high axle and throat clearance means bigger loads at the blade.

The ROLL-AWAY moldboard rolls dirt, gives more performance per horsepower, more production per gallon.

Fully enclosed power steering — easy control under all conditions.



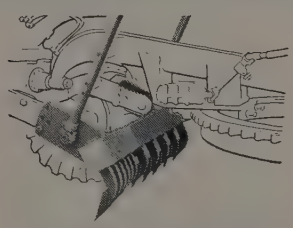
Toggle-type controls are exclusive with Allis-Chalmers.



Front-mounted lift cases eliminate long shafts that twist under loads.

Matched attachments and accessories make it a year-round producer

All-steel, stand-up cab

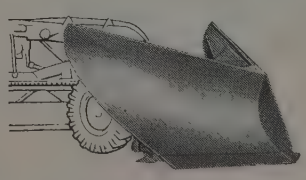


11-tooth, V-type scarifier

Hancock elevator

8-foot bulldozer

Hydraulic, shiftable moldboard



V-type snowplow

ROLL-AWAY is an Allis-Chalmers trademark.

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WESTERN CONSTRUCTION NEWS

Atkinson acquires United Const. Co.

GUY F. ATKINSON Co., contractors and engineers, South San Francisco, has announced the acquisition of the United Construction Co., of Winona, Minn. The activities and organization of the United company will be merged into those of the Atkinson company, and J. A. Henderson, formerly president of United, will become an active vice president of Guy F. Atkinson Co. The other principal United officers will also associate with Atkinson.

United Construction Co. was formed by Henderson in 1933 and has had its headquarters at Winona ever since. It played a major role in the canalization of the upper Mississippi River and completed many large dam and lock projects there. Its activities later spread over the mid-West and included construction of several major dam projects. During World War II it built a large marine terminal at Mobile Bay and a major drydock and two piers at the South Boston Navy Yard. Since then it has continued to be active in heavy projects, and its most recent work has been a jont venture with Atkinson for the construction of the large Greenup Locks at Greenup, Kentucky.

Guy F. Atkinson Co. has a worldwide recognition as a major contractor with many important dams and other heavy projects to its credit. It maintains its general offices at South San Francisco, and Henderson and other United officials have already joined the organization there.

OUT OF A 68-FT. BASEMENT

After finishing the excavation of a 5-story basement for the new California Bank building in Los Angeles, this Caterpillar tractor was lifted out of the hole by this combination of Link-Belt and P & H cranes. The structure will rise 18 stories (267 ft.), and is one of the first built since repeal of the 13-story height limit.

Penstock contract awarded for Trinity Dam project

A $2,302,383 BUREAU of Reclamation contract for the penstock header and outlet pipe at Trinity Dam has been authorized for award. Contract goes to the Southwest Welding and Manufacturing Co., Alhambra, Calif., lowest acceptable bidder. The job calls for furnishing and fabricating 6,800,000 lb. of steel into penstock header and outlet pipe approximately 1,700 ft. long and ranging in size from 16 down to 7 ft. in diameter. The contractor will have two years to finish the job.

Acting Commissioner of Reclamation A. R. Golze said that the penstock header is needed for either a federally or privately built 96,000-kw. powerplant at the foot of Trinity Dam. The header will be placed within a portion of the 28-ft. tunnel used to divert Trinity River from the damsite during construction.

Ben Arp dies at 68—famed tunnel driver

BENJAMIN ARP, nationally known construction superintendent, died June 26 at Colfax, Calif.

Ben Arp, 68, played a prominent role in many major construction projects during a distinguished career that spanned nearly a half century with the same firm, Utah Construction Co.

His specialty was tunnel construction, for which he acquired a nationwide reputation. In 1957 he received the coveted "Beaver" award in recognition of his accomplishments as a superintendent of tunnel and dam projects.

Benjamin Arp

Born May 1, 1890, in Davenport, Iowa, he got his first job in the construction industry there when he was only 15 years old. He came to California in 1906, joining Utah Construction Co. to help build the Western Pacific Railroad line through the rugged Feather River Canyon, and there got his first tunnel experience. He ended his active career with the firm 47 years later, in 1953, supervising the rehabilitation of the same tunnels.

He was superintendent for Utah on large tunnels which the firm drove for various railroads, Alcoa, Kennecott Copper Co. and Pacific Gas and Electric Co.

Dump body mounted on Dodge 900 chassis with Custom cab.

Dodge Heavy-Duty Finance Plan is designed to save you money!

Need a new truck, but need to watch your working capital, too? The Dodge retail finance plan for heavy-duty trucks was designed for just that situation. It lets you operate modern, efficient trucks without burdening yourself with excessive finance charges.

Designed with the same understanding of truck problems that has made Dodge *Power Giants* outstanding, the Dodge Heavy-Duty Retail Finance Plan is tailored to your needs. Whether you need one truck or several, you can finance your purchase with a minimum down payment, and with lowest financing cost. Payments can be arranged over an extended period.

What kind of equipment can be financed with this plan? Any Dodge medium-duty, heavy-duty (400 through 900 models) or four-wheel-drive trucks, plus extra equipment, including bodies mounted on the trucks.

This new plan makes it both easy and economical for you to get *Power-Giant* advantages: exclusive Power-Dome V-8 engines that keep maintenance at a minimum . . . rugged "Job-Rated" construction . . . famous Dodge economy and dependability . . . advanced Dodge styling.

Let your Dodge truck dealer show you how this Heavy-Duty Retail Finance Plan helps truck operators with established credit own thrifty new Dodge *Power Giants*. See your dealer soon.

DODGE *Power Giants*

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Matt Bevanda dies at 70—well known contractor

MATT J. BEVANDA, well known Western contractor died at the age of 70 on June 26 in Los Angeles. For more than 40 years, with his late partner, Vincent Bressi, he had participated in many outstanding construction projects through the West. A partial list of the contracts in which the group participated included Shasta Dam, Owens Gorge Tunnel, Ross Powerhouse, Pine Flat Dam, the Harlan Dam in Nebraska, and more recently as a participant in the group involved in construction of Trinity Dam. The firm also had been active in highway construction throughout California and into Arizona and New Mexico.

In addition to the prominence of the projects carried out by the organization Matt Bevanda was equally well known among construction men throughout the Western half of the United States as a progressive and successful contractor. Since the death of his former associate Bressi, he had operated under the name of M. J. Bevanda Co., Inc.

Study of irrigation district to be made by Ebasco Services

EBASCO SERVICES has been retained by the Nevada Irrigation District with headquarters in Grass Valley, Calif., to prepare a report on the ability of the district to maintain its water supply and service facilities in connection with future developments.

This study, which is estimated to require from 3 to 4 months, will be carried out under the direct supervision of Cecil E. Pearce who is in charge of the San Francisco office and has been with Ebasco Services since 1949. Prior to that time he served on several important water development and storage projects in California including the position of design engineer on the Morris Dam for Pasadena.

The directors were confronted with the necessity of finding engineering answers to four important questions affecting the future of the important irrigation district. These are: (1) Determination of ultimate water requirements for land not at present under irrigation, (2) location of areas of future development and determination of means of serving these areas, together with water requirements at diversion sites, (3) determination of estimated construction costs of ditches and conduits to serve these areas and (4) recommendations for improving water service on the present system together with a reduction in present maintenance costs.

Bids are the same, and contract awarded by lot

IN another one of those rare occasions where identical bids were received, award of a contract by the 11th Naval District in San Diego was made by drawing lots. The award went to M. H. Golden Construction Co., who had submitted a bid of $1,110,000 which was identical to the bid submitted by James Stewart Co., of Phoenix.

The two identical bids were the lowest of five received on June 16 for construction of quarters and other facilities at the U. S. Naval Training Center at San Diego. Plans were prepared by Welton Becket & Associates of Los Angeles, and Capt. W. M. Brown will be the officer who will be in charge of construction.

Grandstand has unobstructed view

A UNIQUE three-level grandstand, featuring a cantilever roof supported by huge fabricated steel plate girders to give spectators an unobstructed view, is rapidly taking shape at the Stockton, Calif. fairgrounds in preparation for the August racing season. The functional structure is one of the first of its type to be built in the West.

Fifteen horseshoe-shaped fabricated steel frames, standing 65 ft. high and set on 25-ft. centers, will form the framework for the 350-ft.-long pavilion. Ten-inch I-beams are being used as the purlins between the upright frames. Each of the sections is fabricated in four parts which are bolted together at the job site before being erected.

The cantilever sections, extending about 60 ft. out from the back wall to form the roof over the seating area, were fabricated from Kaiser Steel plate by National Iron Works, Alameda, Calif. National Iron is also erecting the steelwork with M & K Corp., San Francisco, as the general contractor.

Use of the steel cantilever design makes possible the elimination of supporting columns usually associated with covered pavilions, permitting a clear view of the track and fairground. Metal louvers, included in the roof design, will facilitate air circulation.

The structure incorporates a mezzanine under the stands to house concessions and pari mutual windows. Other concessions and windows are located on the ground level under the mezzanine.

Architect and engineer for the pavilion is the California State Division of Architecture with Edwin A. Verner, San Francisco, as structural engineer. The grandstand, seating 3,776, is part of a multi-million dollar modernization.

NEW 3-TUBE
cutting attachments

Airco Model 3700

Airco Model 3800

Triangular stack design—gives most rugged construction possible.

Finest quality machined brass throughout, stainless steel tubes in Model 3800.

High rigidity parts and construction—protect against flashback.

Excellent balance with no weight increases—keeps operator fatigue to a minimum.

Tip mixing of preheat gases.

New high efficiency O_2 valve. Diaphragm design. No gas leakage. No packing.

Tapered gas seal rings—for long life. Manual tightening. No wrench needed.

Smoothly bored to avoid turbulence.

No. 3700 fits Airco No. 700 welding torch—cuts up to 4″ steel, and Airco No. 750 welding torch—cuts up to 6″ steel.

No. 3800 fits Airco No. 800 welding torch. Cuts up to 8″ steel.

The finest available . . . Airco's 3-tube cutting attachments are fully adaptable to the widely used Airco welding torches. Both attachments take practically all Airco ¾″ seat tips.

Before buying your next cutting attachment send to Airco for literature on these rugged new precision tools. Or, look in the yellow pages of the phone book under "Welding Equipment" for the Airco office or Airco Authorized Dealer nearest you.

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WELD INSPECTION

(Continued from page 53)

are found, they may be cut out and the welds corrected with a minimum of distortion.

Through liaison with the welding inspectors on job sites, we are able to dispatch the radiographer to the field to check the butt welds of both beams and girders during bridge erection.

Although welders in shops and in erection crews are required to pass standard American Welding Society qualification tests, checking of quality of welds by visual inspection has not been as effective as desired because of the obvious limitations of the method.

Since we began checking welds by radiography, improvement of welders' techniques has been quite noticeable. Inspectors have also been able to weed out inconsistent and careless welders. Fabricators and erectors have also been assisted materially in maintaining a higher standard of workmanship. An additional factor toward safety and safeguard against possibe economic loss has been added through inspection by radiographic means.

The number of welding defects found has confirmed our feeling that a non-destructive method of inspection of a positive nature is a prime necessity. We have also found that the radiograph has a psychological influence of a beneficial nature on welders and their supervisors, whether or not a particular weldment is investigated. In many instances the educational advantage of a radiograph is very helpful.

Many welders have never seen the "inside" of their work and have considered themselves proficient without realizing that some phases of their technique may have been faulty. By seeing the type and location of such defects and being able to cut them out for correction, they are convinced of the existence of such defects, and become aware of the importance of proper procedure and conscientious adherence to prescribed techniques.

Insofar as the highway department is concerned, our inspectors can be relieved of some tedium in that they have better knowledge of capabilities of equipment and abilities and skills of operators. Necessity for close visual inspection of welding operations is lessened since a final check on welding quality is available through the radiographs.

Fabrication costs can be reduced by virtue of having positive location and extent of defects determined at a time when corrections may be made with a minimum interference with other shop work.

Radiographs also give a quick means of making decisions, thereby eliminating the delays which may occur while various shop and inspection personnel are considering suspected deficiencies.

Although the radiographic equipment is used primarily on welding inspection of structural steel bridges, it is available for other work. We have used it to check concrete pipe to determine if reinforcing steel has been omitted or if the proper amount has been used. The determination of degree and extent of necessary repairs to machinery which has become cracked in service is another use which should prove valuable.

SLURRY SEALS TRENDS

(Continued from page 41)

in the gutter areas caused by the chemical action of runoff water from residential lawn care. It also has a tendency to protect against the normal washout of rain-water runoff during storms.

In basic design, the spreader box has remained relatively unchanged. Each road maintenance district has its own spreader and there is a tendency toward reducing weight from the first designs through using wood or aluminum in the frame. Also the length of the spreader box from front to back has been reduced.

With this smaller and lighter box it has been possible to attach it to the back of a light, rubber-tired tractor and provide a mechanism for raising and lowering by hydraulic power supplied by the tractor. The accompanying photographs show this type of box. In using this type of tractor-mounted box the transit mixer either travels beside the spreader shooting the mix in from the side or in front of the tractor depositing the mixture in a row which is straddled by the tractor and spread by the box.

Basic standards of the mix and the proportioning have not varied to any marked degree. However, it is now realized that close and constant supervision is essential during the loading process and proper control must be maintained. Adherence to specified material sizes, weights and temperatures are essential if the desired results are to be secured.

Present specifications for the process remain about the same as those presented in the original report which appeared in WESTERN CONSTRUCTION April 1955.

OIL FIELD WASTE WATER

(Continued from page 35)

oakum. Although the steel crossing pipes are exposed to a wide variation in temperature, the joints have remained water-tight.

The pipeline was completed in July 1955 during extreme summer heat. Air temperatures reach 117 deg. It is difficult to lay irrigation pipe with mortar joints in extremely hot weather. The subsequent lower temperatures have a tendency to build up tensile stresses which may open up contraction cracks in the joints. No unusual problem developed in this case, however, perhaps due to the relatively high temperature of the waste water conveyed by the line, ranging from 85 to 114 deg. in the various tank sumps. Moistening the mortar bands immediately after laying undoubtedly helped prevent cracking. Brown Kraft paper strips were placed over the bands as the laying proceeded and were kept moist until the line could be protected with backfill.

The pipeline crossed and recrossed channels carrying waste water, the flow of which could not be interrupted. The procedure here was to dam the channel and divert the flow in the adjacent fields for a few minutes while the trench was excavated, then install a temporary steel pipeline across the ditch. The concrete pipeline was then laid under the steel pipe. As soon as the concrete pipe joints were cured, the steel pipe was removed and the trench backfilled to the normal channel section.

Conclusion

Inspection of the Raisin City and Coalinga concrete pipe waste water system in March 1958 disclosed no deterioration of the concrete pipe used in these systems in spite of the extremely severe conditions. The successful operation of these trial systems to date indicates that comparatively inexpensive concrete pipe can be used to advantage in waste water gathering systems in oil fields, where the disposal problem exists.

ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

OOM AHEAD?—Is the Territory, ow that statehood is a reality, in or a period of construction boom? here are many straws in the wind ointing in that direction. The ost important and the most offi- al is a "farewell address" delivered employees of the U. S. Army En- neer District in Anchorage by Col. V. Kieffer, Jr., district engineer. olonel Kieffer is leaving Alaska r assignment to a new post in the ffice of the Secretary of Defense d will be succeeded as Alaska Dis- ict Engineer by Lt. Col. W. C. ribble, Jr. who has been deputy istrict Engineer. At a farewell din- r held in his honor by more than 0 employees of the Engineer dis- ict, Colonel Kieffer indicated the urse he believes Alaska construc- on will take in the future.

EAR'S BIGGEST NEWS—If Col- el Kieffer's remarks at the fare- ell dinner are based on so-called nside information" as I suspect ey are, Alaska's construction in- stry is on the brink of an era of precedented volume and pros- rity. In his talk, Colonel Kieffer redicted "tremendous expansion" r the Alaska construction indus- y. He added: "I anticipate this istrict will expand two, three or ur-fold. You are coming into a riod where the work of the Alas- District may climb to $250,000,- 0 a year. It will be a tremendous rden on all of you but I am con- dent that you will discharge these ded responsibilities with the same gh degree of excellence that has arked your past performance." hen Colonel Kieffer outlined ans to augment the District's staff planning, design, engineering d construction.

HAT IT MEANS—Colonel Kief- 's remarks were received by Alas- 's business and contractors with eat interest. In substance, his talk dicates that the tempo of military d defense construction in Alaska due for a terrific shot in the arm. his is refreshing news at a time hen crepe hangers have been pre- cting an alarming decline in mili- y expenditures. Coupled with the ost in construction most Alaskans el will follow as a result of state- od, the predicted increase in mili- tary work should be the brightest tidings for contractors so far this year.

HUGE PROJECT—Alaska newspapers have been commenting frequently about the brisk activity reported at the whistle stop of Clear on the Alaska Railroad at Fairbanks. Although no official details on the Clear project have been released, Alaska newspapers have carried stories originating in Washington, D. C., to the effect that a $250,000,000 missile detection site is scheduled at that location. Surveying work is currently under way at the site. Another "headline" story which is attracting attention is the report from Fairbanks that the Alaska Railroad plans to relocate 22 mi. of track to take the railroad away from the vicinity of the missile site.

NEW AGC MANAGER—Larry Moore, head of the Alaska Chapter, Associated General Contractors since 1950, is retiring from that position. Moore, who was formerly the assistant general manager of the Alaska Railroad, plans to visit in San Francisco and to study advanced labor relations. William Hibberd is the new AGC Alaska manager. Hibberd at one time was labor relations manager for the Alaska operations of Birch-Johnson-Lytle. He comes to the Alaska Chapter direct from a position as secretary-manager of the Associated Building Contractors of Colorado, Inc., which is the building chapter of AGC. This writer wishes to pay tribute to Mr. Moore who was most helpful in supplying material for the newsletter and handled labor-management problems in Alaska with great mastery and skill.

NEW CONSTRUCTION PROBLEM—Add a new problem to the list of those Alaska contractors are often called on to cope with: bears. Northern Consolidated Airlines has reported that a large brown bear is hindering construction of a new airstrip in the Katmi National Monument. The bear has been appearing regularly on the airfield. "He causes plenty of trouble", says Claude Demientief, equipment operator. Demientief said each time he went up to the field to work, the bear would appear and impede movement of a caterpillar and other equipment.

HOUSING PROJECTS—Contracts totaling more than $10,000,000 have been awarded by the Army Engineer District, Alaska, for construction of Army family housing units in Alaska. M-B Construction Co. of Seattle received a $5,883,807 contract for construction of 155 family housing units at Fort Richardson. Manson-Osberg Co., also of Seattle, has been awarded a $4,402,-871 contract for a total of 110 units at Eielson and Ladd Air Force bases and along the Haines-Fairbanks pipeline. Included in the M-B contract are 100 units of housing for Fort Richardson and 55 units of Nike installation housing also in the Fort Richardson area.

ANCHORAGE PROJECTS—Alaska's largest city has some king-size construction plans for the statehood era now dawning. Architect Edwin B. Crittenden has been engaged to design a new $800,000 public safety building for the city of Anchorage. Construction of the building, however, will be contingent on working out financing for the project. Another major construction project seems a certainty in the near future: the Anchorage port. City Manager George Shannon said an $8,000,000 bond issue would be used to finance the project. A stateside financial syndicate has already been organized to underwrite the entire bond issue. Currently, the city is working on 55 blocks of paving within the city limits. Tempo of construction in the fast-growing Alaska metropolis is reflected in the fact that building permits in the city have been averaging over $200,000 per week for the past several weeks.

CONSTRUCTION NEWS NUGGETS—Alan Innes-Taylor, aviation consultant, recently told the Fairbanks Chamber of Commerce that unless Alaskans enlarge and lengthen airfields and runways, the Territory is going to lose out on global air routes when the commercial jet age arrives . . . Trustees of the Alaska Methodist University have authorized the start of preliminary construction of the new campus at Anchorage . . . Federal funds have been authorized for a $480,000 armory for Nome . . . City Engineers W. E. Brice of Ketchikan and George Matkin of Anchorage have resigned their positions.

CATERPILLAR

BUILDING THE WORLD'S MOST PRECISELY ENGINEERED HIGHWAYS

A fleet of CAT-built machines worked to exacting standards constructing loops for the AASHO Road Test. Grading operations alone required 114 engineers and technicians, 50,000 tests.

Caterpillar DW21s and DW20s with Scrapers helped move 1¼ million cu. yd. of earth in 3 months. At peak, more than 25,000 cu. yd. were moved daily. About half of this was placed in the upper three feet of embankment under strict controls for uniformity

aterpillar D8 Tractors pulled pneumatic rollers for precisely mea-red compaction. Gross weight of the unit is 15 tons; weight per square inch of tire—425 pounds. Seven to eight passes were required to provide the density demanded.

In La Salle County, Ill., six highway test loops make up what is probably the most rigidly engineered and supervised highway construction job in history.

It had to be. For these roads are the site of the largest, most comprehensive highway research project ever undertaken. Known as the AASHO Road Test, its prime objective is "to study the behavior of pavements of known thickness under dynamic loads of known magnitude and frequency."

Results of the $22 million test will be reported to Congress and probably will affect highway design and construction for years to come.

As is standard on any exacting, important highway construction job, Cat DW21 and DW20 wheel Tractors, D8 track-type Tractors and No. 12 Motor Graders were put to work by S. J. Groves and Sons Co. and Arcole-Midwest Corp. These machines, with their high availability record and minimum maintenance requirements, helped move 1¼ million cu. yd. of earth in 3 months under controls more strict than ever before attempted in large-scale highway construction. Grading operations were completed for four main loops of 6,600 feet each of four-lane divided roadway, a 4,400-foot loop, and a 2,200-foot loop. Total distance around each of the main loops is 3.1 miles.

For test traffic, trucks with axle loads ranging from 2,000 pounds on a single axle to 48,000 pounds on a tandem axle are scheduled to run 18 hours a day, six days a week, for two years over the five largest loops.

As the big yellow machines rolled on the job, thousands of tests were conducted continuously to assure precise uniformity of the earth in embankments. Compacted density was controlled between 95 and 100 per cent of standard maximum, and moisture content was controlled between plus or minus 2 per cent of optimum. During grading operations, 50,000 tests were performed and 114 engineers and technicians were at work both in construction control and in the materials laboratory.

As is usual in jobs where there is no margin for error, Caterpillar-built machines were at work.

No. 12 Motor Graders, workhorses of highway construction, maintained haul roads and graded to fine tolerances. Grading was carried out in blocks 500 to 800 feet long.

HAWAII Report

ALAN GOODFADER, Honolulu, Hawaii

LABOR TIGHT—A special Territorial committee says slight labor shortages have developed here in the carpenter, mason, painter and plumber trades, but adds that the shortages haven't slowed the booming construction industry any. All building trades are being used at top capacity, the committee said. It is keeping an eye on the construction labor situation here to see if a shortage will develop that would require slowing down of governmental projects.

ENGINEERS TO VISIT—Three top officers were expected to lead a post-convention tour of the National Convention of the American Society of Civil Engineers here July 1 and 2. Scheduled to join the delegation from the Portland, Ore., convention were Louis R. Howson, ASCE president; Samuel Morris, vice president; and William Wisely, executive secretary. The Hawaii Section of the ASCE arranged panel discussions and field trips to tunnel construction.

LOW AT SUEZ—Hawaiian Dredging and Construction Co. and three Mainland firms are the apparent low bidders on a $20,000,000 contract to deepen and widen the Suez Canal. Joining HD&C in the project would be J. H. Pomeroy & Co. of San Francisco, and Standard Dredging Co. and Atlantic, Gulf and Pacific Dredging Co., both of New York. The two-year job involves moving about 40,000,000 cu. yd. of material.

PLANS CONSTRUCTION—Honolulu's independent Board of Water Supply plans $5,415,500 worth of major improvements to its construction in the years through 1962. Major jobs include: in 1958, a $170,000, 300,000-gal. reservoir in upper Nuuanu Valley; another reservoir in Manoa and $91,000 worth of large main extensions; in 1959, a 3,500,000-gal. reservoir at Waialae-Iki, $350,000; a 1,000,000-gal. reservoir at Koko Head to be financed by the Bishop Estate and serving the estate's lands in the area; $100,000 worth of main extensions, and a 4,000,000-gal. high service pump at the BWS Beretania station, $100,000; in 1960, a 2,000,000-gal. reservoir at Diamond Head, $260,000; a 300,000-gal. reservoir in Dowsett Highlands, $100,000 and $105,000 worth of main extensions; in 1961, a 1,000,000-gal. reservoir in the Koko Head area and $212,500 worth of main extensions, and in 1962, an underground pumping station, transmission mains and tunnel at Waimalu Valley, $2,200,000, and a 1,000,000-gal. reservoir in the Koko Head-Windmill Tract area, $519,000.

PRICES DOWN?—The Pacific Hawaiian Line's first "lift-on, lift-off" lumber freighter arrived here recently and brought a swift reaction from the Matson Navigation Co. The Pacific Hawaiian operation discharged lumber in packages twice as large as those carried by previous freighters at substantial stevedoring savings. Matson has announced that it has chartered a steam schooner to carry packaged lumber from the Mainland.

THINKING BIG—A preliminary report of an engineering survey team to the Territorial Board of Harbor Commissioners proposes a $8,630,000 combination passenger-cargo facility for Honolulu Harbor. Making the survey are Law & Wilson of Honolulu and Tudor Engineering Co. of San Francisco. Key construction would be a $7,600,000 double-deck terminal. With this would go $1,030,000 worth of modernization work on existing pier facilities. The terminal would handle passengers at the top and cargo at the lower level. The Harbor Board had been thinking of a $6,500,000 terminal program.

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CORRECTION

LARGE BLDG. MOVED 500 MI.

Last month on page 56 began an article about a tilt-up building project in San Bernardino, Calif. Unfortunately, the location was given as San Francisco. Even a casual inspection of the two cities shows definitely that the building is in San Bernardino and not San Francisco. We hope that because of our error not too many men showed up for work in the wrong city.

Low bids and contract awards

ARIZONA

San Xavier Rock & Sand Co Tucson, submitted a low bid of $1 469,354 for grading and surfacin 1.6 mi. and construction of thre grade-separation structures on th Casa Grande-Tucson Highway i Pima County. A low bid of $763 533 was submitted by **Flickinge Bros. Contracting Co.**, Phoeni for 3.7 mi. of grading and surfa ing on the Globe-Show Low Hig way in Gila County. **L. & M. Co struction Co.** of Tucson submitte a low bid of $694,461 for 3.5 mi. grading and surfacing on th Yuma-Casa Grande Highway, P nal County. A low bid of $259,80 was submitted by **D. M. Bradle & S. R. Dysart**, Phoenix, for gra ing and reshaping 17.7 mi. of th Winslow-Long Valley Highway i Coconino County. **Wallace & Wa lace** of Phoenix received a $257 509 contract for 6.1 mi. of gradin and surfacing on the Clifto Alpine project in the Apache N tional Forest in Greenlee Count **Isbell Construction Co.**, Phoeni submitted a low bid of $1,009,72 for grading, surfacing and drai ing 6.5 mi. of the Cordes Junctio Flagstaff Highway south of Fla staff in Coconino County. A lo bid of $1,036,633 was submitted b **Phoenix-Tempe Stone Co.** of Pho nix for 5 mi. of grading and su facing on the Yuma-Casa Gran Highway on Rte. 84 in Maricop County. **Hagen Construction Co Inc.** of Globe submitted a low bi of $343,624 for grading, surfacin curbs and gutters on the Orac Jct.-Globe Highway east of Glob in Gila County. **W. J. Henso** Contractor, Prescott, submitted low bid of $127,680 for gradi and surfacing the Miller Valle Road, city of Prescott, in Yavap County.

CALIFORNIA

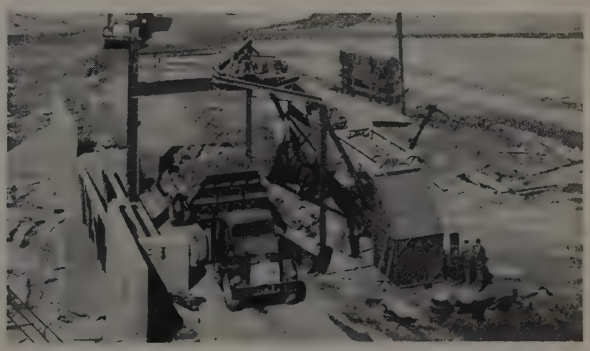
A low bid of $8,394,835 was su mitted by **Peter Kiewit Sons' Co** Arcadia, for 4.5 mi. of grading a surfacing and construction of bridges in city and county of L Angeles. **Guy F. Atkinson Co** South San Francisco, submitted low bid of $7,462,731 for constru tion of 2 mi. of bridge structur in San Francisco County. **Fre rickson & Watson Construction C and Ransome Co.** of Oakland

"It takes a lot of truck to handle 25- to 30-ton loads!"

—says W. B. Couch, superintendent of the Campbell Limestone Co., Beverly, S. C., in reporting on their GMC Diesels

SOME OF THE HUGE BOULDERS THAT HURTLE DOWN into Campbell's GMC's are half the size of a sedan. In fact, the specially built dump bodies are of 1-inch steel plate. And underneath is the GMC brand of super-stamina that shrugs off this kind of punishment—for years.

OFF-THE-ROAD HAULING THAT'S TOO HEAVY FOR LEGAL HIGHWAY TRAVEL is rugged business. Yet Campbell Limestone's GMC Diesels do this day after day—running 10-hour days in the summer. They've never required any pampering—even after the equivalent of 100,000 miles of this work. It's the pay-off on GMC's *all-truck* construction—as the world's largest exclusive commercial vehicle manufacturer can supply it.



EVEN CLIMBING THE STEEP RAMPS with their huge loads is easy for these GMC's. They've got the power reserve to keep rolling where other trucks can't make the grade. You can thank those high-torque 2-cycle Diesels for that!

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ceived a $2,617,777 contract for construction of a 4.5-mile freeway on U. S. Highway 40 near Gold Run in Placer County. Work consists of construction of 4-lane divided freeway and 7 overcrossing bridges. **Norman I. Fadel, Inc.,** North Hollywood, received a $1,079,321 contract for 3.2 mi. of grading and surfacing 4-lane divided freeway on Highway 101, north of Fernbridge in Humboldt County. A $1,062,522 contract was received by **Charles MacClosky Co.,** Gardena, for 1.3 mi. of 4-lane freeway and four structures on U. S. 101 through Arroyo Grande in San Luis Obispo County. **Basich Bros. Construction Co.** and **N. L. Basich,** of Pasadena received two contracts for highway work in Kings and Mono Counties. A $567,537 contract for realigning 6.6 mi. of Route 41, Kings County, and $158,899 for 27.2 mi. of grading and surfacing between Sonora Jct. and Nevada State Line in Mono County. A low bid of $368,588 was submitted by **J. H. Trisdale, Inc.,** Redding, for 1.6 mi. of grading and surfacing north of Oak Run Creek in Shasta County. A $315,016 contract was received by **Baytec Construction Co.,** Hayward, for 2.9 mi. of grading and surfacing south of Fort Jones in Siskiyou County. **E. L. Yeager Co.,** Riverside, received two contracts for highway construction in San Bernardino County. A $188,132 contract for grading and surfacing to construct interchange ramps at Vineyard on the San Bernardino Freeway near Ontario and $257,072 for widening and surfacing six sections of Rte. 18 near Apple Valley and widening three bridges over Cushenbury Creek. **Griffith Co.,** Los Angeles, received a $196,625 contract for grading and surfacing portions of U. S. 466 and State Sign Routes 63 and 65 in Kern and Tulare Counties. A low bid of $169,350 was submitted by **Tom Hull,** Eureka, for construction of concrete culvert east of Arcadia in Humboldt County. **O. B. Pierson,** Bellflower, received a $192,383 contract to construct 5 bridges over Apache Canyon, Oak, Corral Canyon, Round Spring and Castle creeks and redecking five bridges on U. S. 399 north of Wheeler Springs in Ventura County. **Mercer, Fraser Co., Inc.,** & **Mercer, Fraser Gas Co., Inc.** of Eureka received a $169,104 contract for 1.6 mi. of grading and surfacing the Bull Creek road in Humboldt County. **Granite Construction Co.,** Watsonville, received two contracts for highway work in Placer and Santa Cruz counties. A $296,227 contract for grading and surfacing 4.4 mi. of two-lane highway in Placer County and $158,196 for 1.7 mi. of grading and surfacing near Boulder Creek in Santa Cruz County. **M. W. Brown** of Redding received two contracts for highway work in Modoc and Siskiyou counties: $278,991 for 5.4 mi. of grading and surfacing near Canby in Modoc County and $279,124 for grading and surfacing between Callahan and Cedar Gulch in Siskiyou County. **Gordon H. Ball, Inc.,** Danville, received a $1,824,700 contract for extension of runway, lighting and earthwork, U. S. Navy, Miramar, San Diego.

COLORADO

Pioneer Construction Co. of Pueblo submitted two low bids for road work in Baca and Las Animas counties. A $306,381 contract for 5.2 mi. of grading and surfacing and structures on S. H. No. 59, between Springfield and Campo in Baca County and $254,975 for 9.9 mi. of grading, structures and surfacing between Beshoar Junction and Kim on S. H. No. 100 in Las Animas County. **Broderick & Gibbons, Inc.,** Pueblo, submitted a low bid of $355,240 for grading and surfacing on 3.8 mi. of S. H. No. 1, city and county of Pueblo. A low bid of $455,754 was submitted by **L. H. Kilgroe Construction Co.** of Denver for grading, structures and sub-base in city and county of Pueblo. **Latimer Construction Co.,** Denver, submitted a low bid of $93,974 for grading and surfacing in city and county of Denver. **Blanchard Construction Co.,** Derby, submitted a low bid of $206,679 for 8.4 mi. of grading, structures and gravel surfacing between Walden and Hebron on No. 14 in Jackson County. A low bid of $246,903 was submitted by **Gardner Construction Co.,** Glenwood Springs, for 2.7 mi. of grading and surfacing through city of Idaho Springs on S. H. No. 2 in Clear Creek County.

IDAHO

Eagle Construction Co., Boise, received a $1,648,885 contract for grading and surfacing on 4-lane divided roadway on 20.7 mi. and construction of overpass and concrete bridge, Snake River-Raft River in Cassia County. **James**

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Stewart Co., Phoenix, Arizona, received a $1,385,000 contract to construct a laboratory and service building to serve the Experimental Breeder Reactor II project. **Twin Falls Construction Co.,** Twin Falls, received a $488,244 contract for grading, structures and surfacing on 10.7 mi. of State Hwy. No. 25, in Jerome and Minidoka counties. **McAtee & Heath** of Spokane, Wash. received a $261,342 contract for grading and surfacing 11.7 mi. of U. S. Hwy. No. 95, Grangeville —North of Fenn in Idaho County. **J. O. Young & Sons** of Nampa received a $143,989 contract for construction of bridge and approaches over the Payette River in Payette County. **LeGrand Johnson,** Logan, Utah, received a $239,054 contract for grading and surfacing and miscellaneous work in Bingham County. A $138,659 contract was received by **T & S Construction Co.** of Twin Falls for grading and surfacing on 7.5 mi. of the Rogerson-Cedar Creek Res. road, Rogerson-Salmon Falls Dam, in Twin Falls County.

MONTANA

Naranche & Konda, Butte, received a $1,058,369 contract for 10.4 mi. of grading and surfacing the Wolf Creek-Augusta Highway in Lewis and Clark County. **Cherf Bros. & Sandkay,** Ephrata, Wash., received a $347,819 contract for structures on the Crow Agency-Hardin Highway in Big Horn County. **Roth Construction Co.,** Rapid City, South Dakota, received a $218,441 contract for 7.4 mi. of grading and surfacing on the Wibaux-Sidney Highway in Richland County. **Long Construction Co.,** Billings, received a $156,941 contract for 6.5 mi. of grading and surfacing the Wyoming Line-Crow Agency Highway in Big Horn County. A $143,831 contract was received by **Union Credit Co.,** Butte, for 3.4 mi. of grading, draining and surfacing on Eden-Great Falls Highway in Cascade County. **Billings Blacktop Co.** and **Gibson Construction Co.,** Billings, received a $140,740 contract for 1.2 mi. of grading and surfacing on Forsyth-Northwest Highway in Rosebud County. **Nilson Smith Construction Co.,** Great Falls, received a $134,441 contract for 7.4 mi. of grading and surfacing the Pablo-Kalispell Highway in Lake County. A $110,664 contract was received by **Richardson Construction Co.** of Miles City for 11.7 mi. of grading and surfacing the Winnett-South Highway in Musselshell and Petroleum Counties.

NEVADA

Isbell Construction Co., Reno, received two contracts for roadwork in Washoe County. A $253,634 contract for construction of a portion of the State Highway System, from Junction with S. R. 33 near Reno, northerly via Sun Valley Drive to Sun Valley and $257,567 for construction of S.R. 33 in city of Reno. **Dodge Construction Co.,** Fallon, received a $162,407 contract for construction of a portion of the State Highway System near Minden and Cradlebaugh Bridge in Douglas County. **Hoops Construction Co.,** Elko, received a $217,567 contract for grading and surfacing a portion of the State Highway near East Ely in White Pine County.

NEW MEXICO

A $3,000,000 contract has been received by the **J. F. White Engineering Corp.** of Englewood, Colo. for construction of a power plant addition to the Chino Mines plant of the Kennecott Copper Corp. at Hurley. The Chino Mines plant is fifth in production among the Kennecott Copper-producing enterprises in the Rocky Mountain region. **Brown Construction Co.,** Albuquerque, received two contracts for roadwork in Socorro and Valencia counties: $977,599 contract for 4.3 mi. of grading and surfacing the Bernardo Interchange and North in Socorro County, and $566,447 for 1.9 mi. of grading and surfacing the Belen Urban and Overpass in Valencia County. **Haake Construction Co., Inc.,** Santa Fe, received a $316,373 contract for 8.3 mi. of grading and surfacing in McKinley County. A $312,874 contract was received by **D. D. Skousen & Son** of Albuquerque for 4.2 mi. of grading and surfacing the Gobernador-East road in Rio Arriba County. **Leslie Wheeler** of Albuquerque received a $102,355 contract for construction of portions of the highway in De Baca, Roosevelt, Curry and Chaves counties.

OREGON

R. A. Heintz Construction Co., Portland, submitted a low bid of $2,635,493 for the Talent Div. Emigrant Dam enlargement, Rogue River Basin Project. A low bid of $521,615 was submitted by **Newport Construction Co.** of Portland for grading and structures on 7.1 mi. of the Muleshoe Creek-Burton Canyon Section of the John Day Highway in Wheeler County. **O. C. Yocom Co.** of McMinnville submitted a low bid of $194,852 for 1.9 mi. of grading and surfacing 3 mi. east of McMinnville in Yamhill County. **Tom Lillebo Construction Co.,** Reedsport, submitted a low bid of $569,819 for construction of Grande Ronde River Bridges near LaGrande on the Old Oregon Trail Highway in Union County. A low bid of $286,239 was submitted by **Warren Northwest, Inc.,** Portland, for grading, paving and structure on 4 mi. of the Hillsboro-Campbell Bridge Section of the Hillsboro-Silverton Highway in Washington County. **Fred H. Slate Co.** and **E. C. Hall Co.,** Portland, submitted a low bid of $462,065 for 3.7 mi. of grading and surfacing on Multnomah Falls-Dodson Section of the Columbia River Highway in Multnomah County. **Roy L. Houck & Sons** and **Roy L. Houck Sons Corp.,** Salem, submitted a low bid of $890,440 for grading and surfacing on the Harbor Drive-Lowell Street Unit, Harbor Drive-Wash. County Line Section of the Pacific Highway in Multnomah County. **Kuckenberg Construction Co., Inc.,** Portland, submitted a low bid of $308,899 for S. W. Terwilliger Blvd. Unit of R. H. Baldock Freeway in Portland, Multnomah County. **Babler Bros., Inc.,** Portland, submitted a low bid of $353,602 for the Emigrant Reservoir Section of the Green Springs Highway southeast of Ashland in Jackson County. Work consists of 4.5 mi. of grading, paving and structure. **Central Paving Co.,** Independence, submitted a low bid of $161,555 for 3 mi. of grading and paving south of Salem in Marion County. **Keystone Const. Co. Inc.** of Prineville, submitted a low bid of $296,021 for 7.1 mi. of grading and oiling the West Unit, Post-Camp Creek Section of the Paulina Highway, west of Post in Crook County. **United Contracting Co.,** Portland, submitted a low bid of $154,785 for 1.9 mi. of grading and paving on the Seaside Section of the Oregon Coast Highway in Clatsop County. A low bid of $468,830 was submitted by **Fred H. Slate Co.** and **E. C. Hall Co.** of Portland for grading and paving on 2.5 mi. of the Wauna-Westport Section of the Columbia River Highway, east of Astoria in Clatsop County. Hame

Corp., Roseburg, received a $756,590 contract for relocation of the U. S. Forest West Side Road in the dam area of Cougar reservoir on the South Fork McKenzie River, south of Blue River. **Mack Slate Jr.,** Albany, received $163,660 contract for relocating the West Side U. S. Forest Service road at Hills Creek reservoir on the Middle Fork Willamette River. **J. M. Steinmuller, Jr.,** Eugene, submitted a low bid of $508,498 for construction of concrete lined channel at Amazon Creek near Eugene. A $134,016 contract was received by **Albert J. Firchau,** Reedsport, for relocating the County Road No. 736 at Hills Creek Reservoir on the Middle Fork Willamette River, Lane County. **C. R. O'Neil,** Creswell, submitted a low bid of $709,692 for 9.7 mi. of grading and surfacing the North Santiam Highway in Marion County. **Morrison-Knudsen Co., Inc.** of Boise, Idaho, submitted a low bid of $2,554,745 for 3.2 mi. of the Hooskanaden Creek-Thomas Creek Section of the Oregon Coast Highway north of Brookings in Curry County. **C. C. Meisel,** McMinnville, submitted a low bid of $224,558 for 5.8 mi. of grading and oiling on the Kimberly-Long Highway in Grant County.

UTAH

The Arch Dam Constructors, Omaha, Nebr., (joint venture for: **Peter Kiewit Sons' Co., Inc., Morrison-Knudsen Co., Inc., Mid Valley Utility Constructors Inc.,** and **Loker Construction, Inc.**) submitted a low bid of $29,602,497 for the Flaming Gorge Dam and Powerplant, Flaming Gorge Unit, Utah-Wyoming Green Division of the Colorado River Storage Project. **M. H. Hasler Construction Co.** and **H. C. Smith Construction Co.,** Los Angeles, Calif., received a $1,701,140 contract for first State construction of the Willard Dam and Reservoir on the Weber Basin Project. **M. Morrin & Sons Co.,** Ogden, submitted a low bid of $1,765,170 for grading and surfacing on 3.1 mi. of Highway No. 80 and construction of two bridges in Tooele County. **W. W. Clyde & Co.,** Springville, submitted a low bid of $372,401 for 7.9 mi. of grading and surfacing the Redwood Road in Salt Lake County. A low bid of $265,377 was submitted by **Harris Bethers and Bethers & Stoker,** Salt Lake City, for grading and surfacing on 8.5 mi. of Highway 262 in San Juan County. **Morrison-Knudsen Co., Inc.,** Salt Lake City, submitted a low bid of $298,821 for 2.8 mi. of grading and surfacing on State Road No. 46, west of the Utah-Colorado Line in San Juan County. **Sorenson Construction Co.,** Salt Lake City, submitted a low bid of $153,429 for grading and surfacing on 4.9 mi. of Highway No. 133 and one concrete structure in Summit County. A low bid of $128,311 was submitted by **Thorn Construction Co.** of Springville for 3.9 mi. of grading and surfacing on Highway No. 185 in Utah County. **Rosendahl Corp.** of Los Angeles, Calif. received a $2,517,000 contract for construction contract No. 5, of Marquardt Aircraft Co. in Weber County. **General Contractors,** Las Vegas, Nevada, received a $252,260 contract for 2 overpass and 1 underpass structures in Washington County. **R. M. Jensen Construction Co.,** Salt Lake City, submitted low bid of $195,663 for 2.1 mi. of grading and surfacing Greendale Junction—Flaming Gorge Dam in Daggett County.

WASHINGTON

Northwest Construction Co., Seattle, received a $1,281,938 contract for paving U. S. 99, from Portage Creek south of the Stillaguamish River north to Conway Junction in Skagit and Snohomish counties. **F. R. Hewett Co.,** Spokane, received a $839,832 contract for 11.9 mi. of grading and surfacing, Davenport to Rearden in Lincoln County. A $490,184 contract was received by **J. J. Welcome Construction Co.,** Redmond, for grading and surfacing 2.5 mi., from Schneiders Prairie to Mason County Line in Thurston County. **Kathman Construction Co., Inc.,** Kenmore, received a $455,956 contract for 2.8 mi. of grading and surfacing in King and Snohomish Counties. **Quigg Bros.** and **McDonald, Inc.** of Hoquiam received a $393,079 contract for construction of twin bridges across the Yakima River and another across State Highway 2 in Easton, Kittitas County. **Fred H. Slate Co., Ore. Ltd.** and **E. C. Hall Co.,** Portland, Ore. received a $434,078 contract for clearing and grading on new highway from Knappton to Bean Creek south of Nasell in Pacific County. **C. E. Oneal, Inc.,** Ellensburg, received a $323,597 contract for grading and surfacing on the Loon Lake Cutoff on State High-

(Continued on page 116)

ENGINEERS and CONTRACTORS

Brig. Gen. William F. Cassidy is the recipient of the 1957 Wheeler Medal from the Society of American Military Engineers. In making the announcement, **Rear Adm. H. Arnold Karo,** National SAME president, said the award was presented to General Cassidy for his "outstanding leadership in directing the flood fighting and disaster relief activities of the Corps during the California floods of 1955-1956." General Cassidy left San Francisco as division engineer on July 1 for another assignment.

* * *

Pacific Bridge Co. has moved its headquarters from San Francisco to a 50-ac. site at the foot of Sherman St. in Alameda on the eastern shore of San Francisco Bay. Described by its president, **William G. Swigert, Jr.,** as the oldest construction firm in the West, Pacific Bridge was founded in 1869. Among the major projects built by this company through the years are included the piers for the Golden Gate Bridge, and for the western section of the San Francisco-Oakland Bay Bridge. Pacific Bridge was one of the participating firms in the joint venture known as the Six Companies which built Hoover Dam.

* * *

Jerome B. Gilbert has joined the North Marin County Water District, Novato, Calif., as chief engineer and assistant general manager. Prior to his new connection Gilbert was assistant to **T. C. Binkley,** consulting engineer in Palo Alto, Calif. Gilbert is the author of an article which appeared in WESTERN CONSTRUCTION, May 1958, on the construction of Middlefield Reservoir of the Alameda County Water District for which project Binkley was engineer.

* * *

Mel Hord, formerly with General Construction Co., recently joined the Mountain Pacific Chapter, Associated General Contractors, Seattle, as labor relations director. He will also head up the accident prevention program. Hord has a wide background in labor problems. He served as chief engineer for Henry Kaiser & Co. during World War II, and as assistant project manager at Hungry Horse Dam in Montana. He has participated in negotiations of labor agreements in sections of the Northwest, and has been on joint labor committees of the Seattle and Mountain Pacific chapters.

BRIG. GEN. ROBERT G. MacDONNELL, successor to *Brig. Gen. William F. Cassidy* as division engineer of the Army's Corps of Engineers, South Pacific Division. General MacDonnell came to San Francisco from Fort Belvoir, Va., in June and has been acting division engineer during the iterim period. He will direct the spending of $240,000,000 for this year's South Pacific Division construction program.

* * *

Phillip L. Cole has been named resident engineer at the Corps of Engineers' $40,000,000 Hills Creek Dam project on the Middle Fork Willamette River. He has been acting resident since **Joseph C. Patterson** transferred to the Omaha District last May. Before coming to the Portland District in 1948, Cole operated his own contracting firm, Paramount Construction Co.

* * *

S. E. Hunkin was recently elected chairman of the board of The Hunkin-Conkey Construction Co., large general contractors. He will continue to be active in the business. Succeeding his father as president and treasurer is **William J. Hunkin II.** The firm has been identified with many of the West's large construction projects, including Shasta and Chief Joseph dams.

* * *

Capt. Orris F. Haynie, who ha

TO ASSURE the utmost fairness, both to the contractor and to the Government, in analyzing competitive bids submitted to the U. S. Army Engineer District, Alaska, *Col. P. V. Kieffer, Jr.,* district engineer, reappointed a bids review board for another year. Board members, from left, are: *Carl L. Knutson,* supervision and inspection chief for the construction division; *Douglas L. Edwards,* chief of the legal branch; *Robert E. Lee,* chief of the engineering control branch; and *Daniel V. Cronin,* chief of the supply branch, who is board chairman.

6 YARDS PER MINUTE WITH A 105 EXCAVATOR

Constructing a dam spillway involves a considerable amount of earth moving. It also presents loading problems because of extremely tight working quarters.

At a dam project, they had been moving earth, consisting mainly of decomposed shale, with ¾ yd. shovels loading from stockpiles pushed up by a bulldozer. In addition, the bulldozer had to rip the earth before dozing. This meant three separate operations — extra equipment tied up — an extremely costly, time-consuming job.

A versatile EIMCO 105 Excavator moved in — flying earth was all that could be seen from then on. The 105 overhead loader walked into the narrow spillway channel, started loading out 6-yard dumptors at the rate of one every 40 seconds — total time lapse for dumptor to move in, be loaded, move out: ONE MINUTE. The bulldozing and ripping operations were completely eliminated — production costs, equipment required, and time consumed were reduced to an absolute minimum.

EIMCO also manufactures a 105 Front End Loader with the same rugged construction and high production rates as the 105 Excavator. Write The EIMCO Corporation for detailed information on EIMCO high production, cost-saving 105 Loaders.

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B-339

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been on the staff of the U. S. Army Engineer District, Alaska, as project engineer for family housing, has been assigned to the post of district executive, with headquarters at Anchorage.

* * *

Of three honorary members elected to the American Society of Civil Engineers at the 214th national convention recently held at Portland, Ore., two are from the West: **A M Rawn,** chief engineer and general manager of the Los Angeles County Sanitation Districts, and **Henry J. Brunnier,** consulting engineer of San Francisco. More than 1,000 ASCE members were in attendance at the meeting which featured panel discussions on freeways and a field trip to The Dalles Dam.

* * *

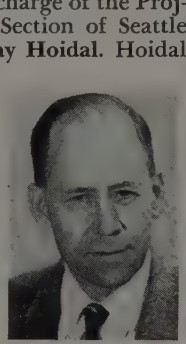
Two employees of the Portland District, Corps of Engineers, retired June 1 with service totaling more than 59 years. They are **Frank E. Driscoll,** general construction inspector at The Dalles Dam regional office, and **George B. Faris,** assistant chief of the drafting section at the Portland office.

* * *

Col. Harry R. Davis has been appointed Deputy Division Engineer of the North Pacific Army Engineer Division, in Portland, succeeding **Col. Richard F. Ebbs,** who recently retired. Before coming to Portland to take over his new duties, Colonel Davis was Engineer of the Fifth Army, Chicago.

* * *

Named to replace **Charles E. Shelving,** recently retired as chief civil engineer in charge of the Project Engineering Section of Seattle City Light, is **Ray Hoidal.** Hoidal



Ray Hoidal

started with City Light in 1946 as a senior inspector. In 1949 he was appointed design engineer. During that time he has worked on all of the department's major projects including Ross Dam and Powerhouse, Gorge Powerhouse expansion, and Gorge High Dam.

* * *

Maj. Gen. E. C. Itschner, one-time Seattle district engineer, and later North Pacific division engineer with headquarters in Portland, was recently installed as president of the American Society of Military Engineers.

* * *

Col. P. V. Kieffer, Jr., Alaska District Engineer, Anchorage, has been assigned to a new post in the office of the Secretary of Defense. He reports for duty in his new assignment in Washington, D. C., on Aug. 18. He has been succeeded as Alsaka District Engineer by **Lt. Col. W. C. Gribble, Jr.,** who was assistant district engineer for planning and deputy district engineer.

NEW TECHNIQUES to reduce construction costs through the use of steel were discussed at a structural steel seminar of the American Institute of Steel Construction in Oakland, Calif., by (l. to r.) *Stephen G. Herrick,* an A.I.S.C. vice president; *Charles M. Herd,* chief construction engineer, California State Division of Architecture; *John A. Blume,* a vice president of American Society of Civil Engineers; *C. M. Gilliss,* chairman and California Director of Public Works; and *F. W. Panhorst,* assistant state highway engineer for California. Blume and Gilliss, principal speakers at the meeting, envisioned a record-breaking building boom for California in the 1960's.

CALENDAR

Sept. 21-25—Prestressed Concrete Institute, annual convention, Edgewater Beach Hotel, Chicago, Ill.

Sept. 29-Oct. 2—American Road Builders' Association, annual highway conference, Concord Hotel, Kiamesha Lake, N. Y.

Oct. 13-17—American Society of Civil Engineers, annual convention, Hotel Statler, New York, N. Y.

Oct. 26-31—International Road Federation, third world meeting, Mexico City, Mexico.

Dec. 1-5—American Association of State Highway Officials, annual meeting, Sheraton-Palace Hotel, San Francisco, Calif.

1959

Jan. 14-15—The Beavers, fourth annual awards dinner, Los Angeles, Calif.

Jan. 19-22—American Road Builders' Association, annual convention, Dallas, Tex.

Jan. 25-29—Associated Equipment Distributors, annual meeting, Conrad Hilton Hotel, Chicago, Ill.

Jan. 28-30—The Institute of Transportation and Traffic Engineering, annual California Street and Highway Conference, Berkeley campus of the University of California.

Feb. 2-6—National Bituminous Concrete Association, annual convention, American Hotel, Miami, Fla.

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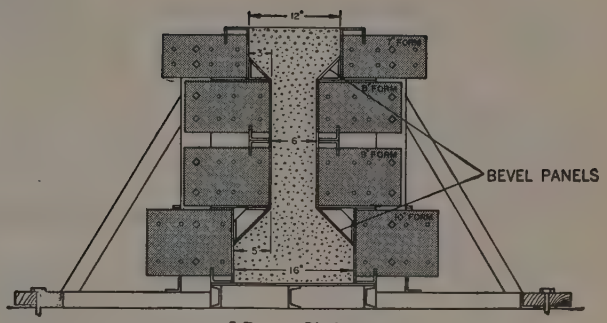
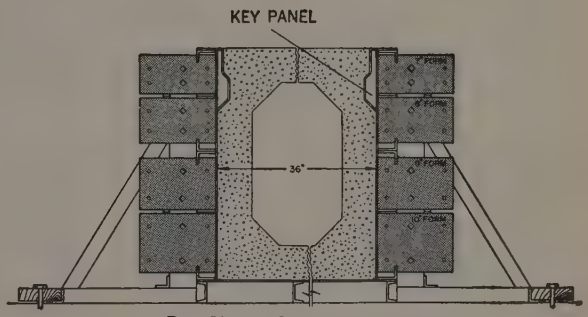
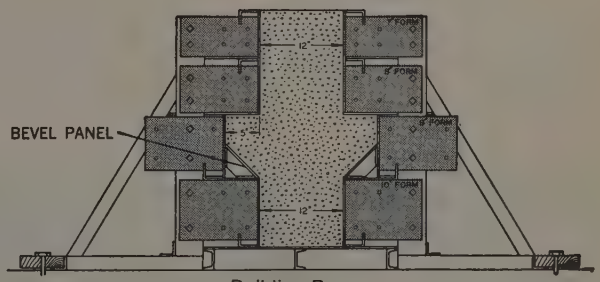


I-Beam Girder



Box Girder, Slab or Channel



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SUPERVISING the jobs

Claude Roper is Graham Construction Co.'s superintendent on a $406,510 contract for grading, surfacing and structures on 5.4 mi. of State Highway 2, between Craig and Lay in Moffat County, Colo. **Sam Rother** is pipe foreman. Master mechanics are **George Kuntz** and **Theran Nelson. Bob Gouty** is stake setter; **Bob Roberts,** shovel operator; **Ben Millage,** blade operator; and **Marion Quick,** backhoe operator. Job got under way April 10 and will finish about Aug. 15.

* * *

R. E. "Bob" Phillips, superintendent for Northwestern Engineering Co. for the past eight years, has resigned. During the past three years, he was general superintendent in charge of construction on air bases in Montana. Phillips reports his future plans are not yet definite.

* * *

Ollie Lesh, general superintendent, **L. E. Davis,** assistant superintendent, **W. J. Trousdale,** office engineer, and **David S. Thomas,** field engineer, comprise Robert E. McKee's key men in construction of permanent facilities at the Youth Training School at Chino, Calif. The buildings are of concrete, structural steel and masonry construction. Bid price was $2,774,000. Contractor started work in May and expects to have it finished towards the end of 1959.

* * *

Guy Scott is superintending a $1,318,441 job for Peter Kiewit Sons' Co. in Curry County, Ore. The office is managed by **Bill Allen. Eddie Thiel** is the master mechanic. Work involves 3.5 mi. of grading and surfacing on the Burnt Hill-Hooskanaden Creek section of the Oregon Coast Highway south of Gold Beach. Started in May, construction will be finished next summer.

* * *

Roger W. Wilson, grading superintendent, and **"Hod" Wachter,** crushing superintendent, are head men for F. R. Hewett Co., successful bidder on 4.6 mi. of grading, surfacing, oiling and bridges located in Whitman County, Wash. from Ewan to Cottonwood Creek and Pleasant Valley Creek. Bridges are subcontracted to Snitily Bros. This job started in May and will be complete in August. Contract price $410,609.

* * *

Ross R. Bevan, project manager and **William R. Pryde,** superintendent, head the job personnel working for Detweilers, Inc., who have the contract for expansion for high temperature hot water boiler house and distribution system at Mountain Home AFB in Idaho. The $1,210,631 contract got under way in mid-April and will be complete about Sept. 1, next year.

* * *

Edwin V. Harris is project manager for M. H. Golden Construction Co.'s $1,594,000 contract covering school and auditorium construction at the Naval Amphibious Base, Coronado, Calif. Superintendent on this job is **Art Vitus,** who has the assistance of **H. Schmoke** and **Curtis Knudsen,** both foremen. Under way since May, Harris expects the construction to be completed about July next year.

* * *

M. Erd, superintendent for Nels Mortensen & Co., Inc., is in charge of construction of 67 frame housing units at Glasgow AFB, Montana, a $1,373,214 contract under way since May, and scheduled for completion next January.

* * *

C. H. Foster is general superintendent for Morrison-Knudsen Co., Inc., on reconstruction and reconditioning of roadbed on 10.6 mi. of State Highway 21, Lucky Peak Dam-north, in Ada and Boise counties, Idaho. This is a $432,846 project within the M-K construction area managed by **P. H. Prewitt.** Area office manager is **Lloyd Ferguson,** who reports that the job is scheduled for completion Sept.

* * *

Arnold Malley is supervising Manson Construction & Engineering Co.'s $776,927 contract to build

LONGER, MORE PROFITABLE ROLLER LIFE—THE RESULT OF CONTINUOUS IMPROVEMENT OF CATERPILLAR PARTS

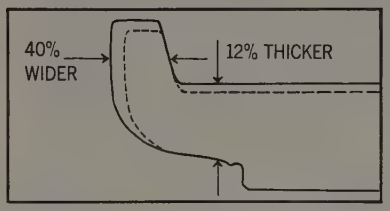
Cat "500" Track Rollers for D8s now have increased rim size for greater strength

A ceaseless search for ways to improve parts performance goes on at Caterpillar. Engineers are constantly striving to make each machine part do its job better, longer and more economically. The payoff for the customer is the steadily improving performance of Cat machines on the job.

New "500" Track Rollers for Cat D8 Tractors, for example, have been redesigned to better resist wear and breakage on the tough jobs. The roller rim has been thickened 12% in its critical area; the flange is 40% wider. The new design prevents roll-over and bending of the outer flange under severe side hill loads.

All Cat roller rims are designed so that treads and flanges may be economically rebuilt by automatic welding—a feature which results in big savings over the life of a tractor.

But that's only part of the story. Matchless Caterpillar quality starts with selection of steel. Extensive testing in Caterpillar metallurgical laboratories eliminates all but the finest quality steel *before* roller manufacturing begins. Further tests (61 in all) are made at every stage of production.



ADDITIONAL MATERIAL on new D8 roller rim is shown by dotted line, above. Thicker, stronger flanges give greater wear resistance and a longer productive life.

Cat roller rims are made from forgings to insure maximum strength and uniformity. They are bored and given a controlled heat treatment producing thick, file-hard wear surfaces; the remainder is left tough to resist shock damage.

These rims are shrunk onto cast-iron hubs of high compressive strength and then center welded. This prevents bore distortion and separation. Automatic precision machines finish-bore the roller assemblies. Careful inspection guarantees uniform quality.

Similar Caterpillar quality is built into track roller bearings and shafts, too. A special bronze alloy is used in Cat bearings to support extra-heavy loads. A cast-iron bushing with high compressive strength encloses the bearing.

There is only one way to get maximum production—the production you paid for—from your equipment. Keep your big, yellow machines on the job by using only constantly improved genuine Cat parts. Your Caterpillar Dealer has full information about the new Cat "500" Track Rollers and all the other quality Caterpillar parts. See him today.

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

SERVICE TIP

Ask your Caterpillar Dealer about the additional economies provided by 500-hour lubrication periods.

CATERPILLAR

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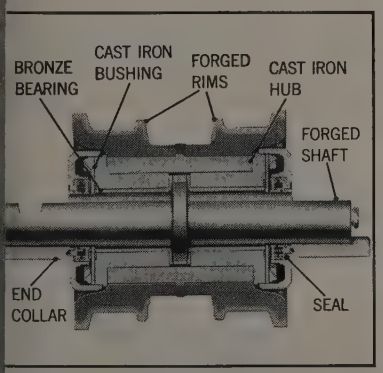

ROLLER CROSS SECTION of Cat "500" Track Roller shows rugged construction. Roller shafts are forged for controlled grain structure, maximum toughness and to permit superior heat treatment. Wear surfaces are hardened to a depth of at least 3/32", leaving a tough, strong core.

TOUGH JOBS, like the one pictured above, play havoc with any but the best track rollers. Here's what happened on an actual job: New Cat rollers were installed on the right side of a tractor; another brand of rollers on the left side. After 668 work hours, seals and bearings of two of the other brand rollers failed. They broke up and were lost from the roller shell. The Cat rollers showed normal wear and the 500-hour lubrication proved its value. Owners everywhere are proving that it pays to standardize on Caterpillar—equipment *and* parts.

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a bridge across the Skagit River 971 ft. long, with four water piers in Washington. **Oliver N. Malley** is timekeeper. Foremen on this job, which has been under way since March and earmarked for completion the end of April next year, are: **Ray House** and **Victor Riddle**, pile-driver, and **Bill Straw** carpenter.

* * *

Forrest W. Morse, partner in the construction firm of Morse Bros., aided by **Tommy Carter** as paving foreman, is in charge of a recent award to the company for 3.2 miles of grading and paving the Newberg-Gearin section of the Hillsboro-Silverton highway in Yamhill and Marion counties, Ore. This $207,151 job has been under way since May.

* * *

Grover Bennett, W. R. Cahoon Construction Co.'s superintendent, heads the job personnel constructing a 118-ft. prestressed concrete highway overpass over interchange at Lima, and another 450-ft. steel and concrete highway overpass over the U. P. railroad tracks, on the Idaho line-Dillon highway in Beaverhead County, Mont. Foreman on this $213,007 project, which will be finished Nov. 1, is **Clarence M. Smith.**

* * *

David L. Massie, superintendent for Northwestern Engineering Co., is supervising grading and structures located between Wyoming state line and Virginia Dale in Larimer County, Colo. There are 262,000 cu. yd. of rock excavation, 525 cu. yd. concrete, and 46,100 L.F. B/W fence in this $437,768 contract. Other key men on this job, now in the finishing stage, are **James D. Bostock**, power foreman; **Adelbert K. Warner**, grade foreman, **William A. Raines**, master mechanic, and **Henry Knight**, field clerk. **Valbert G. White** is the contractor's engineer.

* * *

Walter Reid is supervising a $1,286,510 recent award to Gardner Construction Co. covering grading, structures and surfacing on the Colorado Springs Freeway in El Paso County, Colo. Steel foreman is **Mike Raehal**; carpenter foreman **Harold Hasse**; labor foreman, **Lawrence Rovedo.** Expected to be finished in December, the job started in May.

* * *

Floyd Hardenbrook is superintending some work for B-E-C-K Constructors at Eielson AFB, Alas-

(Continued on page 104)

HAULING GIANTS

COOK BROS.

One of a fleet of 8 units operated by Fife Construction Co. of Brigham City, Utah

SPEED UP THE JOB!

On or off the highway, in rugged mountainous areas, or out on the desert, Cook Bros. Bottom Dump Semi Trailers offer the construction contractor the fastest hauling cycle of ANY equipment on the market.

FASTER LOADING Using either a stationary or traveling belt type loader, a full 35 Ton payload is "on the way" in less than 45 seconds.

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MASTER MECHANIC®

Exhaust fumes in tunnel

Change in fuel for locomotive engines reduces objectionable odors and gas on Wyoming job.

AN EXHAUST gas problem encountered during the construction of a 3-mi. tunnel as part of the Fremont Canyon Project in Wyoming produced a solution which may help others using diesel engine-powered vehicles in underground work.

The Coker-Kiewit-Cunningham Construction Co., Casper, Wyoming, is now engaged in the building of a water diversion tunnel which will carry water from the Pathfinder Dam to a nearby hytroelectric plant and then on to a reservoir. When finished, the tunnel will be 20 ft. in diameter and is being cut through solid granite. An adit was made at approximately the half-way mark and tunneling operations are proceeding in both directions from that point.

Used in this operation are four DRXC Hercules diesel engine locomotives. Because of the high altitude of the job and low temperature conditions in the tunnel, use of the diesel locomotives brought up a serious problem. While diesel engines produce little or no monoxide gases, other gases emitting from the exhaust system caused considerable trouble.

Clyde Sissman, Jr., Power Equipment, Inc., Casper, Wyoming, and Robert Williams, general superintendent of the project for Coker-Kiewit-Cunningham decided upon a replacement for their regular diesel fuel as a means of cutting down or eliminating troublesome exhaust gases. Tests led them to a white kerosene-Marvel Mystery Oil mixture.

Further experimentation gave them exact proportions of the full mixture: 1% Marvel Oil or a 55-gal. drum to every 5,500 gal. of kerosene. The resultant fuel was clean burning and produced no objectionable odors or gases. On-the-job tests confirmed results.

The new fuel was soon put into daily use and has, over the past five months, produced successful results. Construction reports advise that a non-professional visitor to the tunnel could not detect the smell of diesel engines at work. The clean-burning qualities of the mixture are augmented by running exhaust gases through a standard diesel exhaust scrubber.

Locomotives are currently operating on a 24-hr. day, six-day week. Since use of the new fuel was begun, each engine has had better than 3,000 hours of operating time. Only normal nozzle service has been required and under its regular fortnightly service schedule, no fuel injection pump trouble has arisen. Energy cells of the Hercules engines have been staying exceptionally clean and free of carbon.

Make sure of your ground

DURING ARC welding a heavy electric current passes from the arc welding generator through cables to the metal being welded. It then jumps across a gap, melts the metal electrode and returns to the generator. The path of the electric current traveling *from* the ground clamp through a tractor, engine or other piece of equipment to the point where the arc occurs is of the greatest importance.

According to the Service Department of Caterpillar Tractor Co., an arc is likely to occur wherever a gap interrups the flow of current. The heavy welding current may also break up and take numerous paths through a machine on which the welding is being performed. Should the current encounter an air gap across a bearing in an engine, it is possible for welding to take place right there. Although fusion of the two pieces may not take place, weld blotches on a bearing or gear can cause an early failure of the part—simply because the ground connection of the arc welder was not properly placed.

Transmission bearing, engine bearing and gear failures have been traced to arc welds on those parts. Arcs have been known to occur in the transmission when the welding was being done on the front end of a tractor.

The paths taken by the return current to a welding generator are unpredictable. The only certain thing about electric current is that it will travel the route of least resistance. For this reason it's best to fasten a ground clamp directly to the piece being welded. If this is impractical, take extra care to clean off rust, paint or oil to give the return current the least chance of going astray.

Notes from chapters of EMSA

OFFICERS HAVE been elected for the San Diego chapter of the Equipment Maintenance Supervisors Association. Elected president is Keith Robertson, Construction Machinery Co.; 1st vice-president is Fred Cody, Griffith Co.; 2nd vice-president is Allan Watson, Fenton Materials; secretary, Edwin Johnson, Hawthorne Machinery; and treasurer, Frank Lawson, Caudell & Johnson. For more information regarding the San Diego EMSA, contact Keith Robertson, 6265 Broadmoor Drive, La Mesa, Calif.

At the last meeting of the Los Angeles chapter the guest speaker generated a great deal of audience interest and response with his talk entitled, "Engine Wear and Air Filters." The speaker was Allen W. Hardy, research director of Farr Co., a firm which for twenty years has dealt with air filtration problems in heavy engines. For the past four years the company has been developing a dry cyclonic air cleaner followed by a resin impregnated paper strainer after filter for use on off-highway engines. There was a fruitful question and answer period following Hardy's presentation.

A record crowd turned out for the third monthly meeting of the San Francisco Bay Area chapter of the EMSA. The meeting was presided over by 1st Vice-President Mel Walker of Peter Kiewit Sons' Co. The speaker was Al Kent of American Tractor Equipment Corp. speaking on "Rippers." A short film on the subject was shown. The members discussed possibilities for subjects for future meetings with considerable interest shown in transportation permits, off-highway tires, air cleaners, welding, and superchargers.

Hot weather tips for equipment

From the Le-Tourneau-Westinghouse Co. come these tips on how to keep machines at high efficiency during the summer months.

Cooling System

Drain and flush to remove rust and sludge. A clogged cooling system slows circulation, causes engine to overheat. To remove heavy lime scales or other deposits that will not flush out, use sal soda or any other cooling system cleanser. After cleaning, drain system completely. When engine has cooled, flush with clean water. If your solvent requires neutralizer, flush with recommended solution. Check radiator, hose or connections for leaks. Be sure connections are tight. Repair or replace damaged parts.

Radiator

If fins are clogged with dirt, clean with stream of air or water. If fan is puller-type, force air from back (or fan side) to front side of core. If pusher-type, force air through front to back (or fan side) of core. Keep cooling system filled with clean water. Be sure water is free from lime or alkali. Alkali water will corrode metal parts. Lime water forms dangerous deposits in cylinder head and block. To prevent rust, add rust inhibitor to coolant.

Water pump

Check to see that water pump is in good condition—that its pulley or fan belts are not slipping. Belts have proper tension when they can be pushed down about ¾ in. with normal thumb pressure. Proper water circulation during hot weather is IMPORTANT!

Axles

Check axle bearings for wear or damage. Adjust or replace, if necessary.

Engine

Nothing can operate under a blanket of dirt, and the engines powering your Tournapulls and your Tournatractors are no exception. Keep 'em clean. Use a wiping rag to keep the outside of the engine wiped clean. That done, also remember to clean dirt, oil and debris from the bottom of the engine compartment. If you haven't done this for quite a while, you'll be surprised at the accumulation your rig has been carrying around after a season's operation. Clean it out and KEEP it clean.

Oil

Drain heavy, winter-weight oils from engine crankcase, transmission, final drive and electric motor gear boxes. Use a good flushing oil to remove sediment and sludge. Refill with good quality, summer-weight oil. (Refer to your equipment manuals for recommended oil weight.) Do not try to economize by using winter-weight oil in summer. The lighter oil will not lubricate properly, and expensive damage to equipment can result. Using oil recommended for specific seasons is good sense.

Scrapers

Checking ball and socket joints, hinge pins, tailgate rollers and bearings will reveal needed repairs or replacement that should be made before this summer's construction activity gets into full swing. Now is the time, too, to replace worn blades and ground plates, so that you can start things rolling with everything in tiptop condition. Another important thing: Examine scraper closely for cracks or breaks, and re-weld promptly any that are found.

Tires

Check for cuts and breaks. Repair or replace badly damaged tires and tubes.

Daily checks

Each shift, check tire pressures, battery water level and oil level. Each morning before operating, lubricate necessary parts.

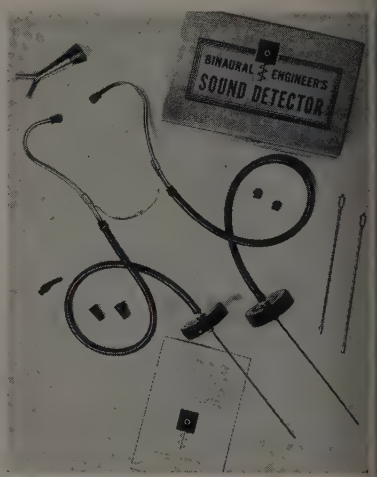
Paint

There are very good reasons for keeping your machine painted—in addition to improving its appearance. Unpainted surfaces rust easily. Clean and paint worn parts not subject to scour. Also . . . clean and paint all recent welds.

A sound detector to help locate engine trouble

A NEW Binaural Engineer's Sound Detector makes it possible to locate the smallest internal defects in moving machinery without shutting down or otherwise taking equipment out of service.

This lightweight detector amplifies normally inaudible defect-caused noises and helps the user to accurately locate broken, loose, worn or bent parts in engines, gear boxes, compressors, pumps and similar equipment, regardless of size. It is also extremely useful in determining the efficiency of steam traps and for locating leaks in air, gas or liquid lines.



The instrument utilizes dual detectors to transmit sounds to one or both ears as desired. Each detector contains both a pick-up diaphragm and an amplifying diaphragm to provide maximum sound vibrations. The unique twin detector feature makes it possible for the engineer or maintenance man to listen to two different points at the same time, thus pin-pointing defects quickly and accurately.

When used on any type gasoline, steam or diesel engine, the instrument enables the user to correctly diagnose sounds caused by scored cylinders, bent shafts, worn bearings, excessive end play or lack of lubrication. Worn brushes, foreign matter, pitted shafts or bearings can easily be distinguished in electric motors, as can stuck or leaking valves in compressors and pumps.

The detector may be put together or disassembled in a matter of seconds and sells for $22.50 shipped insured parcel post prepaid anywhere within the continental USA. An 8-page booklet on its use is included.

. . . Circle No. 183

CLUTCH

CAT D9 TRACTOR: "We have operated this Cat D9 Tractor or 4,000 hours in the toughest kind of work without any repairs o the oil clutch," says Frank Hill of the Silva & Hill Construction Co., Los Angeles, California. "I just wouldn't consider buying a tractor without it now."

CAT NO. 955 TRAXCAVATOR: "In over 4,000 hours on our two hard-working No. 955 Traxcavators, we have made only one simple adjustment on an oil clutch and that took only about a half hour. It's much simpler than the old friction-type clutch," says M. J. Lutz of Bethel Park, Pennsylvania.

OWNERS REPORT TROUBLE-FREE OPERATION

CAT NO. 12 MOTOR GRADER: "Our No. 12 is starting its third season without interruption due to clutch trouble." With only one clutch adjustment in over 2,000 hours, Francis Bloomer, President of the John F. Bloomer Co., Appleton, Wisconsin, says, "We like the No. 12 with the oil clutch." This company, with 35 years of road construction work, owns a fleet of Cat-built equipment consisting of No. 12s, D9, D8s, DW21s.

CATERPILLAR

Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

LEADER IN EARTHMOVING RESEARCH

. . . for more details, circle No. 49 on Reader Service Postcard

Manuals on shores and scaffolds

A brief roundup of the best free literature published by the manufacturers of shoring and scaffolding. For your free copies circle the appropriate numbers on the Reader's Service Card.

Acrow

Acrow California has published a 4-page folder on its widely-used adjustable shores. A table is given of specifications for five sizes of shores, including such information as height closed and height extended, weight, failing load closed and extended, and safe working load closed and extended. Sequence photographs show the steps involved in setting up a typical slab shoring job. *. . . Circle No. 158*

An 8-page brochure is available which enables users of Acrow scaffolds to pick out at a glance the load that may safely be carried on any upright or on any horizontal part of the scaffold, within a range of heights and spans commonly met with in practice. Clearly labeled drawings indicate what the figure referred to in each of the tables. *. . . Circle No. 159*

The company also publishes a hard-covered 210-page catalog of its full line of form work, scaffolding, air compressors, sawing machines, concrete accessories, etc.

. . . Circle No. 160

Safway

A piece of literature is available from Safway Steel Products, Inc., describing the company's line of steel shores. With drawings, charts, tables, photographs, and text the folder describes the product in detail. Three sizes of shores are available to cover heights from 6 ft. to 15 ft. A group of job photographs shows the product in use on both typical and unusual projects.

. . . Circle No. 161

Safway has also published a 16-page folder describing its line of steel scaffolds. The publication shows how the versatile product has been used on a great variety of projects. A useful feature is a complete list of the company's distributors in each area.

. . . Circle No. 162

Patent

The Patent Scaffolding Co. Inc. has made available a 32-page manual on scaffolds and ladders for construction, concrete shoring, plant maintenance and building repairs. The manual has separate sections on sectional scaffolding, tubular steel scaffolding, steel shoring, suspended scaffolding, accessories, ladders, etc. The text is clearly illustrated with photographs and drawings and technical data are included for each product.

. . . Circle No. 163

Beatty

Beatty Safway Scaffold, Inc., the West's largest scaffold and grandstand manufacturing plant, has available a series of folders and bulletins describing the company's line of products and how they are used on many types of jobs. Some particularly useful information is given on the use of scaffolding for shoring concrete slabs. Sequence photographs show how in one minute, one man can set up an aluminum folding scaffold tower. Other subjects covered are maintenance towers, swing scaffolds, aluminum pipe and clamp scaffolds, and horizontal shoring. *. . . Circle No. 164*

Tubular Structures

An 18-page fold-out brochure devoted to the use of steel shoring frames for heavy-duty concrete shoring is available from Tubular Structures Corp. of America. A comparison table between steel shoring and lumber shoring points out the advantages of steel for this use. Three recent construction projects where steel frames for shoring were used are discussed and detailed drawings showing how the contractor supported the concrete are given. Another manual on the same subject will be ready for distribution soon.

. . . Circle No. 165

Baker-Roos

Baker-Roos, Inc., has publishe a fine 20-page manual on its wel known Rooshors and Roos colum clamps. The extension type shor which is partly wood and partl steel, is available in two sizes, ad justable from 8 to 14 ft. and fron 6 to 10½ ft. The operating prin ciples of the shore are very clearl explained and proper operatin and erection procedure is de scribed in detail with photograph and drawings. *. . . Circle No. 16*

A 16-page manual describes the Baker scaffold. This scaffold is fully adjustable to permit workmen to be at exactly the right height. Complete specifications are given on the ladder sections, the platform support truss, the casters, and other special equipment. The rolling type scaffold has no X-braces and thus can be rolled about in occupied areas over stockpiles and equipment. *. . . Circle No. 167*

Brainard

Brainard, a division of Sharon Steel Corp., has published a 12-page booklet describing its easy-to-use scaffolding system. The system has only one basic part, a small portable frame which one man can fit together to form any sized scaffold. Pictures show how two men can assemble a 14-ft. high tower in just three minutes. No nuts, bolts, pins or tools are required because the frames are inserted into one another and are held rigidly by a slip-fit and notch design. Job photographs and drawings describe the basic frame, the adjustable frame, the walk-through frame, the non-load-bearing tie-frame, tie-bars, horizontal braces, ladders, and accessories. A valuable feature is a list of 18 safety rules to remember when working with scaffolds.

. . . Circle No. 168

Waco

Several pieces of literature on shoring and scaffolding are available from Waco Manufacturing Company. The folders give detailed information on the construction and proper use of Waco steel shores and sectional scaffolding. A very useful table, based on a 3 to 1 safety factor, gives the rated capacity of the shores over the full height range. *. . . Circle No. 169*

With Allison Torqmatic Drive

this loader works like the Trojan it is

Allison TORQMATIC DRIVES team up with another great vehicle – the Trojan 404, a four-cubic-yard heavy-duty loader designed from its beginning to use a TORQMATIC CRT-5630.

For years in the earth-moving field the TORQMATIC CRT-5630 has proved its capabilities in tractors, bulldozers and scrapers. And now it enables the Trojan 404 to deliver an upswing in production when pitted against the toughest jobs.

The TORQMATIC CRT-5630 is a complete, balanced power train which *matches* engine speed *instantly* with torque demand. Equipment manufacturers agree an efficient four-cubic-yard loader demands a torque converter with a tailored full-power shift transmission. That's why they pick the TORQMATIC CRT-5630. And, it offers additional benefits – cushion-flow forward and reverse clutches – rugged planetary gearing – equal speeds in either direction – all a result of time-proved Allison design.

Take a tip from Yale and Towne and more than 80 other equipment manufacturers–specify an Allison TORQMATIC DRIVE in your next piece of equipment. See your dealer or write Allison Division of General Motors, Indianapolis 6, Indiana.

Allison TORQMATIC® DRIVES

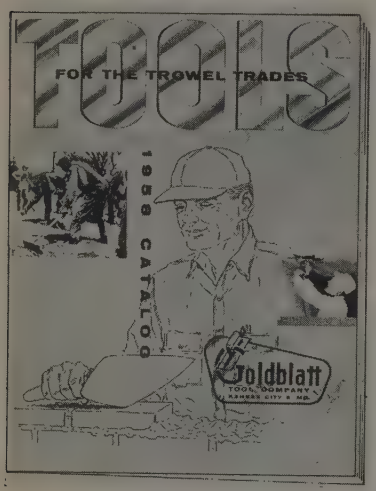
. . . for more details, circle No. 50 on Reader Service Postcard

NEW LITERATURE

To obtain free copies of literature described in this section circle the corresponding numbers on reply postcard.

1958 tool catalog available

New equipment and tools for journeymen and contractors in the trowel trades are featured in the 1958 **Goldblatt Tool Co.** catalog. More colorful and containing more



new equipment than any previous catalog in the firm's 73-year history, the 88-page book contains over 1,200 tools. Some of the tools and equipment listed include the only mechanical plastering trowel; a low cost "stinger" concrete vibrator; "Rock-Rib" cement and plastering trowels; the first portable masonry saw; new work clothes; an expanded line of specialized building materials.

. . . Circle No. 170

Two booklets available from Calcium Chloride Institute

Thousands of tons of abrasives are prepared by highway departments in advance of the winter season each year. Abrasives are usually treated with calcium chloride early in the fall. When motorists need immediate traction on hazardous, ice covered roadways the treated abrasives provide safe roads and a positive answer to ice control problems. For engineers who desire specific information on this subject, the **Calcium Chloride Institute** has prepared a manual called "Calcium Chloride for Ice Control." It contains 30 pages of illustrated text including recommendations for treating and storing abrasives, spreading abrasives and direct application of calcium chloride. Also available is a pocket-sized 36-page illustrated booklet from the Institute entitled "Maintenance Tips for Unpaved Roads." It includes maintenance objectives and tells how to maintain unpaved roads in all seasons. Charts and tables are included and one chapter is devoted to the use of calcium chloride in maintenance procedures. Both publications are available free on request.

. . . Circle No. 171

Introductory manual on electro-channel joists

A 25-page, fully illustrated introductory manual on construction with Ceco Electro-Channel steel joists has been prepared by **Ceco Steel Products Corp.** The manual shows, in a series of photos and

diagrams, how underfloor electrification can be achieved at low cost, using E/C joists. The joist is essentially a standard open-web steel joist, but with a steel raceway substituted for the usual top chord. This raceway serves both as an underfloor electrical distribution duct and as a structural member of the joist. E/C joists have the same load-carrying capacity as standard joists. This system allows construction of electrified floors at a cost of only about 50 cents per sq. ft. over the cost of a standard steel joist floor.

. . . Circle No. 172

Wire rope manual

Wire rope data and tables, a reference manual of data, tables and information most frequently needed by the buyer and user of wire rope, has been prepared by the **E. H. Edwards Co.,** and is now ready for distribution. Designed to help solve common wire rope problems for the man who is working with wire rope in the field, the four preceding sections are: (A) How Edwards Wire Rope is Made, "The Story of Why"; (B) How to Select the Right Rope, "The Rope to Choose;" (C) How to Use a Wire Rope, "Use and Abuse;" and (D) How to Splice a Wire Rope, "Splicing and Fitting." Each of these sections is designed to aid the user in getting the greatest possible service out of wire ropes.

. . . Circle No. 173

Around the world with Raymond

Raymond Concrete Pile Co. has been laying foundations since 1897 and now has a worldwide scope of operations. A 20-page booklet on services the company offers is now available on request. Included in the 2-color publication are sections on soil investigations, pile foundations, prestressed concrete, caissons, underpinning, heavy construction, and pipelining. Extensive illustrations of Raymond jobs all over the world, charts, and diagrams help to make this an interesting and useful booklet.

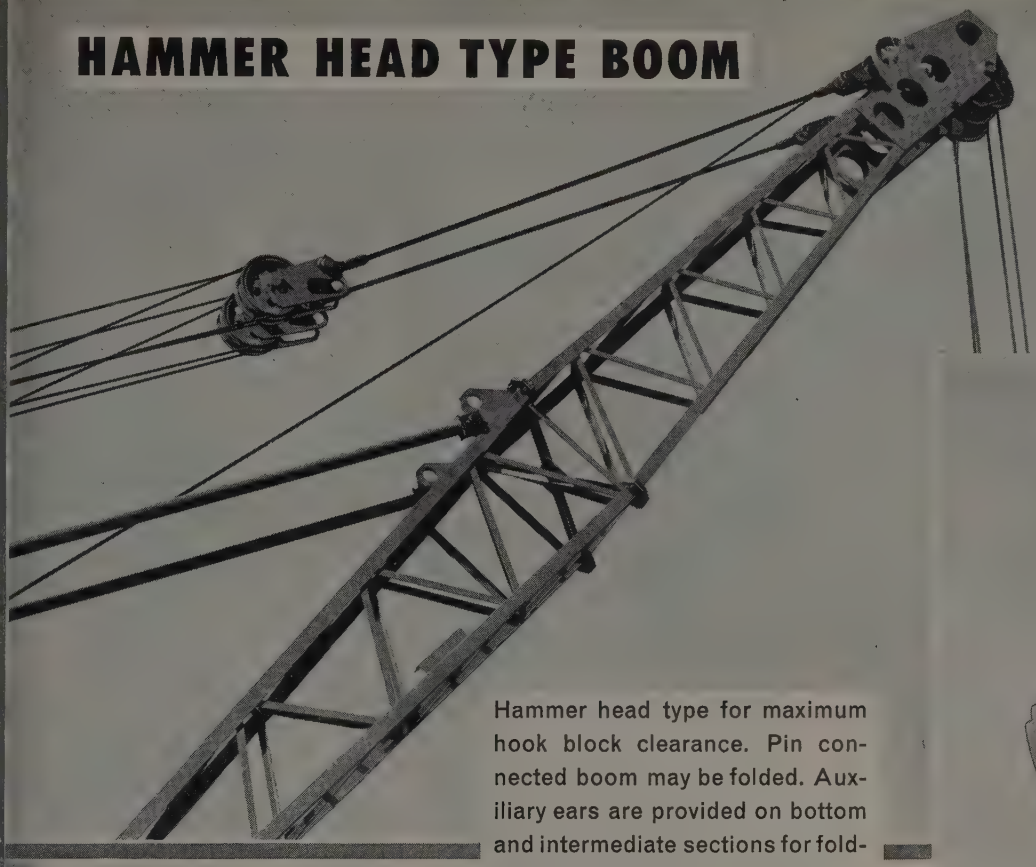
. . . Circle No. 174

Bin-type retaining walls

An 18-page catalog from **Armco Drainage & Metal Products, Inc.,** describes the company's metal bin-type retaining walls — what they are, where used, why used. Well illustrated and in color, the booklet gives easy installation rules and extra advantages. Included also are technical data, curve data, typical applications with photos, drawings.

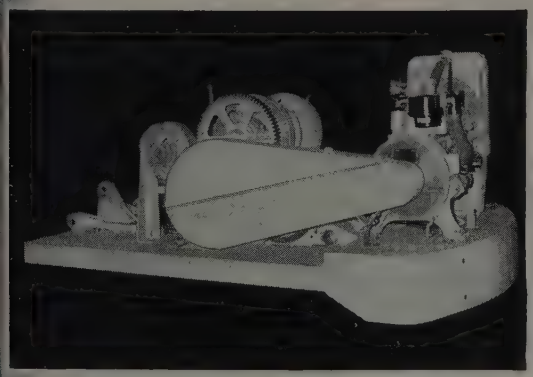
. . . Circle No. 175

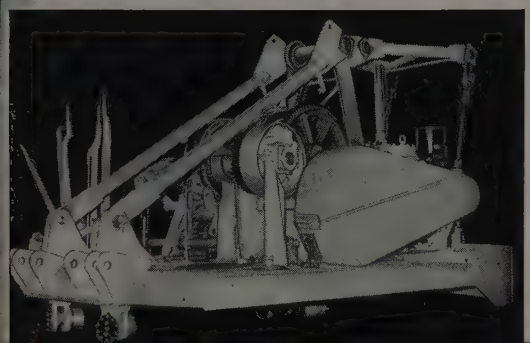
HAMMER HEAD TYPE BOOM



Hammer head type for maximum hook block clearance. Pin connected boom may be folded. Auxiliary ears are provided on bottom and intermediate sections for folding and changing boom sections.

ALL DECK MACHINERY LOW AND BACK OF ℄ OF ROTATION





THERE'S AN **INSLEY** WORKING NEAR YOU

INSLEY MANUFACTURING CORPORATION
GENERAL OFFICES—INDIANAPOLIS 6, IND.
WEST COAST DIVISION—LOS ANGELES 54, CALIF.
THE MAXI CORPORATION (Subsidiary) LOS ANGELES 54, CALIF.

For additional information on the Insley Type M, see your Insley distributor or write direct to Insley, Dept. 400, Indianapolis 6, Indiana.

. . . for more details, circle No. 52 on Reader Service Postcard

SUPERVISING

(Continued from page 90)

ka. Contract calls for construction of armament and electronics shop of tilt-up concrete and block construction with structural steel roof framing and steel deck costing $375,300. In progress since May, the job will be finished in August next year.

* * *

Mel Johnson, job superintendent, and **D. W. Kemp,** project engineer, are key men on construction of 5-story concrete addition to the County Hospital at San Bernardino, Calif., a $1,219,000 project on which Kemp Bros. and George K. Thompson was the low bidder.

* * *

Reid W. Erickson, superintendent, and **R. K. Erickson,** shop superintendent, are key men on a state highway job in Adams County, Wash., which recently went to Erickson Paving Co. on a low bid of $804,274. Job includes 6.7 mi. of grading and surfacing, twin reinforced concrete slab overcrossing and other work. Started in April, the job is expected to be finished next January, according to **C. W. Erickson** of the contracting firm.

* * *

T. R. "Ted" Harris, Allen J. Johannesen, and **R. H. "Dick" Sauage,** superintendent, engineer, and office manager respectively, have been named by General Construction Co. to head a $2,993,995 bridge construction starting soon. Contract covers remodeling of existing Interstate Bridge between Vancouver, Wash., and Portland, Ore., over the Columbia River on Pacific Highway. The job is earmarked for completion the end of 1959.

* * *

B. E. Grounds, superintendent for A. Teichert & Son, Inc., heads the contractor's crew working on improvements to the Santa Anita Wash channel, from AT&SF R.R. to Rio Hondo channel in Los Angeles County, Calif. Assistant superintendent on this $1,198,940 project is **J. C. Lawrence,** and **M. P. Brotherton** is master mechanic. Under way since April, the job will be finished by the end of 1958, according to Vice President **James P. Cagle** of the Teichert company.

* * *

Jack E. Martin, part owner and general superintendent of Lake City Gravel & Materials, Inc., is in charge of a $163,470 award to his company for 1.1 mi. of grading and surfacing approaches to the Willapa River bridge in Pacific County, Wash. Plant superintendent is **Larry Thorson.** Work started in May and Martin expects to see it finished in August.

* * *

C. W. "Red" Ashworth is project superintendent, and **John Blain** is project engineer under **T. E. "Tommy" More** of Southern Arizona Contracting Co., who is acting as his own project manager on a recent highway award to the construc-

Ashworth *Blain*

tion firm. Other key men on the $834,206 job are **James N. Winski** who is office manager and purchasing agent, and **O. H. McDaniel,** master mechanic. The work consists of grading, surfacing, and traffic interchange, approximately 8.8 mi., on the Benson-Steins Pass highway in Cochise County, Ariz. This job has been under way since April 1 and will be finished about the first of January next.

* * *

Jay Grant has been supervising a Grant Construction Co. job of grading and surfacing portions of Adams and Morrison roads in Grant County, Wash. Acting as foremen on this $168,694 contract: **Peare Crable,** crusher, and **Eugene Gilmore,** truck.

R. F. Johnson, project manager, and **Ralph Wells,** superintendent, head the list of job personnel working for Cherf Bros. and Sandkay Bros., Inc., on grading, surfacing and construction of overpasses in Power County, Idaho. Master mechanic on this important job is **D. J. Thompson,** and **Leonard Carl** is office manager at the jobsite. Work will be finished before the end of the year, having been under way since May.

* * *

Donald A. Larsen, superintendent, with the aid of **Homer Grace,** foreman, is in charge of a $127,673 job for John E. Alexander, Inc., contractor. Work is in Grays Harbor County, Wash., on State Highway 9 and consists of replacing two old timber trestles with flat slab reinforced concrete bridges across Raft River and Ten O'clock Creek. The job has been going on since April and is set for September conclusion.

* * *

Dell Holmes, head of Holmes Construction Co., is acting as his own superintendent on a highway job successfully bid at $591,135. His four sons: **Harold, Ralph, Don** and **Keith,** are also on the job as foremen. This contract calls for the preparation of road-bed and asphalt paving through the city of Burley, Idaho, on Highway 30 and Highway 27. Job started in March and will probably be finished by Oct. 1.

* * *

James Rea is job supervisor for Watkins Construction Co., successful bidder on contract for modification of existing underground building and shielded roadway at the Aircraft Nuclear Propulsion project in Idaho. Job foreman is **Earl Seese,** while **Richard Doty** is crane operator. This $316,019 job started in May and will probably be finished in September.

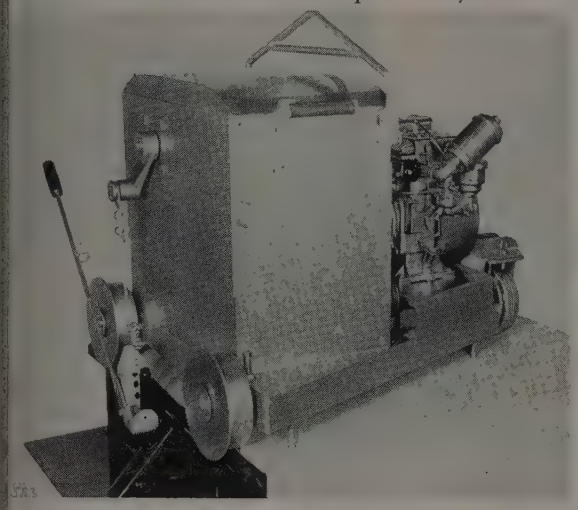
* * *

Earl Rook is acting as superintendent on another N. A. Nelson Construction Co. contract, with **Francis Rook** as foreman. This is a $687,696 bridge project on the Libby-Rexford highway in Lincoln County, Mont., which has been under construction since mid-January. The span is exactly the same type as the one Nelson constructed over the Missouri River, which was described on page 56 of the April 1958 issue of WESTERN CONSTRUCTION. The above two men served as Nelson's key supervisors on this job also.

IEW EQUIPMENT

Automatic Pin Puller offered o road contractors

One of the biggest headaches plaguing road construction men may disappear with the introduction f a new automatic pin pulling machine created by he **Cleveland Formgrader Co.** Known as the Cleveand Pin Puller, the machine requires only one man

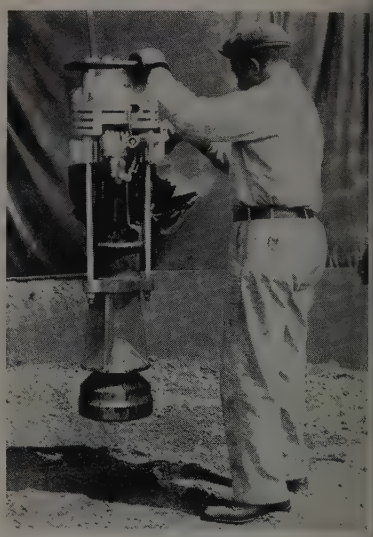


o operate it and is considerably faster than conventional methods, pulling up to 1,500 pins an hour ithout damage to forms or concrete. Weighing 565 b. and powered by a 3-hp. engine, the machine is esigned to pull any size pin with a maximum load trength of 3,000 lb. Any damage to concrete is elimnated with the puller because the pulling load is on he forms. The pins themselves will have longer life ecause they come out vertically and without bending. Riding on rubber tires, the machine is easily moved rom pin to pin, operates on either side without hanges. *. . . Circle No. 176*

DAPTION OF the Davis Backhoe for the Work Bull 1001 Iulti-Purpose Tractor Loader brings new versatility to this nit. Used for excavating, the backhoe makes it possible to do any construction jobs that formerly had to be handled by and labor. With the backhoe-backfill blade combination, the 001 can cover its own tracks without changing attachments. o insure visibility, the seat turns with the mast and boom ssembly so that the operator always faces his work. Easy ortability is achieved because the unit folds back on its lift rms. *Massey-Ferguson Industrial Division. . . . Circle No. 177*

One-man earth rammer safe and easy to operate

The Maxtamp is a one-man operated, gasoline-powered, self-contained earth rammer, which features a positive carburetor, automatic built-in lubrication system, positive control for safe operation, and maximum compaction. The



220-lb. machine jumps to a height of 18 in., 80 times per min., exerting 311 ft. lb. with each blow, on lifts up to 24 in. The action of the machine is simple. The combustion chamber is primed with gas by means of a priming lever conveniently placed on the side of the machine. Ignition is then accomplished by squeezing the striking handle on the handle bar. The machine jumps and additional fuel is pulled into the cylinder for the next jump cycle. The impact of its return to the ground and the reaction of the next jump compact the soil. No additional priming is required. The unit is safe since it will not jump again unless the magneto handle is squeezed. There is no danger of running away. A product of **C. H. Johnson Machinery, Ltd.** Exclusive U. S. distributor is the Complete Machinery & Equipment Co., Inc. *. . . Circle No. 178*

Seamless concrete slump cone

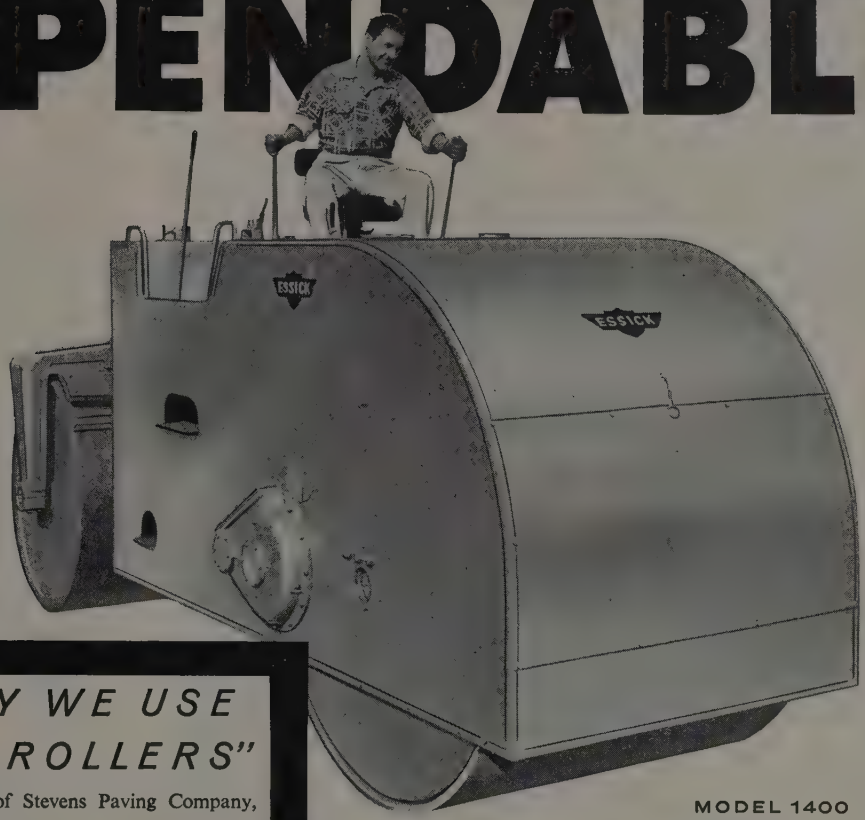
Slump tests on concrete can now be performed more efficiently with a new seamless slump cone designed and manufactured by **Soiltest Inc.**

The cone is made of heavy gauge cadmium-plated sheet steel and is of a one piece construction. The handles and foot clamps are welded in position and are also cadmium plated to resist rust. The new product is made in form of a fustrum of

ESSICK®

TANDEM ROLLERS

DEPENDABLE



MODEL 1400

...“WHY WE USE ESSICK ROLLERS”

Jack Stevens, Owner of Stevens Paving Company, Ontario, California states:

“We use Essick Rollers for a number of reasons and they all add up to Dependability. Dependable equipment is always important when we have deadlines to meet. Essick Rollers have the ability to handle the tough jobs because of their built-in extra huskiness; and we always get maximum production out of the equipment. The Essick Rollers give many advantages that really mean something. The Chrysler Smooth-O-Matic Fluid Drive produces smoother surfaces, and gives longer life to engine, clutches, gears, bearings, shafts and other moving parts. We never have to worry about reduction gears—dirt and sand can't get at them because they are *completely enclosed and running in oil.* Our experience on all types of jobs has shown that Essick Rollers are Dependable—and especially Husky, Heavy and Powerful . . . for the Tough Jobs.”

“HUSKY, HEAVY AND POWERFUL . . . FOR THE TOUGH JOBS”

THERE ARE “9” BIG REASONS

WHY USERS INSIST ON DEPENDABLE

ESSICK ROLLERS . . . FOR THE TOUGH JOBS!

Mail this ad with your letterhead for complete information.

A COMPLETE LINE

1½-2 TON	5-8 TON
2 -3 TON	8-10½ TON
3 -4 TON	10-12 TON
3½-5½ TON	10-14 TON

ALSO A COMPLETE LINE OF VIBRATING ROLLERS

ESSICK MANUFACTURING CO.

1950 SANTA FE AVE. LOS ANGELES 21, CALIF.

850 WOODRUFF LANE, ELIZABETH, NEW JERSEY

affiliated with the T. L. SMITH COMPANY, milwaukee, wisc.

. . . for more details, circle No. 83 on Reader Service Postcard

a cone with an 8-in. diameter open base and a 4-in. diameter open top. Height is 12 in. Slump cones are used for measuring the slump of portland cement concrete in accordance with American Society for Testing Materials Specifications C-39, C-143, C-192 and American Association of State Highway Officials designations T-22, T-119 and T-126.

. . . Circle No. 179

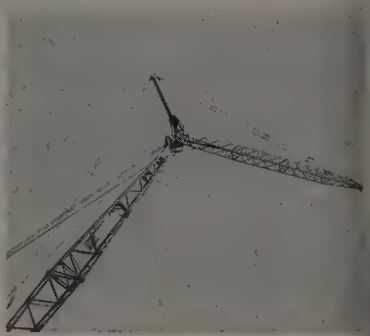
Cleats from Germany increase belt tonnage

A product which has been designed to eliminate conveyor bottlenecks by increasing belt tonnage and preventing conveyed materials from back sliding, is now being distributed in this country by **Flexible Steel Lacing Co.** The Rema Cleat, a product of Western Germany, is a specially designed rubber cleat which can be applied to rubber conveyor belting in the field without heat or cumbersome equipment. This is done by the Rema self Vulcanizing Process. In actual use, the cleat has increased belt capacity by almost 100% in some cases.

. . . Circle No. 180

High-capacity jib

A completely new style jib is now available for **Link-Belt Speeder Corp.'s** K-300 and K-600 series cranes (1½ to 3-yd., 26.6 to 75-ton size range). The basic two-piece 20-ft. jib has a maximum capacity of



10 tons. By means of 10-ft. sections, it can be extended to a 30 or 40-ft. length. Greater capacities are made possible through use of high strength alloy steel construction which gives increased strength-to-weight ratio. Other advantages include the jib peak sheave and strut deflector sheaves mounted on needle bearings. Dead-end cable anchor on jib peak permits use of two-part whipline.

. . . Circle No. 181

CURB, gutter and sidewalk forms with *Clark Industries'* Wedge-lok Slide Connector enable form strippers to remove any section without disturbing adjacent units. Each 10-ft. section has three stake pockets, with division plate slots placed at 12-in. intervals. Alignment of stake pockets and bolt holes allows stacking of forms, to pour variable depth concrete.

. . . Circle No. 182

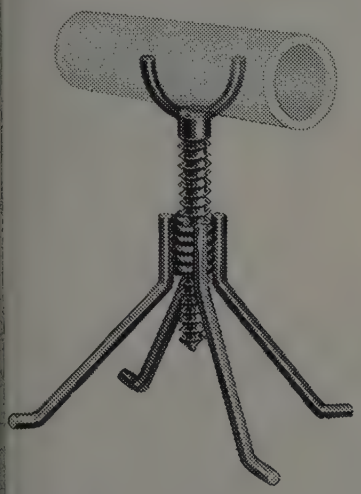
Small size masonry saw easily transported

A one-man portable masonry saw that uses 6-in. to 12-in. abrasive, safety, or diamond blades, yet can be transported in the trunk of an automobile has been made available to contractors by the **Robert G. Evans Co.** The new Target Port-A-Saw cuts brick, block, stone, and tile. The cutting head is instantly adjustable in height for materials up to 8 in. The head can be removed in 2 sec. for easy transportation, taking down to the basement or up on the scaffold right next to the work.

. . . Circle No. 184

Complete line of screed chairs offered by Sure-Grip

The **Dayton Sure-Grip and Shore Co.** now offers a complete line of reusable screed chairs for use on any thickness of concrete slab and on any type of construction. Adjustable screed supports come in four



standard sizes—ranging from 1½ in. to 5 in. in height. These can be used for slabs from 2¾ in. to 11¼ in. thick. Special length pipe holders can be obtained for thicker slabs. The 1-in. I. D. pipe, used for every slab thickness, is supported by a ½-in. lag bolt which screws into the soil of the chair. You can make adjustment in two ways—either by turning the holder in the coil before the screed bar is put in place, or afterward, by turning the chair. The bent legs of the chair allow for special applications, such as nailing the support to the form when necessary. When removed at the same time as the pipe screed bar, the screed holder can be reused indefinitely. Pictured is the adjustable screed chair. Complete screed information and a free catalog.

. . . Circle No. 185

In Oakland, California,

Main entrance to the East Bay Pumping Station. Engineering and erection of the entire sewage system was handled by the East Bay Municipal Utility District Engineering Staff.

Four of the five Chapman Tilting Disc Check V installed in treatment plant of East Bay System. of these five valves has an average dry-weathe of 55,000,000 gallons daily. Maximum flow fo plant is approximately 300,000,000 gallons

55 million gallons per day flow quietly through five trouble-free

CHAPMAN

TILTING DISC

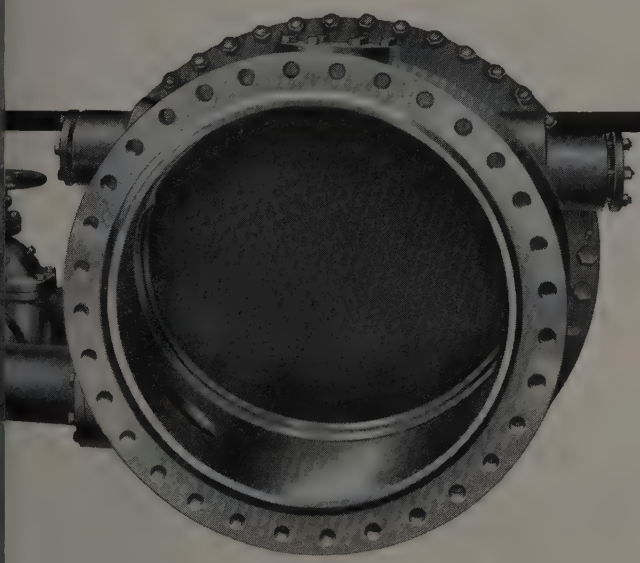
CHECK VALVES

In Oakland, California, the East Bay Sewage Disposal System serves the cities of Oakland, Berkeley, Alameda, Albany, Emeryville and Piedmont. And it serves them well. It has improved health conditions and property values in the large East Bay area.

Representing an investment of $23,500,000 this system is modern in every respect. Twenty-one miles of reinforced concrete pipe bring sewage from six cities to the central treatment plant. At the treatment plant sewage is immediately chlorinated for odor control then raised 35 feet by five 42-inch pumps to the Grit Chambers from where it can flow by gravity through the rest of the system.

Finely screened sewage is pumped up through five 42-inch Chapman Tilting Disc Check Valves to prevent any return of the sewage to the Interceptors. Today, the average flow through these five valves is 55,000,000 gallons per day, with some variations. Yet, no matter how much it varies these Chapman Valves handle the flow quietly . . . no flutter, no slamming, no banging, no damage to valve or system. The valves automatically adjust themselves to the volume of the flow.

Chapman Tilting Disc Check Valves were the first with this unique design, engineered to meet standard and unusual conditions of service. Chapman know-how is one of the many reasons why its valves and control equipment are selected for installations of all kinds. Write, and one of our engineers will tell you more of the ways and whys.



Left: — Chapman Tilting Disc Check Valve with 6″ bypass connection similar to the Chapman Check Valves installed in the East Bay Sewage Disposal System.

Why not send for our free Catalog No. 30-B showing and giving full information on all Chapman Tilting Disc Check Valves.

The CHAPMAN *Valve Manufacturing Company*

INDIAN ORCHARD, MASSACHUSETTS

For over 75 years, Chapman has devoted its entire facilities to the valves of today and tomorrow. Chapman has the engineers, metallurgists, experience and manufacturing facilities to design, develop, build and test the valve equipment you need no matter how tough the requirements.

. . . for more details, circle No. 58 on Reader Service Postcard

New type wire rope offers combined advantage

Wire rope which combines the flexibility and abrasion resistance of Lang lay rope with the stability of regular lay rope under severe operating conditions is now being produced by **John A. Roebling's Sons Corp.** Herringbone wire rope is a construction employing two pairs of Lang lay strands and two strands of regular lay. The new rope has relatively large outside wire construction to take the pressure and abrasion of contact with sheaves and drums, combined with smaller inside wire construction so patterned as to provide the maximum flexibility in service. Test results on the new wire indicate superior flexibility, good resistance to shock and abrasion, smooth operation around drums and sheaves, easy spooling properties, and exceptional structural stability.

. . . Circle No. 186

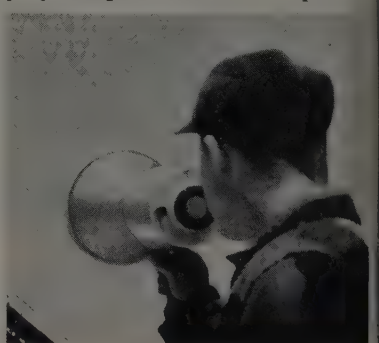
Movable anchor bolt speeds column setting

The Decatur Engineering Co. has introduced an entirely new anchor bolt fitting that will eliminate protruding and time consuming errors often found in the initial setting of anchor bolts when concrete is being poured. The Deco Anchor is flush with the floor until actual installation of equipment or column is made. The box-like fitting, attached to the top of the anchor bolt, contains an oblong nut, movable in all directions sufficiently to compensate for the usual error in setting anchor bolts. The machine or column is attached to the fitting by use of a stud of the desired length, thus eliminating the hoisting and lowering of machines over a fixed bolt by the trial and error method. The anchor bolt is centered in the fitting when attaching to setting templates, and is no more difficult to install than conventional type anchor bolts. The large flat surface of the casting provides an ideal arrangement for leveling and doweling where it is necessary.

. . . Circle No. 187

A transistor-powered megaphone

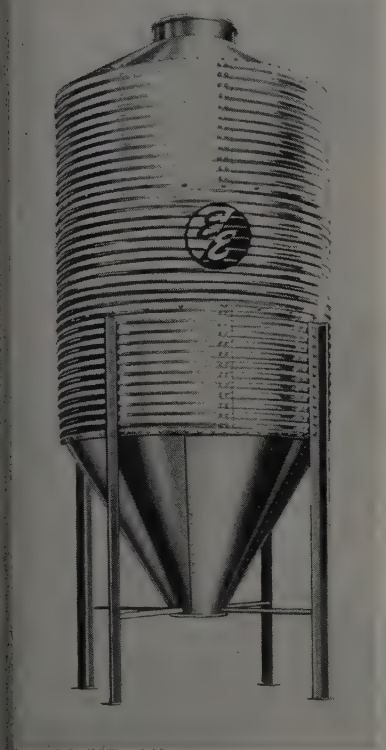
A transistor-powered (TP) Audio Hailer portable megaphone which projects speech, "like a harpoon,"



over ½ mi. is announced by **Audio Equipment Co., Inc.** Unit is completely self-contained, and operates on standard flashlight cells. Amplifier uses 4 new-type power-transistors to produce an output of 7 watts, 115 db. Other exclusive features are patented anti-feed-back construction, encapsulated (hermetically-sealed) transformers, and controlled-reluctance microphone. The "TP" Hailer weighs only 5¾ lb., with pistol-grip for one-hand operation. Two-tone green, weather-proof finish. It is possible to install a complete new TP chassis in units now in use. This doubles acoustic power and reduces battery maintenance cost. . . . *Circle No. 188*

Low cost cement storage

Engineered Equipment, Inc. announces a low-cost Corgal line of bulk storage silos, designed to effect more economical and efficient handling of bulk cement and free-flow-



ing dry granular materials. The new silos are constructed of prefabricated corrugated galvanized steel. Vertical seams are double bolted to assure maximum strength and weather-tight protection. Steep 30-deg. discharge cone insures fast, easy flow of material. The silos are available in 6, 9 and 12-ft. diameters with capacities of 29 to 413 barrels. . . . *Circle No. 189*

Mercury switch on troweler protects operator

A newly engineered cement finishing troweling machine with only half the height of previous models and twice the stability is available through **Dart Manufacturing and Sales Co.** Known as the Superior-Dart Lo-Boy, the finisher has an offset design of tangential arm mountings which equalize the weight on the blade surfaces. This puts more support of the machine onto the center of the blade for longer equipment life and a more even surface. A large control handle close to the operator's hand allows easier blade tilting from float to finish. As the concrete hardens, the operator can tilt the trailing edge of the blade down for breakoff and finish. A mercury safety switch prevents injury to operator and damage to job and machine. Usually, if the blade hits any obstruction while troweling under power, the resultant action produces a violent twist of the handle, injuring the operator. On this model, the mercury switch kills the motor in only ¼ of a revolution. . . . *Circle No. 190*

CONTRACT AWARDS

(Continued from page 83)

way 3 in Stevens County. A $428,530 contract was received by **Alton V. Phillips Co. & Associates** of Seattle for construction of two piers for new bridge across the Columbia River at Beebe in Douglas and Chelan counties. **Troy T. Burnham Co.,** Seattle, received a $240,878 contract for grading and paving 1.4 mi. of State Highway 5 to Burton Creek in Lewis County. **S. D. Spencer & Son,** Vancouver, received a $380,539 contract for 4.7 mi. of grading and surfacing, Bean Creek to Naselle in Pacific County. A $271,376 contract was received by **Associated Sand & Gravel Co.** of Everett for 2.7 mi. of grading and surfacing PSH No. 1, in Skagit County. **Grant Construction Co.,** Coeur d'Alene, Idaho, received a $149,871 contract for improving 15 mi. of Stevens County roads. **Columbia Asphalt Paving Co.,** Yakima, received a $146,140 contract for repaving 10 mi. of State Highway 3 in Kittitas and Yakima counties. **S & S Sand & Gravel, Inc.** of Ephrata received a $148,389 contract for 3.3 mi. of grading and surfacing, Teanaway Jct. to Teanaway River in Kittitas County.

WYOMING

Knisely Moore Co., Inc., Douglas, submitted a low bid of $261,243 for construction of access road for site "A," F. E. Warren Air Force Base, Cheyenne. **Peter Kiewit Sons' Co.,** Sheridan, submitted a low bid of $227,609 for construction of access road for site "B," F. E. Warren Air Force Base, Cheyenne. **Rissler & McMurry Co.,** Casper, received a $291,137 contract for grading and surfacing 1.6 mi. of 4-lane divided highway on the Casper-Muddy Gap road in Natrona County. A $459,938 contract was received by **Ace Construction Co.,** Omaha, Nebr. for grading, draining and two structures on 3.1 mi. of the Sheridan-Ranchester road in Sheridan County. **Riedesel-Lowe Co.,** Cheyenne, received a $121,513 contract for construction of 3 machinery pass structures and miscellaneous work on 3.1 mi. of 4-lane divided highway in Sheridan County. A $729,800 contract was received by **Asbell Brothers Construction Co.** and **Wyoming Paving Co.** of Riverton, for grading and surfacing on 10.4 mi. of the Wheatland-Chugwater road in Platte County. **Don Van Deburg,** Jackson, received a $116,379 contract for grading and surfacing 5.3 mi. and gravel seal 3.2 mi. of various roads in Teton County.

ALASKA

Patti-MacDonald Construction Co., Anchorage, submitted a low bid of $1,761,994 for construction of Nike storage at three Nike locations near Anchorage. **Peter Kiewit Sons' Co.,** Seattle, submitted a low bid of $1,885,286 for construction of four Nike locations in the Fairbanks region. A $552,772 contract was received by **Alcan Pacific Co.,** Anchorage, for construction of vehicle maintenance shop and storage building at Wildwood Station. Combined bidders: **B-E-C-K Constructors** and **Raber-Kief** of Seattle, received a $3,295,805 contract for construction of an additional Nike site for the Army near Ladd Air Force Base in interior Alaska. **Lease Co., Inc.,** Seattle, received a $766,108 contract for construction of a modern Airmen's service club, Elmendorf Air Force Base. **Baker & Ford,** Bellingham, Wash., received a $770,106 contract for stockpiling and road and bridge construction at Bethel Air Force Station.

News of DISTRIBUTORS

WESTERN ROAD SHOW is what Cal-Rex Machinery Sales Division of Chain Belt Co., Southern California distributor for Rex Construction Machinery, calls its recent equipment display. The display included the complete Chain Belt line of concrete batching, mixing, spreading, finishing and curing machines. The show was well attended by contractors, California State Highway officials, Corps of Engineers, and others allied to the concrete paving industry. Shown here, (l. to r.) *Art Schmidt* of Rex Construction Machinery; *Jim Bonner* of Morrison-Knudsen Co., Inc., *LeRoy Gratz*, Cal-Rex Machinery Sales, and *S. Y. Warner*, Chain Belt Co.'s Los Angeles Division mgr.

CONSTRUCTION is in progress on a new main plant and offices for Howard-Cooper Corp., distributor of heavy construction equipment throughout Oregon, Washington, and Northern California. The new building is located on a 6½-ac. tract at Northeast 85th Ave. and Killingsworth St. in Portland. Some 40,000 sq. ft. of space will be available in this modern structure, of which 12,000 sq. ft. will be finished office area.

New accounts for Fox Nailer

Fox Nailer Corp., San Francisco has been appointed Bay Area distributor for Maginniss earth compactors, concrete vibrators and generators. This distributorship has also taken on the sales, service and rentals of the Silent Glow line of portable space heaters.

CB&I welding engineer wins award

Perry C. Arnold, Chicago Bridge & Iron Co. field welding engineer has been awarded the American Welding Society's "James F. Lincoln Gold Medal" for "the greatest original contribution to the advancement and use of welding equipment to be published in the Welding Journal during 1957."

U. S. Rubber appointment

Appointment of Garrett Supply Co., Phoenix, as exclusive distributor in Arizona for U. S. Rubber industrial products is announced jointly by Garrett manager Edwin R. Castle, and U. S. Rubber district manager John M. McCarthy. The addition of the new lines will add a full-time resident sales engineer, William G. Kieffner of U. S. Rubber, to Garrett's staff.

Cate Equipment Co. adds P & H

Announcement is made by H. C. Christensen, sales manager of Cate Equipment Co., Salt Lake City, Utah, that Cate has taken on the Harnischfeger account for P & H power cranes and shovels.

Industrial Vibrator & Machinery takes on small diesel

Industrial Vibrator & Machinery Co., San Francisco, has taken on distribution in California, Washington, Oregon, Nevada, and Arizona for the new Cerlist diesel air compressor. This is a small diesel of 78-cu. ft. per min. capacity, an

Craftsmanship Counts at CB&I . . .

Almost 70 years of specialization in the design, engineering, fabrication and erection of steel plate structures will build long and efficient performance life into your next CB&I-built storage or processing structure. Here's why:

CB&I Engineers From first contact with the customer through final testing, CB&I's general engineering staff supplies technical guidance to the CB&I team. Important coordination between fabricating, erection and testing of your structure is thus insured.

CB&I Fabricates The finest manufacturing facilities—including X-ray and stress relieving—backed by metallurgical laboratories and testing facilities second to none—are maintained in four strategically located and fully equipped fabricating plants.

CB&I Erects Skilled, responsible crews work with up-to-date equipment. Field X-ray and stress relieving equipment, backed by welding research laboratories, are an important part of their trade. Experience in a wide variety of metals, including stainless, nickel, aluminum and clad materials are also part of the service that has earned CB&I a *global* reputation for erecting on a *world-wide* basis.

These coordinated services are what you receive when you contract for a CB&I-built structure. CB&I customers have learned to expect and get top rated performance and maximum service life from CB&I *craftsmanship in steel.* Write our nearest office for details. Ask for the CB&I Bulletins on: *Special Plate Structures* and *CB&I Field Services.*

P73CB

1. 5-in. thick plate for reactor is fabricated at CB&I's Birmingham, Alabama plant.

2. Workman smooths seams on an assembled section.

3. X-ray machine for checking seam welds. Machines operating at 1,000,000 and 2,000,000 volts are used to completely inspect steel vessels as much as 10 inches thick.

4. 72-ton top section for reactor-regenerator is lowered into position under supervision of CB&I erection specialist.

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Kansas City (Mo.)
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, GREENVILLE, PA. and at NEW CASTLE, DELAWARE.
In Canada: HORTON STEEL WORKS LTD., TORONTO, ONTARIO
REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland

. . . for more details, circle No. 64 on Reader Service Postcard

according to L. P. Metesser, general manager of Industrial, it is the only small diesel made, and operates at a fuel cost of about $1.00 per day.

Charlie Kimball joins Phoenix distributor

Charles Kimball, formerly district representative for Iowa Manufacturing Co., has joined the sales force of Arizona Cedar Rapids Co. in Phoenix. Kimball has had many years valuable experience in the heavy equipment field.

Charles Kimball

New Hicycle distributor

W. J. Burke & Co., with headquarters at San Francisco, has been appointed distributor for Northern California for Hicycle electric concrete vibrators manufactured by Chicago Pneumatic Tool Co.

New distributor for LeRoi in central Washington

Announcement is made by Robert E. Marler, district representative at Seattle for the LeRoi Division of Westinghouse Air Brake Co., of the appointment of Safway Equipment Co., 10 N. Sixth Ave., Yakima, for LeRoi portable compressors, Tractairs and air tools in the central Washington area. Headed by Jim Connell, president, the Safway company has a branch store at 310 N. Dayton, Kennewick, Wash.

Rasmussen Equipment Co. adds a line

Manitowoc Engineering Corp. power shovels from 1-yd. to 5½-yd. capacity have been added to the construction equipment lines distributed by the Rasmussen Equipment Co., Salt Lake City, Utah, according to announcement by Frank Rasmussen, manager.

George M. Philpott Co. named Koehring distributor

George M. Philpott Co., Inc., San Francisco, has been appointed as a distributor for sales and ser-

ice for Koehring Division prodcts in 24 counties in California nd portions of five others. Equipnent to be handled includes the ull line of Koehring excavators, ranes, pavers, finishers, Mudacks for roadbed stabilization, and he Dumptor, an off-the-road haulng unit. President of the distributing firm is George M. Philpott. General manager is J. Woodford.

Marion Power Shovel announces o. Calif. distributor

Le Roi-Rix Machinery Co., Los ngeles, was recently appointed outhern California distributor for he Marion Power Shovel Co., hanling the complete line of truck ranes up to 40-ton lifting capacity, nd crawler shovels of ¾- to 4-yd. apacity. Le Roi-Rix also offers the ull Sky-Hi lift for building conractors and the self-propelled Cyone broom.

xclusive Wedge-Lok dealership or west Washington

Clark Industries, Construction quipment Division, Columbus, hio, manufacturer of the new lark Wedge-Lok paving forms, anounces the appointment of Star Iachinery Co., Seattle, as exclusive ealer in western Washington.

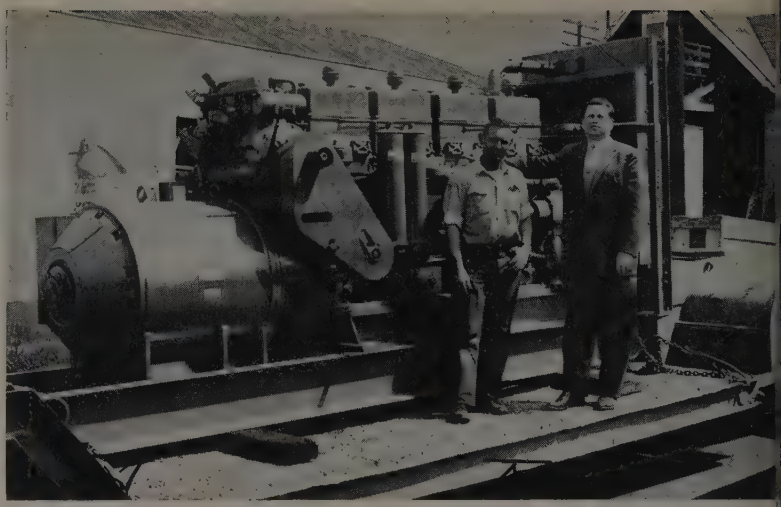
H. W. MOORE EQUIPMENT CO. recently held a Spring Fashion Show and picnic at its plant in Denver, Colo. The Fashion Show featured a demonstration of the Drott 4 in 1 attachment for International tractors. This tool is designed to do four different dirt moving jobs, and is available for TD-6, TD-9, TD-14 and TD-18 tractors. Also on display was a complete line of construction equipment including Hough Payloaders, Galion graders and rollers, Quick-Way truck shovels and a Cedarapids Twin Jaw Master tandem portable cushing and screening plant.

Goodyear Tire announces Pacific Coast distributor

Goodyear Tire & Rubber Co., Los Angeles, through Robert W. Maney, vice president of the Western division, announces that Murray B. Marsh Co. of Los Angeles has been named distributor of Goodyear vinyl and rubber flooring products for an 8-state Pacific Coast and Northwest area.

Howard Hansen represents Billings distributor

Industrial Equipment Co., Billings, announces that Howard Hansen will represent the company in the following Montana counties: Big Horn, Carbon, Yellowstone, Musselshell, Petroleum, and Treasure. Hansen comes from International Harvester Co. where he was employed for five years.



ROSEBURG SAND & GRAVEL CO. President *Don V. Metzger* (left) takes delivery from *Gordon A. Kalk*, sales manager of Hamilton Engine Sales, Inc., at Portland, of a new Model DCSAG-300-A-3 Allis Chalmers 300-kv. diesel motor-generator set. This power plant will be used to furnish electric power to the Roseburg, Ore., rock crushing plant owned by Metzger's firm. The big A-C diesel is rated at 508 hp. at 1,200 rpm.

THE NEW WEMCO branch at 1111 West St. Mary's Road in Tucson, Ariz., is a feature of Western Machinery Co.'s expansion program. This distributor recently added to its many accounts the Noble Company, manufacturer of concrete batching plants. Headquarters of Western Machinery Co. are located in Phoenix.

ago Pneumatic selects two ts in Northwest

new distributorship for the le area and one for the Alaska ory have been announced by . McBeth, district manager in le for Chicago Pneumatic Tool Universal Equipment Co., 1549 ake Ave., Seattle, received the intment for that territory. new distributor for the Alaska is Clyde Taylor Equipment & ly Co., Anchorage. These two will handle the complete Chi- Pneumatic line of pneumatic lectric tools, compressors, rock , and diesel engines in their ctive areas.

state appointed by Utility rawler track line

erstate Tractor & Equipment f Portland and Eugene in Ore- has recently been appointed butor for the line of Utility er tracks manufactured by Utility Steel Foundry Division ility Trailer Mfg. Co., accord- o E. H. Hogl, vice president dvertising manager of Inter- The Utility alloy steel tracks ne result of 4 years of develop- al production of special qual- placement tracks for crawler rs engineered specifically for d Western service.

ges in sales force

shington Machinery Co. of e announces a change in its force line-up in which Jerry will cover the northern terri- including Snohomish County area north to the Canadian r. He had formerly been ng the Seattle metropolitan and on his new assignment continue to work out of the e base office. Don McMillen king over the Seattle metro- n area formerly served by McMillen has formerly been ing the northern territory n Dale now assumes.

n Equipment Co. moves

ion Equipment Co. of Stock- Calif., recently moved to a new on at 4000 N. Wilson Way. n handles Koehring truck s, excavators, pavers and tors, Parsons trenching ma- s, Kwik-Mix concrete mixers, O rollers, HECO truck cranes, ines and shovels, YAUN drag, and concrete buckets, and E tandem roller and pumps.

MANUFACTURERS

Worthington man shifted

H. Needham, Jr., who has been regional manager of the resale division of the Worthington Corp.'s Seattle district office, has been transferred to the San Francisco office, according to Seattle District Manager, C. D. Cummins. Simultaneously, Gordon Needham, who has been in the Worthington Los Angeles office as an application engineer, has been advanced to the post of technical representative and transferred to the Seattle branch. The Messrs. Needham are not related.

Spanall elects officers

At a meeting of the board of directors of Spanall of the Pacific, Inc., in Oakland, Calif., Graeme K. MacDonald was elected president, Charles E. Nelson was elected vice president, and Frederick C. Whitman was named to the board of directors. Both MacDonald and Nelson are contractors in the San Francisco Bay area. Spanall of the Pacific has exclusive franchise rights for five Western states, Alaska and Hawaii for "Spanall," a method of providing horizontal shoring for concrete floor slabs. The product is available in major Western cities from W. J. Burke & Co.

Management changes at Union Wire Rope Corp.

J. H. Hatch, vice president and production manager, recently became president and general manager of Union Wire Rope Corp., Kansas City, Mo., subsidiary of Armco Steel Corp. He succeeds M. G. Ensinger, who has retired but will continue as chairman of the board of directors. Maurice B. Hansell, Jr., has assumed the position of vice president and production manager. The new vice president and general sales manager of Union's wire and wire rope products is George P. Lacy. He succeeds L. G. Schraub, vice president and general sales manager since 1938.

Sales executive receives promotion

Promotion of Bill Talmage to the position of general industrial sales manager for Massey-Ferguson Industrial Division, Wichita, Kans., is announced by C. J. Davis, genral manager of the division. Talmage, formerly central regional industrial sales manager for this division, has twenty years experience in sales at Wichita. Earlier he spent six years with Tractor Sales Corp., Ferguson distributor in Los Angeles. He covered a Ferguson zone and was branch manager of its general line distribution in Stockton, Calif. Previously he was industrial representative for J. I. Case Co. for California, Arizona and Nevada.

New West Coast factory

Ground-breaking ceremonies marked the recent start of construction for Thompson Aircraft Tire Corp.'s new plant adjoining the San Francisco International Airport in South San Francisco. Upon completion in November, the entire West Coast factory and administrative operations will move from San Francisco to the new 55,000-sq. ft. plant. In addition to the aircraft industry, Thompson has for many years served the construction industry. Huge molds make possible the retreading of the largest of the earth-moving equipment tires.

Massey-Ferguson doubles facilities

Doubling of facilities at the Detroit tractor plant of Massey-Ferguson, Inc., was completed recently with a grand opening ceremony. With the $3,500,000 expansion and modernization program, the plant will have a capacity of 250 tractors per shift, one every 2 min. The more than 150 interested persons attending were addressed by A. A. Thornbrough, president of the 111-yr. old company. During his remarks President Thornbrough drew attention to the growing importance too of Massey-Ferguson's new industrial division in Wichita, Kans., and said they are looking forward to a strong increase in the volume of the new 1958 line of light and medium industrial equipment, including the Work Bull industrial tractor. The Work Bull is assembled at the Detroit facility.

Bob Johnsen joins Marion Power Shovel at Phoenix

Marion Power Shovel Co. announces the appointment of E. R. "Bob" Johnsen as district sales manager with headquarters at 1017 N. 22nd, Phoenix, Ariz. His territory includes the states of Arizona and Utah, and parts of Idaho, Nevada, Wyoming and New Mexico.

Brunner & Lay open new plant

Brunner & Lay Rock-Bit of Asheville, Inc., has opened a new plant in Albuquerque, N. Mex., at 2224

Broadway S. E., where a complete stock of B & L tools will be available: carbide Rok-Bits, Intra-Set and conventional drill rods, bit couplings, adapters, extension steel, as well as pneumatic tool accessories, etc.

Kaiser Steel joins forces with Allison Steel Mfg. Co.

Jointly announced by Jack L. Ashby, vice president and general manager of Kaiser Steel Corp., and W. R. Bimson, president of Arizona Bancorporation, is the recent acquisition by Kaiser of a substantial block of the stock of Allison Steel Manufacturing Co. of Phoenix, Ariz. Kaiser Steel will hold approximately 45% of the voting stock.

Realignment of field personnel

In a realignment of field personnel to meet an expanding market, I. T. White, manager of construction equipment sales for The Warner & Swasey Co. of Cleveland, Ohio, announces the transfer of John Seibold from the Gradall factory following several months' training to the Los Angeles territory.

Changes in sales organization

C. S. Johnson Co., Koehring subsidiary, announces changes in its sales organization. Harold E. Buckler, former sales manager of the Western division at Stockton, Calif., has been placed in charge of all Johnson sales and will be located at the home office in Champaign, Ill. Jack D. Shoemaker, who has been active in sales with the Western division for the past six years, has been appointed sales manager of this division.

Northwest key appointments

Robert D. O'Brien has been promoted to the position of vice president-sales of Pacific Car & Foundry Co., Paul Pigott, president, announced in Seattle. O'Brien has been vice president and general manager of the Kenworth Motor Truck Co. Division of Pacific Car & Foundry since 1956. At the same time, Pigott announced that Robert C. Norrie, chief engineer at Kenworth, has been appointed general manager of Kenworth Motor Truck Co., and Wallace M. Brown named chief engineer.

UNIT PRICES

Selected abstracts for Western projects

DAM—Navajo Dam and access roads in Colorado and New Mexico

Colorado and New Mexico—Bureau of Reclamation. A low bid of $22,822,624 was submitted by Morrison-Knudsen Co., Inc.; Henry J. Kaiser Co.; and F & S Contracting Co. for Navajo Dam and access roads, Navajo unit, Colorado-New Mexico, San Juan Division, Colorado River storage project.

(1) Morrison-Knudsen Co., Inc.
Henry J. Kaiser Co.
F & S Contracting Co. $22,822,624

(2) Winston Brothers Co.
Al Johnson Construction Co.
Johnson-Drake & Piper Inc. (joint venture) 25,784,997

Navajo Builders
Potashnick Construction Inc.
Badgett Mine Stripping Corp.
Contracting & Materials Co.
Kenny Construction Co. 26,485,384

Tecon Corp. and Green Construction Co. (joint venture) 28,394,387

		(1)	(2)
Lump sum	Diversion and care of the river during const. & removal of water from foundations	$200,000.00	$300,000.00
80,000 cu. yd.	Excav. for dam embankment foundation to left of Station 44+00	2.60	1.50
700,000 cu. yd.	Excav. for dam embankment foundation to right of Sta. 44+00, 1st 700,000 cu. yd.	0.874	0.28
720,000 cu. yd.	Excav. for dame embankment foundation to right of Sta. 44+00 over 700,000 cu. yd.	0.874	0.28
421,500 cu. yd.	Excav. in excav. area 1	0.71	0.36
800,400 cu. yd.	Excav. in open cut for struc.	1.55	1.20
2,100 cu. yd.	Excav. for grout cap up to 5 ft. in depth	24.00	26.00
200 cu. yd.	Excav. for grout cap between depth of 5 ft. & 8 ft.	31.00	26.00
20,900 sq. yd.	Sprayed protective coating	0.75	0.40
750 sq. yd.	Conc. protective coating	8.30	1.40
6,000 cu. yd.	Excav. in aux. outlet-works tunnel, and in access shaft and access tunnels	50.10	43.00
28,400 cu. yd.	Excav. in outlet-works tunnel and for gate structure	20.25	30.00
3,300 cu. yd.	Excav. in outlet-works gate shaft	28.75	50.00
509,000 lb.	Furn. & placing permanent structural-steel supports	0.33	0.16
7,800 lin. ft.	Furn. & installing tunnel roof support bolts	4.00	3.00
6,700 lb.	Furn. and install. chain-link woven-wire fabric for tunnel roof support bolts	1.20	0.57
500,000 cu. yd.	Excav. stripping borrow pits	0.22	0.30
2,500,000 cu. yd.	Excav. in borrow area gr. 1 & trans. to points of final use, first 2,500,000 cu. yd.	0.37	0.62
2,500,000 cu. yd.	Excav. in borrow area gr. 1 & trans. to points of final use, over 2,500,00 cu. yd.	0.37	0.27
6,000,000 cu. yd.	Excav. in borrow area gr. 2 & trans. to points of final use, first 6,000,000 cu. yd.	0.36	0.62
6,250,000 cu. yd.	Excav. in borrow area gr. 2 & trans. to points of final use, over 6,000,000 cu. yd.	0.36	0.25
2,000,000 cu. yd.	Excav. in borrow area gr. 3 & trans. to points of final use, first 2,000,000 cu. yd.	0.36	0.62
2,230,000 cu. yd.	Excav. in borrow area gr. 3 & trans. to points of final use, over 2,000,000 cu. yd.	0.36	0.25
2,580,000 cu. yd.	Excav. in borrow area gr. 4 & trans. to points of final use	0.36	0.27
1,714,000 cu. yd.	Excav. in borrow area gr. 5 & trans. to points of final use	0.37	0.38
57,000 cu. yd.	Pervious backfill	0.95	0.70
4,000 cu. yd.	Specially compacted zone 2 material	5.00	2.80
9,500,000 cu. yd.	Earth fill in dam embankment, zone 1	0.101	0.15
13,000 cu. yd.	Specially compact. earth fill	3.75	2.80
11,250,000 cu. yd.	Sand, gravel & cobble fill in dam embank., zone 2	0.097	0.12
5,400,000 cu. yd.	Miscell. fill in dam embank., zone 3	0.10	0.12
150,500 cu. yd.	Furn. & placing riprap	6.35	11.50
32,500 lin. ft.	Drilling grout holes in stage bet. depths of 0 ft. and 30 ft.	3.00	1.75
6,600 lin. ft.	Drilling grout holes in stage bet. depths of 30 ft. and 60 ft.	3.20	1.75
5,500 lin. ft.	Drilling grout holes in stage bet. depths of 60 ft. and 110 ft.	3.35	2.15
3,000 lin. ft.	Drilling grout holes in stage bet. depths of 110 ft. & 160 ft.	3.55	2.65
3,000 lin. ft.	Drilling grout holes in stage bet. depths of 160 ft. & 260 ft.	3.85	3.60
13,600 lb.	Furn. & placing pipe & fittings for grouting	1.25	0.70
1,220 hook-up	Hook-up to grout holes and connections	12.45	6.00
44,500 sack	Pressure grouting	1.80	2.45
4,700 lin. ft.	Furn. 6-in. diam. perforated sewer pipe and constructing drains with open joints	6.25	3.70
220 lin. ft.	Furn. 12-in. diam. perforated sewer pipe and constructing drains with open joints	9.45	4.50
100 lin. ft.	Furn. and laying 18-in. diam. sewer pipe with caulked joints	0.85	5.20
4,500 lin. ft.	Drilling drainage holes	3.75	3.00
72,500 lin. ft.	Drilling holes for anchor bars & grouting bars in place.	1.15	1.30
126,000 barrel	Furn. and handling cement.	5.50	6.00
7,560,000 lb.	Furn. & placing reinf. bars.	0.12	0.15
83,000 lb.	Furn. and placing dowels.	0.20	0.22
2,400 cu. yd.	Concrete in grout cap	17.00	24.00
1,400 cu. yd.	Concrete in backfill	15.00	23.00
9,400 cu. yd.	Concrete in spillway walls.	51.00	60.00
2,240 cu. yd.	Concrete in spillway crest and piers	25.00	30.00
20,570 cu. yd.	Conc. in spillway floor slabs	21.00	25.00
290 cu. yd.	Concrete in spillway bridge.	80.00	105.00
190 cu. yd.	Concrete in auxiliary outlet-works intake structure & conduit	78.00	90.00
2,290 cu. yd.	Concrete in auxiliary outlet-works tunnel lining	64.00	54.00
250 cu. yd.	Concrete in auxiliary outlet-works gate chamber	87.00	100.00
410 cu. yd.	Concrete in lining of access shaft and access tunnels.	97.00	87.00
10,400 cu. yd.	Concrete in outlet-works tunnel lining	34.00	40.00
1,180 cu. yd.	Concrete in outlet-works gate structure	47.00	66.00
1,380 cu. yd.	Concrete in outlet-works gate shaft lining	50.00	52.00
6,500 cu. yd.	Concrete in outlet-works intake below elevation 5766	20.00	25.00
2,250 cu. yd.	Concrete in outlet-works intake bet. elev. 5766 and elev. 5882.5	57.00	56.00
550 cu. yd.	Concrete in outlet-works intake struc. above elev. 5882.5	121.00	100.00
270 cu. yd.	Concrete in control house, tunnel access house, valve house, piezometer terminal well, and catch basin	158.00	100.00
5,510 cu. yd.	Concrete in div. channel & oullet-works stilling basin	36.00	43.00
140 cu. yd.	Concrete in walkway supports and pipe piers	76.00	85.00
25 cu. yd.	Concrete in encasement for 30-in. diam. pipe	108.00	109.00
4,660 cu. yd.	Second-stage concrete	20.00	30.00
50 cu. yd.	Concrete in blockouts	107.00	139.00
150 sq. ft.	Furn. & placing ¾-in. elastic joint filler in spillway bridge	1.20	3.00
140 sq. ft.	Furn. & placing 1-in. elastic joint filler in spillway bridge	1.35	3.50
430 lin. ft.	Furn. & placing rubber waterstops, type A	4.80	2.70
9,230 lin. ft.	Furn. & placing rubber waterstops, type B	3.70	1.30
120 lin. ft.	Furn. & placing rubber waterstops, type H	4.50	1.30
260 lin. ft.	Furn. & placing metal seals.	3.80	2.40
3,750 lin. ft.	Furn. & placing metal waterstops	4.70	2.70
30 cu. yd.	Removal of concrete	185.00	30.00
1,660 lin. ft.	Saw cutting 2-in. deep grooves in concrete	1.25	0.70
145 sq. ft.	Furn. & install. industrial-type steel swinging doors	7.00	10.00
190 sq. ft.	Furn. & installing steel rolling door	7.07	6.50
60 sq. ft.	Furn. & installing steel windows	5.50	7.00
1,870 sq. ft.	Furn. & placing roofing	0.50	1.00
615 lin. ft.	Furn. & erecting cham-link fence	5.00	3.60
3,580 sq. ft.	Furn. & install. insulation.	0.80	1.40
500 lin. ft.	Boring holes for foundation-type piezometers	5.00	7.00
52 piezmtr.	Installation of piezometers	450.00	220.00
Lump sum	Completion of piezometer terminal well	2,950.00	3,600.00
52 unit	Installing internal vertical movement units	40.00	40.00
5 unit	Installing internal horizontal movement units	1,400.00	80.00

UGH GROUND DOESN'T STOP
IS RUBBER-TIRE EXCAVATOR!

How
ORAIN SP-107
ks off-the-highway travel:

- scillating, spring-mounted front axle
- ugs the ground for maximum traction
- o hang-up . . . no wheel spin
- owerful, 4-wheel drive

l now, Self-Propelled, rubber-tire el-cranes were restricted pretty h to smooth, hard-ground travel. , the 3/8-yd. Lorain SP-107 is lable — to move right in over the rh, soft-ground conditions that off-the-highway on most hoe, el and dragline jobs.

rain put a powerful, 4-wheel e carrier under the hydraulic-rolled turntable and then added scillating, spring-mounted front . Result? Vastly improved off-the-way travel. Front wheels hug the nd and the 4-wheel drive carries SP-107 where self-propelled ma-es could not go before . . . hang-nd wheel spin are no problems. here *maximum* lifting capacity eeded, the front spring action can uickly "locked out" to give solid axle, full 7-ton crane capacity over front, rear or sides, without setting outriggers.

This "go anywhere" rubber-tire shovel-crane combines mobility, maneuverability and tractive power to get in to the job . . . get it done in a hurry . . . and get out fast . . . to hustle down street or highway to next job.

There is more you should know about the SP-107 . . . features such as: fast, easy-acting hydraulic clutch controls; the optional 4-wheel steering; the exclusive, lighter, yet stronger, square-tubular-chord crane boom. And best of all, the surprisingly low cost for such Lorain quality.

See your Thew-Lorain Distributor . . . and check, too, on-the-spot parts and service facilities that are such plus values when you buy Lorain!

Notice how wheels on the oscillating, spring-mounted front axle of the SP-107 hug the rough terrain . . . keep powerful, 4-wheel traction at work.

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Spokane, Wash.

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Salt Lake City, Utah

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eat Falls, Havre and Lewistown, Mont.

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INTERSTATE TRACTOR & EQUIPMENT CO.
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MOUNTAIN TRACTOR CO.
Missoula and Kalispell, Mont.

NASH-DAVIS MACHINERY CO.
egs and Bozeman, Mont.; Greybull, Wyo.

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LEE REDMAN EQUIP. CO.
Phoenix, Arizona

SANTA FE EQUIPMENT CO., INC.
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SOUTHERN IDAHO EQUIPMENT CO.
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43 point	Constructing surface settlement points	10.00	11.00
Lump sum	Furnishing and installing trashrack metalwork	85,000.00	114,000.00
Lump sum	Installing stop logs	2,900.00	6,700.00
17,400 lb.	Installing seats and guides for stop logs	0.18	0.09
13,400 lb.	Install. embedded metalwork	0.28	0.54
46,400 lb.	Install. nonembedd. metalwk.	0.22	0.40
1,600,000 lb.	Installing outlet pipes	0.05	0.11
Lump sum	Install. fixed-wheel gate frame, including anchorage	7,300.00	11,000.00
Lump sum	Install. fixed-wheel gate	10,000.00	8,000.00
Lump sum	Install. hoist for fixed-wheel gate	10,000.00	6,500.00
Lump sum	Install. elliptical intake bulkhead	6,700.00	9,000.00
Lump sum	Install. tandem outlet gate	3,500.00	2,700.00
Lump sum	Install two 72-in hollow-jet valves	7,500.00	13,000.00
Lump sum	Install. one 30-in. ring-follower gate	1,100.00	2,100.00
Lump sum	Install. hydraulic control system for two 72-in. hollow-jet valves and two 72-in. ring-follower gates	2,600.00	5,000.00
Lump sum	Install. hydraulic control system for one 30-in. hollow-jet valve and one 30-in ring-follower gate	2,600.00	2,000.00
Lump sum	Install. hydraulic control system for 4-ft. by 4-ft. tandem outlet gate	2,600.00	1,100.00
Lump sum	Install. hydraulic control system for 6-ft. by 13-ft. fixed-wheel gate	2,600.00	4,100.00
Lump sum	Furn., install. & operating 36-in. diam. slide gate & lift	1,700.00	1,400.00
Lump sum	Install. reservoir level recorder & float-well inlet piping	3,800.00	1,500.00
92,000 lb.	Install. piping for air inlets, float well, vent, tunnel plug bypass and drains	0.25	0.08
21,000 lb.	Install. ventilating system	0.80	0.50
16,500 lb.	Install. ice-prev. air system	0.80	0.60
3,600 lin. ft.	Furn. & install. elec. met. conduit ¾-in. or less in diam.	1.25	2.40
350 lin. ft.	Furn. & install. elec. met. conduit 1-in. in diam.	1.80	3.00
1,850 lin. ft.	Furn. & install. elec. met. conduit 1 & ½ in. in diam.	2.50	4.20
100 lin. ft.	Furn. & install. elec. met. conduit 2-in. in diam.	3.75	5.40
100 lin. ft.	Furn. & install. elec. met. conduit 2 & ½ in. in diam.	5.00	7.50
2,800 lb.	Furn. & install. insulated electrical conductors	3.75	2.40
220 lb.	Furn. & install. grounding system materials	3.75	3.60
1,800 lb.	Install. electrical apparatus	1.85	1.80
6 fixture	Install. Type A lighting fix.	12.50	30.00
26 fixture	Install. Type B lighting fix.	18.50	30.00
10 fixture	Install. Type C lighting fix.	25.00	30.00
5 fixture	Install. Type D lighting fix.	62.00	30.00
4 fixture	Install. Type E lighting fix.	75.00	30.00
145 device	Furn. and installing wiring devices	12.00	40.00
6 structure	Furn. & constructing Type I structure with 40-ft. pole.	185.00	300.00
2 structure	Furn. & constructing Type II structure with 40-ft. pole.	185.00	420.00
4 guy	Furn. & const. single guys.	50.00	70.00
2 guy	Furn. & const. double guys.	100.00	150.00
2 anchor	Furn. & placing plate or cone guy anchors	25.00	90.00
2 anchor	Furn. & placing grouted guy anchors	25.00	180.00
1,200 lin. ft.	Furn., stringing. & sagging three No. 1 AWG, ASCR weather-resistant conductors	1.00	1.20
1,200 lin. ft.	Furn., stringing & sagging 9-conductor control cable with messenger strand	1.25	3.00
120,000 cu. yd.	Excavation for roadway	0.90	0.86
2,700 M gal.	Watering	2.50	2.40
400 roller br.	Rolling embankments	14.50	14.00
700 cu. yd.	Excavation for culverts	3.60	3.60
2,100 cu. yd.	Compacted backfill	2.20	2.10
500 sq. yd.	Dry-rock paving	4.90	4.80
134 lin. ft.	Furn. & laying 18-in. diam. No. 16-gage corr. metal pipe	6.00	6.00
200 lin. ft.	Furn. & laying 30-in. diam. No. 14-gage corr. metal pipe	11.00	11.00
134 lin. ft.	Furn. & laying 42-in. diam. No. 12-gage corr. metal pipe	20.00	20.00
226 lin. ft.	Furn. & laying 60-in. diam. No. 10-gage corr. metal pipe	35.00	34.00
74 lin. ft.	Furn. & erecting 138-in. diam., seven No. 10-gage, one No. 8-gage multiple-plate corrugated metal pipe	138.00	140.00
800 lin. ft.	Furn. & erecting beam-type guardrail	6.00	6.00
12 section	Furn. & attaching beam-type guardrail end sections	8.00	7.00
440 post	Furn. & setting guide posts	11.00	11.00
2 unit	Furn. & const. combination cattle guard and metal fence gate	8,600.00	3,600.00
0.75 mi.	Furn. & const. right-of-way fence	3,200.00	3,200.00
21,000 ton	Crushed-rock base	2.40	2.15
2,550 ton	Cover-coat material	7.20	7.20
110 ton	Liquid asphalt MC-2	75.00	75.00
95 ton	Liquid asphalt MC-4	75.00	75.00

HIGHWAY—Grading and paving in Oregon

Oregon — Wallowa County — State. A $542,665 contract has been awarded to F. L. Somers for grading and paving on a section of the Wallowa Lake highway.

(1) F. L. Somers $542,665
(2) Central Paving Co. and G. D. Dennis & Sons..... 527,189
McNutt & Sons, Inc. 523,902
Natt McDougall 666,375

		(1)	(2)
Lump sum	Clearing and grubbing	$17,500.00	$24,000.00
500 cu. yd.	Drainage excav. unclassified	3.00	3.00
344,600 cu. yd.	General excav. unclassified	.50	.46
633,000 yd. sta.	Short overhaul	.01	.01
5,500 yd. sta.	Long overhaul	.50	.50
7.60 mi.	Finishing roadbed and slopes	750.00	500.00
18,800 lin. ft.	Rounding cutbanks	.20	.20
700 lin. ft.	18-in. corrugated metal pipe	5.00	4.25
380 lin. ft.	24-in. corrugated metal pipe	7.00	5.30
14 lin. ft.	36i-n. corrugated metal pipe	15.00	16.00
12 lin. ft.	60-in. corrugated metal pipe	25.00	35.00
280 lin. ft.	12-in. concrete pipe	2.50	2.40
640 lin. ft.	18-in. concrete pipe	5.00	4.50
110 lin. ft.	24-in. concrete pipe	6.00	6.50
170 lin. ft.	36-in. concrete pipe	10.00	10.00
60 lin. ft.	7 ft. - 0 in. x 5 ft. - 1 in. structural plate pipe arch, 12 gage	60.00	60.00
240 lin. ft.	Salvaging culvert pipe	2.00	2.00
6,400 lin. ft.	Metal guard rail	2.60	2.54
Cont. sum (200)	Metal sight posts	3.00	2.50
56,800 cu. yd.	Coarse crushed material in base	1.85	1.50
9,500 cu. yd.	¾ in. - 0 material in base	1.85	1.60
2,500 M gal.	Sprinkling	2.00	1.50
7.60 mi.	Preparation of base	300.00	200.00
880 cu. yd.	¾ in. - 0 mat. in binder course	3.00	3.00
145 ton	MC-2 asphalt	50.00	49.00
23,000 ton	Asphaltic concrete mixture	3.65	4.45
1,380 ton	85-100 asphalt in mixture	40.00	39.50
Cont. sum (30)	Extra for asphaltic concrete approaches	25.00	30.00
1,600 rods	Type 1 fence	5.00	5.00
470 rods	Type 2 fence	5.00	6.75
Cont. sum (10)	14 ft. x 48 in. metal gates	100.00	150.00
1,200 cu. yd.	½ in. - ¾ in. crushed material in stockpile	2.50	2.75
1,800 cu. yd.	¼ in. #10 crushed material in stockpile	2.50	2.75

HIGHWAY—.6 mi. in California

California—Stanislaus and San Joaquin counties—State. Stolte, Inc. has received a $439,837 contract for .6 mi. to be graded and surfaced, and for construction of two bridges.

(1) Stolte, Inc. $439,837
(2) Thomas Construction Co. 443,956
Lew Jones Construction Co. 452,959
Lord & Bishop, Inc. 459,640

		(1)	(2)
Lump sum	Remove exist. bridge (dry slough)	$ 2,000.00	$ 2,000.00
Lump sum	Remove exist. bridge (Stanislaus River)	3,000.00	2,000.00
Lump sum	Remove exist. bridge (irrigation canal)	1,000.00	2,000.00
Lump sum	Clear and grub	10,000.00	29,600.00
Lump sum	Dev. wat. sup. & furn. wat. equip.	3,000.00	10,000.00
1,000 M gal.	Applying water	.20	1.50
7,200 cu. yd.	Roadway excavation	.55	.35
11,880 sq. yd.	Comp. original ground	.05	.055
580 cu. yd.	Structure excav., Type A	20.00	4.00
695 cu. yd.	Structure excavation	2.75	2.00
400 cu. yd.	Structure backfill	4.50	3.00
9,200 cu. yd.	Imported borrow	.70	.45
3,510 ton	Untreated base	1.60	1.50
13 ton	Liquid asphalt, SC-2 (prime coat)	30.00	40.00
70 ton	Paving asphalt (P.M.S.)	5.10	4.90
1,404 ton	Mineral aggregate (P.M.S.)	5.10	4.90
1,015 lin. ft.	Placing P.M.S. dikes	.30	.25
10 ton	Asphaltic emulsion (pt. bdr. & sl. ct.)	40.00	50.00
79 ton	Screenings (medium fine seal coat)	6.00	8.00
94 cu. yd.	Class A concrete (structures)	65.00	60.00
180 cu. yd.	Class A conc. (footing block)	35.00	20.00
	Class A concrete (bridges) (2,745 C. Y.)	145,310.00	151,000.00
9,350 lb.	Bar reinforcing steel	.16	.15
	Bar reinforcing steel (bridges) (735,000 lbs.)	96,294.00	100,000.00
2,015 lin. ft.	Furnishing concrete piling	3.80	4.00
256 ea.	Driving piles	155.00	89.00
6,300 lb.	Misc. iron and steel	.25	.30
3,008 lin. ft.	Metal beam bridge railing	6.75	6.00
380 lin. ft.	Metal beam guard railing	5.00	4.60
17 cu. yd.	Class B concrete (curbs)	55.00	40.00
40 ea.	Guide psts. & culvert markers	6.00	7.00
2,002 lin. ft.	New property fence	.80	.50
1 ea.	14-ft. property fence gate	55.00	65.00
20 lin. ft.	10-in. C.M.P. (16 gage)	3.00	3.40
234 lin. ft.	18-in. C.M.P. (16 gage)	4.50	4.00
3 ea.	Spillway assemblies	35.00	40.00
170 lin. ft.	8-in. C.M.P. downdrains	2.25	2.30
3 ea.	Downdrain slip joints	30.00	25.00
16 ea.	Downdrain pipe anchors	28.00	25.00
17 lin. ft.	Raised traffic bars	2.00	3.00

CLASSIFIED

Rates are $15.50 a column inch. Copy should be sent in by the 15th of month preceding publication date.

EMPLOYMENT

Space is sold as advertisers' inches. All advertisements in this section are ⅛ in. short of contracted space to allow for borders and composition.

FOR SALE & RENT

Oliver announces Western personnel changes

After 40 years in the heavy equipment business, H. W. Trittipo is retiring from The Oliver Corporation. Originally employed in 1917 by the Cleveland Tractor Co., "Tritt" has been industrial representative with headquarters in Oakland, Calif., since 1944 when Oliver purchased the Cleveland Tractor Co. It is also announced that W. H. Lawrence is the newly appointed sales promotion manager for the Oakland and Los Angeles branches, making his headquarters in Oakland. Another recent Oliver appointment is that of Laudell M. Fountain of the Los Angeles office who has been named industrial representative in California, Arizona and Nevada. He will maintain offices both in Los Angeles and in Oakland.

Seaman-Andwall elects president

Announcement is made by American-Marietta Co. of the election of John W. Spoor as president of the Seaman-Andwall Corp., Milwaukee, Wis. He fills the vacancy left by the resignation of Kenneth C. Andersen. Seaman-Andwall has three manufacturing plants in the Milwaukee area and has national distribution of construction equipment.

Case promotes Don Beckenbaugh

The promotion of Don A. Beckenbaugh to the newly created position of sales and manufacturing administrator is announced by J. I. Case Co., Racine, Wis. Beckenbaugh started with the Case organization in 1928. His broad experience in practically every phase of the Case operations both in sales and manufacturing wholly qualifies him to handle this new and vital responsibility, according to Marc B. Rojtman, president of J. I. Case Co.

Western appointments by Massey-Ferguson

Recent dealer appointments on an exclusive area basis for Massey-Ferguson Industrial Division, Wichita, Kans., are announced for the following Western states. Oregon: Union County Grange Supply, Island City, and Frank Lane Machinery Co., Eugene. California: Wallace Tractor Sales, Anaheim; Cook Bros. Construction Co., Los Angeles; Glenn B. Dorning, Ontario; Bayshore Tractor & Equipment, Redwood City; Roose & Orlando, San Jose; Knight's Tractor & Equipment Co., Indio; Farm Equipment Center, Inc., Modesto; Granella Tractor Co., Santa Rosa; E. O. Mitchell, Inc., Bakersfield.

Idaho: Starline Equipment Co., Boise. Wyoming: York's Shop, Sheridan. Utah: Lund Machinery Co., Salt Lake City, and Thompson Lumber & Hardware Co., Ogden. Colorado: McCrory Oil Co., Canon City; Modern Farm Service, Inc., Berthoud; Simmerman Construction Equipment Co., Denver. New Mexico: Durand Tractor & Equipment Co., Albuquerque. Arizona: Trimble Equipment Co., Phoenix.

Victor Holland named No. California sales supervisor

Victor Holland has been appointed Northern California and Reno, Nev., sales supervisor for Pacific Mercury generators and flasher lights. He will headquarter at 923 Northrup Ave., San Jose, Calif. For the past five years, Holland has been supervisor of industrial sales for Frank Edwards Co., a central distributor. Prior to that he was an engineer for Guy F. Atkinson Co.

Alaska appointment by Insley Mfg. Co.

Announcement is made of the appointment of Western Tractor & Equipment Co. of Alaska as Insley distributor for the new state. Western Tractor has offices in Seattle, Wash., as well as at Anchorage and Fairbanks.

ADVERTISERS in this issue

BACKFILL, uncompacted

Forecast: Windy with chance of brainstorms

Anyone who has ever driven a car on an open highway knows that a strong wind can make safe driving difficult. It bounces the car around and blows debris onto the road. In the desert regions of the West, wind is a particularly troublesome traffic problem because it is often mixed with sand. Wind-driven sand blasts away your paint, pits your windshield, fouls up your engine, gets in your flask.

This very problem exists west of Indio, Calif., on Highway 60, where the wind is hard and the sand is loose. Fortunately, according to the Riverside Daily Enterprise, somebody is finally talking about doing something about it. A high school teacher turned the problem over to his sophomore class. He described to them the great damage that was being done to automobiles by natural sand-blasting on the road to Indio. He said that something must be done. He asked them to write down the first suggestion that came to their minds. Here are a few of the responses:

"Tell everyone to toss their beer cans on the desert. Enough of them would cover the sand."

"Don't go to Indio."

"Build a town there. Grass and pavement would hold the sand down."

"Use the old road."

"Build a clear glass or plastic tunnel."

"You can't prevent it. Whatever you do you cannot prevent it . . ."

". . . mix cement with the sand . . ."

"I just don't know."

"Make a plastic dome that would fit over the car . . . and have a station to collect them and rent them out at each end."

"Get an old car for driving on this stretch."

"Put lakes there."

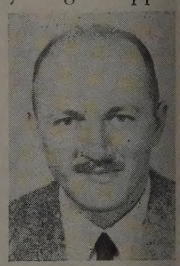
"Next time take the train."

Suggestions like these, made under the strict rules of brainstorming, which encourage outlandishness, usually reveal more about the people offering them than the problem being considered. In the present case it would be interesting to follow the students quoted above to see what they become in later life. Surely the one who said, "Put lakes there," will reach a high post in the Bureau of Reclamation, and the one who said, "I just don't know," will become a specification writer.

Domagalski is back

With the cartoon on this page we are starting another series of cartoons by Hank Domagalski. His first cartoon was published in WESTERN CONSTRUCTION over eight years ago, when he was in charge of placed rock at the Bear River Dam in California. "Down-time" has appeared nearly every month since then, with several interruptions of six months or so when foreign assignments on round-the-clock projects interfered with his artistic output.

He is not the world's greatest artist, or even the second greatest, but his thorough familiarity with construction problems in the field makes him a perfect contributor for our pages. His cartoons have an uncanny ability to get clipped out and stuck on job office bulletin boards. His name probably appears oftener on the walls of Western project offices than the boss at the home headquarters, the State Highway Engineer, or the Secretary of the Interior.



After World War II (during which he made 65 combat missions in 4-engine bombers) Hank took a degree in mechanical engineering at California Polytechnic and joined Utah Construction Co. His first field assignment was the Bear River job, which he says was a "bath of fire." Next was a stint with McCammon-Wunderlich as project engineer on a highway contract, followed by rejoining Utah for a mining project in Peru as assistant super. He's been an engineer and superintendent for Utah ever since on such jobs as an iron ore beneficiation plant in British Columbia and a uranium mill in Wyoming. His wife and two children travel with him wherever he goes.

Hank likes construction, not only because he and his family enjoy the constant change of scenery, but because you can see and measure the results of your work.

Cartoons? He draws them because he believes that a laugh is essential for the proper perspective in construction as in any other serious business. The same reason we print them.

. . . The Editors

Down-time . . . . . By Domagalski

"Let's call it a day."

Western Construction